Agricultural Education Curriculum Enhancements
Volume II

Writers:

Craig W. Gladney and Philip A. Leslie
Instructional Materials Laboratory
University of Missouri-Columbia

Marshall R. Swafford and Lizzi M. Wilkinson
Agricultural Education
University of Missouri-Columbia

Senior Coordinator: Erica J. Kassel
Editor: Janis L. Levsen
Graphic Designer: Christopher J. Benedict
Computer Graphic Artist: Jacqueline M. Craig
Instructional Materials Laboratory
University of Missouri-Columbia

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Instructional Materials Laboratory
University of Missouri-Columbia
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Columbia, MO 65211

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Paula Bodenhamer, Dora R-III High School
Alicia Corson, Fatima High School
Callie Dobbins, Saline County Career Center
Dan Hill, Sweet Springs R-VII High School
Sam Lower, Lebanon Technology and Career Center
Eugene Meyer, Sarcoxie R-II High School
Jennifer Pantry, Schuyler R-I High School
Steve Rogers, Meadville High School
Johnny Viebrock, Smithville R-II High School

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Introduction

The agricultural education curriculum enhancement project was initiated to develop performance-based assessment activities to assist Missouri instructors and students of agriculture in meeting Missouri School Improvement Program (MSIP) standards. The project was unique in that the enhancement activities, while representing new material, were designed to complement and expand upon material instructors were already using.

Each enhancement corresponds to a unit in the existing agricultural curricula and consists of the following parts: a summary page that describes the performance-based assessment activity contained in the enhancement, along with helpful references and strategies and activities in the existing unit that prepare the student for the enhancement activity; an Instructor Guide and Student Handout that provide step-by-step instructions for a performance-based assessment activity that brings together principal unit objectives; and a Scoring Guide that indicates, in detail, the areas being assessed by the activity and the criteria used for assessment and includes spaces for the student's score and additional comments or explanations from the instructor. (For a more detailed explanation of the individual parts of the enhancement, see the Components section, which follows this section.)

Because they build on existing curricula and are designed to work with the instructor's individual teaching strategies, one of the key attributes of the enhancements is their adaptability. The importance of this feature was established during the development process and carries through all aspects of the enhancements in several ways.

First, the enhancements were designed to be flexible as they are currently written. Procedural steps in the Instructor Guide and Student Handout are clear and thorough but not limiting. For instance, a step in the Instructor Guide might indicate that students should incorporate a visual element into an oral report. The step will include suggestions, such as illustrations, a handout, a slide show using presentation software, or some combination of these or other elements, but it is left to the instructor to specify which of these he or she prefers. Likewise, the criterion in the Scoring Guide that corresponds to this aspect of the assessment will be written "Supporting materials emphasize and clarify key points," rather than as a list of a particular kind and quantity of supporting visual elements that the instructor may not want to use. This allows the instructor to more easily guide the activity in a particular direction and to narrow or expand the scope of the activity based on his or her particular requirements. It also encourages the students to apply their creativity to the development of the project.

Second, a number of the activities can be used or adapted for more than one unit. This can be done in two ways. Some activities can be used as they are written to assess student performance in other units. For example, the performance-based assessment activity for Unit IX, Entrepreneurship, of the *Agribusiness Sales, Marketing, and Management* curriculum guide can be used without modification in place of the assessment activity for Unit III, Planning the Farm Business, of the *Agricultural Management and Economics* curriculum guide. Other activities involve a project that can be readily tailored to another unit, such as the performance-based assessment activity for the *Introduction to Swine Production* unit, which is to design a time line that follows the animals from conception to retail. By changing the references and substituting relevant management practices, this activity can be used as the assessment for the *Introduction to Sheep Production* unit. A cross-reference chart is included with the assessments that gives a list of all units, a brief description of their current performance-based assessment activity, and the location of other activities that can be used or adapted for that unit.

And finally, because the enhancements are made available by compact disc, any activity can easily be copied to a separate file and rewritten or adjusted by the instructor while still maintaining the original file unaltered. This allows the instructor the freedom to not only adapt one performance-based activity from one unit to another, but also to change specific aspects within the activity to make it more responsive to his or her needs and the needs of the students. In the Scoring Guide, for instance, the total point value of the assessment can be changed, the weight of any assessment area can be increased or decreased, and criteria can be modified, added, or removed.

It is very important to note, however, that if the instructor does change the activity in any way, whether by using the activity from one unit as the performance-based assessment for another unit or by making changes within the activity, the Show-Me Standards, the References, and the Scoring Guide, as well as the other aspects of the enhancement as it is currently written, may no longer apply. This can be true of even seemingly small adjustments. If the instructor does make any changes to a performance-based assessment activity, he or she should thoroughly review the entire activity for accuracy and suitability and make any additional adjustments these changes necessitate prior to assigning the activity to students.

It is also important to note that the performance-based assessment activities are not a replacement or alternative for activities, assessments, and competencies found in the unit or for more comprehensive activities that address the curriculum guide as a whole, such as the projects completed for the Agricultural Construction and Agricultural Structures classes. Students must complete all required competencies and should only complete the performance-based

assessment activities if they have mastered all the relevant competencies and have the instructor's permission.

These enhancements were designed to be precise, flexible, and functional. All of us who worked on this project sincerely hope that the instructors and students who use them will find them to be a practical and engaging addition to the agricultural curriculum.

Components

Curriculum Guide: This indicates the existing curriculum guide for which the curriculum enhancement was designed. The instructor will need the curriculum guide to complete the curriculum enhancement activity.

Unit: The Unit gives the name and number of the unit within the curriculum guide that the enhancement was designed to assess.

Unit Objective: The Unit Objective indicates what the students should accomplish by completing the unit. The students' mastery of these skills and concepts will be measured by their performance on the performance-based assessment activity contained within the curriculum enhancement.

Show-Me Standards: The Show-Me Standards lists the learner objectives assessed by the enhancement activity. Each enhancement contains a performance-based assessment activity that directly addresses at least one "performance" standard and one "knowledge" standard, although it is possible that the activity addresses other standards as well. Only the most relevant standards are listed.

References: This is the complete bibliographic information for the curriculum guide, as well as other books, web sites, or other reference material used to develop the enhancement or which the instructor or student might find useful to complete the enhancement activity.

Instructional Strategies/Activities: These are activities and strategies already in place in the curriculum. The strategies and activities listed were chosen because they relate directly to the curriculum enhancement activity. There may be additional activities and strategies within the curriculum guide that relate to the overall objectives of the unit.

Performance-Based Assessment: This is a summary of the performance-based assessment activity. It also includes a brief description of the assessment areas addressed by the activity.

Instructor Guide: The Instructor Guide includes step-by-step instructions for administering the performance-based assessment activity. It also includes suggestions and references the instructor may find useful, as well as brief descriptions of the assessment areas addressed by the activity and the criteria used for assessment.

Additional Activities: Following the steps for administering the performance-based assessment activity, some Instructor Guides have a step labeled "Additional Activities." These are activities and strategies that were written by the IML development staff or suggested by committee members based on their classroom experience. Some are suggestions for teaching aids or discussion topics; others are ideas for student activities. Although their purpose is to help students meet the overall objectives of the unit, these activities and strategies were not developed specifically as performance-based assessment activities and should not be used as alternate performance-based assessment activities in their current form.

Student Handout: This is the student's guide to completing the performance-based assessment activity. It is based directly on the Instructor Guide, minus the instructor's directions for conducting the assessment.

Scoring Guide: The Scoring Guide indicates, in detail, the areas being assessed by the activity, the criteria used for assessment, and each area's weight relative to one another and to the activity as a whole. It also includes an area for the student's score and a space for additional comments or explanations from the instructor. Blank Scoring Guides may be handed out to students prior to the activity to identify the assessment criteria in detail, or Scoring Guides may be completed and distributed to the students following the activity, depending on the instructor's preference.

Contents

Performance-based assessment activities are included in this packet for the following units within curricula.

Agricultural Construction Volume II

Unit II. Oxy-Gas and Other Cutting/Welding Processes
Unit III. Woodworking
Unit IV. Metals
Unit V. Finishing

Agricultural Construction Volume III

Unit I. Oxy-Gas and Other Cutting/Welding Processes (Arc and Plasma Cutting)
Unit II. Arc Welding (Gas Metal Arc Welding)
Unit III. Arc Welding (Gas Tungsten Arc Welding)

Agricultural Structures

Unit I. Working With Plans
Unit II. Home and Farmstead Planning
Unit III. Building Construction
Unit IV. Concrete
Unit V. Electricity
Unit VI. Plumbing
Unit VII. Fencing

Biotechnology: Applications in Agriculture

Unit I. Introduction to Biotechnology
Unit II. Issues in Biotechnology
Unit III. Basic Laboratory Skills
Unit IV. Foundations of Genetic Engineering
Unit V. Animal Technologies
Unit VI. Plant Technologies

Floristry

Unit I. Floristry Industry
Unit II. Plant Identification
Unit III. Post-Harvest Handling
Unit IV. Mechanics of Floral Design
Unit V. Basic Principles of Floral Design
Unit VI. Types of Designs
Unit VII. Shop Operations

Food Science and Technology

Unit I. Principles of Food Preservation
Unit II. Food Processing
Unit III. The Biochemistry of Foods
Unit IV. Food Selection and Consumer Health

Greenhouse Operation and Management

Unit I. The Greenhouse Industry
Unit II. Growing Structures
Unit III. Plant Science Basics
Unit IV. Plant Growth
Unit V. Plant Propagation
Unit VI. Plant Health
Unit VII. Greenhouse Business Management

Small Engine Service and Repair

Module 1. Installing a Magnetron Ignition and Breaker Points
Module 2. Carburetor Service and Repair
Module 3. Rewind Starters
Module 4. Small Engine Compression
Module 5. Governor Adjustment and Repair
Module 6. Lubricating Small Engines
Module 7. Troubleshooting
Module 8. Operation and Maintenance of Small Engines

Cross-Reference Chart for Adapting Performance-Based Assessments

NOTE: This table includes performance-based assessments from volumes I and II of *Agricultural Education Curriculum Enhancements*.

Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Agricultural Science I		
Careers I	Write a report on three different occupations	• *Agribusiness Sales, Marketing, and Management*—Agriculture as an Industry, Personal Development • *Career and Personal Development for Plant Science Core Curriculum* • *Floristry*—Floristry Industry • *Greenhouse Operation and Management*—The Greenhouse Industry • *Leadership and Personal Development*—Leadership and Personal Development for Advanced Students
Introduction to Animal Reproduction	Create a poster on advantages and disadvantages of a common breeding method	• *Advanced Livestock Production and Management*—Breeding, Parturition • *Animal Science*—Animal Health, Reproduction • *Introduction to Beef Production*
Introduction to Agricultural Business	Create an advertisement for an SAE	• *Agribusiness Sales, Marketing, and Management*—Financial Management • *Agricultural Management and Economics*—Economic Principles in Agriculture • *Floristry*—Shop Operations • *Introduction to Specialty Animal Production*
Introduction to Beef Production	Present an oral report that compares and contrasts management options applied by beef producers	• *Advanced Livestock Production and Management*—Selection, Parturition, Animal Health, Herd/Flock Management • *Animal Science*—Reproduction • *Equine Science* • *Exploring Agriculture in America*—Animals in Society • *Introduction to Specialty Animal Production* • *Introduction to Swine Production* • *Sheep Production*

* Most PBAs will require some modifications based on the unit topic and content.
** PBA may be used without any modifications.

Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Introduction to Poultry Production	Design, organize, and participate in a mini Poultry CDE	• *Advanced Livestock Production and Management*—Enterprises, Animal Health, Facilities and Equipment, Herd/Flock Management • *Equine Science* • *Introduction to Beef Production* • *Introduction to Dairy Production* • *Introduction to Specialty Animal Production* • *Introduction to Swine Production* • *Sheep Production*
Sheep Production	Present an oral report on breed characteristics, management practices, and health issues of a given breed of sheep	• *Advanced Livestock Production and Management*—Animal Health, Enterprises, Selection, Breeding, Parturition, Herd/Flock Management • *Animal Science*—Reproduction, Animal Health • *Equine Science* • *Exploring Agriculture in America*—Animals in Society • *Introduction to Beef Production* • *Introduction to Swine Production*
Equine Science	Design a health maintenance, hoof care, and feeding plan for a horse	• *Advanced Livestock Production and Management*—Animal Health, Enterprises, Selection, Breeding, Parturition, Herd/Flock Management • *Animal Science*—Reproduction, Animal Health • *Exploring Agriculture in America*—Animals in Society • *Introduction to Beef Production* • *Introduction to Swine Production* • *Sheep Production*
Introduction to Specialty Animal Production	Present a sales pitch on a specialty animal	• *Advanced Livestock Production and Management*—Animal Health, Enterprises, Selection, Breeding, Parturition, Herd/Flock Management • *Animal Science*—Reproduction, Animal Health • *Exploring Agriculture in America*—Animals in Society • *Introduction to Beef Production* • *Introduction to Swine Production* • *Sheep Production*

* Most PBAs will require some modifications based on the unit topic and content.
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Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Introduction to Animal Products	Identify the species, wholesale cuts, and retail cuts of meat	*Exploring Agriculture in America*—Introduction to Agriculture
Introduction to Dairy Production	Create a poster on the layout and parts of a dairy operation	• *Advanced Livestock Production and Management*—Animal Health, Enterprises, Selection, Breeding, Parturition, Herd/Flock Management • *Animal Science*—Reproduction, Animal Health • *Exploring Agriculture in America*—Animals in Society • *Introduction to Beef Production* • *Introduction to Swine Production* • *Sheep Production*
Introduction to Swine Production	Prepare a time line of a pig's life from conception to retail	• *Advanced Livestock Production and Management*—Animal Health, Enterprises, Selection, Breeding, Parturition, Herd/Flock Management • *Animal Science*—Reproduction, Animal Health • *Exploring Agriculture in America*—Animals in Society • *Introduction to Beef Production* • *Introduction to Dairy Production* • *Sheep Production*
Introduction to Animal Nutrition	Write a summary that compares and contrasts two similar animal feeds	*Animal Science*—Nutrition
Agricultural Mechanics Unit for Agricultural Science I • Common Hand Tools	Design, organize, and participate in a tool identification contest	*Agricultural Mechanics Unit for Agricultural Science I* and *Agricultural Mechanics Unit for Agricultural Science II*—Common Power Tools
• Common Power Tools	Give a safety presentation for a power tool	*Agricultural Mechanics Unit for Agricultural Science I*—Common Hand Tools
• Woodworking	Construct a woodworking project	• *Agricultural Construction Volume I*—Project Construction • *Agricultural Construction Volume II*—Woodworking
• Tool Sharpening and Reconditioning	Participate in a tool reconditioning contest	None identified

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Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
• Arc Welding	Make common flat position welds as part of a welding contest	• *Agricultural Construction Volume I*—Arc Welding • *Agricultural Mechanics Unit for Agricultural Science II*—Arc Welding
• Oxyfuel Cutting	Make basic cuts as part of a class-wide contest	*Agricultural Construction Volume II*—Oxy-Gas and Other Cutting/Welding Processes
• Painting	Finish a project using paint and a paintbrush	• *Agricultural Construction Volume II*—Finishing • *Agricultural Mechanics Unit for Agricultural Science II*—Painting and Finishing
Agricultural Science II		
Introduction to Grassland Management • Grasslands and Grassland Plants	Create a plant collection from a grassland area	• *Advanced Crop Science*—Plant Biology, Identifying and Selecting Crops and Seeds, Forage Production • *Floristry*—Plant Identification • *Greenhouse Operation and Management*—Plant Science Basics
• Soil Management	Create a chart and present an oral report that analyzes soil test results	• *Advanced Crop Science*—Soil Fertility and Management • *Soil Science*
• Grassland Management Practices	Create a diagram and present an oral report that evaluates a grassland site for its ability to sustain wildlife	None identified
Crop Science	Create, organize, and participate in a mini Agronomy CDE	• *Advanced Crop Science*—Plant Biology, Identifying and Selecting Crops and Seeds, Forage Production • *Floristry*—Plant Identification • *Introduction to Grassland Management*—Grasslands and Grassland Plants • *Plant Science*
Plant Science	Conduct a seed germination experiment and write a summary on findings	• *Advanced Crop Science*—Plant Biology • *Greenhouse Operation and Management*—Plant Growth, Plant Propagation
Career and Personal Development for Plant Science Core Curriculum	Write a personal development plan	• *Agribusiness Sales, Marketing, and Management*—Personal Development, Agriculture as an Industry • *Careers I*

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Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Entomology	Create a collection of insects found in Missouri	*Floristry*—Plant Identification
Soil Science	Create a table that analyzes how soil composition relates to fertility and soil management	• *Advanced Crop Science*—Soil Fertility and Management • *Introduction to Grassland Management*—Soil Management
Fruit and Vegetable Production	Develop a calendar for cultivating and harvesting fruits and vegetables	• *Advanced Crop Science*—Plant Biology • *Introduction to Grassland Management*—Grasslands and Grassland Plants
Agricultural Mechanics Unit for Agricultural Science II • Common Power Tools	Give a safety presentation for a power tool	*Agricultural Mechanics Unit for Agricultural Science I*—Common Hand Tools
• Arc Welding	Make out-of-position welds as part of a welding contest	• *Agricultural Construction Volume I*—Arc Welding • *Agricultural Mechanics Unit for Agricultural Science I*—Arc Welding
• Oxyacetylene Welding	Make basic welds as part of a class-wide contest	*Agricultural Construction Volume II*—Oxy-Gas and Other Cutting/Welding Processes
• Tool Sharpening and Reconditioning	Participate in a tool reconditioning contest	None identified
• Cold Metal Work	Construct a metalworking project	*Agricultural Construction Volume II*—Metals
• Material Selection, Plan Reading, and Interpretation	Devise a plan of procedure, cutting list, and bill of materials for a project	*Agricultural Structures*—Working With Plans
• Painting and Finishing	Paint a project using air spray or airless spray equipment	• *Agricultural Construction Volume II*—Finishing • *Agricultural Mechanics Unit for Agricultural Science I*—Painting
Animal Science		
Nutrition	Design a balanced feed ration and explain the selection of ration components in a written report	*Introduction to Animal Nutrition*

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Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Genetics	Rank bulls to breed an imaginary herd and explain the placement in a written report	• *Advanced Livestock Production and Management*—Issues in Animal Agriculture, Selection • *Biotechnology: Applications in Agriculture*—Foundations of Genetic Engineering, Animal Technologies
Reproduction	Create a time line on a group of livestock from birth to weaning and present the findings in an oral report	• *Advanced Livestock Production and Management*—Parturition • *Biotechnology: Applications in Agriculture*—Animal Technologies • *Introduction to Animal Reproduction*
Animal Health	Prepare a written checklist and present an oral report on a health management plan for a livestock species	• *Advanced Livestock Production and Management*—Animal Health, Herd/Flock Management • *Equine Science*
Exploring Agriculture in America		
Introduction to Agriculture	Present an oral report that identifies top-producing states for specific agricultural products	• *Agribusiness Sales, Marketing, and Management*—Agriculture as an Industry • *Careers I* • *Exploring Agriculture in America*—Products from Agriculture
Plant Science	Evaluate plants in a plant care contest	• *Advanced Crop Science*—Plant Biology, Identifying and Selecting Crops and Seeds, Forage Production • *Biotechnology: Applications in Agriculture*—Plant Technologies • *Exploring Agriculture in America*—Plant Science • *Floristry*—Plant Identification • *Introduction to Grassland Management*—Grasslands and Grassland Plants** • *Plant Science* **
Animals in Society	Design a poster on a care regimen and budget for a companion or production animal	• *Biotechnology: Applications in Agriculture*—Animal Technologies • *Equine Science*
Products from Agriculture	Design a poster that identifies food and nonfood agricultural products	• *Biotechnology: Applications in Agriculture*—Introduction to Biotechnology • *Introduction to Animal Products*
Natural Resources and Conservation	Present an oral report on an environmental problem and how it could be corrected	*Advanced Crop Science*—Safety, Environment, and Legal Issues
Leadership and Personal Development	Write a report that includes five personal goals and outlines how to reach each goal	*Career and Personal Development for Plant Science Core Curriculum*

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Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Basic Home and Farmstead Safety and Maintenance	Design a home safety checklist	*Agricultural Structures*—Home and Farmstead Planning
Agribusiness Sales, Marketing, and Management		
Agriculture as an Industry	Write a report that describes three different agribusiness job positions	• *Career and Personal Development for Plant Science Core Curriculum* • *Careers I* • *Exploring Agriculture in America*—Products from Agriculture • *Leadership and Personal Development*—Leadership and Personal Development for Advanced Students
Economic Principles in Agribusiness	Produce and present a lesson on an economic principle	*Agricultural Management and Economics*—Economic Principles in Agriculture **
Financial Management	Establish a budget for an SAE	*Agricultural Management and Economics*—Economic Principles in Agriculture
Personal Development	Create a career development and job search plan	• *Agribusiness Sales, Marketing, and Management*—Agriculture as an Industry • *Career and Personal Development for Plant Science Core Curriculum* • *Careers I* • *Leadership and Personal Development*—Leadership and Personal Development for Advanced Students
Communication Skills	Analyze a sales presentation and participate in a class discussion	• *Biotechnology: Applications in Agriculture*—Issues in Biotechnology • *Leadership and Personal Development*—Leadership II
Preparing for a Sale	Write a report that analyzes the sale and use of an agriculture-related product	None identified
Making a Sale	Give a sales presentation on an agriculture-related product	*Introduction to Specialty Animal Production*
Promotional Tools	Create a commercial for an agriculture-related product	• *Floristry*—Shop Operations • *Introduction to Agricultural Business*
Entrepreneurship	Plan, organize, and execute a school-based, fund-raising activity	• *Agricultural Management and Economics*—Planning the Farm Business** • *Greenhouse Operation and Management*—Greenhouse Business Management

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Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Advanced Livestock Production and Management		
Issues in Animal Agriculture	Research a position on the use of biotechnology and participate in a classroom debate on the topic	*Biotechnology: Applications in Agriculture*—Animal Technologies, Issues in Biotechnology**
Enterprises	Give an oral report on the basic resources needed to establish and maintain a livestock enterprise	*Introduction to Dairy Production*
Selection	Judge classes of livestock and prepare written explanations for the judgments	• *Animal Science*—Genetics • *Introduction to Animal Reproduction* • *Introduction to Poultry Production*
Breeding	Present an oral report on factors that affect conception rates and hatchability	None identified
Parturition	Create a birthing checklist on a given species	None identified
Animal Health	Design a poster and handout that outlines symptoms, causes, treatment, and prevention of a livestock health problem	• *Animal Science*—Animal Health • *Equine Science*
Facilities and Equipment	Devise a farm plan for a type of livestock and present an oral report that explains the plan	• *Agricultural Structures*—Home and Farmstead Planning • *Introduction to Dairy Production*
Animal Feeding	Create a display board that explains the feeding options available for a type of livestock	• *Animal Science*—Nutrition • *Introduction to Animal Nutrition*
Herd/Flock Management	Give an oral presentation that explains and demonstrates a management practice	*Animal Science*—Animal Health
Marketing	Write a market plan for two livestock species and include the differences and similarities between the plans	• *Agribusiness Sales, Marketing, and Management*—Promotional Tools • *Introduction to Agricultural Business*
Agricultural Management and Economics		
Economic Principles in Agriculture	Produce and present a lesson on an economic principle	*Agribusiness Sales, Marketing, and Management*—Economic Principles in Agribusiness
Business Management	Present an oral report and lead a class discussion on a factor of business management	*Greenhouse Operation and Management*—Greenhouse Business Management

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Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Planning the Farm Business	Plan, organize, and execute a school-based, fund-raising activity	• *Agribusiness Sales, Marketing, and Management*—Entrepreneurship • *Greenhouse Operation and Management*—Greenhouse Business Management
Operating the Agricultural Business	Create a promotional display for an SAE project or a local business	• *Floristry*—Shop Operations • *Introduction to Agricultural Business*
Developing Programs of Supervised Agricultural Experience		
Developing an SAE Program	Complete a form that describes the design of an SAE	None identified
Using the *Missouri Agricultural Record Book for Secondary Students*	Use sample entries to complete forms in the *Missouri Agricultural Record Book for Secondary Students*	None identified
Analyzing the SAE Program	Complete an FFA State Proficiency Award application	None identified
Leadership and Personal Development		
Leadership I	Interview an FFA member and create a "top 10 list" of membership benefits based on the interview	None identified
Leadership II	Develop, organize, and present a panel discussion on an aspect of FFA	None identified
Leadership and Personal Development for Advanced Students	Create a résumé and a letter of application for a job	*Exploring Agriculture in America*—Leadership and Personal Development
Advanced Crop Science		
Overview	Present an oral report that discusses how governmental policies and current trends influence agriculture	• *Advanced Crop Science*—Safety, Environment, and Legal Issues • *Biotechnology: Applications in Agriculture*—Issues in Biotechnology
Plant Biology	Prepare a time line of the growth stages of a crop seed then compare to the actual growth stages	• *Fruit and Vegetable Production* • *Greenhouse Operation and Management*—Plant Growth, Plant Propagation • *Plant Science*

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Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Soil Fertility and Management	Collect and analyze soil samples and present an oral report that recommends appropriate crop and management strategies for the soil	• *Introduction to Grassland Management*—Soil Management • *Soil Science*
Identifying and Selecting Crops and Seeds	Create a collection of crop and grassland plants	• *Advanced Crop Science*—Forage Production • *Floristry*—Plant Identification • *Greenhouse Operation and Management*—Plant Science Basics
Safety, Environment, and Legal Issues	Write a report explaining safety, environmental, or legal issues in agriculture	• *Advanced Crop Science*—Overview • *Biotechnology: Applications in Agriculture*—Issues in Biotechnology
Corn and Grain Sorghum Production	Write a report explaining a key aspect of production and develop five questions about the topic to be used for a class review	*Advanced Crop Science*—Soybean Production, Wheat and Small Grain Production, Cotton Production, Rice Production
Soybean Production	Present an oral report that compares and contrasts management decisions of regional soybean producers	*Advanced Crop Science*—Corn and Grain Sorghum Production, Wheat and Small Grain Production, Cotton Production, Rice Production
Wheat and Small Grain Production	Devise a calendar that follows wheat or small grain from field preparation through marketing	*Advanced Crop Science*—Corn and Grain Sorghum Production, Soybean Production, Cotton Production, Rice Production
Forage Production	Collect and identify common forage crops and their seeds	*Advanced Crop Science*—Corn and Small Grain Production, Soybean Production, Wheat and Small Grain Production, Cotton Production, Rice Production
Cotton Production	Create a slide show presentation that explains a key aspect of cotton production	*Advanced Crop Science*—Corn and Small Grain Production, Soybean Production, Wheat and Small Grain Production, Rice Production
Rice Production	Create a poster or slide show presentation that identifies and describes food and nonfood by-products and end products of rice production	*Advanced Crop Science*—Corn and Small Grain Production, Soybean Production, Wheat and Small Grain Production, Cotton Production
Agricultural Construction Volume I		
Arc Welding	Perform basic welds, identify welding equipment, and answer questions about related equipment and procedures	• *Agricultural Mechanics Unit for Agricultural Science I*—Arc Welding • *Agricultural Mechanics Unit for Agricultural Science II*—Arc Welding
Project Construction	Select, plan, and complete a construction project	• *Agricultural Structures*—Building Construction, Concrete

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Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Agricultural Construction Volume II		
Oxy-Gas & Other Cutting/Welding Processes	Perform basic welds and cuts, identify welding and cutting equipment, and answer questions about related equipment and procedures	• *Agricultural Construction Volume III*—Oxy-Gas and Other Cutting/Welding Processes • *Agricultural Mechanics Unit for Agricultural Science I*—Oxyfuel Cutting
Woodworking	Construct a woodworking project	• *Agricultural Construction Volume I*—Project Construction • *Agricultural Mechanics Unit for Agricultural Science I*—Woodworking
Metals	Construct a metalworking project	*Agricultural Mechanics Unit for Agricultural Science II*—Cold Metal Work
Finishing	Prepare, prime, and finish a project	• *Agricultural Mechanics Unit for Agricultural Science I*—Painting • *Agricultural Mechanics Unit for Agricultural Science II*—Painting and Finishing
Agricultural Construction Volume III		
Oxy-Gas & Other Cutting/Welding Processes	Make cuts using the air carbon-arc or plasma-arc outfit, identify cutting equipment, and answer questions about related equipment and procedures	• *Agricultural Construction Volume II*—Oxy-Gas and Other Cutting/Welding Processes • *Agricultural Mechanics Unit for Agricultural Science I*—Oxyfuel Cutting
Arc Welding (GMAW/MIG)	Perform welds using the GMAW/MIG outfit, identify GMAW/MIG equipment, and answer questions about related equipment and procedures	• *Agricultural Construction Volume I*—Arc Welding • *Agricultural Construction Volume III*—Arc Welding (GTAW/TIG) • *Agricultural Mechanics Unit for Agricultural Science I*—Arc Welding • *Agricultural Mechanics Unit for Agricultural Science II*—Arc Welding
Arc Welding (GTAW/TIG)	Perform welds using the GTAW/TIG outfit, identify GTAW/TIG equipment, and answer questions about related equipment and procedures	• *Agricultural Construction Volume I*—Arc Welding • *Agricultural Construction Volume III*—Arc Welding (GMAW/MIG) • *Agricultural Mechanics Unit for Agricultural Science I*—Arc Welding • *Agricultural Mechanics Unit for Agricultural Science II*—Arc Welding
Agricultural Structures		
Working With Plans	Draw a construction plan and develop a plan of procedure, cutting bill of materials, and purchasing bill of materials	*Agricultural Mechanics Unit for Agricultural Science II*—Material Selection, Plan Reading, and Interpretation

* Most PBAs will require some modifications based on the unit topic and content.
** PBA may be used without any modifications.

Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Home and Farmstead Planning	Devise a farmstead plan and explain design decisions in writing	*Exploring Agriculture in America*—Basic Home and Farmstead Safety and Maintenance
Building Construction	Lay out joists and rafters, apply roofing skills, and answer questions about roofing materials	*Agricultural Construction Volume I*—Project Construction
Concrete	Make a concrete patio block	*Agricultural Construction Volume I*—Project Construction
Electricity	Diagram a wiring plan for an agricultural structure and complete a bill of materials for the project	None identified
Plumbing	Use plumbing techniques to join dissimilar types of pipe	None identified
Fencing	Devise a fencing plan that complies with local codes and includes the materials used, cost, and layout of the fence	*Agricultural Structures*—Working With Plans
Biotechnology: Applications in Agriculture		
Introduction to Biotechnology	Develop a pamphlet or poster and oral presentation about a genetically manipulated food product	*Advanced Livestock Production and Management*—Issues in Animal Agriculture
Issues in Biotechnology	Conduct a debate on issues in biotechnology	None identified
Basic Laboratory Skills	Create a proposal for a scientific experiment	None identified
Foundations of Genetic Engineering	Extract DNA from a plant or animal source and analyze the results in a written report	*Biotechnology: Applications in Agriculture*—Plant Technologies
Animal Technologies	Describe the process and benefits of bovine embryo transfer in a presentation	None identified
Plant Technologies	Construct and use an electrophoresis device and write a summary of the results	None identified

* Most PBAs will require some modifications based on the unit topic and content.
** PBA may be used without any modifications.

Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Floristry		
Floristry Industry	Create a poster about training and educational opportunities in floristry	• *Agribusiness Sales, Marketing, and Management*—Agriculture as an Industry • *Career and Personal Development for Plant Science Core Curriculum* • *Careers I* • *Leadership and Personal Development*—Leadership and Personal Development for Advanced Students
Plant Identification	Gather plant information and illustrations and present them in a catalog	• *Advanced Crop Science*—Forage Production, Identifying and Selecting Crops and Seeds • *Greenhouse Operation and Management*—Plant Science Basics • *Introduction to Grassland Management*—Grasslands and Grassland Plants
Post-Harvest Handling	Develop procedures for treatment of potted plants and cut plant materials and present them in the form of care cards	None identified
Mechanics of Floral Design	Complete a comprehensive test that covers the tools, supplies, materials, and procedures used in floral design	None identified
Basic Principles of Floral Design	Study, evaluate, and critique floral arrangements and present findings in a written and oral report	None identified
Types of Designs	Plan and produce floral arrangements for a themed display	*Floristry*—Basic Principles of Floral Design
Shop Operations	Create an advertising message to promote the sale of floral produce	• *Agribusiness Sales, Marketing, and Management*—Promotional Tools • *Greenhouse Operation and Management*—Greenhouse Business Management • *Introduction to Agricultural Business*
Food Science and Technology		
Principles of Food Preservation	Present an oral report about a food preservation technique	None identified
Food Processing	Create and describe a food product and design its packaging	None identified

* Most PBAs will require some modifications based on the unit topic and content.
** PBA may be used without any modifications.

Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
The Biochemistry of Foods	Design a poster about a commodity, product, or application created or improved by biochemistry and give an oral report based on the poster	None identified
Food Selection and Consumer Health	Create a chart that tracks the nutritional content of one's diet and write a summary of the results	None identified
Greenhouse Operation and Management		
The Greenhouse Industry	Create a poster that describes the requirements of a position in the greenhouse industry	• *Agribusiness Sales, Marketing, and Management*—Agriculture as an Industry • *Careers I* • *Floristry*—Floristry Industry • *Leadership and Personal Development*—Leadership and Personal Development for Advanced Students
Growing Structures	Make an oral presentation that proposes repairs or improvements to the school's greenhouse and includes the materials and costs involved	None identified
Plant Science Basics	Identify and label plants and present them in a plant collection	• *Advanced Crop Science*—Forage Production • *Floristry*—Plant Identification • *Greenhouse Operation and Management*—Plant Science Basics • *Introduction to Grassland Management*—Grasslands and Grassland Plants
Plant Growth	Conduct a seed germination experiment and write a summary of the findings	• *Advanced Crop Science*—Plant Biology • *Fruit and Vegetable Production* • *Greenhouse Operation and Management*—Plant Propagation • *Plant Science* **
Plant Propagation	Propagate a plant and write a report that describes the process	• *Advanced Crop Science*—Plant Biology • *Fruit and Vegetable Production* • *Plant Science*
Plant Health	Write a report that describes a plant pest and disease and identifies the control methods used	None identified

* Most PBAs will require some modifications based on the unit topic and content.
** PBA may be used without any modifications.

Curriculum/Unit	Performance-Based Assessment (PBA)	Alternative PBAs*
Greenhouse Business Management	Generate a cost analysis and marketing plan for a greenhouse	• *Agribusiness Sales, Marketing, and Management*—Promotional Tools • *Floristry*—Shop Operations • *Introduction to Agricultural Business*
Small Engine Service and Repair		
Installing a Magnetron Ignition and Breaker Points	Identify ignition system tools and components and install and test various ignitions	None identified
Carburetor Service and Repair	Identify and service a variety of carburetors, fuel filters, and air cleaners	None identified
Rewind Starters	Identify starter components and service a variety of small engine starters	None identified
Small Engine Compression	Identify valve tools and their uses and inspect and service the valve train of a small engine	None identified
Governor Adjustment and Repair	Identify governor components and inspect, service, and repair small engine governor systems	None identified
Lubricating Small Engines	Select the correct type and grade of oil and inspect and service the lubrication system of a small engine	None identified
Troubleshooting	Evaluate the condition of a small engine and eliminate engine malfunctions	None identified
Operation and Maintenance of Small Engines	Operate and maintain a small engine	None identified

* Most PBAs will require some modifications based on the unit topic and content.
** PBA may be used without any modifications.

Show-Me Standards Table

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	Show-Me Standards Applicable to Activity
Agricultural Mechanics Unit for Agricultural Science I Common Hand Tools	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation CA6: Participating in formal and informal presentations and discussions of issues and ideas
Common Power Tools	2.1: Plan and make written, oral and visual presentations for a variety of purposes and audiences HP5: Methods used to assess health, reduce risk factors, and avoid high-risk behaviors (such as violence, tobacco, alcohol and other drug use)
Woodworking	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Tool Sharpening and Reconditioning	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Arc Welding	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Oxyfuel Cutting	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Agricultural Mechanics Unit for Agricultural Science I (continued) Painting	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Agricultural Mechanics Unit for Agricultural Science II Common Power Tools	2.1: Plan and make written, oral and visual presentations for a variety of purposes and audiences HP5: Methods used to assess health, reduce risk factors, and avoid high-risk behaviors (such as violence, tobacco, alcohol and other drug use)
Arc Welding	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Oxyacetylene Welding	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Tool Sharpening and Reconditioning	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Cold Metal Work	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Agricultural Mechanics Unit for Agricultural Science II (continued) Material Selection, Plan Reading, and Interpretation	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Painting and Finishing	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals
Advanced Crop Science Overview	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation CA6: Participating in formal and informal presentations and discussions of issues and ideas
Plant Biology	1.3: Design and conduct field and laboratory investigations to study nature and society SC5: Processes (such as plate movement, water cycle, air flow) and interactions of Earth's biosphere, atmosphere, lithosphere, and hydrosphere
Soil Fertility and Management	1.3: Design and conduct field and laboratory investigations to study nature and society SC7: Processes of scientific inquiry (such as formulating and testing hypotheses)

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Advanced Crop Science (continued) Identifying and Selecting Crops and Seeds	1.3: Design and conduct field and laboratory investigations to study nature and society CA1: Speaking and writing standard English (including grammar, usage, punctuation, spelling, capitalization)
Safety, Environment, and Legal Issues	2.1: Plan and make written, oral and visual presentations for a variety of purposes and audiences SC8: Impact of science, technology and human activity on resources and the environment
Corn and Grain Sorghum Production	2.1: Plan and make written, oral and visual presentations for a variety of purposes and audiences SC8: Impact of science, technology and human activity on resources and the environment
Soybean Production	2.1: Plan and make written, oral and visual presentations for a variety of purposes and audiences CA6: Participating in formal and informal presentations and discussions of issues and ideas
Wheat and Small Grain Production	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation SC8: Impact of science, technology and human activity on resources and the environment
Forage Production	1.3: Design and conduct field and laboratory investigations to study nature and society SC7: Processes of scientific inquiry (such as formulating and testing hypotheses)

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Advanced Crop Science (continued) Cotton Production	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation SS7: The use of tools of social science inquiry (such as surveys, statistics, maps, documents)
Rice Production	1.2: Conduct research to answer questions and evaluate information and ideas SC8: Impact of science, technology and human activity on resources and the environment
Agricultural Construction Volume I Arc Welding	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Project Construction	2.5: Perform or produce works in the fine and practical arts MA2: Geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes
Agricultural Construction Volume II Oxy-Gas and Other Cutting/ Welding Processes	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Agricultural Construction Volume II (continued) Woodworking	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Metals	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Finishing	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Agricultural Construction Volume III Oxy-Gas and Other Cutting/ Welding Processes	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Arc Welding (GMAW/MIG)	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Agricultural Construction Volume III (continued) Arc Welding (GTAW/TIG)	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Agricultural Structures Working with Plans	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation MA2: Geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes
Home and Farmstead Planning	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation CA6: Participating in formal and informal presentations and discussions of issues and ideas
Building Construction	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers MA2: Geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes
Concrete	2.5: Perform or produce works in the fine and practical arts MA2: Geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Agricultural Structures (continued) Electricity	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Plumbing	2.5: Perform or produce works in the fine and practical arts CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Fencing	3.8: Assess costs, benefits and other consequences of proposed solutions SS7: The use of tools of social science inquiry (such as surveys, statistics, maps, documents)
Biotechnology: Applications in Agriculture Introduction to Biotechnology	3.4: Evaluate the processes used in recognizing and solving problems SC8: Impact of science, technology and human activity on resources and the environment
Issues in Biotechnology	4.1: Explain reasoning and identify information used to support decisions SC8: Impact of science, technology and human activity on resources and the environment
Basic Laboratory Skills	1.1: Develop questions and ideas to initiate and refine research SC7: Processes of scientific inquiry (such as formulating and testing hypotheses)
Foundations of Genetic Engineering	1.3: Design and conduct field and laboratory investigations to study nature and society SC7: Processes of scientific inquiry (such as formulating and testing hypotheses)

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Biotechnology: Applications in Agriculture (continued) Animal Technologies	3.4: Evaluate the processes used in recognizing and solving problems SC8: Impact of science, technology and human activity on resources and the environment
Plant Technologies	1.2: Conduct research to answer questions and evaluate information and ideas SC3: Characteristics and interactions of living organisms
Floristry Floristry Industry	4.8: Explore, prepare for and seek educational and job opportunities SS6: Relationships of the individual and groups to institutions and cultural traditions
Plant Identification	1.4: Use technological tools and other resources to locate, select and organize information SC3: Characteristics and interactions of living organisms
Post-Harvest Handling	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation SC3: Characteristics and interactions of living organisms
Mechanics of Floral Design	1.6: Discover and evaluate patterns and relationships in information, ideas and structures FA3: The vocabulary to explain perceptions about and evaluations of works in dance, music, theater and visual arts
Basic Principles of Floral Design	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation FA2: The principles and elements of different art forms

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Floristry (continued) Types of Designs	2.5: Perform or produce works in the fine and practical arts FA1: Process and techniques for the production, exhibition or performance of one or more of the visual or performed arts
Shop Operations	4.5: Develop, monitor and revise plans of action to meet deadlines and accomplish goals SS4: Economic concepts (including productivity and the market system) and principles (including the laws of supply and demand)
Food Science and Technology Principles of Food Preservation	2.1: Plan and make written, oral and visual presentations for a variety of purposes and audiences CA6: Participating in formal and informal presentations and discussions of issues and ideas
Food Processing	2.1: Plan and make written, oral and visual presentations for a variety of purposes and audiences FA1: Process and techniques for the production, exhibition or performance of one or more of the visual or performed arts
The Biochemistry of Foods	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation CA6: Participating in formal and informal presentations and discussions of issues and ideas

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Food Science and Technology (continued) Food Selection and Consumer Health	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation HP5: Methods used to assess health, reduce risk factors, and avoid high-risk behaviors (such as violence, tobacco, alcohol and other drug use)
Greenhouse Operation and Management The Greenhouse Industry	4.8: Explore, prepare for and seek educational and job opportunities CA6: Participating in formal and informal presentations and discussions of issues and ideas
Growing Structures	1.1: Develop questions and ideas to initiate and refine research CA1: Speaking and writing standard English (including grammar, usage, punctuation, spelling, capitalization)
Plant Science Basics	1.3: Design and conduct field and laboratory investigations to study nature and society SC3: Characteristics and interactions of living organisms
Plant Growth	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation SC7: Processes of scientific inquiry (such as formulating and testing hypotheses)
Plant Propagation	2.1: Plan and make written, oral and visual presentations for a variety of purposes and audiences CA1: Speaking and writing standard English (including grammar, usage, punctuation, spelling, capitalization)

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Greenhouse Operation and Management (continued) Plant Health	1.4: Use technological tools and other resources to locate, select and organize information SC3: Characteristics and interactions of living organisms
Greenhouse Business Management	1.8: Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation MA1: Addition, subtraction, multiplication and division; other number sense, including numeration and estimation; and the application of these operations and concepts in the workplace and other situations
Small Engine Service and Repair Installing a Magnetron Ignition and Breaker Points	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Carburetor Service and Repair	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Rewind Starters	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)

Performance-Based Assessment Activity (One for Each Curriculum or Unit Listed Below)	**Show-Me Standards Applicable to Activity**
Small Engine Service and Repair (continued) Small Engine Compression	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Governor Adjustment and Repair	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Lubricating Small Engines	1.10: Apply acquired information, ideas and skills to different contexts as students, workers, citizens and consumers CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Troubleshooting	3.1: Identify problems and define their scope and elements CA3: Reading and evaluating nonfiction works and material (such as biographies, newspapers, technical manuals)
Operation and Maintenance of Small Engines	4.7: Identify and apply practices that preserve and enhance the safety and health of self and others HP5: Methods used to assess health, reduce risk factors, and avoid high-risk behaviors (such as violence, tobacco, alcohol and other drug use)

Agricultural Science I

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science I*

Unit: I. Common Hand Tools

Unit Objective:

Students will demonstrate an understanding of common hand tools used in woodworking and metalworking by designing, organizing, and participating in a tool identification contest.

Show-Me Standards: 1.8, CA6

References:

Agricultural Mechanics Unit for Agricultural Science I. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Craftsman. Accessed November 7, 2003, from www.craftsman.com/.

Missouri CDE Handbook. Accessed November 6, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Sears, Roebuck, and Co. Accessed November 25, 2003, from www.sears.com.

SK Hand Tool Corporation. Accessed November 7, 2003, from http://www.skhandtool.com/.

Snap-on Technologies, Inc. Accessed November 7, 2003, from http://www.snapon.com/.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 1.1, Identifying Common Woodworking Hand Tools; and AS 2.1, Identifying Common Metalworking Hand Tools.
- Additional activities that relate to the unit objective can be found under the heading "Unit I Activity" in the following location: p. I-59.

Performance-Based Assessment:

Students will work in groups to design, organize, and participate in a tool identification contest, similar to the tool identification portion of the Agricultural Mechanics Career Development Event. Each group will be responsible for a portion of the tools in the contest and will also compete as a team in the whole event.

Assessment will be based on the content and presentation of the assigned tool display and performance in the whole event.

Agricultural Mechanics Unit for Agricultural Science I
Unit I—Common Hand Tools
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Divide students into groups and assign each group a list of common woodworking and metalworking hand tools to collect for a tool identification contest.
   a. Each group will also compete in the whole event as a team.
   b. Lists should only include tools that have been discussed by the instructor with all the students as a group.

2. This activity will help prepare students for the tool identification portion of the Agricultural Mechanics Career Development Event.
   a. Explain or review event guidelines as needed.
   b. Refer to the *Missouri CDE Handbook* for guidelines regarding the Agricultural Mechanics Career Development Event. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

3. Have students collect their assigned hand tools and display them at a station in the event.

4. Students may consult the instructor for assistance if they have difficulty locating specific tools, but they must be responsible for the overall content and presentation of their portion of the event. Pictures may be substituted for actual tools, if desired.

5. Verify the students' identification of their assigned tools prior to the contest and suggest corrections as needed.

6. Have students identify the tools. Use the tool identification form and tool list found in the *Missouri CDE Handbook* or use a different tool ID form, if preferred.
   a. Have each student identify all the tools in the contest to determine the student's individual score.
   b. Combine the individual scores of the group members to determine the team score for each group.

7. The final assessment score will be based on the content and presentation of the assigned tool display and the student's individual contestant score.

8. Present an appropriate award to the high-scoring team and individual, if desired.

9. NOTE: The following units in this curriculum guide also include material and competencies that are addressed by the Agricultural Mechanics Career Development Event: Unit IV, Tool Sharpening and Reconditioning; Unit V, Arc Welding; and Unit VI, Oxyfuel Cutting. Some or all of the performance-based assessment activities for these units could be combined to form a mini Agricultural Mechanics Career Development Event, if desired. To conduct a mini Agricultural Mechanics Career Development Event, maintain the same student groups for all of the performance-based assessment activities. An expanded score sheet is included at the end of each of these units that can be used to track individual and group performance in the mini CDE.

10. ADDITIONAL ACTIVITIES:
    a. Have a scavenger hunt for tools. Give each student the name of a tool in the shop. Have students locate and present their assigned tool. Guide or correct students' tool selections as needed. Have students return the tools to their assigned location following the scavenger hunt.
    b. Have students locate pictures of tools in catalogs or from tool manufacturers' web sites. Have students paste the pictures onto index cards to make tool identification cards. Tool ID cards could be used as flash cards for review or in place of actual tools in the tool identification activity above.
    c. For further review, an additional unit-level activity, Woodworking and Metalworking Tool Collection, is included on p. I-59 of the Instructor Guide. This activity requires students to plan a hand tool collection for the shop based on a budget set by the instructor. Students must list the tools they would purchase, answer key questions about the tools, and stay within their budget. The purpose of this activity is to familiarize students with a variety of hand tools and to emphasize the importance of choosing tools wisely and taking care of the tools that are available. Answers will vary.

Agricultural Mechanics Unit for Agricultural Science I
Unit I—Common Hand Tools
Student Handout

1. You will work with a group to collect woodworking and metalworking hand tools for a tool identification contest.

2. Your group will also compete in the whole event as a team.

3. You will be responsible for the content and presentation of your portion of the contest.

4. Your final assessment score will be based on the content and presentation of your assigned tool display and your individual contestant score.

Agricultural Mechanics Unit for Agricultural Science I
Unit I—Common Hand Tools
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Thoroughness and Accuracy of Contest Display	Display includes all assigned tools and tools are correctly identified	Failed	Poor	Fair	Good	Excellent	X 10	
Presentation of Contest Display	Display is well organized and eye-appealing	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								/50 pts.

Assessment Area	Total
Tool Identification Contest	/50 pts.

Final Assessment Total _____**/100 pts.**

Comments:

Agricultural Mechanics I Score Sheet

Team Members	Tool ID	Tool Sharpening/ Reconditioning	Arc Welding	Oxyfuel Cutting	Score
Team A					
					Total:
Team B					
					Total:
Team C					
					Total:
Team D					
					Total:
Team E					
					Total:
Team F					
					Total:

Agricultural Science I

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science I*

Unit: II. Common Power Tools

Unit Objective:

Students will demonstrate an understanding of the correct use of power tools by devising and giving a safety presentation for a power tool found in their class shop.

Show-Me Standards: 2.1, HP5

References:

Agricultural Mechanics Unit for Agricultural Science I. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Cyr, D. L., & Johnson, S. B. *Power Tool Safety*. University of Maine Cooperative Extension. Accessed November 25, 2003, from http://www.umext.maine.edu/onlinepubs/htmpubs/2329.htm.

Hobar Publications. Finney-Hobar. Accessed November 10, 2003, from http://www.finney-hobar.com/hobar.html.

Machinery Safety. National Ag Safety Database. Accessed November 10, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_safety.html.

Tritt, S. W. *Hand and Power Tool Safety*. Safety Information Resources on the Internet. University of Vermont. Accessed November 25, 2003, from http://www.esf.uvm.edu/sirippt/handsafe/.

University of Missouri Outreach and Extension Rural Safety and Health Program. Accessed November 10, 2003, from http://www.fse.missouri.edu/ruralsafety/index1.html.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 1.1, Safety and Maintenance Procedures for Power Tools for Woodworking; and AS 2.1, Safety and Maintenance Procedures for Power Tools for Metalworking.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. II-9 (2).

Performance-Based Assessment:

Students will work in groups to develop a safety presentation that summarizes the main parts, uses, and safety and maintenance considerations for a power tool found in their class shop. Students will give the presentation to the class.

Assessment will be based on the overall thoroughness and accuracy of the presentation. Delivery of the presentation and use of supporting material, such as illustrations, also will be factors in the assessment.

Agricultural Mechanics Unit for Agricultural Science I
Unit II—Common Power Tools
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Divide the class into groups and assign each group a power tool in the class shop that is used for woodworking, metalworking, or both.

2. Have each group develop a safety presentation for its assigned tool. Presentations should address the following topics:
   - ❑ Main parts
   - ❑ Uses
   - ❑ Safety features of the tool and safe operating procedures, including wearing appropriate personal protective equipment and proper setup, shutdown, and cleanup procedures
   - ❑ Basic care and maintenance

3. **NOTE: This activity is designed as an informational presentation only; it is not a hands-on demonstration. This activity is *not* a substitute for instructor training and demonstrations, shop safety tests and safety agreements, or any other safety procedures. Students should not demonstrate or operate any equipment unless they have completed all required safety tests and agreements, mastered all relevant competencies, and have the instructor's permission.**

4. Have students incorporate appropriate supporting materials into their report, such as a poster or handout outlining safety practices, examples of personal protective equipment that should be worn when using the tool, a slide show using presentation software, or a combination of elements. Indicate to students what supporting elements are acceptable or preferred.

5. Students may use material found in the unit or discussed in class as well as additional outside material to complete their presentation.

6. Students may not use the source material word for word and must provide a complete bibliography of their sources following their presentation.

7. Review and approve each presentation before the students make their presentations to the class. Guide and correct the students' presentations as needed.

8. Have students give their safety presentations to the class.

9. Students should be prepared to answer questions about their presentations.

10. Guide and correct the students' presentations as needed.

11. The final assessment score will be based on the overall thoroughness and accuracy of the presentation. Delivery of the presentation and use of supporting material also will be factors in the assessment.

Agricultural Mechanics Unit for Agricultural Science I
Unit II—Common Power Tools
Student Handout

1. The instructor will divide the class into groups and assign each group a power tool found in the class shop.

2. Develop a safety presentation for your assigned tool. Your presentation should address the following topics:
   - ❑ Main parts
   - ❑ Uses
   - ❑ Safety features of the tool and safe operating procedures, including wearing appropriate personal protective equipment and proper setup, shutdown, and cleanup procedures
   - ❑ Basic care and maintenance

3. Include appropriate supporting materials in your report, such as a poster or handout outlining safety practices, examples of personal protective equipment that should be worn when using the tool, a slide show using presentation software, or a combination of these or other elements as indicated by your instructor.

4. You may use material found in the unit or discussed in class as well as additional outside material to complete your presentation.

5. You may not use the source material word for word and must provide the instructor with a complete bibliography of your sources following your presentation.

6. The instructor must review and approve your presentation.

7. Give your presentation to the class.

8. Be prepared to answer questions about your presentation.

9. Your final assessment score will be based on the overall thoroughness and accuracy of your presentation. Delivery of the presentation and use of supporting material also will be factors in the assessment.

Agricultural Mechanics Unit for Agricultural Science I
Unit II—Common Power Tools
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Information and Content of Safety Presentation	❑ Presentation addresses main parts, uses, safety, and maintenance of the tool ❑ Information is complete ❑ Facts are accurate ❑ Good use of supporting materials	0 criteria met	1 criterion met	2 criteria met	3 criteria met	4 criteria met	X 20	
Delivery of Safety Presentation	❑ Well organized ❑ Holds audience interest ❑ Speaks clearly and uses correct grammar ❑ Maintains good posture ❑ Needs little or no prompting from the instructor	0 criteria met	1–2 criteria met	3 criteria met	4 criteria met	5 criteria met	X 5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Agricultural Science I

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science I*

Unit: III. Woodworking

Unit Objective:

Students will apply basic woodworking skills by constructing an appropriate woodworking project.

Show-Me Standards: 2.5, CA3

References:

Agricultural Mechanics Building Plans. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Agricultural Mechanics Plans (Set). University of Missouri-Columbia, Instructional Materials Laboratory.

Agricultural Mechanics Unit for Agricultural Science I. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Woodworking for Wildlife. Missouri Department of Conservation. Accessed November 13, 2003, from http://www.conservation.state.mo.us/nathis/woodwork/.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 4.
- Students will complete AS 1.1, Measurement Review; AS 1.2, Calculating Area and Board Feet; AS 2.1, Using a Crosscut Saw; AS 2.2, Using a Rip Saw; AS 2.3, Making a 45-Degree Miter Cut; AS 2.4, Making a Straight Cut With a Portable Circular Saw; AS 2.5, Making a Miter Cut With a Table Saw; AS 3.1, Using a Brace; and AS 3.2, Using a Portable Drill.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. III-5 and pp. III-102–III-103 (1, 2, 3).

Performance-Based Assessment:

Students will use common woodworking tools and procedures discussed in class to lay out and construct an appropriate woodworking project.

Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Mechanics Unit for Agricultural Science I
Unit III—Woodworking
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt the activity sheets found in the unit to assess student competency at performing basic woodworking procedures. Review or supplement these activities as needed, based on student mastery of the procedures and the tools the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit to construct an appropriate woodworking project.
   a. See the Unit III Activity, Woodworking Plans, pp. III-121–III-130, for a selection of project plans and additional details. Single-sheet plans are included for a boot jack, flower box, step stool, and tool box.
   b. For additional project plans, see *Agricultural Mechanics Building Plans* and *Agricultural Mechanics Plans (Set)*, available from the Instructional Materials Laboratory, University of Missouri-Columbia, accessed November 13, 2003, at http://www.iml.coe.missouri.edu/.
   c. Plans are also available from the Missouri Department of Conservation. See Woodworking for Wildlife, accessed November 14, 2003, at http://www.conservation.state.mo.us/nathis/woodwork/.

3. The student handout for this activity is a Project Completion Checklist and Project Evaluation Checklist. Students can use the checklists to track the progress of their project and evaluate their work. Supplement or modify the student handout to reflect actual projects as needed.

4. Have students turn in their completed projects.

5. The final assessment score will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

6. ADDITIONAL ACTIVITY: If all students are building the same project, a display board can be made as a teaching aid for the project. To make a display board, mount correctly made examples of each project piece on a board. Label each piece and indicate the number of pieces needed. Have students compare their project pieces with the correctly made examples. Students should make sure their pieces match the examples before proceeding.

Agricultural Mechanics Unit for Agricultural Science I
Unit III—Woodworking
Student Handout

Name_____

Use the Project Completion Checklist and Project Evaluation Checklist to track the progress of your project.

Project Completion Checklist

Procedure	**Date Due**
❑ Master all competencies necessary to complete the project.	
❑ Receive instructor approval to build the project.	
❑ Review safety precautions for the tools to be used. You can lose points for not following safety precautions and other assigned procedures.	
❑ Perform a quality control inspection of the project during construction. Use the Project Evaluation Checklist.	
❑ Complete project construction.	
❑ Perform a quality control inspection of the project following completion. Use the Project Evaluation Checklist.	
❑ Turn in the completed project. Your final assessment score will be based on the overall quality of the work and your ability to safely and correctly complete the project within the available time.	

Project Evaluation Checklist

Quality Control and Shop Procedures	Criteria
Quality of Work	❑ Fasteners are correct type and size. ❑ Holes, cut edges, and surfaces are smooth. ❑ Measurements are correct. ❑ Cuts are accurate. ❑ Parts fit well for optimum strength. ❑ Project is square and straight. ❑ Work was completed on time.
Design and Suitability	❑ Materials are well suited to the project. ❑ Project is well balanced, proportional, and pleasing to the eye. ❑ Project is the right size for its use. ❑ Project is suitable for its intended purpose. ❑ Project is good enough to sell.
Safety and Work Habits: Observe these safety procedures whenever you are in the shop.	❑ Know how to use the equipment before you attempt to use it. Only use tools and materials the instructor has approved you to use. ❑ Wear appropriate personal protective equipment. ❑ Follow safety guidelines from your instructor and safety information on labels, equipment, and signs in the work area. ❑ Follow assigned setup, shutdown, and cleanup procedures. ❑ Return equipment and materials to their assigned places. ❑ Do not use equipment that does not function properly. ❑ Tell the instructor about any damaged or malfunctioning equipment.

Agricultural Science I

Agricultural Mechanics Unit for Agricultural Science I
Unit III—Woodworking
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Quality of Work	❑ Fasteners are correct ❑ Holes, cuts, and surfaces are smooth ❑ Cuts and measurements are accurate ❑ Parts fit well ❑ Project is square and straight ❑ Work was completed on time	Failed	Poor	Fair	Good	Excellent	X 20	
Design and Suitability	❑ Materials are well suited to the project ❑ Project is well balanced and pleasing to the eye ❑ Project is the right size for its use ❑ Project is suitable for its intended purpose	Failed	Poor	Fair	Good	Excellent	X 5	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-25)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL								

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Science I

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science I*

Unit: IV. Tool Sharpening and Reconditioning

Unit Objective:

Students will apply principles of tool sharpening and reconditioning by participating in a tool reconditioning contest.

Show-Me Standards: 2.5, CA3

References:

Agricultural Mechanics Unit for Agricultural Science I. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete AS 1.1, Reconditioning a Center Punch; AS 1.2, Sharpening a Cold Chisel; and AS 1.3, Reconditioning a Screwdriver.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. IV-3.

Performance-Based Assessment:

Students will be divided into groups. The groups will represent teams and will participate in a tool reconditioning contest that is similar to the tool sharpening and reconditioning portion of the Agricultural Mechanics Career Development Event. Each student will sharpen or recondition a common hand tool, such as a center punch, cold chisel, or screwdriver.

Assessment will be based on the ability to safely and correctly sharpen or recondition the assigned hand tool.

Agricultural Mechanics Unit for Agricultural Science I
Unit IV—Tool Sharpening and Reconditioning
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt the activity sheets found in the unit to assess student competency at tool sharpening and reconditioning. Review or supplement these activities as needed, based on student mastery of the procedures and the tools the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit by participating in a tool reconditioning contest.

3. Divide students into groups and assign each student a hand tool to sharpen or recondition.
   a. Provide students with tools in need of sharpening or reconditioning or have students supply tools. If students supply tools, they must follow any and all school procedures for transporting tools to and from class. Inspect and approve any tools supplied by students prior to the activity.
   b. Assign students a sharpening or reconditioning procedure that they have mastered as part of the instructional activities for this unit.

4. This activity will help prepare students for the tool sharpening and reconditioning portion of the Agricultural Mechanics Career Development Event.
   a. Explain or review event guidelines as needed.
   b. Refer to the *Missouri CDE Handbook* for guidelines regarding the Agricultural Mechanics Career Development Event. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

5. Have students sharpen or recondition their assigned hand tool.
   a. Performance in the tool sharpening contest will determine the student's individual score.
   b. Combine the individual scores of the group members to determine the team score for each group.

6. The final assessment score will be based on the ability to safely and correctly sharpen or recondition the assigned tool.

7. Present an appropriate award to the high-scoring team and individual, if desired.

8. NOTE: The following units in this curriculum guide also include material and competencies that are addressed by the Agricultural Mechanics Career Development Event: Unit I, Common Hand Tools; Unit V, Arc Welding; and Unit VI, Oxyfuel Cutting. Some or all of the performance-based assessment activities for these units could be combined to form a mini Agricultural Mechanics Career Development Event, if desired. To conduct a mini Agricultural Mechanics Career Development Event, maintain the same student groups for all of the performance-based assessment activities. An expanded score sheet is included at the end of each of these units that can be used to track individual and group performance in the mini CDE.

Agricultural Mechanics Unit for Agricultural Science I
Unit IV—Tool Sharpening and Reconditioning
Student Handout

1. The instructor will divide the class into groups and assign each member of your group a tool to sharpen or recondition in a tool reconditioning contest.

2. Your group will compete in the contest as a team.

3. Sharpen or recondition your assigned hand tool.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Sharpen or recondition the hand tool using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow cleanup procedures and return all tools and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

4. Your final assessment score will be based on your ability to safely and correctly sharpen or recondition your assigned hand tool.

Agricultural Mechanics Unit for Agricultural Science I
Unit IV—Tool Sharpening and Reconditioning
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Tool Sharpening and Reconditioning	Tool is properly sharpened or reconditioned	Failed	Poor	Fair	Good	Excellent	X 25	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-25)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL								

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Mechanics I Score Sheet

Team Members	Tool ID	Tool Sharpening/ Reconditioning	Arc Welding	Oxyfuel Cutting	Score
Team A					
					Total:
Team B					
					Total:
Team C					
					Total:
Team D					
					Total:
Team E					
					Total:
Team F					
					Total:

Agricultural Science I

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science I*

Unit: V. Arc Welding

Unit Objective:

Students will apply principles of shielded metal arc welding by making common flat position welds as part of a welding contest.

Show-Me Standards: 2.5, CA3

References:

Agricultural Mechanics Unit for Agricultural Science I. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

American Welding Society. Accessed November 18, 2003, from http://www.aws.org/.

ESAB Knowledge Centre. ESAB. Accessed November 25, 2003, from http://www.esab.com/.

Hobart Institute of Welding Technology. Accessed November 17, 2003, from http://www.welding.org/.

Lincoln Electric. Accessed November 18, 2003, from http://www.lincolnelectric.com/.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Miller Electric. Accessed November 18, 2003, from http://www.millerwelds.com/.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 1.1, Arc Welding Safety Presentation; AS 3.1, Running a Bead Using a Shielded Metal Arc Welder; AS 3.2, Welding a Butt Joint in Steel Plate in Flat Position; AS 3.3, Welding a Butt Joint in Round Stock in Flat Position; AS 3.4, Welding a Lap Joint in Steel Plate in Flat Position; and AS 3.5, Welding a Tee Joint in Steel Plate in Flat Position.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. V-5 (2, 3), p. V-21 (2, 3), and p. V-37 (2, 3, 5).

Performance-Based Assessment:

Students will be divided into groups. The groups will represent teams and will participate in a welding contest that is similar to the welding portion of the Agricultural Mechanics Career Development Event. Each student will use a shielded metal arc welder to make common flat position welds presented in the unit and discussed in class.

Assessment will be based on the ability to safely and correctly perform common welding procedures using a shielded metal arc welder.

Agricultural Mechanics Unit for Agricultural Science I
Unit V—Arc Welding
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt the activity sheets found in the unit to assess student competency at welding. Review or supplement these activities as needed, based on student mastery of the procedures and equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit by participating in a welding contest.

3. Divide the class into groups and assign students a series of welding procedures to perform, such as welding a butt joint, lap joint, and tee joint in steel plate in flat position.
   a. Each student should perform all of the assigned procedures.
   b. Assign students welding procedures that they have mastered as part of the instructional activities for this unit.

4. This activity will help prepare students for the arc welding portion of the Agricultural Mechanics Career Development Event.
   a. Explain or review event guidelines as needed.
   b. Refer to the *Missouri CDE Handbook* for guidelines regarding the Agricultural Mechanics Career Development Event. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

5. Have students perform the assigned welding procedures.
   a. Performance in the welding contest will determine the student's individual score.
   b. Combine the individual scores of the group members to determine the team score for each group.

6. The final assessment score will be based on the ability to safely and correctly perform the assigned welding procedures.

7. Present an appropriate award to the high-scoring team and individual, if desired.

8. NOTE: The following units in this curriculum guide also include material and competencies that are addressed by the Agricultural Mechanics Career Development Event: Unit I, Common Hand Tools; Unit IV, Tool Sharpening and Reconditioning; and Unit VI, Oxyfuel Cutting. Some or all of the performance-based assessment activities for these units could be combined to form a mini Agricultural Mechanics Career Development Event, if desired. To conduct a mini Agricultural Mechanics Career Development Event, maintain the same student groups for all of the performance-based assessment activities. An expanded score sheet is included at the end of each of these units that can be used to track individual and group performance in the mini CDE.

9. ADDITIONAL ACTIVITIES:
   a. Create a display board using correctly made examples of each type of weld to be performed by the class. Have students compare their welds with the correctly made examples.
   b. Create a display board using the students' best welds. Possible display board themes include the following: each student's best weld, the best example of each type of weld performed by the class, and the best weld of the week.
   c. Perform destructive tests to check the strength and soundness of welds students have made.

Agricultural Mechanics Unit for Agricultural Science I
Unit V—Arc Welding
Student Handout

1. The instructor will divide the class into groups and give you a series of welds to perform in a welding contest.

2. Your group will compete in the contest as a team.

3. Perform the assigned welds.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Perform the welds using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow shutdown and cleanup procedures and return all equipment and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

4. Your final assessment score will be based on your ability to safely and correctly perform the assigned welding procedures.

Agricultural Science I

Agricultural Mechanics Unit for Agricultural Science I
Unit V—Arc Welding
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Electrode and Amperage Selection	Electrode was appropriate and amperage was correctly set for all welds	Failed	Poor	Fair	Good	Excellent	X 5	
Distortion	Welds are free of distortion	Failed	Poor	Fair	Good	Excellent	X 6	
Appearance	Appearance indicates correct speed of travel, amperage setting, and arc length for all welds	Failed	Poor	Fair	Good	Excellent	X 7	
Strength	Welds are strong and sound	Failed	Poor	Fair	Good	Excellent	X 7	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-25)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL								

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Mechanics I Score Sheet

Team Members	Tool ID	Tool Sharpening/ Reconditioning	Arc Welding	Oxyfuel Cutting	Score
Team A					
					Total:
Team B					
					Total:
Team C					
					Total:
Team D					
					Total:
Team E					
					Total:
Team F					
					Total:

Agricultural Science I

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science I*

Unit: VI. Oxyfuel Cutting

Unit Objective:

Students will apply principles of oxyfuel cutting by making basic cuts with an oxyfuel outfit as part of a class-wide contest.

Show-Me Standards: 2.5, CA3

References:

Agricultural Mechanics Unit for Agricultural Science I. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

American Welding Society. Accessed November 18, 2003, from http://www.aws.org/.

Hobart Institute of Welding Technology. Accessed November 17, 2003, from http://www.welding.org/.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Thermadyne. Victor. Accessed November 18, 2003, from http://www.thermadyne.com/vec/index.asp?div=vec.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 2.1, Cutting a Straight Line Using an Oxyfuel Outfit; AS 2.2, Cutting a Bevel Using an Oxyfuel Outfit; and AS 2.3, Cutting a Circle Using an Oxyfuel Outfit.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. VI-4 (2).

Performance-Based Assessment:

Students will be divided into groups. The groups will represent teams and will participate in a contest that is similar to the oxyacetylene competency portion of the Agricultural Mechanics Career Development Event. Each student will use an oxyfuel outfit to make common cuts presented in the unit and discussed in class.

Assessment will be based on the ability to safely and correctly make the assigned cuts using the oxyfuel outfit.

Agricultural Mechanics Unit for Agricultural Science I
Unit VI—Oxyfuel Cutting
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt the activity sheets found in the unit to assess student competency at cutting with oxyfuel. Review or supplement these activities as needed, based on student mastery of the procedures and equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit by making basic cuts with an oxyfuel outfit as part of a class-wide contest.

3. Divide the class into groups and assign students a series of cutting procedures to perform using the oxyfuel outfit, such as making a straight cut and a 45° bevel cut and cutting out a circle.
   a. Each student should perform all of the assigned procedures.
   b. Assign students cutting procedures that they have mastered as part of the instructional activities for this unit.

4. This activity will help prepare students for the oxyacetylene portion of the Agricultural Mechanics Career Development Event.
   a. Explain or review event guidelines as needed.
   b. Refer to the *Missouri CDE Handbook* for guidelines regarding the Agricultural Mechanics Career Development Event. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

5. Have students perform the assigned cutting procedures.
   a. Performance in the oxyfuel competency contest will determine the student's individual score.
   b. Combine the individual scores of the group members to determine the team score for each group.

6. The final assessment score will be based on the ability to safely and correctly make the assigned cuts using the oxyfuel outfit.

7. Present an appropriate award to the high-scoring team and individual, if desired.

8. NOTE: The following units in this curriculum guide also include material and competencies that are addressed by the Agricultural Mechanics Career Development Event: Unit I, Common Hand Tools; Unit IV, Tool Sharpening and Reconditioning; and Unit V, Arc Welding. Some or all of the performance-based assessment activities for these units could be combined to form a mini Agricultural Mechanics Career Development Event, if desired. To conduct a mini Agricultural Mechanics Career Development Event, maintain the same student groups for all of the performance-based assessment activities. An expanded score sheet is included at the end of each of these units that can be used to track individual and group performance in the mini CDE.

9. ADDITIONAL ACTIVITY: Create a display board using the students' work. Possible display board themes include the following: each student's best work using the oxyfuel outfit, the best example of each type of procedure performed by the class, and the best work of the week.

Agricultural Mechanics Unit for Agricultural Science I
Unit VI—Oxyfuel Cutting
Student Handout

1. The instructor will divide the class into groups and give you a series of oxyfuel cutting procedures to perform as part of a class-wide contest.

2. Your group will compete in the contest as a team.

3. Perform the assigned cuts using the oxyfuel outfit.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Perform the cuts using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow shutdown and cleanup procedures and return all equipment and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

4. Your final assessment score will be based on your ability to safely and correctly make the assigned cuts using the oxyfuel outfit.

Agricultural Mechanics Unit for Agricultural Science I
Unit VI—Oxyfuel Cutting
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Equipment Setting	Torch flame was properly adjusted	Failed	Poor	Fair	Good	Excellent	X 5	
Uniformity	All cuts are uniform	Failed	Poor	Fair	Good	Excellent	X 5	
Straight Cut	Cut is straight	Failed	Poor	Fair	Good	Excellent	X 5	
Bevel Cut	Bevel is 45°	Failed	Poor	Fair	Good	Excellent	X 5	
Circle Cut	Cut is properly positioned and the correct diameter	Failed	Poor	Fair	Good	Excellent	X 5	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-25)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL								

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Mechanics I Score Sheet

Team Members	Tool ID	Tool Sharpening/ Reconditioning	Arc Welding	Oxyfuel Cutting	Score
Team A					
					Total:
Team B					
					Total:
Team C					
					Total:
Team D					
					Total:
Team E					
					Total:
Team F					
					Total:

Agricultural Science I

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science I*

Unit: VII. Painting

Unit Objective:

Students will apply principles of painting by finishing a project using paint and a paintbrush.

Show-Me Standards: 2.5, CA3

References:

Agricultural Construction Volume II. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Mechanics Unit for Agricultural Science I. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Healthy Indoor Painting Practices. U. S. Consumer Product Safety Commission. Accessed November 25, 2003, from http://www.cpsc.gov/cpscpub/pubs/456.pdf.

Safe Use, Storage and Disposal of Paint. Household Hazardous Waste Project. MU Extension. University of Missouri-Columbia. Accessed November 20, 2003, from http://muextension.missouri.edu/explore/wasteman/wm6001.htm.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. VII-5 (1, 3, 4).

Performance-Based Assessment:

Students will finish a project using paint and a paintbrush. Acceptable projects would include those made for the Agricultural Science I class or outside projects that the instructor determines are appropriate for the curriculum. Students will choose the appropriate primer, paint, and other necessary supplies.

Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Mechanics Unit for Agricultural Science I
Unit VII—Painting
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use the lesson 1 assessment, Finishing With Paint, p. VII-9, to assess student competency at identifying safe and correct painting procedures. Review or supplement the lesson as needed, based on student mastery of these procedures and the equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit to finish a project using paint and a paintbrush.
   a. Choose projects based on the skill level of the students and the time available to work on the project. For example, if students built projects for the woodworking unit of this curriculum guide, have them paint these projects.
   b. If students bring in outside projects to be painted, screen these projects to determine if they are appropriate for the curriculum and can be completed in the time available.

3. Have students choose appropriate primer, paint, and other necessary supplies. Review and approve students' material and equipment selection before they begin working.

4. The student handout for this activity is a Project Completion Checklist and Project Evaluation Checklist. Students can use the checklists to track the progress of their project and evaluate their work. Supplement or modify the student handout to reflect actual projects as needed.

5. Have students turn in their completed projects.

6. The final assessment score will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Mechanics Unit for Agricultural Science I
Unit VII—Painting
Student Handout

Name_____

Use the Project Completion Checklist and Project Evaluation Checklist to track the progress of your project.

Project Completion Checklist

Procedure	**Date Due**
❑ Master all competencies necessary to complete the project.	
❑ Receive instructor approval for the materials and equipment you plan to use. Are they appropriate for the project?	
❑ Review safety precautions for the materials and equipment you will use. You can lose points for not following safety precautions and other assigned procedures.	
❑ Prepare the project surface.	
❑ Apply the primer coat.	
❑ Paint the project.	
❑ Clean all equipment using the appropriate cleaner. Return the equipment and materials to their proper place and dispose of rags and other hazardous materials properly. You can lose points for not following assigned cleanup procedures.	
❑ Perform a quality control inspection of the project following completion. Use the Project Evaluation Checklist.	
❑ Turn in the completed project. Your final assessment score will be based on the overall quality of the work and your ability to safely and correctly complete the project within the available time.	

Project Evaluation Checklist

Quality Control and Shop Procedures	Criteria
Quality of Work	❑ Primer is appropriate for the project. ❑ Primer is properly applied. ❑ Paint is appropriate for the project. ❑ Paint is properly applied. ❑ Paint job is of high quality and pleasing to the eye. ❑ Project is good enough to sell. ❑ Work was completed on time.
Safety and Work Habits: Observe these safety procedures whenever you are in the shop.	❑ Know how to use the tools and materials before you attempt to use them. Only use tools and materials the instructor has approved you to use. ❑ Wear appropriate personal protective equipment. ❑ Follow safety guidelines from your instructor and safety information on labels, equipment, and signs in the work area. ❑ Do not use primers, finishes, or other products with missing or unreadable labels. ❑ Follow assigned setup and cleanup procedures. ❑ Return equipment and materials to their assigned places.

Agricultural Mechanics Unit for Agricultural Science I
Unit VII—Painting
Scoring Guide

Name _____

Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Primer is appropriate and properly applied	Failed	Poor	Fair	Good	Excellent	X 5	
Paint is appropriate and properly applied	Failed	Poor	Fair	Good	Excellent	X 5	
Paint job is of high quality and pleasing to the eye	Failed	Poor	Fair	Good	Excellent	X 5	
Project is good enough to sell	Failed	Poor	Fair	Good	Excellent	X 5	
Work was completed on time	Failed	Poor	Fair	Good	Excellent	X 5	
Student followed all safety precautions	**Passed**				**Failed**	**X (-25)**	Negative Points *
Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL							

Final Assessment Total _____/100 pts.
***Overall combined score cannot be below 0.**

Comments:

Agricultural Science II

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science II*

Unit: I. Common Power Tools

Unit Objective:

Students will demonstrate an understanding of the correct use of power tools by devising and giving a safety presentation for a power tool found in their class shop.

Show-Me Standards: 2.1, HP5

References:

Agricultural Mechanics Unit for Agricultural Science II. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Cyr, D. L., & Johnson, S. B. *Power Tool Safety*. University of Maine Cooperative Extension. Accessed November 25, 2003, from http://www.umext.maine.edu/onlinepubs/htmpubs/2329.htm.

Hobar Publications. Finney-Hobar. Accessed November 10, 2003, from http://www.finney-hobar.com/hobar.html.

Machinery Safety. National Ag Safety Database. Accessed November 10, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_safety.html.

Tritt, S. W. *Hand and Power Tool Safety*. Safety Information Resources on the Internet. University of Vermont. Accessed November 25, 2003, from http://www.esf.uvm.edu/sirippt/handsafe/.

University of Missouri Outreach and Extension Rural Safety and Health Program. Accessed November 10, 2003, from http://www.fse.missouri.edu/ruralsafety/index1.html.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 1.1, Safety and Maintenance Procedures for Power Tools for Woodworking; and AS 2.1, Safety and Maintenance Procedures for Power Tools for Metalworking.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. I-10 (2).

Performance-Based Assessment:

Students will work in groups to develop a safety presentation that summarizes the main parts, uses, and safety and maintenance considerations for a power tool found in their class shop. Students will give the presentation to the class.

Assessment will be based on the overall thoroughness and accuracy of the presentation. Delivery of the presentation and use of supporting material, such as illustrations, also will be factors in the assessment.

Agricultural Mechanics Unit for Agricultural Science II
Unit I—Common Power Tools
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Divide the class into groups and assign each group a power tool in the class shop that is used for woodworking, metalworking, or both.

2. Have each group develop a safety presentation for its assigned tool. Presentations should address the following topics:
   - ❑ Main parts
   - ❑ Uses
   - ❑ Safety features of the tool and safe operating procedures, including wearing appropriate personal protective equipment and proper setup, shutdown, and cleanup procedures
   - ❑ Basic care and maintenance

3. **NOTE: This activity is designed as an informational presentation only; it is not a hands-on demonstration. This activity is *not* a substitute for instructor training and demonstrations, shop safety tests and safety agreements, or any other safety procedures. Students should not demonstrate or operate any equipment unless they have completed all required safety tests and agreements, mastered all relevant competencies, and have the instructor's permission.**

4. Have students incorporate appropriate supporting materials into their report, such as a poster or handout outlining safety practices, examples of personal protective equipment that should be worn when using the tool, a slide show using presentation software, or a combination of elements. Indicate to students what supporting elements are acceptable or preferred.

5. Students may use material found in the unit or discussed in class as well as additional outside material to complete their presentation.

6. Students may not use the source material word for word and must provide a complete bibliography of their sources following their presentation.

7. Review and approve each presentation before the students make their presentations to the class. Guide and correct the students' presentations as needed.

8. Have students give their safety presentations to the class.

9. Students should be prepared to answer questions about their presentations.

10. Guide and correct the students' presentations as needed.

11. The final assessment score will be based on the overall thoroughness and accuracy of the presentation. Delivery of the presentation and use of supporting material also will be factors in the assessment.

Agricultural Mechanics Unit for Agricultural Science II
Unit I—Common Power Tools
Student Handout

1. The instructor will divide the class into groups and assign each group a power tool found in the class shop.

2. Develop a safety presentation for your assigned tool. Your presentation should address the following topics:
   - ❑ Main parts
   - ❑ Uses
   - ❑ Safety features of the tool and safe operating procedures, including wearing appropriate personal protective equipment and proper setup, shutdown, and cleanup procedures
   - ❑ Basic care and maintenance

3. Include appropriate supporting materials in your report, such as a poster or handout outlining safety practices, examples of personal protective equipment that should be worn when using the tool, a slide show using presentation software, or a combination of these or other elements as indicated by your instructor.

4. You may use material found in the unit or discussed in class as well as additional outside material to complete your presentation.

5. You may not use the source material word for word and must provide the instructor with a complete bibliography of your sources following your presentation.

6. The instructor must review and approve your presentation.

7. Give your presentation to the class.

8. Be prepared to answer questions about your presentation.

9. Your final assessment score will be based on the overall thoroughness and accuracy of your presentation. Delivery of the presentation and use of supporting material also will be factors in the assessment.

Agricultural Mechanics Unit for Agricultural Science II
Unit I—Common Power Tools
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Information and Content of Safety Presentation	❑ Presentation addresses main parts, uses, safety, and maintenance of the tool ❑ Information is complete ❑ Facts are accurate ❑ Good use of supporting materials	0 criteria met	1 criterion met	2 criteria met	3 criteria met	4 criteria met	X 20	
Delivery of Safety Presentation	❑ Well organized ❑ Holds audience interest ❑ Speaks clearly and uses correct grammar ❑ Maintains good posture ❑ Needs little or no prompting from the instructor	0 criteria met	1–2 criteria met	3 criteria met	4 criteria met	5 criteria met	X 5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Agricultural Science II

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science II*

Unit: II. Arc Welding

Unit Objective:

Students will apply principles of shielded metal arc welding by making out-of-position welds as part of a welding contest.

Show-Me Standards: 2.5, CA3

References:

Agricultural Mechanics Unit for Agricultural Science II. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

American Welding Society. Accessed November 18, 2003, from http://www.aws.org/.

ESAB Knowledge Centre. ESAB. Accessed November 25, 2003, from http://www.esab.com/.

Hobart Institute of Welding Technology. Accessed November 17, 2003, from http://www.welding.org/.

Lincoln Electric. Accessed November 18, 2003, from http://www.lincolnelectric.com/.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Miller Electric. Accessed November 18, 2003, from http://www.millerwelds.com/.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 5.
- Students will complete AS 1.1, Arc Welding Safety; AS 4.1, Identifying Ferrous Metals Using Spark Testing; AS 5.1, Welding a Butt Joint in the Horizontal Position; AS 5.2, Making a Downhill Fillet Weld; AS 5.3, Making an Uphill Fillet Weld; and AS 5.4, Welding a Butt Joint in the Overhead Position.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. II-5 (2, 3), p. II-24 (2), p. II-42 (1, 2), p. II-60, and p. II-74 (1, 3, 4).

Performance-Based Assessment:

Students will be divided into groups. The groups will represent teams and will participate in a welding contest that is similar to the welding portion of the Agricultural Mechanics Career Development Event. Each student will use a shielded metal arc welder to make out-of-position welds presented in the unit and discussed in class.

Assessment will be based on the ability to safely and correctly make out-of-position welds using a shielded metal arc welder.

Agricultural Mechanics Unit for Agricultural Science II
Unit II—Arc Welding
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt the activity sheets found in the unit to assess student competency at welding. Review or supplement these activities as needed, based on student mastery of the procedures and equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit by participating in a welding contest.

3. Divide the class into groups and assign students a series of out-of-position welds to perform.
   a. Each student should perform all of the assigned procedures.
   b. Assign students welding procedures that they have mastered as part of the instructional activities for this unit.

4. This activity will help prepare students for the arc welding portion of the Agricultural Mechanics Career Development Event.
   a. Explain or review event guidelines as needed.
   b. Refer to the *Missouri CDE Handbook* for guidelines regarding the Agricultural Mechanics Career Development Event. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

5. Have students perform the assigned welding procedures.
   a. Performance in the welding contest will determine the student's individual score.
   b. Combine the individual scores of the group members to determine the team score for each group.

6. The final assessment score will be based on the ability to safely and correctly perform the assigned welding procedures.

7. Present an appropriate award to the high-scoring team and individual, if desired.

8. NOTE: If desired, this activity can be combined with the performance-based assessment activities from Unit III, Oxyacetylene Welding, and Unit IV, Tool Sharpening and Reconditioning, to form a mini Agricultural Mechanics Career Development Event. To conduct a mini Agricultural Mechanics Career Development Event, maintain the same student groups for all of the performance-based assessment activities. An expanded score sheet is included at the end of each of these units that can be used to track individual and group performance in the mini CDE.

9. ADDITIONAL ACTIVITIES:
   a. Create a display board using correctly made examples of each type of weld to be performed by the class. Have students compare their welds with the correctly made examples.
   b. Create a display board using the students' best welds. Possible display board themes include the following: each student's best weld, the best example of each type of weld performed by the class, and the best weld of the week.
   c. Perform destructive tests to check the strength and soundness of welds students have made.
   d. Create a display board that identifies different metals and their characteristics. Have students contribute samples.

Agricultural Mechanics Unit for Agricultural Science II
Unit II—Arc Welding
Student Handout

1. The instructor will divide the class into groups and give you a series of welds to perform in a welding contest.

2. Your group will compete in the contest as a team.

3. Perform the assigned welds.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Perform the welds using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow shutdown and cleanup procedures and return all equipment and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

4. Your final assessment score will be based on your ability to safely and correctly perform the assigned welding procedures.

Agricultural Mechanics Unit for Agricultural Science II
Unit II—Arc Welding
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Positioning	Metal was properly positioned	Failed	Poor	Fair	Good	Excellent	X 5	
Electrode and Amperage Selection	Electrode was appropriate for the weld and amperage was correctly set	Failed	Poor	Fair	Good	Excellent	X 4	
Distortion	Welds are free of distortion	Failed	Poor	Fair	Good	Excellent	X 5	
Appearance	Weld appearance indicates correct speed of travel, amperage setting, and arc length	Failed	Poor	Fair	Good	Excellent	X 6	
Strength	Welds are strong and sound	Failed	Poor	Fair	Good	Excellent	X 5	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-25)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL								

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Mechanics II Score Sheet

Team Members	Arc Welding	Oxyacetylene Welding	Tool Sharpening/ Reconditioning	Score
Team A				
				Total:
Team B				
				Total:
Team C				
				Total:
Team D				
				Total:
Team E				
				Total:
Team F				
				Total:

Agricultural Science II

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science II*

Unit: III. Oxyacetylene Welding

Unit Objective:

Students will apply principles of oxyacetylene welding by making basic welds with an oxyacetylene outfit as part of a class-wide contest.

Show-Me Standards: 2.5, CA3

References:

Agricultural Mechanics Unit for Agricultural Science II. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

American Welding Society. Accessed November 18, 2003, from http://www.aws.org/.

Hobart Institute of Welding Technology. Accessed November 17, 2003, from http://www.welding.org/.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Thermadyne. Victor. Accessed November 18, 2003, from http://www.thermadyne.com/vec/index.asp?div=vec.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 2.1, Running a Continuous Weld Pool With and Without Welding Rod; AS 2.2, Welding a Butt Joint in Flat Position Using Welding Rod; AS 2.3, Welding an Edge Weld in a Flanged Butt Joint Without Welding Rod; AS 2.4, Welding an Outside Corner Joint With and Without Welding Rod; AS 3.1, Running a Bead With Brazing Rod; and AS 3.2, Braze Welding an Outside Corner Joint in Mild Steel.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. III-5 (2, 3) and p. III-55.

Performance-Based Assessment:

Students will be divided into groups. The groups will represent teams and will participate in a contest that is similar to the oxyacetylene competency portion of the Agricultural Mechanics Career Development Event. Each student will use an oxyacetylene outfit to make common welds presented in the unit and discussed in class.

Assessment will be based on the ability to safely and correctly make the assigned welds using the oxyacetylene outfit.

Agricultural Mechanics Unit for Agricultural Science II
Unit III—Oxyacetylene Welding
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt the activity sheets found in the unit to assess student competency at welding and braze welding with the oxyacetylene outfit. Review or supplement these activities as needed, based on student mastery of the procedures and equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit by making basic welds with an oxyacetylene outfit as part of a class-wide contest.

3. Divide the class into groups and assign students a series of welding procedures to perform using the oxyacetylene outfit, such as welding a butt joint in flat position using welding rod, welding an outside corner joint with or without welding rod, and braze welding an outside corner joint in mild steel.
   a. Each student should perform all of the assigned procedures.
   b. Assign students welding procedures that they have mastered as part of the instructional activities for this unit.

4. This activity will help prepare students for the oxyacetylene portion of the Agricultural Mechanics Career Development Event.
   a. Explain or review event guidelines as needed.
   b. Refer to the *Missouri CDE Handbook* for guidelines regarding the Agricultural Mechanics Career Development Event. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

5. Have students perform the assigned welding procedures.
   a. Performance in the oxyacetylene welding contest will determine the student's individual score.
   b. Combine the individual scores of the group members to determine the team score for each group.

6. The final assessment score will be based on the ability to safely and correctly make the assigned welds using the oxyacetylene outfit.

7. Present an appropriate award to the high-scoring team and individual, if desired.

8. NOTE: If desired, this activity can be combined with the performance-based assessment activities from Unit II, Arc Welding, and Unit IV, Tool Sharpening and Reconditioning, to form a mini Agricultural Mechanics Career Development Event. To conduct a mini Agricultural Mechanics Career Development Event, maintain the same student groups for all of the performance-based assessment activities. An expanded score sheet is included at the end of each of these units that can be used to track individual and group performance in the mini CDE.

9. ADDITIONAL ACTIVITY: Create a display board using the students' work. Possible display board themes include the following: each student's best work using the oxyacetylene outfit, the best example of each type of procedure performed by the class, and the best work of the week.

Agricultural Mechanics Unit for Agricultural Science II
Unit III—Oxyacetylene Welding
Student Handout

1. The instructor will divide the class into groups and give you a series of oxyacetylene welding procedures to perform as part of a class-wide contest.

2. Your group will compete in the contest as a team.

3. Perform the assigned welds using the oxyacetylene outfit.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Perform the welds using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow shutdown and cleanup procedures and return all equipment and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

4. Your final assessment score will be based on your ability to safely and correctly make the assigned welds using the oxyacetylene outfit.

Agricultural Science II

Agricultural Mechanics Unit for Agricultural Science II
Unit III—Oxyacetylene Welding
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Positioning	Metal was properly positioned	Failed	Poor	Fair	Good	Excellent	X 5	
Filler Rod and Equipment Setting	Filler is appropriate for procedure and torch flame was properly adjusted	Failed	Poor	Fair	Good	Excellent	X 5	
Distortion	Welds are free of distortion	Failed	Poor	Fair	Good	Excellent	X 5	
Appearance	Weld beads are uniform	Failed	Poor	Fair	Good	Excellent	X 5	
Strength	Welds are strong and sound	Failed	Poor	Fair	Good	Excellent	X 5	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-25)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL								

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Mechanics II Score Sheet

Team Members	Arc Welding	Oxyacetylene Welding	Tool Sharpening/ Reconditioning	Score
Team A				
				Total:
Team B				
				Total:
Team C				
				Total:
Team D				
				Total:
Team E				
				Total:
Team F				
				Total:

Agricultural Science II

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science II*

Unit: IV. Tool Sharpening and Reconditioning

Unit Objective:

Students will apply principles of tool sharpening and reconditioning by participating in a tool reconditioning contest.

Show-Me Standards: 2.5, CA3

References:

Agricultural Mechanics Unit for Agricultural Science II. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete AS 1.1, Dressing a Grinding Wheel; AS 1.2, Sharpening a Twist Drill; AS 1.3, Sharpening a Lawn Mower Blade; and AS 1.4, Maintaining a Chain Saw Chain.

Performance-Based Assessment:

Students will be divided into groups. The groups will represent teams and will participate in a tool reconditioning contest that is similar to the tool sharpening and reconditioning portion of the Agricultural Mechanics Career Development Event. Each student will perform a sharpening or reconditioning procedure presented in the unit or discussed in class, such as sharpening a twist drill or lawn mower blade or maintaining a chain saw chain.

Assessment will be based on the ability to perform the assigned sharpening or reconditioning procedure safely and correctly.

Agricultural Mechanics Unit for Agricultural Science II
Unit IV—Tool Sharpening and Reconditioning
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt the activity sheets found in the unit to assess student competency at tool sharpening and reconditioning. Review or supplement these activities as needed, based on student mastery of the procedures and the tools the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit by participating in a tool reconditioning contest.

3. Divide students into groups and assign each student a sharpening or reconditioning procedure to perform. Procedures covered in the unit include sharpening a twist drill and a lawn mower blade and maintaining a chain saw chain.
   a. Provide students with tools in need of sharpening or reconditioning or have students supply tools. If students supply tools, they must follow any and all school procedures for transporting tools to and from class. Inspect and approve any tools supplied by students prior to the activity.
   b. Assign students a sharpening or reconditioning procedure that they have mastered as part of the instructional activities for this unit.

4. This activity will help prepare students for the tool sharpening and reconditioning portion of the Agricultural Mechanics Career Development Event.
   a. Explain or review event guidelines as needed.
   b. Refer to the *Missouri CDE Handbook* for guidelines regarding the Agricultural Mechanics Career Development Event. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

5. Have students sharpen or recondition their assigned tool.
   a. Performance in the tool sharpening contest will determine the student's individual score.
   b. Combine the individual scores of the group members to determine the team score for each group.

6. The final assessment score will be based on the ability to safely and correctly sharpen or recondition the assigned tool.

7. Present an appropriate award to the high-scoring team and individual, if desired.

8. NOTE: If desired, this activity can be combined with the performance-based assessment activities from Unit II, Arc Welding, and III, Oxyacetylene Welding, to form a mini Agricultural Mechanics Career Development Event. To conduct a mini Agricultural Mechanics Career Development Event, maintain the same student groups for all of the performance-based assessment activities. An expanded score sheet is included at the end of each of these units that can be used to track individual and group performance in the mini CDE.

Agricultural Mechanics Unit for Agricultural Science II
Unit IV—Tool Sharpening and Reconditioning
Student Handout

1. The instructor will divide the class into groups and assign each member of your group a tool to sharpen or recondition in a tool reconditioning contest.

2. Your group will compete in the contest as a team.

3. Sharpen or recondition your assigned tool.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Sharpen or recondition the tool using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow cleanup procedures and return all tools and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

4. Your final assessment score will be based on your ability to perform the assigned sharpening or reconditioning procedure safely and correctly.

Agricultural Science II

Agricultural Mechanics Unit for Agricultural Science II
Unit IV—Tool Sharpening and Reconditioning
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Tool Sharpening and Reconditioning	Tool is properly sharpened or reconditioned	Failed	Poor	Fair	Good	Excellent	X 25	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-25)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL								

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Mechanics II Score Sheet

Team Members	Arc Welding	Oxyacetylene Welding	Tool Sharpening/ Reconditioning	Score
Team A				
				Total:
Team B				
				Total:
Team C				
				Total:
Team D				
				Total:
Team E				
				Total:
Team F				
				Total:

Agricultural Science II

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science II*

Unit: V. Cold Metal Work

Unit Objective:

Students will apply principles of cold metal work by constructing an appropriate metalworking project.

Show-Me Standards: 2.5, CA3

References:

Agricultural Construction Volume II. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Mechanics Building Plans. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Agricultural Mechanics Plans (Set). University of Missouri-Columbia, Instructional Materials Laboratory.

Agricultural Mechanics Unit for Agricultural Science II. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will observe instructor demonstrations of the following activities and perform the activities at the instructor's discretion: AS 1.1, Techniques for Bending Cold Metal; AS 1.2, Fastening Metal With Rivets and Pop Rivets; and AS 1.3, Using a Tap and Die Set.

Performance-Based Assessment:

Students will use common metalworking tools and procedures discussed in class to lay out and construct an appropriate metalworking project.

Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Mechanics Unit for Agricultural Science II
Unit V—Cold Metal Work
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use the activity sheets to demonstrate techniques for working with cold metal. Adapt these sheets as needed and use them to assess student competency at performing basic metalworking procedures. Review or supplement these activities as needed, based on student mastery of the procedures and the tools the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit to construct an appropriate metalworking project.
   a. See the Unit V Activity, Metalworking Plans, pp. V-43–V-44, for a project plan and additional details. The activity includes a plan for a small shelf bracket.
   b. For additional project plans, see *Agricultural Mechanics Building Plans* and *Agricultural Mechanics Plans (Set)*, available from the Instructional Materials Laboratory, University of Missouri-Columbia, accessed November 13, 2003, at http://www.iml.coe.missouri.edu/.

3. The student handout for this activity is a Project Completion Checklist and Project Evaluation Checklist. Students can use the checklists to track the progress of their project and evaluate their work. Supplement or modify the student handout to reflect actual projects as needed.

4. Have students turn in their completed projects.

5. The final assessment score will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

6. ADDITIONAL ACTIVITY: If all students are building the same project, a display board can be made as a teaching aid for the project. To make a display board, mount correctly made examples of each project piece on a board. Label each piece and indicate the number of pieces needed. Have students compare their project pieces with the correctly made examples. Students should make sure their pieces match the examples before proceeding.

Agricultural Mechanics Unit for Agricultural Science II
Unit V—Cold Metal Work
Student Handout

Name_____

Use the Project Completion Checklist and Project Evaluation Checklist to track the progress of your project.

Project Completion Checklist

Procedure	**Date Due**
❑ Master all competencies necessary to complete the project.	
❑ Receive instructor approval to build the project.	
❑ Review safety precautions for tools to be used. You can lose points for not following safety precautions and other assigned procedures.	
❑ Perform a quality control inspection of the project during construction. Use the Project Evaluation Checklist.	
❑ Complete project construction.	
❑ Perform a quality control inspection of the project following completion. Use the Project Evaluation Checklist.	
❑ Turn in the completed project. Your final assessment score will be based on the overall quality of the work and your ability to safely and correctly complete the project within the available time.	

Project Evaluation Checklist

Quality Control and Shop Procedures	Criteria
Quality of Work	❑ Fasteners are correct type and size. ❑ Holes and cut edges are deburred and there are no sharp edges. ❑ Measurements are correct. ❑ Cuts are accurate. ❑ Parts fit well for optimum strength. ❑ Project is square and straight. ❑ Work was completed on time.
Design and Suitability	❑ Project is well balanced, proportional, and pleasing to the eye. ❑ Project is the right size for its use. ❑ Project is suitable for its intended purpose. ❑ Project is good enough to sell.
Safety and Work Habits: Observe these safety procedures whenever you are in the shop.	❑ Know how to use the equipment before you attempt to use it. Only use tools and materials the instructor has approved you to use. ❑ Wear appropriate personal protective equipment. ❑ Follow safety guidelines from your instructor and safety information on labels, equipment, and signs in the work area. ❑ Follow assigned setup and cleanup procedures. ❑ Return equipment and materials to their assigned places. ❑ Do not use equipment that does not function properly. ❑ Tell the instructor about any damaged or malfunctioning equipment.

Agricultural Science II

Agricultural Mechanics Unit for Agricultural Science II
Unit V—Cold Metal Work
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Quality of Work	❑ Fasteners are correct ❑ Holes and cut edges are deburred and there are no sharp edges ❑ Cuts and measurements are accurate ❑ Parts fit well ❑ Project is square and straight ❑ Work was completed on time	Failed	Poor	Fair	Good	Excellent	X 20	
Design and Suitability	❑ Project is well balanced and pleasing to the eye ❑ Project is the right size for its use ❑ Project is suitable for its intended purpose ❑ Project is good enough to sell	Failed	Poor	Fair	Good	Excellent	X 5	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-25)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL								

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Science II

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science II*

Unit: VI. Material Selection, Plan Reading, and Interpretation

Unit Objective:

Students will demonstrate an understanding of material selection and plan reading and interpretation by devising a plan of procedure, cutting list, and bill of materials for a project.

Show-Me Standards: 1.8, CA3

References:

Agricultural Construction Volume I. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Mechanics Building Plans. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Agricultural Mechanics Plans (Set). University of Missouri-Columbia, Instructional Materials Laboratory.

Agricultural Mechanics Unit for Agricultural Science II. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Pastoret, J. *Measurements and Pricing of Primary Wood Materials*. MU Extension. University of Missouri-Columbia. Accessed November 26, 2003, from http://muextension.missouri.edu/explore/agguides/forestry/g05506.htm.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. VI-14 and p. VI-30 (1, 2).

Performance-Based Assessment:

Students will develop a plan of procedure, cutting list, and bill of materials for a project based on a working drawing.

Assessment will be based on the thoroughness and accuracy of the plan of procedure, cutting list, and bill of materials.

Agricultural Mechanics Unit for Agricultural Science II
Unit VI—Material Selection, Plan Reading, and Interpretation
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Have students develop a plan of procedure, cutting list, and bill of materials for a project based on a working drawing.
   a. See the Unit VI Activity, Preparing a Plan of Procedure, Cutting List, and Bill of Materials, pp. VI-45–VI-46, for a project plan and additional details. The activity includes a working drawing for a feed bunk. The plan of procedure, cutting list, and bill of materials for the feed bunk are included on p. VI-31 of the Instructor Guide.
   b. For additional project plans, see *Agricultural Mechanics Building Plans* and *Agricultural Mechanics Plans (Set)*, available from the Instructional Materials Laboratory, University of Missouri-Columbia, accessed November 13, 2003, at http://www.iml.coe.missouri.edu/.
   c. This activity could also be adapted for use with students' class projects, if desired.

2. The student handout for this activity is a cutting list work sheet, a bill of materials work sheet, and a plan of procedure work sheet.
   a. The student handout work sheets are adapted from WS 3.1, Estimated Bill of Materials, p. VI-33, and WS 4.1, List of Tools and Procedures, p. VI-45, of *Agricultural Construction Volume I*, available from the Instructional Materials Laboratory, University of Missouri-Columbia, accessed November 13, 2003, at http://www.iml.coe.missouri.edu/.
   b. For additional work sheets, handouts, and related material, see Unit VI, Project Construction, of *Agricultural Construction Volume I*.

3. The final assessment score will be based on the overall thoroughness and accuracy of the plan of procedure, cutting list, and bill of materials.

4. ADDITIONAL ACTIVITY: Divide the class into groups. Have the groups draw up a purchasing bill of material for the same project but assign each group different materials for the project. Variations in materials could include different types of material and different grades or dimensions of lumber. Have students present their findings to the class. Lead a discussion comparing the bills of materials. Ask students to explain which materials they would use and why.

Agricultural Mechanics Unit for Agricultural Science II
Unit VI—Material Selection, Plan Reading, and Interpretation
Student Handout

Date_____ **Name**_____

Project Title_____

Cutting List

Develop a cutting list from a working drawing.

Number of Pieces	Dimensions	Stock	Part and Use

Date_____

Project Title_____

Bill of Materials

Determine the materials you will need from a working drawing. Write "N/A" if a heading does not apply to a particular material.

Number of Pieces or Amount of Material	Dimensions	Material

Date_____ **Name**_____

Project Title_____

Plan of Procedure

Develop of plan of procedure from a working drawing.

Construction Procedure

Agricultural Science II

Agricultural Mechanics Unit for Agricultural Science II
Unit VI—Material Selection, Plan Reading, and Interpretation
Scoring Guide

Name _____

Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Cutting list includes all necessary materials in their final dimensions	Failed	Poor	Fair	Good	Excellent	X 7.5	
Bill of materials includes all necessary materials in standard dimensions, as well as any fasteners and finish	Failed	Poor	Fair	Good	Excellent	X 7.5	
Plan of procedure includes all steps needed to complete the project	Failed	Poor	Fair	Good	Excellent	X 10	

Final Assessment Total _____**/100 pts.**

Comments:

Agricultural Science II

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science II*

Unit: VII. Painting and Finishing

Unit Objective:

Students will apply principles of painting by finishing a project using air spray or airless spray equipment.

Show-Me Standards: 2.5, CA3

References:

Agricultural Construction Volume II. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Mechanics Unit for Agricultural Science II. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Healthy Indoor Painting Practices. U. S. Consumer Product Safety Commission. Accessed November 25, 2003, from http://www.cpsc.gov/cpscpub/pubs/456.pdf.

Safe Use, Storage and Disposal of Paint. Household Hazardous Waste Project. MU Extension. University of Missouri-Columbia. Accessed November 20, 2003, from http://muextension.missouri.edu/explore/wasteman/wm6001.htm.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete AS 1.1, Spray Painting.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. VII-8.

Performance-Based Assessment:

Students will finish a project using air spray or airless spray equipment. Acceptable projects would include those made for the Agricultural Science II class or outside projects that the instructor determines are appropriate for the curriculum. Students will choose the appropriate primer, paint, and other necessary supplies.

Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Mechanics Unit for Agricultural Science II
Unit VII—Painting and Finishing
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt AS 1.1, Spray Painting, to assess student competency at painting with spray equipment. Review or supplement the lesson as needed, based on student mastery of these procedures and the equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit to finish a project using spray painting equipment.
   a. Choose projects based on the skill level of the students and the time available to work on the project. For example, if students built projects for the Agricultural Science II class, have them paint these projects.
   b. If students bring in outside projects to be painted, screen these projects to determine if they are appropriate for the curriculum and can be completed in the time available.

3. Have students choose appropriate primer, paint, and other necessary supplies. Review and approve students' material and equipment selection before they begin working.

4. The student handout for this activity is a Project Completion Checklist and Project Evaluation Checklist. Students can use the checklists to track the progress of their project and evaluate their work. Supplement or modify the student handout to reflect actual projects as needed.

5. Have students turn in their completed projects.

6. The final assessment score will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Mechanics Unit for Agricultural Science II
Unit VII—Painting and Finishing
Student Handout

Name_____

Use the Project Completion Checklist and Project Evaluation Checklist to track the progress of your project.

Project Completion Checklist

Procedure	**Date Due**
❑ Master all competencies necessary to complete the project.	
❑ Receive instructor approval for the materials and equipment you plan to use. Are they appropriate for the project?	
❑ Review safety precautions for the materials and equipment you will use. You can lose points for not following safety precautions and other assigned procedures.	
❑ Prepare the project surface.	
❑ Apply the primer coat.	
❑ Paint the project.	
❑ Clean all equipment using the appropriate cleaner. Return the equipment and materials to their proper place and dispose of rags and other hazardous materials properly. You can lose points for not following assigned cleanup procedures.	
❑ Perform a quality control inspection of the project following completion. Use the Project Evaluation Checklist.	
❑ Turn in the completed project. Your final assessment score will be based on the overall quality of the work and your ability to safely and correctly complete the project within the available time.	

Project Evaluation Checklist

Quality Control and Shop Procedures	Criteria
Quality of Work	❑ Primer is appropriate for the project. ❑ Primer is properly applied. ❑ Paint is appropriate for the project. ❑ Paint is properly applied. ❑ Paint job is of high quality and pleasing to the eye: no runs, streaks, or orange peeling. ❑ Project is good enough to sell. ❑ Work was completed on time.
Safety and Work Habits: Observe these safety procedures whenever you are in the shop.	❑ Know how to use the equipment and materials before you attempt to use them. Only use equipment and materials the instructor has approved you to use. ❑ Wear appropriate personal protective equipment. ❑ Follow safety guidelines from your instructor and safety information on labels, equipment, and signs in the work area. ❑ Do not use primers, finishes, or other products with missing or unreadable labels. ❑ Follow assigned setup and cleanup procedures. ❑ Return equipment and materials to their assigned places.

Agricultural Mechanics Unit for Agricultural Science II
Unit VII—Painting and Finishing
Scoring Guide

Name _____

Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Primer is appropriate and properly applied	Failed	Poor	Fair	Good	Excellent	X 5	
Paint is appropriate and properly applied	Failed	Poor	Fair	Good	Excellent	X 5	
Paint job is of high quality and pleasing to the eye	Failed	Poor	Fair	Good	Excellent	X 5	
Project is good enough to sell	Failed	Poor	Fair	Good	Excellent	X 5	
Work was completed on time	Failed	Poor	Fair	Good	Excellent	X 5	
Student followed all safety precautions	**Passed**				**Failed**	**X (-25)**	Negative Points *
Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL							

Final Assessment Total _____/100 pts.
***Overall combined score cannot be below 0.**

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: I. Overview

Unit Objective:

Students will demonstrate an understanding of how governmental policies and current trends influence agriculture by explaining, in an oral presentation, how a particular policy or trend has affected agriculture in their state.

Show-Me Standards: 1.8, CA6

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

MDC Private Land Assistance. Missouri Department of Conservation. Accessed March 11, 2004, from http://www.conservation.state.mo.us/landown/.

Missouri Cattlemen's Association. Accessed October 7, 2003, from http://www.mocattle.org/.

National Association of Conservation Districts. Accessed March 8, 2004, from http://www.nacdnet.org/.

National Pork Board. Accessed October 7, 2003, from http://www.porkboard.org/Home/default.asp.

Progressive Farmer.com. Accessed October 3, 2003, from http://www.progressivefarmer.com/farmer/.

Soil and Water Conservation Program. Missouri Department of Natural Resources. Accessed March 12, 2004, from http://www.dnr.state.mo.us/wpscd/swcp/service1.htm.

Successful Farming Online. Accessed October 3, 2003, from http://www.agriculture.com/sfonline/index.html.

United States Department of Agriculture. Accessed March 8, 2004, from http://www.usda.gov/.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 4.
- Students will complete AS 2.1, Missouri Cropland; and AS 4.1, The World Trade Organization (WTO).
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. I-6 (3), p. I-32 (1), and p. I-45.

Performance-Based Assessment:

Students will be divided into groups. Each group will develop an oral report that explains how a governmental program or agreement, such as the North American Free Trade Agreement, or a current trend in agriculture, such as precision farming, has affected agriculture within the state. Students should include appropriate visual elements, such as illustrations, graphs, or charts, to make the report interesting and support the information in the report.

Assessment will be based on the overall content and presentation of the report.

Unit I—Overview
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Prior to assigning the investigative portion of this assessment activity, lead a class discussion about governmental programs, trade agreements, and trends currently affecting agriculture. See Lesson 4, Government Influence and Current Trends, for study questions and topics.

2. Have students brainstorm about programs and trends affecting agriculture in their state and make a list of topics on the board. Sample topics could include the following:
   - ❑ Trade agreements, such as the North American Free Trade Agreement
   - ❑ Farming techniques, such as precision farming
   - ❑ Bioengineered products, such as Bt corn
   - ❑ Soil and water conservation programs, such as the Agricultural Nonpoint Source Special Area Land Treatment (AgNPS SALT) program
   - ❑ Organizations or groups, such as the Midwest Area Rivers Coalition 2000, could also be considered, if desired

3. Divide the class into groups.

4. Assign each group one of the topics or have groups choose their topic, as desired.

5. Have each group develop an oral report that explains how its assigned topic has affected agriculture within the state.

6. Have students incorporate appropriate visual elements into their report, such as illustrations, graphs, or charts, to make the report interesting and support the information in the report. Students could also use presentation software to give their report, if desired.

7. Students may use material found in the unit or discussed in class as well as additional outside material to complete their report.

8. Students may not use the source material word for word and must provide a complete bibliography of their sources following their report.

9. Students should be prepared to answer questions about their topic.

10. The final assessment score will be based on the overall content and presentation of the report.

11. ADDITIONAL ACTIVITY: Invite a guest speaker who is involved in a program such as the AgNPS SALT program to talk to the class about his or her experience. Have students prepare questions for the speaker.

Unit I—Overview
Student Handout

1. The instructor will divide the class into groups and assign each group a program, trend, or agreement that is currently making an impact on agricultural production.

2. Develop an oral report that explains how your topic affects agriculture in your state and present the report to the class.

3. Be prepared to answer questions from the instructor and your classmates about your topic.

4. Include appropriate visuals in your report, such as illustrations, graphs, or charts, to make your report interesting and informative.

5. You may use material found in the unit or discussed in class as well as additional outside material to complete your report.

6. You may not use the source material word for word and must provide the instructor with a complete bibliography of your sources following your report.

7. Your final assessment score will be based on the overall content and presentation of your report.

Advanced Crop Science

Unit I—Overview
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Information and Content of Report	❑ Information is complete ❑ Facts are accurate ❑ Well organized ❑ Supporting materials emphasize and clarify key points ❑ Answers questions from the instructor or students correctly	0 criteria met	1-2 criteria met	3 criteria met	4 criteria met	All 5 criteria met	X 20	
Presentation of Report	❑ Holds audience interest ❑ Speaks clearly and uses correct grammar ❑ Maintains good posture ❑ Needs little or no prompting from the instructor	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: II. Plant Biology

Unit Objective:

Students will apply principles of plant biology by devising a time line for the growth stages of a common crop seed and comparing and contrasting, in a poster, the time line with the actual growth stages of seeds they plant and care for.

Show-Me Standards: 1.3, SC5

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Agriculture Network Information Center. Accessed March 29, 2004, from http://laurel.nal.usda.gov:8080/agnic/.

Agriculture Publications. MU Extension. University of Missouri-Columbia. Accessed October 7, 2003, from http://muextension.missouri.edu/explore/agguides/.

American Society of Plant Biologists. Accessed November 11, 2003, from http://www.aspb.org/.

Exploring Agriculture in America. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Plant Science. University of Missouri-Columbia, Instructional Materials Laboratory, 1991.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. II-6 (1, 2) and p. II-23.

Performance-Based Assessment:

Students will be divided into groups. Each group will devise a time line that outlines the expected growth stages of a common crop seed, such as corn, wheat, sorghum, or soybeans. Students will also plant actual seeds for their assigned crop and care for and record the progress of the seeds over the course of the activity. They will create a poster that compares and contrasts the expected growth stages with the actual growth stages of the seeds they plant. The poster will be displayed in class.

Assessment will be based on the overall content and presentation of the poster and the ability to care for the assigned plants.

Unit II—Plant Biology
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. NOTE: For this activity, students will plant seeds and follow their growth stages. Be sure to assign appropriate seeds and allow enough time for seeds to reach the desired growth stage.

2. Divide the class into groups and assign each group a common crop seed discussed in the unit, such as corn, wheat, sorghum, or soybeans.

3. Provide students with the following materials.
   - ❑ Seeds
   - ❑ Containers
   - ❑ Growing medium
   - ❑ Water
   - ❑ Fertilizer

4. Have students plant their seeds.
   a. Explain that students will be responsible for caring for the plants through the course of the activity. Indicate what care procedures students should perform, such as watering and fertilizing.
   b. Review basic plant-care procedures, if needed. Additional plant-care information can be found in the *Plant Science* curriculum guide and the Plant Science unit of the *Exploring Agriculture in America* curriculum guide, which are available from the University of Missouri-Columbia, Instructional Materials Laboratory.

5. Once students have planted their seeds, have the groups develop a time line that charts the expected growth stages of their assigned crop. Have students make their time line on half of a piece of poster board.

6. On the other half of the poster board, have students develop a time line that charts the progress of the seeds they planted. Students should update this time line over the course of the activity.

7. Have students include brief captions on their posters to indicate how the growth stages of their plants are similar to or different from the expected growth stages of their assigned crop.

8. Students should incorporate other elements, such as illustrations, as needed to make their poster interesting and informative.

9. Display completed posters in class.

10. The final assessment score will be based on the overall content and presentation of the poster and the ability to care for the assigned plants.

11. ADDITIONAL ACTIVITY: Choose one or more crops appropriate for your region. Plant some sample seeds in the ground outdoors and others in the greenhouse. Move the greenhouse plants outside when appropriate and label both samples. Have students follow the plants' growth stages over the course of the unit or longer, if desired. Lead a class discussion about the plants and have students compare and contrast the samples.

Unit II—Plant Biology
Student Handout

1. The instructor will divide the class into groups and assign each group a common crop seed.

2. The instructor will provide the following materials.
   - ❑ Seeds
   - ❑ Containers
   - ❑ Growing medium
   - ❑ Water
   - ❑ Fertilizer

3. Plant your sample crop seeds.
   a. You will be responsible for caring for the plants through the course of the activity.
   b. Follow the plant-care schedule determined by the instructor.

4. On one half of a piece of poster board, make a time line that charts the expected growth stages of your assigned crop.

5. On the other half of the poster board, make a time line that charts the progress of the seeds you planted. Update this time line over the course of the activity.

6. Include brief captions on the poster to indicate how the growth stages of your plants are similar to or different from their expected growth stages.

7. Incorporate other elements, such as illustrations, as needed to make your poster interesting and informative.

8. Completed posters will be displayed in class.

9. Your final assessment score will be based on the overall content and presentation of the poster and your ability to care for the assigned plants.

Advanced Crop Science

Unit II—Plant Biology
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Plant Care	Plants are properly cared for	Failed	Poor	Fair	Good	Excellent	X 7.5	
Thoroughness	First time line includes all expected growth stages; second time line follows plant development over the whole activity	Failed	Poor	Fair	Good	Excellent	X 5	
Accuracy	Information in captions is complete and accurate	Failed	Poor	Fair	Good	Excellent	X 5	
Presentation	Poster is well organized and eye-appealing	Failed	Poor	Fair	Good	Excellent	X 5	
Technical	Spelling, grammar, and punctuation are correct	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: III. Soil Fertility and Management

Unit Objective:

Students will apply principles of soil fertility and management by conducting and analyzing soil tests and presenting, in an oral report, their crop recommendation and management strategy for the soil they sampled.

Show-Me Standards: 1.3, SC7

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Back-to-Basics Soil Fertility Information. Accessed November 11, 2003, from http://www.back-to-basics.net/.

Grassland Evaluation Contest Study Guide. University of Missouri-Columbia, Instructional Materials Laboratory, 1997.

"How to Take a Soil Sample." Missouri Department of Conservation. Accessed October 9, 2003, from http://www.conservation.state.mo.us/landown/wild/landmgmt/practices.htm#how.

International Potash Institute. Accessed October 9, 2003, from http://www.ipipotash.org/.

Missouri Cooperative Soil Survey. Accessed March 12, 2004, from http://soils.missouri.edu/.

Soil and Water Publications. MU Extension. University of Missouri-Columbia. Accessed October 9, 2003, from http://muextension.missouri.edu/explore/agguides/soils/index.htm.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 6.
- Students will complete AS 1.1, Estimating Soil Texture by Feel; AS 2.1, Interpreting Soil Survey Books; AS 3.1, Interpreting Soil Test Results; AS 3.2, Collecting a Soil Sample; AS 4.1, Calculating Fertilizer Needs and Cost; AS 5.1, Determining Tillage Costs; AS 5.2, Soil Compaction and How It Develops; AS 5.3, Estimating the Percent of Residue Cover; AS 6.1, Measuring Slope; and AS 6.2 and AS 6.2A, Contour Farming and Soil Erosion.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. III-23, p. III-35, p. III-59, and p. III-70.

Performance-Based Assessment:

Students will work in groups to collect soil samples from an assigned area. Students will categorize the samples based on texture as well as have the soil chemically tested. Based on the results of the physical and chemical tests, they will recommend an appropriate crop and management strategy for the soil. Students will present their findings to the class in an oral report.

Assessment will be based on the accuracy of the interpretation of the soil analysis, crop and management recommendations, and the overall content and presentation of the oral report.

Unit III—Soil Fertility and Management
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Divide the class into groups and assign each group a different area from which to collect soil samples, such as a yard, conservation area, football or softball field, or farm.
   a. If it is more practical, because of time or cost constraints, to only collect and test one composite sample, have students collect samples within one designated site and conduct this activity as a class project.
   b. If the activity is conducted as a class project, have students present their findings in a short written report, rather than an oral report, so that the groups will not be presenting the same information to the class.

2. Have each group collect soil samples to create a composite sample.
   a. Use AS 3.2, Collecting a Soil Sample, p. III-51. See also AS 3.1, Interpreting Soil Test Results, p. III-49, which can be used to identify components of a soil test and interpret the results.
   b. Be sure to collect samples early and allow enough time to receive a response if samples are submitted to an outside agency for testing.

3. Have students determine the soil texture based on feel. Use AS 1.1, Estimating Soil Texture by Feel, p. III-17.

4. Test the soil samples by having students submit their composite samples to a University of Missouri Outreach & Extension office or by testing the samples in class.
   a. Extension offices can be located by searching the University of Missouri Outreach & Extension web site at http://outreach.missouri.edu/regions/.
   b. If samples are tested in class, provide testing equipment and explain how to use it properly.
   c. If students test the samples, verify the accuracy of their results by retesting the samples.

5. Based on the results of the physical and chemical tests, have the students recommend an appropriate crop and management plan for the soil they sampled. Have students present their findings to the class as an oral report.

6. Indicate what information students must provide for their samples in their report. Topics could include the following:
   - ❑ Description of topography
   - ❑ Physical properties of the sample
   - ❑ Interpretation of physical properties
   - ❑ Soil analysis results
   - ❑ Interpretation of soil analysis
   - ❑ Crop recommendation
   - ❑ Management plan

7. Students should be prepared to answer questions about their interpretations and recommendations.

8. Students should also incorporate other elements, such as charts or illustrations, and make use of presentation software or other equipment or material as needed to make the report interesting and informative.

9. The final assessment score will be based on the accuracy of the interpretations of the physical and chemical soil test results, crop and management recommendations, and the overall content and presentation of the report.

Unit III—Soil Fertility and Management
Student Handout

1. The instructor will divide the class into groups and assign each group an area from which to collect soil samples.

2. Use the procedures in AS 1.1, Estimating Soil Texture by Feel, to estimate the soil's sand, silt, and clay content and determine its texture.

3. Submit your composite sample for testing.

4. Compile your observations and test results and present your findings to the class as an oral report. Keep in mind questions such as the following:
   - ❑ What is the topography of the sample area like?
   - ❑ What are the physical characteristics of the soil?
   - ❑ What do the physical characteristics indicate about the sample?
   - ❑ What does the soil analysis indicate about the sample?
   - ❑ Based on the physical characteristics and the soil analysis results, what crop would I plant in this type of soil?
   - ❑ What management plan would I recommend?

5. Be prepared to answer questions about your interpretations and recommendations.

6. Incorporate other elements, such as charts or illustrations, and make use of presentation software or other equipment or material as needed to make your report interesting and informative.

7. Your final assessment score will be based on the accuracy of your interpretations of the physical and chemical soil test results, crop and management recommendations, and the overall content and presentation of your report.

Advanced Crop Science

Unit III—Soil Fertility and Management
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Information and Content of Oral Report	❑ Information is complete ❑ Crop and management recommendations are valid ❑ Interpretation of physical and chemical soil tests are accurate ❑ Report is well organized ❑ Good use of supporting materials	0 criteria met	1-2 criteria met	3 criteria met	4 criteria met	All 5 criteria met	X 20	
Presentation of Oral Report	❑ Holds audience interest ❑ Speaks clearly and uses correct grammar ❑ Maintains good posture ❑ Needs little or no prompting from the instructor	0 criteria met	1 criterion met	2 criteria met	3 criteria met	4 criteria met	X 5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: IV. Identifying and Selecting Crops and Seeds

Unit Objective:

Students will demonstrate an understanding of basic principles of plant identification by collecting common crop and grassland plants, identifying them by their leaf characteristics, and presenting them on a poster or in another format, as determined by the instructor.

Show-Me Standards: 1.3, CA1

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Crop and Grassland Plant Identification Manual. University of Missouri-Columbia, Instructional Materials Laboratory, 1997.

Forage Identification Pages. Purdue University. Accessed November 11, 2003, from http://www.agry.purdue.edu/ext/forages/forageid.htm.

Kallenbach, R. L., & Bishop-Hurley, G. J. *A Guide to the Common Forages and Weeds of Pastures*. MU Extension. University of Missouri-Columbia. Accessed October 15, 2003, from http://muextension.missouri.edu/explore/manuals/m00169.htm.

Leaf Terms. MBG Net. Missouri Botanical Garden. Accessed October 27, 2003, from http://mbgnet.mobot.org/sets/temp/lftypes.htm.

Missouri CDE Handbook. Accessed March 12, 2004, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Plants of Missouri. Missouri Department of Conservation. Accessed October 14, 2003, from http://www.conservation.state.mo.us/.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 3.2, Identify Plant Seeds.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. IV-6 (2) and p. IV-45 (2).

Performance-Based Assessment:

Students will work in groups to identify common crop and grassland plants by their leaf characteristics. The groups will locate and identify samples that illustrate characteristics discussed in the unit—leaf and bud arrangement, leaf venation, leaf type, leaf shape, and leaf margin. They will present their collection on a poster or in another format, as determined by the instructor.

Assessment will be based on the overall content and presentation of the collection.

Unit IV—Identifying and Selecting Crops and Seeds
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Divide the class into groups.

2. Have each group collect and identify samples of common crop and grassland plants. Indicate how many samples students should collect.
   a. Students may use outside sources to help them in the identification process. For example, information regarding Missouri plants can be found on the Missouri Department of Conservation web site at http://www.conservation.state.mo.us/. An ID manual, the *Crop and Grassland Plant Identification Manual*, is available from the University of Missouri-Columbia, Instructional Materials Laboratory.
   b. For a list of common crop and grassland plants, see the Crop Plant and Weed Plant list that accompanies the Agronomy Career Development Event. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.
   c. If students do use web sites or other sources to help identify plants, they must turn in a list of these sources along with their completed project.

3. Have students classify the samples by their leaf characteristics and present the collection on a poster. Students should classify each sample according to each of the characteristics listed below.
   - ❑ Leaf and bud arrangement
   - ❑ Venation
   - ❑ Margin
   - ❑ Leaf type
   - ❑ Leaf shape
   - ❑ Base shape
   - ❑ Tip shape

4. If preferred, have students assemble their collection in a different format, such as in a binder or as a presentation using presentation software. Tell students what format is preferable. Adjust the student handout and scoring guide accordingly as needed.

5. Use TM 1.1, Leaf Characteristics, to explain or review the different physical characteristics of leaves. NOTE: Because the leaf characteristic illustrations in the TM are not included in the Student Reference, it might be useful to post the illustrations in class.

6. Display completed posters in class.

7. The final assessment score will be based on the overall content and presentation of the collection.

Unit IV—Identifying and Selecting Crops and Seeds
Student Handout

1. The instructor will divide the class into groups.

2. Collect and identify samples of common crop and grassland plants.

3. Classify the samples by their leaf characteristics. Classify each sample according to each of the characteristics listed below.
   - ❑ Leaf and bud arrangement
   - ❑ Venation
   - ❑ Margin
   - ❑ Leaf type
   - ❑ Leaf shape
   - ❑ Base shape
   - ❑ Tip shape

4. Assemble and present your collection as directed by the instructor.

5. You may use outside sources to help identify the crops and plants. Turn in a list of any sources you used to identify plants along with your completed collection.

6. Your final assessment score will be based on the overall content and presentation of your collection.

Advanced Crop Science

Unit IV—Identifying and Selecting Crops and Seeds
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Information and Content	Collection includes a representative sample of crop and grassland plants in which plants and leaf characteristics are correctly identified	Failed	Poor	Fair	Good	Excellent	X 17.5	
Presentation	Collection is well organized and eye-appealing	Failed	Poor	Fair	Good	Excellent	X 5	
Technical Considerations	Spelling, grammar, and punctuation are correct	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: V. Safety, Environment, and Legal Issues

Unit Objective:

Students will demonstrate an understanding of the importance of safety and environmental and legal responsibility in agriculture by identifying and explaining a relevant current safety, environmental, or legal issue in a written report.

Show-Me Standards: 2.1, SC8

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Agricultural Safety. National Safety Council. Accessed November 11, 2003, from http://www.nsc.org/issues/agrisafe.htm.

Chemical Application Information. University of Georgia College of Agricultural and Environmental Sciences. Accessed November 11, 2003, from http://www.cpes.peachnet.edu/spray/.

Guide Sheets. University of Missouri Outreach & Extension. Accessed October 27, 2003, from http://www.fse.missouri.edu/ruralsafety/guide_sheets.htm.

National Ag Safety Database, Accessed October 27, 2003, from http://www.cdc.gov/nasd/index.html.

Pesticide Applicator Training. University of Missouri-Columbia. Accessed October 28, 2003, from http://ipm.missouri.edu/pat/index.asp.

Smart Communities Network. U. S. Department of Energy. Accessed November 11, 2003, from http://www.sustainable.doe.gov/.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 1.1, Farm Safety Survey; and AS 3.1, Legal Land Descriptions.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. V-15 (1, 2) and p. V-26 (2).

Performance-Based Assessment:

Each student will identify a current safety, environmental, or legal issue and explain how that issue affects crop producers and crop production in a written report. Students should include appropriate visual elements, such as illustrations, graphs, or charts, to make the report interesting and support the information in the report.

Assessment will be based on the overall content and presentation of the report.

Unit V—Safety, Environment, and Legal Issues
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Lead the class in a discussion to identify current safety, environmental, and legal issues in agriculture and make a list of topics on the board. Sample topics could include the following:
   - ❑ Potential dangers and necessary safeguards associated with farm equipment
   - ❑ Requirements for private and commercial pesticide applicator training
   - ❑ Effective soil management practices
   - ❑ Importance of waste management
   - ❑ Legal liabilities for mishandling chemicals

2. Have students choose a topic and explain how that issue affects crop producers and crop production in a written report.

3. Students may use material found in the unit or discussed in class as well as additional outside material to complete their report.
   a. Students may not use the source material word for word and must provide a complete bibliography of their sources along with their report.
   b. Students should include appropriate visual elements, such as illustrations, graphs, or charts, to make the report interesting and support the information in the report.

4. The final assessment score will be based on the overall content and presentation of the report.

5. ADDITIONAL ACTIVITIES:
   a. Suggest that students receive private pesticide applicator certification. Information regarding certification is available from the University of Missouri-Columbia at Pesticide Applicator Training, accessed October 28, 2003, from http://ipm.missouri.edu/pat/index.asp.
   b. Invite one or more experts to discuss specific safety, environmental, or legal issues in agriculture. Have students prepare questions for the speaker.

Unit V—Safety, Environment, and Legal Issues
Student Handout

1. Choose a current safety, environmental, or legal issue related to agriculture.

2. Explain in a written report how your chosen issue affects crop producers and crop production.

3. You may use material found in the unit or discussed in class as well as additional outside material to complete your report.

4. You may not use the source material word for word and must provide a complete bibliography of your sources along with your report.

5. Include appropriate visual elements, such as illustrations, graphs, or charts, to make the report interesting and support the information in the report.

6. Your final assessment score will be based on the overall content and presentation of your report.

Advanced Crop Science

Unit V—Safety, Environment, and Legal Issues
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Thoroughness	Information is complete; report provides a thorough overview of the topic	Failed	Poor	Fair	Good	Excellent	X 8.75	
Accuracy	Facts are accurate	Failed	Poor	Fair	Good	Excellent	X 8.75	
Presentation	Report is clear and well organized	Failed	Poor	Fair	Good	Excellent	X 2.5	
Supporting Materials	Supporting materials emphasize key points	Failed	Poor	Fair	Good	Excellent	X 2.5	
Technical Considerations	Spelling, grammar, and punctuation are correct	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: VI. Corn and Grain Sorghum Production

Unit Objective:

Students will demonstrate an understanding of basic principles of corn and grain sorghum production by explaining, in an oral report, a key aspect of production and developing five questions about their topic that can be used for a class review.

Show-Me Standards: 2.1, SC8

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Crops. *Missouri Farm Facts*. Accessed October 28, 2003, from http://agebb.missouri.edu/mass/farmfact/crops/index.htm.

Crops Publications. MU Extension. University of Missouri-Columbia. Accessed October 28, 2003 from http://muextension.missouri.edu/explore/agguides/crops/index.htm.

Missouri Corn Online. Missouri Corn Growers Association. Accessed October 28, 2003, from http://www.mocorn.org/.

National Corn Growers Association. Accessed October 28, 2003, from http://www.ncga.com/.

National Grain Sorghum Producers. Accessed November 11, 2003, from http://www.sorghumgrowers.com/.

University of Missouri Grain Sorghum Production Page. Accessed October 28, 2003, from http://www.psu.missouri.edu/cropsys/Grain_Sorghum/.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 8.
- Students will complete AS 1.1, Ingredients for a Successful Crop of Corn; AS 2.1, Identifying Corn and Sorghum Diseases; AS 3.1, Figuring Corn Populations and Costs; AS 4.1, Corn and Grain Sorghum Pests; AS 5.1, Determining Replanting Costs and Returns; AS 6.1, Measuring Harvest Losses; AS 7.1, Determining Storage Break-Even Costs; and AS 8.1, Determining Crop Costs and Returns.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. VI-5, p. VI-20, p. VI-45, and pp. VI-91–VI-92 (1, 2).

Performance-Based Assessment:

Students will be divided into groups. Each group will develop an oral report that explains a key aspect of corn and grain sorghum production, such as selecting a planting method or harvesting the crop. Each group will also develop five questions about its assigned topic that can be used by the instructor for a class review. Presentations should be from 5 to 15 minutes long and include appropriate supporting material, such as illustrations, tables, or charts.

Assessment will be based on the overall content and presentation of the report and the review questions.

Unit VI—Corn and Grain Sorghum Production
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Divide the class into groups and assign each group a key aspect of corn and grain sorghum production discussed in the unit. Choose topics from those listed below, which correspond to the lessons in the unit.
   - ❑ Planning the crop
   - ❑ Selecting a variety
   - ❑ Selecting a tillage and planning method
   - ❑ Selecting a pest control program
   - ❑ Scouting and maintaining the crop
   - ❑ Harvesting the crop
   - ❑ Marketing the crop
   - ❑ Figuring crop costs

2. Have each group develop an oral report about its topic and give the report to the class. Reports should be from 5 to 15 minutes long.

3. Have the groups write five questions and answers based on the material they present in their report.
   a. Questions should be short answer or multiple choice.
   b. Students should turn in their questions and answers following their report.

4. Have students incorporate other elements, such as illustrations, and make use of presentation software or other equipment or material as needed to make the report interesting and informative.

5. Students may use material found in the unit or discussed in class as well as additional outside material to complete their report.

6. Students may not use the source material word for word and must provide a complete bibliography of their sources following their report.

7. Students should be prepared to answer questions about their topic.

8. Guide or correct the students' presentations, if needed.

9. Following the reports, read through the students' questions and answers about their topic and check them for accuracy.

10. Use some or all of the questions for a class review of corn and grain sorghum production.

11. The final assessment score will be based on the overall content and presentation of the report and the review questions.

12. ADDITIONAL ACTIVITIES:
    a. Lead a discussion about nontraditional uses for products and by-products of corn and grain sorghum production. Have students provide examples and write the examples on a poster. Each day challenge the students to think of additional products and applications to add to the poster.
    b. Have students identify a nontraditional use for a product or by-product of corn or grain sorghum production and briefly explain it to the class. Students could work independently or in small groups.

Unit VI—Corn and Grain Sorghum Production
Student Handout

1. The instructor will divide the class into groups and assign each group a topic related to corn and grain sorghum production.

2. Develop an oral report that explains the key factors and considerations concerning your topic. Reports should be from 5 to 15 minutes long.

3. Write five questions and answers based on the material in your report.
   a. Questions should be short answer or multiple choice.
   b. You will turn in your questions following your report.

4. Include other elements, such as illustrations, and make use of presentation software or other equipment or material as needed to make your report interesting and informative.

5. You may use material found in the unit or discussed in class as well as additional outside material to complete your report.

6. You may not use the source material word for word and must provide the instructor with a complete bibliography of your sources following your report.

7. Present your report to the class. Be prepared to answer questions from the instructor and your classmates about your topic.

8. Your final assessment score will be based on the content and presentation of your report and the questions you wrote about your topic.

Advanced Crop Science

Unit VI—Corn and Grain Sorghum Production
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Information and Content of Report	❑ Information is complete ❑ Facts are accurate ❑ Report gives a thorough overview of the topic ❑ Includes five review questions and correct answers	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 17.5	
Presentation of Report	❑ Well organized ❑ Uses correct grammar ❑ Good use of supporting material ❑ Needs little or no prompting from the instructor	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5	
Delivery of Report	❑ Holds audience interest ❑ Speaks clearly ❑ Maintains good posture ❑ Maintains eye contact	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: VII. Soybean Production

Unit Objective:

Students will demonstrate an understanding of basic principles of soybean production by comparing and contrasting the management decisions applied by regional soybean producers and presenting their findings in an oral report.

Show-Me Standards: 2.1, CA6

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Missouri Soybean Association. Accessed October 30, 2003, from http://www.mosoy.org/MSA/msa.htm.

Soybeans. Missouri Farm Facts. Accessed October 30, 2003, from http://agebb.missouri.edu/mass/farmfact/crops/soybean/index.htm.

Soybeans. MU Extension. University of Missouri-Columbia. Accessed October 30, 2003, from http://muextension.missouri.edu/explore/agguides/crops/#Soybeans.

United Soybean Board. Accessed November 11, 2003, from http://www.unitedsoybean.org/.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 8.
- Students will complete AS 2.1, Selecting a Seed Variety; AS 2.2, Identify Soybean Diseases; AS 3.1, Determining Planting Rates; AS 4.1, Matching Herbicides to Specific Weeds; AS 5.1, Soybean Replant Worksheet; AS 6.1, Measuring Harvest Loss; AS 7.1, Figuring Soybean Returns; and AS 8.1, Determining Soybean Costs.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. VII-27, p. VII-37, p. VII-59, and p. VII-71.

Performance-Based Assessment:

Students will work in groups to compare and contrast the management decisions applied by soybean producers in their area. Each group will interview a different soybean producer to learn about the operation and management techniques the producer prefers and why. Following the interviews, groups will be paired to compare and contrast their findings. The groups will present their findings to the class in an oral report.

Assessment will be based on the overall content and presentation of the report.

Unit VII—Soybean Production
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Prior to assigning the performance-based assessment activity, contact soybean producers in the area and develop a list of producers willing to be interviewed by students. NOTE: It is preferable to have more producers, rather than fewer, if possible, because this will provide more opportunity for varied management styles and will help ensure a sufficient number of producers in case any must later cancel the interview. If possible, contact producers whose operations reflect the diversified uses of soybeans.

2. Divide the class into an even number of groups and assign each group one of the soybean producers to interview. If preferred, arrange for telephone interviews with the producers or have them attend class for a panel discussion.

3. Lead students in a discussion to establish key topics and develop a uniform interview questionnaire. A uniform questionnaire is important because students will be comparing and contrasting information they collect. Sample questions might include the following:
   - ❑ How did you get started working with soybeans?
   - ❑ What planting method do you use and why do you prefer this method?
   - ❑ What weeds represent the biggest threat to your crop and how do you control them?
   - ❑ What crops do you rotate with your soybeans?
   - ❑ What is the biggest challenge you face in your operation?
   - ❑ What do you foresee for the future of your operation?
   - ❑ What advice would you give to someone who is considering a career in soybean production?

4. Have the students interview their assigned producer about his or her soybean operation and management techniques.

5. Following the interviews, pair up groups to discuss how the two operations are similar and different. Each group will present its findings to the class in an oral report.

a. Explain that the pairs of groups should discuss their presentations so that their reports work together to provide a clear and thorough picture of the two operations rather than presenting the same information.
b. Students should be prepared to answer questions about their reports.

6. The final assessment score will be based on the overall content and presentation of the report.

7. ADDITIONAL ACTIVITIES:
   a. Lead a discussion about non-traditional uses for products and by-products of soybean production. Have students provide examples and write the examples on a poster. Each day challenge the students to think of additional products and applications to add to the poster.
   b. Have students identify a non-traditional use for a product or by-product of soybean production and briefly explain it to the class. Students could work independently or in small groups.

Unit VII—Soybean Production
Student Handout

1. The instructor will divide the class into groups and provide each group with the name of a soybean producer.

2. Your group will interview the producer about his or her soybean operation and management techniques.

3. Following the interviews, your group will meet with another group to discuss how the two operations are similar and different.

4. Present your findings to the class in an oral report. Remember that your group's report should work with the other group's report to provide a clear and thorough picture of the two operations rather than present the same information.

5. Be prepared to answer questions from your instructor and classmates regarding your report.

6. Your final assessment score will be based on the content and presentation of your report.

Advanced Crop Science

Unit VII—Soybean Production
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Information and Content of Report	❑ Addresses all key topics and questionnaire questions ❑ Information is complete ❑ Facts are accurate ❑ Report works well with other group's report and does not present the same information	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 20	
Presentation of Report	❑ Well organized ❑ Engages listeners ❑ Speaks clearly and uses correct grammar ❑ Maintains good posture and eye contact	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: VIII. Wheat and Small Grain Production

Unit Objective:

Students will apply basic principles of wheat and small grain production by devising a calendar that follows a variety of wheat or small grain from field preparation through marketing.

Show-Me Standards: 1.8, SC8

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Grains. MU Extension. University of Missouri-Columbia. Accessed October 31, 2003, from http://muextension.missouri.edu/explore/agguides/crops/#Grains.

Small Grains. Minnesota Association of Wheat Growers. Accessed November 11, 2003, from http://www.smallgrains.org/.

University of Missouri Small Grain Production Page. Accessed October 31, 2003, from http://www.psu.missouri.edu/cropsys/Wheat/.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 8.
- Students will complete AS 2.3, Wheat and Small Grain Diseases; AS 3.1, Making Planting Decisions; AS 5.1, Determining the Corrective Action; and AS 6.1, Determining Grain Loss and Moisture.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. VIII-5 (1) and p. VIII-20.

Performance-Based Assessment:

The instructor will randomly assign each student a variety of wheat or small grain discussed in the unit. Students will devise a calendar that follows their assigned grain from the planning stages through marketing. The calendar should include the appropriate time and a brief description of the student's management strategy for each of the following: planning the crop, tillage and planting method, pest control, scouting and maintenance, harvesting, marketing, and figuring costs. Students will present their calendar on a poster or in another format, as determined by the instructor.

Assessment will be based on the overall content and presentation of the production calendar.

Unit VIII—Wheat and Small Grain Production
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Randomly assign each student a variety of wheat or small grain discussed in the unit. If preferred, divide students into groups and assign each group a type of wheat or small grain.

2. Have students design a yearlong calendar that follows their assigned grain from the planning stages through marketing. The calendar should include the appropriate time and a brief description of the student's management strategy for each of the following:
   - ❑ Planning the crop
   - ❑ Tillage and planting method
   - ❑ Pest control
   - ❑ Scouting and maintenance
   - ❑ Harvesting
   - ❑ Marketing
   - ❑ Figuring costs

3. Have students present their calendar on a poster, which will be displayed in class. If preferred, have students make their calendar using presentation software. Tell students what format is preferable. Adjust the student handout and scoring guide accordingly as needed.

4. Have students incorporate other elements, such as illustrations, as needed to make their calendar interesting and informative.

5. Students may use material found in the unit or discussed in class as well as additional outside material to complete their calendar.

6. Students may not use the source material word for word and must provide a complete bibliography of their sources along with their calendar.

7. Display completed posters in class.

8. The final assessment score will be based on the overall content and presentation of the production calendar.

Unit VIII—Wheat and Small Grain Production
Student Handout

1. The instructor will assign you a variety of wheat or small grain.

2. Design a yearlong calendar that follows your assigned grain from the planning stages through marketing. The calendar should include the appropriate time and a brief description of your management strategy for each of the following:
   - ❑ Planning the crop
   - ❑ Tillage and planting method
   - ❑ Pest control
   - ❑ Scouting and maintenance
   - ❑ Harvesting
   - ❑ Marketing
   - ❑ Figuring costs

3. Present your calendar as directed by the instructor.

4. Include other elements, such as illustrations, as needed to make your calendar interesting and informative.

5. You may use material found in the unit or discussed in class as well as additional outside material to complete your calendar.

6. You may not use the source material word for word and must provide the instructor with a complete bibliography of your sources along with your calendar.

7. Your final assessment score will be based on the overall content and presentation of your production calendar.

Advanced Crop Science

Unit VIII—Wheat and Small Grain Production
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Thoroughness	Calendar addresses all key topics and provides a thorough overview of crop production from planning through marketing	Failed	Poor	Fair	Good	Excellent	X 10	
Accuracy	Information is accurate	Failed	Poor	Fair	Good	Excellent	X 7.5	
Presentation	Calendar is well organized and eye-appealing	Failed	Poor	Fair	Good	Excellent	X 5	
Technical Considerations	Spelling, grammar, and punctuation are correct	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: IX. Forage Production

Unit Objective:

Students will demonstrate an understanding of forage production by collecting and identifying common forage crops and their seeds and assembling their samples in a binder or other format.

Show-Me Standards: 1.3, SC7

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Crop and Grassland Plant Identification Manual. University of Missouri-Columbia, Instructional Materials Laboratory, 1997.

Forage Information System. Accessed November 11, 2003, from http://forages.oregonstate.edu/default.cfm.

Forages. MU Extension. University of Missouri-Columbia. Accessed November 3, 2003, from http://muextension.missouri.edu/explore/agguides/crops/#Forages.

Grassland Evaluation Contest Study Guide. University of Missouri-Columbia, Instructional Materials Laboratory, 1997.

Missouri CDE Handbook. Accessed March 12, 2004, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 8.
- Students will complete AS 1.1, Evaluating Topography and Soil for Forage Crops; AS 2.1, Identify Characteristics of Cool- and Warm-Season Grasses; and AS 6.1, Forage Seed and Plant Identification.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. IX-16 (2), p. IX-47 (2), and p. IX-76 (2).

Performance-Based Assessment:

As part of the instructional activities for this unit, students will collect and identify five common forage plants and their seeds. For the performance-based assessment activity, students should collect and identify as many additional forage plants and their seeds as they can and assemble all the samples in a binder, photo album, or other format, such as a poster. Students should further describe the forages by identifying each sample as an annual or perennial, a grass or legume, and a cool-season or warm-season crop.

Assessment will be based on the overall content and presentation of the collection.

Unit IX—Forage Production
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. As part of the instructional activities for the unit, have students complete AS 6.1, Forage Seed and Plant Identification.
   a. As part of AS 6.1, students will collect five common forage plants and their seeds. Students will mount the plants and seeds on sheets of paper and identify the plants by their common name.
   b. See AS 6.1 for additional details.

2. For the performance-based assessment activity, have students collect and identify as many additional forage plants and seeds as they can. Students should mount and label the samples in the same way as the samples for AS 6.1. NOTE: For areas where five or more forage samples would be difficult to locate, reduce the assigned number of samples for AS 6.1 and the performance-based assessment activity accordingly.

3. Have students identify each sample as an annual or perennial, a grass or legume, and a cool-season or warm-season crop.

4. Have students assemble all their samples in a binder or photo album. Students could also mount their samples on poster board, if preferred.

5. Students may use material found in the unit or discussed in class as well as additional outside material to identify their samples.

6. If students do use outside sources to help identify plants, they must turn in a list of these sources along with their project.

7. Completed projects could be displayed in class, if desired.

8. The final assessment score will be based on the overall content and presentation of the collection.

9. ADDITIONAL ACTIVITY: Have students evaluate hay samples using the format outlined in the hay judging portion of the Agronomy Career Development Event.

a. Refer to the *Missouri CDE Handbook* for guidelines regarding Career Development Events.
b. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Unit IX—Forage Production
Student Handout

1. Collect samples of common forage plants and their seeds.

2. Mount each plant and its seeds on a separate sheet of paper and write its common name on the bottom of the page. Follow the directions on AS 6.1 for preparing samples, as well as any additional directions from your instructor.

3. Identify each sample as an annual or perennial, a grass or legume, and a cool-season or warm-season crop and write this information on the sheet with the sample.

4. Assemble all your samples in a binder or photo album.

5. You may use material found in the unit or discussed in class as well as additional outside material to identify your samples.

6. Turn in a list of any sources you used to identify plants along with your completed project.

7. Your final assessment score will be based on the overall content and presentation of your collection.

Advanced Crop Science

Unit IX—Forage Production
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Thoroughness	Collection includes a representative assortment of forage crops	Failed	Poor	Fair	Good	Excellent	X 8.75	
Accuracy	Samples are correctly labeled and accurately identified as an annual or perennial, a cool-season or warm-season plant, and a grass or legume	Failed	Poor	Fair	Good	Excellent	X 8.75	
Presentation	Collection is well organized and eye-appealing	Failed	Poor	Fair	Good	Excellent	X 5	
Technical Considerations	Spelling and punctuation are correct	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: X. Cotton Production

Unit Objective:

Students will demonstrate an understanding of basic principles of cotton production by explaining, in a slide show presentation, a key aspect of cotton production in their state.

Show-Me Standards: 1.8, SS7

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Agriculture in the Classroom. Accessed March 16, 2004, from http://www.agclassroom.org/.

Cotton. *Missouri Farm Facts*. Accessed November 5, 2003, from http://agebb.missouri.edu/mass/farmfact/crops/cotton/index.htm.

Cotton. MU Extension. University of Missouri-Columbia. Accessed November 5, 2003, from http://muextension.missouri.edu/explore/agguides/crops/#Cotton.

Crop and Plant Science Links. Agripedia. University of Kentucky College of Agriculture. Accessed March 16, 2004, from http://www.ca.uky.edu/agripedia/links/linkcrop.htm.

The World of Cotton. National Cotton Council of America. Accessed November 5, 2003, from http://www.cotton.org/econ/world/index.cfm.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 8.
- Students will complete AS 1.1, Soil Nutrients Needed by Cotton; AS 2.1, Cotton Variety Seed Selection; AS 5.1, Scouting a Crop; AS 6.1, Evaluating Harvested Cotton; and AS 7.1, Cotton Quality and Effect on Price.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. X-6, p. X-45 (1), and p. X-76.

Performance-Based Assessment:

Students will be divided into groups. Each group will develop a slide show using presentation software that explains a key aspect of cotton production in the state. Topics could include, but are not limited to, steps of production; major pests, weeds, and diseases; most commonly farmed varieties; related industries found within the state; and overall importance to the state's economy. Students will present their completed slide show to the class.

Assessment will be based on the overall content and presentation of the slide show.

Unit X—Cotton Production
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Divide the class into groups and assign each group a topic related to cotton production in the state. Topics could include, but are not limited to, the following:
   - ❑ Steps of production
   - ❑ Major pests, weeds, and diseases
   - ❑ Most commonly farmed varieties
   - ❑ Related industries found within the state
   - ❑ Overall importance to the state's economy

2. Have students develop a slide show using presentation software that illustrates and explains their assigned topic.

3. Students may use material found in the unit or discussed in class as well as additional outside material to complete their slide show.

4. Students may not use the source material word for word and must provide a complete bibliography of their sources.

5. Have students present their completed slide shows to the class.

6. The final assessment score will be based on the overall content and presentation of the slide show.

7. ADDITIONAL ACTIVITY: As a class project, plant some sample cotton seeds and have students follow the plants' growth stages over the course of the unit or longer, if desired.

Unit X—Cotton Production
Student Handout

1. The instructor will divide the class into groups and assign each group a topic related to cotton production in the state.

2. Create a slide show using presentation software that illustrates and explains your assigned topic.

3. In addition to illustrations, include charts, graphs, or other elements as needed to make your presentation interesting and informative.

4. You may use material found in the unit or discussed in class as well as additional outside material to complete your slide show.

5. You may not use the source material word for word and must provide the instructor with a complete bibliography of your sources following your presentation.

6. Present your completed slide show to the class.

7. Your final assessment score will be based on the overall content and presentation of your slide show.

Advanced Crop Science

Unit X—Cotton Production
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Information and Content	Information is complete and facts are accurate	Failed	Poor	Fair	Good	Excellent	X 8.75	
Supporting Materials	Slides—illustrations, graphs, charts, etc.—emphasize key points	Failed	Poor	Fair	Good	Excellent	X 8.75	
Presentation of Slide Show	Slide show is well organized and eye-appealing	Failed	Poor	Fair	Good	Excellent	X 5	
Delivery of Slide Show	Slide show is well delivered and holds audience interest	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Advanced Crop Science

Curriculum Guide: *Advanced Crop Science*

Unit: XI. Rice Production

Unit Objective:

Students will demonstrate an understanding of basic principles of rice production by identifying and describing food and nonfood by-products and end products of rice production and presenting their findings on a poster or in a slide show presentation, as determined by the instructor.

Show-Me Standards: 1.2, SC8

References:

Advanced Crop Science. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

California Rice. California Rice Commission. Accessed November 5, 2003, from http://www.calrice.org/home.html.

National Agricultural Statistics Service. U. S. Department of Agriculture. Accessed November 5, 2003, from http://www.usda.gov/nass/.

Rice. Environmental Literacy Council. Accessed November 5, 2003, from http://www.enviroliteracy.org/article.php/573.html.

Riceweb. International Rice Research Institute. Accessed November 11, 2003, from http://www.riceweb.org/.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 7.
- Students will complete AS 5.1, The Harvested Crop; AS 5.2, Features of a Harvested Rice Variety; and AS 6.1, Rice Crops on the Market.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. XI-5 (3), p. XI-16 (2), pp. XI-25–XI-26 (1), p. XI-36 (2, 3), and p. XI-64 (2).

Performance-Based Assessment:

Each student will identify food and nonfood by-products and end products of rice production. For each listing, students will include a caption that provides factual information about that product or use. For example, along with a food use of rice, a student could include information about the nutritional value of rice or the amount of rice the average person consumes in a year. Students will present their findings on a poster or in a slide show presentation, as determined by the instructor.

Assessment will be based on the overall content and presentation of the poster or slide show.

Unit XI—Rice Production
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Have students identify as many different food and nonfood by-products and end products of rice production as they can.
   a. If desired, lead the class in finding a few examples. Guide them toward thinking broadly about rice-related products, if needed.
   b. If desired, have students include a category for potential uses that are being explored through research.

2. For each item, have students write a caption that provides factual information about that product or use. For example, along with a food use of rice, a student could include information about the nutritional value of rice or the amount of rice the average person consumes in a year.

3. Have students present their products, uses, and captions on a poster or have students use their findings to develop a slide show using presentation software. Tell students which format is preferable.

4. Have students incorporate appropriate visual elements, such as illustrations, charts, or graphs, as needed to make the poster or slide show interesting and informative.

5. Students may use material found in the unit or discussed in class as well as additional outside material to complete their poster or slide show.

6. Students may not use the source material word for word and must provide a complete bibliography of their sources along with their poster or slide show.

7. The final assessment score will be based on the overall content and presentation of the poster or slide show.

Unit XI—Rice Production
Student Handout

1. Identify as many different food and nonfood by-products and end products of rice production as you can.

2. For each item, write a caption that provides factual information about that product or use.

3. Present your products, uses, and captions on a poster or use them to make a slide show with presentation software, as directed by your instructor.

4. Include appropriate visual elements, such as illustrations, charts, or graphs, as needed to make the poster or slide show interesting and informative.

5. You may use material found in the unit or discussed in class as well as additional outside material to complete your poster or slide show.

6. You may not use the source material word for word and must provide the instructor with a complete bibliography of your sources along with your poster or slide show.

7. Your final assessment score will be based on the overall content and presentation of your poster or slide show.

Advanced Crop Science

Unit XI—Rice Production
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Thoroughness	Poster or slide show provides a thorough overview of rice-related by-products and end products	Failed	Poor	Fair	Good	Excellent	X 8.75	
Accuracy	Information is accurate	Failed	Poor	Fair	Good	Excellent	X 8.75	
Presentation	Poster or slide show is well organized and eye-appealing	Failed	Poor	Fair	Good	Excellent	X 5	
Technical Considerations	Spelling, grammar, and punctuation are correct	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume I*

Unit: I. Arc Welding

Unit Objective:

Students will apply principles of arc welding by performing common welds, identifying welding equipment, and answering welding-related questions.

Show-Me Standards: 1.10, CA3

References:

Agricultural Construction Volume I. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

American Welding Society. Accessed November 18, 2003, from http://www.aws.org/.

ESAB Knowledge Centre. ESAB. Accessed November 25, 2003, from http://www.esab.com/.

Hobart Institute of Welding Technology. Accessed November 17, 2003, from http://www.welding.org/.

Lincoln Electric. Accessed November 18, 2003, from http://www.lincolnelectric.com/.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Miller Electric. Accessed November 18, 2003, from http://www.millerwelds.com/.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 8.
- Students will complete JS 4.1, Welds in the Flat Position; JS 4.2, Welds in the Horizontal Position; JS 4.3, Welds in the Vertical-Up Position; JS 4.4, Welds in the Vertical-Down Position; JS 4.5, Welds in the Overhead Position; JS 5.1, Prewelding and Postwelding Procedures for GMAW; JS 5.2, Welds in the Flat Position; JS 5.3, Welds in the Horizontal Position; JS 5.4, Welds in the Vertical Position; JS 5.5, Welds in the Overhead Position; JS 6.1, Hardsurfacing; JS 7.1, Welding Cast Iron; JS 8.1, Pipe Welding T-Joints; JS 8.2, Laying Out Angles; JS 8.3, Closing the End of Pipe—Orange-Peel Plug; JS 8.4, Butt Joint—Repositioned; and JS 8.5, Butt Joint—Not Repositioned.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: pp. I-5–I-6 (1, 2, 3), p. I-17 (2), p. I-29 (1, 2, 3, 4), p. I-82 (3), p. I-119 (1), p. I-133 (3), and p. I-147 (3, 4).

Performance-Based Assessment:

Students will perform a series of welds determined by the instructor, identify arc welding equipment, and answer questions about arc welding equipment and procedures. This activity is modeled on the arc welding portion of the Agricultural Mechanics Career Development Event.

Assessment will be based on the ability to safely and correctly perform the assigned welding procedures and on the accuracy of responses to the identification and written assessment portions of the activity.

Agricultural Construction Volume I
Unit I—Arc Welding
Instructor Guide

The instructor should explain the performance-based assessment activity format at the beginning of the unit. Students will work toward completing the competencies necessary to perform the activity as they progress through the unit material. The assessment activity will be due at the completion of the unit.

1. Explain the performance-based assessment activity format at the beginning of the unit: At the completion of the unit, students will perform a series of welds, identify welding-related equipment, and answer questions about welding equipment and procedures. Welds will be determined by the instructor and announced at the time of the performance-based assessment activity.

2. Use or adapt the activity sheets found in the unit to assess student competency at welding. Review or supplement these activities as needed, based on student mastery of the procedures and equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

3. Assign the performance-based assessment activity. The student handout can be used as an outline for the activity or adapted as desired.
   a. Information and directions for the student handout as it is currently written are listed at the end of this instructor guide.
   b. Section II requires some advance setup by the instructor.

4. This activity will help prepare students for the arc welding portion of the Agricultural Mechanics Career Development Event.
   a. Refer to the *Missouri CDE Handbook* for guidelines regarding Career Development Events. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.
   b. Previous years' agricultural mechanics events can be found at http://web.missouri.edu/~pavt0689/statecon.html, accessed July 7, 2003.

5. Have students turn in their welds and completed handouts.

6. The final assessment score will be based on the ability to safely and correctly perform the assigned welding procedures and on the accuracy of responses to the identification and written assessment portions of the activity. All welds must pass destructive testing.

7. ADDITIONAL ACTIVITIES:
   a. Create a display board using the students' best welds. Possible display board themes include the following: each student's best weld, the best example of each type of weld performed by the class, and the best weld of the week.
   b. Create a display board that identifies different metals and their characteristics. Have students contribute samples.

Section I: Welding

1. Have students perform a series of welds that they have mastered as part of the instructional activities for this unit.

Section II: Identification

1. Select ten parts of the shielded metal arc welder, gas metal arc welder, or items of related equipment that have been discussed in class.

2. Label the parts or items with tags A through J.

3. Have students identify the parts on their handouts.

Section III: Written Assessment

1. Have students answer questions about arc welding procedures, equipment, or safety. Multiple-choice and short-answer questions are suggested.

2. The answers to the questions on the student handout are listed below.

Answers to Written Assessment:

1. b

2. c

3. d

4. Students should list four of the following:
   a. Always wear a helmet with the proper shade lens.
   b. Always check the helmet and lens for cracks before using.
   c. Wear long sleeves and gauntlet-style gloves.
   d. Do not leave any skin exposed to rays from the welder.
   e. Shout the word "Cover!" to all people standing nearby when ready to strike the arc.
   f. Never look at the arc with an unprotected eye.

5. Students should list three of the following:
   a. Impurities cause poor fusion or bending of base metals, reducing their strength.
   b. Foreign material or impurities are poor conductors of electricity.
   c. Foreign material or impurities interfere with control and manipulation of the arc.
   d. Weld appearance is improved when impurities are removed.

Agricultural Construction Volume I
Unit I—Arc Welding
Student Handout

Section I: Welding

Directions:

1. The instructor will give you a series of welds to perform.

2. Perform the assigned welds.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Perform the welds using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow shutdown and cleanup procedures and return all equipment and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

3. Complete sections II and III of the activity and turn your completed handout in to the instructor.

4. Your final assessment score will be based on your ability to safely and correctly perform the assigned welding procedures and on the accuracy of your responses to the identification and written assessment portions of the activity. All welds must pass destructive testing.

Section II: Identification

Directions:
Go to the identification station. Write the names of the tagged parts or items in the spaces below. Be sure to write each name next to its correct tag letter.

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

Section III: Written Assessment

Circle the letter that corresponds to the correct answer.

1. To weld a lap joint in flat position with a shielded metal arc welder, which choice is the correct work angle and travel angle?

   a. 90-degree work angle and a 45-degree travel angle
   b. 45-degree work angle and a 25- to 30-degree travel angle
   c. 90-degree work angle and a 25- to 30-degree travel angle
   d. 45-degree work angle and a 90-degree travel angle

2. A bright silver metal that is slightly magnetic and relatively hard to chip is likely to be which of the following?

   a. Wrought iron
   b. Aluminum
   c. Stainless steel
   d. Cast iron

3. For gas metal arc welding, the lens should ***not*** be lighter than number _____.

   a. 4
   b. 7
   c. 9
   d. 11

Complete the following short-answer questions.

4. List four ways to avoid exposure to harmful light rays when arc welding. (Each answer is worth 1 point for a maximum value of 4 points.)

   a.

   b.

   c.

   d.

5. List three reasons why metals should be cleaned before being welded. (Each answer is worth 1 point for a maximum value of 3 points.)

   a.

   b.

   c.

Agricultural Construction Volume I
Unit I—Arc Welding
Scoring Guide

Name _____

Assessment Area Section I	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Positioning	Metal was positioned properly	Failed	Poor	Fair	Good	Excellent	X 3	
Electrode and Amperage Selection	Electrode was appropriate and amperage was correctly set	Failed	Poor	Fair	Good	Excellent	X 3	
Distortion	Welds show no signs of distortion	Failed	Poor	Fair	Good	Excellent	X 4	
Appearance	Appearance indicates correct speed of travel, amperage setting, and arc length	Failed	Poor	Fair	Good	Excellent	X 5	
Strength	Welds are strong and sound	Failed	Poor	Fair	Good	Excellent	X 5	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-20)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-8)**	Negative Points *
TOTAL								/80 pts.

Assessment Area		Total
Section II: Identification		
Section III: Written Assessment		
TOTAL	[redacted]	/20 pts.

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

- **Comments:**

Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume I*

Unit: VI. Project Construction

Unit Objective:

Students will demonstrate an understanding of the skills and procedures necessary to build a project by selecting an appropriate project; devising elevation drawings, a bill of materials, and a plan of procedure for the project; and applying their plan to complete the project within the allotted time.

Show-Me Standards: 2.5, MA2

References:

Agricultural Construction Volume I. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Mechanics Building Plans. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Agricultural Mechanics Plans (Set). University of Missouri-Columbia, Instructional Materials Laboratory.

Master Plans Trailer Plans Store. Accessed December 15, 2003, from http://www.trailerplans.com/.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 14.
- Students will complete HO 2.1, Project Construction Check List; WS 3.1, Estimated Bill of Materials; WS 3.3, Where Are Materials Obtained?; WS 4.1, List of Tools and Procedures; WS 4.2, Tools—Safety Precautions; WS 5.1, Time Estimation Sheet; WS 6.1, Interpreting the Project Plan for a Pipe Sawhorse; WS 10.1, Quality Control—Project Evaluation Check List; WS 13.1, Actual Costs of Materials and Labor; and WS 14.1, Hand and Power Tools Used in Completing a Project.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. VI-5 (1, 3, 4), p. VI-15 (2), pp. VI-25–VI-26 (2, 3), p. VI-41 (1, 2, 3, 4), p. VI-51 (1, 2), p. VI-57 (1, 2), p. VI-68 (2, 4), p. VI-79 (1, 2, 3), p. VI-91 (2, 3, 4), p. VI-99 (1, 3, 4), p. VI-118 (2, 3), and p. VI-131 (1, 2).

Performance-Based Assessment:

As part of the instructional strategies and activities for this unit, students will complete an estimated bill of materials, a list of tools and procedures and safety precautions, and a time estimation sheet for sample project plans included with the unit. For the performance-based assessment activity, students will apply the skills and procedures discussed in the unit to select, plan, and complete an appropriate project.

Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Construction Volume I
Unit VI—Project Construction
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. As part of the instructional strategies and activities for this unit, students will complete an estimated bill of materials, a list of tools and procedures and safety precautions, and a time estimation sheet for sample project plans included with the unit.

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit to choose and complete an appropriate project. Use the handouts and work sheets in the unit to help students select, plan, and complete their projects. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

3. The student handout for this activity is a checklist that includes key steps in the project completion process based on the handouts and worksheets included in the unit.
   a. Students can use the checklist to track the progress of their project and ensure that they perform the necessary steps in the proper sequence.
   b. Supplement or modify the student handout to reflect projects or assignments as needed.

4. Have students turn in their completed project.

5. A scoring guide based on WS 10.1, Quality Control—Project Evaluation Check List, is included with this activity that can be used to assess students' projects.
   a. Because this performance-based activity represents a more comprehensive project than other unit activities, the number of points possible has been set at 500 instead of 100.
   b. Adjust the total point values, assessment criteria, and weight as needed.

6. The final assessment score will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Construction Volume I
Unit VI—Project Construction
Student Handout **Name** _____

Project Completion Checklist

Use the checklist below to track the progress of your project.

Procedure	Date Due
❑ Complete Lesson 1: Safety Procedures for Project Construction.	
❑ Complete and turn in HO 2.1, Project Construction Check List.	
❑ Complete and turn in WS 3.1, Estimated Bill of Materials.	
❑ Turn in signed Parental Permission Form, WS 3.2.	
❑ Complete elevation drawings for the project.	
❑ Develop a plan of procedure and list of tools needed.	
❑ Review safety precautions for the tools to be used. You can lose points for not following safety precautions and other assigned procedures.	
❑ Complete and turn in WS 5.1, Time Estimation Sheet.	
❑ Perform a quality control inspection of the project during construction. Use WS 10.1.	
❑ Complete project construction.	
❑ Prepare the surface and apply the finish.	
❑ Perform a quality control inspection of the project following completion. Use WS 10.1.	
❑ Complete and turn in WS 13.1, Actual Cost of Materials and Labor.	
❑ Complete and turn in WS 14.1, Hand and Power Tools Used in Completing a Project.	
❑ Turn in the completed project.	

Agricultural Construction

Agricultural Construction Volume I
Unit VI—Project Construction
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Quality of Work	❑ Fasteners are appropriate ❑ Measurements are accurate ❑ Parts fit for maximum strength ❑ Tools and equipment were used correctly	Failed	Poor	Fair	Good	Excellent	X 50	
Project Design	❑ Reinforcement is sufficient ❑ Clearances are sufficient ❑ Materials are appropriate ❑ Project is proportional and pleasing to the eye	Failed	Poor	Fair	Good	Excellent	X 25	
Project Suitability	❑ Correct size for use ❑ Suitable for purpose ❑ Salable ❑ Clean and presentable	Failed	Poor	Fair	Good	Excellent	X 25	
Finish Application	❑ Surface was properly prepared ❑ Primer and finish are appropriate ❑ Primer and finish are properly applied ❑ Finish application is high quality	Failed	Poor	Fair	Good	Excellent	X 25	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-125)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-50)**	Negative Points *
TOTAL								

Final Assessment Total _____/500 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume II*

Unit: II. Oxy-Gas and Other Cutting/Welding Processes

Unit Objective:

Students will apply principles of oxy-gas cutting and welding and other processes, such as air carbon-arc cutting and plasma-arc cutting, by using the equipment to perform welds and cuts, identifying welding and cutting equipment, and answering questions about related equipment and procedures.

Show-Me Standards: 1.10, CA3

References:

Agricultural Construction Volume II. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Construction Volume III. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

American Welding Society. Accessed November 18, 2003, from http://www.aws.org/.

Hobart Institute of Welding Technology. Accessed November 17, 2003, from http://www.welding.org/.

Hypertherm, Inc. Accessed December 16, 2003, from http://www.hypertherm.com/.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Victor. Thermadyne. Accessed December 16, 2003, from http://www.thermadyne.com/vec/index.asp?div=vec.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 10.
- Students will complete JS 2.1, Lighting, Adjusting, and Shutting Down the Torch; JS 4.1, Oxy-Acetylene Welds in the Flat Position; JS 4.2, Oxy-Acetylene Welding in the Horizontal Position; JS 4.3, Oxy-Acetylene Welding in the Vertical Position; JS 4.4, Oxy-Acetylene Welding in the Overhead Position; JS 5.1, Hardsurfacing With Oxy-Acetylene; JS 6.1, Welding Cast Iron; JS 7.1, Braze Welding; JS 8.1, Making Beveled Cuts; JS 8.2, Cutting Holes With Oxy-Gas; JS 9.1, Arc-Air Cutting; and JS 9.2, Plasma-Arc Cutting.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. II-6 (1, 2, 3), p. II-12, p. II-26 (1, 2, 3), p. II-37 (1, 2), p. II-112 (2), and p. II-131 (2).

Performance-Based Assessment:

Students will use the oxyacetylene, air carbon-arc, or plasma-arc outfit to perform a series of welds and cuts determined by the instructor. They will also identify parts of the welding and cutting equipment and answer questions about related equipment and procedures. This activity is modeled on the oxyacetylene portion of the Agricultural Mechanics Career Development Event.

Assessment will be based on the ability to safely and correctly perform the assigned procedures and on the accuracy of responses to the identification and written assessment portions of the activity.

Agricultural Construction Volume II
Unit II—Oxy-Gas and Other Cutting/Welding Processes
Instructor Guide

The instructor should explain the performance-based assessment activity format at the beginning of the unit. Students will work toward completing the competencies necessary to perform the activity as they progress through the unit material. The assessment activity will be due at the completion of the unit.

1. Explain the performance-based assessment activity format at the beginning of the unit: At the completion of the unit, students will perform a series of welds and cuts, identify welding and cutting equipment, and answer questions about welding and cutting equipment and procedures. Welds and cuts will be determined by the instructor and announced at the time of the performance-based assessment activity.

2. Use or adapt the job sheets found in the unit to assess student competency at welding and cutting with the oxyacetylene outfit and cutting with air carbon-arc and plasma-arc equipment. Review or supplement these activities as needed, based on student mastery of the procedures and equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

3. Assign the performance-based assessment activity. The student handout can be used as an outline for the activity or adapted as desired.
   a. Because this unit focuses on oxyacetylene procedures, the activity, as it is written, also focuses on oxyacetylene procedures and equipment. Add or substitute air carbon-arc or plasma-arc equipment and procedures as needed. For additional air carbon-arc and plasma-arc cutting information and activities, see also *Agricultural Construction Volume III*, Unit I—Oxy-Gas and Other Cutting/Welding Processes: Arc Cutting and Plasma-Arc Cutting.
   b. Information and directions for the student handout as it is currently written are listed at the end of this instructor guide.
   c. Section II requires some advance setup by the instructor.

4. This activity will help prepare students for the oxyacetylene portion of the Agricultural Mechanics Career Development Event.
   a. Refer to the *Missouri CDE Handbook* for guidelines regarding Career Development Events. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.
   b. Previous years' agricultural mechanics events can be found at http://web.missouri.edu/~pavt0689/statecon.html, accessed July 7, 2003.

5. Have students turn in their welds and cuts and completed handouts.

6. The final assessment score will be based on the ability to safely and correctly perform the assigned procedures and on the accuracy of responses to the identification and written assessment portions of the activity.

7. ADDITIONAL ACTIVITY: Create a display board using the students' work. Possible display board themes include the following: each student's best work using the oxyacetylene outfit, the best example of each type of procedure performed by the class, and the best work of the week.

Section I: Welding and Cutting

1. Have students perform a series of welds and cuts that they have mastered as part of the instructional activities for this unit.

Section II: Identification

1. Select ten parts of the oxyacetylene, air carbon-arc, or plasma-arc outfit or items of related equipment that have been discussed in class.

2. Label the parts or items with tags A through J.

3. Have students identify the parts on their handouts.

Section III: Written Assessment

1. Have students answer questions about oxyacetylene, air carbon-arc, or plasma-arc procedures, equipment, or safety. Multiple-choice and short-answer questions are suggested.

2. The answers to the questions on the student handout are listed below.

Answers to Written Assessment:

1. c

2. b

3. a

4. Students should list four of the following:
   a. Use tongs or pliers to handle hot metal.
   b. Never point the torch toward another person when lighting it.
   c. Never hand another person a hot piece of metal or a hot torch.
   d. The word "HOT" should be written on metal that cannot be moved to a storage area to warn other students not to touch it.
   e. Keep hands away from the flame.

5. Students should list the following:
   a. By the tip size stamped on the torch end of each tip
   b. By the drill size listed in the manufacturer's information
   c. By the diameter of the hole in the end of the tip

Agricultural Construction Volume II
Unit II—Oxy-Gas and Other Cutting/Welding Processes
Student Handout

Section I: Welding and Cutting

Directions:

1. The instructor will give you a series of welding and cutting procedures to perform.

2. Perform the assigned welds and cuts.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Perform the welds and cuts using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow shutdown and cleanup procedures and return all equipment and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

3. Complete sections II and III of the activity and turn your completed handout in to the instructor.

4. Your final assessment score will be based on your ability to safely and correctly perform the assigned procedures and on the accuracy of your responses to the identification and written assessment portions of the activity.

Section II: Identification

Directions:
Go to the identification station. Write the names of the tagged parts or items in the spaces below. Be sure to write each name next to its correct tag letter.

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

Section III: Written Assessment

Circle the letter that corresponds to the correct answer.

1. Open the acetylene tank valve _____ so it can be shut off quickly.

    a. 1 full turn
    b. 3/4 turn
    c. 1/2 turn
    d. all the way

2. Which of the following should be used to properly light the torch?

    a. Match
    b. Spark lighter
    c. Cigarette lighter
    d. Another lit torch

3. To weld a butt joint in the horizontal position with an oxyacetylene outfit, which choice is the correct work angle and travel angle?

    a. 5- to 10-degree work angle and a 5- to 10-degree travel angle
    b. 15-degree work angle and a 20-degree travel angle
    c. 5-degree work angle and a 15-degree travel angle
    d. 10-degree work angle and a 20-degree travel angle

Complete the following short-answer questions.

4. List four ways to avoid burns when using oxyacetylene equipment. (Each answer is worth 1 point for a maximum value of 4 points.)

   a.

   b.

   c.

   d.

5. List three methods to identify torch tips. (Each answer is worth 1 point for a maximum value of 3 points.)

   a.

   b.

   c.

Agricultural Construction Volume II
Unit II—Oxy-Gas and Other Cutting/Welding Processes
Scoring Guide

Name _____

Assessment Area Section I	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Torch Adjustment	Torch was properly adjusted	Failed	Poor	Fair	Good	Excellent	X 3	
Cuts	Cuts are correctly made and uniform	Failed	Poor	Fair	Good	Excellent	X 7	
Welds	Welds are uniform, free of distortion, and strong and sound	Failed	Poor	Fair	Good	Excellent	X 10	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-20)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-8)**	Negative Points *
TOTAL								/80 pts.

Assessment Area		Total
Section II: Identification		
Section III: Written Assessment		
TOTAL	[redacted]	/20 pts.

Final Assessment Total _____/100 pts.
***Overall combined score cannot be lower than 0.**

Comments:

Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume II*

Unit: III. Woodworking

Unit Objective:

Students will apply basic woodworking skills to make an appropriate woodworking project.

Show-Me Standards: 2.5, CA3

References:

Agricultural Construction Volume II. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Mechanics Building Plans. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Agricultural Mechanics Plans (Set). University of Missouri-Columbia, Instructional Materials Laboratory.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 6.
- Students will complete JS 5.1, Using a Shaper; JS 5.2, Using a Router; JS 5.3, Using a Power Miter Box Saw; JS 5.4, Using a Reciprocating Saw; and JS 5.5, Using a Scroll Saw.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. III-5 (1, 2), p. III-18 (1, 2, 3), p. III-27 (1), p. III-29 (2, 3), p. III-36 (1), and p. III-64 (1).

Performance-Based Assessment:

Students will use common woodworking tools to lay out, cut, drill, and dress a board.

Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Construction Volume II
Unit III—Woodworking
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt the job sheets found in the unit to assess student competency at performing basic woodworking procedures. Review or supplement these activities as needed, based on student mastery of the procedures and the tools and materials the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit to complete an appropriate woodworking project, such as the one that accompanies this enhancement. This plan requires students to lay out, cut, drill, and dress a board.
   a. This project can be completed using hand tools, power tools, or a combination, as desired, depending on the tools students will use while working on their class projects.
   b. If planing is added to the list of procedures, be sure that the boards used are at least the minimum required length for the planer in your shop. The board on the project plan is 21" long prior to cutting; its finished length is 18".

3. The student handout for this activity is a Project Completion Checklist and Project Evaluation Checklist that can be used with the project. Students can use the checklists to track the progress of their project and evaluate their work. Supplement or modify the student handout to reflect actual projects as needed.

4. Have students turn in their completed projects.

5. The final assessment score will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Construction Volume II
Unit III—Woodworking
Student Handout

Name_____

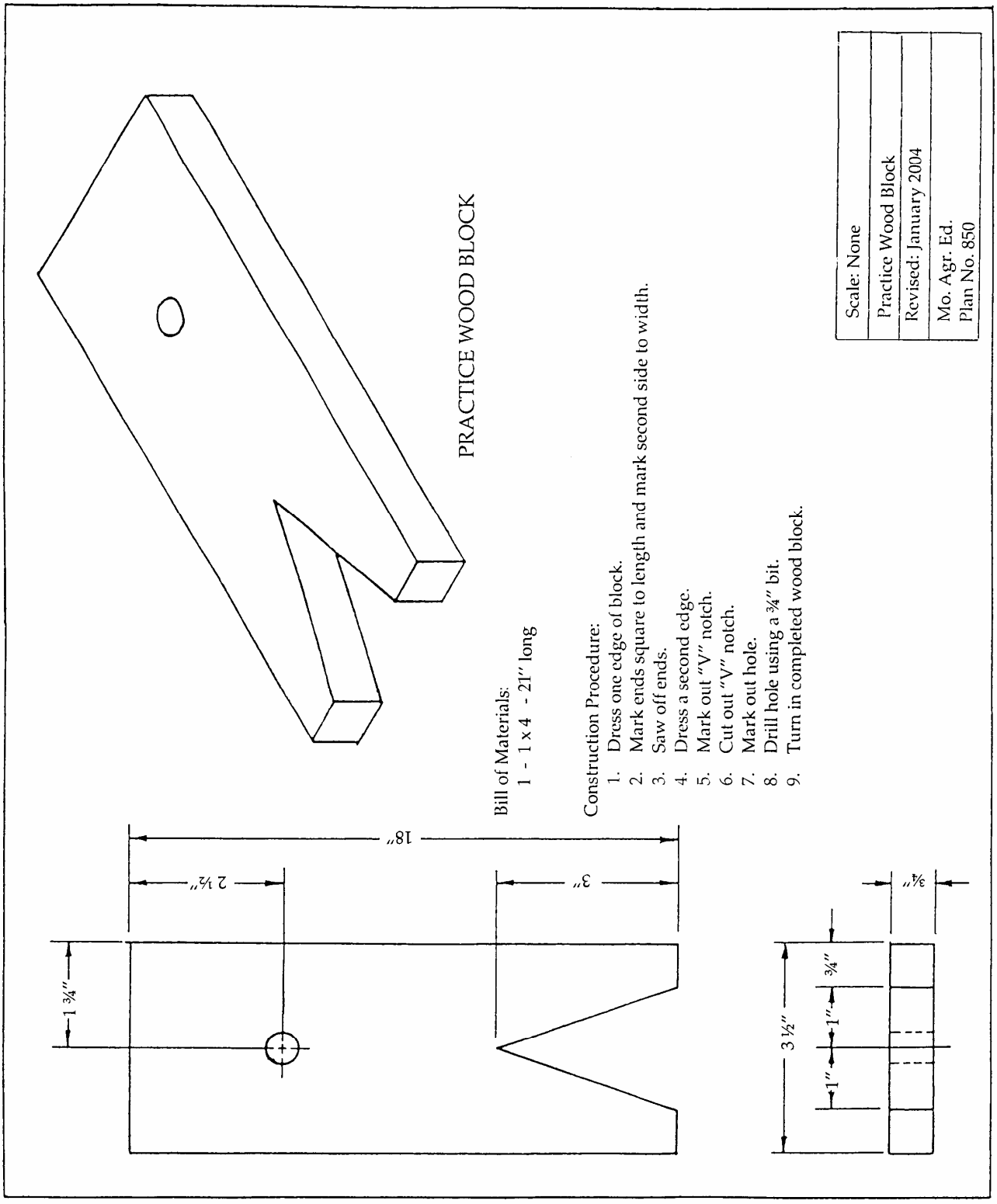
Use the Project Completion Checklist and Project Evaluation Checklist to track the progress of your project.

Project Completion Checklist

Procedure	**Date Due**
❑ Master all competencies necessary to complete the project.	
❑ Review safety precautions for tools and materials to be used. You can lose points for not following safety precautions and other assigned procedures.	
❑ Complete project procedures.	
❑ Perform a quality control inspection of the project following completion. Use the Project Evaluation Checklist.	
❑ Turn in the completed project. Your final assessment score will be based on the overall quality of the work and your ability to safely and correctly complete the project within the available time.	

Project Evaluation Checklist

Quality Control and Shop Procedures	Criteria
Quality of Work	❑ Holes, cut edges, and surfaces are smooth. ❑ Measurements are correct. ❑ Cuts are accurate. ❑ Project is square and straight. ❑ Work was completed on time.
Safety and Work Habits: Observe these safety procedures whenever you are in the shop.	❑ Know how to use the equipment before you attempt to use it. Only use tools and materials the instructor has approved you to use. ❑ Wear appropriate personal protective equipment. ❑ Follow safety guidelines from your instructor and safety information on labels, equipment, and signs in the work area. ❑ Follow assigned setup and cleanup procedures. ❑ Return equipment and materials to their assigned places. ❑ Do not use equipment that does not function properly. ❑ Tell the instructor about any damaged or malfunctioning equipment.



Plan adapted from *Agricultural Mechanics Building Plans*. University of Missouri-Columbia: Instructional Materials Laboratory.

Agricultural Construction

Agricultural Construction Volume II
Unit III—Woodworking
Scoring Guide

Name _____

Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Holes, cut edges, and surfaces are smooth	Failed	Poor	Fair	Good	Excellent	X 5	
Measurements are correct	Failed	Poor	Fair	Good	Excellent	X 5	
Cuts are accurate	Failed	Poor	Fair	Good	Excellent	X 5	
Project is square and straight	Failed	Poor	Fair	Good	Excellent	X 5	
Work was completed on time	Failed	Poor	Fair	Good	Excellent	X 5	
Student followed all safety precautions	**Passed**				**Failed**	**X (-25)**	Negative Points *
Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL							

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be below 0.**

Comments:

Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume II*

Unit: IV. Metals

Unit Objective:

Students will apply basic metalworking skills by constructing an appropriate metalworking project.

Show-Me Standards: 2.5, CA3

References:

Agricultural Construction Volume I. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Construction Volume II. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 10.
- Students will complete JS 9.3, Using the Drill Press as a Precision Guide for Tapping; JS 9.4, Tapping a Hole With a Drill Press; and JS 10.1, Making a Cold Chisel.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. IV-4 (1, 2), p. IV-17, p. IV-32 (2), p. IV-64, p. IV-72 (1, 2), p. IV-80 (1, 3), and p. IV-125 (2).

Performance-Based Assessment:

Students will use common equipment, materials, and procedures discussed in class to lay out and construct an appropriate metalworking project.

Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Construction Volume II
Unit IV—Metals
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt the activity sheets found in the unit to assess student competency at working with metal. Review or supplement these activities as needed, based on student mastery of the procedures and the equipment and materials students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit to make an appropriate project out of metal. The student handout includes a procedure for making a chipping hammer.

3. The student handout also includes a Project Completion Checklist and a Project Evaluation Checklist. Students can use the checklists to track the progress of their project and evaluate their work. Supplement or modify the student handout to reflect actual projects as needed.

4. Have students turn in their completed projects.

5. The final assessment score will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Construction Volume II
Unit IV—Metals
Student Handout

Making a Chipping Hammer

Objective: Use the proper metalworking procedures to fabricate a chipping hammer.

Equipment Needed:
Oxyacetylene outfit and heating tip
AC/DC or AC welder
Anvil
Ball peen hammer
Tape measure
Metal file
Wire brush
Bench grinder
Drill press
Pliers
Gloves
Safety goggles*
Welding goggles and helmet*

*Everyone participating in or observing this procedure must wear the proper eye protection. Safety practices should be followed at all times while in the shop area.

Materials Needed:
1" x 6" hexagon or round high-carbon rod
3/8" x 7" round rod
Bucket of water

Procedure:

1. Drill a 3/8" hole in the 1" x 6" rod. Make sure the hole is centered in the rod. This is where the handle will be connected to the rod.

2. Heat the lower 2" of the 1" x 6" rod until it reaches a cherry-red color, as shown in Figure 4.1.

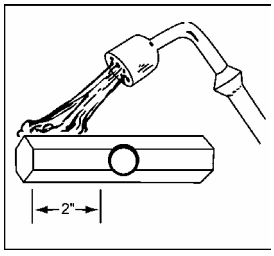


Figure 4.1

Caution: Hot metal should be handled with pliers. Gloves will not give adequate protection to pick up hot metal.

3. Use an anvil and a hammer to taper the heated end of the rod. The taper should begin on the chipping tip and end about 2" up the rod, as illustrated in Figure 4.2. The end of the tip should be 3/16" thick.

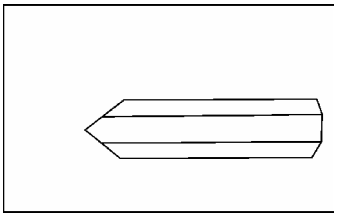


Figure 4.2

4. Cool the hammer in water until the steam stops. As you are cooling the hammer, move it slightly up and down in the water to avoid causing cracks at the waterline, which can result from uneven cooling. See Figure 4.3.

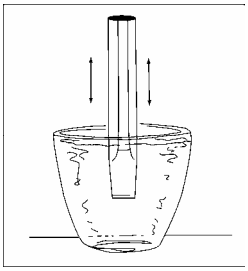


Figure 4.3

5. Remove the hammer from the water. Remove the oxides that have formed on the chipping end by using a wire brush or file.

6. Grind a 60^{o} angle on the chipping end of the hammer, as shown in Figure 4.4.

7. Insert the 3/8" round rod in the hole in the 1" rod and weld it where it enters and exits the larger rod, as shown in Figure 4.4.

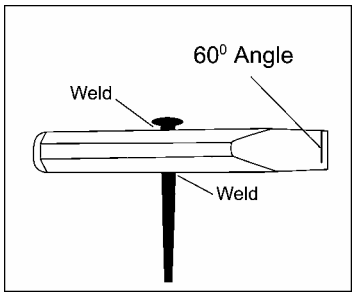


Figure 4.4

8. Cool the weld and clean and examine the hammer for accuracy.

9. Turn your completed chipping hammer in to the instructor for grading.

Name_____

Use the Project Completion Checklist and Project Evaluation Checklist to track the progress of your project.

Project Completion Checklist

Procedure	Date Due
❑ Master all competencies necessary to complete the project.	
❑ Receive instructor approval to build the project.	
❑ Review safety precautions for equipment and materials to be used. You can lose points for not following safety precautions and other assigned procedures.	
❑ Complete project construction.	
❑ Perform a quality control inspection of the project following completion. Use the Project Evaluation Checklist.	
❑ Turn in the completed project. Your final assessment score will be based on the overall quality of the work and your ability to safely and correctly complete the project within the available time.	

Project Evaluation Checklist

Quality Control and Shop Procedures	Criteria
Quality of Work	❑ Chipping tip is properly tapered and ground. ❑ Handle is centered. ❑ Weld appearance indicates correct speed of travel, amperage setting, and arc length. ❑ Welds are strong and sound. ❑ Measurements are correct. ❑ Project is good enough to sell. ❑ Work was completed on time.
Safety and Work Habits: Observe these safety procedures whenever you are in the shop.	❑ Know how to use the tools and materials before you attempt to use them. Only use tools and materials the instructor has approved you to use. ❑ Wear appropriate personal protective equipment. ❑ Follow safety guidelines from your instructor and safety information on labels, equipment, and signs in the work area. ❑ Follow assigned setup and cleanup procedures. ❑ Return equipment and materials to their assigned places.

Agricultural Construction

Agricultural Construction Volume II
Unit IV—Metals
Scoring Guide

Name _____

Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Chipping tip is properly tapered and ground	Failed	Poor	Fair	Good	Excellent	X 6	
Handle is centered	Failed	Poor	Fair	Good	Excellent	X 3	
Weld appearance indicates correct speed of travel, amperage setting, and arc length	Failed	Poor	Fair	Good	Excellent	X 2	
Welds are strong and sound	Failed	Poor	Fair	Good	Excellent	X 4	
Measurements are correct	Failed	Poor	Fair	Good	Excellent	X 5	
Project is good enough to sell	Failed	Poor	Fair	Good	Excellent	X 3	
Work was completed on time	Failed	Poor	Fair	Good	Excellent	X 2	
Student followed all safety precautions	**Passed**				**Failed**	**X (-25)**	Negative Points *
Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL							

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume II*

Unit: V. Finishing

Unit Objective:

Students will apply principles of painting by preparing, priming, and finishing a project.

Show-Me Standards: 2.5, CA3

References:

Agricultural Construction Volume II. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Healthy Indoor Painting Practices. U. S. Consumer Product Safety Commission. Accessed November 25, 2003, from http://www.cpsc.gov/cpscpub/pubs/456.pdf.

Safe Use, Storage and Disposal of Paint. Household Hazardous Waste Project. MU Extension. University of Missouri-Columbia. Accessed November 20, 2003, from http://muextension.missouri.edu/explore/wasteman/wm6001.htm.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 4.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. V-5 (1, 4), p. V-15 (1), and p. V-27 (1).

Performance-Based Assessment:

Students will use equipment and materials discussed in class, such as sandpaper, brushes, and rollers, to prepare the surface of a project, prime the project, and paint it. Acceptable projects would include those made for the Agricultural Construction class or outside projects that the instructor determines are appropriate for the curriculum.

Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Construction Volume II
Unit V—Finishing
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use the study questions and handouts in the unit to explain basic principles of painting. Review or supplement the material as needed, based on student mastery of these procedures and the equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

2. For the performance-based activity, have students apply the skills and procedures discussed in the unit by preparing the surface of a project, priming the project, and painting it.
   a. Choose projects based on the skill level of the students and the time available to work on the project. For example, if students built projects for the Agricultural Construction class, have them prepare, prime, and finish these projects.
   b. If students bring in outside projects to be painted, screen these projects to determine if they are appropriate for the curriculum and can be completed in the time available.

3. Have students choose appropriate primer, paint, and other necessary supplies. Review and approve students' material and equipment selections before they begin working.

4. The student handout for this activity is a Project Completion Checklist and Project Evaluation Checklist. Students can use the checklists to track the progress of their project and evaluate their work. Supplement or modify the student handout to reflect actual projects as needed.

5. Have students turn in their completed projects.

6. The final assessment score will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Agricultural Construction Volume II
Unit V—Finishing
Student Handout

Name_____

Use the Project Completion Checklist and Project Evaluation Checklist to track the progress of your project.

Project Completion Checklist

Procedure	Date Due
❑ Master all competencies necessary to complete the project.	
❑ Receive instructor approval for the materials and equipment you plan to use. Are they appropriate for the project?	
❑ Review safety precautions for the materials and equipment you will use. You can lose points for not following safety procedures.	
❑ Prepare the project surface.	
❑ Apply the primer coat.	
❑ Paint the project.	
❑ Clean all equipment using the appropriate cleaner. Return the equipment and materials to their proper place and dispose of rags and other hazardous materials properly. You can lose points for not following assigned cleanup procedures.	
❑ Perform a quality control inspection of the project following completion. Use the Project Evaluation Checklist.	
❑ Turn in the completed project. Your final assessment score will be based on the overall quality of the work and your ability to safely and correctly complete the project within the available time.	

Project Evaluation Checklist

Quality Control and Shop Procedures	Criteria
Quality of Work	❑ Surface was properly prepared. ❑ Primer is appropriate for the project. ❑ Primer is properly applied. ❑ Paint is appropriate for the project. ❑ Paint is properly applied. ❑ Paint job is of high quality and pleasing to the eye. ❑ Project is good enough to sell. ❑ Work was completed on time.
Safety and Work Habits: Observe these safety procedures whenever you are in the shop.	❑ Know how to use the equipment and materials before you attempt to use them. Only use equipment and materials the instructor has approved you to use. ❑ Wear appropriate personal protective equipment. ❑ Follow safety guidelines from your instructor and safety information on labels, equipment, and signs in the work area. ❑ Do not use primers, finishes, or other products with missing or unreadable labels. ❑ Follow assigned setup and cleanup procedures. ❑ Return equipment and materials to their assigned places.

Agricultural Construction

Agricultural Construction Volume II
Unit V—Finishing
Scoring Guide

Name _____

Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Surface was properly prepared	Failed	Poor	Fair	Good	Excellent	X 3	
Primer is appropriate and properly applied	Failed	Poor	Fair	Good	Excellent	X 5	
Paint is appropriate and properly applied	Failed	Poor	Fair	Good	Excellent	X 5	
Paint job is of high quality and pleasing to the eye	Failed	Poor	Fair	Good	Excellent	X 5	
Project is good enough to sell	Failed	Poor	Fair	Good	Excellent	X 5	
Work was completed on time	Failed	Poor	Fair	Good	Excellent	X 2	
Student followed all safety precautions	**Passed**				**Failed**	**X (-25)**	Negative Points *
Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL							

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be below 0.**

Comments:

Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume III*

Unit: I. Oxy-Gas and Other Cutting/Welding Processes

Unit Objective:

Students will apply principles of air carbon-arc cutting and plasma-arc cutting by using the equipment to make cuts, identifying cutting equipment, and answering questions about related equipment and procedures.

Show-Me Standards: 1.10, CA3

References:

Agricultural Construction Volume II. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Construction Volume III. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

American Welding Society. Accessed November 18, 2003, from http://www.aws.org/.

Hobart Institute of Welding Technology. Accessed November 17, 2003, from http://www.welding.org/.

Hypertherm, Inc. Accessed December 16, 2003, from http://www.hypertherm.com/.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Victor. Thermadyne. Accessed December 16, 2003, from http://www.thermadyne.com/vec/index.asp?div=vec.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete JS 1.1, Air Carbon-Arc Cutting; and JS 1.2, Plasma-Arc Cutting.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. 8 (2).

Performance-Based Assessment:

Students will use the air carbon-arc or plasma-arc outfit to make a series of cuts determined by the instructor. They will also identify parts of the cutting equipment and answer questions about related equipment and procedures. This activity is modeled on the oxyacetylene portion of the Agricultural Mechanics Career Development Event.

Assessment will be based on the ability to safely and correctly perform the assigned procedures and on the accuracy of responses to the identification and written assessment portions of the activity.

Agricultural Construction Volume III
Unit I—Oxy-Gas and Other Cutting/Welding Processes
Instructor Guide

The instructor should explain the performance-based assessment activity format at the beginning of the unit. Students will work toward completing the competencies necessary to perform the activity as they progress through the unit material. The assessment activity will be due at the completion of the unit.

1. Explain the performance-based assessment activity format at the beginning of the unit: At the completion of the unit, students will perform a series of cuts, identify cutting equipment, and answer questions about cutting equipment and procedures. Cuts will be determined by the instructor and announced at the time of the performance-based assessment activity.

2. Use or adapt the job sheets found in the unit to assess student competency at cutting with air carbon-arc and plasma-arc equipment. Review or supplement these activities as needed, based on student mastery of the procedures and equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

3. Assign the performance-based assessment activity. The student handout can be used as an outline for the activity or adapted as desired.
   a. For additional air carbon-arc and plasma-arc cutting information and activities, see also *Agricultural Construction Volume II*, Unit II—Oxy-Gas and Other Cutting/Welding Processes.
   b. Information and directions for the student handout as it is currently written are listed at the end of this instructor guide.
   c. Section II requires some advance setup by the instructor.

4. This activity is modeled on the oxyacetylene portion of the Agricultural Mechanics Career Development Event.
   a. Refer to the *Missouri CDE Handbook* for guidelines regarding Career Development Events. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.
   b. Previous years' agricultural mechanics events can be found at http://web.missouri.edu/~pavt0689/statecon.html, accessed July 7, 2003.

5. Have students turn in their finished cutting assignments and completed handouts.

6. The final assessment score will be based on the ability to safely and correctly perform the assigned procedures and on the accuracy of responses to the identification and written assessment portions of the activity.

7. ADDITIONAL ACTIVITY: Create a display board using the students' work. Possible display board themes include the following: each student's best work using the air carbon-arc or plasma-arc cutting outfit, the best example of each type of procedure performed by the class, and the best work of the week.

Section I: Cutting

1. Have students perform cutting procedures that they have mastered as part of the instructional activities for this unit.

Section II: Identification

1. Select ten parts of the air carbon-arc or plasma-arc outfit or items of related equipment that have been discussed in class.

2. Label the parts or items with tags A through J.

3. Have students identify the parts on their handouts.

Section III: Written Assessment

1. Have students answer questions about air carbon-arc or plasma-arc procedures, equipment, or safety. Multiple-choice and short-answer questions are suggested.

2. The answers to the questions on the student handout are listed below.

Answers to Written Assessment:

1. a

2. c

3. Students should list the following:
   a. Any nonferrous metal
   b. Stainless steel
   c. Carbon steel

4. Students should list five of the following:
   a. Observe all safety procedures. Always point the torch away from the body and toward the workpiece.
   b. Wear safety glasses with a side shield and use a face shield or helmet.
   c. Wear the proper lens shade based on the machine's amperage capabilities.
   d. Wear leather gloves and shoes to protect extremities from burns or other injuries.
   e. Wear clothing made of tightly woven material and keep clothing dry.
   f. Button shirt collars, cuffs, and front pockets. Do not wear cuffed pants.
   g. Protect against excessive noise: add room acoustics, reduce intensity of noise, and wear ear muffs or ear plugs.
   h. Avoid flammable gases, vapors, dusts, and liquids. Keep flammable materials 35 ft from the cutting area or in flame-proof containers.
   i. Keep the work area dry.
   j. Avoid inhaling fumes. Keep the work area well ventilated. Wear an air-supplied respirator if necessary.
   k. Remove coatings that can emit toxic fumes.
   l. Replace worn cables and broken connections to avoid electrical shock.
   m. Ensure equipment is properly grounded.
   n. Chain nitrogen cylinders to an upright, stable support; put a protector cap on a cylinder before moving it; and remove faulty regulators and send them to the manufacturer for repair.
   o. Use recommended wires or ferrules to connect hoses to fittings.
   p. Keep hoses off the ground to prevent damage; examine hoses for leaks; do not let hoses become tangled; and replace worn or damaged hoses.
   q. Replace worn electrodes and nozzles.

Agricultural Construction Volume III
Unit I—Oxy-Gas and Other Cutting/Welding Processes
Student Handout

Section I: Cutting

Directions:

1. The instructor will give you a series of cutting procedures to perform.

2. Perform the assigned cuts.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Perform the cuts using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow shutdown and cleanup procedures and return all equipment and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

3. Complete sections II and III of the activity and turn your completed handout in to the instructor.

4. Your final assessment score will be based on your ability to safely and correctly perform the assigned procedures and on the accuracy of your responses to the identification and written assessment portions of the activity.

Section II: Identification

Directions:
Go to the identification station. Write the names of the tagged parts or items in the spaces below. Be sure to write each name next to its correct tag letter.

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

Section III: Written Assessment

Circle the letter that corresponds to the correct answer.

1. When using a plasma-arc cutting outfit using less than 300 amps, which lens shade should be used by the operator?

   a. 9
   b. 10
   c. 11
   d. 12

2. Which of the following is ***not*** an advantage of plasma-arc cutting?

   a. Clean—uses clean, dry air
   b. Safer than oxy-fuel gas cutting
   c. An arc welding machine can be used
   d. Can be used for shape cutting

Complete the following short-answer questions.

3. List three types of metal that can be cut using plasma-arc equipment. (Each answer is worth 1 point for a maximum value of 3 points.)

   a.

   b.

   c.

4. List five safety precautions to follow when plasma-arc cutting. (Each answer is worth 1 point for a maximum value of 5 points.)

   a.

   b.

   c.

   d.

   e.

Agricultural Construction

Agricultural Construction Volume III
Unit I—Oxy-Gas and Other Cutting/Welding Processes
Scoring Guide

Name _____

Assessment Area Section I	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Equipment Setting	Equipment was properly adjusted	Failed	Poor	Fair	Good	Excellent	X 5	
Cuts	Cuts are correctly made and uniform	Failed	Poor	Fair	Good	Excellent	X 15	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-20)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-8)**	Negative Points *
TOTAL								/80 pts.

Assessment Area		Total
Section II: Identification		
Section III: Written Assessment		
TOTAL	[redacted]	/20 pts.

Final Assessment Total _____/100 pts.
***Overall combined score cannot be lower than 0.**

- **Comments:**

Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume III*

Unit: II. Arc Welding (GMAW/MIG)

Unit Objective:

Students will apply principles of gas metal arc welding by performing common welds with a gas metal arc welding outfit, identifying welding equipment, and answering questions about related equipment and procedures.

Show-Me Standards: 1.10, CA3

References:

Agricultural Construction Volume I. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Construction Volume III. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

American Welding Society. Accessed November 18, 2003, from http://www.aws.org/.

ESAB Knowledge Centre. ESAB. Accessed November 25, 2003, from http://www.esab.com/.

Hobart Institute of Welding Technology. Accessed November 17, 2003, from http://www.welding.org/.

Lincoln Electric. Accessed November 18, 2003, from http://www.lincolnelectric.com/.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Miller Electric. Accessed November 18, 2003, from http://www.millerwelds.com/.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete JS 2.1, Prewelding and Postwelding Procedures for GMAW; JS 2.2, Welds in the Flat Position; JS 2.3, Welds in the Horizontal Position; JS 2.4, Welds in the Vertical Position; and JS 2.5, Welds in the Overhead Position.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. 34 (1, 2).

Performance-Based Assessment:

Students will perform a series of welds determined by the instructor, identify gas metal arc welding equipment, and answer questions about gas metal arc welding equipment and procedures. This activity is modeled on the arc welding portion of the Agricultural Mechanics Career Development Event.

Assessment will be based on the ability to safely and correctly perform the assigned welding procedures and on the accuracy of responses to the identification and written assessment portions of the activity.

Agricultural Construction Volume III
Unit II—Arc Welding (GMAW/MIG)
Instructor Guide

The instructor should explain the performance-based assessment activity format at the beginning of the unit. Students will work toward completing the competencies necessary to perform the activity as they progress through the unit material. The assessment activity will be due at the completion of the unit.

1. Explain the performance-based assessment activity format at the beginning of the unit: At the completion of the unit, students will perform a series of welds, identify welding-related equipment, and answer questions about welding equipment and procedures. Welds will be determined by the instructor and announced at the time of the performance-based assessment activity.

2. Use or adapt the activity sheets found in the unit to assess student competency at welding with the gas metal arc welding outfit. Review or supplement these activities as needed, based on student mastery of the procedures and equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

3. Assign the performance-based assessment activity. The student handout can be used as an outline for the activity or adapted as desired.
   a. Information and directions for the student handout as it is currently written are listed at the end of this instructor guide.
   b. Section II requires some advance setup by the instructor.

4. This activity is modeled on the arc welding portion of the Agricultural Mechanics Career Development Event.
   a. Refer to the *Missouri CDE Handbook* for guidelines regarding Career Development Events. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.
   b. Previous years' agricultural mechanics events can be found at http://web.missouri.edu/~pavt0689/statecon.html, accessed July 7, 2003.

5. Have students turn in their welds and completed handouts.

6. The final assessment score will be based on the ability to safely and correctly perform the assigned welding procedures and on the accuracy of responses to the identification and written assessment portions of the activity. All welds must pass destructive testing.

7. ADDITIONAL ACTIVITY: Create a display board using the students' best welds. Possible display board themes include the following: each student's best weld, the best example of each type of weld performed by the class, and the best weld of the week.

Section I: Welding

1. Have students perform a series of welds that they have mastered as part of the instructional activities for this unit.

Section II: Identification

1. Select ten parts of the gas metal arc welder or items of related equipment that have been discussed in class.

2. Label the parts or items with tags A through J.

3. Have students identify the parts on their handouts.

Section III: Written Assessment

1. Have students answer questions about gas metal arc welding procedures, equipment, or safety. Multiple-choice and short-answer questions are suggested.

2. The answers to the questions on the student handout are listed below.

Answers to Written Assessment:

1. c

2. b

3. a

4. Students should list three of the following:
   a. Short circuiting arc or short arc
   b. Globular
   c. Spray arc
   d. Pulse-spray arc or spray-arc pulse

5. Students should list the following:
   a. Wire size
   b. Amperage range
   c. Base metal properties
   d. Lens manufacturer's selection card

Agricultural Construction Volume III
Unit II—Arc Welding (GMAW/MIG)
Student Handout

Section I: Welding

Directions:

1. The instructor will give you a series of welds to perform.

2. Perform the assigned welds.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Perform the welds using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow shutdown and cleanup procedures and return all equipment and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

3. Complete sections II and III of the activity and turn your completed handout in to the instructor.

4. Your final assessment score will be based on your ability to safely and correctly perform the assigned welding procedures and on the accuracy of your responses to the identification and written assessment portions of the activity. All welds must pass destructive testing.

Section II: Identification

Directions:
Go to the identification station. Write the names of the tagged parts or items in the spaces below. Be sure to write each name next to its correct tag letter.

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

Section III: Written Assessment

Circle the letter that corresponds to the correct answer.

1. To weld a butt joint in flat position, which of the following angles should be used?

    a. 90-degree work angle and a 10- to 15-degree push angle
    b. 45-degree work angle and a 10- to 15-degree push angle
    c. 90-degree work angle and a 25- to 30-degree drag angle
    d. 45-degree work angle and a 10-degree drag angle

2. Precautions must be taken when working with argon because it _____.

    a. is highly flammable.
    b. will quickly displace oxygen.
    c. is highly toxic.
    d. will contaminate welds.

3. Which of the following is ***not*** an advantage of gas metal arc welding (GMAW)?

    a. Uses less equipment than shielded metal arc welding (SMAW)
    b. Easy to learn
    c. Faster than SMAW
    d. Adaptable for a variety of ferrous and nonferrous metals

Complete the following short-answer questions.

4. List three methods of metal transfer using GMAW. (Each answer is worth 1 point for a maximum value of 3 points.)

   a.

   b.

   c.

5. List four factors for choosing the correct lens shade when welding with the GMAW setup. (Each answer is worth 1 point for a maximum value of 4 points.)

   a.

   b.

   c.

   d.

Agricultural Construction

Agricultural Construction Volume III
Unit II—Arc Welding (GMAW/MIG)
Scoring Guide

Name _____

Assessment Area Section I	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Positioning	Metal was positioned properly	Failed	Poor	Fair	Good	Excellent	X 3	
Equipment Setup	Equipment was properly adjusted	Failed	Poor	Fair	Good	Excellent	X 3	
Distortion	Welds show no signs of distortion	Failed	Poor	Fair	Good	Excellent	X 4	
Appearance	Weld beads are uniform	Failed	Poor	Fair	Good	Excellent	X 5	
Strength	Welds are strong and sound	Failed	Poor	Fair	Good	Excellent	X 5	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-20)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-8)**	Negative Points *
TOTAL								/80 pts.

Assessment Area		Total
Section II: Identification		
Section III: Written Assessment		
TOTAL	[redacted]	/20 pts.

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume III*

Unit: III. Arc Welding (GTAW/TIG)

Unit Objective:

Students will apply principles of gas tungsten arc welding by performing common welds with a gas tungsten arc welding outfit, identifying welding equipment, and answering questions about related equipment and procedures.

Show-Me Standards: 1.10, CA3

References:

Agricultural Construction Volume I. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Construction Volume III. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

American Welding Society. Accessed November 18, 2003, from http://www.aws.org/.

ESAB Knowledge Centre. ESAB. Accessed November 25, 2003, from http://www.esab.com/.

Hobart Institute of Welding Technology. Accessed November 17, 2003, from http://www.welding.org/.

Lincoln Electric. Accessed November 18, 2003, from http://www.lincolnelectric.com/.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Miller Electric. Accessed November 18, 2003, from http://www.millerwelds.com/.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from http://web.missouri.edu/~pavt0689/statecon.html.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete JS 3.1, Prewelding and Postwelding Procedures for GTAW; JS 3.2, Welds in the Flat Position; JS 3.3, Welds in the Horizontal Position; JS 3.4, Welds in the Vertical Position; and JS 3.5, Welds in the Overhead Position.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. 69.

Performance-Based Assessment:

Students will perform a series of welds determined by the instructor, identify gas tungsten arc welding equipment, and answer questions about gas tungsten arc welding equipment and procedures. This activity is modeled on the arc welding portion of the Agricultural Mechanics Career Development Event.

Assessment will be based on the ability to safely and correctly perform the assigned welding procedures and on the accuracy of responses to the identification and written assessment portions of the activity.

Agricultural Construction Volume III
Unit III—Arc Welding (GTAW/TIG)
Instructor Guide

The instructor should explain the performance-based assessment activity format at the beginning of the unit. Students will work toward completing the competencies necessary to perform the activity as they progress through the unit material. The assessment activity will be due at the completion of the unit.

1. Explain the performance-based assessment activity format at the beginning of the unit: At the completion of the unit, students will perform a series of welds, identify welding-related equipment, and answer questions about welding equipment and procedures. Welds will be determined by the instructor and announced at the time of the performance-based assessment activity.

2. Use or adapt the activity sheets found in the unit to assess student competency at welding with the gas tungsten arc welding outfit. Review or supplement these activities as needed, based on student mastery of the procedures and equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

3. Assign the performance-based assessment activity. The student handout can be used as an outline for the activity or adapted as desired.
   a. Information and directions for the student handout as it is currently written are listed at the end of this instructor guide.
   b. Section II requires some advance setup by the instructor.

4. This activity is modeled on the arc welding portion of the Agricultural Mechanics Career Development Event.
   a. Refer to the *Missouri CDE Handbook* for guidelines regarding Career Development Events. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.
   b. Previous years' agricultural mechanics events can be found at http://web.missouri.edu/~pavt0689/statecon.html, accessed July 7, 2003.

5. Have students turn in their weld and completed handouts.

6. The final assessment score will be based on the ability to safely and correctly perform the assigned welding procedures and on the accuracy of responses to the identification and written assessment portions of the activity. All welds must pass destructive testing.

7. ADDITIONAL ACTIVITY: Create a display board using the students' best welds. Possible display board themes include the following: each student's best weld, the best example of each type of weld performed by the class, and the best weld of the week.

Section I: Welding

1. Have students perform a series of welds that they have mastered as part of the instructional activities for this unit.

Section II: Identification

1. Select ten parts of the gas tungsten arc welder or items of related equipment that have been discussed in class.

2. Label the parts or items with tags A through J.

3. Have students identify the parts on their handouts.

Section III: Written Assessment

1. Have students answer questions about gas tungsten arc welding procedures, equipment, or safety. Multiple-choice and short-answer questions are suggested.

2. The answers to the questions on the student handout are listed below.

Answers to Written Assessment:

1. d

2. c

3. c

4. b

5. Students should list six of the following:
   a. Never drag cables or hoses or pull them to force them over an obstruction.
   b. Run hoses and cables so that they will not be damaged or cause a tripping hazard.
   c. Use only clean rags to clean cables and hoses.
   d. Keep cables and hoses free of kinks at all times.
   e. Do not drape welding cables or hoses over any type of gas cylinder or over the flowmeter or regulator.
   f. Never strike an arc on a gas cylinder.
   g. Cylinders must be fastened to a wall, post, or approved cylinder truck so that they stay upright at all times.
   h. Valve protection caps should be in place when cylinders are not in use.
   i. Crack cylinders before attaching the regulator to clean any debris out of the cylinder valve outlet.

Agricultural Construction Volume III
Unit III—Arc Welding (GTAW/TIG)
Student Handout

Section I: Welding

Directions:

1. The instructor will give you a series of welds to perform.

2. Perform the assigned welds.
   - ❑ Wear appropriate safety equipment at all times.
   - ❑ Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
   - ❑ Inspect the equipment, materials, and work area to ensure safe and correct operation.
   - ❑ Perform the welds using the assigned procedure.
   - ❑ Inspect your work.
   - ❑ Follow shutdown and cleanup procedures and return all equipment and materials to their assigned places.
   - ❑ Turn in your work to the instructor.

3. Complete sections II and III of the activity and turn your completed handout in to the instructor.

4. Your final assessment score will be based on your ability to safely and correctly perform the assigned welding procedures and on the accuracy of your responses to the identification and written assessment portions of the activity. All welds must pass destructive testing.

Section II: Identification

Directions:
Go to the identification station. Write the names of the tagged parts or items in the spaces below. Be sure to write each name next to its correct tag letter.

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

Section III: Written Assessment

Circle the letter that corresponds to the correct answer.

1. Which of the following is ***not*** an advantage of gas tungsten arc welding (GTAW)?

    a. Welds are generally clean.
    b. Welding is easily done in all positions.
    c. The arc and weld pool are clearly visible.
    d. GTAW is cheaper and faster than shielded metal arc welding.

2. _____ is an inert shielding gas used in GTAW.

    a. Oxygen
    b. Hydrogen
    c. Argon
    d. Nitrogen

3. Which of the following is a step in GTAW setup?

    a. Turn the power on and attach the torch hoses.
    b. Disconnect the ground clamp.
    c. Set the current range.
    d. Close the gas cylinder valve.

4. Which of the following is a step in GTAW shutdown?

   a. Adjust the electrode extension.
   b. Bleed the gas line.
   c. Crack the cylinder valve.
   d. Select the collet body, collet, and nozzle.

Complete the following short-answer question.

5. List six safety and maintenance procedures for working with welding cables, hoses, and cylinders. (Each answer is worth 1 point for a maximum value of 6 points.)

   a.

   b.

   c.

   d.

   e.

   f.

Agricultural Construction

Agricultural Construction Volume III
Unit III—Arc Welding (GTAW/TIG)
Scoring Guide

Name _____

Assessment Area Section I	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Positioning	Metal was positioned properly	Failed	Poor	Fair	Good	Excellent	X 4	
Equipment Setup	Equipment was properly adjusted	Failed	Poor	Fair	Good	Excellent	X 4	
Distortion	Welds show no signs of distortion	Failed	Poor	Fair	Good	Excellent	X 3	
Appearance	Weld beads are uniform	Failed	Poor	Fair	Good	Excellent	X 5	
Strength	Welds are strong and sound	Failed	Poor	Fair	Good	Excellent	X 4	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-20)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-8)**	Negative Points *
TOTAL								/80 pts.

Assessment Area		Total
Section II: Identification		
Section III: Written Assessment		
TOTAL	[redacted]	/20 pts.

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Structures

Curriculum Guide: *Agricultural Structures*

Unit: I. Working With Plans

Unit Objective:

Students will demonstrate an understanding of the importance planning has on effective work procedure by drawing a construction plan and developing a plan of procedure, a cutting bill of materials, and a purchasing bill of materials.

Show-Me Standards: 1.8, MA2

References:

Agricultural Construction Volume I. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Structures. University of Missouri-Columbia, Instructional Materials Laboratory, 1999.

Computer Applications in Agriculture. University of Missouri-Columbia, Instructional Materials Laboratory, 2001.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 1.1, Reading a Plan; AS 1.2, Drawing a Plan; and AS 2.1, Preparing a Plan of Procedure.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. I-5 and p. I-32.

Performance-Based Assessment:

Students will develop a construction plan for a project by making three scale drawings—one each for the top, front, and side of the project. Students must also devise a plan of procedure, a cutting bill of materials, and a purchasing bill of materials for a project.

Assessment will be based on the completeness, accuracy, and appearance of the drawings and the overall thoroughness and accuracy of the plan of procedure and bills of materials.

Unit I—Working With Plans
Instructor Guide

The instructor should distribute the student handouts at the beginning of the unit and assign the performance-based assessment activities in conjunction with the relevant lesson material as indicated in the instructor guide. Students will complete the activities as they progress through the unit lessons.

1. Use AS 1.2 (Student), Drawing a Plan, to assess student competency at preparing a construction plan. Students will use computer-aided drafting (CAD) equipment or pencils and paper to make three elevation drawings of a storage building.
   a. For a complete description of the activity, see AS 1.2 (Instructor), p. I-25.
   b. Answers for the activity are located on p. I-6.

2. Use AS 2.1, Preparing a Plan of Procedure, to assess student competency at developing a plan of procedure and preparing a cutting bill of materials and purchasing bill of materials. Students will use elevation drawings of a pine workbench to develop a plan of procedure and bills of materials for the project.
   a. For a complete description of the activity, see AS 2.1, pp. I-37–I-38.
   b. Answers for the activity are located on p. I-32.

3. For additional practice in working with plans and developing bills of materials, see Unit VI, Project Construction, in *Agricultural Construction Volume I* and AS 18, Electronic Bill of Materials, in *Computer Applications in Agriculture*. Both are available from the Instructional Materials Laboratory, University of Missouri-Columbia, accessed December 1, 2003, at http://www.iml.coe.missouri.edu/.

4. The student handout includes checklists based on these activity sheets that students can use to evaluate their work.

5. The student handout and scoring guide can also be adapted for use with students' class projects, if desired.

6. The final assessment score will be based on the completeness, accuracy, and appearance of the drawings and the overall thoroughness and accuracy of the plan of procedure and bills of materials.

7. ADDITIONAL ACTIVITY: Have students determine the time frame for the completion of a project. For a work sheet that could be used for this activity, see WS 5.1, Time Estimation Sheet, p. VI-53 of *Agricultural Construction Volume I*.

Unit I—Working With Plans
Student Handout

Complete the activities below; use the checklists to evaluate your work.

AS 1.2, Drawing a Plan

1. Use the procedure outlined in AS 1.2 to draw a construction plan.
2. Check your work and make any necessary changes.
   - ❑ Scale is appropriate and all dimensions are to scale.
   - ❑ Plan includes all necessary dimensions and specifications.
   - ❑ Drawings are correctly labeled.
   - ❑ Lines and symbols are used correctly.
   - ❑ Plan includes front, side, and top elevations.
3. Turn in your completed activity sheet. Due date _____.
4. Your final assessment score will be based on the completeness, accuracy, and appearance of your drawings.

AS 2.1, Preparing a Plan of Procedure

1. Complete AS 2.1, Preparing a Plan of Procedure.
2. Check your work and make any necessary changes.
   - ❑ Plan includes all steps needed to complete the project.
   - ❑ Cutting bill of materials includes materials needed for the project in their final dimensions.
   - ❑ Purchasing bill of materials includes all materials in standard sizes, as well as any fasteners, hinges, etc., if needed.
3. Turn in your completed activity sheet. Due date _____.
4. Your final assessment score will be based on the overall thoroughness and accuracy of the plan of procedure and bills of materials.

Agricultural Structures

Unit I—Working With Plans
Scoring Guide

Name _____

Activity	Criteria	Points Possible	Points Earned	Comments
Drawing a Plan	❑ Scale is appropriate and all dimensions are to scale ❑ Plan includes all necessary dimensions and specifications ❑ Drawings are correctly labeled ❑ Lines and symbols are used correctly ❑ Plan includes front, side, and top elevations			
Preparing a Plan of Procedure	❑ Plan includes all steps needed to complete the project ❑ Cutting bill of materials includes materials in their final dimensions ❑ Purchasing bill of materials includes all materials in standard sizes, as well as any fasteners, hinges, etc.			

Total Points Earned _____

Agricultural Structures

Curriculum Guide: *Agricultural Structures*

Unit: II. Home and Farmstead Planning

Unit Objective:

Students will apply principles of farm and homestead planning by devising a farmstead plan and explaining their design decisions in paragraph form.

Show-Me Standards: 1.8, CA6

References:

Agricultural Structures. University of Missouri-Columbia, Instructional Materials Laboratory, 1999.

Agriculture Publications. MU Extension. University of Missouri-Columbia. Accessed August 25, 2003, from http://muextension.missouri.edu/explore/agguides/.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Appeals*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7613.htm.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Making Applications*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7612.htm.

Local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners

Missouri Cooperative Soil Survey. Accessed March 22, 2004, from http://soils.missouri.edu/.

NASCO On-Line Catalogs. Accessed August 25, 2003, from http://www.nascofa.com/prod/Home.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 1.1, Evaluating Home Sites; AS 1.1, Farmstead Planning; AS 1.2, Planning a Farmstead; and AS 3.1, Resources for Manure Management.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. II-7, p. II-18, and p. II-30.

Performance-Based Assessment:

Students will design a farmstead plan and explain their design decisions on separate paper in paragraph form. Students must explain how they designed their farm in relation to topography, wind, natural resources, type and size of business, service and utilities, home, neighbors, and how regulatory agencies would view the plan.

Assessment will be based on the overall content and presentation of the farmstead plan and explanations. Spelling, grammar, and punctuation also will be factors in the assessment.

Unit II—Home and Farmstead Planning
Instructor Guide

The instructor should distribute the student handouts and assign the performance-based assessment activity in conjunction with the relevant lesson material as indicated in the instructor guide. The activity will be due at the completion of the lesson.

1. Emphasize the importance of following local building codes and zoning laws when planning a farmstead. Discuss relevant building codes and zoning laws.
   a. Information regarding building codes and zoning laws is available from local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners.
   b. General information about Missouri building codes and zoning laws is also available from the MU Extension, University of Missouri-Columbia, accessed December 3, 2003, from http://muextension.missouri.edu/explore/agguides/.

2. Use AS 1.2, Planning a Farmstead, to assess student competency at preparing a farmstead plan. Students will sketch the layout for their ideal farmstead and explain how their plan addresses the factors covered in the study questions for lesson 2. (The activity sheets Farmstead Planning and Planning a Farmstead are labeled AS 1.1 and AS 1.2, respectively, but are located in lesson 2.)
   a. Have students design their farm plan as an aerial view to include all the facilities and indicate where they are located in relation to each other.
   b. For a complete description of the activity, see AS 1.2, p. II-25.
   c. Answers for this activity will vary.
   d. If desired, have students present their farm plans on a poster instead of the activity sheet. Display completed posters in class.
   e. If desired, have students design their farm plan using collage or presentation software. Have students present their plan to the class as an oral report. Adjust the student handout and scoring guide as needed.

3. The final assessment score will be based on the overall content and presentation of the farmstead plan and explanations. Spelling, grammar, and punctuation also will be factors in the assessment.

4. ADDITIONAL ACTIVITY: Have students research a particular code or regulation that affects farmstead planning in their area. What is the regulation designed to protect? How does it affect farmstead planning? Lead a class

discussion in which students present their findings or have students explain their assigned regulation in a brief oral report.

Unit II—Home and Farmstead Planning
Student Handout

1. Using the activity sheet Planning a Farmstead, design your ideal farm. Draw your plan as an aerial-view map to include all the facilities and indicate where they are located in relation to each other. See the activity sheet for a complete list of instructions.

2. Explain, on separate paper in paragraph form, how your design addresses each of the considerations below.
   - ❑ Topography
   - ❑ Wind
   - ❑ Natural resources
   - ❑ Type and size of business
   - ❑ Services and utilities
   - ❑ Location of the home
   - ❑ Location of neighbors
   - ❑ How government agencies would view the plan

3. Your final assessment score will be based on the overall content and presentation of the farmstead plan and explanations. Spelling, grammar, and punctuation also will be factors in the assessment.

Agricultural Structures

Unit II—Home and Farmstead Planning
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Farm Plan Design	Plan addresses all discussion question topics and represents a good, workable design	Failed	Poor	Fair	Good	Excellent	X 8.75	
Written Explanation of Plan Design	Responses are complete and facts are accurate	Failed	Poor	Fair	Good	Excellent	X 8.75	
Presentation	Plan is well organized and eye-appealing	Failed	Poor	Fair	Good	Excellent	X 5	
Technical Considerations	Spelling, grammar, and punctuation are correct	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Agricultural Structures

Curriculum Guide: *Agricultural Structures*

Unit: III. Building Construction

Unit Objective:

Students will demonstrate an understanding of correct building construction procedures by laying out joists and rafters, applying roofing skills, and answering questions about roofing materials.

Show-Me Standards: 1.10, MA2

References:

Agricultural Structures. University of Missouri-Columbia, Instructional Materials Laboratory, 1999.

Agriculture Publications. MU Extension. University of Missouri-Columbia. Accessed August 25, 2003, from http://muextension.missouri.edu/explore/agguides/.

CEV Multimedia. Accessed December 4, 2003, from http://www.cev-inc.com/.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Appeals*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7613.htm.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Making Applications*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7612.htm.

Local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 9.
- Students will complete AS 1.1, Safety on the Construction Site; AS 2.1, Identifying Building Designs; AS 3.1, Construction Materials; AS 4.1, Identifying Fasteners; AS 5.1, Diagramming Flooring; JS 5.1, Joist Layout; AS 6.1, Wall Construction; JS 7.1, Rafter Layout; AS 8.1, Applying Roofing Materials; and AS 10.1, Heating, Cooling, and Ventilation Needs.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. III-4, p. III-15, p. III-25 (1), p. III-37, p. III-71, p. III-88, and p. III-113 (1, 2).

Performance-Based Assessment:

Students will lay out joists and rafters, use roofing skills to apply model shingles, and answer key questions about applying roofing materials.

Assessment will be based on the ability to safely and correctly perform the assigned procedures and to answer questions about applying roofing materials.

Unit III—Building Construction
Instructor Guide

The instructor should distribute the student handouts at the beginning of the unit and assign the performance-based assessment activities in conjunction with the relevant lesson material as indicated in the instructor guide. Students will complete the activities as they progress through the unit lessons.

1. Emphasize the importance of following local building codes and zoning laws when building new structures or making repairs. Discuss relevant local building codes and zoning laws.
   a. Information regarding building codes and zoning laws is available from local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners.
   b. General information about Missouri building codes and zoning laws is also available from the MU Extension, University of Missouri-Columbia, accessed December 3, 2003, from http://muextension.missouri.edu/explore/agguides/.

2. Use JS 5.1, Joist Layout, to assess student competency at laying out joists for floor framing. Students will lay out and assemble an 8' x 10' section of floor joists. For a complete description of the activity, see JS 5.1, p. III-65. **NOTE: This activity calls for students to use hand and power tools. Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

3. Use JS 7.1, Rafter Layout, to assess student competency at laying out rafters. Students will lay out the ridge cut, seat cut, and tail cut for a rafter on boards, paper, or cardboard. For a complete description of the activity, see JS 7.1, p. III-107.

4. Use AS 8.1, Applying Roofing Materials, to assess student competency at applying shingles. Students will use appropriate roofing techniques to apply paper shingles to a desk or shop table. They will also answer three key questions about applying roofing materials.
   a. For a complete description of the activity, see AS 8.1, pp. III-125–III-126.
   b. Answers for the activity are located on p. III-114.

5. The student handout for this performance-based assessment activity is a checklist based on these activity sheets that students can use to evaluate their work.

6. The student handout and scoring guide can also be adapted for use with students' class projects, if desired.

7. The final assessment score will be based on the ability to safely and correctly perform the assigned procedures and to answer questions about applying roofing materials.

8. ADDITIONAL ACTIVITIES:
   a. Have students make models of building styles and building substructures discussed in the unit, such as a shed with a hip or gable roof, a truss, and a stud frame wall with a door and window opening. Small wood stock such as strips of balsa or Popsicle sticks would be suitable for these projects.
   b. As an alternative to a larger class project, have students build a smaller project, such as a dog house, that requires them to apply many of the same construction skills.

Unit III—Building Construction
Student Handout

Complete the activities below; use the checklists to evaluate your work.

JS 5.1, Joist Layout

1. Use the procedure outlined in JS 5.1 to lay out floor joists.
2. Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
3. Check your work and make any necessary changes.
   - ❑ Measurements and cuts are accurate.
   - ❑ Joists are centered.
   - ❑ Joists fit well and are fastened for optimum strength.
   - ❑ Project is square and straight.
4. Have the instructor check your work. Due date _____.
5. Your final assessment score will be based on your ability to safely and correctly lay out floor joists.

JS 7.1, Rafter Layout

1. Use the procedure outlined in JS 7.1 to lay out the ridge cut, seat cut, and tail cut for a rafter on a board or piece of paper.
2. Check your work and make any necessary changes.
   - ❑ Measurements are correct.
   - ❑ Ridge cut, seat cut, and tail cut are accurately laid out.
3. Have the instructor check your work. Due date _____.
4. Your final assessment score will be based on your ability to correctly lay out rafters.

AS 8.1, Applying Roofing Materials

1. Use the procedure outlined in AS 8.1 to apply model three-tab shingles.
2. Check your work and make any necessary changes.
   - ❑ Measurements are accurate.
   - ❑ Cuts are accurate.
   - ❑ Courses are properly staggered.
   - ❑ Courses are properly overlapped.
   - ❑ Shingles are square and run straight.
   - ❑ Cap shingles are properly overlapped.
   - ❑ Cap shingles are running the right direction.
3. Have the instructor check your work. Turn in your completed activity questions. Due date _____.
4. Your final assessment score will be based on your ability to correctly apply roofing material and on your responses to the activity questions.

Agricultural Structures

Unit III—Building Construction
Scoring Guide

Name _____

Activity	Criteria	Points Possible	Points Earned	Comments
Joist Layout	❑ Measurements and cuts are accurate ❑ Joists are centered, square, and straight ❑ **Student followed all safety precautions** ❑ **Student followed all assigned procedures**			
Rafter Layout	❑ Measurements are correct ❑ Ridge cut, seat cut, and tail cut are accurately laid out			
Applying Roofing Materials	❑ Measurements and cuts are accurate ❑ Courses are correctly staggered and overlapped ❑ Shingles are square and run straight ❑ Cap shingles are properly overlapped and running in the right direction ❑ Activity questions are answered correctly			

Total Points Earned _____

Agricultural Structures

Curriculum Guide: *Agricultural Structures*

Unit: IV. Concrete

Unit Objective:

Students will apply principles of correct concrete construction procedures by making a concrete patio block.

Show-Me Standards: 2.5, MA2

References:

Agricultural Structures. University of Missouri-Columbia, Instructional Materials Laboratory, 1999.

Agriculture Publications. MU Extension. University of Missouri-Columbia. Accessed August 25, 2003, from http://muextension.missouri.edu/explore/agguides/.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Appeals*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7613.htm.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Making Applications*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7612.htm.

Local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 7.
- Students will complete AS 1.1, Concrete Safety; AS 2.1, Mixing Concrete; AS 3.1, Subgrade Preparation; AS 3.2, Laying Out a Building; AS 3.1, Reinforcing Concrete; JS 5.1, Pouring a Concrete Curb; AS 6.1, Curing Concrete; and JS 7.1, Preparing Forms for a Concrete Wall.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. IV-14 (1), p. IV-28 (1, 2), p. IV-46, and p. IV-68.

Performance-Based Assessment:

Students will use common equipment, materials, and procedures to make a concrete patio block. To complete the project, students must make a form for the patio block; determine the volume of the form; calculate and mix the correct amount of Portland cement, sand, gravel, and water to fill the form; and cure the project.

Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Unit IV—Concrete
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Emphasize the importance of following local building codes and zoning laws when working with concrete. Discuss relevant local building codes and zoning laws.
   a. Information regarding building codes and zoning laws is available from local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners.
   b. General information about Missouri building codes and zoning laws is also available from the MU Extension, University of Missouri-Columbia, accessed December 3, 2003, from http://muextension.missouri.edu/explore/agguides/.

2. Use or adapt the activity sheets found in the unit to assess student competency at working with concrete. Review or supplement these activities as needed, based on student mastery of the procedures and the equipment and materials students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

3. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit to make an appropriate project out of concrete. The student handout includes a procedure for making a patio block.

4. The student handout also includes a Project Completion Checklist and a Project Evaluation Checklist. Students can use the checklists to track the progress of their project and evaluate their work. Supplement or modify the student handout to reflect actual projects as needed.

5. Have students turn in their completed projects.

6. The final assessment score will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

7. ADDITIONAL ACTIVITY: As a class project, contact your local Habitat for Humanity affiliate to find out how students can help work on a Habitat project.

Unit IV—Concrete
Student Handout

Pouring a Concrete Patio Block

Objective: Pour concrete to make a patio block.

Materials and Equipment:
Wood and screws for forms
Tape measure
Drill
Shovel or spade
Container for mixing concrete
Gravel
Sand
Portland cement
Water
Oil
Hand trowel or wood float
Safety goggles*
Latex gloves
Face mask
Calculator

*Everyone participating in or observing this procedure must wear the proper eye protection. Safety practices should be followed at all times while in the shop area.

Procedure:

1. The purpose of this activity is to build a concrete patio block. To complete the project, you will need to make a form for the patio block; determine the volume of the form; calculate and mix the correct amount of gravel, sand, Portland cement, and water to fill the form; and cure the project.

2. Construct a form using the materials provided by your instructor. Build the form so that the patio block will be 3 1/2" x 18" x 18" when it is completed. Be sure to use screws so the form can be removed more easily after the concrete has set.

3. Using a calculator, determine the volume of the form.

   Volume of the form _____

4. Using the mixture ratio 1:2:3:6, determine the amount of Portland cement, sand, gravel, and water needed. Confirm the amounts with your instructor before proceeding.

   Cement _____
   Sand _____
   Gravel _____
   Water _____

5. Lightly coat the inside of the form with oil to prevent the form from sticking to the block.

6. After you have determined the amount of ingredients needed, mix the concrete thoroughly. When the concrete is ready, begin pouring the concrete into the form. Pour until the form is filled halfway and then use a hand trowel to work up and down through the concrete, especially around the edges. This will remove air bubbles and move the aggregate away from the edges to create a smoother finish.

7. Pour the concrete to the top of the form. Using a hand trowel, work the concrete that was added to the form to remove air pockets.

8. Using a straight board as a screed, work the top until the entire surface is level and even.

9. Allow the concrete to begin to set.

10. Once the surface of the concrete starts to dry and no water is standing on top of the poured concrete, take a small hand trowel and smooth the surface of the block.

11. Allow the patio block to cure for at least 3 to 4 days or preferably up to 1 week for maximum strength.

12. After the concrete has set completely, remove the block from the form.

13. Perform assigned cleanup procedures. Return materials and equipment to their proper places.

14. Turn your completed patio block in to the instructor for grading.

Name_____

Use the Project Completion Checklist and Project Evaluation Checklist to track the progress of your project.

Project Completion Checklist

Procedure	Date Due
❑ Master all competencies necessary to complete the project.	
❑ Receive instructor approval to build the project.	
❑ Review safety precautions for equipment and materials to be used. You can lose points for not following safety precautions and other assigned procedures.	
❑ Complete project construction.	
❑ Perform a quality control inspection of the project following completion. Use the Project Evaluation Checklist.	
❑ Turn in the completed project. Your final assessment score will be based on the overall quality of the work and your ability to safely and correctly complete the project within the available time.	

Project Evaluation Checklist

Quality Control and Shop Procedures	Criteria
Quality of Work	❑ Form was properly constructed. ❑ Volume of the form was figured correctly. ❑ Amounts of cement, sand, gravel, and water were figured correctly. ❑ Concrete was mixed to the proper consistency. ❑ Concrete is properly finished. ❑ Project is good enough to sell. ❑ Work was completed on time.
Safety and Work Habits: Observe these safety procedures whenever you are in the shop.	❑ Know how to use the tools and materials before you attempt to use them. Only use tools and materials the instructor has approved you to use. ❑ Wear appropriate personal protective equipment. ❑ Follow safety guidelines from your instructor and safety information on labels, equipment, and signs in the work area. ❑ Follow assigned setup and cleanup procedures. ❑ Return equipment and materials to their assigned places.

Agricultural Structures

Unit IV—Concrete
Scoring Guide

Name _____

Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Form was properly constructed	Failed	Poor	Fair	Good	Excellent	X 3	
Volume of the form was figured correctly	Failed	Poor	Fair	Good	Excellent	X 5	
Amounts of cement, sand, gravel, and water were figured correctly	Failed	Poor	Fair	Good	Excellent	X 6	
Concrete was mixed to the proper consistency	Failed	Poor	Fair	Good	Excellent	X 4	
Concrete is properly finished	Failed	Poor	Fair	Good	Excellent	X 2	
Project is good enough to sell	Failed	Poor	Fair	Good	Excellent	X 3	
Work was completed on time	Failed	Poor	Fair	Good	Excellent	X 2	
Student followed all safety precautions	**Passed**				**Failed**	**X (-25)**	Negative Points *
Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL							

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Structures

Curriculum Guide: *Agricultural Structures*

Unit: V. Electricity

Unit Objective:

Students will demonstrate an understanding of how to work with electricity and wiring by diagramming a wiring plan for an agricultural structure, identifying sources of electrical grounding in the structure, and completing a bill of materials for the project.

Show-Me Standards: 1.10, CA3

References:

Agricultural Structures. University of Missouri-Columbia, Instructional Materials Laboratory, 1999.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Appeals*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7613.htm.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Making Applications*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7612.htm.

Home Electrical Wiring. DoItYourself.com Inc. Accessed December 5, 2003, from http://doityourself.com/electric/index.htm.

Local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners

NFPA Online. National Fire Protection Association. Accessed December 5, 2003, from http://www.nfpa.org/catalog/home/index.asp.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 12.
- Students will complete AS 1.1, Electricity on the Internet; AS 2.1, Electrical Terms; AS 3.1, Calculating Feeder Wire Size; AS 4.1, Grounding and GFCIs; AS 5.1, Evaluating Lights, Outlets, Switches, and Circuit Protection; AS 6.1, Diagramming Electrical Wiring; AS 7.1, Diagramming the Service Stack; AS 8.1, Identifying SEP Components; JS 9.1, Wiring a Three-Way Switch; AS 10.1, Calculating Electrical Costs; AS 11.1, Assessing Lightning Protection; and AS 12.1, Using Test Devices.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. V-14, p. V-28, p. V-47, p. V-61, p. V-71, p. V-119, p. V-150, and p. V-180.

Performance-Based Assessment:

Students will diagram a wiring plan for a machinery shed using the appropriate symbols and identify sources of electrical grounding in the building. They will also complete a bill of materials for the project.

Assessment will be based on the overall content and presentation of the work.

Unit V—Electricity
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Emphasize the importance of following local building codes and zoning laws when working with wiring and electricity. Discuss relevant local building codes and zoning laws.
   a. Information regarding building codes and zoning laws is available from local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners.
   b. General information about Missouri building codes and zoning laws is also available from the MU Extension, University of Missouri-Columbia, accessed December 3, 2003, from http://muextension.missouri.edu/explore/agguides/.

2. The student handout includes an activity that can be used to assess student performance. For this activity, students will diagram a wiring plan for a machinery shed using the appropriate symbols, identify sources of electrical grounding in the building, and complete a bill of materials for the project.
   a. Provide each student with two blank transparency sheets. Students will place the transparencies over the diagram of the machinery shed and develop their wiring plan in stages.
   b. Provide students with dry-erase markers in assorted colors to add the fixtures, receptacles, switches, and wiring to the plan.

3. Have students turn in their completed activity sheets and transparencies. Answers will vary.

4. The final assessment score will be based on the overall content and presentation of the work.

Unit V—Electricity
Student Handout **Name**_____

Objective: Wire a machinery shed.

Materials Needed:
Diagram
Transparencies
Dry-erase markers

1. The instructor will give you a diagram of a machinery shed. Develop a wiring plan for the building using the steps below. Be sure to determine what local building and zoning codes apply to the structure and design a wiring plan that complies with all relevant codes.

2. Identify the best position for the electrical service panel and ground rod and mark the locations on the diagram using their symbols.

3. Place a transparency sheet over the diagram. Determine the best location for the fixtures, receptacles, and switches listed below and draw their symbols on the transparency using a dry-erase marker.
   - 6 ceiling light fixtures
   - 3 wall-mount light fixtures
   - 9 duplex receptacles (3 must be GFCIs)
   - Wall switches (You decide how many.)

4. Place a second transparency over the diagram and the first transparency. Determine how many circuits you need and draw in the circuits. Draw lines from the switches to the fixtures they control. Use different colors to make the wires easier to follow.

5. Complete a bill of materials for the project. See the back side of this sheet for a bill of materials form. Include all the materials that will be needed to complete the electrical work in the building—light bulbs, receptacles, cover plates, wire, etc.

Date_____

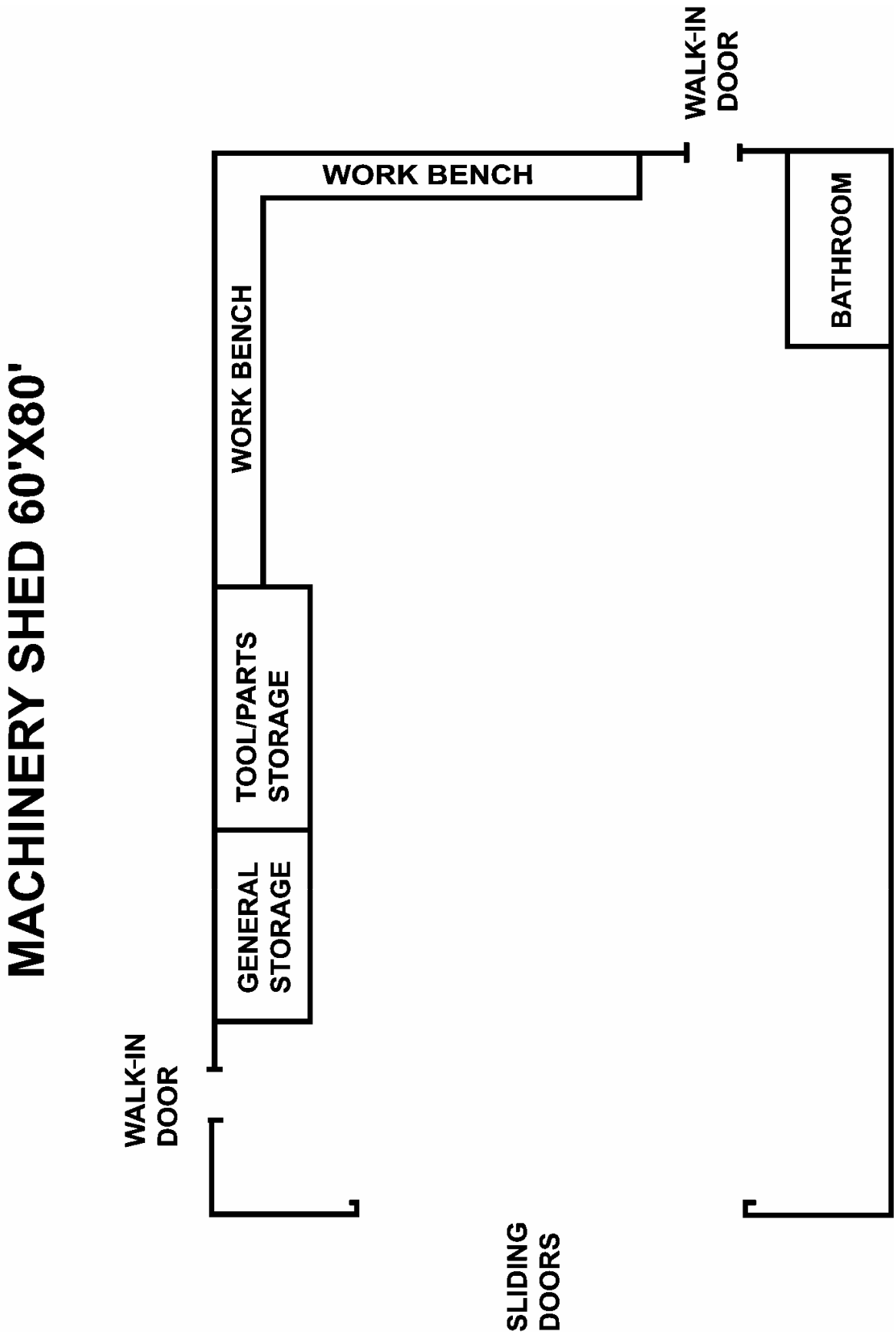
Project Title_____

Bill of Materials

Determine the materials you will need for this project and complete the bill of materials below.

No. of Pieces or Amount of Material	Material or Electrical Hardware	Estimated Cost per Unit	Cost

Estimated Total Cost _____


MACHINERY SHED 60'X80'
WALK-IN DOOR
WORK BENCH
BATHROOM
WORK BENCH
TOOL/PARTS STORAGE
GENERAL STORAGE
WALK-IN DOOR
SLIDING DOORS

Agricultural Structures

Unit V—Electricity
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Wiring Diagram	❑ Electrical service panel and ground rod are properly positioned ❑ Fixtures, receptacles, and switches are well positioned ❑ Wiring is properly run ❑ Symbols are correct and plan is clear and easy to read	Failed	Poor	Fair	Good	Excellent	X 10	
Bill of Materials	Bill of materials includes all materials needed, their cost, and the total cost of the project	Failed	Poor	Fair	Good	Excellent	X 7.5	
Building and Zoning Codes	Wiring complies with all relevant building and zoning codes	Failed	Poor	Fair	Good	Excellent	X 7.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Agricultural Structures

Curriculum Guide: *Agricultural Structures*

Unit: VI. Plumbing

Unit Objective:

Students will demonstrate an understanding of plumbing equipment and procedures by applying different techniques to join dissimilar types of pipe—copper, PVC, CPVC, and black iron.

Show-Me Standards: 2.5, CA3

References:

Agricultural Mechanics Building Plans. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Agricultural Structures. University of Missouri-Columbia, Instructional Materials Laboratory, 1999.

Agriculture Publications. MU Extension. University of Missouri-Columbia. Accessed August 25, 2003, from http://muextension.missouri.edu/explore/agguides/.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Appeals*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7613.htm.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Making Applications*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7612.htm.

Local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 5.
- Students will complete AS 1.1, Determining Water Needs; AS 2.1, Working With Plumbing Safely; AS 3.1, Pipe Usage; AS 4.1, Cutting and Joining Plastic Pipe; and JS 4.1, Sweating Copper Pipe.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. VI-4 and p. VI-47 (1, 2).

Performance-Based Assessment:

Students will use different techniques to join dissimilar types of pipe—copper, PVC, CPVC, and black iron.

Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Unit VI—Plumbing
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Emphasize the importance of following local building codes and zoning laws when installing or repairing plumbing. Discuss relevant local building codes and zoning laws.
   a. Information regarding building codes and zoning laws is available from local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners.
   b. General information about Missouri building codes and zoning laws is also available from the MU Extension, University of Missouri-Columbia, accessed December 3, 2003, from http://muextension.missouri.edu/explore/agguides/.

2. Use or adapt the activity sheets found in the unit to assess student competency at performing basic plumbing procedures. Review or supplement these activities as needed, based on student mastery of the procedures and the tools and materials the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**

3. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit to complete an appropriate plumbing project, such as the one that accompanies this enhancement. This plan requires students to join dissimilar types of pipe—copper, PVC, CPVC, and black iron.

4. The student handout for this activity is a Project Completion Checklist and Project Evaluation Checklist that can be used with the project. Students can use the checklists to track the progress of their project and evaluate their work. Supplement or modify the student handout to reflect actual projects as needed.

5. Have students turn in their completed projects.

6. Test the completed projects by attaching a water source to one side and a copper hose bib to the other. All joints should be watertight.

7. The final assessment score will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.

Unit VI—Plumbing
Student Handout

Name_____

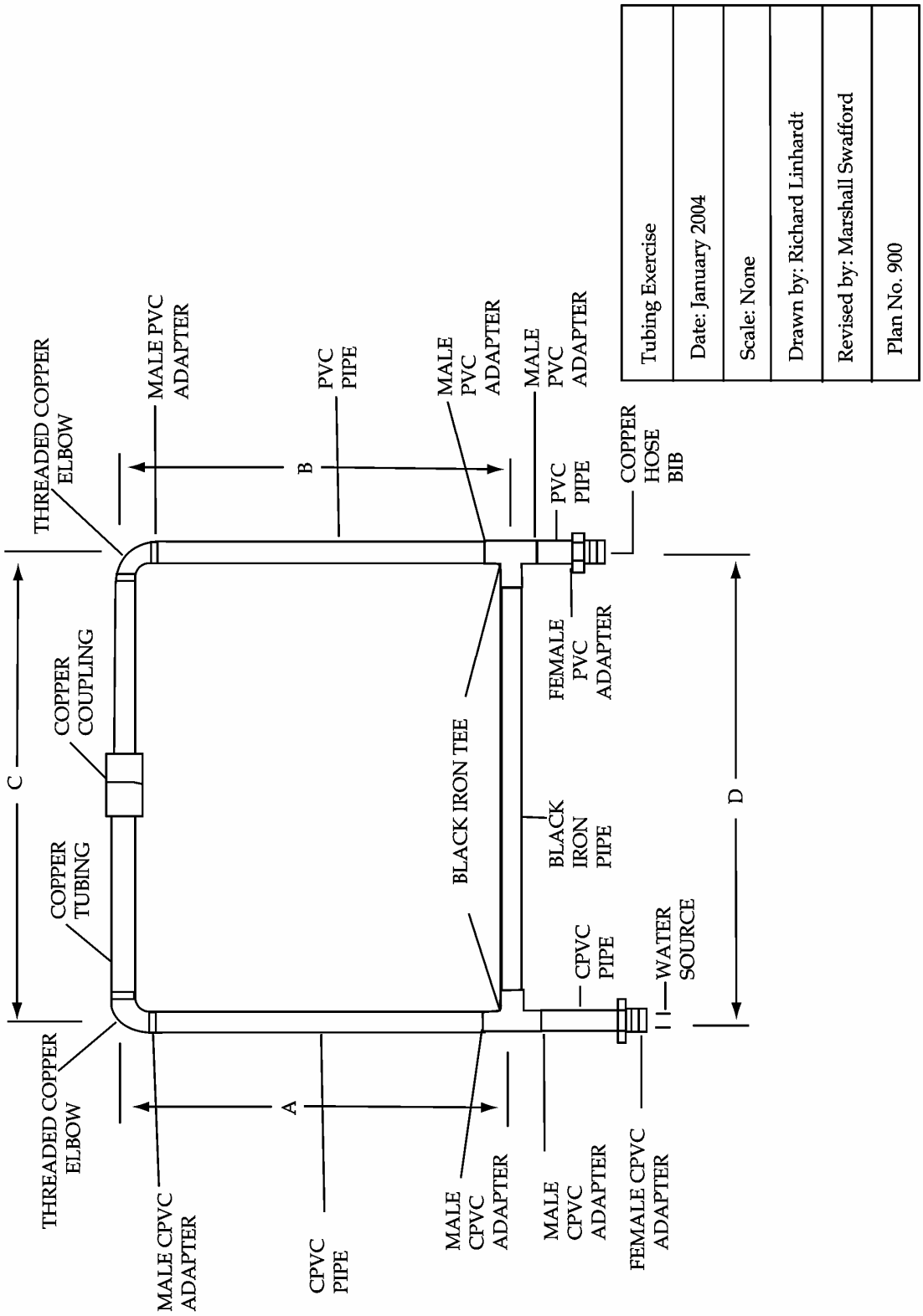
Use the Project Completion Checklist and Project Evaluation Checklist to track the progress of your project.

Project Completion Checklist

Procedure	**Date Due**
❑ Master all competencies necessary to complete the project.	
❑ Review safety precautions for tools and materials to be used. You can lose points for not following safety precautions and other assigned procedures.	
❑ Complete project construction.	
❑ Perform a quality control inspection of the project following completion. Use the Project Evaluation Checklist.	
❑ Turn in the completed project. Your final assessment score will be based on the overall quality of the work and your ability to safely and correctly complete the project within the available time.	

Project Evaluation Checklist

Quality Control and Shop Procedures	Criteria
Quality of Work	❑ Fittings and pipe were properly cleaned and prepared. ❑ Assembly procedures—cementing, soldering, etc.—are correct for the materials being joined. ❑ Measurements are correct and project has the correct dimensions. ❑ Parts fit well for optimum strength. ❑ Work was completed on time.
Safety and Work Habits: Observe these safety procedures whenever you are in the shop.	❑ Know how to use the equipment before you attempt to use it. Only use tools and materials the instructor has approved you to use. ❑ Wear appropriate personal protective equipment. ❑ Follow safety guidelines from your instructor and safety information on labels, equipment, and signs in the work area. ❑ Follow assigned setup and cleanup procedures. ❑ Return equipment and materials to their assigned places. ❑ Do not use equipment that does not function properly. ❑ Do not use cleaners, cements, or other products with missing or unreadable labels. ❑ Tell the instructor about any damaged or malfunctioning equipment.



Plan adapted from *Agricultural Mechanics Building Plans*. University of Missouri-Columbia: Instructional Materials Laboratory.

Bill of Materials:

1 - 1/2" x 18" black iron pipe
1 - 1/2" x 18" copper tubing
1 - 1/2" x 2' PVC pipe
1 - 1/2" x 2' CPVC pipe
3 - 1/2" PVC male adapters
2 - 1/2" threaded copper elbows
1 - 1/2" copper coupling
3 - 1/2" CPVC male adapters
2 - 1/2" black iron tees
1 - 1/2" PVC female adapter
1 - 1/2"copper hose bib
1 - 1/2" CPVC female adapter
1 - can pipe primer
1 - can CPVC cement
1 - can PVC cement
1 - roll wire solder
1 - piece steel wool
1 - jar soldering flux
1 - propane torch
1 - roll 1/2" Teflon tape

Construction Procedure:

Assemble the project as shown. The pieces should be lengths such that A equals B and C equals D.

When connecting copper to copper: Clean the inside of the fitting and the outside of the tubing using steel wool or a similar abrasive. Apply a thin coat of soldering flux to the outside of the tubing and the inside of the fitting. Apply heat to the fitting until the solder flows. Touch the solder to the heated fitting and allow the solder to flow around the fitting to produce a leakproof seal.

When connecting plastic to plastic: Clean the inside of the fitting and the outside of the tubing using pipe primer or a similar pipe cleaner. Apply a thin coat of pipe cement to the outside of the tubing and the inside of the fitting and connect the pipe and fitting.

When connecting plastic to copper or iron: To ensure a leakproof seal when connecting threaded materials, wrap the external threads of each connecting piece with Teflon tape and tighten the pieces with a pipe wrench.

Agricultural Structures

Unit VI—Plumbing
Scoring Guide

Name _____

Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Fittings and pipe were properly cleaned and prepared	Failed	Poor	Fair	Good	Excellent	X 5	
Assembly procedures are correct for the materials being joined	Failed	Poor	Fair	Good	Excellent	X 5	
Measurements are correct and project has the correct dimensions	Failed	Poor	Fair	Good	Excellent	X 3	
Parts fit well for optimum strength	Failed	Poor	Fair	Good	Excellent	X 4	
Project is watertight	Failed	Poor	Fair	Good	Excellent	X 6	
Work was completed on time	Failed	Poor	Fair	Good	Excellent	X 2	
Student followed all safety precautions	**Passed**				**Failed**	**X (-25)**	Negative Points *
Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL							

Final Assessment Total _____/100 pts.
*** Overall combined score cannot be lower than 0.**

Comments:

Agricultural Structures

Curriculum Guide: *Agricultural Structures*

Unit: VII. Fencing

Unit Objective:

Students will apply principles of correct fence installation by devising a fencing plan that complies with local codes and includes the materials used, cost, and layout of the fence.

Show-Me Standards: 3.8, SS7

References:

Agricultural Structures. University of Missouri-Columbia, Instructional Materials Laboratory, 1999.

Call 1-800-DIG-RITE First. University of Missouri Outreach & Extension. Lincoln University. Accessed March 24, 2004, from http://outreach.missouri.edu/webster/ag-edge/legal/dig-rite.html.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Appeals*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7613.htm.

Cook, J. B., & Nickolaus, G. F. *Basic Procedures in Administration of Zoning Regulations: Making Applications*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/commdm/dm7612.htm.

Local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners

Matthews, S. F. *Missouri Fencing and Boundary Laws*. MU Extension. University of Missouri-Columbia. Accessed December 2, 2003, from http://muextension.missouri.edu/explore/agguides/agecon/g00810.htm.

Phillips, R. E. *Constructing Wire Fences*. MU Extension. University of Missouri-Columbia. Accessed August 20, 2003, from http://muextension.missouri.edu/explore/agguides/agengin/g01192.htm.

Zulovich, J. M. *Selecting Wire Fencing Materials*. MU Extension. University of Missouri-Columbia. Accessed August 20, 2003, from http://muextension.missouri.edu/explore/agguides/agengin/g01191.htm.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 5.
- Students will complete AS 1.1, Building Legal Fences; AS 2.1, Constructing Model Brace Assemblies; JS 3.1, Constructing Barbed Wire Fencing; AS 4.1, Tensioning Fences; and AS 5.1, Splicing Wire.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. VII-5, p. VII-16 (1), and p. VII-54.

Performance-Based Assessment:

Each student will devise a fencing plan for an area designated by the instructor. The plan will include the materials used, cost, and an aerial-view drawing to indicate the layout of the fence. Students must also determine what local building and zoning codes apply to the fence and must design a fence that complies with all relevant codes.

Assessment will be based on the overall content and presentation of the fencing plan.

Unit VII—Fencing
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Emphasize the importance of following local building codes and zoning laws when working with fencing. Discuss relevant local building codes and zoning laws.
   a. Information regarding building codes and zoning laws is available from local regulatory agencies, such as the planning and development department, public works department, and county board of commissioners.
   b. General information about Missouri building codes and zoning laws is also available from the MU Extension, University of Missouri-Columbia, accessed December 3, 2003, from http://muextension.missouri.edu/explore/agguides/.

2. Describe an area to be enclosed with fencing, such as a pasture or a yard. Include as much detail as necessary to describe the area and its intended use, such as the dimensions of the area, whether or not the fence must enclose or keep out livestock, and the uses of the adjoining land.

3. Have students devise a fencing plan for the described area.
   a. Have students make an aerial-view scale drawing to indicate fence layout and post spacing. Have students use computer-aided drafting (CAD) equipment or pencils and paper to make their drawing, as preferred. Drawing to scale was discussed in Unit 1, Working With Plans.
   b. Have students compile a bill of the materials they will need, the estimated cost of each item, and the estimated total cost of the fence. A bill of materials work sheet is included with the student handout.
   c. Students must also determine what local building and zoning codes apply to the fence and design a fence that complies with all relevant codes.

4. The final assessment score will be based on the overall content and presentation of the fencing plan.

Unit VII—Fencing
Student Handout

1. The instructor will describe an area to be enclosed with fencing.

2. Develop a fencing plan for the described area. Be sure to determine what local building and zoning codes apply to the fence and design a fence that complies with all relevant codes.

3. Make an aerial-view scale drawing to indicate fence layout and post spacing.

4. Complete a bill of materials for the project. Include all the materials that will be needed to complete the fence. A form for a bill of materials is included on the back of this sheet.

5. Your final assessment score will be based on the overall content and presentation of your fencing plan.

Name_____ **Date**_____

Project Title_____

Bill of Materials

Determine the materials you will need for this project and complete the bill of materials below.

No. of Pieces or Amount of Material	Material	Estimated Cost per Unit	Cost

Estimated Total Cost _____

Agricultural Structures

Unit VII—Fencing
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Fence Plan	Fence is well suited for its intended use and posts are properly spaced	Failed	Poor	Fair	Good	Excellent	X 7.5	
Building and Zoning Codes	Fence complies with all relevant building and zoning codes	Failed	Poor	Fair	Good	Excellent	X 6.25	
Bill of Materials	Bill of materials includes all materials needed, their cost, and the total cost of the fence	Failed	Poor	Fair	Good	Excellent	X 6.25	
Presentation	Plan is well drawn and to scale	Failed	Poor	Fair	Good	Excellent	X 5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Biotechnology:
Applications in Agriculture

Curriculum Guide: *Biotechnology: Applications in Agriculture*

Unit: I. Introduction to Biotechnology

Unit Objective:

Students will demonstrate an understanding of the foundations of biotechnology by developing a pamphlet or poster and oral presentation describing the history, the use, and the benefits or detriments of a specific genetically manipulated food product.

Show-Me Standards: 3.4, SC8

References:

Biotechnology: Applications in Agriculture. University of Missouri-Columbia, Instructional Materials Laboratory, 1998.

Biotechnology in Food and Agriculture. Food and Agriculture Organization of the United Nations. Accessed August 8, 2003, from http://www.fao.org/BIOTECH/act.asp.

Food Biotech Info. Accessed August 8, 2003, from http://www.foodbiotechinfo.com/index.html.

Food Science and Technology. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Genetically Engineered Foods. Mc Vitamins. Accessed March 16, 2004, from http://www.mcvitamins.com/genetically_engineered_foods.htm.

Lambrecht, B. *Dinner at the New Gene Café: How Genetic Engineering Is Changing What We Eat, How We Live, and the Global Politics of Food*, 1st ed., New York: Thomas Dunne Books, 2001.

Rader, C. M. *A Report on Genetically Engineered Crops*. Accessed March 16, 2004, from http://members.tripod.com/c_rader0/gemod.htm.

Science in Your Shopping Cart. U.S. Department of Agriculture. Accessed October 9, 2003, from http://www.ars.usda.gov/is/np/shopcartintro.html.

Winston, M. L. *Travels in the Genetically Modified Zone*. Cambridge, MA: Harvard University Press, 2002.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete AS 1.1, What Is…? Facts about Biotechnology.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. I-5 (1, 2).

Performance-Based Assessment:

Students will work in groups of three to develop a pamphlet or poster designed to describe the history, the use, and the benefits or detriments of a specific genetically manipulated food product. Each team will complete its project with a brief oral presentation to the class regarding its findings.

Assessment will be based on the accuracy, organization, and clarity of the information cited in the pamphlet or poster. Additional consideration will be given to the quality of both the material produced and the oral presentation. Assessment also will take into account grammar, spelling, punctuation, and capitalization.

Unit I—Introduction to Biotechnology
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work in teams of three to focus their efforts on the production of a pamphlet or poster on a genetically manipulated food product.

2. Team members will work as a unit to identify and research an example of a genetically manipulated food product.

3. Students may use material in the unit and additional outside material to complete their presentations. Students may not use the source material word for word and must provide a complete bibliography of their sources along with their presentation.

4. Below is a suggested list of genetically manipulated food products you may want to provide for students to consider. Students may also select another genetically manipulated food product, provided the selection is approved by the instructor.
   - ❑ Milk and other dairy products from cows that are injected with rBGH, a genetically engineered growth hormone
   - ❑ Soybean, tomato, corn, and canola plants that withstand herbicide application
   - ❑ Corn, tomatoes, and potatoes with built-in pesticides
   - ❑ Potatoes, tomatoes, cantaloupe, squash, cucumber, corn, canola, soybeans, and grapes manipulated to resist plant viruses
   - ❑ Peppers and tomatoes engineered to resist plant fungi
   - ❑ Tomatoes, peas, peppers, and tropical fruits manipulated to extend shelf life and improve processing quality
   - ❑ Corn, sunflowers, and soybeans engineered to contain altered levels of nutrients
   - ❑ Canola and peanuts with altered lipid profiles
   - ❑ Coffee beans with altered caffeine content
   - ❑ Potatoes that absorb less oil when fried
   - ❑ Corn and peas engineered for a prolonged shelf life
   - ❑ Various enzymes (proteins that speed up biological processes) used to make various products (e.g., beer, wine, fruit juice, sugar, oil, and baked goods)
   - ❑ Genetically engineered rennet for making cheese

5. After completing the research, the team will use its findings to develop, outline, and write material for a pamphlet or poster.
   a. Information in the pamphlet or poster will serve as the focus for a brief oral presentation on the food product selected for research.
   b. The presentation should be thorough, but concise, and range between 5 and 10 minutes, including time for questions and answers.

6. Information in the oral presentation and in the pamphlet or poster should address the following:
   - ❑ The product's history and its use
   - ❑ How the food product has been genetically manipulated
   - ❑ Why the food product has been genetically manipulated
   - ❑ The implications (pro and con) for the commercial food production industry of the product's genetic manipulation
   - ❑ The benefits or detriments of the genetically manipulated product for the consumer

7. Assessment will evaluate the team's effort (both on the presentation and pamphlet/poster).
   a. Factors to be evaluated will be accuracy, organization, clarity, and quality.
   b. Spelling, grammar, punctuation, and capitalization will be factors in the assessment.

Unit I—Introduction to Biotechnology
Student Handout

1. You will work in teams of three students to focus your efforts on the production of a pamphlet or poster on a genetically manipulated food product.

2. As team members, you will work as a unit to identify and research an example of a genetically manipulated food product.

3. You may use material in the unit and additional outside material to complete your presentation. You may not use the source material word for word and must provide a complete bibliography of your sources along with your presentation.

4. After completing the research, your team will use its findings to develop, outline, and write material for a pamphlet or poster.
   a. Information in the pamphlet or poster will serve as the focus for a brief oral presentation on the food product selected for research.
   b. The presentation should be thorough, but concise, and range between 5 and 10 minutes, including time for questions and answers.

5. Information in your team's oral presentation and in the pamphlet or poster should address the following:
   - ❑ The product's history and its use
   - ❑ How the food product has been genetically manipulated
   - ❑ Why the food product has been genetically manipulated
   - ❑ The implications (pro and con) for the commercial food production industry of the product's genetic manipulation
   - ❑ The benefits or detriments of the genetically manipulated product for the consumer

6. Assessment will evaluate your team's effort (both on the presentation and pamphlet/poster).
   a. Factors to be evaluated will be accuracy, organization, clarity, and quality.
   b. Spelling, grammar, punctuation, and capitalization will be factors in the assessment.

Biotechnology: Applications in Agriculture

Unit I—Introduction to Biotechnology
Scoring Guide
Team Topic/Members _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Oral Presentation	❑ Accuracy ❑ Organization ❑ Clarity ❑ Quality	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 7.5	
Pamphlet or Poster	❑ Accuracy ❑ Organization ❑ Clarity ❑ Quality	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 15	
Technical Considerations	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Biotechnology:
Applications in Agriculture

Curriculum Guide: *Biotechnology: Applications in Agriculture*

Unit: II. Issues in Biotechnology

Unit Objective:

Students will demonstrate an understanding of the concerns regarding biotechnology by conducting debates on issues in the field.

Show-Me Standards: 4.1, SC8

References:

Amber Waves. United States Department of Agriculture. Economic Research Service. Accessed October 15, 2003, from http://www.ers.usda.gov/AmberWaves/.

Biotechnology: Applications in Agriculture. University of Missouri-Columbia, Instructional Materials Laboratory, 1998.

Extemporaneous Debate Rules. San Diego State University. Accessed August 8, 2003, from http://www-rohan.sdsu.edu/faculty/dunnweb/debaterules.html.

Faces of Agriculture. Accessed October 15, 2003, from http://www.facesofag.com/.

Loos Tales. Accessed October 15, 2003, from http://www.loostales.com/.

Tomlinson, J. *Argumentation*. Accessed August 8, 2003, from http://facstaff.bloomu.edu/jtomlins/debate_formats.htm.

What is Debate? International Debate Education Association. Accessed December 3, 2003, from http://www.idebate.org/info/whatisdebate.asp.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 1.1, Community Survey; and AS 2.1, Solving the Regulatory Puzzle.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. II-4 (3) and p. II-21 (1).

Performance-Based Assessment:

Students will form teams of two to three students to research and debate issues, such as ethical, social, economic, and cultural concerns, in biotechnology.

Assessment will be based on each speaker's effort and will take into consideration the thoroughness, completeness, accuracy, and persuasiveness of the information presented during the debate. Other factors to be assessed will be presentation and timing.

Unit II—Issues in Biotechnology
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work in teams of two or three to research and debate a topic related to an issue of the application of biotechnology.

2. Each team of two or three students will link with a team of similar size to select a single debatable topic for which one team will serve as advocates and the other team will serve as dissenters.

3. The list below is suggested debate topic questions you may want to provide for students to consider. Students may also develop their own questions to debate, provided those questions are based on valid issues in the field of biotechnology, approved by the instructor, and agreed upon by the two teams debating the issue.
   - ❑ Will genetically engineered animals present any health hazards to people?
   - ❑ Is it ethically acceptable to create genetically engineered animals?
   - ❑ Are genetically engineered foods safe to eat?
   - ❑ Will engineered foods be less expensive and/or more nutritious?
   - ❑ Will decisions about the use of biotechnology products include input from those who will be most directly affected?
   - ❑ What is the ethical and moral framework for creating all types of engineered organisms?
   - ❑ How adequate are current regulations for assuring public safety?
   - ❑ How can the public have a direct voice in the risk assessment process?
   - ❑ Will increased knowledge about biotechnology be sufficient to alleviate concerns?
   - ❑ Do television and the press accurately depict biotechnology issues?
   - ❑ What are the legal considerations regarding the application of biotechnology to agriculture?
   - ❑ What are the moral ramifications of the application of biotechnology techniques to agriculture?

4. Once a topic is identified, both teams will agree on subtopics to be researched and debated by each paired advocate and dissenter. NOTE: Members of each pairing of students could conduct research independently or in pairs, depending on the instructor's approach to the assignment. While independent research may afford an element of surprise in the debate, paired research could encourage deeper thought and consideration by the participants as they prepare to debate each other.

5. Students may use material in the unit and additional outside material to complete their research. Students may not use the source material word for word and must provide a complete bibliography of their sources after their debate.

6. After completing research, the teams will square off in a formal debate format roughly organized as follows:
   a. First speaker, advocate: 5 minutes
   b. First speaker, dissenter: 5 minutes
   c. Second speaker, advocate: 5 minutes
   d. Second speaker, dissenter: 5 minutes
   e. Rebuttal, third (or first) speaker, dissenter: 2 minutes
   f. Rebuttal, third (or first) speaker, advocate: 2 minutes

7. To accurately time the presentation of each speaker, you may want to designate an official timekeeper from among the members of the class.

8. Assessment will evaluate each speaker's effort and will take into account the following factors:
   a. Thoroughness: Does the speaker thoroughly cover his or her assigned aspect of the debated issue?
   b. Completeness: How completely does the speaker explain her or his position on the issue?
   c. Accuracy: Does the speaker present accurate factual information?
   d. Persuasiveness: How persuasive is the speaker in winning listeners to his or her side of the debated issue?
   e. Presentation: What is the overall impression conveyed by the speaker during her or his presentation?
   f. Timing: Does the speaker confine his or her presentation to the time allotted?

Unit II—Issues in Biotechnology
Student Handout

1. You will work a team of two or three to research and debate a topic related to an issue of the application of biotechnology.

2. Your team will link with a team of similar size to select a single debatable topic for which one team will serve as advocates and the other team will serve as dissenters.

3. Once a topic is identified, both teams will agree on subtopics to be researched and debated by each paired advocate and dissenter.

4. You may use material in the unit and additional outside material to complete your research. You may not use the source material word for word and must provide a complete bibliography of your sources after your debate.

5. After completing research, the teams will square off in a formal debate format roughly organized as follows:
   a. First speaker, advocate: 5 minutes
   b. First speaker, dissenter: 5 minutes
   c. Second speaker, advocate: 5 minutes
   d. Second speaker, dissenter: 5 minutes
   e. Rebuttal, third (or first) speaker, dissenter: 2 minutes
   f. Rebuttal, third (or first) speaker, advocate: 2 minutes

6. Assessment will evaluate each speaker's effort and will take into account the following factors:
   a. Thoroughness: Does the speaker thoroughly cover his or her assigned aspect of the debated issue?
   b. Completeness: How completely does the speaker explain her or his position on the issue?
   c. Accuracy: Does the speaker present accurate factual information?
   d. Persuasiveness: How persuasive is the speaker in winning listeners to his or her side of the debated issue?
   e. Presentation: What is the overall impression conveyed by the speaker during her or his presentation?
   f. Timing: Does the speaker confine his or her presentation to the time allotted?

Biotechnology: Applications in Agriculture

Unit II—Issues in Biotechnology
Scoring Guide
Debate Topic/Members _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Debate Content and Presentation	Issue covered thoroughly	Failed	Poor	Fair	Good	Excellent	X 5	
	Position explained completely	Failed	Poor	Fair	Good	Excellent	X 5	
	Information is accurate	Failed	Poor	Fair	Good	Excellent	X 5	
	Speaker is persuasive	Failed	Poor	Fair	Good	Excellent	X 5	
	Speaker makes good impression	Failed	Poor	Fair	Good	Excellent	X 2.5	
	Speaker presents within allotted time	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Biotechnology:
Applications in Agriculture

Curriculum Guide: *Biotechnology: Applications in Agriculture*

Unit: III. Basic Laboratory Skills

Unit Objective:

Students will demonstrate a working understanding of the skills and considerations required to conduct laboratory experiments by creating a proposal for an experiment.

Show-Me Standards: 1.1, SC7

References:

Agriscience Handbook. National FFA Organization. (See an example cover sheet for a research proposal on p. 10.) Accessed March 30, 2004, from http://www.ffa.org/programs/ag_sci/documents/agsci_handbook.pdf.

Biology Lesson Plans (High School). Texas A&M University. Accessed August 11, 2003, from http://www.tamucc.edu/~eduweb/AppliedConnections/HSScience/biology.html.

Biotechnology: Applications in Agriculture. University of Missouri-Columbia, Instructional Materials Laboratory, 1998.

Science Fair Central. Discoveryschool.com. Accessed March 23, 2004, from http://school.discovery.com/sciencefaircentral/.

Science Fair Project on the Web. Accessed March 23, 2004, from http://sciencefairproject.virtualave.net/.

Scifair.org. The Society for Amateur Scientists. Accessed March 23, 2004, from http://www.scifair.org/.

Tutorials With Emphasis on Applicability to High School Chemistry. Chemistrycoach.com. Accessed August 11, 2003, from http://www.chemistrycoach.com/tutorials-9.htm.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 1.1, Using the Scientific Method; and AS 3.1, Using a Material Safety Data Sheet (MSDS).
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. III-17 (1) and p. III-26 (1).

Performance-Based Assessment:

Students will work in groups of three to develop a written proposal for a scientific experiment. The proposal will include a statement of the problem, a list of materials and equipment, an outline of the procedure, and a list of safety measures to be taken or observed when conducting the lab work. Assessment will be based on the thoroughness, completeness, accuracy, and practicality of the proposed work. Other factors to be assessed will be grammar, spelling, punctuation, and capitalization.

Unit III—Basic Laboratory Skills
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work in teams of three to identify an appropriate subject for a scientific laboratory experiment.

2. Experiment subjects may be derived from any legitimate field of science and do not need to be related to biotechnology. Students may develop their own ideas for an experiment subject, or the teacher may offer suggestions. Examples of practical experiment subjects include, but are not limited, to the following:
   - ❑ Do pH levels vary in different varieties of apples?
   - ❑ Do pH levels vary in different varieties of oranges?
   - ❑ Does the length of exposure to moisture affect popcorn popping rates?
   - ❑ Does the length of exposure to dry conditions affect popcorn popping rates?
   - ❑ Do water levels vary in different varieties of lettuce?
   - ❑ How is the freezing rate of water influenced by the water's initial temperature? For example, does hot water freeze sooner or later than cold water?
   - ❑ What amount and frequency of plant food application yields the largest blooms on a specific variety of rosebush?
   - ❑ Under specified conditions, how much water does a specific variety of houseplant absorb in a week?
   - ❑ How far do bees travel from their hives?
   - ❑ What natural substances kill mosquito larvae?
   - ❑ What are the effects of various temperatures on the behavior of a specific type of insect?
   - ❑ On what type of a surface does a snail move fastest?
   - ❑ How do pet mice respond to different types of food?
   - ❑ What color of bird feeder will attract the most birds?

3. After identifying an appropriate experiment subject, each team will write a proposal describing the design of the experiment.

4. Each team's proposal will include descriptions of the following elements:
   - ❑ A statement of the problem (NOTE: Each team is required to obtain approval of the problem from the teacher before proceeding with the proposal.)
   - ❑ A complete list of materials and equipment required to execute the proposed experiment
   - ❑ A detailed, step-by-step outline of the procedure to be used in conducting the experiment
   - ❑ A complete list of safety measures to be taken or observed when conducting the laboratory experiment

5. Students may use material in the unit and additional outside material to complete their proposals. Students may not use the source material word for word and must provide a complete bibliography of their sources along with their proposals.

6. Assessment will be based on the thoroughness, completeness, accuracy, and practicality of the proposal. Each of the four elements of the proposal will be examined according to those factors. Other factors to be considered in the assessment are grammar, spelling, punctuation, and capitalization.

Unit III—Basic Laboratory Skills
Student Handout

1. You will work in a team of three students to identify an appropriate subject for a scientific laboratory experiment.

2. After identifying an appropriate experiment subject, your team will write a proposal describing the design of the experiment.

3. Your team's proposal will include descriptions of the following elements:
   - ❑ A statement of the problem (NOTE: Your team is required to obtain approval of the problem from the teacher before proceeding with the proposal.)
   - ❑ A complete list of materials and equipment required to execute the proposed experiment
   - ❑ A detailed, step-by-step outline of the procedure to be used in conducting the experiment
   - ❑ A complete list of safety measures to be taken or observed when conducting the laboratory experiment

4. You may use material in the unit and additional outside material to complete the proposal. You may not use the source material word for word and must provide a complete bibliography of your sources along with your proposal.

5. Assessment will be based on the thoroughness, completeness, accuracy, and practicality of your proposal. Each of the four elements of the proposal will be examined according to those factors. Other factors to be considered in the assessment are grammar, spelling, punctuation, and capitalization.

Biotechnology: Applications in Agriculture

Unit III—Basic Laboratory Skills
Scoring Guide
Experiment Topic/Team Members _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Statement of Problem	❑ Thorough ❑ Complete ❑ Accurate ❑ Practical	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5.625	
List of Materials and Equipment	❑ Thorough ❑ Complete ❑ Accurate ❑ Practical	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5.625	
Outline of Procedure	❑ Thorough ❑ Complete ❑ Accurate ❑ Practical	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5.625	
List of Safety Measures	❑ Thorough ❑ Complete ❑ Accurate ❑ Practical	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5.625	
Technical Considerations	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Biotechnology:
Applications in Agriculture

Curriculum Guide: *Biotechnology: Applications in Agriculture*

Unit: IV. Foundations of Genetic Engineering

Unit Objective:

Students will demonstrate an understanding of an aspect of genetic engineering by extracting DNA from a plant or animal source and analyzing the results in a written report.

Show-Me Standards: 1.3, SC7

References:

Biotechnology: Applications in Agriculture. University of Missouri-Columbia, Instructional Materials Laboratory, 1998.

DNA Extraction From Kiwi. Office of Biotechnology. Iowa State University. Accessed October 31, 2003, from http://www.biotech.iastate.edu/publications/lab_protocols/DNA_Extraction_Kiwi.html.

DNA Extraction From Onion. Office of Biotechnology. Iowa State University. Accessed October 31, 2003, from http://www.biotech.iastate.edu/publications/lab_protocols/DNA_Extraction_Onion.html.

DNA Extraction From Onion – Teacher Guide "Chemical Version." Biotech Project. University of Arizona. Accessed October 31, 2003, from http://biotech.biology.arizona.edu/labs/DNA_extraction_onion_teach.html.

How to Extract DNA From a Banana. Biology. About, Inc. Accessed October 31, 2003, from http://biology.about.com/c/ht/00/07/How_Extract_DNA_Banana0962932481.htm.

How to Extract DNA From Anything Living. Genetic Science Learning Center. University of Utah. Accessed July 24, 2003, from http://gslc.genetics.utah.edu/units/activities/extraction/.

Onion DNA Extraction. Solarwind.com. Accessed October 31, 2003, from http://www.solarwinds.com/users/neumann/onion_dna_extraction.htm.

Teacher Guide: What is DNA? DNA Extraction From Kiwifruit. Biotech Project. University of Arizona. Accessed October 31, 2003, from http://biotech.biology.arizona.edu/labs/DNA_Kiwifruit_teacher.html.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 1.1, Comparing Plant and Animal Cells; and AS 2.1, Mitosis and Meiosis.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. IV-5 (2) and p. IV-21.

Performance-Based Assessment:

Students will form teams of three to extract DNA from a specific plant or animal material. After completing the process, each team will compare its findings with those of other teams and write a brief summary report of its findings.

Assessment will be based on the application of proper laboratory procedure and technique, team cohesiveness, the time needed to conduct the procedure, the degree of success resulting from the procedure, and conclusions drawn from the comparison of findings.

Unit IV—Foundations of Genetic Engineering
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will form teams of three to conduct the procedure to extract DNA material from a plant or animal source.

2. The teacher will provide, or assign responsibility for providing, the following to each team of students:
   - ❑ Organic material (plant or animal sources) to be used as subjects of the DNA extraction procedure (NOTE: To promote diverse results, each team should analyze material from a different source.)
   - ❑ Equipment and material to conduct the procedure
   - ❑ A description or plan for extracting DNA, including maximum time for the procedure (NOTE: The teacher is advised to consult one or more of the web sites listed among the references for this performance-based assessment activity to determine the specific equipment, material, and procedure outline to supply to each team of students.)

3. Each team will conduct the procedure a minimum of twice; if time permits, each member of the team will conduct the procedure to duplicate and verify results.

4. After completing the procedure, each team will rotate through all other team stations and visually compare one of its samples to the one or two samples remaining at each team's station.

5. After completing the rotation through all stations, each team will briefly summarize in a written report the results of its procedure and its findings during the visual comparison of other teams' results. The report should be no more than two short paragraphs.

6. Assessment will be based on the quality of effort for the following factors:
   a. Application of proper procedure and technique during the laboratory exercise
   b. Team cohesiveness (i.e., how well team members worked together)
   c. The time needed to conduct the procedure
   d. The degree of success resulting from the procedure
   e. Conclusions drawn from the comparison of results

Unit IV—Foundations of Genetic Engineering
Student Handout

1. You will form a team with two other students to conduct the procedure to extract DNA material from a plant or animal source.

2. Your teacher will provide, or assign responsibility for providing, the following to your team:
   - ❑ Organic material (plant or animal sources) to be used as subjects of the DNA extraction procedure
   - ❑ Equipment and material to conduct the procedure
   - ❑ A description or plan for extracting DNA, including maximum time for the procedure

3. Your team will conduct the procedure a minimum of twice; if time permits, each member of your team will conduct the procedure to duplicate and verify results.

4. After completing the procedure, your team will rotate through all other team stations and visually compare one of your samples to the one or two samples remaining at each team's station.

5. After completing the rotation through all stations, your team will briefly summarize in a written report the results of your procedure and your findings during the visual comparison of other teams' results. The report should be no more than two short paragraphs.

6. Assessment will be based on the quality of your effort for the following factors:
   a. Application of proper procedure and technique during the laboratory exercise
   b. Team cohesiveness (i.e., how well team members worked together)
   c. The time needed to conduct the procedure
   d. The degree of success resulting from the procedure
   e. Conclusions drawn from the comparison of results

Biotechnology: Applications in Agriculture

Unit IV—Foundations of Genetic Engineering
Scoring Guide
Laboratory Subject/Team Members_____

Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Proper procedure and laboratory technique were used	Failed	Poor	Fair	Good	Excellent	X 12.5	
Team members worked well together	Failed	Poor	Fair	Good	Excellent	X 7.5	
Amount of time for procedure was appropiate	Failed	Poor	Fair	Good	Excellent	X 2.5	
Procedure results were successful	Failed	Poor	Fair	Good	Excellent	X 1.25	
Conclusions from comparisons were thorough and valid	Failed	Poor	Fair	Good	Excellent	X 1.25	
TOTAL							

Final Assessment Total _____/100 pts.

Comments:

Biotechnology:
Applications in Agriculture

Curriculum Guide: *Biotechnology: Applications in Agriculture*

Unit: V. Animal Technologies

Unit Objective:

Students will demonstrate an understanding of a biotechnology technique applied to livestock production by describing the process and benefits of bovine embryo transfer in a pamphlet, poster, or another format, as determined by the instructor.

Show-Me Standards: 3.4, SC8

References:

Biotechnology: Applications in Agriculture. University of Missouri-Columbia, Instructional Materials Laboratory, 1998.

Bovine Embryo Transfer: 1990 Short Course Proceedings. Fort Collins, CO: Colorado State University, Animal Reproduction Laboratory, 1990.

Bovine Embryo Transfer. The University of Findlay. Accessed November 6, 2003, from http://www.findlay.edu/users/brennan/eqst131/fa99/mowrer/index.htm?o=0.

Grimes, J. F. *Utilization of Embryo Transfer in Beef Cattle*. Ohio State University Extension. Accessed December 3, 2003, from http://ohioline.osu.edu/anr-fact/0017.html.

Seidel, G. E., Jr., Seidel, S. M., & Bowen, R. A. *Bovine Embryo Transfer Procedures*. Fort Collins, CO: Colorado State University, Animal Reproduction Laboratory, 1980.

Trans Ova Genetics. Accessed March 19, 2004, from http://www.transova.com/.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 4.
- Students will complete AS 2.1, Examining Embryos.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. V-4 (2 or 3), p. V-15 (2 or 3), and p. V-41.

Performance-Based Assessment:

Students will work in groups of three to develop a pamphlet or poster designed to describe the process and the benefits of bovine embryo transfer. Optionally, students could present their findings in a slide show using presentation software.

Assessment will be based on the accuracy, organization, and clarity of the information cited in the pamphlet or poster. Additional consideration will be given to the quality of the material produced. Assessment also will take into account grammar, spelling, punctuation, and capitalization.

Unit V—Animal Technologies
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work in teams of three to focus their efforts on the production of a pamphlet or poster describing the process and benefits of bovine embryo transfer. (NOTE: If preferred, have students present their findings in a slide show using presentation software. Tell students what format is preferable. Adjust the student handout and scoring guide accordingly as needed.)

2. Team members will work as a unit to research the topic of bovine embryo transfer.

3. Students may use material in the unit and additional outside material to complete their posters or pamphlets. Students may not use the source material word for word and must provide a complete bibliography of their sources along with their presentation.

4. After completing research, the team will develop, outline, and write material for a pamphlet or poster describing the process and benefits of bovine embryo transfer.

5. Assessment will evaluate the team's effort and will be based on the accuracy, organization, clarity, and quality of the information in the poster or pamphlet. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Unit V—Animal Technologies
Student Handout

1. You will work in a team with two other students to focus your efforts on the production of a presentation describing the process and benefits of bovine embryo transfer. The presentation may be a pamphlet, poster, or another format, as directed by your instructor.

2. You and your team members will work together to research the topic of bovine embryo transfer.

3. You may use material in the unit and additional outside material to complete your presentation. You may not use the source material word for word and must provide a complete bibliography of your sources along with your presentation.

4. After completing research, your team will develop, outline, and write material for a pamphlet, poster, or other format describing the process and benefits of bovine embryo transfer.

5. Assessment will evaluate your team's effort and will be based on the accuracy, organization, clarity, and quality of the information in the presentation. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Biotechnology: Applications in Agriculture

Unit V—Animal Technologies
Scoring Guide
Team Members_____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Poster or Pamphlet Content and Quality	Accuracy of information	Failed	Poor	Fair	Good	Excellent	X 5.625	
	Organization of information	Failed	Poor	Fair	Good	Excellent	X 5.625	
	Clarity of Information	Failed	Poor	Fair	Good	Excellent	X 5.625	
	Quality of Overall Effort	Failed	Poor	Fair	Good	Excellent	X 5.625	
Technical Considerations	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Biotechnology:
Applications in Agriculture

Curriculum Guide: *Biotechnology: Applications in Agriculture*

Unit: VI. Plant Technologies

Unit Objective:

Students will demonstrate an understanding of the purpose and process of electrophoresis by constructing and using an electrophoresis device and writing a summary of the results.

Show-Me Standards: 1.2, SC3

References:

Biotechnology: Applications in Agriculture. University of Missouri-Columbia, Instructional Materials Laboratory, 1998.

Electrophoresis. Nexus Research Group. Accessed August 11, 2003, from http://www.nexusresearchgroup.com/fun_science/electrophoresis.htm.

Gel Electrophoresis – Teacher Instructions. Biological Sciences Initiative. University of Colorado. Accessed December 3, 2003, from http://www.colorado.edu/Outreach/BSI/pdfs/electrophoresis_teacher.pdf.

Instruction Guide. Genetic Science Learning Center. University of Utah. Accessed December 3, 2003, from http://gslc.genetics.utah.edu/units/activities/electrophoresis/guide.cfm.

Lane, L., Loh, P., & Roe, B. A. "Experiment #5 – Butter Dish Electrophoresis."*Biotechnology & Recombinant DNA Techniques for Middle and High School Students and Teachers*. Accessed August 11, 2003, from http://www.genome.ou.edu/HHMI/workshop.pdf.

Moeed, A. *Electrophoresis Procedure*. AgResearch 2000. Accessed November 4, 2003, from http://www.agresearch.cri.nz/scied/search/tools/electro/background_electro_photos.htm.

Teacher Guide: Build a Gel Electrophoresis Chamber. Genetic Science Learning Center. University of Utah. Accessed December 3, 2003, from http://gslc.genetics.utah.edu/teachers/units/basics/gelbox_build.pdf.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 5.
- Students will complete AS 3.1, The Current State of Plant Biotechnology; and AS 4.1, Designer Plants—The Agricultural Products of the Future.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. VI-4 and p. VI-15 (1).

Performance-Based Assessment:

Students will work in teams of three to build an electrophoresis device. The instructor will provide materials and directions. In addition to constructing the device, each team will use its device to separate DNA material into groups based on length.

Assessment will be based on the application of the proper construction procedure and the time required, the application of the proper DNA processing procedure and the time required, and the degree of success resulting from the procedure. Laboratory technique and team cohesiveness also will be factors in the assessment.

Unit VI—Plant Technologies
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will form teams of three to assemble a simple electrophoresis device and to use it to separate DNA material.

2. The teacher will provide to each team of students the following:
   - ❑ Equipment and material to assemble a simple electrophoresis device
   - ❑ A description or plan for assembling the device using the equipment and material provided (NOTE: The teacher is advised to consult one or more of the web sites listed among the references for this performance-based assessment activity to determine the specific equipment, material, and assembly procedure outline to supply to each team of students.)
   - ❑ Directions for processing DNA samples with the electrophoresis device each team has assembled (NOTE: The teacher is advised to consult one or more of the web sites listed among the references for this performance-based assessment activity to determine the DNA material to be processed and for a list of the material needed and description of the process to be conducted with the electrophoresis device.)

3. Each team will construct an electrophoresis device using the equipment and materials provided and according to the procedure outlined by the teacher.

4. After completing assembly of the electrophoresis device, each team will process the designated DNA material using the device the team assembled. If time permits, each member of the team will conduct his or her own processing of the DNA material to serve as duplication and verification of the process.

5. After completing the processing of DNA material, each team will briefly summarize in a written report the results of its procedure or multiple procedures. The report should not be more than two short paragraphs.

6. Assessment will be based on the quality of effort for the following factors:
   a. Application of the proper procedure to construct the electrophoresis device
   b. Time required to build the device
   c. Application of the proper procedure during the DNA material processing exercise
   d. The time needed to conduct the processing
   e. The degree of success resulting from the DNA material processing

   Additional factors to be considered are laboratory technique (i.e., orderly, clean, and careful use of facilities and equipment) and cohesiveness of the team (i.e., how well team members worked with each other).

Unit VI—Plant Technologies
Student Handout

1. You will form a team with two other students to assemble a simple electrophoresis device and to use it to separate DNA material.

2. The teacher will provide to your team the following:
   - ❑ Equipment and material to assemble a simple electrophoresis device
   - ❑ A description or plan for assembling the device using the equipment and material provided
   - ❑ Directions for processing DNA samples with the electrophoresis device each team has assembled

3. Your team will construct an electrophoresis device using the equipment, materials, and directions provided.

4. After completing assembly of the electrophoresis device, your team will process the designated DNA material using the device your team assembled. If time permits, each member of your team will conduct his or her own processing of the DNA material to serve as a duplication and verification of the process.

5. After completing the processing of DNA material, your team will briefly summarize in a written report the results of its procedure or multiple procedures. The report should not be more than two short paragraphs.

6. Assessment will be based on the quality of your team's effort for the following factors:
   a. Application of the proper procedure to construct the electrophoresis device
   b. Time required to build the device
   c. Application of the proper procedure during the DNA material processing exercise
   d. The time needed to conduct the processing
   e. The degree of success resulting from the DNA material processing

   Additional factors to be considered are laboratory technique (i.e., orderly, clean, and careful use of facilities and equipment) and cohesiveness of the team (i.e., how well team members worked with each other).

Biotechnology: Applications in Agriculture

Unit VI—Plant Technologies
Scoring Guide
Experiment Topic/Team Members _____

Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Proper construction procedure was used	Failed	Poor	Fair	Good	Excellent	X 3.75	
Amount of time to build the device was appropriate (the less time, the better)	Failed	Poor	Fair	Good	Excellent	X 2.5	
Proper DNA processing procedure was used	Failed	Poor	Fair	Good	Excellent	X 3.75	
Amount of time to conduct the procedure was appropriate (the less time, the better)	Failed	Poor	Fair	Good	Excellent	X 2.5	
Procedure results were successful	Failed	Poor	Fair	Good	Excellent	X 10	
Proper laboratory technique was used	Failed	Poor	Fair	Good	Excellent	X 1.25	
Team worked well together	Failed	Poor	Fair	Good	Excellent	X 1.25	
TOTAL							

Final Assessment Total _____/100 pts.

Comments:

Floristry

Curriculum Guide: *Floristry*

Unit: I. Floristry Industry

Unit Objective:

Students will demonstrate an understanding of the floristry industry by exploring training and educational opportunities available to prospective industry practitioners and presenting their findings in a poster.

Show-Me Standards: 4.8, SS6

References:

Careers in Floriculture: Catalog of Schools. Society of American Florists. Accessed August 14, 2003, from http://www.safnow.org/Public/schoollisting.doc.

Floristry. University of Missouri-Columbia, Instructional Materials Laboratory, 1996.

Make People Smile: Grow Your Future in the Floral Industry. Society of American Florists. Accessed August 14, 2003, from http://www.safnow.org/Public/career%20brochure.pdf.

Students will use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 2.1, Careers in Floristry.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. I-16 (2, 3).

Performance-Based Assessment:

Students will work in groups of three to develop a list of common and unique floristry and related courses at postsecondary educational institutions. Each group will present findings from its survey in poster form, grouping common courses and citing unique courses at specific institutions.

Assessment will be based on the content, organization, clarity, and quality of the poster. Assessment also will take into account grammar, spelling, punctuation, and capitalization.

Unit I—Floristry Industry
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work in teams of three to develop a poster on floristry courses offered at a variety of postsecondary educational institutions.

2. Team members will research and identify course listings in floristry programs at three to five schools or colleges. NOTE: The instructor may want to assign specific educational institutions to each team to ensure a variety of floristry programs are surveyed by the entire class.

3. Students will need to use outside material for their research and must provide a complete bibliography of their sources along with their posters.

4. After completing the research, the team will develop and write material for a poster about the subject of the team's research. The poster will essentially contain several lists of course titles and corresponding course descriptions.
   - ❑ One list will contain courses common to all or several of the floristry educational programs researched. Each course on the list should appear with a synopsis of the course description.
   - ❑ All other lists will contain courses unique to each floristry educational program researched. There should be one list for each institution researched by the team. Each course on each of these lists should appear with a synopsis of its respective course description.

5. Assessment will evaluate the team's poster and will be based on a range of success (from excellence to failure) in several categories:
   a. Factors to be evaluated will be content, organization, clarity, and quality.
   b. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Unit I—Floristry Industry
Student Handout

1. You will work in teams of three students to develop a poster on floristry courses offered at a variety of postsecondary educational institutions.

2. You and your team members will research and identify course listings in floristry programs at three to five schools or colleges.

3. You will need to use outside material for your research and must provide a complete bibliography of your sources along with your poster.

4. After completing the research, your team will develop and write material for a poster about the subject of your team's research. The poster will essentially contain several lists of course titles and corresponding course descriptions.
   - ❑ One list will contain courses common to all or several of the floristry educational programs researched. Each course on the list should appear with a synopsis of the course description.
   - ❑ All other lists will contain courses unique to each floristry educational program researched. There should be one list for each institution researched by the team. Each course on each of these lists should appear with a synopsis of its respective course description.

5. Assessment will evaluate your team's poster and will be based on a range of success (from excellence to failure) in several categories.
   a. Factors to be evaluated will be content, organization, clarity, and quality.
   b. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Floristry

Unit I—Floristry Industry
Scoring Guide
Team Members_____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Poster	Content	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5.625	
	Organization	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5.625	
	Clarity	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5.625	
	Quality	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5.625	
Technical Considerations	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Floristry

Curriculum Guide: *Floristry*

Unit: II. Plant Identification

Unit Objective:

Students will demonstrate the ability to identify plants by gathering information and illustrations of various plants and assembling a catalog of those plants.

Show-Me Standards: 1.4, SC3

References:

Commercial seed and plant catalogs providing illustrations and descriptions of specimens

Floristry. University of Missouri-Columbia, Instructional Materials Laboratory, 1996.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 2.1, Flowering Potted Plants; and AS 2.2, Potted Foliage Plants.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. II-5 (2, 3) and p. II-15 (3).

Performance-Based Assessment:

Students will work in teams of three to gather information for and illustrations of 20 plants. Each team will use its information and illustrations to prepare a catalog of the 20 plants for display to the class.

Assessment will be based on the accuracy and clarity of the information cited in the catalog, the quality of the illustrations used and each catalog entry produced, and the overall quality of the entire catalog, including the cover. Assessment also will take into account grammar, spelling, punctuation, and capitalization.

Unit II—Plant Identification
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work in teams of three to produce a plant catalog of 20 specimens for display to their classmates.

2. Team members will gather information on and illustrations of each specimen.
   a. Information about each specimen in all catalog entries should include the following:
      - ❑ Specimen's scientific name
      - ❑ Common name
      - ❑ Characteristics
      - ❑ Growing conditions
      - ❑ Growing area
      - ❑ Seasonal availability
      - ❑ Minimum quantities
   b. Sources of illustrations can include the following:
      - ❑ Personal copies of commercial plant catalogs or other personal sources
      - ❑ Photocopies from library references or other nonpersonal sources, such as plant encyclopedias
      - ❑ Photos taken by team members of actual specimens

3. Students may use material found in the unit and additional outside material to complete their catalogs. Students must provide a complete bibliography of their sources along with their catalogs.

4. After collecting the information and illustrations, the team will perform the following steps:
   - ❑ Write material for each entry in the catalog.
   - ❑ Match the written material with the appropriate illustration.
   - ❑ Place each catalog entry on a single page.
   - ❑ Assemble all pages into a catalog with an appropriate cover.

5. Assessment will evaluate the team's catalog with the following considerations:
   a. Each catalog entry will be individually evaluated for accuracy and clarity of information, the quality of the illustration, and the overall quality of the entry.

b. The quality of the entire catalog, including its cover, also will be evaluated.
c. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Unit II—Plant Identification
Student Handout

1. You will work in a team with two other students to produce a plant catalog of 20 specimens for display to your classmates.

2. Your team will gather information on and illustrations of each specimen.
   a. Information about each specimen in all catalog entries should include the following:
      - ❑ Specimen's scientific name
      - ❑ Common name
      - ❑ Characteristics
      - ❑ Growing conditions
      - ❑ Growing area
      - ❑ Seasonal availability
      - ❑ Minimum quantities
   b. Sources of illustrations can include the following:
      - ❑ Personal copies of commercial plant catalogs or other personal sources
      - ❑ Photocopies from library references or other nonpersonal sources, such as plant encyclopedias
      - ❑ Photos taken by team members of actual specimens

3. You may use material found in the unit and additional outside material to complete your catalog. You must provide a complete bibliography of your sources along with your catalog.

4. After collecting the information and illustrations, your team will perform the following steps:
   - ❑ Write material for each entry in the catalog.
   - ❑ Match the written material with the appropriate illustration.
   - ❑ Place each catalog entry on a single page.
   - ❑ Assemble all pages into a catalog with an appropriate cover.

5. Assessment will evaluate your team's catalog with the following considerations:
   a. Each catalog entry will be individually evaluated for accuracy and clarity of information, the quality of the illustration, and the overall quality of the entry.
   b. The quality of the entire catalog, including its cover, also will be evaluated.
   c. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Floristry

Unit II—Plant Identification
Scoring Guide
Team Members_____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Catalog Specimens	Information accuracy	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5	
	Information clarity	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5	
	Illustration quality	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5	
	Entry quality	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5	
Catalog, Including Cover	Overall quality	Failed	Minimum Effort	Adequate	Superior	Excellent	X 3	
Technical Considerations	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Floristry

Curriculum Guide: *Floristry*

Unit: III. Post-Harvest Handling

Unit Objective:

Students will demonstrate an understanding of post-harvest handling parameters by developing procedures for treatment of potted plants and cut plant materials and presenting them in the form of care cards.

Show-Me Standards: 1.8, SC3

References:

Beaurain, B. "Caring for Flowering and Foliage House Plants." *The Garden Helper*. Accessed August 21, 2003, from http://www.thegardenhelper.com/houseplants.html.

Floristry. University of Missouri-Columbia, Instructional Materials Laboratory, 1996.

Plants. DMOZ Open Directory Project. Accessed August 21, 2003, from http://dmoz.org/Home/Gardens/Plants/.

Plants. Google Directory. Accessed August 21, 2003, from http://directory.google.com/Top/Home/Gardens/Plants/.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. III-5, p. III-12 (1), and p. III-20.

Performance-Based Assessment:

Students will work individually to develop and write lists of post-harvest care procedures for potted plants and cut plant materials. The lists will be presented in the form of "care cards" intended to provide guidelines for treatment to prospective consumers or users of the plants or plant materials.

Assessment will be based on the accuracy of the information in each care card. In addition, the organization and clarity of the information, as well as

the overall quality of each card will be assessed. Assessment also will take into account grammar, spelling, punctuation, and capitalization.

Unit III—Post-Harvest Handling
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work individually to develop post-harvest care procedures and write those procedures on care cards for two types of potted plants and two types of cut plant material.

2. Each student will research care procedures for the four specific specimens the student has selected or has been assigned for his or her project. NOTE: The instructor may want to assign specific specimens to each student to ensure a variety of specimens are surveyed by the entire class.

3. Students may use material found in the unit and additional outside material to complete their care cards. Students must provide a complete bibliography of their sources along with their care cards.

4. After completing the research, each student will develop care procedures and write material for care cards concerning the four specimens.
   a. Each care card will contain a short, simple list of care procedures to be used as a guide by prospective consumers or users of the potted plants or cut plant materials.
   b. The list below provides examples of factors that could appear in the care cards for potted plants. Other or additional factors may be appropriately included on each card, depending on the research findings of the student.
      - ❑ Soil preference
      - ❑ Lighting requirements
      - ❑ Soil pH level
      - ❑ Temperature tolerances
      - ❑ Water needs
   c. The list below provides examples of factors that could appear in the care cards for cut plant material. Other or additional factors may be appropriately included on each card, depending on the research findings of the student.
      - ❑ Storing temperatures
      - ❑ Whether water is needed
      - ❑ When refrigeration is required
      - ❑ Specific approach to cutting

5. Assessment will evaluate each of the four cards each student produces.
   a. Factors to be evaluated will be the accuracy, organization, and clarity of the information appearing on each card, as well as the overall quality of each card.
   b. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Unit III—Post-Harvest Handling
Student Handout

1. You will work individually to develop post-harvest care procedures and write those procedures on care cards for two types of potted plants and two types of cut plant material.

2. You will research care procedures for the four specific specimens you have selected or have been assigned for your project.

3. You may use material found in the unit and additional outside material to complete your care cards. You must provide a complete bibliography of your sources along with your care cards.

4. After completing the research, you will develop care procedures and write material for care cards concerning the four specimens.
   a. Each care card will contain a short, simple list of care procedures to be used as a guide by prospective consumers or users of the potted plants or cut plant materials.
   b. The list below provides examples of factors that could appear in the care cards for potted plants. Other or additional factors may be appropriately included on each card, depending on your research.
      - ❑ Soil preference
      - ❑ Lighting requirements
      - ❑ Soil pH level
      - ❑ Temperature tolerances
      - ❑ Water needs
   c. The list below provides examples of factors that could appear in the care cards for cut plant material. Other or additional factors may be appropriately included on each card, depending on the research findings of the student.
      - ❑ Storing temperatures
      - ❑ Whether water is needed
      - ❑ When refrigeration is required
      - ❑ Specific approach to cutting

5. Assessment will evaluate each of the four cards you produce.
   a. Factors to be evaluated will be the accuracy, organization, and clarity of the information appearing on each card, as well as the overall quality of each card.
   b. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Floristry

Unit III—Post-Harvest Handling
Scoring Guide
Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Care Card #1	❑ Accuracy ❑ Organization ❑ Clarity ❑ Quality	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5.625	
Care Card #2	❑ Accuracy ❑ Organization ❑ Clarity ❑ Quality	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5.625	
Care Card #3	❑ Accuracy ❑ Organization ❑ Clarity ❑ Quality	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5.625	
Care Card #4	❑ Accuracy ❑ Organization ❑ Clarity ❑ Quality	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 5.625	
Technical Considerations	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Floristry

Curriculum Guide: *Floristry*

Unit: IV. Mechanics of Floral Design

Unit Objective:

Students will demonstrate an understanding of the nomenclature of floral design mechanics by associating terms with definitions, illustrations, and tools.

Show-Me Standards: 1.6, FA3

References:

Floristry. University of Missouri-Columbia, Instructional Materials Laboratory, 1996.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 5.
- Students will complete AS 1.1, Florist's Tools; JS 2.1, Constructing a Bow; JS 3.1, Preparing Floral Foam; JS 4.1, Wiring Flowers; JS 4.2, Taping Flowers; and JS 5.4, Dressing Potted Plants.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. IV-27 and p. IV-41.

Performance-Based Assessment:

Students will work individually in taking a test that includes matching, multiple-choice, and short-answer questions on the tools, supplies, materials, and procedures used in floral design.

Assessment will be based on the accuracy of each student's response to each item on the test.

Unit IV—Mechanics of Floral Design
Instructor Guide

The instructor should assign the performance-based assessment activity after presenting the relevant lesson material outlined in the instructor guide. The assessment activity will be due at the completion of the unit.

1. Students will work individually to demonstrate their knowledge of the nomenclature of floral mechanics.

2. Have students complete a written assessment that covers the material presented during the course of the unit.
   a. The student handout provides suggested test items. The teacher is not limited to these test items and is encouraged to devise many, if not all, of the items for the test to reflect the specific approach the teacher uses to teach this unit.
   b. Answers to the written assessment as it is currently written are listed at the end of this instructor guide.

3. This activity will help prepare students for a portion of the Floriculture Career Development Event.
   a. Refer to the *Missouri CDE Handbook* for guidelines regarding Career Development Events.
   b. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

4. Assessment will evaluate the student's knowledge of each of the items on the test. All the test items in this assessment activity are worth 1 point unless otherwise noted.

Answers to Written Assessment:

1. b
2. a
3. c
4. d
5. d
6. c
7. d
8. a
9. b
10. c

11. Students should provide seven of the answers listed below. (Each tip is worth 1 point for a maximum value of 7 points.)
    a. Gather all materials before beginning.
    b. Keep the right face of the ribbon turned outward.
    c. Use the ribbon directly from the bolt.
    d. Hold the bow in one hand while working the ribbon back and forth with the other hand.
    e. Make the bow in proportion to the arrangement; it should not dominate the arrangement but serve as an accessory.
    f. Make sure tail length is in proportion to ribbon width. The tail should generally be no longer than the longest loop of the bow.
    g. Use a bow without a center loop to tuck under a flower or deep within an arrangement.
    h. Construct bows used on church pews out of #40 ribbon.
    i. Make some bows in advance.
    j. Practice making bows.

12. Students should provide the answers listed below. (Each step is worth 1 point for a maximum value of 5 points.)
    a. Lay a large sheet of green waxed tissue paper on the worktable.
    b. Arrange a few leaves of foliage, such as leatherleaf, pointing toward one corner of the paper.
    c. Place flowers on top of the foliage. If possible, avoid piling the heads of flowers on top of each other to keep them from being crushed.
    d. Fold the lower corner of the paper up over the stems.
    e. Fold in each side, then roll the paper around the flowers. The paper is then cone-shaped and needs to be tightened around the lower end of the stems and flared out at the flower end. Tie a ribbon around the wrap or staple the ends to secure the flowers.

13. Students should provide the answers listed below. (Each step is worth 1 point for a maximum value of 2 points.)
    a. Wrap a light wire around the stem or cluster several times.
    b. Bend the two wire ends down alongside the stem or stems.

14. Students should provide the answers listed below. (Each step is worth 1 point for a maximum value of 3 points.)
    a. Insert the wire into the base of the flower head until it comes out the top.
    b. Bend a small hook in the tip of the wire.
    c. Pull the hook back into the center of the flower. Make sure the wire is not visible.

15. c
16. e
17. f
18. d
19. b

20. c
21. e
22. g
23. b
24. a
25. h
26. d

27.–31. Students should list the following, in any order.
Plastic – Come in a range of colors and shapes; often appear more expensive than they really are
Glass – Advantageous for use in cylindrical containers and bud vases
Ceramic – More expensive; best used for permanent arrangements
Wicker – Additional liner is necessary for holding fresh arrangements
Papier-mâché – Intended for temporary use; will eventually deteriorate and leak

32. Camellia; stitch
33. Daisy; hook
34. Rose; straight-wire or piercing
35. Carnation; piercing
36. Stephanotis; hairpin
37. Baby's breath; clutch
38. Daffodil; insertion

39. 2
40. 5
41. 3
42. 1
43. 4

Unit IV—Mechanics of Floral Design
Student Handout **Name** _____

Written Assessment

Circle the letter that corresponds to the correct answer.

1. Which of the following is **not** a material commonly used to construct containers?

   a. Plastic
   b. Cardboard
   c. Glass
   d. Ceramic

2. What should be used to secure floral foam in the container?

   a. Waterproof tape
   b. Staples
   c. Cool melt glue
   d. Wooden picks

3. A pin holder is also known as a:

   a. pin cushion.
   b. pin container.
   c. frog.
   d. bird.

4. Anchor pins are used to:

   a. secure candles in floral foam.
   b. hold enclosure cards.
   c. secure moss to floral foam.
   d. hold floral foam in a container.

5. Which of the following is a step in the hairpin wiring method?

   a. Bend the wire end alongside the stem.
   b. Push the wire up until it is in the flower head.
   c. Bend a small hook in the top of the wire.
   d. Bend the wire into a large U-shape.

6. Which type of pick is used to attach bows to potted plants?

    a. Water
    b. Knife
    c. Wooden
    d. Metal

7. The piercing wiring method is commonly used with which flowers?

    a. Daisies
    b. Asters
    c. Daffodils
    d. Roses

8. Which material is used to cushion flowers in a box?

    a. Orchid grass
    b. Bluegrass
    c. Shredded newspaper
    d. Recycled paper

9. Which of the following is used to construct a grid?

    a. Wire
    b. Foliage
    c. Masking tape
    d. Plastic strips

10. What is the first step when boxing cut flowers?

    a. Mist the flowers lightly with water.
    b. Arrange a layer of foliage on the bottom of the box.
    c. Line the box with florist paper.
    d. Place a pack of floral preservative in the box.

Complete the following short-answer questions.

11. List seven tips to remember when constructing bows. (Each tip is worth 1 point for a maximum value of 7 points.)

    a.

    b.

    c.

    d.

    e.

    f.

    g.

12. What steps should be followed when wrapping cut flowers for sale? (Each step is worth 1 point for a maximum value of 5 points.)

    a.

    b.

    c.

    d.

    e.

13. Describe the steps used to wire a flower using the clutch method. (Each step is worth 1 point for a maximum value of 2 points.)

    a.

    b.

14. Describe the steps used to wire a flower using the hook method. (Each step is worth 1 point for a maximum value of 3 points.)

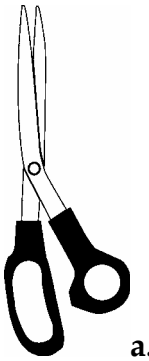
    a.

    b.

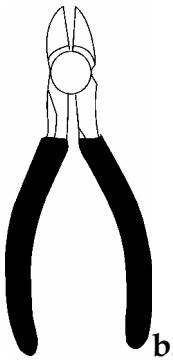
    c.

Match the following tools to the correct illustration. All the illustrations will not be used.

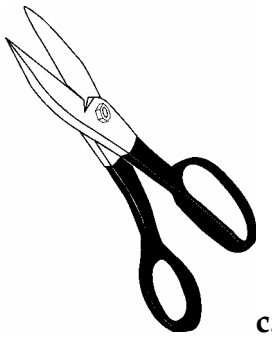
15. _____ Floral shears
16. _____ Glue gun
17. _____ Floral knife
18. _____ Rose stripper
19. _____ Wire cutters



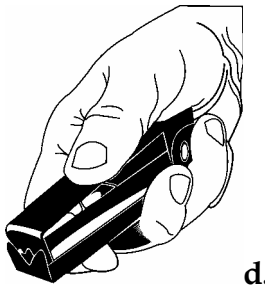
a.



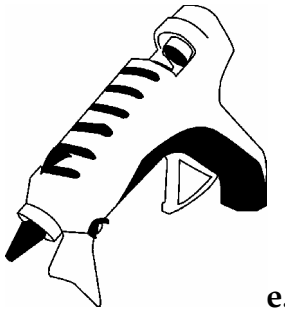
b.



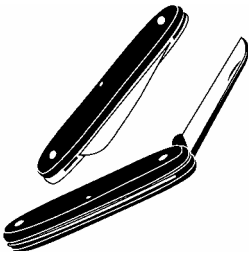
c.



d.



e.



f.

Match the following tools with their function. All the functions will not be used.

20. _____ Floral knife	a. Cut ribbon and fabric
21. _____ Glue gun	b. Cuts group of flower stems at once
22. _____ Wire cutters	c. Cuts stems
23. _____ Bunch cutter	d. Removes thorns
24. _____ Ribbon scissors	e. Attaches objects in designs
25. _____ Floral shears	f. Attaches picks to stems for insertion in foam
26. _____ Rose stripper	g. Cuts wire
	h. Use serrated blades to cut stems and wire
	i. Bends wire around flower stems

Identify the five varieties of containers and provide an advantage or disadvantage of each type.

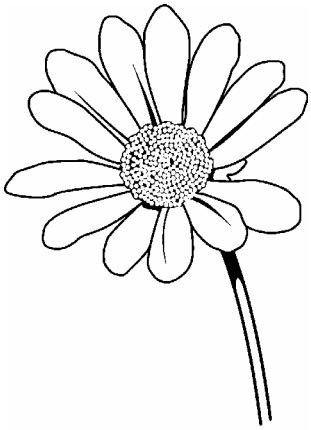
	Container variety	**Advantage/Disadvantage**
27.	_____	_____
28.	_____	_____
29.	_____	_____
30.	_____	_____
31.	_____	_____

Identify each flower and label the correct wiring method used for each of the next seven items.

32. 

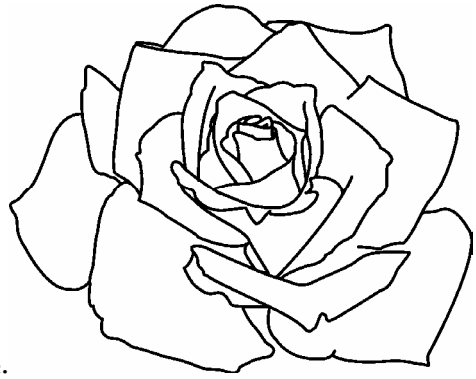
Flower name: _____

Wiring method: _____

33. 

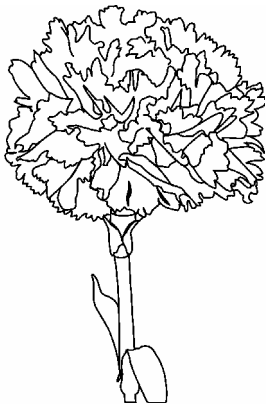
Flower name: _____

Wiring method: _____

34. 

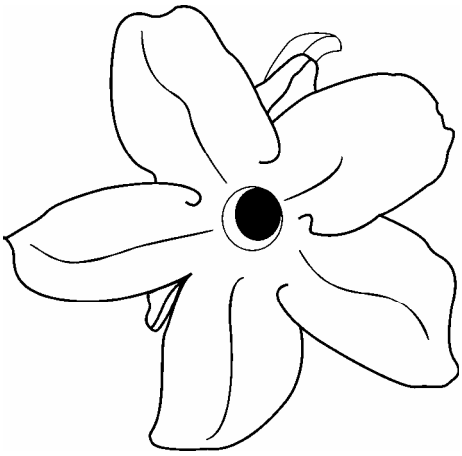
Flower name: _____

Wiring method: _____

35. 

Flower name: _____

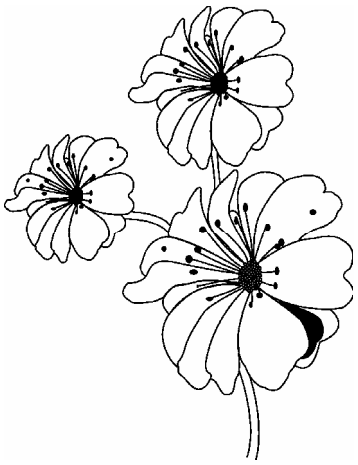
Wiring method: _____



36.

Flower name: _____

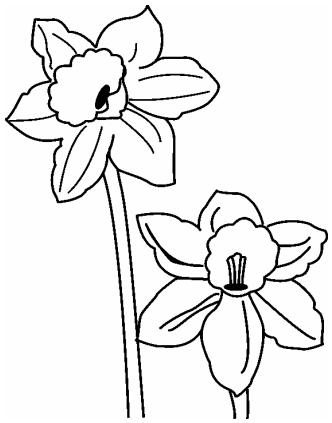
Wiring method: _____



37.

Flower name: _____

Wiring method: _____

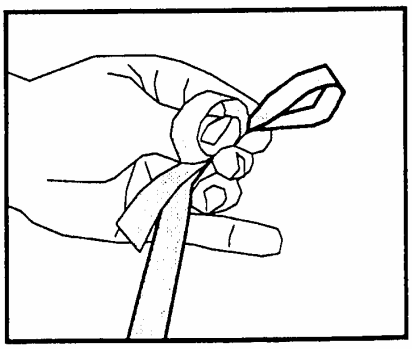


38.

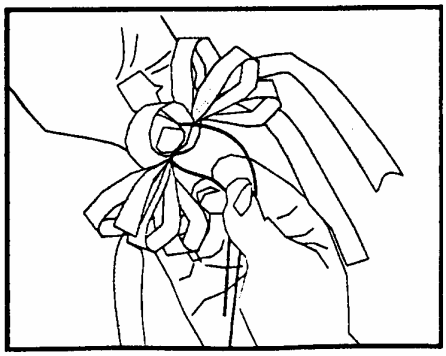
Flower name: _____

Wiring method: _____

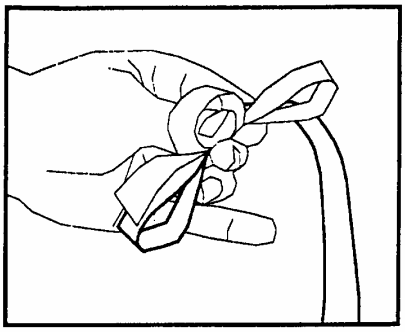
Identify the proper sequence of bow construction, from start to finish, by labeling the following illustrations with numbers 1–5, the first step being 1.



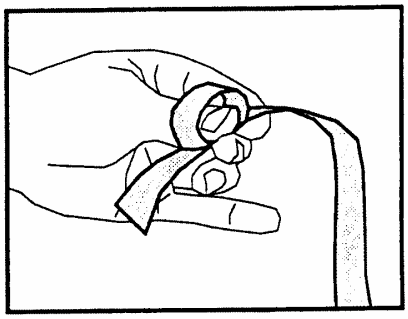
39. _____



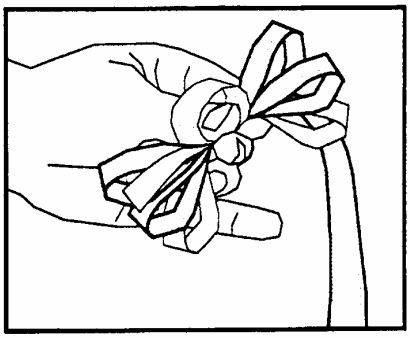
40. _____



41. _____



42. _____



43. _____

Floristry

Curriculum Guide: *Floristry*

Unit: V. Basic Principles of Floral Design

Unit Objective:

Students will demonstrate an understanding of the basic principles of floral arranging by studying, evaluating, and critiquing floral arrangements and presenting their findings in a written and oral report.

Show-Me Standards: 1.8, FA2

References:

Floristry. University of Missouri-Columbia, Instructional Materials Laboratory, 1996.

Flowers Only. Accessed January 26, 2004, from http://www.flowersonly.com.

FTD.com. Accessed January 26, 2004, from http://www.ftd.com/.

Justflowers.com. Accessed January 26, 2004, from http://tulip.justflowers.com/.

Proflowers.com. Accessed January 26, 2004, from http://www.proflowers.com.

Students will use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. V-4 (1).

Performance-Based Assessment:

Students will work in teams of two to study, evaluate, and critique two floral arrangements. The teams will study each arrangement in terms of how each principle of design is used and if each principle is used successfully. Each team's findings will be submitted in a written report. Each member of the team will also make a short oral presentation to the class regarding the team's conclusions on one of the two arrangements.

Assessment will be based on the application of floral arranging principles in the written critique of each arrangement. It will take into account the completeness, organization, clarity, and overall quality of each of the two critiques. In addition, a portion of the assessment will cover the brief oral presentation, using the same criteria applied to the written report. Grammar, spelling, punctuation, and capitalization will also be factors in the assessment.

Unit V—Basic Principles of Floral Design
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work in teams of two to study, evaluate, and critique two floral arrangements.
   a. Each team will submit a written report critiquing two arrangements.
   b. Each team member will make a short oral presentation to the class offering a critique of one of the two arrangements the team studied.

2. Each team will select two subjects and obtain a picture of each subject. Pictures may be obtained from printed material such as catalogs, from web sites, or from photographs taken by the students at locations where floral arrangements appear. NOTE: If taking photos of floral arrangements, students should obtain permission from location owners or managers before taking the photos.

3. After selecting the subjects to be studied and obtaining a picture of each subject, students should evaluate and critique each subject in terms of the principles of flower arranging:
   - ❑ Design
   - ❑ Balance
   - ❑ Scale and proportion
   - ❑ Harmony
   - ❑ Focal point
   - ❑ Accent
   - ❑ Rhythm
   - ❑ Repetition
   - ❑ Unity

4. After evaluating the two subjects, students will complete the following:
   a. The team will prepare a written report critiquing the two floral arrangements.
   b. Each member of the team will present a short oral report on one of the arrangements the team critiqued. The written report will serve as the basis for the oral report. An image of the subject of each oral report should be made available for all members of the class to view (e.g., photocopies of the arrangement's picture or a photo projected on a screen).

5. Assessment will evaluate both the written and oral reports.
   a. Factors to be evaluated will be the completeness, organization, clarity, and overall quality of each team's critiques of the two floral arrangements.
   b. Similar factors will be applied to the assessment of each oral report.
   c. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Unit V—Basic Principles of Floral Design
Student Handout

1. You will work in teams of two to study, evaluate, and critique two floral arrangements.
   a. Your team will submit a written report critiquing the two arrangements.
   b. You and your teammate will each make a short oral presentation to the class offering a critique of one of the two arrangements your team studied.

2. Your team will select two subjects and obtain a picture of each subject. Pictures may be obtained from printed material such as catalogs, from web sites, or from photographs taken by you and your partner at locations where floral arrangements appear. NOTE: If taking photos of floral arrangements, you should obtain permission from location owners or managers before taking the photos.

3. After selecting the subjects to be studied and obtaining a picture of each subject, your team should evaluate and critique each subject in terms of the principles of flower arranging:
   - ❑ Design
   - ❑ Balance
   - ❑ Scale and proportion
   - ❑ Harmony
   - ❑ Focal point
   - ❑ Accent
   - ❑ Rhythm
   - ❑ Repetition
   - ❑ Unity

4. After evaluating the two subjects, your team will complete the following:
   a. Your team will prepare a written report critiquing the two floral arrangements.
   b. You and your teammate each will present a short oral report on one of the arrangements the team critiqued. Your written report will serve as the basis for the oral report. An image of the subject of each oral report should be made available for all members of the class to view (e.g., photocopies of the arrangement's picture or a photo projected on a screen).

5. Assessment will evaluate both the written and oral reports.
   a. Factors to be evaluated will be the completeness, organization, clarity, and overall quality of your team's critiques of the two floral arrangements.
   b. Similar factors will be applied to the assessment of your oral report.

c. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Unit V—Basic Principles of Floral Design
Scoring Guide
Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Critiques of Floral Arrangements	Completeness	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5	
	Organization	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5	
	Clarity	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5	
	Quality	Failed	Minimum Effort	Adequate	Superior	Excellent	X 5	
Oral Report	❑ Completeness ❑ Organization ❑ Clarity ❑ Quality	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 3	
Technical Considerations	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Floristry

Curriculum Guide: *Floristry*

Unit: VI. Types of Designs

Unit Objective:
Students will demonstrate an understanding of various floral designs by planning and producing floral arrangements for a themed display.

Show-Me Standards: 2.5, FA1

References:

Floral Designs. The Gardener. Accessed September 3, 2003, from http://www.thegardener.btinternet.co.uk/flowerarranging.html.

FloralShops.com. Accessed April 12, 2004, from http://www.floralshops.com/.

Floristry. University of Missouri-Columbia, Instructional Materials Laboratory, 1996.

Zientek-Sico, W. *Flower Arranging 101 – 10 Tips for Better Flower Arrangements*. Perfect Entertaining. Accessed September 2, 2003, from http://www.perfectentertaining.com/article1100.html.

Instructional Strategies/Activities:
- Students will engage in study questions in lessons 1 through 9.
- Students will complete JS 2.1, Constructing Corsages; JS 3.1, Constructing a Bud Vase; JS 4.1, Constructing a One-Sided Arrangement; JS 5.1, Constructing a Centerpiece; JS 6.1, Constructing a Wreath Using Evergreens in a Styrofoam or Straw Wreath Base; JS 7.1, Constructing a Silk Arrangement; JS 8.1, Constructing a Dried Flower Arrangement; and JS 9.1, Constructing a Dish Garden.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. VI-33 (2), p. VI-41 (1), and p. VI-52 (2).

Performance-Based Assessment:
Students will work in groups of three to plan, design, and produce a floral arrangement that will serve as one element of a themed display to be produced and exhibited by the entire class.

Assessment will take into account the quality of the design of the arrangement, the materials used in the arrangement, and the final product (i.e., the arrangement itself). Also to be assessed will be the compatibility of the floral arrangement's theme in relation to the theme of the unified display and the arrangement's contribution to the overall appearance and impression of the unified display.

Unit VI—Types of Designs
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work in teams of three to plan, design, and produce a floral arrangement.
   a. The arrangement will be used as part of a general theme selected by the instructor or the class.
   b. When completed, all arrangements will be presented and shown as a unified display at an appropriate venue.

2. The goal for the unified display is to have a variety of arrangements to demonstrate the range of floral possibilities.
   a. Listed below are arrangement styles to consider. Other types of arrangement styles may be agreed upon by each team.
      - ❑ Bud vases
      - ❑ One-sided arrangements
      - ❑ Centerpieces
      - ❑ Wreaths
      - ❑ Silk arrangements
      - ❑ Dried arrangements
      - ❑ Dish gardens
   b. Every team's arrangement style must be approved by the instructor to ensure that a variety of floral arrangements will be available for the unified display.

3. Each team will develop its floral arrangement in three stages:
   a. Stage one. Design the arrangement. All team members must agree on the details of the arrangement and develop a list of materials and tools to be used in producing the arrangement.
   b. Stage two. Gather materials and tools. All materials and tools must be easily accessible and available to all team members.
   c. Stage three. Produce the arrangement. All team members must participate in some way in the development and final production of the floral arrangement.

4. Upon completion, each team's effort will become part of a unified floral display of all arrangements produced by class members.

5. Assessment will evaluate the quality of the arrangement's design, the materials used in the arrangement, and the final product (i.e., the arrangement itself). Also to be assessed will be the compatibility of the floral arrangement's theme in relation to the theme of the unified display and the arrangement's contribution to the overall appearance and impression of the unified display.

Unit VI—Types of Designs
Student Handout

1. You will work in a team with two other students to plan, design, and produce a floral arrangement.
   a. The arrangement will be used as part of a general theme selected by your instructor or your class.
   b. When completed, all arrangements will be presented and shown as a unified display at an appropriate venue.

2. The goal for your class's unified display is to have a variety of arrangements to demonstrate the range of floral possibilities.
   a. Listed below are arrangement styles for your team to consider. Other types of arrangement styles may be agreed upon by your team.
      - ❑ Bud vases
      - ❑ One-sided arrangements
      - ❑ Centerpieces
      - ❑ Wreaths
      - ❑ Silk arrangements
      - ❑ Dried arrangements
      - ❑ Dish gardens
   b. Your team's arrangement style must be approved by the instructor to ensure that a variety of floral arrangements will be available for the unified display.

3. Your team will develop its floral arrangement in three stages:
   a. Stage one. Design the arrangement. All team members must agree on the details of the arrangement and develop a list of materials and tools to be used in producing the arrangement.
   b. Stage two. Gather materials and tools. All materials and tools must be easily accessible and available to all team members.
   c. Stage three. Produce the arrangement. All team members must participate in some way in the development and final production of the floral arrangement.

4. Upon completion, your team's effort will become part of a unified floral display of all arrangements produced by each team in the class.

5. Assessment will evaluate the quality of the arrangement's design, the materials used in the arrangement, and the final product (i.e., the arrangement itself). Also to be assessed will be the compatibility of the floral arrangement's theme in relation to the theme of the unified display and the arrangement's contribution to the overall appearance and impression of the unified display.

Floristry

Unit VI—Types of Designs
Scoring Guide
Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Design of the Arrangement	Quality of the design	Failed	Minimal	Adequate	Superior	Excellent	X 5	
Materials Used in the Arrangement	Appropriate for the design	Failed	Minimal	Adequate	Superior	Excellent	X 5	
Final Production of the Arrangement	Matches the intent of the design	Failed	Minimal	Adequate	Superior	Excellent	X 5	
Theme Compatibility With the Unified Display	Matches the proposed theme of unified display	Failed	Minimal	Adequate	Superior	Excellent	X 5	
Contribution to Appearance and Impression of the Unified Display	Quality of the arrangement's contribution to the unified display	Failed	Minimal	Adequate	Superior	Excellent	X 5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Floristry

Curriculum Guide: *Floristry*

Unit: VII. Shop Operations

Unit Objective:

Students will demonstrate an understanding of the marketing aspect of a floral shop operation by contributing their time and effort to the creation of an advertising message to promote the sale of floral produce.

Show-Me Standards: 4.5, SS4

References:

Baldwin, H. *How to Create Effective TV Commercials*, 2nd ed., Lincolnwood, IL: NTC Business Books, 1989.

Behan, J. *How to Create Great Newspaper Ads That Will Pull All the Customers You Will Ever Need: Insider Trade Secrets Revealed*. Hertfordshire, United Kingdom: Lambert Publishing, 2000.

Book, A. C. *The Radio and Television Commercial*, 2nd ed., Chicago, IL: Crain Books, 1984.

Floristry. University of Missouri-Columbia, Instructional Materials Laboratory, 1996.

Jain, C. L. *An Introduction to Direct Marketing*. New York: AMACOM, 1978.

McLean, E. *The Basics of Copy: A Monograph on Direct Marketing*. Yonkers, NY: R. Gilmore, 1975.

Redmond, M. *60 Second Sells: 99 Hot Radio Spots for Retail Businesses*. Jefferson, NC: McFarland & Co., 1993.

Schulberg, B. *Radio Advertising: The Authoritative Handbook*. Lincolnwood, IL: NTC Business Books, 1989.

Stewart, D. W. *Effective Television Advertising: A Study of 1000 Commercials*. Lexington, MA: Lexington Books, 1986.

Warner, C., & Buchman, J. *Media Selling: Broadcast, Cable, Print, and Interactive*, 3rd ed., Ames, IA: Iowa State Press, 2004.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 7.
- Students will complete AS 1.1, Completing a Sales Slip; AS 3.1, Calculating Prices; AS 5.1, Florist Shop Display; and AS 7.1, Preparing a Print Ad.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. VII-5 (3), p. VII-15 (1), p. VII-42 (2), p. VII-49 (4), and p. VII-64 (2).

Performance-Based Assessment:

Students will work in groups of four to develop an advertisement in a specific medium within an overall marketing plan for a floral business. Each group will follow up in class with a presentation of its advertisement.

Assessment will be based on the content, clarity, completeness, and quality of the advertisement and presentation. Assessment also will take into account grammar, spelling, punctuation, and capitalization.

Unit VII—Shop Operations
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work in teams of four to plan, design, and produce an advertisement, in a specific medium, to promote a floral shop product or effort.
   a. The instructor may decide to relate this activity to a particular sales effort (e.g., a special holiday) for which the class is producing specific floral arrangements.
   b. The instructor may decide to restrict the number of teams that can produce an advertisement in a given medium, thus ensuring each advertising medium is employed by teams within the class.

2. Each team will produce an advertisement in one of the following media:
   - ❑ Radio – Write the script for a 30-second spot and produce the commercial intended for broadcast on a local radio station.
   - ❑ Television – Write the script for a 30-second spot and produce the commercial intended for use on a local TV station or cable TV system.
   - ❑ Direct mail – Write, design, and print a brochure, pamphlet, or flyer intended for distribution to a mailing list of floral customers.
   - ❑ Outdoor – Design and write the message for a billboard or poster to be posted at various locations in the area.

3. Each team will show and discuss its advertising effort in a brief presentation to the class.
   a. The presentation is intended to demonstrate each team's approach to the assignment.
   b. In the presentation, the team will discuss the following points:
      - ❑ Product to be advertised
      - ❑ Intended audience for the message
      - ❑ Reason the medium is used to reach the audience

4. Assessment will evaluate each team's efforts related to producing the advertisement and making its presentation to the class.
   a. Factors to be evaluated will be the content, clarity, completeness, and quality of the advertisement. These will be assessed on a range from excellence to failure.

b. The presentation will be evaluated in a similar manner, though its weight will be half of the advertisement's value.
c. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Unit VII—Shop Operations
Student Handout

1. You will work in a team with three other students to plan, design, and produce an advertisement, in a specific medium, to promote a floral shop product or effort.

2. Your team will produce an advertisement in one of the following media:
   - ❑ Radio – Write the script for a 30-second spot and produce the commercial intended for broadcast on a local radio station.
   - ❑ Television – Write the script for a 30-second spot and produce the commercial intended for use on a local TV station or cable TV system.
   - ❑ Direct mail – Write, design, and print a brochure, pamphlet, or flyer intended for distribution to a mailing list of floral customers.
   - ❑ Outdoor – Design and write the message for a billboard or poster to be posted at various locations in the area.

3. Your team will show and discuss its advertising effort in a brief presentation to the class.
   a. The presentation is intended to demonstrate your team's approach to the assignment.
   b. In the presentation, your team will discuss the following points:
      - ❑ Product to be advertised
      - ❑ Intended audience for the message
      - ❑ Reason the medium is used to reach the audience

4. Assessment will evaluate your team's efforts related to producing the advertisement and making your presentation to the class.
   a. Factors to be evaluated will be the content, clarity, completeness, and quality of your advertisement. These will be assessed on a range from excellence to failure.
   b. Your presentation will be evaluated in a similar manner, though its weight will be half of the advertisement's value.
   c. Spelling, grammar, punctuation, and capitalization also will be factors in the assessment.

Floristry

Unit VII—Shop Operations
Scoring Guide
Team Members_____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Advertisement	❑ Content	Failed	Minimum Effort	Average	Above Average	Excellent	X 4	
	❑ Clarity	Failed	Minimum Effort	Average	Above Average	Excellent	X 4	
	❑ Completeness	Failed	Minimum Effort	Average	Above Average	Excellent	X 4	
	❑ Quality	Failed	Minimum Effort	Average	Above Average	Excellent	X 4	
Presentation	❑ Content	Failed	Minimum Effort	Average	Above Average	Excellent	X 2	
	❑ Clarity	Failed	Minimum Effort	Average	Above Average	Excellent	X 2	
	❑ Completeness	Failed	Minimum Effort	Average	Above Average	Excellent	X 2	
	❑ Quality	Failed	Minimum Effort	Average	Above Average	Excellent	X 2	
Technical Considerations	❑ Grammar ❑ Spelling ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	4 criteria met	X 1	
TOTAL								

Final Assessment Total_____/100 pts.

Comments:

Food Science and Technology

Curriculum Guide: *Food Science and Technology*

Unit: I. Principles of Food Preservation

Unit Objective:

Students will demonstrate an understanding of food preservation by researching food preservation techniques and presenting their findings to the class in an oral report.

Show-Me Standards: 2.1, CA6

References:

The Council. Accessed December 3, 2003, from http://www.agedhq.org/councilindex.cfm.

Exploring Agriculture in America. University of Missouri-Columbia, Instructional Materials Laboratory, 2000.

Food and Nutrition Information Center. U.S. Department of Agriculture and Agricultural Research Service. Accessed December 11, 2003, from http://www.nal.usda.gov/fnic/.

Food and Nutrition Publications. MU Extension. University of Missouri-Columbia. Accessed January 13, 2004, from http://muextension.missouri.edu/explore/hesguide/foodnut/index.htm.

Food Science and Technology. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Institute of Food Technologists (IFT). Accessed December 3, 2003, from http://www.ift.org/cms/.

Kimchee. Bottle Biology. Accessed December 3, 2003, from http://www.bottlebiology.org/investigations/kimchee_main.html.

Students will use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 1.1, Effects of Packaging Material in Maintaining Meat Quality.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. I-6 and p. I-21.

Performance-Based Assessment:

Students will be divided into eight groups and each group will research a different technique of food preservation: heat, cold, drying, irradiation, packaging, additives, fermentation, and canning. Each group's findings should include various methods of the technique, the process of each method, and three different product examples. Students will report their findings to the class in an oral presentation. The presentation should be approximately 10 minutes in length and all group members should participate in some way. As part of the presentation, the group should use visual aids such as posters, illustrations, charts, or transparencies. Students will also be encouraged to actually perform the preservation technique, if possible.

Assessment will be based on the overall content and presentation of the report. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Unit I—Principles of Food Preservation
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Divide the class into eight groups and assign each group one of the following food preservation techniques:
   - ❑ Heat
   - ❑ Cold
   - ❑ Drying
   - ❑ Irradiation
   - ❑ Packaging
   - ❑ Additives
   - ❑ Fermentation
   - ❑ Canning

2. Each group will research the food preservation technique and find the following information:
   - ❑ The various methods of the technique
   - ❑ The process of each method
   - ❑ Three different product examples

3. Students will report their findings to the class in the form of a presentation (minimum 10 minutes in length).
   a. Students should incorporate visual aids into their presentation such as posters, illustrations, charts, or transparencies.
   b. If feasible, have students actually perform the food preservation technique as part of their presentation. If not doing an actual demonstration, have students show one physical example of a product that was preserved using the technique.
   c. Have each group prepare a detailed outline of the report that will be turned in after the presentation.
   d. Each group member should play an active part in the presentation.

4. Students may use material found in the unit or discussed in class as well as additional outside material to complete their report. Useful web sites are listed under the references section in this assessment activity.

5. Students may not use the source material word for word and must provide a complete bibliography of their sources following their report.

6. The final assessment score will be based on the overall content and presentation of the report. The written aspects of the report will also be assessed for spelling, grammar, punctuation, and capitalization errors.

Unit I—Principles of Food Preservation
Student Handout

1. The instructor will divide the class into eight groups and assign your group one of the following food preservation techniques:
   - ❑ Heat
   - ❑ Cold
   - ❑ Drying
   - ❑ Irradiation
   - ❑ Packaging
   - ❑ Additives
   - ❑ Fermentation
   - ❑ Canning

2. Your group will research the food preservation technique and find the following information:
   - ❑ The various methods of the technique
   - ❑ The process of each method
   - ❑ Three different product examples

3. Your group will report its findings to the class in the form of a presentation (minimum 10 minutes in length).
   a. You should incorporate visual aids into your presentation such as posters, illustrations, charts, or transparencies.
   b. With permission from the instructor, your group can actually perform the food preservation technique as part of the presentation. If not doing an actual demonstration, your group should show one physical example of a product that was preserved using the technique.
   c. Your group will prepare a detailed outline of the report that will be turned in after the presentation.
   d. Each member of your group should play an active part in the presentation.

4. You may use material found in the unit and discussed in class as well as additional outside material to complete your report.

5. You may not use the source material word for word and must provide a complete bibliography of your sources following your report.

6. Your final assessment score will be based on the overall content and presentation of the report. The written aspects of the report will also be assessed for spelling, grammar, punctuation, and capitalization errors.

Food Science and Technology

Unit I—Principles of Food Preservation
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Content of Report	❑ Includes all the required elements ❑ Facts are accurate ❑ Visual aids emphasize and clarify key points ❑ Well organized	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 15	
Presentation of Report	❑ Holds audience interest ❑ Speaks clearly and uses correct grammar ❑ Maintains good posture ❑ All members participated	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 7.5	
Technical Considerations (Written Aspects)	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Food Science and Technology

Curriculum Guide: *Food Science and Technology*

Unit: II. Food Processing

Unit Objective:

Students will demonstrate an understanding of the food processing industry by creating and describing a food product, in outline form, that will appeal to today's consumers and designing the packaging materials to effectively market the product.

Show-Me Standards: 2.1, FA1

References:

"Agricultural Sales." *National FFA Career Development Events Handbook.* Accessed April 13, 2004, from http://www.ffa.org/programs/cde/html/cde_events.htm#agsales.

Food for America. National FFA Organization. Accessed April 13, 2004, from http://www.ffa.org/ageducators/lps/documents/lps_foodforamerica.pdf.

"Food Science and Technology." *National FFA Career Development Events Handbook*. Accessed December 10, 2003, from http://www.ffa.org/programs/cde/html/cde_events.htm#food.

Food Science and Technology. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 12.
- Students will complete AS 2.1, Soy Milk; AS 9.1, Soybean Processing; AS 9.2, Corn Sweeteners; AS 10.1, Processing Wheat; and AS 11.1, Making Nut Butter.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. II-125.

Performance-Based Assessment:

Students will work in pairs or individually to develop a food product idea, create the product's packaging, and describe the product in outline form. Examples of products could include ready-to-eat cereal, breakfast bars, candy, beverages (soda, sports drinks, etc.), pizza, processed fruit snacks, stir-fried vegetables, or ready-to-eat sandwiches. Students will describe their product in an outline that should include the group of consumers that the product appeals to, how the product appeals to and meets the needs of the target group, why the packaging design was chosen, and reasons behind the various design elements of the packaging. Students also will create a full sketch of the product logo and a sketch of the packaging, which will show all sides of the packaging. The packaging sketch should include nutritional information, ingredients, product description, and any preparation instructions.

Assessment will be based on the overall quality of the content of the outline and the design and content of the logo and packaging sketches. Spelling, grammar, punctuation, and capitalization also will be assessed.

Unit II—Food Processing
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will be working individually or in pairs to design a food product, draw a sketch of the product's packaging, and write a description of the product in outline form.

2. Have students think of a food product idea that will appeal to consumers and fulfill a need. Encourage students to be creative and innovative. Examples of products could include, but are not limited to, the following:
   - ❑ Ready-to-eat cereal
   - ❑ Breakfast bars
   - ❑ Candy
   - ❑ Beverages (soda, sports drinks, etc.)
   - ❑ Pizza
   - ❑ Processed fruit snacks
   - ❑ Stir-fried vegetables
   - ❑ Ready-to-eat sandwiches

3. Students will prepare sketches for their product that will include the following:
   - ❑ Full sketch of the product logo
   - ❑ Product packaging that shows all sides and includes the following elements:
     - ❑ Nutritional information
     - ❑ Ingredients
     - ❑ Product description
     - ❑ Any directions to prepare the product for consumption

4. Have students prepare an outline that answers the following questions about their product.
   - ❑ What is the product?
   - ❑ What group of consumers does the product appeal to?
   - ❑ How does the product appeal to and meet the needs of the target group?
   - ❑ Why was this packaging design chosen?
   - ❑ What are the reasons behind the various design elements used in the packaging?

5. The final assessment score will be based on the overall quality of the content of the outline and the design and content of the logo and packaging sketches. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Unit II—Food Processing
Student Handout

1. You will be working individually or with another student to design a food product, draw a sketch of the product's packaging, and write a description of the product in outline form.

2. Develop a creative and innovative food product idea that will be appealing to consumers and fulfill a need. Examples of products could include, but are not limited to, the following:
   - ❑ Ready-to-eat cereal
   - ❑ Breakfast bars
   - ❑ Candy
   - ❑ Beverages (soda, sports drinks, etc.)
   - ❑ Pizza
   - ❑ Processed fruit snacks
   - ❑ Stir-fried vegetables
   - ❑ Ready-to-eat sandwiches

3. Prepare sketches for your product that will include the following:
   - ❑ Full sketch of the product logo
   - ❑ Product packaging that shows all sides and includes the following elements:
     - ❑ Nutritional information
     - ❑ Ingredients
     - ❑ Product description
     - ❑ Any directions to prepare the product for consumption

4. In outline form, answer the following questions about your product.
   - ❑ What is the product?
   - ❑ What group of consumers does the product appeal to?
   - ❑ How does the product appeal to and meet the needs of the target group?
   - ❑ Why was this packaging design chosen?
   - ❑ What are the reasons behind the various design elements used in the packaging?

5. Your final assessment score will be based on the overall quality of the content of the outline and the design and content of the logo and packaging sketches. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Food Science and Technology

Unit II—Food Processing
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Content of Product Outline	❑ Product idea is creative and innovative ❑ Establishes need for the product in a specific market ❑ Includes all the required elements ❑ Well organized	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 12.5	
Design and Content of Product Sketches (Logo and Packaging)	❑ Well organized ❑ Creative design ❑ Includes all the required elements ❑ Eye-catching and appealing to consumers	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 10	
Technical Considerations (Written Aspects)	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Food Science and Technology

Curriculum Guide: *Food Science and Technology*

Unit: III. The Biochemistry of Foods

Unit Objective:

Students will demonstrate an understanding of biochemistry of foods by creating a poster about a commodity, product, or application that has been created or made better by the influence of biochemistry and giving an oral report to the class based on their poster.

Show-Me Standards: 1.8, CA6

References:

Food and Nutrition Information Center. U.S. Department of Agriculture and Agricultural Research Service. Accessed December 11, 2003, from http://www.nal.usda.gov/fnic/.

Food Science and Technology. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Monsanto Company. Accessed November 3, 2003, from http://www.monsanto.com/monsanto/layout/default.asp.

Weidner, K. "Science in Your Shopping Cart." *Penn State Agriculture* (magazine), Fall 2002/Winter 2003. Accessed November 3, 2003, from http://www.aginfo.psu.edu/psa/fw2003/gmo.html.

Students will use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 5.
- Students will complete AS 5.1, A Bioengineered Food Product.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. III-5 and pp. III-52–III-53.

Performance-Based Assessment:

Each student will create a poster that describes a commodity, product, or application that has been created or made better by biochemistry. The poster will include who developed the commodity, product, or application; a summary of the process; a picture of the commodity, product, or application; a short summary of how biochemistry has affected the commodity, product, or application; and what makes this commodity, product, or application different than its predecessor, if applicable. They will present their findings to the class in a presentation (5 minutes minimum in length) while using their poster as a visual aid.

Assessment will be based on the overall quality of the content of the poster and outline and the presentation of the report. The written portions of the project will also be assessed for spelling, grammar, punctuation, and capitalization.

Unit III—The Biochemistry of Foods
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Have each student choose a commodity, product, or application that has been created or improved by biochemistry. NOTE: If the class size is large or if time is limited, divide students into small groups. Students may select one of the following examples or find one on their own.
   - ❑ Provit A corn (enhanced)
   - ❑ Roundup Ready wheat, canola, corn, cotton, or soybeans
   - ❑ Yieldgard corn
   - ❑ Bollgard cotton
   - ❑ Yieldgard Plus corn
   - ❑ Bollgard/Roundup Ready cotton
   - ❑ StarLink corn
   - ❑ Hothouse tomatoes
   - ❑ Animal cloning for any purpose

2. After making a selection, students will research the topic and create a poster that illustrates their findings. The poster should include the following information:
   - ❑ Who developed the commodity, product, or application
   - ❑ How the commodity, product, or application is produced (steps involved in the biochemical process)
   - ❑ What the commodity, product, or application looks like (Find a picture.)
   - ❑ How biochemistry has affected the commodity, product, or application
   - ❑ How this commodity, product, or application is different from its predecessor, if applicable

3. Students may use material found in the unit or discussed in class as well as additional outside material to complete their poster. Useful web sites are listed under the references section in this assessment activity.

4. Students may not use the source material word for word and must provide a complete bibliography of their sources.

5. Students will present their findings to the class in an oral report while using their poster as a visual aid.
   a. Have students prepare a detailed outline of their presentation to turn in after the report.
   b. The presentation should be at least 5 minutes in length.

6. The final assessment score will be based on the overall quality of the content of the poster and outline and the presentation of the report. The written aspects of the report will also be assessed for spelling, grammar, punctuation, and capitalization errors.

Unit III—The Biochemistry of Foods
Student Handout

1. You will choose a commodity, product, or application that has been created or improved by biochemistry. You may select one of the following examples or find one on your own.
   - ❑ Provit A corn (enhanced)
   - ❑ Roundup Ready wheat, canola, corn, cotton, or soybeans
   - ❑ Yieldgard corn
   - ❑ Bollgard cotton
   - ❑ Yieldgard Plus corn
   - ❑ Bollgard/Roundup Ready cotton
   - ❑ StarLink corn
   - ❑ Hothouse tomatoes
   - ❑ Animal cloning for any purpose

2. After making a selection, you will research the topic and create a poster that illustrates your findings. The poster should include the following information:
   - ❑ Who developed the commodity, product, or application
   - ❑ How the commodity, product, or application is produced (steps involved in the biochemical process)
   - ❑ What the commodity, product, or application looks like (Find a picture.)
   - ❑ How biochemistry has affected the commodity, product, or application
   - ❑ How this commodity, product, or application is different from its predecessor, if applicable

3. You may use material found in the unit or discussed in class as well as additional outside material to complete your poster.

4. You may not use the source material word for word and must provide a complete bibliography of your sources.

5. You will present your findings to the class in an oral report while using your poster as a visual aid.
   a. You will prepare a detailed outline of your presentation to turn in after the report.
   b. Your presentation should be at least 5 minutes in length.

6. Your final assessment score will be based on the overall quality of the content of the poster and outline and the presentation of the report. The written aspects of the report will also be assessed for spelling, grammar, punctuation, and capitalization errors.

Food Science and Technology

Unit III—The Biochemistry of Foods
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Content of Poster and Outline	❑ Includes all the required elements ❑ Facts are accurate ❑ Poster emphasizes and clarifies key points ❑ Well organized	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 15	
Presentation of Report	❑ Holds audience interest ❑ Speaks clearly and uses correct grammar ❑ Maintains good posture ❑ Easy to follow	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 7.5	
Technical Considerations (Written Portions)	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Food Science and Technology

Curriculum Guide: *Food Science and Technology*

Unit: IV. Food Selection and Consumer Health

Unit Objective:

Students will demonstrate an understanding of the nutritional facts on food labels and the nutritional requirements of a healthy diet by creating a chart where they will keep track of the foods they consume and writing a summary of their results.

Show-Me Standards: 1.8, HP5

References:

Food and Nutrition Information Center. U.S. Department of Agriculture and Agricultural Research Service. Accessed December 11, 2003, from http://www.nal.usda.gov/fnic/.

Food and Nutrition Publications. MU Extension. University of Missouri-Columbia. Accessed January 13, 2004, from http://muextension.missouri.edu/explore/hesguide/foodnut/index.htm.

Food Science and Technology. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Nutrition and Health. University of Missouri Outreach & Extension. Accessed December 11, 2003, from http://outreach.missouri.edu/main/nutrition/.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 4.
- Students will complete AS 1.1, Comparing Snack Foods; AS 2.1, Nutritional Status; and AS 3.1, A Test for Vitamin C.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. IV-5, p. IV-14, and pp. IV-36–IV-37.

Performance-Based Assessment:

Students will work individually on their assignment. They will record what they eat and drink for 3 days (72 hr) in a chart they create. Each day they will provide totals for the nutrients (in grams) and vitamins and minerals (percentages) that they consume. Taking into account the totals, students will write a summary that evaluates whether they are meeting the daily

nutritional requirements in each category and that provides recommendations on how they can improve their diet (e.g., eat more foods high in iron like peas or take a calcium supplement to meet the calcium requirement).

Assessment will be based on the overall quality of the summary and chart content. Spelling, grammar, punctuation, and capitalization also will be assessed.

Unit IV—Food Selection and Consumer Health
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Working individually, students will keep track of what they eat for 3 days (72 hr). NOTE: This time period may be adjusted to your preference and teaching calendar. Three days is suggested so that students may have a better understanding of the types of food they eat.

2. For each food students eat and drink, they will need to record the following information:
   - ❑ Daily nutritional information totals (in grams)
     - ❑ Calories
     - ❑ Fat
     - ❑ Cholesterol
     - ❑ Sodium
     - ❑ Carbohydrates
     - ❑ Sugar
     - ❑ Protein
   - ❑ Daily vitamin and mineral totals (percentages)
     - ❑ Vitamin A
     - ❑ Vitamin C
     - ❑ Calcium
     - ❑ Iron

3. Students should keep their records in chart form to make it easier to read and track. They can either draw their chart or create the chart in a computer program like Excel.

4. After the chart is complete, students will write a summary (maximum of 1 page) that answers the following questions:
   - ❑ How healthy is my diet?
   - ❑ What needs to change about my diet?
   - ❑ Does my diet meet the recommended percentages of vitamins A and C, calcium, and iron? If not, what foods should be added to my diet to increase the percentages?

5. The final assessment score will be based on the overall quality of the summary and chart content. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Unit IV—Food Selection and Consumer Health
Student Handout

1. Working individually, you will keep track of what you eat for a time period specified by your instructor. For each food you eat and drink, you will need to record the following information:
   - ❑ Daily nutritional information totals (in grams)
     - ❑ Calories
     - ❑ Fat
     - ❑ Cholesterol
     - ❑ Sodium
     - ❑ Carbohydrates
     - ❑ Sugar
     - ❑ Protein
   - ❑ Daily vitamin and mineral totals (percentages)
     - ❑ Vitamin A
     - ❑ Vitamin C
     - ❑ Calcium
     - ❑ Iron

2. Keep your records in chart form to make it easier to read and track. You can either draw the chart or create the chart in a computer program like Excel.

3. After the chart is complete, write a summary (maximum of 1 page) that answers the following questions:
   - ❑ How healthy is my diet?
   - ❑ What needs to change about my diet?
   - ❑ Does my diet meet the recommended percentages of vitamins A and C, calcium, and iron? If not, what foods should be added to my diet to increase the percentages?

4. Your final assessment score will be based on the overall quality of your summary and chart content. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Food Science and Technology

Unit IV—Food Selection and Consumer Health
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Content of Summary	❑ Addresses all questions ❑ Facts are accurate ❑ Suggestions for diet changes are valid ❑ Well organized	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 10.0	
Content of Chart	❑ Well organized ❑ Covers time period specified ❑ Includes all the elements required ❑ Neat and easy to read	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 12.5	
Technical Considerations (Written Aspects)	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Greenhouse Operation and Management

Curriculum Guide: *Greenhouse Operation and Management*

Unit: I. The Greenhouse Industry

Unit Objective:

Students will demonstrate an understanding of the requirements of a position in the greenhouse industry by researching the position and presenting their findings on a poster that will be displayed in class.

Show-Me Standards: 4.8, CA6

References:

Area businesses, the newspaper, or the local phone book

CAFNR Career Services. University of Missouri. Accessed December 3, 2003, from http://cafnr.missouri.edu/Students/CareerServices/default.asp.

Division of Workforce Development. Missouri Department of Economic Development. Accessed December 3, 2003, from http://www.ded.mo.gov/employment/workforcedevelopment/.

Greenhouse Operation and Management. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Missouri Occupational information Coordinating Committee. Accessed December 3, 2003, from http://www.moicc.net/.

Monster.com (job search engine). Accessed December 3, 2003, from http://www.monster.com/.

Occupational Outlook Handbook. U.S. Department of Labor. Bureau of Labor and Statistics. Accessed February 3, 2004, from http://www.bls.gov/oco/home.htm.

University of Missouri-Career Center. Accessed December 3, 2003, from http://www.career.missouri.edu/.

Students will use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 1.4, Greenhouse Careers: Which One? How to Succeed?; and AS 1.5, Getting Involved in the Greenhouse Industry.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities and Strategies" in the following location: p. 29.

Performance-Based Assessment:

Students will work individually to research one profession listed in TM 1.4 in lesson 2 of the unit. Areas to examine include, but are not limited to, educational requirements, pay scale, responsibilities, and duties. Students will present their findings on a poster that will be displayed in class.

Assessment will be based on the content and presentation of the poster. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Unit I—The Greenhouse Industry
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Have each student select a greenhouse operation position listed on TM 1.4 in lesson 2 of the unit and determine the job requirements for that position.
   a. If preferred, assign each student a greenhouse operation position to ensure that a variety of positions are researched and represented on the posters.
   b. Provide students with other position choices if additional positions are needed due to class size or interests.

2. Have students find information on the following requirements.
   - ❑ Education
   - ❑ Pay scale
   - ❑ Responsibilities
   - ❑ Duties
   - ❑ Any other information that is relevant to the position

3. Students should use a variety of sources to find information, such as books, the Internet, journals, magazines, and job ads.
   a. Several useful Internet resources are listed in the references section of this assessment activity.
   b. Students must submit a complete bibliography of their sources along with their posters.

4. Have students present their information on a poster. Display completed posters in class. NOTE: The information on the posters could be used for material for quizzes or exams.

5. The final assessment will be based on the overall content and presentation of the poster. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Unit I—The Greenhouse Industry
Student Handout

1. Select a greenhouse operation position listed on TM 1.4 in lesson 2 of the unit and determine the job requirements for that position.

2. Find information on the following job requirements.
   - ❑ Education
   - ❑ Pay scale
   - ❑ Responsibilities
   - ❑ Duties
   - ❑ Any other information that is relevant to the position

3. Use a variety of sources to find information, such as books, the Internet, journals, magazines, and job ads. You must submit a complete bibliography of your sources along with your poster.

4. Present your findings on a poster, which will be displayed in class.

5. Your final assessment score will be based on the overall content and presentation of your poster. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Greenhouse Operation and Management

Unit I—The Greenhouse Industry
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Content of Poster	Information is complete and facts are accurate	Failed	Poor	Fair	Good	Excellent	X 15	
Presentation of Poster	Well organized, neat, and easy to follow	Failed	Poor	Fair	Good	Excellent	X 7.5	
Technical Considerations	Spelling, grammar, punctuation, and capitalization are correct	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Greenhouse Operation and Management

Curriculum Guide: *Greenhouse Operation and Management*

Unit: II. Growing Structures

Unit Objective:

Students will demonstrate an understanding of greenhouse structures by making an oral presentation in which they will propose a repair or improvement to the school's greenhouse and provide specifics on the materials and costs involved.

Show-Me Standards: 1.1, CA1

References:

Biondo, R. J. *Greenhouse Production*. Pearson Prentice Hall, 2004.

Greenhouse Operation and Management. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Hummert International. Accessed December 3, 2003, from http://www.hummert.com/.

Stuppy, Inc. Accessed December 3, 2003, from http://www.stuppy.com/.

Students will use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 2.1, Plan Your Own: Part I; and AS 2.2, Plan Your Own: Part II.
- Additional activities that relate to the unit objective can be found under the headings "Other Activity and Strategy" and "Unit II Activity" in the following locations: p. 47, p. 74, and pp. 92–93.

Performance-Based Assessment:

Students will be given the scenario that the department's instructors want to make repairs or improvements to the school's greenhouse. Students will work individually or in groups to develop a plan to present to the school board (classmates) to convince the board that the greenhouse needs these changes. They will present their plan in the form of a 5-minute sales pitch that will include a visual aid, such as a diagram of the proposed changes and where in the greenhouse they will be made, a list of materials, and a price sheet that provides the overall cost.

Assessment will be based on the overall content and presentation of the plan.

Unit II—Growing Structures
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Present the following scenario to the students: The department's instructors want to get approval from the school board to make repairs or improvements to the school's greenhouse.

2. Have students evaluate the greenhouse to determine what repairs or improvements to make or suggest changes for students to consider, such as replacing a gravel floor with a cement floor or installing an overhead sprinkler system.

3. Have students work individually or in groups to develop a plan that will convince the school board that the changes should be made.

4. Students may use material in the unit and will need to use additional outside sources to prepare their plan.
   a. Several resources are listed in the references section of this assessment activity that contain information on greenhouse structure options, materials, and costs.
   b. Students must provide a complete bibliography of their sources along with their presentation.

5. Have students present their plan to the school board (classmates) in the form of a sales pitch. Presentations should be 5 minutes long.
   a. The presentation will include the following elements:
      - ❑ Visual aid, such as a diagram of the proposed changes (This should show where in the greenhouse the changes will be made and include a picture of the materials, if possible.)
      - ❑ List of materials needed to make the improvement or repair
      - ❑ Price sheet displaying the total cost
   b. For example, if the student proposes installing an overhead sprinkler system, the presentation should include a picture of the system, where it would be installed in the greenhouse, a list of the materials required, and a price sheet that provides the total cost.

6. Remind students who are working in groups that all members must participate in the presentation in some way.

7. The final assessment will be based on the overall content and the presentation of the plan.

8. ADDITIONAL ACTIVITY: For further review, an additional unit-level activity, Greenhouse Portfolio, is included on pp. 92–93 of the Instructor Guide. For this activity, students will work in groups to assemble a portfolio that includes information about all the structural and internal mechanisms needed to build a new commercial greenhouse. Students will then give their portfolio to the instructor and receive another group's portfolio to critique using questions included in the activity. Answers will vary.

Unit II—Growing Structures
Student Handout

1. Consider the following scenario: The department's instructors want to get approval from the school board to make repairs or improvements to the school's greenhouse.

2. Your instructor may suggest repairs or improvements or may instruct you to evaluate the greenhouse and decide what repair or improvement is needed most.

3. Develop a presentation that will convince the school board that the changes should be made.

4. You may use material in the unit and will need to use additional outside sources to prepare your presentation. You must provide a complete bibliography of your sources along with your presentation.

5. Present your plan to the school board (classmates) in the form of a sales pitch. Presentations should be 5 minutes long.
   a. The presentation will include the following elements:
      - ❑ Visual aid, such as a diagram of the proposed changes (This should show where in the greenhouse the changes will be made and include a picture of the materials, if possible.)
      - ❑ List of materials needed to make the improvement or repair
      - ❑ Price sheet displaying the total cost
   b. For example, if you were proposing to install an overhead sprinkler system, the presentation should include a picture of the system, where it would be installed in the greenhouse, a list of the materials required, and a price sheet that provides the total cost.

6. If you are working in a group, be sure that all group members participate in the presentation in some way.

7. Your final assessment score will be based on the overall content and the presentation of your plan.

Greenhouse Operation and Management

Unit II—Growing Structures
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Content of Plan	❑ Includes all required elements ❑ Facts are accurate ❑ Visual elements emphasize and clarify key points ❑ Well organized	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 17.5	
Presentation of Plan	❑ Holds audience interest ❑ Speaks clearly and uses correct grammar ❑ Speaks in a persuasive manner ❑ Maintains good posture	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 7.5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Greenhouse Operation and Management

Curriculum Guide: *Greenhouse Operation and Management*

Unit: III. Plant Science Basics

Unit Objective:

Students will demonstrate an understanding of plant science by creating a plant collection in which plants will be identified and labeled as to the type of root, leaf shape, leaf margin, leaf attachment, and venation.

Show-Me Standards: 1.3, SC3

References:

Greenhouse Operation and Management. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Horticulture Publications. MU Extension. University of Missouri-Columbia. Accessed February 6, 2004, from http://muextension.missouri.edu/explore/agguides/hort/index.htm.

The National Arbor Day Foundation. Accessed December 11, 2003, from http://www.arborday.org/.

Plants of Missouri. Missouri Department of Conservation. Accessed December 11, 2003, from http://www.conservation.state.mo.us/.

Reiley, H. E., & Shry, C. L., Jr. *Introductory Horticulture*, 6th ed., Delmar Learning, 2000.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 3.2, Stem Poster; AS 3.3, Leaf Poster; AS 3.4, Identifying Monocot and Dicot Plants; AS 3.6, Plant Pictionary: Part I; and AS 3.7, Plant Pictionary: Part II.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities and Strategies" in the following location: p. 161.

Performance-Based Assessment:

Each student will create a plant collection that includes two types of roots, six types of leaf shapes, four types of leaf margins, four types of leaf attachments, and two types of venation. For examples of these plant types and shapes, students can refer to lesson 1 in the unit. Students will mount each specimen to a piece of paper in some manner. Each root or leaf should be labeled as to the category and the sample it represents (e.g., type of leaf shape, oval).

Assessment will be based on the overall content and presentation of the plant collection.

Unit III—Plant Science Basics
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work individually to collect plant specimens that represent the following categories:
   - ❑ Two types of roots
   - ❑ Six types of leaf shapes
   - ❑ Four types of leaf margins
   - ❑ Four types of leaf attachments
   - ❑ Two types of venation

2. Students can refer to lesson 1 in the unit to find examples of the different categories.

3. Have students create a plant collection from their specimens.
   a. Students will mount each specimen to a piece of paper in some manner.
   b. Each specimen will be labeled as to the category and sample it represents (e.g., type of leaf shape, oval).

4. The final assessment will be based on the overall content and presentation of the collection.

Unit III—Plant Science Basics
Student Handout

1. You will work individually to collect plant specimens that represent the following categories:
   - ❑ Two types of roots
   - ❑ Six types of leaf shapes
   - ❑ Four types of leaf margins
   - ❑ Four types of leaf attachments
   - ❑ Two types of venation

2. You can refer to lesson 1 in the unit to find examples of the different categories.

3. Create a plant collection from your specimens.
   a. Mount each specimen to a piece of paper in some manner.
   b. Label each specimen as to the category and sample it represents (e.g., type of leaf shape, oval).

4. Your final assessment score will be based on the overall content and presentation of your collection.

Greenhouse Operation and Management

Unit III—Plant Science Basics
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Content of Collection	All the required mounts are present	Failed	Poor	Fair	Good	Excellent	X 5	
	Mounts are labeled correctly	Failed	Poor	Fair	Good	Excellent	X 5	
Presentation of Collection	Mounts are well organized and neat	Failed	Poor	Fair	Good	Excellent	X 15	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Greenhouse Operation and Management

Curriculum Guide: *Greenhouse Operation and Management*

Unit: IV. Plant Growth

Unit Objective:

Students will demonstrate an understanding of the basic plant processes of germination and photosynthesis by conducting a seed germination experiment and writing a summary of their findings.

Show-Me Standards: 1.8, SC7

References:

Greenhouse Operation and Management. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

The National Arbor Day Foundation. Accessed December 11, 2003, from http://www.arborday.org/.

Reiley, H. E., & Shry, C. L., Jr. *Introductory Horticulture*, 6th ed., Delmar Learning, 2000.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 5.
- Students will complete AS 4.2, Effects of Light on Plants; AS 4.5, Growing Media and Containers; and AS 4.8, Over-, Under-, and Proper Watering.
- Additional activities that relate to the unit objective can be found under the headings "Other Activities and Strategies" and "Unit IV Activity" in the following locations: p. 180, p. 203, and p. 279.

Performance-Based Assessment:

Students will work individually to conduct a seed germination experiment comparing the differences in growth patterns based on the variable to which the seeds are exposed. Each student will plant and care for approximately 10 seeds (e.g., corn or beans) to the instructor's specifications. Students will examine the plants each class period and record the differences (i.e., the height and appearance of the plant) in a chart that they design. Before the students plant their seeds, they must hypothesize what will happen to their seeds. At the end of the experiment, students will write a short summary of their findings.

Assessment will be based on the overall content and presentation of the chart and summary. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Unit IV—Plant Growth
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work individually to conduct a seed germination experiment comparing the differences in growth patterns based on the variable to which the plant seeds are exposed.

2. Give each student specifications (a variable) for planting or caring for his or her seeds. Variables may include, but are not limited to, the following:
   - ❑ Light (different light strengths or light colors)
   - ❑ Media type
   - ❑ Moisture levels
   - ❑ Fertilizer (amount or type)
   - ❑ pH
   - ❑ Seed depth

3. Before the students plant their seeds, have them hypothesize what will happen to their seeds based on their given variable. For example, they should address whether the plants will grow well or poorly and if the plants will have root system problems.

4. Provide each student approximately 10 seeds (e.g., corn or beans). Have the students plant the seeds according to specifications and care for them.

5. Have students develop a chart to record their plants' activity.
   a. The chart will include a space at the top for writing the hypothesis before the experiment begins.
   b. Students will examine their plants and record activity (e.g., the height and appearance of the plant) every day that they are in the classroom.

6. At the end of the experiment, each student will write a short summary that presents his or her findings and evaluates how the hypothesis held up. The summary should at least cover the following topics:
   - ❑ General performance of the plants
   - ❑ What the variable was
   - ❑ What the initial hypothesis was and how it changed (if applicable)
   - ❑ Summary of the care given to the plants

7. The final assessment will be based on the overall content and presentation of the chart and summary. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

8. ADDITIONAL ACTIVITY: For further review, an additional unit-level activity, Plant Portfolio, is included on p. 279 of the *Greenhouse Operation and Management* Instructor Guide. For this activity, students create a portfolio of the plants they grew at the beginning of unit I. They are asked to provide basic information and specific greenhouse needs for the plants in their portfolio. See the activity for additional directions and details. Answers will vary.

Unit IV—Plant Growth
Student Handout

1. You will work individually to conduct a seed germination experiment comparing the differences in growth patterns based on the variable to which your plant seeds are exposed.

2. Your instructor will give you a variable (e.g., different light strength or color, media type, moisture level, fertilizer amount or type, etc.) for planting or caring for your seeds.

3. Before planting your seeds, hypothesize what will happen to your seeds based on the given variable. For example, address whether the plants will grow well or poorly and if the plants will have root system problems.

4. You will plant approximately 10 seeds (e.g., corn or beans) according to specifications and care for them.

5. You will develop a chart to record your plants' activity.
   a. The chart will include a space at the top for writing your hypothesis before the experiment begins.
   b. Each day you are in the classroom, you will examine your plants and record the activity (e.g., the height and appearance of the plant).

6. At the end of the experiment, you will write a short summary that presents your findings and evaluates how your hypothesis held up. The summary should at least cover the following topics:
   - ❑ General performance of the plants
   - ❑ What your variable was
   - ❑ What your initial hypothesis was and how it changed (if applicable)
   - ❑ Summary of the care you gave to the plants

7. Your final assessment score will be based on the overall content and presentation of the chart and summary. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Greenhouse Operation and Management

Unit IV—Plant Growth
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Chart	❑ All entries were made and are complete ❑ Information is accurate ❑ Easy to read and understand ❑ Well organized	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 15	
Summary	❑ Contains all elements required ❑ Information is complete ❑ Conclusions are valid ❑ Well organized	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 7.5	
Technical Considerations	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____**/100 pts.**

Comments:

Greenhouse Operation and Management

Curriculum Guide: *Greenhouse Operation and Management*

Unit: V. Plant Propagation

Unit Objective:

Students will apply principles of plant propagation by properly propagating a plant and describing the process in written form.

Show-Me Standards: 2.1, CA1

References:

Greenhouse Operation and Management. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Reiley, H. E., & Shry, C. L., Jr. *Introductory Horticulture*, 6th ed., Delmar Learning, 2000.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 5.1, Transplanting a Seedling; AS 5.2, Asexual Propagation; and AS 5.3, Budding and Tissue Culture.
- Additional activities that relate to the unit objective can be found under the heading "Other Activity and Strategy" in the following locations: p. 287 and p. 302.

Performance-Based Assessment:

Each student will propagate a plant from the school's greenhouse. After propagating the plant, students will write a procedure that will include the method used, materials required, and steps for the propagation method. Students will give the instructor the plant cutting sample along with the written procedure.

Assessment will be based on the overall content of the written procedure and the quality of the propagated plant specimen. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Unit V—Plant Propagation
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Have each student propagate a plant from the school's greenhouse. Students should use plants already in the greenhouse to prevent pest transfer.
   a. Students may need to share a plant if there are not enough plants available.
   b. Be sure to provide different types of plants so that a variety of propagating techniques are represented.

2. Have students determine the correct propagation method, propagate their plant, and write a procedure for the method they used. The written procedure will cover the following topics:
   - ❑ Statement of the method used
   - ❑ List of the materials needed
   - ❑ Steps for the propagation method

3. Have students turn in the planted cutting and written procedure.

4. The final assessment will be based on the content of the written procedure and the quality of the propagated plant specimen. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Unit V—Plant Propagation
Student Handout

1. Your instructor will provide a plant from your school's greenhouse for you to propagate.

2. Determine the correct propagation method, propagate your plant, and write a procedure for the method you used. The written procedure should cover the following topics:
   - ❑ Statement of the method used
   - ❑ List of the materials needed
   - ❑ Steps for the propagation method

3. Turn the planted cutting and written procedure in to the instructor.

4. Your final assessment score will be based on the content of the written procedure and the quality of the propagated plant specimen. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Greenhouse Operation and Management

Unit V—Plant Propagation
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Procedure	❑ Includes all required elements ❑ Content is accurate ❑ Information is complete ❑ Well organized	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 15	
Propagated Plant	❑ Correct method was used ❑ Propagated correct portion of plant ❑ Plant watered properly ❑ Plant is in good health	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 7.5	
Technical Considerations (Procedure)	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL							_____	

Final Assessment Total _____/100 pts.

Comments:

Greenhouse Operation and Management

Curriculum Guide: *Greenhouse Operation and Management*

Unit: VI. Plant Health

Unit Objective:

Students will demonstrate an understanding of a plant pest and disease by writing a report on each that describes the pest and disease and identifies the control method.

Show-Me Standards: 1.4, SC3

References:

Greenhouse Operation and Management. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Insects and Diseases Publications. MU Extension. University of Missouri-Columbia. Accessed February 9, 2004, from http://muextension.missouri.edu/explore/agguides/pests/index.htm.

McKinley, M. (Ed.). *Home Gardener's Problem Solver*. Ortho Books, 2001.

"Nursery/Landscaping." *Missouri CDE Handbook*. Accessed November 3, 2003, from http://dese.mo.gov/divcareered/AG/CDE/Nursery-Landscape.pdf.

Plant Diseases Library. Kansas State Research and Extension. Accessed February 9, 2004, from http://www.oznet.ksu.edu/library/plant2/.

Plant Industries Division. Missouri Department of Agriculture. Accessed February 9, 2004, from http://www.mda.mo.gov/WhoWeAre/i7.htm.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 6.1, Path of Destruction Part I: Insects and Arachnids; A.S 6.2, Path of Destruction Part II: Other Pests and Diseases; AS 6.3, Applied Pest Management; and AS 6.4, Integrated Pest Management.

- Additional activities that relate to the unit objective can be found under the heading "Other Activities and Strategies" in the following locations: p. 327, p. 361 (1, 2), and p. 378 (1, 2, 3).

Performance-Based Assessment:

Students will be assigned one plant pest and one plant disease. They will write a report on each that includes the effects the pest or disease has on the plant, warning signs the plant might exhibit to indicate the presence of the pest or disease, and a listing of any recommended treatments and their application methods. Students should include a picture with each report that illustrates the pest or disease. The reports also can be used to educate future students.

Assessment will be based on the overall content and presentation of the reports. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Unit VI—Plant Health
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Assign each student one plant pest and one plant disease.

2. Have students write a report about the pest and another report about the disease. Reports should address the following topics:
   - ❑ Effects of the pest or disease on the plant
   - ❑ Warning signs the plant might exhibit to indicate the presence of the pest or disease
   - ❑ Recommended treatments and their application methods

3. Have students include pictures that illustrate the pest and disease.

4. Students may use material found in the unit or discussed in class as well as additional outside sources to complete their reports.

5. Students may not use the source material word for word and must provide a complete bibliography of their sources along with their reports.

6. The final assessment will be based on the overall content and presentation of the reports. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

7. ADDITIONAL ACTIVITIES:
   a. Have students examine the school's greenhouse for evidence of pests and diseases. Use their findings as the basis for a class discussion. Topics could include the following:
      - ❑ Was there evidence of pests or diseases?
      - ❑ What was the evidence?
      - ❑ What was the cause?
      - ❑ What treatment would you recommend?
      - ❑ If you did not find evidence of pests or diseases, what management methods were being used to keep the plants free of pests and diseases?
   b. Use pictures from students' reports as illustrations for a class discussion about pests and diseases or as flash cards for a matching activity or review.

Unit VI—Plant Health
Student Handout

1. The instructor will assign you one plant pest and one plant disease.

2. Write a report about the pest and another report about the disease. Reports should address the following topics:
   - ❑ Effects of the pest or disease on the plant
   - ❑ Warning signs the plant might exhibit to indicate the presence of the pest or disease
   - ❑ Recommended treatments and their application methods

3. Be sure to included pictures that illustrate the pest and disease.

4. You may use material found in the unit or discussed in class as well as additional outside sources to complete your reports.

5. You may not use the source material word for word and must provide a complete bibliography of your sources along with your reports.

6. Your final assessment score will be based on the overall content and presentation of your reports. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Greenhouse Operation and Management

Unit VI—Plant Health
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Pest Report	❑ Covers all required topics ❑ Content is complete ❑ Information is accurate ❑ Picture clearly illustrates the pest	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 11.25	
Disease Report	❑ Covers all required topics ❑ Content is complete ❑ Information is accurate ❑ Picture clearly illustrates the disease	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 11.25	
Technical Considerations	❑ Spelling ❑ Grammar ❑ Punctuation ❑ Capitalization	0 criteria met	1 criterion met	2 criteria met	3 criteria met	All 4 criteria met	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Greenhouse Operation and Management

Curriculum Guide: *Greenhouse Operation and Management*

Unit: VII. Greenhouse Business Management

Unit Objective:

Students will apply principles of greenhouse business management by generating a cost analysis and marketing plan for a greenhouse.

Show-Me Standards: 1.8, MA1

References:

Ball Seed Company. Accessed February 18, 2004, from http://www.ballseed.com/.

Commercial seed and plant catalogs

"Economics and Marketing." *The Texas Poinsettia Producers Guide*. Accessed February 19, 2004, from http://aggie-horticulture.tamu.edu/greenhouse/nursery/guides/poinsettia/econ.html.

Greenhouse Operation and Management. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

Hummert International. Accessed December 3, 2003, from http://www.hummert.com/.

Poinsettias. UK Cooperative Extension Service, University of Kentucky College of Agriculture. Accessed February 19, 2004, from http://www.uky.edu/Ag/NewCrops/introsheets/poinsettiaintro.pdf.

Stuppy, Inc. Accessed December 3, 2003, from http://www.stuppy.com/.

Students will use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 and 2.
- Students will complete AS 7.1, Selecting Commercial Crops and Devising a Growing Schedule; AS 7.2, Cost Analysis of a Commercial Crop; AS 7.3, Plant Care After Harvest and During Marketing; and AS 7.4, Creating a Marketing Plan.
- Additional activities that relate to the unit objective can be found under the headings "Other Activities and Strategies" and "Unit VII Activity" in the following locations: p. 400 (1) and pp. 425–427.

Performance-Based Assessment:

Each student will generate a cost analysis and marketing plan for a greenhouse. The student handout includes a scenario, or the instructor may change the activity to reflect the facts and figures from the school's greenhouse, if desired.

Assessment will be based on the overall thoroughness and accuracy of the cost analysis and marketing plan.

Unit VII—Greenhouse Business Management
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Have each student devise a cost analysis and marketing plan for a greenhouse.

2. The student handout includes a scenario that can be used for the performance-based assessment activity, or it can be adapted, if preferred. In the scenario, students will grow poinsettias to sell during the Christmas season. They must decide on a spring season plan to alternate with their poinsettia crop.

3. For the cost analysis portion of the activity, students must calculate the fixed costs related to the greenhouse, determine variable/operating costs, and answer key questions about overall cost and profit.

4. For the marketing plan portion, they must devise a yearlong marketing plan for the greenhouse based on their cost analysis. The plan must address the following topics.
   - ❑ Market timing based on growing season
   - ❑ Target customers
   - ❑ Advertising and display costs that stay within their budget
   - ❑ Spring season crops to provide efficient year-round bench use
   - ❑ Seasonal or holiday promotions to increase sales

5. Students may use material found in the unit or discussed in class as well as additional outside material to complete this activity. Students must provide a complete list of their sources along with their completed handout.

6. Have students turn in their completed handout.
   a. For the activity as it is currently written, the average cost per week per square foot is $.023.
   b. Answers to parts B, C, and D will vary.

7. The final assessment score will be based on the overall thoroughness and accuracy of the cost analysis and marketing plan.

8. ADDITIONAL ACTIVITY: For further review, an additional unit-level activity, Designing a Garden, is included on pp. 425–427 of the Instructor Guide. For this activity, students must design a garden, create a cost analysis and growth schedule for the project, and present their plan to the class. See the activity for additional directions and details. Answers will vary.

Unit VII—Greenhouse Business Management
Student Handout **Name**_____

Cost Analysis and Marketing Plan

Objective: Generate a cost analysis and marketing plan for a greenhouse.

Directions: You are planning to sell poinsettias for the Christmas season. Use the following scenario. Show all of your work.

Your greenhouse has 4,000 sq ft of bench space. Assume your crop consists of 750 poinsettia plugs grown in 6-inch pots. The production time for the crop is 15 weeks. Your utilities for the year are $1,800 and labor costs are $1,200 for the year.

Part A—Fixed Costs*

Depreciation:	$1,500
Interest on Investment:	$30,000 X 6% opportunity cost =_____
Repairs & Maintenance:	$550
Taxes:	$30,000 X 32% (commercial rate) X $5.20/$100 assessed value = _____
Insurance:	$500
Total fixed costs:	$_____

Average cost per week per square foot = total fixed costs/52 weeks per year/square foot bench space

Average cost per week per square foot = _____

*Estimates for the purpose of this exercise only

Directions: Once you have determined your fixed costs, determine the variable/operating costs for your crop. Use the Internet, commercial catalogs, and other sources to fill in the blanks below and then answer the key questions that follow. List all of the sources you used to locate your information in the space provided.

Part B—Variable/Operating Costs

Plugs:	
Royalty/Plug:	
Transportation/Plug:	
Soilless Media:	
Containers:	
Fertilizer:	
Care Tags:	
Commission:	
Advertising/Mailing/Paper/Copying:	
Subtotals:	
Death Loss or Unsalable (5% of subtotal):	
Totals:	

Part C—Key Questions

1. What are the total costs for the crop?

2. What is the total cost per plant?

3. What is the net profit for the plant?

4. At what sale price could you sell the plants and still make a profit?

Sources:

Part D—Marketing Plan

Directions: On separate paper, describe a yearlong marketing plan for your greenhouse based on your cost analysis. Be sure to address the following topics.

- ❑ Indicate when you will start your poinsettia crop, when you will have plants ready to sell, and how long you expect your selling period to be.
- ❑ Who are the target customers for your poinsettias?
- ❑ How do you plan to attract customers? Your advertising and display expenses must stay within the budget you established in your cost analysis.
- ❑ Describe a spring season plan to alternate with your poinsettia crop. For your spring season plan, choose 15 plants you will grow, determine their growing season, and indicate when you would start your spring plants.
- ❑ What seasonal or holiday promotions will you use to increase sales?

Greenhouse Operation and Management

Unit VII—Greenhouse Business Management
Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Fixed Costs	❑ Calculations are accurate for interest, taxes, fixed costs, and cost per week per square foot ❑ Shows all work	Failed	Poor	Fair	Good	Excellent	X 2.5	
Variable/ Operating Costs and Key Questions	❑ Includes all necessary operating costs ❑ Costs are reasonable for the crop and scenario ❑ Correctly answers key questions ❑ Includes sources	Failed	Poor	Fair	Good	Excellent	X 10	
Marketing Plan	❑ Includes a workable marketing plan for poinsettia crop ❑ Identifies target customers ❑ Includes a workable spring season plan and identifies 15 spring plants ❑ Includes an advertising plan and special promotions ❑ Spelling, grammar, and punctuation are correct	Failed	Poor	Fair	Good	Excellent	X 12.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments:

Small Engine Service and Repair

Curriculum Guide: *Small Engine Service and Repair*

Module: 1. Installing a Magnetron Ignition and Breaker Points

Unit Objective:

Students will apply principles of small engine ignition service and repair by identifying ignition system tools and components and installing and testing a variety of ignitions.

Show-Me Standards: 1.10, CA3

References:

Briggs & Stratton Corporation. Accessed January 13, 2004, from http://www.briggsandstratton.com.

Kohler Engines. Accessed January 13, 2004, from http://www.kohlerengines.com/.

Small Engine Service and Repair. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete the Module 1 evaluation, Installing a Magnetron Ignition and Breaker Points.
- Students will complete the following competency profiles: Installing and Servicing Composite Magnetron Ignition, Magnetron Retrofit Installation, and Installing Breaker Points and Condenser.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: pp. 1.5–1.6 (1, 7), pp. 1.14–1.15 (3), and p. 1.27 (6, 8).

Performance-Based Assessment:

As part of the instructional strategies and activities for this module, students will identify ignition system tools and components. They will also install and test a Magnetron ignition, install and test a retrofit Magnetron ignition, and install and test a breaker point and condenser ignition.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Module 1—Installing a Magnetron Ignition and Breaker Points Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Installing and Servicing Composite Magnetron Ignition Competency Profile, p. 17 of the student manual, to assess student performance. The profile covers disassembly and reassembly procedures necessary to install and service a Magnetron ignition system.

2. Use the Magnetron Retrofit Installation Competency Profile, p. 27 of the student manual, to assess student performance. The profile covers disassembly and reassembly procedures for replacing a breaker point ignition with a Magnetron ignition.

3. Use the Installing Breaker Points and Condenser Competency Profile, p. 45 of the student manual, to assess student performance. The profile covers disassembly and reassembly procedures necessary to install and service a breaker point and condenser ignition.

4. Have students complete the Module 1 evaluation, Installing a Magnetron Ignition and Breaker Points. Answers for the evaluation are found on p. 1.28 of the instructor manual.

5. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

6. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Small Engine Service and Repair

Module 1—Installing a Magnetron Ignition and Breaker Points
Scoring Guide

Name _____

Activity	Points Possible	Points Earned	Instructor Comments
Installing and Servicing Composite Magnetron Ignition Competency Profile			
Magnetron Retrofit Installation Competency Profile			
Installing Breaker Points and Condenser Competency Profile			
Module 1 Evaluation			

Total Points Earned _____

Small Engine Service and Repair

Curriculum Guide: *Small Engine Service and Repair*

Module: 2. Carburetor Service and Repair

Unit Objective:

Students will apply principles of small engine carburetor service and repair by identifying and servicing a variety of carburetors, fuel filters, and air cleaners and by explaining the operation and service of all-temperature and standard automatic chokes.

Show-Me Standards: 1.10, CA3

References:

Briggs & Stratton Corporation. Accessed January 13, 2004, from http://www.briggsandstratton.com.

Kohler Engines. Accessed January 13, 2004, from http://www.kohlerengines.com/.

Small Engine Service and Repair. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete the Module 2 evaluation, Carburetor Service and Repair.
- Students will complete the following competency profile: Small Engine Carburetor Service and Repair.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. 2.19 (2, 5) and p. 2.33 (3).

Performance-Based Assessment:

As part of the instructional strategies and activities for this module, students will identify and service a variety of carburetors, fuel filters, and air cleaners. They will also explain the operation and service of all-temperature and standard automatic chokes.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Module 2—Carburetor Service and Repair
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Small Engine Carburetor Service and Repair Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - ❑ Servicing an Oil Foam Air Cleaner, p. 11
   - ❑ Servicing a Cartridge Air Cleaner (Round), p. 14
   - ❑ Servicing a Reverse Air Flow Cartridge Air Cleaner, p. 17
   - ❑ Servicing a Flat Cartridge (Vertical Crankshaft) Air Cleaner, p. 20
   - ❑ Servicing a Flat Cartridge (Horizontal Crankshaft) Air Cleaner, p. 23
   - ❑ Servicing an Oil Bath Air Cleaner, p. 25
   - ❑ Servicing Briggs and Stratton Walbro One-Piece Flo-Jet Carburetor, p. 33
   - ❑ Servicing Pulsa-Jet, Vacu-Jet All-Temperature Automatic Choke, pp. 43–44
   - ❑ Servicing Pulsa-Jet (Suction Feed) Carburetor and Fuel Tank Assembly With Automatic Choke, pp. 56–57
   - ❑ Servicing Minlon (Vacu-Jet) Carburetor, p. 61
   - ❑ Servicing Pulsa-Jet (Suction Feed) Carburetor and Fuel Tank Assembly, p. 70
   - ❑ Servicing a Large One-Piece Flo-Jet Carburetor, pp. 78–79
   - ❑ Servicing Briggs and Stratton Pulsa-Prime Carburetor Model Series 95900 to 95999, p. 85

2. Have students complete the Module 2 evaluation, Carburetor Service and Repair. Answers for the evaluation are found on p. 2.34 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Small Engine Service and Repair

Module 2—Carburetor Service and Repair
Scoring Guide

Name _____

Activity	Criteria	Points Possible	Points Earned	Instructor Comments
Small Engine Carburetor Service and Repair Competency Profile	❑ Oil foam air cleaner			
	❑ Cartridge air cleaner (round)			
	❑ Reverse air flow cartridge air cleaner			
	❑ Flat cartridge (vertical crankshaft) air cleaner			
	❑ Flat cartridge (horizontal crankshaft) air cleaner			
	❑ Oil bath air cleaner			
	❑ Walbro one-piece Flo-Jet carburetor			
	❑ Pulsa-Jet, Vacu-Jet all-temperature automatic choke			

	❑ Pulsa-Jet (suction feed) carburetor and fuel tank assembly with automatic choke			
	❑ Minlon (Vacu-Jet) carburetor			
	❑ Pulsa-Jet (suction feed) carburetor and fuel tank assembly			
	❑ Large one-piece Flo-Jet carburetor			
	❑ Pulsa-Prime carburetor model series 95900 to 95999			
Module 2 Evaluation	Complete Module 2 evaluation			

Total Points Earned _____

Small Engine Service and Repair

Curriculum Guide: *Small Engine Service and Repair*

Module: 3. Rewind Starters

Unit Objective:

Students will apply principles of rewind starter service and repair by identifying starter components and servicing a variety of small engine starters.

Show-Me Standards: 1.10, CA3

References:

Briggs & Stratton Corporation. Accessed January 13, 2004, from http://www.briggsandstratton.com.

Kohler Engines. Accessed January 13, 2004, from http://www.kohlerengines.com/.

Small Engine Service and Repair. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete the Module 3 evaluation, Rewind Starters.
- Students will complete the following competency profile: Rewind Starters Service and Repair.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. 3.7 (3, 6, 7, 8).

Performance-Based Assessment:

As part of the instructional strategies and activities for this module, students will service a rope-rewind starter, replace a starter rewind spring, replace a starter rope, service a starter clutch, and service a vertical pull starter.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Module 3—Rewind Starters
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Rewind Starters Service and Repair Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - ❑ Model 120000 Quantum Rewind Starters, p. 16
   - ❑ Starter Service and Repair Model 60000, 80000, 90000, 100200, 100900, and 110000 Rewind Starters, p. 23
   - ❑ Vertical Pull Starters, p. 31
   - ❑ Starter Clutch, p. 35

2. Have students complete the Module 3 evaluation, Rewind Starters. Answers for the evaluation are found on pp. 3.7–3.8 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Small Engine Service and Repair

Module 3—Rewind Starters
Scoring Guide

Name _____

Activity	Criteria	Points Possible	Points Earned	Instructor Comments
Rewind Starters Service and Repair Competency Profile	❑ Model 120000 Quantum rewind starters			
	❑ Starter service and repair model 60000, 80000, 90000, 100200, 100900, and 110000 rewind starters			
	❑ Vertical pull starters			
	❑ Starter clutch			
Module 3 Evaluation	Complete Module 3 evaluation			

Total Points Earned _____

Small Engine Service and Repair

Curriculum Guide: *Small Engine Service and Repair*

Module: 4. Small Engine Compression

Unit Objective:

Students will demonstrate an understanding of small engine compression by identifying valve tools and their uses and inspecting and servicing the valve train of a small engine.

Show-Me Standards: 1.10, CA3

References:

Briggs & Stratton Corporation. Accessed January 13, 2004, from http://www.briggsandstratton.com.

Kohler Engines. Accessed January 13, 2004, from http://www.kohlerengines.com/.

Small Engine Service and Repair. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete the Module 4 evaluation, Compression–Valve Service and Repair.
- Students will complete the following competency profile: Compression–Valve Service and Repair.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. 4.9 (1, 2).

Performance-Based Assessment:

As part of the instructional strategies and activities for this module, students will identify valve tools and their uses and inspect and service the valve train of a small engine.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Module 4—Small Engine Compression
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Compression–Valve Service and Repair Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - ❑ Checking Compression, p. 33
   - ❑ Removing Cylinder Head, p. 33
   - ❑ Removing the Valves, p. 33
   - ❑ Inspecting the Valves and Accessories, p. 33
   - ❑ Replacing the Valve Guide, p. 34
   - ❑ Refacing the Valves, p. 34
   - ❑ Refacing Valve Seats, p. 34
   - ❑ Replacing Valve Seats, p. 34
   - ❑ Lapping the Valves, p. 35
   - ❑ Installing the Cylinder Head, p. 35

2. Have students complete the Module 4 evaluation, Compression–Valve Service and Repair. Answers for the evaluation are found on pp. 4.10–4.11 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Small Engine Service and Repair

Module 4—Small Engine Compression
Scoring Guide

Name _____

Activity	Criteria	Points Possible	Points Earned	Instructor Comments
Compression–Valve Service and Repair Competency Profile	❑ Checking compression			
	❑ Removing cylinder head			
	❑ Removing the valves			
	❑ Inspecting the valves and accessories			
	❑ Replacing the valve guide			
	❑ Refacing the valves			
	❑ Refacing valve seats			
	❑ Replacing valve seats			
	❑ Lapping the valves			
	❑ Installing the cylinder head			
Module 4 Evaluation	Complete Module 4 evaluation			

Total Points Earned _____

Small Engine Service and Repair

Curriculum Guide: *Small Engine Service and Repair*

Module: 5. Governor Adjustment and Repair

Unit Objective:

Students will apply principles of governor adjustment and repair by identifying governor components and inspecting, servicing, and repairing small engine governor systems.

Show-Me Standards: 1.10, CA3

References:

Briggs & Stratton Corporation. Accessed January 13, 2004, from http://www.briggsandstratton.com.

Kohler Engines. Accessed January 13, 2004, from http://www.kohlerengines.com/.

Small Engine Service and Repair. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete the Module 5 evaluation, Governor Adjustment and Repair.
- Students will complete the following competency profile: Governor Adjustment and Repair.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. 5.7 (1, 2).

Performance-Based Assessment:

As part of the instructional strategies and activities for this module, students will identify governor components and inspect, service, and repair small engine governor systems.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Module 5—Governor Adjustment and Repair
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Governor Adjustment and Repair Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - ❑ Adjusting and Repairing Air Vane Governors, p. 17
   - ❑ Servicing Mechanical Governors, p. 23
   - ❑ Servicing Mechanical Governors (New Style), p. 27

2. Have students complete the Module 5 evaluation, Governor Adjustment and Repair. Answers for the evaluation are found on pp. 5.7–5.8 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Small Engine Service and Repair

Module 5—Governor Adjustment and Repair
Scoring Guide

Name _____

Activity	Criteria	Points Possible	Points Earned	Instructor Comments
Governor Adjustment and Repair Competency Profile	❑ Adjusting and repairing air vane governors			
	❑ Servicing mechanical governors			
	❑ Servicing mechanical governors (new style)			
Module 5 Evaluation	Complete Module 5 evaluation			

Total Points Earned _____

Small Engine Service and Repair

Curriculum Guide: *Small Engine Service and Repair*

Module: 6. Lubricating Small Engines

Unit Objective:

Students will apply principles of small engine lubrication by selecting the correct type and grade of oil for a four-cycle engine and inspecting and servicing the lubrication system.

Show-Me Standards: 1.10, CA3

References:

Briggs & Stratton Corporation. Accessed January 13, 2004, from http://www.briggsandstratton.com.

Kohler Engines. Accessed January 13, 2004, from http://www.kohlerengines.com/.

Small Engine Service and Repair. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete the Module 6 evaluation, Lubricating Small Engines.
- Students will complete the following competency profile: Lubricating Small Engines.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. 6.8 (1, 2, 3).

Performance-Based Assessment:

As part of the instructional strategies and activities for this module, students will select the correct type and grade of oil for a four-cycle engine and inspect and service the lubrication system.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Module 6—Lubricating Small Engines
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Lubricating Small Engines Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - ❑ Checking and Adding Oil to the Lubrication System, p. 14
   - ❑ Changing the Crankcase Oil (Four-Cycle Engines), p. 18

2. Have students complete the Module 6 evaluation, Lubricating Small Engines. Answers for the evaluation are found on pp. 6.8–6.9 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Small Engine Service and Repair

Module 6—Lubricating Small Engines
Scoring Guide

Name _____

Activity	Criteria	Points Possible	Points Earned	Instructor Comments
Lubricating Small Engines Competency Profile	❑ Checking and adding oil to the lubrication system			
	❑ Changing the crankcase oil (four-cycle engines)			
Module 6 Evaluation	Complete Module 6 evaluation			

Total Points Earned _____

Small Engine Service and Repair

Curriculum Guide: *Small Engine Service and Repair*

Module: 7. Troubleshooting

Unit Objective:

Students will apply principles of small engine repair by systematically evaluating the condition of the ignition system, fuel supply, spark plug, and compression to locate and eliminate engine malfunctions.

Show-Me Standards: 3.1, CA3

References:

Briggs & Stratton Corporation. Accessed January 13, 2004, from http://www.briggsandstratton.com.

Kohler Engines. Accessed January 13, 2004, from http://www.kohlerengines.com/.

Small Engine Service and Repair. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete the Module 7 evaluation, Troubleshooting.
- Students will complete the following competency profile: Maintenance Procedures.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. 7.6 (1).

Performance-Based Assessment:

As part of the instructional strategies and activities for this module, students will locate and eliminate engine malfunctions by testing the ignition system and checking the fuel supply, spark plug, and compression.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Module 7—Troubleshooting
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Maintenance Procedures Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - ❑ Check Fuel Supply, p. 14
   - ❑ Test Ignition System, p. 14
   - ❑ Check the Spark Plug, p. 14
   - ❑ Checking Compression, p. 14

2. Have students complete the Module 7 evaluation, Troubleshooting. Answers for the evaluation are found on pp. 7.6–7.7 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Small Engine Service and Repair

Module 7—Troubleshooting
Scoring Guide

Name _____

Activity	Criteria	Points Possible	Points Earned	Instructor Comments
Maintenance Procedures Competency Profile	❑ Check fuel supply			
	❑ Test ignition system			
	❑ Check the spark plug			
	❑ Checking compression			
Module 7 Evaluation	Complete Module 7 evaluation			

Total Points Earned _____

Small Engine Service and Repair

Curriculum Guide: *Small Engine Service and Repair*

Module: 8. Operation and Maintenance of Small Engines

Unit Objective:

Students will demonstrate an understanding of correct operation procedures for small engines by operating and maintaining a small engine.

Show-Me Standards: 4.7, HP5

References:

Briggs & Stratton Corporation. Accessed January 13, 2004, from http://www.briggsandstratton.com.

Kohler Engines. Accessed January 13, 2004, from http://www.kohlerengines.com/.

Small Engine Service and Repair. University of Missouri-Columbia, Instructional Materials Laboratory, 1994.

Instructional Strategies/Activities:

- Students will engage in study questions in lesson 1.
- Students will complete the Module 8 evaluation, Maintaining Small Engines.
- Students will complete the following competency profile: Maintenance Procedures.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: pp. 8.7–8.8 (1, 2).

Performance-Based Assessment:

As part of the instructional strategies and activities for this module, students will follow a step-by-step procedure for safely and correctly operating a small gas engine. They will also perform maintenance procedures, such as servicing ignition stop switches, mufflers, and cutter blades, and adjusting "System 2" and "System 4" Consumer Product Safety Commission (CPSC) compliance engines.

Assessment will be based on performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Module 8—Operation and Maintenance of Small Engines
Instructor Guide

The instructor should assign the performance-based assessment activity procedures in conjunction with the relevant lesson material outlined in the instructor guide. Students will complete the activity procedures as they progress through the module lessons.

1. Use the Maintenance Procedures Competency Profile to assess student performance. This profile includes the procedures listed below. The page number indicates the location of a checklist for the procedure. The procedures and checklists are found in the student manual.
   - ❑ Procedure for Safe Lawn Mower Operation, p. 8
   - ❑ Operating Small Engines, p. 14
   - ❑ Servicing Cutter Blade, p. 17
   - ❑ Servicing Mufflers: Bolt-On and Pipe Thread, p. 23
   - ❑ Adjusting "System 2" and "System 4" CPSC Compliance Engines, p. 25
   - ❑ Adjusting the Brake for "System 2" and "System 4" CPSC Compliance Engines, p. 28
   - ❑ Servicing Ignition Stop Switches, p. 30

2. Have students complete the Module 8 evaluation, Maintaining Small Engines. Answers for the evaluation are found on p. 8.8 of the instructor manual.

3. Because the student manual includes step-by-step instructions and an itemized checklist for each competency procedure, there is no student handout for this performance-based assessment activity. However, there is a scoring guide that can be used, if desired. The scoring guide lists the assessment activity procedures and includes spaces for points possible, points earned, and instructor comments.

4. The final assessment score will be based on the performance on the module evaluation and the ability to safely and correctly perform the assigned repair and service procedures.

Small Engine Service and Repair

Module 8—Operation and Maintenance of Small Engines
Scoring Guide

Name _____

Activity	Criteria	Points Possible	Points Earned	Instructor Comments
Maintenance Procedures Competency Profile	❑ Procedure for safe lawn mower operation			
	❑ Operating small engines			
	❑ Servicing cutter blade			
	❑ Servicing mufflers: bolt-on and pipe thread			
	❑ Adjusting "System 2" and "System 4" CPSC compliance engines			
	❑ Adjusting the brake for "System 2" and "System 4" CPSC compliance engines			
	❑ Servicing ignition stop switches			
Module 8 Evaluation	Complete Module 8 evaluation			

Total Points Earned _____