Arcadia Valley Career Technology Center
Embedded Mathematics and Communication Arts Credit
Version: January 31, 2005

Overview:

The Arcadia Valley Career Technology Center has developed the following proposal to offer "embedded" academic credit for those students who complete a six-hour vocational program and specific, additional academic criteria. It should be kept in mind that this is a working document and will be continually updated and revised. Students who complete a six-hour vocational program will receive the following:

◆ One hour of elective mathematics credit, Technical Mathematics, if they pass a competency test sometime within their two years in the vocational program. The mathematics credit could be used to meet the math credit requirements of the sending school if the student has failed a previous mathematics class. All awarding of credit is based on the sending school's policies and preferences.

◆ One hour of elective communication arts credit, Technical Writing, if they meet the minimum requirements for all established components of a portfolio. Each required element will be assessed by a scoring guide with minimum levels established.

Rationale:

The concept of "embedded" credit may seem revolutionary, however, other schools in other states are offering some form of additional credit. In Missouri there have been local schools that have offered math and/or science credit through vocational agriculture programs. What we have developed is an entirely unique integration of mathematics and communication arts into all vocational programs. We feel that the concept of earning academic credit for completion of a vocational program is a perfect fit for Arcadia Valley R-II and its sending schools. The key to the program is that students will not be "given credit," they will earn it by passing a test (math) or by demonstration of their work through a portfolio for communication arts. It is also important to realize that there will be additional work required of students who attempt to earn "embedded" credit. Again, it is important to understand that students will have to earn the credit; it will not be automatically given to them for completion of a vocational program. The integration of academic credit into vocational classes (with additional requirements) meets the intent or requirements of the following:

◆ The Perkins III program has accountability requirements that are based on student achievement in mathematics and communication arts. The Congressional debate over future Perkins funding is continually centered on the idea that CTE classes do not assist in raising overall academic achievement scores. This program will allow for an academic focus in CTE classes while maintaining the technical learning within the various trades.

- The majority of the sending school students attending the AVCTC lose two credits due to travel. Most of the sending school students have at least a one hour bus ride to the CareerTech and a one hour bus ride back to their home school. This program would provide them the opportunity to earn as many credits as other students in their schools.

- Granting embedded credit will help all districts meet the MSIP requirement for lowering dropout rates by allowing vocational students to earn additional credits and remain on track to graduate with their class. This process will be even more important as accountability moves from dropouts to graduation rates.

- The number of CTE students who have to take remedial writing, reading, or math classes while continuing their education at local community colleges will be reduced. All the vocational classes at the AVCTC have articulation agreements with Mineral Area College and Three Rivers Community College for up to 36 college credits. Most of the students who attend post-secondary education have to take remedial classes and cannot graduate within the normal two years. Therefore they have higher educational costs and longer community college enrollments. Vocational students need to be well-educated citizens who are prepared to enter the workforce equipped in the areas of mathematics, science, engineering, and technology while at the same time they must be prepared academically to enter postsecondary education. Many of our graduates will eventually be employed in fields that have not even been developed. CTE graduates must be prepared for the future and they must be prepared to continue their education after secondary graduation.

- There are several areas of the High Schools That Work reform model that the granting of "embedded" credit will allow the district to meet. Academic and vocational integration is critical for both the high school and the vocational school. The extra work to earn the "embedded" credit will add rigor to our vocational programs and will require homework for most of the vocational students.

- All students need more mathematics and as Cohen, (1995) has stated, "Technical programs place strong emphasis on mathematics in the context of real applications. Students should lean to appreciate mathematics and to use mathematics to solve problems in a variety of fields so that they will be able to adapt to change in their career and educational goals." This cannot be accomplished if the typical CTE student ends their high school mathematics at the 10th grade. The key here is the contextual learning of mathematics that is "embedded" in each vocational program.

- The National Council of Teachers of Mathematics states, "All students should study mathematics in each of the four years they are enrolled in high school." "Because student's interests and aspirations may change during and after high school, their mathematics education should guarantee access to a broad spectrum of career and educational options. They should experience the interplay of algebra, geometry, statistics, probability, and discrete mathematics."

- Our placement rate should improve since our graduates will have the basic academic skills that employers are looking for in new hires. Most business and industry representatives say they can teach the technical skills but do not have the resources to improve basic academic skills for their employees. This project will increase higher order thinking skills for all vocational students and increase basic reading, writing and mathematics skills. By acquiring these skills, our graduates will be better prepared for entry into the workforce. This will be true if they enter it upon graduation or continue their education through post-secondary education.

◆ The embedded credit concept is designed to align mathematics and language arts in a setting where students understand that it is needed in their future. This is real world. The following are basic principals for post-secondary mathematics, according to Cohen (1995), that relate to all the reform efforts the district is striving for:

- All students should grow in their knowledge of mathematics.

- The mathematics that students study should be meaningful and relevant.

- Mathematics must be taught as a laboratory discipline.

- The use of technology is an essential part of an up-to-date curriculum.

- Increased participation by all students in mathematics and in careers using mathematics is a critical goal in our heterogeneous society.

Goals and Objectives

The following goals and objectives have been developed to provide an overall guide for the purpose of the embedded credit program and to allow a basis for evaluation. The goals of the program are intended to allow CTE students to be better prepared to face the challenges of careers in the 21st Century. In order to better prep our CTE graduates, the components of the Perkins III legislation and the development of high expectations under the comprehensive school reform model of High Schools That Work have been used to develop the goals and objectives.

Goal 1: To meet the Perkins III Core Indicators for secondary academic attainment (1S1) and vocational skill attainment (1S2).

> **Objective 1:** The number of students who enroll in each vocational program will reach 100% capacity and maintain that level of enrollment.

> **Objective 2:** The number of CTE students who complete their vocational program will increase by 5% each year until a 100% completion rate is reached.

> **Objective 3:** The number of CTE completers placed in employment, postsecondary education, or the military will increase by 5% each year until 100% placement is achieved.

> **Objective 4:** The number of CTE students who score in the top three levels of the MAP for mathematics and communication arts will increase 5% each year until 100% of all CTE students are in the top three levels.

Goal 2: High expectations will be established for all CTE students.
> **Objective 1:** All CTE curriculum guides will include integration of mathematics and language arts objectives.

> **Objective 2:** The number of CTE students who complete embedded credit(s) will increase by 5% each year until 75% of CTE graduates have completed at least one embedded credit.

Objective 3: The number of CTE graduates who are required to take remedial mathematics, reading, or writing courses upon enrollment in postsecondary education will decrease by 5% each year until 0% of CTE graduates are required to take remedial classes.

Objective 4: Employer, community and student satisfaction with CTE preparation programs and level of graduate preparation will increase by 5% until 100% satisfaction is reached by all three groups.

Timeline:

August 2003	AVCTC teachers start "extra mathematics instruction"
September 5	Begin the development of topics for credit by exhibit (portfolio) to earn the communication arts credit
September 9	AVCTC teachers begin to determine vocabulary terms for two-year programs
September 11	Begin AVCTC in-service for reading/writing
September 12	Informational proposal to AV BOE
September 17	Informational proposal to AV Curriculum Committee
September 18	Informational proposal to sending school superintendents and counselors, invitation and set date for sending school math teachers to attend a 1-day meeting to determine embedded math curriculum. Determine if each sending school's Board of Education would like to vote on proposal of presentation for information
September 23	Meeting of area math teachers to determine curriculum topics.
September 24	AVCTC teachers turn in competency list with topics that do not contain mathematics identified.
September 26	AVCTC teachers turn in list of vocabulary terms.
September	Contact DESE representatives in math, communication arts and vocation education, community college representatives and/or four college/university representatives to enlist their assistance
September 29	Meet with area Communication Arts teachers, begin to define list of exhibits for technical writing credit
October 1	AVCTC teachers begin aligning competencies to identified math topics
October 20	List of exhibits completed for technical writing. Begin writing rubrics for technical writing exhibits.
October 27	Begin pre-testing of vocational students for reading level

October 27	Local Math teachers begin writing math exit test questions (see appendix D)
October 29	AVCTC teachers complete initial cross reference of vocational competencies and math topics
October	Meeting with area communication arts teachers to determine topics for technical writing curriculum along with development of scoring guides
November 10	Begin pre-testing of all vocational students for math skills
November 15	Complete pre-testing of all vocational students for reading level and begin process for individualized assistance
November	Final Proposal to AV Curriculum Committee
November 26	Completion of math skills pre-testing
December	Complete cross-referencing math topics to Show-Me Standards, Missouri Grade-Level Expectations, and NCTM Standards
December	Completion of reading level determination and math skills inventory

2004

January 2004	Final Proposal to AV Board of Education
January/February	Submission of final proposal to sending school boards of education
January 5	Local math teachers complete math exit test questions
January 19	Survey CTE students to determine number of students who plan to work toward embedded credit
January	Vocational students continue to work on technical writing; emphasis placed on placement and advanced education requirements
January	Arcadia Valley Staff begin technology integration in the classroom
January	Additional work in math topics with videos and textbook assignments begins
February	Testing begins for math credit. Students can test as often as needed with records kept
April	Math and language arts teachers attend follow-up meeting at the AVCTC to review and revise curriculums.
May	Three-hour vocational seniors who pass test receive credit for Technical Math

May/June	Evaluate pilot program: How many students attempted test?; How many students passed test?; student, parent, community satisfaction?; staff input.
July	Hire full time Basic Skills instructor
July/August	Make any necessary changes based on formative evaluation
August	Start field test of Technical Writing curriculum and begin implementation.
August	Begin school year with survey of those who wish to earn embedded credit
September	Completion and implementation of instructional resources for math topics.
September/October	Revise math tests.
October	Vocational students start reading/writing assignments and senior projects.
November	Complete all curriculum/study material for language arts (Technical Writing) credit.

2005

January	Complete evaluation of year one pilot program. All data should be collected including placement.
February	Publish revised Embedded Credit Plan and post all mathematics and technical writing curriculum on the district webpage.
All Year	Six-hour vocational students work on math and technical writing
May	Six-hour vocational seniors who pass math test receive credit for Technical Mathematics; six-hour vocational seniors who complete all performance requirements receive credit for Technical Writing
May/June	Evaluation of year two begins.
September	Mineral Area College and Three Rivers Community College enrollment data collected and final evaluation for year two completed.
September/October	Revision for year three completed. All students tested in math and year three process begins.

Key Players:

The following individuals have been instrumental in the development of this proposal. Each person has provided input and assisted with the development of the various sections.

Vocational staff

AVCTC

David Dillard	Vocational Director
David Rhuman	Basic Skills Instructor (hired August 2004)
Mike Allen	Placement Coordinator
Donna Barnhouse	VRE
David Bates	Automotive Collision Repair Technology
Bart Ackley	Building and Grounds Maintenance
Max Hobson	Computer Repair and Networking
Rebecca Henson	Business Technology
Marlene Asher	Health Sciences
Mike Yates	Welding Technology
Vernon Montgomery	Automotive Technology
Patti Walker	Childcare
David Amelunke	Graphic Communications

AV middle and high school math and communication arts teachers

Communication arts	Mathematics
Karen Sargent	Michele Axtell
Amy Klempert	Vickie Branstetter
Debbie Smith	Connie Pollock
	Tabatha Crites

Sending school math and communication arts teachers

Communication arts (Sept 29)

Nancy Nodine-Hassert	Bunker R-III	Angie Hammons	Bunker R-III
Heather Tibbs	South Iron R-I	Doris Ramsey	Clearwater R-I
Evelyn Hedrick	Iron County C-4	Lee Ann Wright	Clearwater R-I
Anna-Marie Beard	South Iron R-I		

Mathematics (Sept 23)

Peggy Roach	Clearwater R-I	Carol Godwin	Lesterville R-I
Ronda Polk	Clearwater R-I	Sandy Buckner	South Iron R-I
Ken Halter	Central R-III	Leslie McCaig	South Iron R-I
Kory Schweiss	Central R-III	Randall Crites	Bunker R-III
Jason St. Gemme	Lesterville R-I		

Key Points

1. Reasons/Purpose (in addition to the rationale)

   - Sending school students lose one credit per year due to travel
   - Arcadia Valley students are now required to earn three math credits
   - Mathematics is important for all students, especially technical ones
   - There is no MAP testing the 11th or 12th grade years so credits will not interfere with MAP preparation
   - Focus on mathematics will reduce the number of AVCTC graduates who have to take remedial college entrance classes
   - Meets the Perkins III requirements for integration of academics in vocational classes

2. Teacher preparation and mathematics teacher assistance

   - Weekly vocational teacher training on specific topics. Teachers review a specific math topic each week based on the worksheets developed by the AVCTC staff. These worksheets address each of the identified mathematics topics. See **Appendix B** for sample lessons. Students will be provided a folder to keep the lessons in for review in preparation of the final exam for credit.

   - Video development of identified math topics. Short videos will be developed by the AVCTC Graphic Communications department. These videos address each of the identified mathematics topics. Teachers will be able to show them in their class or allow students to view them on an individual basis. The VRE will maintain the series for checkout and be available to assist students.

   - Determine what mathematics credit will be offered. It appears that we would offer a class called: Core Data # 115899 Other Mathematics or Core Data # 115825 Applied Mathematics. Both classes require a certification in mathematics for the teacher. Core Data #996000 Academic Program, Related On-Campus Instruction (Certification in subject area) Core Data #994010 Basic Skills. Based on discussions with DESE, the local school boards can offer the credit as they define. It is proposed that the course will be titled: Technical Mathematics. None of the sending schools offer a class with this title.

   - Determine what communication arts credit will be offered. The reading/writing component will be titled: Technical Writing. Again the local schools board can vote to offer the credit as proposed under this document

   - Define topics that need to be taught to earn math credit. The area mathematics teachers have determined that the following is the list of topics to be covered in the embedded mathematics curriculum. See table I for the list.

3. Identify which math topics are embedded in each vocational competency. This has been accomplished by bringing in high school and middle school math teachers to provide in-services to vocational teachers in the "practical definitions" for each identified mathematics topic. The area mathematics teachers developed "expanded explanations" for each identified mathematics topic. Vocational teachers were provided in-service over the "expanded explanations" and how to identify the topics. Vocational teachers review each competency and identify which, if any, math topics are related to the competency. Additional review of the cross-referencing is still

being planned. This could be accomplished by other vocational teachers from area CTCs reviewing the initial cross-referencing and/or math teachers reviewing the cross-referencing. Vocational and mathematics teachers review vocational competencies and related math topics. The process has been completed. The vocational teachers have also identified the topics that are not embedded in their curriculums and these topics will be identified for "out of class/additional homework" and "pull-out" instruction. The cross-reference of vocational competencies and the mathematics topics are listed in **Appendix C**.

4. Identify which math topics will need additional instruction "out of class/additional homework" and "pull-out" instruction. Based on the topics listed in each vocational class, the topics that are not covered in that class will be identified so additional instruction can be provided to the students in that vocational program. The process for this will take place after the cross referencing is completed. Those topics that are not covered in a particular vocational program will be handled by students being assigned additional work in the adopted textbook for Technical Mathematics. The major focus of mathematics instruction will be provided through:

   - Once each week all vocational teachers attend morning workshops where one of the math topics and study guides are discussed and reviewed. The teachers then teach the lesson within the week to their class. All students complete the lesson, even those who have passed the test and earned the credit. The continual review for all students will better prepare them for their career field and keep the material fresh for college entrance testing.

   - Testing is used to identify weakness for all students. Starting in the 2005-2006 school year, all students will be required to test at least once early in the year.

   - Pullout sessions will be made available for students as needed. It is hoped that the sessions will be offered at least once each week.

   - Classroom assistance: Classroom instruction will be provided to each vocational program. In a effort to minimize the disruption of vocational training it is planned that most of the classroom instruction will be provided when the teacher is attending professional development of out for illness.

5. Prepare testing process and monitoring/pre-testing. The test that actually provides the credit for the embedded math credit will have to be developed with multiple options. Some of the key questions that have been answered about the test are:

   - It will be multiple-choice only. The CTC does not have the resources to test and grade authentic or short answer test. While this is not the most desirable method of testing, it is the only format that is practical.

   - What is the pass rate? Would it be a percent of topics or total score? This is being answered as the tests are being developed. Each test will consist of three questions per subtopic (3a, 4c, etc) and the student will have to answer two of the three correct to pass the section. It has also been decided that as students take the test and pass specific sections, they will not have to take the entire test as a retake since the pass rate is based on 2 out of three questions per section. In other words, students retaking the

test would only take the sections they failed in previous attempts. Since mastery of the subject matter is the focus of the program, students will be able to take the test (different versions) as many times as possible before the end of their senior year. As the tests have been developed there are 28 sections. Students must pass 25 of the sections to earn the mathematics credit.

◆ Multiple versions of the test will be needed. The area math teachers are writing the test questions in a format that allows for a pool of questions for each subtopic. There will be 12 questions for each subsection and three questions from the pool will be chosen for each test. This will allow several versions of the test to be constructed with very few of the same questions on any two versions.

◆ Pre-testing to assist students in identifying topics that they need additional study in is critical. We are currently using the Orchard exit exam for basic high school math and algebra. Pre-testing and assessment of student's knowledge is critical to the process. Students will pre-test as soon as possible to determine where extra help is needed. If it is determined that the individual vocational course curriculum will not cover the individual student's weak areas, they will be assigned additional work in the adopted class textbook.

6. Define process for additional mathematics work to include:

◆ The process of identifying additional work will be based on student assessment and pre-testing.

◆ Once the topics that comprise the curriculum have been identified, a series of alternative instructional processes will be established for each topic.

    ➢ Home work

    ➢ Assistance in all classes

    ➢ Assistance through textbooks: we have plans to purchase textbooks which students can check out as their weak areas are determined.

    ➢ Assistance through software: AVCTC students will have access to the A+LS software and the Orchard software packages.

7. Grading and credit

At this point, discussions have been held on several aspects of grading and credit. It is the recommendation that each sending school will be able to choose the options that fit them best as for the awarding of credit.

◆ Pass/fail would be easier to manage

◆ If a grade is involved, (the score on the final math test and the score on the scoring guides for the technical writing) then more students would have increased incentive to do better

◆ The best thought at this time is to allow the students to have the option of a letter grade that would be used in GPA calculation or pass/fail that would not affect GPA. The choice could even be made after the test or the calculations were made. Although these issues may be important, they really do not impact student learning directly.

◆ The process of assigning a letter grade will be left to the sending schools. The percentage or score on the test and the average score on the writing assignments will be reported with a pass/fail report. This will allow the sending school to assign a letter grade, based on their grading scale, if they choose to do so or to assign a pass/fail grade for credit.

8. Supplemental Textbook and materials:

▪ Phagan, R. Jesse. Applied Mathematics. Tinley Park, IL: The Goodheart-Willcox Company, Inc., 2004.

▪ Lesson Plans: developed by the AVCTC. They are in production based on the topics identified in the **AVCTC Embedded Mathematics Topics Table I.**

▪ Videos for each of the **AVCTC Embedded Mathematics Topics: Table I** are in production. They should be completed by the beginning of the 2005-2006 school year.

▪ Students are able to use the ALS-A+ computer based curriculum to work on areas of concern. The program is on all district computers and teachers have been trained on how to use it. The software will be used more effectively when a Basic Skills Instructor is in place.

EVALUATION

The process of evaluation is important for any program. It is important to assess the progress of the program in relation to its goals and objectives. If evaluation is the process of examining a subject and rating it based on its important features, then this program must be evaluated to determine if it is meeting the needs of CTE graduates. The evaluation process for this program will consist of performance measures that will lead to formative and summative evaluation. The performance measures provide the basis for the data that will be collected for evaluation. Performance measures will also explain the format of the evaluation. The evaluation methods will form the basis of the formal written evaluation of the embedded credit program that will use the performance measures to determine if the program has a positive effect on CTE students and raises their academic and vocational achievement. Evaluation will be ongoing and continuously changing. As the program develops there will be a written evaluation plan developed on the following concepts:

◆ Performance measures (program): The evaluation of the actual embedded curriculum (the day to day integration of academic and vocational subjects) and its implementation will be considered evaluation of the program. Data will need to be collected for each of the following performance measures. Some of the data will be simple numbers that can be tracked and the other data will require the development of surveys. The evaluation of the program will lead to changes in the presentation of the embedded instruction, development and revision of materials, and revision of the tests and scoring guides.

- Number of students planning to earn embedded credit
- Number of students who test
- Number of times students test
- Parent satisfaction with program
- Community satisfaction with program
- Student satisfaction with program

◆ Performance measures (outcomes): The evaluation of the broader outcomes of the embedded curriculum will be evaluated over an extended time period. This data will be collected over time and future data will be compared to existing data for previous years. The long term evaluation will determine if the program actually improves CTE student achievement.

  - Number of students who earn embedded credit
  - Number of students who enroll in AVCTC programs
  - Number of AVCTC graduates who are successfully placed
  - Number of students who have to take remedial math, reading or writing upon enrollment into post-secondary education
  - Student scores of the ASVAB
  - Student MAP scores

◆ Evaluation methods (Formative): Each year of the program, the plan is to conduct formative evaluation for program improvement. The formative evaluation will serve as benchmarks to determine if the program is "on-track" and making adequate progress. Based on the input from all participants changes will have to be made to continually improve the program. The use of survey data will be important to determine the perception of most groups.

  - Survey students for number of participants (each year)
  - End of year survey of students to determine what worked and what needs changing
  - End of year survey of community and parents to determine what worked and what needs changes
  - End of year survey of CTE staff to determine what worked and what needs to be changed
  - Informal, antidotal evaluation and collection of feedback.

◆ Evaluation methods (Summative): To meet the long term goals of this program and the accountability of Perkins III, the summative evaluation will be conducted each year upon completion of the program and as soon as the data can be collected.
  - Enrollment in each CTE program
  - Placement rate for each CTE program
  - Achievement test scores (MAP) of CTE students
  - Number of students who are required to take remedial math, reading and/or writing upon enrollment in post-secondary education
  - Survey of employer satisfaction with CTE graduates

AVCTC Embedded Mathematics Topics   Table I

ID #	Topic	Show-Me Standards	MO Grade Level Expectations	NCTM Standard
1	**Integers**			
1a	Order of Operation	MA1, MA5	N2B9,N2C9	2A
1b	Basic operations (+, -, *. /)	MA1, MA5	N2B8,N3C8	2A,3A
1c	Word Problems	MA1, MA5,G3-4	N2D10,N2D9	2A,3A,3B,18A,18B,18 C,18D
1d	Calculator Operations	MA1, MA5	N2D10,N3C9	2A,3A,3B,18A,18B,18 C,18D
1e	Personal/Business Finance	MA1, MA5, G4-8,G3-8,	N2D10,N3B9,N3D10	20A,20B,22A,22B,22C
2	**Fractions, Decimals, and percent**			
2a	Basic operations decimals	MA1, MA5	N2B6,N2B7,N2B8,N2C9	2A,3A
2b	Basic operations fractions	MA1, MA5	N2B6,N2B7,N2B8,N2C9	2A,3A
2c	Conversions (f – d) (d- f) (f, d - %) (% - f, d)	MA1, MA5	N2B6,N2B7,N2B8N2C9,N 1B5,N1B6	2A,3B
2d	Estimations	MA1, MA5	N3D12,N3D8	3B
2e	Applications (Personal/business finance)	MA1, MA5, G4-8,G3-8,	N2B6,N2B7,N2D10,N3D1 2	2A,3A,3B,18A,18B,18 C,18D,20A,20B,22A,22 B,22C
3	**Exponents, Square Roots, Scientific Notation**			
3a	Basic operations	MA1, MA5	N1C8,N1C10,N2B9,N2C1 0,N1C7	1A
3b	Word Problems	MA1, MA5	N1C8,N1C10,N2B9,N2C1 0,N1C7	1A,18B,18C,18D
3c	Calculator Operations	MA1, MA5	N1C8,N1C10,N2B9,N2C1 0,N1C7	1A,18B,18C,18D
4	**Ratio and Proportion**			
4a	Write and interpret	MA5, MA6	N3E10,N3E8,N2D9	2A,3A
4d	Basic operations	MA5, MA6	N3E10,N3E8,N2D9	2A,3A
4c	Applications	MA5, MA6,G3-4	N3E10,N3E8,N2D9	2A,3A,20A,20B
4d	Calculator	MA5, MA6	N3E10,N3E8,N2D9	2A,3A,20A,20B
5	**Statistics**			
5a	Measures of central tendency (mean, median, mode)	MA3,G1-5	D1A10,D2A6,D2A9	14E,15A
5b	Graphs and charts	MA3,G1-8	D1C10,D3A9	14C,14D
5c	Creation	MA3,GI-8	D1C10,D2C9,D2B8	14A,14B,14C,14D,14E
5d	Interpretation/misinterpretation	MA3, MA6,G1-8,G1-5	D2A10,D2B10,D3B12	14,15,16 ALL
5e	Measures of variance (range, standard deviation, interpretation)	MA3,G1-8	D3A10,D3B12,D2A8	14B,14E,15A
6	**Basic algebra**			
6a	Evaluate expressions	MA1,MA2,MA4	N2C8,N2C9,A2B7	4A,5A
6b	Equations	MA1,MA2,MA4	N2C10, A2A10,A2C9	4A,4B,5B
6c	Formulas	MA1,MA2,MA4	N2C10, A2A10,A2C9	4A,4B,5B,5E

ID #	Topic	Show-Me Standards	MO Grade Level Expectations	NCTM Standard
6d	Personal/Business Finance	MA1,MA2,MA4,G3-8,G4-8	N2C10, A2A10,A2C9	4A,4B,5B,5C,5E
6e	Word problems	MA1,MA2,MA4	N2C10,A2A10,A2C9,A3A10	4A,4B,5B,5C,5E
7	**Basic Geometry**			
7a	Area, perimeter, volume, surface area	MA2	G1A8,G1B9,G1B10	5A,5C,8A
7b	Right triangles (Pythagoras & Trigonometry)	MA2,MA4	G1A9,G1A11,G2A8,G4B10	8D,10A
7c	Similar and congruent figures	MA2	G1A9,G1B8,G3B8	8B
7d	Angle relationships	MA2	G1A9,M1A6	8A,8B
7e	Circle geometry	MA2	G2A9,G1A8,M2C6,M2C7,M2C8,M2C9	8A,8B
7f	Word problems	MA2,MA4,G3-4	G1B9,G2A9,G1A8,M2C6,M2C7,M2C8,G4A10	8A,8B,8D,11A
8	**Units of measure**			
8a	Conversion within systems	MA1,MA2	M1A5,M1B5,M2E5,M2E6,M2E7	12A
8b	Conversion between systems	MA1,MA2	M1A5,M1B5,M2E5,M2E6,M2E7	12A
8c	Reading tools of measurement	MA1,MA2	M1A5,M1B5	12A
8d	Measurement	MA1,MA2,G3-4	M1A7,M1C7	12A,13A,13D,18A,22A
8e	Accuracy, precision, tolerance	MA1,MA2	M2D10	13A
8f	Estimation	MA1,MA2,G3-8	N3D10,M2A6,M2D10,	12A,13A,13D,18A,22A

Key for mathematics topic cross alignment: Cross-referencing the mathematics topics to the Missouri Show-Me Standards, the Missouri Grade-Level Expectations, and the NCTM Standards will allow instructors to find resource materials and teaching strategies that relate the various standards to the CTE classrooms.

Missouri Grade-Level Expectations: The format used is a letter that corresponds to the STRAND, the number of the "BIG IDEA," the letter of the CONCEPT LEVEL, followed by the grade level. An example is Strand, Big Idea, Concept Level, Grade Level: N1A9 is (1) Number and Operations, (1) Understanding numbers, ways of representing numbers, relationships among numbers and number systems, (9) ninth grade. The STRAND names are abbreviated as follows:

> Numbers and Operations: N
> Algebraic Relations: A
> Geometric and Spatial Relationships: G
> Measurement: M
> Data and Probability: D

National Council of Mathematics Teachers Standards: There is no numbering system for the NCTM Standards. We have taken the topics and numbered them according to Appendix D which can be found at the end of this proposal.

Communications Arts

The communication Arts credit will be awarded based on the development of a portfolio by the CTE student. Each section of the portfolio will have a scoring guide developed for it along with a system to determine an overall percentage for scoring.

- Mehlich, Sue, and Smith-Worthington, Darlene. <u>Technical Writing for Success: A School-to-Work Approach</u>. Cincinnati, OH: South-Western Educational Publishing, 1997.

1. The development of the communication arts credit has the following key points:

◆ The "exhibits" (products of reading and writing) have been determined. Scoring guides to evaluate each exhibit are being developed with the assistance of the Arcadia Valley High School English Department and will be completed by December 2003. Students will not receive credit for this in the 2003-2004 school year, but 11th grade (first year) vocational students will be developing their portfolios for credit in the 2004-2005 school year. There may be exceptions if there are specific students (seniors for 2003-2004) who are in need of ½ credit of communication arts for graduation. This would be determined on an individual basis and the home school of the student involved would have to request the credit. The CTC feels that we can have the Technical writing curriculum in place to meet this need on a limited basis.

◆ Professional development of CTE staff is critical in this area. The mathematics is more often used and recognized by most of the staff, the language arts curriculum will require more professional development.

◆ Local sending school language arts instructors and the Arcadia Valley Technology Department have been providing or scheduling in-services in the following areas:

    📖 Developing a paragraph

    📖 Supporting an argument/thesis

    📖 Reading comprehension using technology

    📖 Using rubrics to grade article summaries

    📖 Using PowerPoint in the Classroom

    📖 Using Excel in the Classroom

    📖 Technology Integration in the Classroom

    📖 Developing Vocabulary in the Classroom

◆ The Arcadia Valley R-II School District has provided the district staff (including CTE staff) in-service activities on how to incorporate reading and writing across the curriculum

◆ The Arcadia Valley R-II School District has provided the district staff (including CTE staff) in-service activities on how to integrate technology in the classroom.

◆ The important aspect of the language arts curriculum is that most of the curriculum will implemented through the Preparation for

The list of exhibits for Technical Writing Portfolio include:

◆ **Cover letter/letter of introduction:** students will create these using technology (word processing) and save, edit and print them as needed.
Writing Skill: Business letter format; persuasive techniques.

◆ **Resume:** students will create these using technology (word processing) and save, edit and print them as needed.
Writing Skill: Resume format; organization of information.

◆ **Sample job application/college entrance application:** students will be able to complete the standard form developed by the AVCTC and then update this criteria with "real" applications as they complete them.
Writing Skill: Accuracy; neatness.

◆ **Content (vocational program) specific forms**: these are forms that each CTE staff member will identify that pertain to their career field. Students will properly filled out the forms as identified for their CTE program.
Writing Skill: Accuracy; neatness.

◆ **PowerPoint presentation:** Each vocational student will develop and make a presentation using MS PowerPoint. This objective could be fulfilled by a classroom presentation or small group or the development of a presentation to be provided to an "agreed upon audience." The agreement process will be between the class instructor and the administration of the AVCTC.
Writing Skill: Elements of design/presentation.

◆ **10-15 article summaries** (vocational program specific): Each CTE program will require reading and writing assignments in class at least bi-weekly. Students will be able to select their best work for submission. Some of the articles will be assigned by the instructor and some will be independent for each student.
Writing Skill: Identify main idea(s); discern between major and minor details.

◆ **Technical paper** that explains a career specific operation or process (technical manual): This is an attempt to develop a "Senior Project." CTE students with the consent of their instructor, will develop a major project that will be presented to the class and possibly to a review committee.
Writing Skill: Process analysis; sequencing.

◆ **Graphing of data**: Students will be required to demonstrate that they understand how to present statistical information. This section will take some development, but may include information in graphs and charts in the technical paper or some other form of graphical presentation of date including MS Excel.
Writing Skill: Interpreting data.

◆ **Vocabulary terms** (4 semester exams) (see Appendix A). These are the vocational program specific terms that each graduate will need to know and understand to successfully communicate within their career field. The terms will serve as the basis for the semester final in each vocational program. According to Nagy (1988), "vocabulary knowledge is fundamental to reading comprehension." This is most important for vocational students as they develop their career skills.
Writing Skill: Increase vocabulary skills and reading comprehension.

◆ **Recommendation Report (Pg. 248):** A recommendation report helps decision-makers make choices. After comparing and contrasting two items to a common set of criteria, it recommends one item over the other(s).
Writing Skill: Point-by-point comparison contrast

◆ **Informal Proposal (Pg. 39):** An informal proposal is a persuasive document that offers a solution to an identified problem. A research component is recommended. For instance, students should gather data and prepare a bibliography.
Writing Skill: Persuasive techniques (a MAP tested skill); research skills

◆ **Safety Report/Memo (Pg. 32):** Students can select safety issues relating to their job-related skills and prepare a safety report in the form of a memo (a written internal communication).
Writing Skill: Expository writing; memo format

◆ **Career/Guidance Plan**. Students will develop a working document that outlines their career planning process. The plan will include future plans and "defined steps" to complete their plan. This will be an expanded career planning portfolio that will also lead to increased placement rates. (See Appendix D)
Writing Skill: Expository writing; process analysis.

Portfolio Assignment	Required Work/Optional Submission		Completed	Initials
Vocabulary Terms				
	Honors Vocabulary Test			
	Semester Test (85% minimum score)			
	Final Test (85% minimum score)			
	Acceptable Vocabulary Test			
	Semester Test			
	Final Test			
Career/Guidance Plan				
	Junior Year Career/Guidance Plan			
	Senior Year Career/Guidance Plan (revision)			
	OPTIONAL:			
	Additional Revision during Junior Year			
	Additional Revision during Senior Year			
Cover Letter/Letter of Introduction				
	Honors Letter			
	1. Excellent Grammar			
	2. Appropriate Format			
	3. Proof of Letter Use for Application			
	Acceptable Letter			
	1. Appropriate Grammar			
	2. Appropriate Format			
Resume				
	Honors Resume			
	1. Excellent Grammar			
	2. Appropriate Format			
	3. Proof of Resume Use for Application			
	Acceptable Resume			
	1. Appropriate Grammar			
	2. Appropriate Format			
Job Application/College Entrance Application				
	Honors Application			
	1. Excellent Grammar			
	2. Appropriately Completed			
	3. Proof of Submission of the Application			
	Acceptable Application			
	1. Appropriate Grammar			
	2. Appropriately Completed			
	3. Use of AVCTC Form, or Actual Application			

Graphing of Data

		Completed	Initials
1. Source of Raw Data			
2. Professional Appearance			
3. Accurate Representation			
4. Written Summary of Graphic Representation			

Portfolio Assignment	Required Work/Optional Submission	Completed	Initials

Recommendation Report

Honors Recommendation Report

	Completed	Initials
1. Report has:		
Introduction (with method of investigation)		
Recommendation		
Scope		
Discussion		
2. Appropriate Grammar and Punctuation		
3. Related to Field of Study at AVCTC		
4. Printed (with Title Page)		

Acceptable Recommendation Report

	Completed	Initials
1. Report has:		
Introduction		
Recommendation		
Scope		
Discussion		
2. Appropriate Grammar and Punctuation		
3. Related to Field of Study at AVCTC		
4. Printed as Memo		

Technical Presentation

Honors Technical Presentation

	Completed	Initials
1. Prior Approval of Topic and Audience.		
2. Use of PowerPoint Software or Video Medium		
3. Provided Recorded Medium of Presentation.		
4. Provided Handout and/or Slide Handout .		
5. Gave Presentation to Targeted Audience.		
6. Professional Appearance/Actions During Presentation to Target Audience.		

Acceptable Technical Presentation

	Completed	Initials
1. Prior Approval of Topic and Audience.		
2. Use of PowerPoint Software or Video Medium		
3. Provided Recorded Medium of Presentation.		
4. Provided Handout and/or Slide Handout .		

Trade Journal Article Summaries

ARTICLE 1	
1. Provides Introduction to Article	
2. Summarizes Authors Reason for Writing Article	
3. Gives Personal Reaction to Article	
4. Includes Journal Name, Volume, Edition/Date	
5. Appropriate Grammar and Punctuation	

		Completed	Initials
	ARTICLE 2		
	1. Provides Introduction to Article		
	2. Summarizes Authors Reason for Writing Article		
	3. Gives Personal Reaction to Article		
	4. Includes Journal Name, Volume, Edition/Date		
	5. Appropriate Grammar and Punctuation		
Portfolio Assignment	**Required Work/Optional Submission**	**Completed**	**Initials**
Trade Journal Article Summaries			
	ARTICLE 3		
	1. Provides Introduction to Article		
	2. Summarizes Authors Reason for Writing Article		
	3. Gives Personal Reaction to Article		
	4. Includes Journal Name, Volume, Edition/Date		
	5. Appropriate Grammar and Punctuation		
	ARTICLE 4		
	1. Provides Introduction to Article		
	2. Summarizes Authors Reason for Writing Article		
	3. Gives Personal Reaction to Article		
	4. Includes Journal Name, Volume, Edition/Date		
	5. Appropriate Grammar and Punctuation		
	ARTICLE 5		
	1. Provides Introduction to Article		
	2. Summarizes Authors Reason for Writing Article		
	3. Gives Personal Reaction to Article		
	4. Includes Journal Name, Volume, Edition/Date		
	5. Appropriate Grammar and Punctuation		
	ARTICLE 6		
	1. Provides Introduction to Article		
	2. Summarizes Authors Reason for Writing Article		
	3. Gives Personal Reaction to Article		
	4. Includes Journal Name, Volume, Edition/Date		
	5. Appropriate Grammar and Punctuation		
	ARTICLE 7		
	1. Provides Introduction to Article		
	2. Summarizes Authors Reason for Writing Article		
	3. Gives Personal Reaction to Article		
	4. Includes Journal Name, Volume, Edition/Date		
	5. Appropriate Grammar and Punctuation		
	ARTICLE 8		
	1. Provides Introduction to Article		
	2. Summarizes Authors Reason for Writing Article		
	3. Gives Personal Reaction to Article		
	4. Includes Journal Name, Volume, Edition/Date		
	5. Appropriate Grammar and Punctuation		

	ARTICLE 9			
	1. Provides Introduction to Article			
	2. Summarizes Authors Reason for Writing Article			
	3. Gives Personal Reaction to Article			
	4. Includes Journal Name, Volume, Edition/Date			
	5. Appropriate Grammar and Punctuation			

Portfolio Assignment	Required Work/Optional Submission		Completed	Initials
Trade Journal Article Summaries				
	ARTICLE 10			
	1. Provides Introduction to Article			
	2. Summarizes Authors Reason for Writing Article			
	3. Gives Personal Reaction to Article			
	4. Includes Journal Name, Volume, Edition/Date			
	5. Appropriate Grammar and Punctuation			
	HONORS ARTICLE SUMMARIES (13 Required)			
	ARTICLE 11			
	1. Provides Introduction to Article			
	2. Summarizes Authors Reason for Writing Article			
	3. Gives Personal Reaction to Article			
	4. Includes Journal Name, Volume, Edition/Date			
	5. Appropriate Grammar and Punctuation			
	ARTICLE 12			
	1. Provides Introduction to Article			
	2. Summarizes Authors Reason for Writing Article			
	3. Gives Personal Reaction to Article			
	4. Includes Journal Name, Volume, Edition/Date			
	5. Appropriate Grammar and Punctuation			
	ARTICLE 13			
	1. Provides Introduction to Article			
	2. Summarizes Authors Reason for Writing Article			
	3. Gives Personal Reaction to Article			
	4. Includes Journal Name, Volume, Edition/Date			
	5. Appropriate Grammar and Punctuation			
Content Specific Forms				
	Safety Report (AVCTC form from scenario)			
	Work Order, or Field Specific Form (Instructor approved)			
	Requisition, or Field Specific Form (Instructor approved)			
Senior Project				
	Formal/Informal Proposal (see attached guidelines)			
	Materials and Supplies Checklist (see guidelines)			
	Planning Phase Completed (see guidelines)			
	Process Phase Completed (see guidelines)			
	Product Phrase Completed (see guidelines)			

FINAL SIGN-OFF
    FOR CREDIT: _____   _____

                                                  Position: **Date**

All work must be submitted for approval to your instructor. After the work is completed, and approved, it should be stored in your Career Portfolio. Final Sign-Off for the Communication Arts Embedded Credit will require review of your Career Portfolio with all submitted and approved assignments.

CA – 1 Vocabulary Terms	Communication Arts Embedded Credit
Arcadia Valley Career and Technology Center	Last Update: September 2004
Honors Grade – 85% or better on tests	Passing Grade – 60% or better on tests

OBJECTIVE: Students will improve reading comprehension in their skill training area by organized development of vocabulary recognition related to the career field.

Introduction:

Reading comprehension is vital to the success of an employee in today's world of business. Today's employees must be savvy in recognizing career related terms. Additionally, today's employee must also be able to know, and communicate, these terms by the career field definition that is most widely accepted by the professionals, and non-professionals, within the skill training area. Recognizing the importance of words and their meanings, the Arcadia Valley Career and Technology Center provides each student with support in the area of career specific vocabulary and term definitions.

During enrollment in a vocational training program at the Arcadia Valley Career and Technology Center, students are required to participate in a program that seeks to improve each students recognition of career field related vocabulary. Each student is required to take semester exams that have a focus on vocabulary recognition within her/his chosen skill training area. By stressing the importance of developing a strong career field vocabulary the Career and Technology Center believes that all students in the skill training programs will show marked improvement in reading comprehension of career related materials.

The chosen terms are vocational program specific to build the successful graduate's knowledge and understanding, thus, enhancing her/his successful communication within the skill training area. Enhancement of reading comprehension begins with word recognition and understanding term definitions. To provide opportunity for excellence in vocational training, the Arcadia Valley Career and Technology Center provides all students the opportunity for expanding her/his career related vocabulary.

Each vocational program instructor completes the following:

1. **Identifies the terms that are essential for the skill training area.**
    a. Each program has approximately 200 terms for a two-year program participant.
    b. The definitions start with the textbook definition, but also have additional information when necessary.
    c. Semester final exams have vocabulary related questions of terms covered during the class periods leading up to the exam date.

2. **Encouraging students to learn the definitions by:**
    a. Developing a method for keeping an on-going list of terms in a log of some kind.
    b. Regular practice of putting various term definitions in the students' own words.
    c. Use of "word walls" in the classroom and/or shop area that place the terms and their definitions in front of the students regularly.

3. **Developing a list of terms for the career related vocabulary list based on the following divisions:**
    a. Specific terms related to the individual skill training area.
    b. General terms that are related to all vocational training programs.

4. **Developing test questions on semester exams that monitor student understanding of class specific terms and their definitions.**

5. **Developing test questions that require students to choose to define terms in her/his own words. Combined with the multiple-choice questions on the semester exam, these questions should demonstrate student comprehension of the selected terms.**

CA – 2 Career/Guidance Plan	Communication Arts Embedded Credit
Arcadia Valley Career and Technology Center	**Last Update: September 2004**
Honors Grade – Individual Career Portfolio ("ICP") Completed, Three Kuder Assessments Completed and Copies of Results Inserted in the ICP, Records of Attendance for Visits from Recruiters for 4 or more Programs.	**Passing Grade – Individual Career Portfolio ("ICP") Completed, Records of Attendance for Visits from Recruiters for less than 4 Programs.**

OBJECTIVE: Student will develop a Career/Guidance Plan during attendance at the Arcadia Valley Career and Technology Center.

Introduction:
Developing a Career/Guidance plan while attending a Career and Technology Center is vital to making the most of one's vocational training. The Career/Guidance Plan is the 'map' a student will use to take skill training to successful employment at a high-wage job, enrollment at a vocational, or technical, training facility, or enrollment at a two- or four-year institution of higher learning. Although the training at the Career and Technology Center is specialized, the skill of developing a Career/Guidance Plan is applicable for all areas of academic study.

The Career/Guidance Plan is a 'fluid' document. A 'fluid' document is one that is flexible and open for revision as the individual gains knowledge about a specific area of training. A student should use the Career/Guidance Plan as a guide for future study and planning. Flexibility is a must in this arena as interests and opportunities are under constant influence for change. Thus, an individual's Career/Guidance Plan must be reviewed and/or revised regularly to keep up with changes in interests, opportunities, and/or advancements.

It is highly recommended that all Career and Technology Center students develop a Career/Guidance Plan during the Junior year. Additionally, all students are encouraged through the Embedded Credit program to make revisions during the student's Senior year. This developed plan and revision make-up the base for successful completion of the Career/Guidance Plan for the Communication Arts Embedded Credit. Students are encouraged to make additional revisions, as necessary, during the Junior and Senior year. As stated earlier, the Career/Guidance Plan is a working document that needs to be reviewed and revised as applicable.

The additional revisions are not necessary for successful completion of the Communication Arts Embedded Credit; however, they will be a strong example to a potential employer of the student's commitment to excellence and training. A student portfolio should contain the Junior and Senior year Career/Guidance Plans and any additional revisions that were completed during the student's Junior and Senior year.

Change is not negative when it comes to developing a plan for future use of vocational training skills. In fact, change will be necessary to ensure that one's plans meet the ever-changing demands of skill-trained jobs. A well-documented Career/Guidance Plan reflects strong skills in planning, adapting and flexibility. These are all skills most employers are seeking in potential candidates for positions they have available.

Career/Guidance Planning Program

Step-By-Step Instructions for Completing the Career/Guidance Plan

1. Obtain the "Individual Career Portfolio" from the Arcadia Valley Career and Technology Center during your junior year.
2. Start completing the folder information as presented. Sections that need to be completed for credit include:
   a. "My Career Research"
   b. "My Extracurricular Activities"
   c. "My Employability Skills"
   d. "My Individual Career Plan"
   e. "My Education Plan"
3. More detail on these sections that is important to remember.
   a. "My Career Research" – this section covers many activities that you may participate in already with your attendance at the Arcadia Valley Career and Technology Center.
      i. Interviewing on your own, or as part of your classroom instruction, is an item that you can use to answer several of the questions in this section. Keep an on-going record of all interviews you have participated in during your time attending the Career and Technology Center in your "Individual Career Portfolio".
      ii. Job shadowing is also possible for Career and Technology Center students and will be a good resource in completing this section. Keep a copy of any evaluations and assessments that were made of you in this type of position and place in your "Individual Career Portfolio".
      iii. Career information software is used quite often in the Career and Technology Center. It is also part of the work that your high school's guidance counselor may do with you in guidance programs. Currently, all of the sending schools for the Arcadia Valley Career and Technology Center are utilizing the "Kuder Program". This program is available in, and outside, of school for all students. With your user name and password you can complete three assessments ("Kuder Career Search with Person Match"; "Kuder Skills Assessment"; and "Super's Work Values Inventory – Revised") and satisfy any requirements for this check box on the form. When one of these assessments is completed print the results and add them to your "Individual Career Portfolio".

      iv. Career Resource Centers are available through the Career and Technology Center, your local high school and any technical, two- and four-year institutions of higher learning. Keep any information you receive from these centers for your portfolio and this folder.

      v. Job Fairs are available through your high school's guidance counseling office and are usually attended by students in their junior and senior year. Keep any information you receive from these fairs for your portfolio and this folder.

      vi. The Internet is also a good resource for reviewing various career possibilities. When researching possible career choices on the Internet, keep a copy of information that you deem important and place it in your "Individual Career Portfolio".

b. "My Extracurricular Activities" – this section tracks awards and recognition that you have received during your school experience. There are two main sections to keep up-to-date:

      i. "Activity/Office" for each year grades seven through twelve.

      ii. "Honors and Awards" for all awards received, especially during high school year.

c. "My Employability Skills" – this section helps you to record skill areas that will be important for the training area you are participating in. There are two main areas on the form to complete.

      i. "My Work Experience" – by recording your employment as it occurs it will be much easier to complete job applications and/or update your resume. Take the time to complete one of the boxes for each job you have during your time in high school. If you need additional space, please attach additional sheets.

      ii. "Skills Employers Seek" – each year individual students should be aware of the skills and achievements she/he is gaining. On an individual sheet of paper the students should track evidence of achievement in various areas. Possible sources for these listed skills could be: classroom experience, job for which you were paid, volunteer activities, extracurricular activities, etc. Keep a running record of your training in the eight areas listed on the "Individual Career Portfolio".

d. "My Individual Career Plan" – this section is personal information you record so that it remains at your fingertips for job interviews, college recruiting visits, job applications, etc. Completion is simply a matter of expressing your interests in writing.

e. "My Educational Plan" – this section is required by most schools and you probably completed a document that has this information when you were in 8th grade; however, few students update the document as they move along through high school. Sometimes what we plan to accomplish and what we actually accomplish are very different. Take time to get a copy of your "Six-Year Plan" and update this record on the back of the "Individual Career Portfolio" with what you actually accomplished. You may even surprise yourself.

4. Complete the following assessments from the Kuder Program (see http://www.mo.kuder.com):

      a. "Kuder Career Search with Person Match"
      b. "Kuder Skills Assessment"
      c. "Super's Work Values Inventory – Revised"
5. Complete a Recruiter Report Sheet for all programs you attend where someone is presenting information about a high-wage job, technical school, two- and four-year college, or armed forces. Insert the form into the "Individual Career Portfolio".

CA – 5 Job Application/College Entrance Application	Communication Arts Embedded Credit
Arcadia Valley Career and Technology Center	Last Update: September 2004
Honors Grade – Excellent Grammar/Proof of Actual Submission	Passing Grade – Appropriate Grammar/Use of AVCTC form or Actual Application

OBJECTIVE: Student will be able to effectively complete a job application, or college entrance application, displaying work habits reflective of a commitment to accuracy and neatness.

Introduction:
An effective job application, or college entrance application, is a true reflection of the person completing the paperwork. Applications can best be described by the phrase, "You never get a second chance to make a first impression". Effective completion of an application starts with preparation and ends with attention to details.

The best way to begin the application process is to complete an application "FACT SHEET". This sheet should include all pertinent, and relevant, information that you may have to put on an application. It will aid each individual in completing an application where the place of business requires you to complete the application on premises. The "FACT SHEET" includes information about your personal, education and career experiences, and your references.

From time to time the "FACT SHEET" will need to be updated in order to include an individual's present experiences. Each time a job application is completed the individual should take the time to update the "FACT SHEET".

Important terms to understand from applications:

ADDRESS: The place where you live, where your references can be reached, or where your school or employer is located. An address should include the number and street name, the city and state, and the Zip Code+4. Remember that a comma goes between the city and state, but no comma is used between the state and the Zip Code+4.

COLLEGE: The name of the college, university, or trade school you attended. You do not have to have graduated to include each school.

COMPANY: The place where you work or the places where you have worked before.

COURSE: The subject in which you majored in school. For example, in high school you might have taken an academic, a college preparatory, a business, an auto mechanics, or a general course.

DEGREE: An award given if you graduated from a two-year or four-year college, university, or trade school.

EXPERIENCE: A term referring to other jobs that you have held. This section may also ask for the dates worked at these jobs, the name of the companies, the addresses of the companies, your duties and titles, the names of your direct supervisors, and the reasons why you left these jobs.

POSITION: Job or job title, such as 'short-order cook' or 'receptionist'.

REFERENCES: The names, positions, addresses, and sometimes the telephone numbers of people who know you and can talk about the kind of person you are. They might tell how well you do things and how well you get along with others. References can include previous employers, friends, teachers, and clergy. Previous employers can only discuss job-related information when giving a reference.

SIGNATURE: A handwritten (rather than typed or printed) name. Most applications require that you write, not print, your name somewhere near the bottom of the application.

Important application phrases that can be confusing must be handled with care. Here are some of the more common phrases and what is being asked by the phrase.

"Position applied for" – The job, or jobs, you want.

"List last or present employer first" – Your employment record starting with the last job you had or the job you are currently employed in. After this position start listing your previous positions starting with the one you held immediately preceding your current position. Continue with your list until you have listed the very first job that you had.

"Reason for leaving" – The reason you left your job. Your reason might be that you learned new skills or changed careers, that the company went out of business, or that you were laid off.

"May we call your present employer?" – A request to use your present employer for a reference. If you do not want to have your current supervisor know that you are looking for another job, answer "No" after this question.

"References" – The names and addresses of people who can recommend you for a job. Give as many as the application calls for. For example, if the application has three spaces for references, give three references.

"Kind of work desired" – Means, "What kind of job would you like to have?"

"Have you ever been employed by this company?" – Means, "Did you ever work for this company before?"

"Have you ever been employed by a similar concern?" – Means, Did you ever work for a company that makes the same kind of product or offers the same kind of service as this company?"

"Is all the information on this application true? If we discover that it is not, that will be considered sufficient cause for dismissal." – Means, "If our company hires you and then finds out that you did not tell the truth on your application, you could be fired."

"In case of emergency, notify" – Means, "If you have an accident or get sick, whom should the company call?"

"Final rate of pay" – Means, "before you left you last job, how much were you being paid?"

"Nature of work done" – Means, "What kind of work did you do on this job?"

"N/A" – Means, "Not Applicable". It should sparingly be used on sections of the application that do not apply to the person applying for the job.

Preparing a "FACT SHEET".

What should be on your "FACT SHEET"?

1. *Your Social Security Number.*

2. *Your complete list of education experiences.*

   a. Include all post-middle schools that you have attended.

   b. For every school listed, include the following information:
      i. Full Name of the School.
      ii. Full Official Address of the School (number, street, city, state and Zip Code+4).
      iii. Accurate Phone Number for the School.
      iv. Course of Study at the School (i.e., College Prep, Business, Computer Programming, etc.)
      v. Total Number of Years Attending the School.
      vi. Graduation Date/Anticipated Graduation Date.
      vii. Degree Received/Expected, if applicable.

   c. If moving to an area to attend school, include the schools information using a start date instead of a graduation date.

3. *Your complete list of work experience.*

   a. Include all relevant work experience that you have had.

   b. For every work experience listed, include the following information:
      i. Dates You Worked/Volunteered at Each Place of Business.
      ii. Full Name of the Place of Business.
      iii. Full Address of the Place of Business (number, street, city, state and Zip Code+4).
      iv. Accurate Phone Number for the Place of Business.
      v. Title of the Position Held at Each Place of Business.
      vi. Supervisor's Name, or a Manager/Owner.
      vii. Reason for Leaving Each Position.

4. *Your three (3) to five (5) BEST references.*

a. For every reference listed, include the following information:
    i. Full Name of the Individual, with appropriate title.
    ii. Position of the Individual.
    iii. Place of Business for the Individual.
    iv. Full, Accurate, Address for Each Reference (number, street, city, state and Zip Code+4).
    v. Accurate Phone Number for Reaching the Reference (include times available if the person could be hard to reach).

CA – 6 Graphing Data	Communication Arts Embedded Credit
Arcadia Valley Career and Technology Center	Last Update: September 2004
Honors Grade – No Distinction	Passing Grade – No Distinction

OBJECTIVE: Student will accurately represent data by graphical form and provide a written explanation of the data and its interpretation.

Introduction:
Representing data in graphical form is vital to 'seeing the big picture'. Numbers and bits of information are often meaningless until they are placed in a graphical representation. Today's marketing and quality control data is often represented in graphical form to allow more consumers to see the advantage of a particular product over another similar product. Graduates of the Arcadia Valley Career and Technology Center will be able to represent data in graphical representations.

Students are required to complete a graphical representation using raw data prior to graduation from their vocational program. The following lesson utilizes a United States Government Website to create a graphical representation that will successfully complete the requirements for the Embedded Credit in the area of Communication Arts.

Students may also utilize their own resources for making a graphical representation. The important components of a student's project are:
1. Finding/Creating Raw Data
2. Creating a Graph with a Professional Appearance
3. Providing an Accurate Representation of the Data
4. Providing an Appropriate Written Summary of the Data and What the Graph Represents

The fist step in completing the graphical representation is to obtain raw data from a source relevant to what you are trying to communicate. After the raw data is collected the student needs to input the data into a graph format. There are four main types of graphs: Bar Graph; Pie Graph; Line Graph; and an Area Graph.

Each of the graph types is included for you to show the class. An example of the necessary work to complete this assignment is also included for you to review with the class. An easy way to create a graph for this assignment is included for you to share with the students.

Step-By-Step Instructions for Completing Graph Using a Government Website:

1. Logon at a computer.

2. Type the following address in the computer: http://nces.ed.gov/ncekids/graphing

3. Select a graph type for your data.

4. Select "Click Here to Create a _____".

5. Read through all of the instructions.

6. Give the graph a title.

7. Enter the data for plotting.

8. Make sure that you have selected one of the two largest sizes for your graph.

9. Make sure that you select "JPEG" for your graphical representation.

10. Select "Create Your Graph"

11. Print a Copy of the Graph IMMEDIATELY. If you go back all of the data will have to be entered a second time.

12. Write a summary of your graph and turn both the summary and your graph into your instructor.

       The graph I prepared represents the information I obtained when surveying 100 students in the vocational school about the enthusiasm that they have for completing the possible Communication Arts Embedded Credit now offered by the Arcadia Valley Career and Technology Center. On Thursday, September 23, 2004, I was permitted to survey 100 students of the Arcadia Valley Career and Technology Center about whether they were sure that they wanted to complete the 'new' Communication Arts Embedded Credit.

       During the morning and afternoon breaks I surveyed 100 different students giving them the following question:

       "Using the following scale how would you rate your feelings about completing the 'new' Communication Arts Embedded Credit.

<div align="center">

Very Sure I Will
Somewhat Sure I Will
Sure I Will
Somewhat Unsure I Will
Very Unsure I Will"

</div>

       Of the 100 students surveyed, 56 said they were 'very sure' they would complete the credit (or 56%); 21 said they were 'somewhat sure' they would complete the credit (or 21%); 18 said they were 'sure' they would complete the credit (or 18%); 3 said they were 'somewhat unsure' they would complete the credit (or 3%); and 2 students said they were 'very unsure' they would complete the credit (or 2%).

       I would conclude from this survey that students are generally in favor of the new program and they see many benefits for individual students regarding this program. The information, however, is only based on a single question and should be cautiously viewed. Too often a bigger conclusion is drawn from a minimal amount of information.

       The students selected were randomly chosen from those students who spend time in the hallways during the morning and afternoon breaks. About 60% of the respondents were spoken to in the morning and 40% were spoken to in the afternoon. It was not determined whether students were in their Junior or Senior year and/or whether they were from each of the vocational classes taught in the Arcadia Valley Career and Technology Center facility. I cautiously recommend the conclusion that the data shows that Arcadia Valley Career and Technology Center students welcome the 'new' opportunity available for obtaining an elective credit in Communication Arts from their vocational classes.

CA 9 – Journal/Article Summary	Communication Arts Embedded Credit
Arcadia Valley Career and Technology Center	Last Update: August 2004
Honors Grade – 13 Approved Summaries in Portfolio	Passing Grade – 10 Approved Summaries in Portfolio

Writing an article summary is easier when you consider that you are giving the reader a verbal description of the information you have read. Approach the Journal/Article Summary as if you are a reporter. An important part of this type of writing is answering the "5 W's" in your summary: Who?; Where?; When?; What?; and Why?

The following steps will help you to develop information to write in a summary that will be effective in communicating the information from your selected Journal/Article.

STEP #1: Completely read the article.
STEP #2: Answer the "5 W's" on scratch paper. Draw pictures if it helps.
STEP #3: Write the summary as though you were telling a friend about your notes.
STEP #4: Re-read and edit your summary. Run the spelling and grammar check on your computer.
STEP #5: See if you can locate a quote in the Journal/Article that would help emphasize your summary.
STEP #6: Re-read and edit your summary. Run the spelling and grammar check on your computer one final time. Print a 'final draft' to submit to your instructor.

It is important to note that most instructors consider plagiarism to be when a student uses five or more direct words from the author in a statement. To help you avoid plagiarism, set your Journal/Article aside when completing STEPS 3 and 4. Developing a good STEP 2 will make the Journal/Article unnecessary for STEPS 3 and 4. It will also help to prevent possible issues with plagiarism.

An article is included in this lesson along with a 'good' summary for you to review. An example of STEP 2 is also presented so you can see what would make STEPS 3-6 easier.

To help you understand the format for the Journal/Article summaries, do the following:
   1. **Read the article;**
   2. **Review the graphic representation of STEP 2;**
   3. **Attempt STEPS 3-5;**
   4. **Discuss the process as a class.**

Journal/Article Summary Notes

Name:	Date:
Journal/Article Title:	**Instructor:**
Journal/Article Summary notes help you get the crucial information and the meaning of the facts. The following table will help you to work through your Journal/Article as if you were a reporter meeting the expectations of your editor.	*Not all questions are always appropriate; you must decide if it's okay to leave one, or more, blank, but be sure you can explain why that information is absent.*
WHO (is involved or affected):	**Most Important WHO:**
WHAT (happened):	**Most Important WHAT:**
WHERE (did it happen):	**Most Important WHERE:**
WHEN (did it, or will it, happen):	**Most Important WHEN:**
WHAT/HOW (did they do it, or others respond):	**Most Important WHAT/HOW:**
WHY (did they do it, react this way):	**Most Important WHY:**
SO WHAT? (Why is this event/information/idea important?):	**Most Important SO WHAT:**

Adapted from: Tools for Thought *by Jim Burke (Heinemann: Portsmouth, NH); © 2002*

STEP #2: Graphic Representation of the Journal/Article.

WHO? Liam Lahey, Author (writing for Computing Canada)

Faye West, Alberta Research Council	Michael Barr, Senior Researcher Ivey Business Consulting Group	John Tyler, Dell Canada

Support

1. Myth of Paperless Office.
2. Room for More Printer Manufacturers.

Simon Giggs, Lexmark Canada

Bill Fournier, Evans Research Corp.

Frank Albanese, IDC Canada

WHERE? Canada

Support
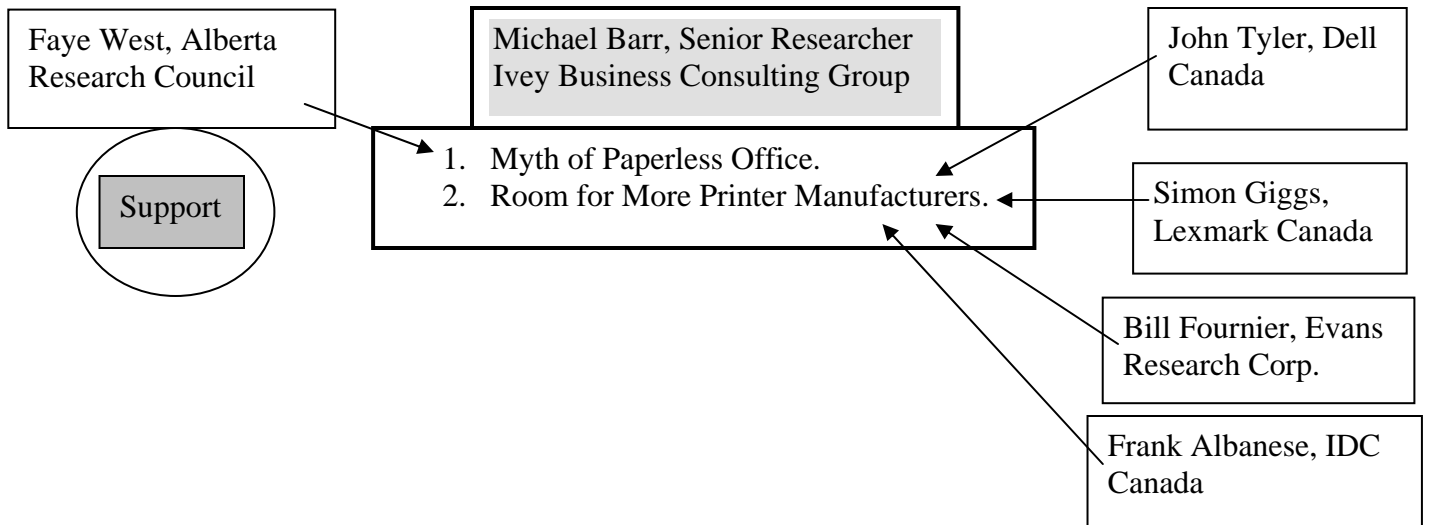
WHEN? Fall 2002 through April 2003

WHAT?

1. "Myth of the Paperless Office" – The "e-office" [Internet and email] has made printer volumes increase. The need for printers has increased instead of decreasing as predicted.
2. "Room for More Printer Manufacturers in Canada" - The Canadian market can accommodate more manufacturing of printers.

WHY? (Reserved for your opinion regarding the Journal/Article material that you have read.)

Following is an example of a 'good' Journal/Article summary (in appropriate format).

NAME   **PM Graphic Arts**
Mr. Graphic Arts   **August 27, 2004**

Trade Journal/Article Summary for Portfolio

Lahey, L. "Still pushing paper at the office: Dell joins the race to service enterprise users' printing needs but one analyst thinks it's a 'silly' move – Personal Technology – Brief Article." http://www.findarticles.com/p/articles/mi_m0CGC/is_8_29/ai_101196201, *August 27, 2004.*

The rise of the Internet, email and wireless computer connections promised to reduce the load on printers and paper products needed to conduct business. The outcome, however, is very different from what was expected. Liam Lahey, writing for *Computing Canada*, indicates that the 'paperless office' is a myth, according to Michael Barr, a senior researcher with the Ivey Business Consulting Group. In fact, from the fall of 2002 to the spring of 2003, the volume of work being produced by printers was increasing instead of decreasing for Canadian businesses.

Mr. Barr conducted a study of business printing behavior, commissioned by Canadian printer manufacturer, Lexmark, and his conclusion was that "almost half (40 per cent) of the respondents said they print data they receive (electronically) daily, while more than two thirds (67 per cent) of the enterprise users print information they've personally created on a daily basis." Faye West, director of information systems for the Alberta Research Council agrees with Mr. Barr's conclusions. She believes that the 'e-office' has increased the demand for, and on, printers at the business site.

Mr. Lahey then shares that Dell Computers is jumping into the printer manufacturing market in Canada to compete with companies like Lexmark, Hewlett-Packard, Epson and others. John Tyler, product manager of software and peripherals for Dell Canada, is optimistic that Dell can easily crack the "$6 billion Canadian software and peripheral market". Is the introduction of a 'new' printer manufacturer a concern to one of Canada's largest printer producers? Simon Giggs, director of marketing for Lexmark says Lexmark is not concerned about an increase in the competition on his company's share of the printer market.

Bill Fournier, a senior analyst for the Evans Research Corp., agrees that printer usage will see an increase, but he feels that this will be a modest increase at best. When asked what he felt about the move by Dell to enter the printer manufacturing business in Canada, Mr. Fournier called it "a silly" move. Frank Albanese, a research manager for IDC Canada, sees Dell's move more positively. Mr. Albanese noted that other manufacturers 'beat the odds' entering the Canadian computing market and he feels that Dell's entrance will increase "the level of competition in the printer business."

Will Dell succeed in this endeavor? The need for more printers appears to be established in the business market. A lot will depend on the printers Dell produces and the services they provide. A lot of success in the business world is based on a 'gamble' and dedication to strong production and service. Dell may not change the make-up of Canada's largest printer manufacturers but they could become "a thorn in the side of the market leader," as Mr. Albanese was quoted as saying.

AVCTC Embedded Credit
Communication Arts
Journal/Article Summary
SCORING RUBRIC

NAME: _____

CRITERIA	CHARACTERISTICS	POINTS EARNED	COMMENTS
Introductory Paragraph **Possible Pts.** _____	Student provided appropriate summary heading; appropriate Journal/Article Reference is included; author's name is included; student presented the main point/thesis through the introduction.		
Main Ideas/Points Made in the Journal/Article **Possible Pts.** _____	Main ideas of the author were presented; student included only significant details from the writing; summary of ideas are proportionate to the context of the ideas in the original work; material presented is objective and void of student opinion.		
Language, Grammar and Spelling **Possible Pts.** _____	Student used present tense; student paraphrased author's main ideas; student quoted effectively but sparingly; student provided transitions from one idea to the next; student showed appropriate use of grammar; student checked spelling for appropriate usage.		
Personal Opinion Shared as Conclusion **Possible Pts.** _____	Student shared his/her opinion as a conclusion to the article; opinion expresses support or disagreement with the author's point-of-view; good summary statement.		

Journal/Article Summary "Cheat Sheet" of the
IMPORTANT COMPONENTS OF A SUMMARY

1. Include the thesis, or the main point, of the original in your first sentence.

2. Make it clear that you are summarizing early in the summary. When summarizing an article, you can introduce this information by including the name of the author and the title of the article in the first sentence. If you are summarizing a speech of a meeting, you can give credit in the opening sentence.

3. After you have determined the thesis, find the main ideas of the original. Look for the topic sentences that support the thesis.

4. Decide if your audience needs a few details or only the main ideas.
   a. For longer summaries, pick out only those details that are especially important.
   b. For short summaries, leave out all details.
   c. For abstracts, include only the most important general ideas. Be concise. Reduce the original to the thesis in a few sentences.

5. Reproduce the author's ideas in proportion to the original emphasis. If the author spent four paragraphs on one topic and two paragraphs on another, try to make your summary give equal time and emphasis. For example, you would not include more information from the two-paragraph topic than from the four-paragraph topic. You would keep your summary information proportional to the original.

6. Write in present tense.

7. Be sure to paraphrase, not copy word for word.

8. Quote sparingly, if at all, and use quotation marks correctly.

9. End on the same idea as the original.

10. Provide adequate transition to keep the summary from sounding choppy.

DO NOT include too many details.

DO NOT give your opinion about the information contained in the summary, unless asked to do so. A summary should be an objective presentation of what you read or what happened.

TO GET STARTED writing a summary, try one of these:
   1. If you are summarizing an oral presentation, take notes during the presentation or as soon after as you can. This way you are less likely to forget.
   2. If you are summarizing something written, read the document at least twice. As you read for the third time, cross out everything (all the details) except the main ideas. Paraphrase

what is left. For longer summaries, go back and choose a few important details to include. For abstracts, condense the paraphrased material.

PARAPHRASING:

1. Read the original carefully.
2. Put the original aside.
3. Write the idea in your own words.
4. Compare your version with the original.
5. Be certain you have used your own words and sentence structure and have accurately conveyed the author's idea.

BIBLIOGRAPHY:

JOURNAL/ARTICLE: For each source you consult, write the following information in the reference for the Journal/Article:

1. Author's Full Name (Last Name First)
2. Title and Subtitle of Article and/or Journal.
3. Publication Information: Volume Number, Publication Date, and Inclusive Page Numbers.

WEB ADDRESS: For a web address use the following:

1. Author's Full Name (Last Name First)
2. Title and Subtitle of Article and/or Journal
3. Copy of the complete web address for getting to the article (highlight and copy into your summary).
4. Date Article, and or Journal, was viewed on the Internet.

EXAMPLE:

Lahey, L. *"Still pushing paper at the office: Dell joins the race to service enterprise users' printing needs but one analyst thinks it's a 'silly' move – Personal Technology – Brief Article."* http://www.findarticles.com/p/articles/mi_m0CGC/is_8_29/ai_101196201, August 27, 2004.

Adapted from:
Mehlich, S. and Smith-Worthington, D. *Technical Writing for Success: A School-To-Work Approach.* Mason, OH, South-Western Educational Publishing, 1997.
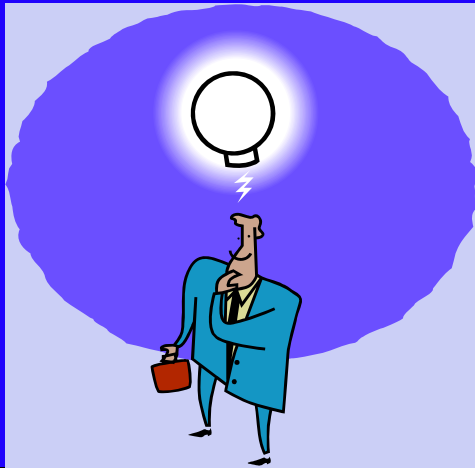
Senior Project Guidelines

Arcadia Valley Career and

Technology Center

Student Excellence Program

2004-2005

Arcadia Valley Career and Technology Center
Senior Project
Guidelines
2004-2005

The Senior Project at the Arcadia Valley Career and Technology Center is an opportunity for students to showcase her/his skills. Training is more than receiving instruction. The completion of training includes the application of the skills obtained. The Arcadia Valley Career and Technology Center offers all of its students the opportunity to showcase the individual talents she/he is developing while receiving instruction in our facility. Students should carefully plan for the Senior Project to enhance her/his individual portfolio to be used when seeking employment in their field of study.

There are five main areas of the Senior Project: *1. Proposal; 2. Materials and Supplies; 3. Planning; 4. Process; and 5. Product.* Each of these areas must be planned for in detail to ensure the success of the project. Thorough pre-planning will do a lot to guarantee the success of the project while the work is being completed. What follows is a brief description of the five main areas of the project and what is expected of the student in each of these areas.

PROPOSAL:
Every good project begins with a proposal. The proposal is the formation of the idea behind the project. The student must make a decision about what they would like to do and outline the steps that it will take to take the idea to a reality. Part of any planning stage is the need to obtain approval from the responsible parties. For the student the idea needs to be reviewed with her/his instructor to ensure that it is appropriate to the field of training. Additionally, students should make an initial contact with the responsible individual/group to make sure that her/his idea is possible for attempt.

Once these conversations are completed and the student has a good plan for the project they will need to develop the Senior Project proposal. This should be completed on the "Senior Project Proposal Form". The two main parts of this proposal are the project summary and the steps required for completion. These two items will give the student assurance that the project is reasonable and possible. Review the proposal with your instructor and the Contact/Supervisor to ensure that your plan is attainable. Submit your proposal for approval until you receive acknowledgement that all parts of the proposal are approved. Finally, document the date of approval on the "Senior Project Checklist".

MATERIALS and SUPPLIES:
All projects require a thought out list of needed materials and supplies. The Senior Project is no different. After the instructor has initially approved the proposal, begin to document all of the necessary materials and supplies you will need. Include the items that you will need that can be found in the classroom (all materials used for the Senior Project from the classroom MUST have pre-authorization from the instructor). Include the materials that will have to be purchased (this step is important for estimating the cost of the project for the Contact/Supervisor). Finally, include incidental type materials and supplies. Remember that 'nuts and bolts' will not

magically appear for your project. A good estimate includes necessary and incidental materials and supplies.

PLANNING:
This step is vital to a smooth transition from planning to implementation. Knowing when you can begin, what hours you can work, how long you plan on being at the facility and the hours you can work without interfering with normal business operations sets the pace for the employer/contractor relationship. By making sure that the planning information is clearly communicated between the student and the Contact/Supervisor will not eliminate all possible problems, but it will indicate the level of commitment the student has to her/his work and normal business operations.

The planning stage is also where the student should have completed the proposal form and submitted it to the Arcadia Valley Career and Technology Center. At this stage the student should carefully review the proposal form, making sure it is completely filled out, and then submit all documentation for the proposal, materials and supplies and planning stages of the project. This is the best time to place all documents in a notebook for safekeeping. Submitted materials will be returned after review and approval by the panel.

An important consideration in this stage should be the method the student will use to document her/his progress in the Process stage of the Senior Project. Digital photos, videotape, 35mm pictures, and other mediums should be considered. Knowing how you will record the progress of the project will enable you to make sure that the appropriate equipment is available for use during the next phase of the project.

PROCESS:
Now the student has reached the stage of implementation. Work will begin at the earliest part of this stage. The major focus during this phase of the project is recording progress for the final product. After all work is completed the student will need to obtain a final 'sign-off' on their work to show that the project has been reviewed, and approved, by the Contact/Supervisor. As is all real world situations, final approval is necessary to protect the contractor from being required to do more work than proposed originally.

PRODUCT:
In this stage the student gathers the information that she/he has been generating so far in the project and puts it together in its final presentation form. Once together, the student should work to put the final touches on the information to ensure that the record shows the total picture of her/his project. After completing this review the student is ready to submit the information for approval. Revisions may be required and should be completed, as necessary. Once final approval of the project is received the student should include the Senior Project in her/his portfolio of excellence.

Students needing special assistance, or alterations of required work, should review her/his plan with Ms. Barnhouse, or Mr. Ruhman, prior to beginning the Senior Project. Exceptions will only be accepted when **PRE-AUTHORIZED** by Ms. Barnhouse and/or Mr. Ruhman.

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Arcadia Valley Career and Technology Center
Senior Project
Proposal Form
2004-2005

Student Name:

Partnering Site/Organization:
Address:

Contact/Supervisor Name:
Phone Number: (   )   -
Email Address:

Summary of the Proposed Project:

Incremented Steps for Completing the Project:

(attach additional sheets, if necessary)

Projected Start Date:

Projected Hours for Completing the Project:
Contact/Supervisor Approval of Start Date:

Hours Contact/Supervisor Agrees for Student to Work:

Method to be used for recording project progress:

Instructor review period (must have a minimum of three reviews during the Process stage):

Review 1 Scheduled: _____

Review 2 Scheduled: _____

Review 3 Scheduled: _____

Additional Reviews Scheduled for: _____

Contract for Project:

We agree that _____ will completed the proposed project. All parties also agree to provide assistance for successful completion of the proposed project. Finally, it is understood that this is a student project and responsibility for completion of the project is primarily based on the student's initiative, work ethic and support of those listed in this contract.

_____   _____
Student Name   Date

_____   _____
Instructor   Date

_____   _____
Contact/Supervisor   Date

_____   _____
Mr. Ruhman   Date

_____   _____
Ms. Barnhouse   Date
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Appendix A

Vocabulary

A major aspect of technical writing is the identification and knowledge of the terminology of each vocational program. Each vocational teacher should:

- Identify the terms that are essential for their program
  - There should be about 200 terms for the entire two year program
  - The definitions should start with the textbook definition, but they should have additional information
  - Semester final exams should be based on the definitions covered during that semester

- Encourage students to learn the definitions by:
  - Keep their own list of the terms
  - Attempt to put the definitions in their own words
  - "Word walls" should be developed in the classroom and/or shop

- Develop terms for the vocabulary list based on the following categories:
  - Specific terms for the individual vocational program
  - Terms that all vocational students should know

- Develop tests that are multiple choice

- There should also be a list of terms that students can choose to define in their own words. This will be considered a two-part writing assignment for Technical Writing, the multiple choice series of semester exams and the four writing sections of the test where students provide the definition. The terms to define "In their own words" should be provided in advance and students should be able to choose something like 5 of 10 to define.

At this point teacher need to develop the list of terms identified by semester, with the current semester be Semester One. The following sections are examples of the terms for vocational classes.

Building And Grounds Maintenance Vocabulary List

Blue Print	Diagonal Pliers	Shingle	partition	condenser
Architectural	Straight Snips	Slope	rough opening	spark plug
Drawing	aviation Snips	Pitch	rafter	camshaft
Floor Plan	Speed Square	Span	truss	crank shaft
Symbol	Try Square	Oxboard	sheathing	flywheel
Foundation Plan	Combination	R-Value	framing hammer	Cement
Detail View	Square	Insulation	curved claw	Concrete
Elevation	C-Clamp	Roofing Nail	hammer	Lime
Plot Plan	Bar Clamp	Galvanized	Masonry anchor	Masonry
Dimensions	spade bit	Roof Felt	toggle bolt	Mortar mix
Door Schedule	anger bit	tappet	plastic anchor	Pre-mix
Building Code	perpendicular	Lifter	threaded anchor	Cement finisher
Window Schedule	level parallel	Lobe	ground fault	Brick Mason
Single Pole Switch	radial arm saw	valve train	interrupter	Re bar
3 Way Switch	miter saw	reed valve	ampere	Re wire
4 Way Switch	cross cut saw	Deflector	volt	Scaffold
Duplex Receptacle	hammer drill	cylinder	current	Forms
Carpenter	drill press	compression ring	conduit	grade stakes
Electrician	ripping	oil ring	tubing cutter	Screed
Plumber	plumb	intake stroke	breaker	Knee boards
Taper	squaring	power stroke	fuse	Pouring
Transit	countersinking	compression stroke	romex	Vibrating
Level (Tool)	sweating	exhaust stroke	gauge	Jitter bugging
Scaffold	threading	piston	ground wire	Floating
Masonry Bit	pipe compound	connecting rod	hot wire	Finishing
Twist Bit	teflon tape	end cap	neutral wire	Jointing
Open End Wrench	compression fitting	crank case	junction box	Edging
Box And Wrench	flare fitting	venturri	terminal loop	Troweling
Combination	shut-off valve	float	backwire	curing
Wrench	lavatory	Diaphragm	continuity	Bull float
Ratchet Wrench	water closet	gasket	neon tester	Hand trowel
Socket	ferrell	valve	volt-ohm meter	Power Trowel
Table Saw	s. trap	valve spring	friction	Cement edger
Circular Saw	p. trap	timing marks	oil dipper	Cement groover
Jig Saw	Micrometer	sole plate	oil slinger	Wall ties
Recipricating Saw	Veneer Caliper	Header	viscosity	Lead
Flaring Tool	Small Hole Gauge	trimmer	4 cycle engine	Corner Lead
Tubing Water	Telescoping Gauge	jack	2cycle engine	Closure Brick
Flux	Feeler Gauge	cripple	premix fuel	Course
Solder	Spark Plug Gauge	top plate	coil	
Faucet Wrench	Fly Wheel	double plate	contact points	

Auto Collision Repair

	Space-frame	Radiator support	Fascia
First Semester:	Sublet	Firewall	Decimal
Torque box	Unibody	Cowl panel	Fraction
Body	Labor rate	Header bar	Fractional-inch rule
OSHA	Front rails	Roof panel	Metric rule
Body Panels	Overlap	Outer quarter panel	Percentage
EPA	Rocker panels	Inner quarter panels	Ratio
Chassis	Rear rails	Rear lower panel	Whole number 38
Primary damage	A-pillars	Fenders	Frame stands
Frame	B-pillars	Hood	Jack stands
Secondary damage	Floor pans	Doorskin	Jacking
Frame-body	Trunk floors	Doorshell	Lifting
construction	Glass	Decklid	Pinchweld
Interior trim	Inner fender	Bumpers	

Child Care I Vocabulary List

Concepts	Imitation	Intelligence	Articulation	Speech therapist
Creativity	Incidental	Trail – and –	Flammable	Ambidextrous
Directed learning	learning	error learning		Dexterity

Enuresis
Group identification
Self esteem
Moral development
Dramatic play
Finger play
Attention deficit
Hyperactivity disorder {ADHD}
Dyslexia
Gifted children
Learning disability
Allergy
Communicable diseases
Immunize
Infant mortality rate
Nontoxic
Vaccine

Artificial respiration
Convulsion
CPR – cardiopulmonary resuscitation
Fracture
Heimlich maneuver
Poison control centers
Empathy
Therapist
Child abuse
Crisis nurseries
Joint custody
Anecdotal record
Baseline
Confidentiality
Developmental checklist
Frequency count
Interpret
Objective

Running record
Subjective
Learning centers
Time-out
Transitions
Child Care I 2nd semester

Early childhood
Nanny
Licensing specialist
Attachment behaviors
Deferred imitation
Development
Development scales
Fine motor development
Gross motor development
Infant

Intellectual development
Motor sequence
Object permanence
Reflex
Physical development
Preschooler
Separation distress
Social - emotional development
Temperament
Toddler
Expressive language
Gender roles
Language comprehension
Articulation
Rote counting
Stuttering

Consistency
Flexible rules
Limits
Rules
Dramatic play
Sensory play
Active listening
Direct guidance
Encouragement
Guidance
Ignoring
Indirect guidance
Listening
Modeling
Observation
Persuading
Praising
Promoting
Redirecting
Suggesting
Warning

Graphic Communications Vocabulary List

absorption
activator
additives
angstrom
ascender
autotracing
backup
binary
binding
bitmap
bleed
brayer
brightness
calibrate
caliper
caps
case
CD-ROM
CD-RW
chalking
characters
collate
colorant
colorfastness
composition
compression
contact
contrast
copyright
cutting
definition
design

digital
drawdown
dry
dummy
duplicate
editing
embossing
emulsion
entrepreneur
f-stop
film
filter
finishing
fixer
font
frequency
gamma
gigabyte
halftone dots
hard copy
highlights
hinting
hue
illustrations
imagesetter
infringement
inkometer
internet
italic
jaggies
job
jog

journeyman
justify
keyboard
knockout
laminating
layers
layout
light table
line art
lithography
lowercase
magnifiers
makeup
manuscript
masks
matrix
maximum
resolution
megabyte
memory
midtones
modem
monochromatic
monotype
mouse
nanometer
network
nonimaging
nonpareil
numbering
object-oriented
oblique

off color
offset printing
on-demand printing
opacity
opaque
optical character readers
original plate
out-of-register
output device
outsourcing
overlay
overprinting
overrun
packing
page composition
paint
palette
paste-up method
perforating
petrochemicals
phosphor
photocomposing
photoconversion
photographic masking
photometer
pica
picking
pigments
pinholes

pixel
pixelize
plastic comb binding
plate
platesetter
platform
point
polymerization
positive-working
Postscript
Ppi
Preflighting
Prepress
Preservative
Press proofs
Pressrun
Principles of design
Primary colors
Printability
Process camera
Process colors
Productivity
Proof
Proofreader's marks
Proofreading
Proportional scale
Puches
Quad

RAM	Ribbons	Set	Stabilizer	Uppercase
Raster	Roman	Shade	Stamping	Value
Readability	Rosettes	Show-through	Step-and-repeat	Vector
Reader	Rotofilm	Signatures	Stereotype	Washup solvents
Ream	Rough layout	Sizing	Stop bath	Watermark
Reduction	Run length	Slurring	T-square	Window
Register marks	Safelights	Software	Template	Work-and-tumble
Registration	Saturation	Spatial	Text	Workmarks
Regulator	Scanner	resolutions	Thinners	Zero-speed
Resolution	Scoring	Spellcheck	Tinting	splicer
Retouching	Screen printing	Spiral binding	Toner	
Reverse type	Script	Spread	Tooth	
Rhythm	Separation plates	Squeegee	Unity	

Automotive Mechanics Vocabulary List

Coefficient of friction	Boiling Point	Circuit	Specific Gravity	Steering play
Brake Fading	Contamination	Current	Sulfuric Acid	Wander
Brake Lining	Department of Transportation	Electrical Control	Battery Load Test	Cassellated nut
Brake pad	Denatured Alcohol	Electrical Load	Battery Starter Tester	Pickle fork
Brake Shoe	Hygroscopic	Electrons	Carbon Pike tester	Pitman arm puller
Calipers	Inert	Electromotive force	Hydrometer	Self locking nut
Disc Brakes	Toxic	Electron pump	Inductive Probe	Taper blanker
Drum Brakes	Vapor Point	Free Electron	Open Circuit	Toe
Kinetic Energy	Pressure	Molecules	Voltage test	Aeration
Kinetic Friction	Bleeder	Nucleus	Specific Gravity	Ball joint
Static Friction	Bleeder hose	Ohm	Electromagnet	Control arm
Combination Value	Bleeder Value	Ohm's law	Field Coils	Coil spring
Differential	Bleeder wrench	Protons	Magnetic Poles	Independent suspension
Pressure Value	Brake Bleeding	Repulsion	Relay	Jounce
Hydraulic Pressure	Spongy Radar	Resistance	Sozenoid	Kingpin
Muster Cylinder	Undercoating	Volts	Ball socket	Leaf spring
Asbestos	Vacuum	Surface Charge	Center link	Mac-Pherson strut
Brake Backing Plate	Encapsulation	Sulfation	Control valve	Rebound
Dissipate	Brake Fade	Volts Amp tester	Idler arm	Ride height
Fixed caliper disc brake design	Brake Pedal	Armature	Pitman arm	Shock absorber
Floating Caliper disc Brake design	Free Play	Brush	Power cylinder	Spindle
Friction Material	Brake wear indicators	Ambient Temperature	Power steering	Sprung weight
Friction Surface	Rotor	Ampere Hour	Steering pump	Stabilizer bar
Primary Brake shoe	Parallelism	Battery Capacity	Rack and penion steering	Steering Knuckle
Rotor	Rotor Run out	Discharge	Steering column	Straight axel
Secondary Brake Shoe	Power Brake System	Electrode	Gear Lash	Strut rod
	Pressurized	Electrolyte	Power steering fluid	Torsion bar spring
	Warping	Element	Pull	Twin I-Beam axel
	Ampere	Hydrogen gas	Shimmy	Unsprung weight
	Atom	Lead	Steering chunk	
	Attraction	Lead dioxide		
	Conductor			

Camber
Caster
Steering axis inclination (SAI)
Included angle
Thrust angle
Set back
Aluminum alloy
Bearing
Cam
Cast aluminum
Cast iron
Cooling system
Crank
Cycle

Cylinder
Diesel engine
Forged steel
Fuel
Gasoline engine
Camshaft
Choke
Coking
Compression
Connecting rods
Coolant
Coolant recovery

Crank ease
Crankshaft
Cylinder
Cylinder blow by
Disable
EGR value
Emission control system
Engine analyzer
Engine compartment
Engine conditioning
Freeze plugs

Fuel pump
Intake manifold
Oil pan
Oil pump
PCV system
Piston
Piston Pin
Primary ignition circuit
Radiator
Rocker arm cover
Rod bearing and journal

Secondary Ignition Circuit
Sender Unit
Short block assembly
Timing chain/ belt
Water pump
Front wheel drive
Rear wheel drive
Transaxles

Welding Technology Vocabulary List

Capillary
Ferrous
Nonferrous
Base metal
Fusion
Filler metal
Hydrogen— (h)
Melting point
Natural gas
Electrode
Arc
Acetylene
Flux
High-purity welds
Inert gas
Hydrocarbon
Ionized gas
Metal deposition
Welding
Propane
Plasma
Work piece
Scavenger
Oxygen—colorless
Flat
Flat butt
Flat lap
Flat tee
Horizontal
Horizontal Butt
Horizontal lap
Horizontal tee
Vertical up
Vertical butt
Vertical lap

Vertical tee
Vertical down
Vertical butt
Vertical lap
Vertical tee
Overhead
Overhead butt
Overhead lap
Overhead tee
Oxy-acetylene
Submerged arc
Gas tungsten
Shielded metal arc
Gas metal arc
Brazing
Base metal
Fusion welding
Interpass heating
Oxyacetylene welding
Oxy-fuel welding
PSI
Penetration
Postheating
Preheating
Postheating
Stress relief
Tack weld
Welding torch and mixer components
Parts and functions of a welding torch
Torch handle

Welding head or tip
Mixer types and purposes
Medium or equal-pressure type
Injector type
Drag line
Kerf
Slag
Tinning
Flux
Oxidation
Scale
Machining
Oxidizing flame
Carburizing flame
Gouging
Oxygen displacement
Toxic Hazard
Contaminants
Weld axis
Root pass
Hot pass
Filler pass
Cap pass
Basic circuit
Polarity
Alternating current(AC)
Direct current(DC)
Direct current, straight polarity(DCSP)

Direct current, reverse polarity(DCRP)
Electrode selection
Welding speed
Joint preparation
Fit-up
AC transformer
DC transformer
AC or DC transformer-rectifier
DC generator
Cables
Clamps
Electrode holders
Contaminants
Duty cycle
Gas metal arc welding(GMAW)
Metal inert gas(MIG)
National Electrical Manufacturer's Association(NEMA)
Oxygen displacement
Toxic hazards
GMAW machine controls and functions
Coolant solenoid
Electrode stickout(ESO)

Flow meter regulator
Gun and cable assembly
Gun-trigger-operated
Power supply
Wire feeder
GMAW electrical controls and functions
On-off switch
Voltage range selector
Fine voltage control
Power supply voltmeter
Power supply ammeter
Slope
Polarity switch
Contactor
Inductance
Wire feeders
Controls and functions
On-off switch
Amp/ipm
Contractor dropoiut
Spot weld function
Purge
Wire-inch switch

Wire feed volt and ammeters	Tungsten inert gas(TIG)	Interpass heating	Types of mechanical	Principal alloying agents of steel
Remoteunit	Heliarc	Metallurgy	strengths	Chromium
Reverse control	Shielding gases	Postheating	Tensile	Nickel
Gas metal arc welding(GMAW)	Inert	Preheating	Compressive	Molybdenum
Inductance	Nonconsumable	SAE	Shear	Vanadium
Metal inert gas(MIG)	Deposition rate	Strain-hardened	Torsional	Carbon
Short-circuit transfer	Ar	Weldment	Physical properties of metals	Tungsten
Slope	He	Mechanical properties of metals	Density	Silicon
Slope control	Cfh	Hardness	Electrical conductivity	Manganese
Flux-cored arc welding(FCAW)	Contamination	Strength	Thermal conductivity	Cobalt
Self-shielded	EWP	Ductility	Thermal expansion	Identifying metals by appearance
Dual-shielded	EWTh	Malleability	Melting point	Low, medium and high carbon steel
Semi-automatic	EWZr	Brittleness	Annealing	Manganese steel
Automatic	Amps	Elasticity	Critical Point	Stainless steel
Duty cycle	Volts	Plasticity	Hardening	Cast iron
Gas tungsten arc welding(GTAW)	AA	Fatigue	Tempering	Wrought iron
	AISI	Impact resistance		Aluminum
	Compatibility	Elongation		Copper
	Extruding			Nickel
	Filler metals			
	Heat-affected zone			

Computer Repair and Networking Vocabulary List

Adaptor	Cable	Port	Degauss	Segmentation
Amp	Gigabit	Power	Cylinder	Routing
Application	Hardware	Printhead	Crosstalk	Repeater
Binary	Hertz	Printwire	Console	Redundancy
Boot	Icon	Prompt	Cluster	Queue .
Browser	Interface	Proxy	Broadcast	Pipelining
Bus	Internet	Refresh	Brownout	Pipeline
Bytes	Interrupt	Registry	Bootstrap	Parity
Capacitor	Intranet	Resistor -	Blackout	Overvoltage
Chipset	Jumper	Router	Baud	Overdrive
Circuit	Keyboard	Standard	Bandwidth	Overclocking
Clone	Kilobyte	Switch	Backbone	Multicast
Computer	Megabyte	Topology	Attenuation	Metric
Connector	Megahertz	Transistor	Address	Mask
Continuity	Memory	Conflict	Architecture	Latency
Current	Microprocessor	Window	Asynchronous	Link
Data	Modem	Mesh	Watt	Keyed
Desktop	Monitor	Message	Traceroute	Infrared
Disk	Motherboard	Loop	Token	Hop
Driver	Mouse	Interlacing	Timeout	Hot
Virus	Path	Hub	Tick	Gateway
Explorer	Partitioning	Firmware	Throughput	Header
Extension	Patch	Grounding	Telnet	Flooding
File	Input	Gigahertz	Switching	Designer -
Filename	Picoseconds	Folder	Surge	Connectionless
Font	Ping	Filter	Subnet	Compression
Format	Pixel	Encryption	Socket	Carrier
Fragmentation	Platter	Dongle	Session	Caddy

Broadband	Baseline	Exabyte	Payload	Simplex
Bridge	Brainstorming -	Heaps	Pits	Spoofing
Baseband	Bridging	InfiniBand	Raster	Signaling
Backplane -	Caching	Interleaving	Ream	Trailer
Authentication	CardBay	Keepalive	Reassembling	Trap
Acknowledge	CardBus	Layering	Redirect	Tunneling
Client	Checkbox	Load	Reliability	Unicast
Coding	Congestion	Master	Ring	Wildcard
Flow	Decoder	Multiplexing	Sag	E-mail
Frame	Demarc	NetWare	Scalability	Petabyte
Backoff	Downstream	Octet	Segment	Host
Bank	Encoding	Page	Server	Zone

Business Mathematics Vocabulary List

Employees	Cash payments	Ordinary interest	Internet Service	Additional Living
Employer	records	method	Provider	Expense
Hourly rate	Grand total	Banker's interest	Access Fees	Personal Liability
Gross pay	Budgets	method	Online	Medical Payments
Salary	Deposit slip	Banker's year	Cable Connection	Premium
Average	Check register	Bank discount	Dial-up	Rider
Time-and-a-half pay	Balance	Noninterest-bearing	Digital subscriber line	Deductible
Overtime	Electronic funds	note	connection	Coinsurance Policy
Double-time	transfer(EFT)	Discounting a note	Satellite Connection	MSRP
Commission	Automatic teller	Rate of discount	Hackers	(Manufacturer's
Straight commission	machine(ATM)	Proceeds	Firewall	Suggested Retail
Quota	Direct deposit	Down payment	Kbps	Price)
Graduated	Debit card	Installment contract	Mbps	Base Price
commission	Online banking	Installment plan	Bits	Purchase Price
Piece-rate	Service charge	Finance charge	Download	Delivered Price
Per diem	Bank statement	Installment loan	Upload	Resale Value
Tip	Outstanding checks	Level payment plan	Byte	Trade-in Value
Gratuity	Interest	Simple interest	Down Payment	Average Annual
Deductions	Transaction	installment loan	Mortgage Loan	Depreciation
Withholding taxes	Compound amount	Rule of 78	Principal	Straight-line Method
Withholding	Compound interest	Finance charge refund	Closing Costs	Rate of Depreciation
allowance	Certificate of	Annual percentage	Points	Uninsured Motorists
Employee benefits	deposit(CD)	rate(APR)	Fixed Rate Mortgage	Insurance
Fringe benefits	Term	Truth in Lending Act	Variable Rate	Lease
Job Expenses	Maturity date	Amount financed	Mortgage	Residual Value
Net job benefits	Effective Rate of	Finance charge	Amortized	Life Insurance
Gross income	Interest	Periodic rate	Depreciation	Premium
Adjusted gross	Promissory note	Previous balance	Loss of Income	Term Life Insurance
income	Interest	method	Equity	Permanent Life
Taxable income	Interest-bearing note	Average daily balance	Security Deposit	Insurance
Deductions	Collateral	method	Property Taxes	Straight Life
Standard deduction	Home equity loans	Cash advances	Assessed Value	Insurance
Exemption	Home equity	Sales tax	Homeowners	Universal Life
Earned Income	Principal	Subtotal	Insurance	Insurance
Unearned Income	Time	Cash Register Receipt	Dwelling	Cash Value
Flat Tax	Rate of interest	Sales Slip	Other Structures	Health Insurance
Cash receipts records	Maturity value	Unit Price	Personal Property	Group Health
	Exact interest method	Extension		Insurance

Hospitalization Insurance	Rectangle graph	Ordering costs	Markup pricing	Accounts receivable(A/R)
Surgical Insurance	Consumer Price Index (CPI)	Carrying costs	Price lines	Current A/R
Medical Insurance	Base period	Raw materials	Markdown	Long-term A/R
Major Medical Insurance	Purchasing power of the dollar	Direct labor costs	Marked price	Liabilities
Annual deductible	Unemployment rate	Factory overhead	Discount	Accounts payable(A/P)
Amount	Labor force	Prime cost	Respondents	Creditors
Coinsurance	Computer hardware	Total manufacturing cost	Sample population	Current A/P
Disability Insurance	Storage media	Break-even point	Sample	Long-term A/P
Short-term Disability Insurance	Bytes	Fixed costs	Population	Capital
Long-term Disability Insurance	Site license	Variable costs	Demographic data	Current ratio
Worker's Compensation Insurance	Total cost of ownership	Book value	Forecasts	Debt-to-Equity ratio
Bonds	Outsourcing	Declining-balance method	Trend	Return on equity
Bondholders	E-business	Modified accelerated cost recovery system(MACRS)	Market tests	Bankrupt
Premium	Web-hosting companies	Class life	Surveys	Insolvent
Discount	Hit	Freight	Sales force projections	Secured creditors
Market Value	Home coverage area	Free on board(f.o.b.)	Management opinion	Claim percent paid
Full Service	Roaming charges	Travel expenses	Market	Gross domestic product(GDP)
Broker's Commission	Airtime	Per diem	Market share	Per capital GDP
Current Yield	Pager	Reimburse	Advertising	Per capita
Dividends	Exempt employees	Bar codes	Target audience	Domestic business
Preferred Stock's	Nonexempt employees	Proving cash	Media	International business
Mutual Fund	Executive recruiters	Cash proof form	Print ads	Foreign trade
Net Asset Value	Contingency fee	Cash short	General ads	Exporting
No-load Funds	Retainer fee	Cash over	Display ads	Importing
Load Funds	Contract employees	Change fund	Column inch	Balance of trade
Redeemed	Cost-of-Living Adjustment(COLA)	Sales invoice	Page size	Trade surplus
Capital Investment	Retroactive pay	Purchase invoice	Frequency rate	Trade deficit
Individual Retirement Account	Bonus	Credit memo	Reach	Foreign debt
Defined Contribution Plans	Profit sharing	On account	Income statement	Foreign exchange rate
Defined Benefit Plans	Part-time employees	Customer account	Sales returns and allowances	Exchange rate
Central tendency	Stock	Sales invoice	Cost of goods sold	Time zones
Mean	Inventory	Purchase order	Beginning inventory	Prime meridian
Median	Stock record	Total due	Ending inventory	Fahrenheit scale
Mode	Perpetual inventory	Cash discounts	Gross profit	Celsius scale
Range	Reorder point	Credit period	Net income	Metric system
Frequency distribution	Lead time	Terms of sale	Operating expenses	Customary system
Random sample	Daily usage	Invoice price	Net profit	Meter
Vertical bar grape	Safety stock	Trade discounts	Net loss	Area
Horizontal bar grape	First In, First out(FIFO)	List price	Gross profit margin	Square meter
Line graph	Last in, Last out(LIFO)	Invoice price	Net profit margin	Liter
Circle graph	Weighted average	Discount series	Merchandise turnover rate	Gram
		Single discount equivalent	Partnership	
		Marup	Proprietorship	
		Margin	Balance sheet	
			Assets	
			Current assets	
			Long-term assets	

Office Technology Vocabulary List

Bold	Cell	Cell reference	Center align	Change case

Character	background	confidential	proprietary	Indexing
Clipboard	button	corporation	information	Individual Folder
Close	camcorder	Deductions	reliable	Informational
Column	CD-ROM	demographic data	revenue	Overload
Copy	Compact Disk(CD)	desktop publishing	single proprietorship	Interview
Cut	currency	Direct deposit	software	Itinerary
Default	date/time	diversity	state-of-the-art	Job termination
Dialog box	DPI	Documentation	Storyboarding	Mailing list
Document	entry	ecommerce	Telecommunications	Minutes
Double spacing	field format	e-mail	Telephony	Mobile File
Extension	field name	employee	total quality	Name File
File	field size	empowerment	management	Numeric File
File name	field type	Enunciation	transaction	OUT Folder or Guide
Find	fields	expense	Videoconferencing	Parcel post
Footer	fixed	firewall	Voice mail	Parliamentary-
Format	form	Fiscal year	wide area network	Procedures
Formula	hyperlink	freelancer	word processing	Passport
Formula bar	Hypertext	global marketplace	World Wide Web	Postage meter
Function	long integer	Gross salary	Agenda	Priority mail
Graphs	memo	hardware	Annotate	Records Disposition
Grid	multimedia	HTML	Back Up	Records Management
Header	number	information	Brainstorm	Software
Italic	number	information-	Business attire	Records Management
Justified alignment	OLE object	management	Carpal Tunnel	System
Label	pixel	information-	Syndrome	Registered mail
Left align	presentation	processing	Certified mail	Routing slip
Margins	primary key	initiative	Chronological File	Schedule
Menu	query	Internet	Coding	Appointments
New	Record	Internet service	Computer-Assisted	Secondary Storage
Open	scanner	provider	Retrieval	Sexual harassment
Page break	single	intranet	Confirmation Number	Shelf File
Paste	slide	liabilities	Consensus	Social Security Act
Preview	slide transition	local area network	Copyright Laws	Standard envelope
Print	stationary	mailing list	Cross-Reference	Standard mail
Range	table	modem	Directory	Task List
Redo	text	negligence	Downsize	Teleconference
Replace	text box	Net pay	Employee handbook	Telegram
Right align	yes/no3rd Semester	Netiquette	Employment	Tickler File
Row	Accounts payable	newsgroup	discrimination	Time Management
Save	Accounts receivable	Nonverbal	Ergonomics	Travel Documents
Save As	Appendix	communication	Ethics	Travel Expense
Single spacing	aptitude	office	Etiquette	Report
Spell checker	assets	overhead	Express mail	Travel Folder
Spreadsheet	Audit	Overtime	File Cabinet	Vaccination
Subscript	Automated attendant	Owner's equity	File Path	Verbatim
Superscript	Bank reconciliation	partnership	File Security	Visa
Text	Bank statement	Payroll	Filing	Volume mailing
Thesaurus	Budget	Petty cash	First-class mail	Window envelope
Underline	Call forwarding	priorities	General Folder	Work ethic
Undoanimation	code of ethics	proficiency	Geographical File	ZIP code
audio clip	Commission	profit	Inactive Records	
autonumber	computer virus		Index Records	

MA 1A /AGCO/	Mathematics Embedded Credit
Arcadia Valley Career and Technology Center	**Last Update: September 2004**
Topic: Integers	**Focus: Order of Operations**

Show-Me Standards: MA1, MA5	**MO Grade Level Expectations: N2b9, N2C9**	**NTCM Standard: 2A**

OBJECTIVE: Students will be able to use proper order of numeric operations to solve and/or simplify arithmetic and algebraic problems.

Introduction: When working with an arithmetic expression such as $12 + 3 / 5$, or an algebraic equation such as $3x + 9 = 18$, there is an established order for the arithmetic operations to be performed. If the proper order of operations is not followed, an incorrect answer may result.

When solving, or simplifying, an arithmetic expression, the following order of operations needs to be followed. Each level will be repeated until that operation is no longer used.

RULES FOR ORDER OF OPERATIONS

Operations *MUST* be performed in this order:

 📖 Start with grouped symbols, starting with the innermost parentheses and working

  outward.

 📖 Next, perform powers and roots in any order.

EXAMPLE:

Simplify the following: $4 - 3^2 - (3 - 2^2 + 1)$

Step #1: Work inside the parentheses. $(3 - 2^2 + 1) = (3 - 4 + 1) = (-1 + 1) = 0$

Step #2: Work out powers and roots. $4 - 3^2 - 0 = 4 - 9 - 0$

Step #3: Addition and subtraction in order from LEFT to RIGHT. $4 - 9 - 0 = -5 - 0 = -5$

GUIDED PRACTICE:

1.) $\dfrac{25 \bullet 3 + 25}{5}$ = _____

2.) $\dfrac{9 + 3 \bullet 2}{6}$ = _____

3.) $(5+3)^2 + \dfrac{144}{12} =$ _____   4.) $32 + 5 \bullet (90 - 45 \bullet 2) =$ _____

5.) $15 - 3 \bullet 2 + (\dfrac{8}{4})^2 =$ _____   6.) $3^2 + 3^3\!/\!9 + 72\!/\!(5+4) =$ _____

When solving algebraic equations, the order of operations will be reversed. This reversal of the order of operations allows the process of simplification to work. This topic will be explained later in lesson **MA 6A (Basic Algebra: Evaluate Expressions).**

See "***RULES OF POWERS***", pg. 198; "***RULES OF ROOTS***", pg. 199; "***RULES OF GROUPING SYMBOLS***", pg. 201-202 and "***ORDER OF OPERATIONS***", pg. 202 for additional help.
(Phagan, J. Applied Mathematics. The Goodheart-Wilcox Co., Tinley Park, IL, 2004.)

GUIDED PRACTICE:

1.) $\dfrac{25 \bullet 2 + 45}{5} =$ _____   2.) $\dfrac{12 + 3 \bullet 3}{6} =$ _____

3.) $(7+3)^2 + \dfrac{144}{6} =$ _____   4.) $32 + 8 \bullet (135 - 45 \bullet 2) =$ _____

5.) $15 - 3 \bullet 2 + (\dfrac{8}{4})^2 =$ _____   6.) $3^2 + 3^3\!/\!9 + 72\!/\!(5+4) =$ _____

MA 1B *AVCTC*	**Mathematics Embedded Credit**
Arcadia Valley Career and Technology Center	**Last Update: September 2004**
Topic: Integers	**Focus: Basic Operations**

Show-Me Standards: MA1, MA5	**MO Grade Level Expectations: N2B8, N3C8**	**NCTM Standards: 2A, 3A**

OBJECTIVE: Students will be able to solve problems using basic operations with integers.

Introduction: Integers are positive and negative whole numbers and zero. Rules for integers, once mastered, can also be applied to fractions and decimals. Important to your understanding of integers is the use, and concepts, of a number line. Negative numbers can be used to represent many things: direction, payment, loss, and temperature below zero degrees are a few examples of how negative numbers can be used in everyday living.

Mastering the rules for integers will allow you to solve problems using integers. In later lessons these same procedures will be applied to fractions, decimals and other types of equations. The most common problems with solving 'signed number' (integers) problems are recognizing the format for a negative number. Signed numbers, when negative, may be represented in the following ways: (-4); (⁻4), -4, and ⁻4. Notice that the negative sign may be raised as a 'superscript' or it may remain on the level of the number. Technically, an integer is a negative number if it is represented with a 'superscript' and a 'minus sign' if the integer is not represented with a 'superscript'. You can treat integers represented either way the same, however, without changing the results of the problem. Positive integers are usually NOT represented with the "+" sign. Basically, the world works under the assumption that this sign is understood to be there.

ADDITION RULES:
If the sign of the numbers is the same, add them and keep the common sign.
If the sign of the numbers is different, subtract the smaller number from the larger number and keep the sign of the larger number.
SUBTRACTION RULES:
Change the operation (the "-" sign) to addition and change the sign of the second number. Then follow the rules for addition of integers.
MULTIPLICATION/DIVISION RULES (they are the same):
If the signs are the same, or there is an even number of elements, the answer is positive.
If the signs are different, or there are an odd number of elements, the answer is negative.
MULTI-STEP PROBLEMS:
Treat them the same as a series of one- step problems using the rules stated above.

Many problems in the workplace require several steps to resolve. The key to solving multiple step integer problems is to work them one step at a time. It is recommended that you solve multiple step problems using the one-step method and re-write the problem each time. Many times multiple-step problems are solved incorrectly by an omission of a step as one tries to work the problem "in your head". The method that is demonstrated below (the second example) applies for integers, decimals and fractions. The method used will also work in solving word

problems, with a little effort to get the formula out of the wording of the problem. Remember, solving problems like those in the examples below are just for practice; the real world is almost always made up of verbal and/or written word problems.

PRACTICE PROBLEMS:

One-step: $12 + (-10) = 12 - 10 = 2$ $\qquad \dfrac{-32}{4} = -(\dfrac{32}{4}) = -(8) = -8$

Multiple-step: $12 \bullet -3 + \dfrac{24}{-6} = -36 + \dfrac{24}{-6} = -36 + (-4) = -36 - 4 = -40$

$\dfrac{125}{-25} + -8 = -(\dfrac{125}{25}) + -8 = -5 + -8 = -5 - 8 = -13$

PROBLEMS:

a. $-5 + {}^-8 = $ _____

b. $64 + ({}^-32) = $ _____

c. $45 - {}^-13 = $ _____

d. ${}^-84 - 38 = $ _____

e. ${}^-98 - (-15) = $ _____

f. $6 \bullet {}^-3 = $ _____

g. ${}^-12 * 5 = $ _____

h. ${}^-3 \bullet {}^-6 = $ _____

i. $\dfrac{12}{{}^-3} = $ _____

j. $\dfrac{{}^-25}{{}^-5} = $ _____

k. ${}^-53 + {}^-45 / {}^-9 = $ _____

l. $10 * {}^-3 + 10 * 3 = $ _____

m. $14 + ({}^8\!/_{-4}) - 14 - {}^-5 = $ _____

n. $15 / {}^-5 \bullet (8 - {}^-5) = $ _____

o. $90 + -40 \bullet {}^-4 = $ _____

p. $32 - {}^-8 + ({}^{12}\!/_{-6}) \bullet {}^-2 = $ _____

q. $5 - {}^-5(6 - 8)^2 = $ _____

r. $3 + {}^-5 * ({}^{81}\!/_{-9}) = $ _____

See "***RULES OF ADDITION OF SIGNED NUMBERS***", pg. 192; "***RULES OF SUBTRACTION OF SIGNED NUMBERS***", pg. 192; and "***RULES OFMULTIPLICATION/DIVISION OF SIGNED NUMBERS***", pg. 195 for additional help.
(Phagan, J. Applied Mathematics. The Goodheart-Wilcox Co., Tinley Park, IL, 2004.)

MA 1C		Mathematics Embedded Credit
Arcadia Valley Career and Technology Center		**Last Update: September 2004**
Topic: Integers		**Focus: Word Problems**

Show-Me Standards: MA1, MA5, G3-4	MO Grade Level Expectations: N2D10, N3C9	NCTM Standards: 2A, 3A, 3B, 18A, 18B, 18C, 18D

OBJECTIVE: Students will be able to calculate solutions to whole number word problems using basic operations.

Introduction:
Word problems often appear to be complicated. The importance of word problems cannot be overstressed. The majority of real-world math problems are calculations phrased in written, or spoken, word problems. Very seldom will an individual be given a sheet of math calculations to solve while "on-the-job". One of the better ways to solve word problems is like any other activity where excellence is desired: PRACTICE. Throughout these lessons, we will attempt to place as many problems in a real world context as is possible.

The following steps will allow you to calculate the solutions to most word problems. Remember that the "real world" is not always neat and orderly. In some cases you will have to dig to find information needed to solve the problem that is presented.

STEPS TO SOLVING WRITTEN OR SPOKEN WORD PROBLEMS:
A. Read/listen to the entire problem or question.
B. Determine from the information what you are looking for.
C. Find/list out what is given to you in the presented problem.
D. Determine what operation, or operations, will be necessary to solve the problem.
E. Set up the mathematical representation of the problem using the given information and operations.
F. Perform the mathematical operations to solve the mathematical representation.
G. Determine if the answer is reasonable by estimation, and include the units in the answer.

Below you will find common terms used to describe basic operations. Some space has been left for you to add terms that you find that are not included in the chart.

Addition:	Subtraction:	Multiplication:	Division:
Sum	Difference	Product	Quotient
Total	Fewer	At	Divided into
In addition to...	Less than	Times	Per (=each)
Plus	Reduced	By	
Increase	Reduce	Rate	
More than...	Decrease	Per (=each)	
And			

Example:
The owner of the Day Care, where you work, wants you to calculate the cost of a new brand of diapers being carried at a local store. You are given the following information. The cost of a case of diapers is $41.88. Each case contains 6 packages of diapers. The Day Care owner has always bought diapers by the package. She is considering the purchase of cases, if it is cost effective. She wants you to determine the cost of the diapers so she can compare it to what she has been paying per package. What is the price per package of this brand of diapers prior to any state and local taxes?

What are you looking for?	Price per package of diapers in a case.
What is given?	One case of diapers has 6 packages and costs $41.88.
What operation(s) is/are needed?	Division
Set up the problem:	$41.88/6 = the price per package of diapers
Perform the operation(s):	$41.88/6 = 6.98
Determine if the answer is reasonable by estimation and include the units in the answer.	$42/6 = $7 per package $6.98 per package, "my final answer"

NOTE: ALWAYS remember to include units with your answer. Make sure you have the correct units. This part of the answer can change the entire problem!

PROBLEMS:
1. You have just purchases a used car and you desire to find an estimation of the gas mileage that the vehicle gets. The odometer reads 65787 after you fill the gas tank. You then drive the vehicle for four days. You need more gas so you go to a local gas station. The odometer reads 66177 when you put 26 gallons of gas in the car. What is the approximate gas mileage you are getting with this vehicle?

2. An auto collision and repair shop charges $465 for repairs to your car. The actual amount of labor paid to the employee was $196. Paint and materials cost the shop $67. Replacement parts were ordered at a cost of $110 to the shop. How much profit did the shop owner make on this repair?

3. A welder needs to cut a 28 ft. piece of steel into four-inch sections to meet a customer's specifications. How many sections of steel will the welder make while completing the job as specified by the customer?

4. A roofing contractor estimates 12 bundles of shingles for one section of roof, 15 bundles of shingles for another section of roof and 25 bundles of shingles for the final section of roof. Each bundle of roofing shingles will cost $19.95, nails for the entire project will cost $49.95, labor will cost you $15/hour for 6 people working 48 hours and miscellaneous materials and supplies will cost approximately $250. You are assigned to calculate the total cost of the project. What total would you tell the roofing contractor should be bid on the project?

5. An electric meter reads 14087-kilowatt hours used when the electric company employee reads it at the end of October. When the employee returns at the end of November, the meter reads 16897-kilowatt hours used. How many kilowatt-hours of electricity were used between the October reading and the November reading of the meter?

6. A customer brings a computer into you for repair. After determining the problem, you pull the part that needs to be replaced. In checking with the manufacturer, you are told that the part has a "limited warranty" that covers 25% of the replacement cost for the part at this time and all shipping costs. If a new part costs $198.50, what are you going to charge the customer, prior to any sales tax, if your labor costs are $75 for the work you did?

7. A mechanic buys a customers car for $2100 prior to any repairs. After sinking half the cost of the car into new parts, and $360 for labor, what price does the mechanic have to put on the car to make $600 profit?

8. You pay $9000 to take over a small business. Current debts at the time of the sale are $6500. At the end of the year, the store records operating expenses of twice the amount of the debts at the time of the sale. How much money must the store gross in this time period to break even?

MA 1E		Mathematics Embedded Credit
Arcadia Valley Career and Technology Center		**Last Update: September 2004**
Topic: Integers		**Focus: Personal/Business Finance**

Show-Me Standards: MA1, MA5, G4-8, G3-8	MO Grade Level Expectations: N2D10, N3B9, N3D10	NCTM Standards: 20A, 20B, 22A, 22B, 22C

OBJECTIVE: Students will be able to explain basic terminology of personal finance, perform mathematical operations with dollars and cents, estimate net income, calculate simple and/or compound interest on an amount of money, estimate monthly loan payments and apply percentages to figure merchandise pricing.

Introduction:
Applications of everyday problems of money are essential for success in the real world. Money is utilized in the purchase of merchandise, payment of labor and/or services and many other aspects of personal/business finance. Banks specialize in money matters and the business leader of today must be able to show good sense in personal and business finance to attract the assistance of these lending and savings institutions.

Definitions:
Gross Income: The money earned prior to payroll deductions and calculated by number of hours worked times the hourly rate. Can also be calculated as a salary in which case it is the yearly sum divided by the number of pays per year.
Net Income: The amount of money received after payroll deductions are withheld. The number of deductions is dependent on the individual's employment paperwork and/or benefits options.
Property Tax: A tax on the ownership of property – real estate and/or personal property.
Sales Tax: A tax placed, by the government, on goods and/or services.
Interest: Percentage of a sum of money that is saved or loaned. In a savings situation, the interest is paid to the individual. In a loan situation, the interest is paid to the lending institution.
Principal: Original amount of money loaned, or deposited, on which the interest is paid.
Interest Rate: The percentage applied to the principal.
Time: The duration, or period, for which the interest is compounding.
Simple Interest: Interest applied only to the principal of a savings account, or loan.
Annual Percentage Rate ("APR"): The average annual interest divided by the outstanding principal.
Retail Price: The amount charged to consumers in the retail stores.
Wholesale Cost: The price a store pays to buy an item.
Mark-Up: The amount the retail business adds to the wholesale cost to help in covering operating expenses and ensure a profit.
Discount: The amount subtracted from the retail price resulting in a lower price for sale.

FORMULAS:

Calculating Wages:

W x B = RTP, if hours > 40, then (**W** – 40) x 1.5 = **OP**

RTP + OP = WI

WI x 52 = AGI

Where: **W** = *Weekly Hours*; **B** = *Base Hourly Rate*; **RTP** = *Regular Time Pay*; **OP** = *Overtime Pay*; **WI** = *Weekly Income*; and **AGI** = *Annual Gross Income*.

Calculating Net Income:

GI – FT – ST – FICA – BC = NI

Where: **GI** = *Gross Income*; **FT** = *Federal Taxes*; **ST** = *State Taxes*; **FICA** = *FICA/Social Security/Medicaid Taxes*; **BC** = *Benefit Costs*; and **NI** = *Net Income*.

Calculating Total Price with Sales Tax:

RP x ST = TPP

Where: **RP** = *Retail Price*; **ST** = *Sales Tax* and **TPP** = *Total Purchase Price*.

Calculating Property Tax on a Home:

AV x R = PT

Where: **AV** = *Assessed Value*; **R** = *Rate*; and **PT** = *Property Tax*.

mil = mileage rate and is expressed as $1 for every $1,000 of home assessed value; or it can be stated that 1 mil = 0.001% of the home's assessed value.

Simple Interest Loan (Interest Due for Loan):

(P x APR) X LP = ID

Where: **P** = *Principal*; **APR** = *Annual Percentage Rate*; **LP** = *Loan Period* (*expressed in <u>years</u>*); and **ID** = *Interest Due*

Calculating Savings Account Balance:

ID = P x R, where **ID** = *Interest Due*; **P** = *Principal*; and **R** = *Rate*.

Calculate for each of the periods required to total the entire Savings Period (divided into the Compounding periods). **Each time remember**: *After calculating the interest due to you for the compounding period, the 'new' principal equals the Interest Paid + Previous Balance, then go back to the formula.*

Calculating a Monthly Payment:

(LA x APR) x LP = TP/mnths = MP

Where: **LA** = *Loaned Amount*; **APR** = *Annual Percentage Rate*; **LP** = *Loan Period* (expressed in <u>years</u>); **TP** = *Total Principal*; **mnths** = *Loan Period expressed as months*; and **MP** = *Monthly Payment*.

Calculating Wholesale Cost, Retail Cost, or Percent Mark-Up:
WC x PMU = RP

Where: **WC** = *Wholesale Cost*; **PMU** = *Percent Mark-Up*; and **RP** = *Retail Price*.
NOTE: **PMU is expressed as a whole + the percent.** [For Example: a 35% mark-up equals a PMU of 1.35; a 175% mark-up equals a PMU of 2.75; etc.]
Calculating Retail Price, Sale Price, or Percent Discount:

RP x PD = SP

Where: **RP** = *Retail Price*; **PD** = *Percent Discount*; and **SP** = *Sale Price*.
NOTE: **PD is expressed as 100% - the percent.** [For Example: a 35% discount equals 65% of the RP; a 15% discount equals 85% of the RP; etc.]
PRACTICE PROBLEMS:

	Weekly Hours	Base Hourly Rate	Regular Time Pay	Overtime Pay (@ 1 ½ rate)	Total Weekly Income	Annual Gross Income
1	35	$7.25				
2	37					$19,500
3	40				$340	
4	50	$16.00				
5	55		$260			

	Gross Income	Federal Tax	State Tax	FICA	Family Insurance	Net Income
1	$675 Weekly	$165	$34	$54.40	$46	
2	$35,200 Annually	35%	6%	8%	$1500	
3	$460 Weekly	25%	6%	8%	$25	
4	$46,800 Annually	$16,380	$2808	$3744	$1500	
5	$3875 Monthly	35%	6%	8%	$1500	

	Retail Price	Sales Tax	Total Purchase Price
1	$14.95	6%	
2	$298.50	6.25%	
3	$1,899.99	6.5%	
4	$15,990.00	7%	
5	$52,995.00	7.25%	

	Assessed Value	Mil Rate	Property Tax Due
1	$6,500.00	18.2	
2	$22,300.00	18	
3	$69,500.00	6	
4	$125,000.00	18.1	
5	$250,000.00	6.4	

	Principal	Loan Period (in months)	APR %	Interest Due
1	$250.00	12	8.25%	
2	$1,495.00	18	7.75%	
3	$22,540.00	48	6.25%	
4	$125,225.00	240	5.75%	
5	$375,000.00	360	4.95%	

	Savings	APR %	Compounding Period	Savings Period	New Balance
1	$1,250.00	2.25%	Quarterly	1 year	
2	$4,995.00	1.75%	Monthly	1 ½ years	
3	$1,795.00	3.25%	Quarterly	12 months	
4	$5,500.00	1.75%	Monthly	9 months	
5	$5,495.00	2.75%	Quarterly	3 months	

	Loaned Amount	APR %	Loan Period	Monthly Payment
1	$950.00	8.25%	1.5 years	
2	$6,950.00	7.75%	24 months	
3	$25,450.00	6.25%	5 years	
4	$78,300.00	5.75%	120 months	
5	$125,350.00	4.75%	25 years	

	Wholesale Cost	Retail Price	Percent Mark-Up
1	$19.95	$32.49	
2		$42.25	50%
3	$125.00		35%
4		$1,299.00	150%
5	$1,499.00		75%
	Retail Price	Sale Price	Percent Discount
1	$45.50	$38.50	
2	$129.95		25%
3		$319.00	1/3
4	$1,899.99		80%
5		$2,595.00	Half-price

Word Problems – Practice:

1. If 2 ½ pounds of fiberglass compound costs $14.85, what is the cost per pound?

2. A salesperson earns $7.25 per hour, plus 2.5% commission on all sales. If the total sales for this employee during a 35-hour workweek were $12,500, what was her gross pay?

3. A mobile home is valued by the local government at $19,500. The personal property tax in the area is 6.25% and the property tax is 6.5 mils. If the mobile home is considered personal property, what is the tax that the local government will charge the owner of the mobile home is it sits in a trailer park?

4. Someone deposits $75 per week into a savings account offering 2.25% interest compounded quarterly. What is the balance at the end of 1 year? (NOTE: 1 quarter = 13 weeks)

5. Principal Amount = $8000, APR = 7 ½ %, loan period is 18 months. Find the estimated monthly payment for the loan. Round to the nearest dollar.

MA 2A	AGTC	**Mathematics Embedded Credit**
Arcadia Valley Career and Technology Center		**Last Update: November 2004**
Topic: Fractions, Decimals, Percents		**Focus: Basic Operations – Decimals**

Show-Me Standards: MA1, MA5	MO Grade Level Expectations: N2D10, N3B9, N3D10	NCTM Standards: 2A, 3A

OBJECTIVE: Students will be able to solve problems using basic operations with decimals.

Introduction:
Decimal numbers are a standard practice in every aspect of our lives and work. The use of decimals is important in communication of fractions. The definition of a decimal can be stated as the portion of the whole amount available, added, or reduced. In like fashion a fraction is defined as a portion of the whole amount. Thus, decimals and fractions are similar. There are three ways that decimals are written: **Decimal Fraction**; **Decimal Number**; or **Decimal**. Other important items in dealing with decimals are:

- **Decimal System** – the system of numbers where each digit is assigned a value that is a multiple of 10 depending on the place or location of the digit in the complete number.
- **Digits** – any of the numerals 0 to 9 used to express a complete number.
- **Decimal Point** – the place where the complete number separates between a whole number and a fraction of a whole number. Thus, all decimal numbers can be expressed in terms of the total amount of wholes plus the fraction of a whole. **NOTE:** Numbers written without a decimal point are called whole numbers (or integers) – in these numbers the decimal point is assumed to come to the right of the last number.
- **Place Values** – the value of the location of a digit in a complete number. The place value determines the value of the digit.
- **Significant Figures** – are the figures of a number that begin with the first nonzero figure to the left and with the last figure to the right that is not zero, or is a zero.
- **Rounding** – is giving a close approximation of a number.

WHERE TO BEGIN:
- When working with decimal numbers it is **VERY IMPORTANT** to align the decimal points prior to completing any operations on the numbers. Example:

Good Form	*Poor Form*
12.345 + 9.85	12.345 + 9.85
126.487 - 9.1269	126.487 - 9.1269
12.5983 x 9.423	12.5983 x 9.423

- In multiplication of decimals, the answer will have the number of decimal places equal to the sum of the decimal places of the numbers being multiplied.

- In division of decimals, the decimal place is moved in the divisor so that a whole number is divided into the dividend – **REMEMBER**, the decimal place must be moved an equal number of spaces in the dividend at the same time. After

movement is complete, the decimal point is copied directly above the place it appears in the dividend and then division is completed.

  📖 Items to remember regarding a complete numbers "significant numbers":
- o Significant digits are counted in consecutive place from left to right.
- o All nonzero numbers are significant.
- o Zeroes are significant if they are between two nonzero digits.
- o Zeroes to the right of a number and to the right of the decimal point are significant.
- o Zeroes to the left of a number are not significant.
- o Zeroes to the right of a number and without a decimal point are not significant.
- o If a measured decimal number is multiplied or divided by a whole number, the measured number of significant figures is normally counted.
- o Most answers are recorded with the least number of significant digits.

  📖 Rounding Answers in another important step in working with decimal numbers. The rules for rounding are:
- o Determine the number of significant digits.
- o All digits to the right of the rounding number – the number that will determine if the last digit is increased, or decreased, are dropped off.
- o If the digit to the right of the last significant digit is five (5) or greater, then the last digit is increased by one. If the digit to the right of the last significant digit is less than five (5) then the digit remains the same.

PROBLEMS:

1.) $12.78 + 4.56$ 2.) $127.86 - 8.93$ 3.) $27.1983 + 9.302$ 4.) $8.375 -$
6.0092

5.) $9.502 * 6.25$ 6.) $10.75" \text{ x } 3.5"$ 7.) $9.25" * 6$ 8.) $16.215' \text{x}$
$8.402'$

9.) $2.5 \div 4$ 10.) $10 \div 2.5$ 11.) $125.75" / 5.5"$ 12.) $\dfrac{55.75'}{2.5'}$

WORD PROBLEMS:

1. A piece of carpet for your day care facility measures 144.50 inches in length and 48 inches in width is to be cut into 18 inch pieces for use as play areas for the children. How many pieces will be cut from the original piece of carpet? (NOTE: Answer should be in a decimal form.)

2. In building a piece of machinery, there are three parts manufactured that are welded together, one on top of the other, with no loss of length. If the three parts are 12.75 ft., 23.50 ft. and 21.25 ft., what is the height of the machine?

3. A sheet metal technician at an automotive collision and repair shop needs to cut an 88.75 ft. piece of steel into 9 equal sections. How long will each section be after they are cut figuring there is no loss of material for cutting?

4. A patient needs to be administered a medicine based on 0.25 mg. Per pound of body weight. If the patient weighs 178 lbs., how much medicine does the patient need to be administered?

MA 2B		**Mathematics Embedded Credit**
Arcadia Valley Career and Technology Center		**Last Update: November 2004**
Topic: Fractions, Decimals, Percents		**Focus: Basic Operations - Fractions**

Show-Me Standards: MA1, MA5	**MO Grade Level Expectations: N2B6, N2B7, N2B8, N2C9**	**NCTM Standards: 2A, 3A**

OBJECTIVE: Students will be able to solve problems using basic operations with fractions.

Introduction:
Fractions are historically one of the hardest forms of problems for students to solve. In the world of work, most problems involve a form of fraction in some way. You cannot make most measurements in the shop, the graphic arts classroom, or in the medical clinic without fractions being involve as a major part of what you are calculating. All vocational students need to have an accurate working knowledge of fraction problem solving. Future lessons will use a calculator to solve fraction problems; however, in the world of work a calculator may not always be readily available to the problem solver. A solid understanding of fractions will help the savvy employee keep on top of the calculations necessary for estimates and operations.

The following are important concepts to remember when working with fractions:
- Most fractions contain three parts: the Whole Number, the Numerator (the number located on the top of the fraction), and the Denominator (the number located on the bottom of the fraction).
  - **EXAMPLE:** 3 ¼ - the 3 is the Whole Number, the 1 is the Numerator, the 4 is the Denominator.

- It is usually best to write fractions as proper fractions before performing any calculations. Proper fractions are whole numbers and fractions where the numerator is smaller than the denominator.

  - **EXAMPLE:** $4\dfrac{10}{3}$ is an 'improper fraction'. The numerator (10) is larger than

    the denominator (3). Divide the numerator (10) by the denominator (3) and the

    non-remainder result should be added to the whole number (4). The remainder

    becomes the 'new' numerator and the denominator remains as it was originally.

    In this case the 'proper fraction' is $7\dfrac{1}{3}$ since 10/3 is 3 with a remainder of 1.

- Always reduce the fraction to the lowest form in calculating the answer. This is

  achieved by dividing the numerator and denominator by the same number.

  - **EXAMPLE:** $\dfrac{6}{8}$ can be reduced to $\dfrac{3}{4}$ since the 6 and the 8 are divisible by 2.

📕 There are several ways to handle the addition and subtraction of fractions, but the key is that the denominators are the same before performing the operations. Thus, you need to find the common denominator before you add or subtract. Once the common denominator is found you add or subtract the numerators and keep the common denominator. The next step is to reduce the fraction to its lowest form. If the numerator is larger than the denominator, the whole number is increased by the total whole numbers taken from the numerator.

    o **EXAMPLE:** $3\frac{1}{5} + 2\frac{2}{3}$ - the common denominator for 5 and 3 is 15, so the

        fractions are re-written as: $3\frac{3}{15} + 2\frac{10}{15}$ - then add the whole numbers and

        numerators (placing the 'new' numerator over the common denominator [in this

        case 15]) and re-write as: $5\frac{13}{15}$ - since 13 and 15 do not reduce, the problem is

        currently written in its lowest form.

📕 When multiplying fractions, the best way to proceed is to make the fractions into improper fractions and then multiply the numerators and then the denominators. After completing this step reduce until the fraction is in the lowest form.

    o **EXAMPLE:** $2\frac{1}{2} * 3\frac{2}{5}$ - change the fractions to 'improper fractions': $\frac{5}{2} * \frac{17}{5}$

        then multiply the numerators and the denominators to get: $\frac{85}{10}$ - which will

        reduce since 5 divides into both 85 and 10. The result is $\frac{17}{2}$ which can be

        reduced when 2 is divided into 17, the lowest proper fraction is $8\frac{1}{2}$.

📕 When dividing fractions, the best way to proceed is to make the fractions improper fractions and invert the second fraction (put the denominator on top and the numerator on the bottom) and then multiply the numerators and denominators. After completing this step reduce until the fraction is in the lowest form.

    o If you are to divide by a whole number: convert the whole number to a fraction by placing the whole number in the numerator position and placing 1 in the denominator position. Then follow the directions listed above.

    o **EXAMPLE:** $3\frac{2}{3} \div \frac{3}{4}$ - would be solved by converting the fractions to 'improper

        fractions': $\frac{11}{3} \div \frac{3}{4}$ - and then inverting the second fraction and multiplying the

fractions together: $\dfrac{11}{3} * \dfrac{4}{3}$ - which equals: $\dfrac{44}{9}$. Reducing this fraction to its lowest form results in $4\dfrac{8}{9}$ as the answer.

PROBLEMS:

1. $2\dfrac{3}{5} + 4\dfrac{2}{3}$	2. $2\dfrac{3}{8} + 5\dfrac{1}{4}$	3. $8\dfrac{9}{16} - 3\dfrac{1}{4}$	4. $2\dfrac{1}{2} - \dfrac{3}{16}$
5. $\dfrac{1}{2} * \dfrac{3}{5}$	6. $2\dfrac{1}{3} * 3\dfrac{3}{5}$	7. $2\dfrac{3}{8} * 4\dfrac{3}{4}$	8. $5\dfrac{7}{16} * \dfrac{1}{2}$
9. $2\dfrac{1}{2} \div \dfrac{4}{5}$	10. $\dfrac{3}{8} \div \dfrac{1}{2}$	11. $\dfrac{5}{16} \div \dfrac{1}{4}$	12. $5\dfrac{1}{2} \div 2$

WORD PROBLEMS:

1. In a stack of lumber there are 147 boards of dimensional lumber. $\dfrac{3}{7}$ of the boards are 2x4's. What fraction of the boards are other sizes?

2. A length of copper pipe $14\dfrac{3}{4}$ ft. long is cut into 5 equal pieces. How long is each piece, assuming no length is lost with each cut?

3. A case of paper costs $24. The project you are working on needs $3\dfrac{3}{4}$ cases of paper.

   The manager of the print shop asks you for an estimate on the cost of paper for the project. What do you present to the manager as the estimate for the cost of paper for this project?

4. In machining operations that use a rotating work piece, such as lathe turning, the reduction in diameter of the work piece is twice the depth of the cut. If a round aluminum shaft is reduced in diameter by $\frac{7}{16}$″, what is the total depth of the cut?

5. A patient needs to have $\frac{2}{3}$ oz. of juice with each 15 milligrams of a specific medicine. How many ounces of juice are needed for 75 milligrams of the medicine?

Appendix C

The following pages are the cross referenced vocational program competencies and the Technical Mathematics curriculum topics. Each Technical Math topic is identified using the labeling system from table I. If all the subsections of a topic are included in a vocational competency, the whole number designation is used to represent the entire topic. The teaching strategies are coded to the following definitions:

- C—Classroom. This strategy is the traditional teacher led classroom process. The vocational instructor will teach the topic to all students in the classroom setting.
- R—Resource. This strategy is designed for individual assistance using various classroom and building resources as outlined in the resource section.
- OJ—On the Job. This is the process of students using the math skill in the shop or during the creation of a project.
- OC—Out of Class. This strategy is for mathematical topics that are not embedded anywhere in the specific vocational program. Students will be provided additional lesson material for out of class work to prepare for the test and to learn the information.

Graphic Communications Math Competency Integration			
Group/No.	Competency Master Name	Math Topics	Strategies
A1	Demonstrate laboratory safety	na	
A2	Demonstrate toxic chemical safety	Na	
A3	Apply Material Safety Data Sheet (MSDS) requirements	5 b, 5 d	OJ, OJ
A4	Apply basic first-aid techniques	Na	
A5	Comprehend local, state, and federal guidelines and effects on the printing industry (e.g., OSHA)	Na	
B1	Check specifications and planning	5b, 5d	OJ, OJ
B2	Estimate job costs (e.g., space and utilities, labor and supplies, web vs. sheet fed)	2, 5 b, 5 d, 6 b,6 c,6 d	C, R, R,C,C,C
B3	Compute customer's cost (planning, scheduling)	2, 5 b, 5 d, 6 b,6 c,6 d	C, R, R,C,C,C
B4	Compare estimates with actual production costs	1,2	OJ,C
C1	Prepare a rough layout	7a, 7b, 7e, 8b, 8c, 8 d	C, R, R, C, C, C
C2	Indicate to layout person how photographs and headings are to be printed	7a, 7b, 7e, 8b, 8c, 8 d	C, R, R, C, C, C
C3	Indicate percentage of enlargement or reduction required on photos	8b,8c,8d, 2a,2c,6	C,C,C,C,C,C
C4	Indicate typefaces and point sizes to be used	8b,8c,8d	C,C,C
C5	Make dummy layout of multi-page printed product for signature specifications	7a, 7b, 7e, 8b, 8c, 8 d	C, R, R, C, C, C

C6	Indicate crop marks for pictures	8b,8c,8d	C,C,C
C7	Produce a comprehensive layout	8b,8c,8d	C,C,C
C8	Revise layouts to customer specifications	7a, 7b, 7e, 8b, 8c, 8 d	C, R, R, C, C, C
D1	Measure copy/text in points and picas using a line gauge	8b,8c,8d	C,C,C
D2	Identify x-height, base-line, ascenders, descenders and their roles in measuring and designing with type	8b,8c,8d	C,C,C
D3	Identify caps, lowercase, uppercase, small caps and ligatures	Na	
D4	Identify dingbats, bullets, rules and symbols and their uses in publications	1a,1b	OJ
D5	Distinguish between display (headline) type and body (text) type by their point sizes and styles	5b, 5d, 8b,8c,8d	OJ, OJ,C,C,C
D6	Explain the basic type styles and their uses	Na	
D7	Explain the "weight" and "posture" of type	Na	
D8	Define fonts and families	Na	
D9	Explain the letterspacing and kerning of type characters	8b,8c,8d	C,C,C
D10	Explain word spacing and the relation of em and en in paragraph spacing	8b,8c,8d	C,C,C
D11	Define line spacing and explain the measurement principles for the leading of text	8b,8c,8d	C,C,C
D12	Define type arrangements: flush left/ragged right, flush right/ragged left, centered and justified	Na	
E1	Apply production information on a job jacket/ticket	Na	
E2	Demonstrate the basic principles of design (e.g., unity, contrast, page proportions, balance, etc.) on a given project	8b,8c,8d, 7a, 7b, 7d, 7e	C,C,C,C, R,C,R
E3	Identify the four basic process colors and kinds of color printing	Na	
E4	Identify basic desktop publishing equipment	Na	
E5	Explain the limitations and capabilities of desktop publishing		
E6	Explain the differences in quality of imagesetter output and laser printer output	4c	C
E7	Distinguish between word processing, page layout and graphic software (e.g., Photoshop, Illustrator, Pagemaker, Quark)	Na	
E8	Demonstrate file management operations for opening, copying, saving and deleting files	Na	
E9	Prepare layouts incorporating appropriate marks (e.g., gutters, register marks, fold lines)	7a, 7b, 7e, 8b, 8c, 8 d	C, C, R, R, C, C, C
E10	Prepare a dummy for a multipage signature	7a, 7b, 7e, 8b, 8c, 8 d	C, R, R, C, C, C
E11	Operate scanner/program for line artwork	Na	

E12	Operate scanner/program for continuous/halftone copy	Na	
E13	Activate a graphics-generating program and demonstrate a functional knowledge of commands/menus/hand tools and procedures for their uses	Na	
E14	Draw a design appropriate for a given job using a graphics program	7a, 7b, 7e, 8b, 8c, 8 d	C, R, R, C, C, C
E15	Create a design using tints, fills and paint for a given job using a graphics program	4c, 7a, 7b, 7e, 8b, 8c, 8d	C, C, R, R, C, C, C
E16	Create a design using manipulated type (rotated, circled, extended, etc.) for a publication	7a, 7b, 7e, 8b, 8c, 8 d	C, C, R, C, C, C
E17	Trace a drawing/photograph using a graphics program	Na	
E18	Select appropriate page layout software for a given job	Na	
E19	Activate a page layout program and demonstrate a functional knowledge of computer commands/codes/menus/palette for the software in use	Na	
E20	Demonstrate text alignment, element positioning and rules of page design for printed matter	7a, 7b, 7e	C, R, R
E21	Set up column grids for electronic page layout according to job specifications	8b,8c,8d	C,C,C
E22	Set up/select appropriate pagination for a given job	Na	
E23	Set text with appropriate margins, formatting, gutters, leading, headings, page cross overs, etc.	7a, 7b, 7e, 8b, 8c, 8 d	C, R, R, C, C, C
E24	Flow copy from word processing program to page layout program according to job specifications	8b,8c,8d	C,C,C
E25	Proofread, edit and make corrections/adjustments to copy on screen	Na	
E26	Place graphics/scanned images from an existing file into a publication	8b,8c,8d	C,C,C,
E27	Crop graphics electronically	Na	
E28	Create a two-sided, three-panel brochure using graphics and text for publication	4c, 8b,8c,8d	C,C,C,C
E29	Create a four-page newsletter using windows, blocks, text, graphics, frames and headings	4c, 8b,8c,8d	C,C,C,C
E30	Create a two-page newsletter using kerned letters for paragraph openings, wraparounds (runarounds) and graphics	Na	
E31	Create a printed piece using tints, reverses and manipulated type for effect	2a, 2b, 7a, 7b, 7e, 8b, 8c, 8 d	C, C, R, R, C, C, C
E32	Produce a multicolor flyer using electronic spot color separations	6	OJ
F1	Mix processing chemicals	5b, 5d, 8	R,R,C
F2	Develop film to proper density	5b, 5d,	R,R,C,C

		8d,8e	
F3	Inspect negative for quality and density	8d,8e	C,C
F4	Inspect negatives for density, quality and size	8	R
G1	Draw all reference and centering lines on the masking sheets	8	R
G2	Check negatives against dummy layout	Na	
G3	Tape negatives in position on flat (imposition) and label	8	R
G4	Open all areas of material to be printed	Na	
G5	Opaque imperfections on negative	Na	
G6	Place and secure halftones and screen tints	8	R
G7	Add registration marks and trim marks	8	R
G8	Inspect finished flat for accuracy	Na	
G9	Check flat against copy and dummy layout	Na	
H1	Show proofs to customers	Na	
H2	Make changes and corrections to flat	8	OJ
H3	Make revised proofs	Na	
H4	Create a digital proof for pre-imaging inspection	Na	
I1	Check flat for imperfections, scratches, blocked images and imposition	Na	
I2	Position flat and expose plate using single or multiple burns	Na	
I3	Test and maintain chemicals for proper development	8	R
I4	Delete images from plate	Na	
I5	Inspect plate for accuracy and quality	Na	
I6	Preserve plate for future use	Na	
J1	Describe major parts and systems of an offset printing unit	Na	
J2	Make ready dampening system	Na	
J3	Measure and mix dampening fountain solution	4, 8	C, R
J4	Change and/or adjust feeder and delivery for different sheets and set guides accordingly	5b, 5d	R,R,
J5	Air, jog and condition paper	Na	
J6	Load stock into press feeder	Na	
J7	Mount plate on press	Na	
J8	Adjust impression to caliper of paper	5b, 5d, 8	R,R,R
J9	Inspect and pack blanket and plate cylinders	5b, 5d, 8	R,R,R,
J10	Put dampening fountain solution in press	Na	
J11	Ink up press	Na	
J12	Square image up on paper	8	R
J13	Adjust ink fountain screws and maintain color	Na	
J14	Register printing images to each other	8	R
J15	Wipe off particles of dust or dried ink (hickies) from plate	Na	
J16	Run solid color	Na	
J17	Run screens/halftones	Na	
J18	Print single color job on carbonless paper	Na	
J19	Remove plate and gum, if necessary	Na	

J20	Wash press and ink rollers	Na	
J21	Remove, clean and store dampening systems	Na	
J22	Identify minor mechanical malfunctions	Na	
J23	Lubricate press	Na	
J24	Perform preventive maintenance on press	Na	
J25	Observe lock-out/tag-out procedures	Na	
K1	Jog paper manually or by machine	Na	
K2	Prepare cutting layout	8	R
K3	Make cuts according to cutting sequence or other instructions given	8	C
K4	Cut paper with single-knife hydraulic paper cutter	8	C
K5	Set up and run folder	5b, 5d, 8	R,R,R
K6	Perforate/score with wheel attached to delivery end of paper folder	8	R
K7	Perform saddle-wire binding (wire staple)	8	R
K8	Perform side wire binding (wire staples)	8	R
K9	Identify different binding methods and their uses (e.g., perfect, thermal and case binding)	Na	
K10	Perform spiral wire or plastic cylinder binding	8	R
K11	Perform padding	Na	
K12	Pad carbonless stock	Na	
K13	Trim job after binding	8	C
K14	Drill stock	8	R
K15	Gather and collate by hand and machine	Na	
K16	Perforate/score using rotary perforating machine	8	R
K17	Perform preventive maintenance on finishing equipment	Na	
L1	Use numbering machine	Na	
L2	Laminate materials	Na	
M1	Demonstrate an understanding of VICA, its structure and activities	Na	
M2	Demonstrate an understanding of one's personal values	Na	
M3	Perform tasks related to effective personal management skills	Na	
M4	Demonstrate interpersonal skills	Na	
M5	Demonstrate etiquette and courtesy	Na	
M6	Demonstrate effectiveness in oral and written communication	Na	
M7	Develop and maintain a code of professional ethics	Na	
M8	Maintain a good professional appearance	Na	
M9	Perform basic tasks related to securing and terminating employment	Na	
M10	Perform basic parliamentary procedures in a group meeting	Na	
	Not Taught in Class	1	OC
	Not Taught in Class	3	OC
	Not Taught in Class	4C	OC

	Not Taught in Class	5A	OC
	Not Taught in Class	5C	OC
	Not Taught in Class	6A	OC
	Not Taught in Class	6E	OC
	Not Taught in Class	7C	OC
	Not Taught in Class	7F	OC

Group	Competency	Math Topics	Strategies
Business Technology I Competency Math Integration			
A1	Utilize career assessment tools (e.g., student interest survey, aptitude test)	5.b	C
A2	Analyze various business careers by looking at salary, benefits, job requirements, educational requirements, employment outlook, etc.	5.a 5.b 1.a 1.b	C
A3	Research career choice	N/A	
A4	Prepare a career development plan	N/A	
A5	Participate in work experience activities (e.g., job shadowing)	N/A	
B1	Research a potential employer	N/A	
B2	Prepare a resume	N/A	
B3	Compose a letter of application	N/A	
B4	Complete a job application	N/A	
B5	Prepare a work-sample portfolio	N/A	
B6	Differentiate between legal and illegal pre-employment questions	N/A	
B7	Participate in an interview for a job	N/A	
B8	Compose follow-up (i.e., thank-you) letter	N/A	
B9	Compose letters accepting and declining a job offer	N/A	
B10	Participate in internship or Supervised Business Experience activities	N/A	
C1	Compare and contrast ethical, unethical, legal, and illegal business practices	N/A	
C2	Explain the importance of working within organizational structures (i.e., chain of command)	N/A	
C3	Describe rights and responsibilities of employees and employers (including information related to OSHA, FMLA, sexual harassment, FLSA, discrim., ADA)	N/A	
C4	Describe the importance of life-long learning through continuing education and membership in professional organizations	N/A	
C5	Exhibit leadership skills through a student organization (e.g., FBLA, PBL)	N/A	
C6	Utilize performance-based job evaluation instruments	N/A	
C7	Prepare for job separation (e.g., letter of resignation, extended leave)	N/A	
D1	Use correct grammar, spelling, and punctuation	N/A	
D2	Apply proofreading and editing skills	N/A	
D3	Select appropriate communication methods (e.g., e-mail, FAX, U.S. mail) for tasks	N/A	

D4	Communicate appropriately with internal and external customers	N/A	
D5	Compose business correspondence (e.g., e-mail, letter, report, memo)	N/A	
D6	Access information from professional, technical, and electronic resources	N/A	
D7	Deliver oral presentations using appropriate tools	N/A	
D8	Demonstrate and interpret nonverbal communication	N/A	
D9	Demonstrate effective listening skills	N/A	
D10	Identify factors (e.g., time, culture, exchange rates, human relations skills) affecting global communications	8d	C
D11	Give and take accurate messages (in person or by telephone)	N/A	
E1	Compare business equipment	1 2	C
E2	Answer and place telephone calls	8d	C
E3	Deliver and receive voice mail messages	N/A	
E4	Prepare and send facsimile (FAX) communication	N/A	
E5	Operate a calculator to perform business mathematical functions	1 2	C
E6	Produce business documents from dictated material	N/A	
E7	Capture an image with a digital camera or scanner	8b	C
E8	Record and edit sound	N/A	
E10	Identify routine equipment maintenance needs	N/A	
F1	Maintain good attendance record	N/A	
F2	Interact effectively with others	N/A	
F3	Respect beliefs, opinions, and rights of others	N/A	
F4	Work effectively in teams	N/A	
F5	Demonstrate positive behavior when given direction, criticism, and comment	N/A	
F6	Manage stress effectively	N/A	
F7	Use appropriate language	N/A	
F8	Demonstrate proper professional appearance	N/A	
F9	Exhibit positive attitude	N/A	
F10	Exhibit initiative	N/A	
F11	Exhibit punctuality	N/A	
F12	Exhibit responsibility	N/A	
F13	Exhibit dependability	N/A	
F14	Exhibit honesty	N/A	
F15	Demonstrate proper business etiquette	N/A	
G1	Manage electronic and/or paper financial records	1 2	C
G2	Manage filing systems	N/A	
G3	Coordinate business travel arrangements	8c 8d	OJ
G4	Plan meetings and events	8c 8d	OJ
G5	Research workplace trends (e.g., TQM, teams, voice recognition, ergonomics)	N/A	

G6	Demonstrate time management skills	8c 8d	OJ
G7	Maintain electronic calendaring	N/A	
G8	Apply critical-thinking and problem-solving skills to make business decisions	N/A	
G9	Compare and contrast similar software programs	N/A	
G10	Process incoming and outgoing mail	N/A	
G11	Manage supplies economically and efficiently	1c 1d 2d	OJ
H1	Determine appropriate software application for tasks	N/A	
H7	Manipulate image files	8	R
H9	Maintain electronic files (e.g., server, workstation, shared files)	N/A	
H10	Capture text using OCR software	N/A	
H11	Produce documents using voice recognition technology	N/A	
I1	Distinguish between Internet and Intranet	N/A	
I2	Use e-mail to send and receive messages and attachments	N/A	
I3	Demonstrate appropriate Internet use for business (includes copyright, netiquette, privacy issues, ethics, etc.)	N/A	
I4	Evaluate reliability of the Internet as a resource	N/A	
I5	Analyze basic components of an electronic business Web site	N/A	
I6	Identify advantages and disadvantages of electronic business procedures (e-commerce)	N/A	
I7	Explore the career implications of e-commerce for entrepreneurs and employees	N/A	
J1	Describe forms of business ownership (e.g., sole proprietorship, partnership, corporation, cooperative)	N/A	
J2	Describe advantages and disadvantages of small business ownership	N/A	
J3	Identify steps necessary to start a business (I.e., need evaluation, site selection, marketing plan, financial plan, management plan)	1 2	C

ECommerce Competency Math Integration			
Group	Competency	Math Topics	Strategies
A.	**Examine the Electronic-Business (E-Business) Environment**		
A1	Discuss the evolution of the Internet and the World Wide Web	N/A	
A2	Assess the impact of the Internet on business	N/A	
A3	Explain basic business functions (e.g., accounting, finance, and management)	N/A	

A4	Analyze how basic business functions apply to an electronic business	N/A	
A5	List the advantages and disadvantages of doing business online	N/A	
A6	Discuss the global issues related to doing business electronically	8d	C
A7	List the key characteristics of a successful electronic business	N/A	
A8	Describe the components of a business plan	N/A	
B.	**Identify Social, Legal, and Ethical Issues of E-Business**		
B1	Explain copyright and trademark laws as they relate to e-business	N/A	
B2	Analyze security issues relating to the Internet, Intranet, e-commerce, etc.	N/A	
B3	Explain governmental polices related to e-business	N/A	
B4	Discuss ethical issues relating to e-business	N/A	
C.	**Identify Electronic-Commerce (E-Commerce) Functions**		
C1	Describe e-commerce software services and products (e.g., Websphere, Biztalk, and customer relations management software)	N/A	
C2	Define e-commerce models (B2B, B2C, B2G, etc.)	N/A	
C3	Discuss electronic customer communication issues (e.g., telephone and email)	8d	C
C4	Identify electronic order fulfillment procedures	N/A	
C5	Describe collection and payment options for Websites	N/A	
C6	Compare the uses of databases in e-commerce (e.g., supplier and customer)	5c 5d	R
C7	Discuss how research is used to gather information in e-commerce (e.g., customer behavior and demographics)	5c 5d	R
C8	Describe ways to improve customer service through e-commerce	N/A	
D.	**Plan for the Implementation of an E-Business Website**		
D1	Develop a business plan for an e-business	2	C
D2	Discuss the elements of good web design	N/A	
D3	Critique various Websites	N/A	
D4	Storyboard a Website	N/A	
D5	Develop a Website and/or Webpage using authoring software	N/A	
D6	Develop a Website and/or Webpage using HTML	8b 8c 8d 8f	C
D7	Publish a Website	N/A	
D8	Describe methods for promoting a Website	N/A	
D9	Locate places to post a Website	N/A	
D10	Explain ways to maintain a Website	N/A	
D11	Maintain a Website	N/A	
D12	Analyze hardware and software requirements for a Website	N/A	
D13	Describe the start-up and maintenance costs associated with a Website	1 2	C
E.	**Prepare for a Career in E-Business**		
E1	Demonstrate teamwork	N/A	

E2	Evaluate research skills	N/A	
E3	Demonstrate decision-making skills	N/A	
E4	Practice public communication skills	N/A	
E5	Apply problem-solving skills	N/A	
E6	Demonstrate initiative	N/A	
E7	Illustrate proper Internet etiquette as it relates to e-business	N/A	
E8	Demonstrate leadership	N/A	
E9	Develop an electronic resume	N/A	
E10	Describe career opportunities in e-business	N/A	
E11	List available professional and industrial certifications	N/A	
E12	Develop a portfolio (e.g., business plan and business Website)	N/A	

Computer Programming Competency Math Integration			
Group	**Competency**	**Math Topics**	**Strategies**
A.	**Explore Computer Concepts**		
A1	Trace the development of computers and their impact on society	N/A	
A2	Describe the categories and evolution of programming languages	N/A	
A3	Explain the functions of computer hardware and architecture	N/A	
A4	Demonstrate an understanding of computer theory (e.g., bits, bytes, binary logic, memory, and storage)	8a 8f	C
A5	Compare computer operating systems (e.g., DOS, Windows, and Unix)	N/A	
A6	Discuss legal/ethical issues related to computers	N/A	
A7	Identify the application environment/interface for the specific language being covered (e.g., Windows, Macintosh, or DOS Based)	N/A	
A8	Explain the concept of security and its relationship to programming	N/A	
B.	**Apply Logical Problem-Solving Skills**		
B1	Analyze a problem	6e	C
B2	Determine the steps needed to solve a problem	6b 6c 6e	C
B3	Create a method to solve a problem	6e	C
B4	Illustrate the problem solution using a flowchart or pseudocode	N/A	
C.	**Describe the Software Development Life Cycle**		
C1	Explain how requirements for a new program are gathered	N/A	
C2	Explain how to analyze the requirements for a new program	N/A	
C3	Explain how to create a flowchart or pseudocode for a new program	N/A	
C4	Explain how to use a flowchart or pseudocode in coding the modules of a new program	N/A	
C5	Explain how to integrate the modules of a new program	N/A	
C6	Explain how a new program is authorized/accepted	N/A	
C7	Explain how to maintain a program	N/A	
D.	**Develop Program Applications**		
D1	Use correct syntax of a given programming language	N/A	
D2	Create a program using internal documentation	N/A	

D3	Create a program using variables and constants	1a 2a 3a 6	C
D4	Create a program using counters and accumulators	1a 2a 3a 6	C
D5	Create a program using arithmetic operations and functions	1a 2a 3a 6	C
D6	Create a program using a conditional statement	1a 2a 3a 6	C
D7	Create a program using a loop instruction	1a 2a 3a 6	C
D8	Create a program that requires user input	1a 2a 3a 6	C
D9	Create a program that includes input validation	1a 2a 3a 6	C
D10	Create a program to open, write, and read from a data file	1a 2a 3a 6	C
D11	Create a program to produce a report	1a 2a 3a 6	C
D12	Create a modular program using one or more subroutines	1a 2a 3a 6	C
D13	Create a program using a sort routine	1a 2a 3a 6	C
D14	Create a program with a standard Windows graphic user interface (GUI) with objects and menus	1a 2a 3a 6	C
D15	Create a program with a custom GUI	1a 2a 3a 6	C
D16	Create an object-oriented program by creating objects and classes	1a 2a 3a 6	C
D17	Create a program to display graphics	1a 2a 3a 6	C
D18	Create a program and supporting external documentation	1a 2a 3a 6	C
D19	Modify an existing program	6a	C
D20	Create a program in collaboration with a team	1a 2a 3a 6	C
E.	**Explore Additional Programming Concepts**		
E1	Describe steps involved in troubleshooting and debugging	N/A	
E2	Discuss considerations in programming for efficiency (e.g., computer time, programmer time, etc.)	1d 2d 8d 8f	R
E3	Discuss how to create a user-friendly program	N/A	
E4	Describe event-driven programming	N/A	
E5	Describe error catching/handling	N/A	
E6	Compare object-oriented programming with structured programming	N/A	
E7	Describe how the Internet uses programming	N/A	
E8	Explain uses of scripting languages	N/A	
E9	Discuss handicap accessibility considerations in programming	N/A	
F.	**Apply Database Concepts**		
F1	Create file structures	N/A	

F2	Describe database structures (e.g., fields, records, files, and tables)	N/A	
F3	Create a database file with one or more tables for manipulation by program code	5c	R
F4	Write code to append, delete, and update a table or a file	N/A	
F5	Write code to integrate a database with another application	N/A	
F6	Create a relational database application	N/A	
F7	Write code to search, sort, and query a database	6a 6b 6c	C
G.	**Prepare for Employment**		
G1	Demonstrate working as a team	N/A	
G2	Demonstrate analytical skills	N/A	
G3	Search the Internet and other places to locate career-planning information and job opportunities related to programming	N/A	
G4	Identify careers in the information technology field	N/A	
G5	Demonstrate communication skills	N/A	
G6	Demonstrate logical thinking	N/A	
G7	Demonstrate interpersonal skills	N/A	
G8	Explore compatibility for programming	N/A	

Business Technology II Competency Math Integration			
Group	**Competency**	**Math Topics**	**Strategies**
A. Apply Input Methods			
A1	Demonstrate improvement in speed and accuracy of keyboarding.	N/A	
A2	Demonstrate proper keyboarding technique.	N/A	
A3	Demonstrate ability to use voice recognition software.	N/A	
A4	Identify proper ergonomic principles.	N/A	
B. Execute Basic Computer Operations			
B1	Use program interface (e.g., menu items, toolbars, dialog boxes).	N/A	
B2	Manage files.	N/A	
B3	Format disks.	N/A	
B4	Copy disks.	N/A	
B5	Transfer files.	1A	C
B6	Identify resources to obtain assistance (e.g., Help menu, software manual, Web site).	N/A	
B7	Perform basic printer functions (e.g., load paper, change cartridge).	N/A	
B8	Scan for viruses.	N/A	
B9	Demonstrate proper network user procedures and protocol (e.g., logging on, saving to network).	N/A	
B10	Identify security issues related to computer hardware, software, and data.	N/A	
B11	Identify file formats and extensions.	N/A	
B12	Perform basic troubleshooting and maintenance.	N/A	
B13	Determine appropriate software applications for tasks.	N/A	
C. Use Word Processing Applications			
C1	Demonstrate correct use of word processing terminology.	N/A	
C2	Identify a variety of word processing programs.	N/A	

C3	Create and format business documents.	N/A	
C4	Store and retrieve documents.	1a	C
C5	Set printer specifications.	N/A	
C6	Proofread and edit copy.	N/A	
C7	Enhance documents (e.g., bold, bullets).	N/A	
C8	Prepare single envelope.	N/A	
	Advanced:		
C9	Create tables.	8d	R
C10	Create mail-merge documents.	N/A	
C11	Create macros.	N/A	
C12	Create and manipulate graphics.	8	OJ
C13	Create documents using a template.	N/A	
C14	Develop templates.	N/A	
C15	Convert word processing document to HTML.	N/A	
C16	Create hyperlinks within documents.	N/A	
C17	Create master document including table of contents and index.	N/A	
C18	Prepare multiple envelopes and labels.	N/A	
C19	Develop multilevel outline.	N/A	
C20	Demonstrate use of enhancement features (e.g., borders, lines, shading).	N/A	
C21	Demonstrate use of automatic features (e.g., AutoCorrect).	N/A	
C22	Create business documents using advance word processing features (e.g., headers, footers, graphics).	N/A	
D. Use Spreadsheet Applications			
D1	Demonstrate correct use of spreadsheet terminology.	N/A	
D2	Create spreadsheets.	6d 8d	C
D3	Design spreadsheets.	8d	C
D4	Edit spreadsheets.	6a	C
D5	Create basic formulas with addition, subtraction, multiplication, and division.	1 2 6	C
D6	Format cell contents (e.g., font, color, alignment, shading, decimal).	N/A	
D7	Format columns and rows.	8	C
D8	Use basic functions (e.g., font, color, alignment, shading, decimal).	N/A	
D9	Create charts and graphs.	5	C
D10	Determine validity of spreadsheet results.	8f	OJ
D11	Interpret spreadsheet data.	5d	R
D12	Set print specifications for formulas, graphs, worksheets, etc.	N/A	
D13	Incorporate spreadsheets in word processing documents.	N/A	
	Advanced:		
D14	Link spreadsheet data.	6c	C
D15	Create spreadsheet macros.	N/A	
D16	Use advanced functions/formulas (e.g., payment, future value, statistical).	1 2 6	C
D17	Use lookup tables.	6	C
D18	Demonstrate locking feature.	N/A	
D19	Demonstrate freezing feature.	N/A	
D20	Distinguish between relative and absolute cell references.	6a	C
D21	Create and use named ranges in formulas.	6	C

D22	Manipulate spreadsheet data to answer "what if" questions.	6a	OJ
D23	Display and format data.	N/A	
D24	Embed objects in spreadsheets.	N/A	
D25	Manipulate multiple worksheets in a workbook.	N/A	
D26	Present spreadsheet data orally to a group.	N/A	
E. Use Database Applications			
E1	Demonstrate correct use of database terminology.	N/A	
E2	Create a database.	6d 5b	C
E3	Manipulate a database (e.g., move, delete, insert, edit).	N/A	
E4	Process material using database features (e.g., query, sort, merge).	6	C
E5	Generate and format reports.	8	R
E6	Print reports.	N/A	
E7	Distinguish between different field types.	N/A	
E8	Demonstrate search/find procedures.	N/A	
	Advanced:		
E9	Integrate database information with spreadsheet/word processing documents.	N/A	
E10	Integrate word processing/spreadsheet information with database.	N/A	
E11	Create table relationships.	N/A	
E12	Modify databases using advance queries (e.g., combine, calculate, update, duplicate).	1 2 6	C
E13	Design and use forms in database.	N/A	
E14	Use import feature (e.g., database, table).	N/A	
G. Use Presentation Software			
G1	Demonstrate correct use of presentation software terminology.	N/A	
G2	Produce presentations using text, graphics, and transition.	N/A	
G3	Enhance presentations using sound and animation.	N/A	
G4	Create presentations using a template.	N/A	
G5	Apply design and layout principles to presentations.	8	R
G6	Set print specifications for outline, slides, etc.	N/A	
G7	Deliver an oral presentation.	N/A	
G8	Edit presentations.	N/A	
G9	Manipulate graphics.	8	R
G10	Integrate input from various software applications.	N/A	
H. Explore the Internet			
H1	Demonstrate correct use of Internet terminology.	N/A	
H2	Demonstrate principal usages of e-mail.	N/A	
H3	Demonstrate principal usages of the Internet (e.g., search, locating URLs).	N/A	
H4	Describe how businesses use the Internet.	N/A	
H5	Identify copyright principles (e.g., public domain, copy protection, licensing).	N/A	
H6	Evaluate Internet resources.	N/A	

Multimedia Competency Math Integration			
Group	**Competency**	**Math Topics**	**Strategies**

A.	Introductory Concepts		
A1	Define terms related to multimedia.	N/A	
A2	List hardware requirements for various types of media.	N/A	
A3	Explain multimedia hardware standards.	N/A	
A4	Compare categories of multimedia software (e.g., presentation, authoring, animation, sound).	N/A	
A5	List types of files used in multimedia applications (e.g., EPS, GIF, JPG)	N/A	
A6	Manage files.	1A 1B	OJ
A7	Access media resources.	N/A	
A8	Identify tools in toolbars and palettes in various software programs.	N/A	
A9	Apply tools in toolbars and palettes in various software programs.	N/A	
A10	Explain import functions.	N/A	
A11	Determine import and export capabilities of various software packages.	N/A	
A12	Proofread and correct multimedia documents.	N/A	
A13	Perform file compression.	1A 1B	OJ
A14	Describe how businesses use the Internet.	N/A	
A15	Identify career/self-employment opportunities in multimedia production.	N/A	
A16	Identify design principles used in multimedia productions	N/A	
A17	Use organizational tools to plan multimedia products (e.g., storyboarding, outlining, branching).	N/A	
B.	Ethics		
B1	Demonstrate ethical behavior when designing multimedia applications.	N/A	
B2	Explain key principles in the Electronic Users' Bill of Rights (e.g., safety, security, privacy).	N/A	
B3	Identify copyright and patent laws for multiple media (e.g., video, text, sound, pictures).	N/A	
C.	Graphics		
C1	Create scanned images.	1A 1B	OJ
C2	Determine appropriate file formats.	N/A	
C3	Manipulate scanned images (e.g., resizing, cropping, scaling, rotating).	4	OJ
C4	Import graphics.	N/A	
C5	Edit graphics (e.g., color, filters, tints).	N/A	
C6	Manipulate graphics (e.g., resizing, cropping, scaling, rotating).	4	OJ
C7	Use color tables (e.g., hue, saturation).	N/A	
C8	Create digital camera images.	N/A	
C9	Incorporate screen captures into multimedia productions.	N/A	
C10	Create simple animations.	N/A	
C11	Apply object linking in multimedia products.	N/A	
D.	Audio		
D1	Describe functions of hardware required for performing audio tasks.	N/A	
D2	Import sound files.	N/A	
D3	Create audio files (MIDI).	N/A	
D4	Access and capture recorded and live audio from a variety of sources (e.g., laser disk, CD-ROM, video, microphone).	N/A	

D5	Edit sound files.	N/A	
E. Video			
E1	Access and capture video clips from a variety of sources (e.g., laser disk, CD-ROM, video camera).	4 8	OJ
E2	Edit a video.	4 8	OJ
E3	Alter frames per second.	8	OJ
E4	Queue a video.	N/A	
E5	Transfer digital video output to other media (e.g., videotape, disk, CD-ROM, web page).	N/A	
E6	Describe functions of hardware required to perform video tasks.	N/A	
F. Web Page Design			
F1	Define web page design principles	N/A	
F2	Evaluate web page design.	N/A	
F3	Define HTML (hypertext markup language).	N/A	
F4	Explain the capabilities of HTML.	N/A	
F5	Define creation, organization, and navigation of links.	N/A	
F6	Create storyboards.	N/A	
F7	Design a web page with text, graphics, and tables.	5b 5c 5d 8	C C C OJ
F8	Create hyperlinks (internal and external).	N/A	
F9	Edit using HTML.	N/A	
F10	Apply external media (e.g., text, images, sound).	N/A	
F11	Apply Internet etiquette.	N/A	
F12	Evaluate file size as it relates to the Internet.	2a 2c	OJ
F13	Identify various browser software and their restrictions (e.g., Netscape Navigator, Microsoft Internet Explorer).	N/A	
F14	Identify various HTML editing software (e.g., WYSIWYG, text-only).	N/A	
F15	Upload files to a web server.	N/A	
G. Electronic Presentations			
G1	Identify components of effective electronic presentations.	N/A	
G2	Demonstrate basic features of presentation software.	N/A	
G3	Use master slides and templates.	N/A	
G4	Edit master slides and templates.	N/A	
G5	Create master slides and templates using a variety of formats.	N/A	
G6	Draw and edit objects incorporating fills, borders, and lines.	N/A	
G7	Incorporate audio and visual elements (e.g., sound, graphics, animation).	N/A	
G8	Incorporate transitions.	N/A	
G9	Apply builds to slides.	N/A	
G10	Apply timed settings.	8D	OJ
G11	Import files into a presentation (e.g., text, graphics, sound, video).	N/A	
G12	Prepare an electronic presentation using a variety of formats (e.g., text, graphics, bulleted lists).	N/A	
G13	Evaluate peer-created tutorials.	N/A	

Desktop Publishing Competency Math Integration		

Group	Competency	Math Topics	Strategies
A. Introductory Concepts			
A1	Define terms related to desktop publishing.	N/A	
A2	Describe the functions of hardware components required for desktop publishing.	N/A	
A3	Compare functions and features of software used for desktop publishing.	N/A	
A4	Label all components of the desktop.	N/A	
A5	Identify tools in toolbars and palettes.	N/A	
A6	Apply tools in toolbars and palettes.	N/A	
A7	Use editing tools (e.g., copy, cut, paste).	N/A	
A8	Access available resources to solve problems (e.g., Internet, reference manuals, help screens).	N/A	
A9	Manage electronic files.	N/A	
A10	Explain copyright issues related to desktop publishing (e.g., legal, ethical).	N/A	
A11	Complete a project using customer-supplied instructions and/or materials.	N/A	
B. Layout			
B1	Set margins.	8	OJ
B2	Create columns.	8c 8d	OJ, OJ
B3	Set guttering.	8c 8d	OJ, OJ
B4	Set double-sided facing pages.	N/A	
B5	Create master pages.	N/A	
B6	Create an effective focal point.	N/A	
B7	Utilize pasteboard.	N/A	
B8	Create templates.	8	OJ
B9	Modify templates.	8	OJ
B10	Apply layering techniques in publications.	N/A	
B11	Adjust or change color in a layout.	N/A	
B12	Create a template for a preprinted form (e.g., label, business card, pamphlet).	N/A	
B13	Print on a preprinted form (e.g., label, business card, pamphlet).	8c 8d	OJ OJ
C. Text			
C1	Create a text block.	8c 8d	OJ OJ
C2	Import text files and word processing documents into publications.	N/A	
C3	Use text objects and associated features (e.g., word wrapping, drop caps, initial caps, sizing, color, linkage, frames).	N/A	
C4	Adjust paragraphs attributes.		
C5	Apply tabs and indents in text blocks.	8c 8d	OJ OJ
C6	Create a bulleted list using special characters (e.g., ®, ©, ™, opening and closing quotation marks, em and en dashes).	8c 8d	OJ OJ
C7	Compose headlines and captions.	N/A	
C8	Proofread and correct errors.	N/A	
D. Typography			
D1	Measure type in points, picas, inches, and centimeters.	8	C
D2	Manage a font library.	N/A	

D3	Determine and adjust type attributes (e.g., italics, underline, reverse, strike through).	N/A	
D4	Determine and apply character and word spacing (e.g., tracking, kerning, widening, horizontal scale).	8c 8d	OJ OJ
D5	Determine and apply leading.	8d 8f	OJ OJ
E. Graphics			
J1	Import graphics from various sources (e.g., software-specific library, other applications, Internet).	N/A	
J2	Manipulate graphics (e.g., resizing, cropping, scaling, rotating).	8	OJ OJ
J3	Edit graphics (e.g., color, filters, tints).	N/A	
J4	Create scanned files.	N/A	
J5	Create files from a digital camera.	N/A	
J6	Determine appropriate file formats (e.g., bmp, tiff, jpeg, gif, pict, eps).	N/A	
J7	Download graphic files from Internet.	N/A	
F. Print Process			
F1	Select a network printer.	N/A	
F2	Select a direct printer.	N/A	
F3	Format document for selected printer.	N/A	
F4	Describe characteristics and uses of basic color models (e.g., RGB, CMYK).	N/A	
F5	Prepare desktop publishing document for export to the Internet.	N/A	
G. Develop a Portfolio			
G1	Explain the purpose of portfolios.	N/A	
G2	Explain the reasons for selecting the pieces in the portfolio.	N/A	
G3	Create a flyer with text and graphics.	8	OJ
G4	Produce an advertisement.	8	OJ
G5	Create business forms (e.g., business cards, letterhead, desk notes).	8	OJ
G6	Create a resume.	8	OJ
G7	Create multipage, multicolumn documents (e.g., newsletters, magazines).	8	OJ
G8	Create brochures (single or multiple pages).	8	OJ
G9	Create mailing pieces (e.g., product labels, business reply cards).	8	OJ
	Not taught in class	3b	OC
	Not taught in class	3c	OC
	Not taught in class	4	OC
	Not taught in class	7	OC

Computer / Network Repair Competency Math Integration			
Group	Competency Master Name	Math topics	Strategies
A1	Describe historical evolution of computers, microcomputers and relationships to current computing	8	C,R
A2	Identify components of information system model (e.g., input, process, output)	3,8	C,R,OJ
A3	Practice ethical conduct in everyday procedures (e.g., piracy, licensing, intellectual)		
A4	Present solutions in a positive, tactful manner	5d,5e	C,R,OJ
A5	Create technical correspondence	na	
B1	Describe the operation of fire suppression resources, including fire extinguishers	na	
B2	Identify electrical hazards	na	
B3	Identify and practice workplace safety, including eye protection and environmental	na	
B4	Identify and practice safe soldering methods	na	
B5	Demonstrate safe and proper use of hand tools	na	
B6	Identify hazard of RF radiation devices	na	
B7	Identify basic first aid resources and procedures	na	
B8	Identify electrical, mechanical, chemical and environmental hazards	na	
C1	Evaluate and test sources of DC and AC signals and power	3,5,6b,8	C,R,OJ.OC
C2	Apply Ohm's law by evaluating series and parallel circuits	3,6	C,R,OJ.OC
C3	Measure voltage, current and resistance using multimeters (VOM, EVM, DVM)	3,8	C,R,OJ
D1	Describe the function of various parts of a computer, including ports	5d,8	C,R
D2	Assemble and configure a microcomputer from constituent parts	1,2,5d,8	C,R,OJ,OC
D3	Compare and contrast merits of various micropeocessors for various architectures	4a,8	C,R
D4	Compare and contrast current industry-standard busses	8	R,OJ
D5	Install and remove common peripherals	na	
D6	Verify operation of common peripherals	na	
D7	Install and configure hardware	5d,6a	C,R,OJ,OC
D8	Install hardware upgrades	na	
D9	Install, configure and verify device drivers	5a,5d,5e	C,R,OJ
D10	Troubleshoot and repair subsystems	1a,2b,5d,8a	C,R,OJ,OC
D11	Practice accepted anti-static (ESD) procedures	na	
D12	Perform preventive maintenance on computer/network systems and peripherals	8c	C,R,OJ,OC
E1	Differentiate between common operating systems, including file systems	na	
E2	Install and configure operating systems	na	
E3	Analyze and modify system configuration files	na	

E4	Install and troubleshoot Windows software	1a,3a,3c,6a	
E5	Install software and upgrades	na	
E6	Optimize memory/desk top cleanup	1a,3a,3c,6a	C,R,OJ,OC
E7	Download Internet software	na	
E8	Install application software and suites successfully	na	
E9	Learn applications	na	
E10	Know and enter hardware and software configurations	na	
E11	Install network interface card software	na	
F1	Discuss capabilities of network wiring systems	1a,3a,3c,6a	C,R,OJ,OC
F2	Implement current wiring technologies (copper and fiber) according to current standards (e.g.,TIA/EIA, IEEE, ANSI)	na	
F3	Explain different functions of network communications equipment (e.g., modems, DSU/CSU, bridges, switches, routers and hubs)	1a,3a,3c,6a	C,R,OJ,OC
F4	Install and configure a network concentrator/hub	1a,3a,3c,6a	C,R,OJ,OC
F5	Trace wiring	1a,1c,8b	C,R,OJ
F6	Design wiring layouts	1a,1c,7,8b	C,R,OJ
F7	Troubleshoot wiring and connector problems	na	
F8	Pull wire	na	
F9	Make cables	1a,1c,8b	C,R,OJ
F10	Make terminations	8e	C,R,OJ
F11	Install punch down blocks	na	
F12	Install connectors	8e	C,R,OJ
F13	Install drops	1a,1c,8b	C,R,OJ
F14	Make patchcords	1a,1c,8b	C,R,OJ,OC
F15	Troubleshoot basic telecommunications problems (e.g., place loop-back mode)	2b	C
G1	Draw, label and explain functions of networking layers (e.g., OSI)	na	
G2	Compare and contrast network topologies (e.g., star, bus, ring, broadband, baseband)	5d,5e,8d	C,R,OJ
G3	Diagram and explain network topologies	na	
G4	Differentiate various current protocols (e.g., TCP/IP, IPX/SPX, NETBEUI, DHCP)	na	
G5	Differentiate between routing and switching/bridging	na	
G6	Use the Internet	na	
G7	Set up Internet access	1a,3a,3c,6a	C,R,OJ,OC
H1	Specify internal components for a network server	na	
H2	Install and configure network operating systems	na	
H3	Install and configure network hardware (e.g., NICs)	1a,3a,3c,6a	C,R,OJ,OC
H4	Establish client environments to utilize network resources	1a,2c,2e	C,R,OJ
H5	Install and know TCP/IP protocols	1a,3a,3c,6a	C,R,OJ,OC

H6	Implement various current protocols (e.g., TCP/IP, IPX/SPX,NETBEUI, DHCP)	5d,5e	C,R
H7	Verify client access to network resources	na	
I1	Perform site survey	1a,2c,2d,2e	C,R,OJ,OC
J1	Document cable infrastructure	1a,1c,8b	C,R,OJ
J2	Maintain maintenance logs	1a,1c,6b	C,R,OJ
J3	Practice constructive problem solving with customers	1a,1c,2a,2c,2d,2e	OJ,OC
K1	Demonstrate traits of a good leader, i.e., get others to cooperate and work together	na	
K2	Show confidence	na	
K3	Show perseverance, i.e., see difficult tasks through to completion	na	
K4	Demonstrate reliability, i.e., do tasks assigned without constant supervision	na	
	Not taught in class	4	OC

Group& #	Competency Master Name	Math Topic	Strategy
	HEALTH SCIENCES MATH INTEGRATION		
a1	Describe the characteristics and issues in the health care industry	N/A	
a2	Demonstrate qualities and traits of health care assistants	N/A	
a3	Apply the ethical and legal standards of the health care industry	N/A	
a4	Identify health care career opportunities	N/A	
b1	Communicate effectively with clients, co-workers, and the public	N/A	
b2	Chart procedures and observations	5B,C	C
b3	Utilize medical terminology	N/A	
b4	Convert U.S. customary measurements to metric measurements	1A,B,2,4,8	C
c1	Maintain safe environment for clients, workers, and public	N/A	
c2	Use appropriate body mechanics	N/A	
c3	Follow emergency procedures for fire and other disasters	N/A	
d1	Describe growth and control of microorganisms	N/A	
d2	Practice medical aseptic techniques	2A,B,4A,B	C
d3	Practice techniques for prevention and control of communicable diseases	4	C
e1	Describe the body anatomically	N/A	
e2	Explain the organizational structure of the body from the simple to the complex	N/A	
e3	Identify the structure of the skin and its appendages	N/A	
e4	Explain the functions of the skin and its appendages	N/A	
e5	Identify the structures of the digestive system	N/A	
e6	Explain the functions of the digestive system	N/A	
e7	Describe nutrition and its relationship to good health	1A,B,2,4,8	C
e8	Identify the structures of the musculoskeletal system	N/A	
e9	Explain the functions of the musculoskeletal system	N/A	
e10	Identify the structures of the cardiovascular system	N/A	
e11	Explain the functions of the cardiovascular system	N/A	
e12	Identify the structures of the respiratory system	N/A	
e13	Explain the functions of the respiratory system	N/A	

e14	Identify the structures of the nervous system	N/A	
e15	Explain the functions of the nervous system	N/A	
e16	Identify the structures of the sensory system	N/A	
e17	Explain the functions of the sensory system	N/A	
e18	Identify the structures of the endocrine system	N/A	
e19	Explain the functions of the endocrine system	N/A	
e20	Identify the structures of the urinary system	N/A	
e21	Explain the functions of the urinary system	1A,B,2,4,8	C
e22	Identify the structures of the reproductive system	N/A	
e23	Explain the functions of the reproductive system	N/A	
f1	Identify the physical, mental, and social changes that occur at different stages of life	N/A	
f2	Identify basic human needs	N/A	
f3	Assist the dying client in meeting his/her psychological, spiritual, and physical needs	N/A	
f4	Incorporate acceptable techniques when caring for the confused client	N/A	
g1	Measure vital signs	5B,8	C
g2	Administer cardiopulmonary resuscitation techniques and Heimlich maneuver	N/A	
g3	Identify special considerations related to oxygen therapy	N/A	
Leadership Competencies	Demonstrate an understanding of VICA, its structure and activities	N/A	
Leadership Competencies	Demonstrate an understanding of one's personal values	N/A	
Leadership Competencies	Perform tasks related to effective personal management skills	N/A	
Leadership Competencies	Demonstrate interpersonal skills	N/A	
Leadership Competencies	Demonstrate etiquette and courtesy	N/A	
Leadership Competencies	Demonstrate effectiveness in oral and written communication	N/A	
Leadership Competencies	Develop and maintain a code of professional ethics	N/A	
Leadership Competencies	Maintain a good professional appearance	N/A	
Leadership Competencies	Perform basic tasks related to securing and terminating employment	N/A	
Leadership Competencies	Perform basic parliamentary procedures in a group meeting	N/A	

Nurse Assisting Math Integration			
Group	Competency Master Name	Math Topics	Strategies

a1	Define the role of a nurse assistant in acute, long-term and home health care	N/A	
a2	Identify health care team members and each of their roles	N/A	
a3	Organize workload and prioritize tasks	N/A	
a4	Follow a chain of command	N/A	
b1	Describe the job search process	N/A	
b2	Identify requests that are beyond the nurse assistant's training	N/A	
b3	Implement techniques to manage stress	N/A	
c1	Participate as a team member	N/A	
c2	Provide quality health care	N/A	
c3	Exhibit sensitivity to the diversity of others	N/A	
c4	Exhibit tolerance to challenging clients and/or families	N/A	
c5	Exhibit sensitivity to clients' and/or families' pain and loss	N/A	
c6	Communicate pertinent information at the shift change	N/A	
c7	Chart observations and procedures		
c8	Recognize and report incidents	N/A	
c9	Complete incident reports	N/A	
c10	Reinforce client teaching identified on the care plan	N/A	
c10	Maintain client confidentiality	N/A	
d1	Follow OSHA guidelines	5B,5C	C
d2	Respond appropriately to hazards and home safety concerns	N/A	
d3	Respond appropriately to community emergencies	N/A	
d4	Review the home safety plan with the client and others providing care in the home	N/A	
d5	Carry out the home safety plan if an emergency occurs during the home visit	N/A	
d6	Apply CDC isolation precautions to client situations	N/A	
d7	Use physical crisis intervention	N/A	
e10	Maintain hearing aides	N/A	
e2	Maintain eyeglasses	N/A	
e3	Place and remove eyeglasses	N/A	
e4	Assist clients to dress	N/A	
e5	Assist clients to undress	N/A	
e6	Give a complete bed bath	8B,C,D	C
e7	Give a tub bath	8B,C,D	C
e8	Give a whirlpool tub bath	2A,B,4B,8B,C,D	C
e9	Give a shower bath	8B,C,D	C
e10	Shave the client with a safety razor	N/A	
e11	Shave the client with an electric razor	N/A	
e12	Comb or brush hair	N/A	
e13	Give a shampoo during a tub or shower bath	N/A	
e14	Give a bed shampoo	N/A	
e15	Assist with oral hygiene for a conscious client	2A,B,4B	C
e16	Provide flossing of teeth	N/A	

e17	Administer oral hygiene to helpless or unconscious clients	N/A	
e18	Provide denture care	N/A	
e19	Give fingernail care	N/A	
e20	Give toenail care	N/A	
e21	Give perineal care to a female client	N/A	
e22	Give perineal care to a client with a catheter	N/A	
f1	Assist or raise a client's head and shoulders	N/A	
f2	Move helpless client to the head of the bed	N/A	
f3	Move or assist client to the head of the bed	N/A	
f4	Move a client to one side of the bed	N/A	
f5	Turn client to one side of the bed	N/A	
f6	Turn client to his or her side	N/A	
f7	Transfer a client from bed to chair	N/A	
f8	Transfer a client from chair to bed	N/A	
f9	Transfer a client using a mechanical lift	N/A	
f10	Transfer a client from bed to gurney	N/A	
f11	Transfer a client using a three-person carry transfer	N/A	
f12	Transfer a client using a two-person sitting transfer	N/A	
f13	Ambulate client with a gait belt	N/A	
f14	Ambulate client who is using a walker	N/A	
f15	Ambulate a client who is using a cane	N/A	
f16	Ambulate a client who is using crutches	N/A	
f17	Perform range of motion exercises	N/A	
f18	Assist with active range of motion exercises	N/A	
g1	Prepare a client for a meal	N/A	
g2	Distribute trays, assisting with tray set-up	N/A	
g3	Feed a helpless client	N/A	
g4	Modify feeding technique as appropriate for a client's condition	N/A	
g5	Distribute drinking water	1A,5B,8B,C,D	C
g6	Measure and record intake and output	1A,2A,B,4A,B,5B,8	C
g7	Convert household measurements to metric equivalents	1A,B,2,4A,B,C,8	C
g8	Convert a measurement of pounds into kilograms and one of kilograms to pounds	1A,B,2,4A,B,C,8	C
g9	Convert a measurement of inches to feet and inches and one of feet and inches to inches	1A,B,2,4A,B,C,8	C
g10	Measure client's weight and height	1A,B,2,4A,B,C,8	C
g11	Measure weight and length of infant	1A,B,2,4A,B,C,8	C
h1	Assist client with a urinal	N/A	
h2	Assist client with bedpan	N/A	
h3	Change urinary drainage bag	N/A	
h4	Change adult incontinent brief	N/A	
h5	Administer unmedicated enemas	N/A	
h6	Change ostomy bag	N/A	
h7	Collect a midstream clean-catch urine specimen	N/A	
h8	Collect a 24-hout urine specimen	N/A	

h9	Collect a sterile urine specimen from a catheter	N/A	
h10	Collect a stool specimen	N/A	
h11	Collect a sputum specimen	N/A	
h12	Apply warm, moist compress	N/A	
h13	Apply warm water bottle	N/A	
h14	Apply aquatherma pad	N/A	
h15	Apply ice bag or ice cap	N/A	
h16	Perform clean, nonmedicated dressing changes	N/A	
h17	Give pressure ulcer care	N/A	
h18	Perform post-mortem care	N/A	
	Not taught in class	1c	OC
	Not taught in class	1d	OC
	Not taught in class	3	OC
	Not taught in class	5a	OC
	Not taught in class	5d	OC
	Not taught in class	5e	OC
	Not taught in class	6	OC
	Not taught in class	7	OC

Welding Technology

Group No	Competency Master Name	Math Topics	Strategies
A1	Identify and correct or report safety hazards	N/A	
A2	Identify and utilize proper storage for flammables	N/A	
A3	Identify and demonstrate correct use of fire extinguishers	5b,5d	C
A4	Identify ventilation hazards and take corrective action	N/A	
A5	Observe and adhere to safety labels	N/A	
A6	Maintain, use and safely work with machines, tooling and equipment	N/A	
A7	Use power and equipment, grinder, drill press and power safe safely/correctly	N/A	
A8	Identify confined space and fall protection hazards	N/A	
B1	Obtain and use reference books and charts	5b,5d	C
B2	Apply math to solution of welding problems - whole numbers, fractions, decimals, rounding numbers [A08]	1,2&6	C
B3	Apply math to solution of welding problems - geometry and trigonometry	7	C
B4	Identify basic hand tools	N/A	
B5	Select, use and care for hand tools	N/A	
B6	Identify and store electrodes/filler materials	5d,5e	OJ
B7	Read and implement welding procedures	5e	OJ
B8	Identify basic power sources	5b	OJ
B9	Identify structural shapes, sizes and weights	7a	OJ
C1	Read and interpret basic prints	5d	C
C2	Interpret welding symbols, abbreviation and joint designs	5d,5e	OJ
C3	Construct an exercise(s) using basic print and sketch	2abcd,6abce	OJ
C4	Make sketches - pictorial and orthographic	2&6abce	OJ
C5	Convert English measurements to metric and vice-versa	8	C
D1	Make layout of material for plate, structural and pipe fabrication	1,2,3,4,5,6,7,8	OJ
D2	Prepare material for weld procedure specification (WPS)	1a,2abc	OJ
D3	Fabricate parts from a drawing or sketch	1,2,4,5,6,7,8	OJ
E1	Demonstrate safety procedures for oxyfuel cutting/brazing	N/A	
E2	Describe theory of oxyfuel cutting/brazing	N/A	
E3	Identify types of fuel gases and their applications	N/A	
E4	Handle, make preliminary safety inspection and store cylinders properly	N/A	
E5	Identify, select and set up oxyfuel welding and cutting equipment	N/A	
E6	Light and adjust flame for welding and cutting	N/A	
E7	Pierce holes and cut slots	7e,8cde	OJ
E8	Make straight 90-degree and beveled cuts on mild steel plate and pipe	7e,7d,8cde	OJ
E9	Make circle cuts - off hand and with guide	7d,8cde	OJ
E10	Lay out, cut and fit materials (such as pipe, plate and structural shapes)	1,2,3,4,5,6,7,8	OJ
E11	Braze weld materials	N/A	
E12	Prepare coupon for testing and pass visual test	N/A	

E13	Identify brazing and cutting problems, their causes and take corrective action	N/A	
E14	Identify and select correct brazing rod and flux, if applicable	N/A	
F1	Demonstrate safety procedures for shielded metal arc welding	N/A	
F2	Describe theory of shielded metal arc welding	N/A	
F3	Select polarity and current for electrode	N/A	
F4	Identify and make proper electrode selection for base material and material thickness of follow WPS (weld procedure specification)	N/A	
F5	Identify joint design and prepare material for WPS	N/A	
F6	Identify shielded metal arc welding problems, their causes and take corrective action	N/A	
F7	Build pad of beads in horizontal position (qualifies flat position)	8d	OJ
F8	Build pad of beads in vertical position upward	8d	OJ
F9	Visually inspect shielded metal arc	8d	OJ
G1	Make weld in 2D position with E-6010 or E-6011 (qualifies 1F position)	8d	OJ
G2	Make weld in 2F position with E-7024	8d	OJ
G3	Make weld in 2F position with e-7018 (qualifies 1F position)	8d	OJ
G4	Make weld in 3F position, vertical up, with E-6010 or E-6011	8d	OJ
G5	Make weld in 3F position, vertical up, with E-7018	8d	OJ
G6	Make weld in 4F position with E-6010 or E-6011	8d	OJ
G7	Make weld in 4F position with E-7018	8d	OJ
G8	Make weld in 2G position with e-6010 or E-6011 (qualifies 1G position)	8d	OJ
G9	Make weld in 2G position with E-7018 (qualifies 1G position)	8d	OJ
G10	Make weld in 3G position, vertical up, with E-6010 or E-6011	8d	OJ
G11	Make weld in 2G position, vertical up, with E-7018	8d	OJ
G12	Make weld in 4G position with E-6010 or E-6011	8d	OJ
G13	Make wield in 4G position with E-7018	8d	OJ
H1	Make weld in 1G position with E-6010 or E-6011	8d	OJ
H2	Make weld in 1G position with E-7018	8d	OJ
H3	Make weld in 2G position with E-6010 or E-6011	8d	OJ
H4	Make weld in 2G position with E-7018	8d	OJ
H5	Make weld in 5G position, vertical up, with E-6010 or E-6011	8d	OJ
H6	Make weld in 5G position, vertical up, with E-7018	8d	OJ
H8	Make weld in 5G position, vertical down, with E-6010 or E-6011	8d	OJ
H9	Make weld in 6G position, vertical up with E-6010 or E-6011	8d	OJ
H10	Make weld in 6G position, vertical up, with E-7018	8d	OJ
I1	Demonstrate safety procedures for gas metal arc welding	N/A	
I2	Describe theory of gas metal arc welding	N/A	
I3	identify, select and safely handle shielding gases for various metals	N/A	
I4	Adjust current, voltage, pulse, wire feed rate and gas flow	N/A	
I5	Identify, select and set up equipment	N/A	
I6	Identify and select solid wire electrode for carbon steel, aluminum and stainless steel	N/A	
I7	Make weld in 2F position with carbon steel, aluminum and stainless steel	8d	OJ
I8	Make weld in 2F position with aluminum (qualifies 1F position)	8d	OJ
I9	Make weld in 2F position with stainless steel	8d	OJ

I10	Make weld in 3F position, vertical up, with material 3/16" or thicker	8d	OJ
I11	Make weld in 3F position, vertical down, with carbon steel thinner than 3/16" and solid wire	8d	OJ
I12	Make weld in 4F position with solid wire	8d	OJ
I13	Make butt weld in 1G position with aluminum	8d	OJ
I14	Make butt weld in 1G position with stainless steel	8d	OJ
I15	Make weld in 2G position with solid wire (qualifies 1F position)	8d	OJ
I16	Make weld in 3G position, vertical up, with carbon steel 3/16" or thicker	8d	OJ
I17	Make weld in 3G position, vertical down, with carbon steel less than 3/16" thick	8d	OJ
I18	Make weld in 5G position, vertical up, with carbon steel (pipe)	8d	OJ
I19	Make weld in 6G position, vertical up, with carbon steel (pipe)	8d	OJ
I20	Identify gas metal arc welding problems, their causes and take corrective action	N/A	
I21	Prepare gas metal arc weld for test	N/A	
J1	Demonstrate safety procedures for flux cored arc welding	N/A	
J2	Describe theory of flux cored arc welding	N/A	
J3	Identify, select and safely handle shielding gases for various metals	N/A	
J4	Adjust current, voltage, pulse, wire feed rate and gas flow	N/A	
J5	Identify, select and set up equipment	N/A	
J6	Identify and select cored wire electrodes for carbon steel and stainless steel	N/A	
J7	Make weld in 2F position with carbon steel and cored wire (qualifies 1F position)	8d	OJ
J8	Make weld in 3F position, vertical up, with carbon steel and cored wire	8d	OJ
J9	Make weld in 2G position with carbon steel and cored wire	8d	OJ
J10	Make weld in 3G position, vertical up, with carbon steel and cored wire	8d	OJ
J11	Identify welding problems, their causes and take corrective action	N/A	
J12	Prepare flux cored arc weld for test	N/A	
K1	Demonstrate safety procedures for gas tungsten arc welding	N/A	
K2	Describe theory of gas tungsten arc welding	N/A	
K3	Identify, select and set up equipment and explain function	N/A	
K4	Identify, select and safely handle shielding gases	N/A	
K5	Identify, select and safely install tungsten electrode	N/A	
K6	Adjust polarity, pulse, current, gas flow setting and low post timer and strike arc	N/A	
K7	Identify joint design and prepare material for weld procedure specifications (WPS)	N/A	
K8	Select filler rod for base material	N/A	
K9	Make weld in 2F position, stainless steel (qualifies 1F position)	8d	OJ
K10	Make weld in 2F position, aluminum (qualifies 1F position)	8d	OJ
K11	Make weld in 2F position, carbon steel	8d	OJ
K12	Make weld in 3F position, stainless steel	8d	OJ
K13	Make weld in 3F position, aluminum	8d	OJ
K14	Make weld in 3F position, carbon steel	8d	OJ
K15	Make weld in 2G position, stainless steel (qualifies 1G position)	8d	OJ

K16	Make weld in 2G position, aluminum	8d	OJ
K17	Make weld in 2G position, carbon steel	8d	OJ
K18	Make weld in 3G position, vertical up, on stainless steel	8d	OJ
K19	Make weld in 3G position, vertical up, on aluminum	8d	OJ
K20	Make weld in 3G position, vertical up on carbon steel	8d	OJ
K21	Make weld in 4G position with carbon steel	8d	OJ
K22	Identify gas tungsten arc welding problems, their causes and take corrective action	N/A	
L1	Demonstrate safety procedures for plasma cutting	N/A	
L2	Describe theory of plasma cutting	N/A	
L3	Set up and operate plasma cutting equipment	N/A	
L4	Lay out and make straight line cuts	7e,8d	OJ
L5	Lay out and make bevel cuts	8d	OJ
L6	Lay out and make circular cuts	8d	OJ
L7	Lay out and make pattern cuts	8d	OJ
L8	Lay out, cut and bevel pipe to a 30-37 1/2 degree angle	7,8d	OJ
L9	Lay out and cut square and round solid stock	8d	OJ
M1	Demonstrate safety procedures for metallurgy and heat treating	N/A	
M2	Identify the classification and physical properties of ferrous and nonferrous metals	N/A	
M3	Identify and apply principles of preheating and postheating	N/A	
M4	Describe and apply principles of metallurgy in annealing, hardening and tempering	N/A	
M5	Describe methods of testing metals	N/A	
M6	Identify types of ferrous metal by spark test	N/A	
M7	Describe the relationship between the hardness test of weld, heat-affected zone and base metal, and interpret the results	N/A	
N1	Demonstrate safety procedures for carbon arc gouging	N/A	
N2	Describe theory of carbon arc gouging	N/A	
N3	Identify and select electrode size, polarity, current and air pressure	N/A	
N4	Set up and operate carbon arc gouging equipment	N/A	
N5	Remove weld material/backgouge	N/A	
O1	Prepare, sample for visual test per appropriate standard	N/A	
O2	Inspect for undercut, overlap, porosity, slag, spatter and weld side	N/A	
O3	Identify defects and take corrective action based on visual test	N/A	
P1	Prepare coupon for bend test per appropriate standard	N/A	
P2	Perform destructive test on welds	N/A	
P3	Identify defects and take corrective action based on destructive test	N/A	
Q1	Prepare sample for non-destructive test per appropriate standard	N/A	
Q2	Perform non-destructive test per appropriate standard	N/A	
Q3	Inspect for undercut, overlap, porosity, slag, spatter and surface cracks	N/A	
Q4	Identify defects and take corrective action based on non-destructive test	N/A	
R1	Demonstrate an understanding of VICA, its structure and activities	N/A	
R2	Demonstrate an understanding of one's personal values	N/A	
R3	Perform tasks related to effective personal management skills	N/A	
R4	Demonstrate interpersonal skills	N/A	
R5	Demonstrate etiquette and courtesy	N/A	

R6	Demonstrate effectiveness in oral and written communication	N/A	
R7	Develop and maintain a code of professional ethics	N/A	
R8	Maintain a good professional appearance	N/A	
R9	Perform basic tasks related to securing and terminating employment	N/A	
R10	Perform basic parliamentary procedures in a group meeting	N/A	

Building and Grounds Maintenance Competency Math Integration			
Group	Competency Master Name	math topics	strategies
a1	Identify building maintenance occupations and related fields	NA	
a2	Identify safe work site procedures/practices, including fall protection and confined space	NA	
a3	Identify emergency first-aid procedures, including MSDS (material safety data sheets)	NA	
a4	Identify fire safety equipment	NA	
a5	Identify hand tools	NA	
a6	Identify power tools	NA	
a7	Identify measuring instruments	NA	
a8	Identify blueprints/schematics and as-built drawings	1,4,7,8	C
a9	Identify cause-and-effect relationships (e.g., water and dirt intrusion)	NA	
a10	Identify awareness of the environmental impact of hazardous waste (e.g., asbestos)	NA	
a11	Identify and apply maintenance as it relates to building codes and applicable laws	NA	
a12	Identify anchors and fasteners	NA	
b1	Identify carpentry safety practices	NA	
b2	Demonstrate safe and proper use of a ladder	NA	
b3	Demonstrate safe and proper use of scaffolding	NA	
b4	Replace/install exterior doors	8,1b	OJ
b5	Replace/install exterior doors operating hardware	8,1b	OJ
b6	Replace/repair windows	8,1b	OJ
b7	Replace/repair/install siding	7f,6e,6c,7a,8	OJ
b8	Replace/repair exterior trim	8,1b	OJ
b9	Replace/repair roof flashing	8,1b	OJ
b10	Replace/repair roofing	7f,6e,6c,7a,8	OJ
b11	Replace/repair downspouts and guttering	8,1b	OJ
b12	Perform weatherizing procedures		
c1	Identify plumbing safety practices		
c2	Cut, clean and glue plastic pipe	8,1b	OJ
c3	Cut, clean and solder copper pipe	8,1b	OJ

c4	Cut and thread pipe	8,1b	OJ
c5	Form a flare	8,1b	OJ
c6	Assemble a compression fitting	8,1b	OJ
c7	Rough-in plumbing fixtures	8,1b	OJ
c8	Replace/repair plumbing fixtures		
c9	Locate and repair leaks in pipes and lines		
c10	Clean traps, drains and vents		
c11	Replace/repair/install plumbing accessories	8,1b	OJ
c12	Identify backflow prevention		
c13	Service water heater		
d1	Identify electrical safety practices		
d2	Troubleshoot and replace outlets, switches, fuses, conductors, breakers, and fixtures	8	OJ
d3	Bend and connect conduit	8,1b	OJ
d4	Wire circuits of 120V and 240V according to code	8,1b	OJ
d5	Wire a low-voltage circuit using a schematic	8,1b	OJ
d6	Use electrical test equipment	8	OJ
d7	Identify power supplies	8,1b	OJ
d8	Install/replace/service alarms and detectors	8,1b	OJ
e1	Review carpentry safety practices		
e2	Repair drywall/plaster wall	8,1b	OJ
e3	Replace/repair interior walls	8,1b	OJ
e4	Replace/repair interior door operating hardware	8,1b	OJ
e5	Identify procedures for replacing, repairing and/or installing floor coverings	7f,6e,6c,7a,8	OJ
e6	Replace, repair and/or install suspended ceiling system	8,1b	OJ
e7	Install wall and/or ceiling insulation	8,1b	OJ
e8	Install or replace interior trim	8,1b	OJ
e9	Install or replace ceramic tile	7f,6e,6c,7a,8	OJ
e10	Replace/repair interior doors	8,1b	OJ
f1	Identify finishing safety practices		
f2	Prepare surface for finish		
f3	Select finishing materials	7f,6e,6c,7a,8	C
f4	Prepare finishing materials		
f5	Clean and properly store finishing equipment and materials		
f6	Apply finishing materials		
h1	Identify masonry safety practices		

h2	Set forms	8,1b	OJ
h3	Mix concrete	4d	OJ
h4	Patch and/or repair concrete structures	4d	OJ
h5	Pour and finish concrete	7f,6e,6c,7a,8	OJ
h6	Mix mortar	4d	OJ
h7	Remove, repair walls and/or replace blocks	8,1b	OJ
h8	Remove, repair walls and/or replace bricks	8,1b	OJ
I1	Identify safety practices		
I2	Change oil, filters and service breathers	8,1b	OJ
I3	Remove, repair and service spark plugs	8	OJ
I4	Sharpen and balance blade; lubricate spindle assemblies		
I5	Select and add fuel	4d	OJ
I6	Test the coil, condenser, armature, and flywheel magnets	8,1b	OJ
I7	Remove and replace contact points and condenser	8	OJ
I8	Clean and/or replace air filter and cooling system	NA	
I9	Adjust and/or replace belts	NA	
I10	Service battery	NA	
I11	Service trimmer	NA	
I12	Clean and store Maintenance	NA	
j1	Identify grounds maintenance safety procedures	NA	
j2	Mow & trim grass	NA	
j3	Prune trees, shrubs, and vines	NA	
j4	Prepare and/or repair concrete structures	NA	
j5	Plant and/or replace shrubs and ornamentals	NA	
j6	Mix, apply, and store fertilizer	4d	OJ
j7	Identify weed-control procedures	NA	
j8	Identify procedures for use of pesticides	NA	
k1	Demonstrate an understanding of VICA, its structure and activities	NA	
k2	Demonstrate an understanding of one's personal values	NA	
k3	Perform tasks related to effective personal management skills	NA	
k4	Demonstrate interpersonal skills	NA	
k5	Demonstrate etiquette and courtesy	NA	

k6	Demonstrate effectiveness in oral and written communication	NA	
k7	Develop and maintain a code of professional ethics	NA	
k8	Maintain a good personal appearance	NA	
k9	Perform basic tasks related to securing and terminating employment	NA	
k10	Perform basic parliamentary procedures in a group meeting	NA	
l1	Identify welding safety practices	NA	
l2	Set up oxyacetylene welding equipment	NA	
l3	Demonstrate proper use of oxyacetylene welder/cutter	NA	
l4	Demonstrate proper transport and storage of tanks	NA	
l5	Set up arc welder	NA	
l6	Weld with arc welder	NA	
	Not Taught in Class	2	OC
	Not Taught in Class	3	OC
	Not Taught in Class	5	OC
	Not Taught in Class	6	OC

Child Care Math Competency Integration		Math Topics	Strategies
Group	**Competency Master Name**	**Math Topics**	**Strategies**
A1	Plan and implement safe and legal field trips	NA	
A2	Provide and maintain safety indoors and outdoors	NA	
A3	Respond to emergency situations appropriately	NA	
A4	Practice secure procedures for releasing children from the center	NA	
B1	Meet health requirements	1B, 5A	C, OJ
B2	Plan, prepare and serve nutritious meals or snacks	2A, 2C	C,R
B3	Assess child's health status and follow appropriate health procedures	1A, 4C, 4B	OJ, OJ, OJ
B4	Provide and maintain proper sanitary conditions	NA	
B5	Help children develop proper health habits	2A	C
B6	Recognize signs of suspected child abuse/neglect	NA	
C1	Plan and arrange learning centers for an early childhood program	7A	C
C2	Establish a balanced daily schedule	1A,	C
C3	Plan for individual and group needs	NA	
C4	Develop plans for daily activities	NA	
D1	Observe and describe a child's physical development	NA	
D2	Provide and develop appropriate large motor activities	NA	
D3	Provide activities to promote small motor skills	NA	
D4	Plan and guide activities appropriate for outdoor play	7A	C
D5	Interact appropriately with child's physical activities	NA	
D6	Provide opportunities for sensory experience	2A	C
E1	Plan and guide appropriate language experiences	NA	
E2	Guide the child in problem solving and decision making	NA	
E3	Offer opportunities for emerging literacy	NA	
E4	Use play to support cognitive development	NA	
E5	Plan and guide developmentally appropriate pre-math activities	1A, 2A	C, C
E6	Plan and guide developmentally appropriate science and nature activities	1A, 1B, 7A	C, C, C
E7	Plan and guide developmentally appropriate social studies activities	NA	
E8	Observe and describe a child's cognitive development	NA	
F1	Use effective oral communication	NA	
F2	Listen actively	NA	
F3	Use written communication competently	NA	
G1	Evaluate characteristics of process-oriented activities for encouraging children's self-expression	NA	
G2	Plan and guide opportunities for dramatic play	NA	
G3	Plan and guide creative art activities	NA	
G4	Plan and guide activities for self-expression through music and dance	NA	

H1	Encourage cooperation in play	NA	
H2	Identify the levels of play	NA	
H3	Help children develop appropriate social skills	NA	
H4	Observe and describe child's level of social development	NA	
I1	Interact with child as an individual and in group settings	NA	
I2	Identify behaviors that reflect negative and positive self-concepts	NA	
I3	Recognize and respect the individual differences of child and family	NA	
I4	Recognize children's special needs	NA	
J1	Set and communicate limits for acceptable behavior	NA	
J2	Direct and guide positive behaviors	NA	
J3	Use strategies to provide guidance/intervention for inappropriate behavior	NA	
K1	Develop and implement strategies to strengthen school/family partnerships	NA	
K2	Communicate with family members	NA	
L1	Demonstrate professional behavior	NA	
L2	Provide a positive role model for child, parents, and coworkers	NA	
L3	Demonstrate enjoyment of working with young children	NA	
L4	Display good work habits	1B	OJ
L5	Use problem-solving skills to enhance the program	1A, 1B,	C, C
L6	Balance social, home and work lives	NA	
L7	Accept constructive criticism	NA	
L8	Show interest in professional growth	NA	
L9	Recognize standards of accreditation of child-care programs	2D, 5B	C, C
L10	Utilize technology and other resources to influence positive change for children and families	NA	
L11	Maintain confidentiality about the child and the family	NA	
	Not taught in Class	2b	OC
	Not taught in Class	2c	OC
	Not taught in Class	3	OC
	Not taught in Class	4a	OC
	Not taught in Class	5c	OC
	Not taught in Class	5d	OC
	Not taught in Class	5e	OC
	Not taught in Class	6	OC
	Not taught in Class	7b	OC
	Not taught in Class	7c	OC
	Not taught in Class	7d	OC
	Not taught in Class	7e	OC
	Not taught in Class	7f	OC
	Not taught in Class	8	OC

Collision Repair Technology Competency - Math Integration			
Group	Competency Master Name	Math Topics	Strategies
A1	Identify opportunities in the auto body field	na	
A2	Identify the basic construction of the auto body	na	
B1	Read a rule, fractional-inch and metric	1ab,2a,8abcd	C,OJ
B2	Solve problems involving volume and ratios	1abc,(4),8b	C,OJ
C1	Demonstrate safe use and maintenance of general hand tools	na	
C2	Demonstrate safe use and maintenance of auto body hand tools	na	
C3	Demonstrate safe use and maintenance of electric and pneumatic hand tools	na	
C4	Demonstrate safe use and maintenance of electric, pneumatic, and hydraulic equipment	na	
C5	Describe proper lifting and jacking techniques	5bd	C,OJ
D1	Identify government agencies regulating the auto body industry (OSHA, EPA)	na	
D2	Identify general safety rules	na	
D3	Use protective clothing and equipment	na	
D4	Identify the proper use of fire protection equipment	na	
D5	Use chemicals safely	na	
D6	Identify environmental effects of chemicals	na	
D7	Identify proper chemical disposal techniques	na	
D8	Identify information on and importance of MSD sheets	na	
D9	Identify important toxic substances		
E1	Diagnose and analyze damage	1abc,(2),5b,(8)	C,OJ
E2	Use collision manuals	(1),(2),5b	C,OJ
E3	Write a damage report inlogical sequence	(1),(2),5b,8ae	C,OJ
F1	Identify auto body welding processes	na	

F2	Use MIG welding safety procedures	na	
F3	Set up equipment for MIG welding	1ab,5b,8bcd	C,OJ
F4	Prepare metal for MIG welding	na	
F5	Use weld-through primers	na	
F6	Construct a MIG plug weld	na	
F7	Construct a MIG continuous weld	na	
F8	Construct a MIG stitch weld	na	
F9	Weld high strength steel unibody structural components	na	
F10	Identify oxyacetylene welding safety procedures	na	
F11	Set up and use equipment for oxyacetylene welding	1ab,8bcd	C,OJ
F12	Set up and use equipment for oxyacetylene cutting	1ab,8bcd	C,OJ
F13	Use protective clothing and equipment	na	
G1	Analyze damage	1ab,2a,8bcd	C,OJ
G2	Clean the exterior surface	na	
G3	Roughout panel	na	
G4	Shrink panel	na	
G5	Prepare surface for body filler	na	
G6	Apply body filler	na	
G7	Finish body filler	na	
G8	Apply corrosion protection	na	
G9	Use weld-on stud gun to repair sheet metal	na	
H1	Identify plastic types	na	
H2	Analyze Damage	1ab,8bcd	C,OJ
H3	Clean exterior and interior surfaces	na	
H4	Perform chemical plastic welding	na	
H5	Perform airless plastic welding	na	
H6	Repair plastic with chemical fillers	1ab,4bc	C,OJ
I1	Identify safety procedures when working with fiberglass	na	
I2	Analyze damage	1ab,8bc	C,OJ
I3	Prepare exterior and interior surfaces	na	
I4	Reconstruct fiberglass panels	na	
I5	Section fiberglass panels	1ab,8bcd	C,OJ
J1	Remove and replace cosmetic panels, welded on	1ab,2a,8bcd	C,OJ
J2	Remove and replace structural panels, welded on	1ab,2a,8bc	C,OJ
J3	Remove and replace cosmetic panels, bolted on	1ab,2a,8bc	C,OJ

J4	Section non-structural panels, welded on	1ab,2a,8bc	C,OJ
K1	Remove and replace bumpers, steel or aluminum	1ab,2a	C,OJ
K2	Replace energy absorbers	2a	C,OJ
K3	Remove and replace soft fascia covers	1a,2a	C,OJ
K4	Repair soft fascia covers	1a,4bc	C,OJ
K5	Identify refinishing equipment	na	
L1	Use safe painting practices, including the use of protective clothing and equipment	na	
L2	Use the paint gun with proper technique	1ab,5bd,8cde	C,OJ
L3	Service and maintain a spray gun	na	
L5	Service and maintain the paint room	na	
L6	Identify HVLP paint systems	na	
M1	Identify surface preparation technique	na	
M2	Strip painted surfaces using chemicals	na	
M3	Demonstrate appropriate masking techniques	na	
M4	Prepare surface of new panel	na	
M5	Prepare surface of damaged panel	na	
M6	Demonstrate appropriate sanding techniques	na	
M7	Select and apply appropriate primer/primer surfacer/sealant	1b,(4),8cd	C,OJ
M8	Perform guide coat/block sanding/reprime	1b,(4)	C,OJ
M9	Identify topcoats and topcoat application procedures	1ab,(4),8cd	C,OJ
M10	Mix and apply urethane enamel system	1ab,(4),8cd	C,OJ
M11	Mix and apply basecoat/clearcoat system	1ab,(4),8cd	C,OJ
M12	Tint and blend color coat	1ab,(4),8cd	C,OJ
M13	Apply chip-resistant coating	1ab,8cd	C,OJ
M14	Mix and apply flexible paint system	1ab,(4),8cd	C,OJ
M15	Apply tri-coat paints	1ab,(4),8cd	C,OJ
M16	Perform clearcoat repair without refinishing	na	
M17	Perform clearcoat repair by refinishing	1ab,(4)	C,OJ
M18	Perform paint detailing after refinishing	na	
N1	Identify types of bolts and nuts, US and metric	1ab,2a	C,OJ

O1	Remove and replace belt molding and trim	na	
O2	Remove and replace diprail scalp molding and trim	na	
O3	Remove and install glue-on molding and trim	na	
O4	Locate and drill holes for molding and trim	1ab,2a,8bc	C,OJ
P1	Remove and replace decals and stripes	na	
Q1	Identify interior components and interior trim	na	
Q2	Clean plain interior fabrics	na	
Q3	Clean coated interior fabrics, genuine leather and molded plastic interior components	na	
Q4	Clean polyurethane foam interior components	na	
Q5	Clean painted interior surfaces	na	
Q6	Clean black-rubber interior surfaces and weatherstrip	na	
Q7	Remove and replace seats	1a,2a	C,OJ
Q8	Remove and replace seat tracks	1a,2a	C,OJ
Q9	Remove and reinstall carpeting	1a,2a	C,OJ
Q10	Remove and reinstall seat belts and shoulder harness	1a,2a	C,OJ
Q11	Identify supplemental inflatable restraing systems	na	
R1	Identify vehicle glass and replacement procedures	na	
R2	Remove and replace a reveal molding	na	
R3	Remove and replace a gasket-type window or back glass	na	
R4	Remove and replace glass with urethane sealants	na	
R5	Remove and replace glass with butyl tape kit	na	
R6	Install bonded mirror brackets to windshield	na	
R7	Remove and replace a door handle	na	
R8	Remove and replace a door trim panel	na	
R9	Remove and replace a lock cylinder	1ab,2a	C,OJ
R10	Remove and replace a door glass	1a,2a	C,OJ
R11	Remove and replace a door glass regulator	1ab,2a	C,OJ
R12	Inspect power windows	na	

S1	Identify electrical system components	na	
S2	Service a battery	1a,8bc	C,OJ
S3	Splice a wire	na	
S4	Diagnose and repair electrical accessories	1a,8bc	C,OJ
T1	Service a taillight assembly	na	
T2	Service a headlight assembly	na	
T3	Service mechanical headlights and covers	na	
T4	Aim headlights using mechanical aiming equipment	na	
U1	Remove and replace a radiator	1ab,2a	C,OJ
U2	Remove, inspect and replace V-Belts	1ab,2a	C,OJ
U3	Test antifreeze solution	1ab,5b	C,OJ
U4	Service fan blades and clutches	na	
U5	Check and service radiator and heater hoses	8cd	C,OJ
U6	Inspect, repair, and replace auxiliary oil cooler	1ab,2a	C,OJ
U7	Inspect, repair, and replace fuel, exhaust, and emissions systems	1ab,2a	C,OJ
V1	Identify air conditioning system components and service procedures	na	
V2	Replace condenser	1ab,2a	C,OJ
V3	Remove and reinstall compressor	1ab,2a	C,OJ
V4	Test the system for leaks	1ab,8bc	C,OJ
V5	Repair leaks in air conditioning system	1ab,6c,8bc	C,R,OJ,OC,OJ
V6	Evacuate and charge system using vacuum pump or charging system	1ab,6c,8bc	C,R,OJ,OC,OJ
V7	Check and service air conditioning hoses	na	
W1	Identify front suspension systems	na	
W2	Identify rear suspension systems	na	
W3	Remove and reinstall front suspension systems	1ab,2a	C,OJ
W4	Remove and reinstall rear suspension systems	1ab,2a	C,OJ
W5	Identify steering systems	na	
W6	Perform suspension quick checks	na	
W7	Service power steering system	na	
W8	Service brake system	na	
W9	Identify causes of uneven tire wear	na	
W10	Inspect, repair, and replace steering system components	1ab,2a	C,OJ

X1	Identify vehicle frame construction, conventional and unibody	na	
X2	Identify frame and unibody terminology	na	
X3	Identify the 5 types of damage	1ab,2a,7d,8bcd	CC,R,C,OJ, OJ,OC,OJ
X4	Use and interpret specification manuals	1ab,2a,5be,7d,8bcd	C,C,C,R,C, OJ,OJ,OJ,OC,OJ
X5	Identify characteristics and uses of high strength steel	na	
X6	Analyze damage using datum gauge	1ab,2a,8bcd	C,OJ
X7	Analyze damage using tram gauge and tape measure	1ab,2a,8bcd	C,OJ
X8	Analyze damage using universal measuring system	1ab,2a,7d,8bcd	C,C,R,C,OJ,OJ,OC,OJ
Y1	Straighten and align structural damage	1ab,2a,5be,7d,8bcd	C,C,R,R,C, OJ,OJ.OC, OC,OJ
Y2	Replace component parts	1ab,2a,8bcd	C,OJ
Y3	Perform stress relief using shock	na	
Y4	Perform stress relief using heat	na	
Y5	Replace high strength steel	1ab,2a,5e,8cde	C,OJ
Y6	Section component parts	1ab,2a,7d,8bcd	C,C,R,C,OJ,OJ,OC,OJ
Y7	Remove and reinstall mechanical components	1ab,2a	
Z1	Demonstrate an understanding of VICA, its structure and activities	na	
Z2	Demonstrate an understanding of one's personal values	na	
Z3	Perform tasks related to effective personal management skills	na	
Z4	Demonstrate interpersonal skills	na	
Z5	Demonstrate etiquette and courtesy	na	
Z6	Demonstrate effectiveness in oral and written communications	na	
Z7	Develop and maintain a code of professional appearance	na	
Z8	Maintain a good professional appearance	na	

Z9	Perform basic tasks related to securing and terminating employment	na	
Z10	Perform basic parliamentary procedures in a group meeting	na	
	not taught in class	3	OC

Auto Technology Competency Math Integration			
Group	Competency Master Name	Math Topics	Strategies
A1	Identify the safe use of chemicals	N/A	
A2	Identify the safe use of hand tools	N/A	
A3	Identify the safe use of power tools	N/A	
A4	Identify the safe use of protective clothing and equipment	N/A	
A5	Identify the safe use of fire protection equipment	N/A	
A6	Identify the safe use of shop equipment	N/A	
A7	Follow Environmental Protection Agency (EPA) and Occupational Safety and Health Act (OSHA) regulations	N/A	
B1	Communicate with customers and write repair orders	N/A	
B2	Estimate time and cost for job and order parts	1,2	C
B3	Obtain appropriate repair information from shop manuals	N/A	
B4	Practice clean and orderly work habits (vehicle, tools and work area)	N/A	
C1	Identify basic function and operation of vehicle mechanical components	N/A	
C2	Identify auto mechanics career opportunities and the duties of a technician	N/A	
D1	Check continuity in electrical circuits using test light and voltmeter, oscilloscope and wiring diagram	1,2,3,4,5,6,7,8	C
D2	Check for shorts, opens, and grounds	1,2,3,4,5,6,7,8	C
D3	Measure resistance in electrical circuits using an ohmmeter	1,2,3,4,5,6,7,8	C
D4	Measure volts with a voltmeter or oscilloscope	1,2,3,4,5,6,7,8	C
D5	Measure current with an ammeter	1,2,3,4,5,6,7,8	C
E1	Clean and inspect battery clamps, cables, and connectors	N/A	
E2	Perform battery condition tests	1,2,	OJ
E3	Jump start a vehicle	N/A	
E4	Charge and install a battery	N/A	
F1	Diagnose starting system and determine needed repair	1,2,3,4,5,6,7,8	OJ
F2	Remove, clean, and inspect starter motor and components	N/A	
F3	Repair or replace starter motor components	N/A	
G1	Diagnose charging system and determine needed repairs	1,2,3,4,5,6,7,8	OJ
G2	Remove, clean, and inspect alternator	N/A	
G3	Repair or replace alternator components	N/A	
G4	Repair or replace charging system components	N/A	

H1	Diagnose lighting system problems and determine needed repairs	1,2,3,4,5,6,7,8	OJ
H2	Repair or replace lights, sockets, wires, and switches	N/A	
I1	Diagnose and repair gauge and warning circuits	1,2,3,4,5,6,7,8	OJ
I2	Diagnose and repair electrical accessories (horn, wiper, motor)	1,2,3,4,5,6,7,8	OJ
J1	Conduct engine performance test using engine analyzer and determine needed repairs	1,2,3,4,5,6,7,8	OJ
J2	Inspect, repair, or replace primary ignition components	N/A	
J3	Inspect, repair or replace secondary ignition components	N/A	
J4	Adjust ignition system to manufacturer's specifications	8	OJ
J5	Perform on-board computer system diagnosis	N/A	
J6	Repair or replace computer system components	N/A	
K1	Diagnose fuel system problems and determine needed repairs	1,2,8	OJ
K2	Disassemble, clean, and inspect carburetors	N/A	
K3	Reassemble and adjust carburetors	N/A	
K4	Disassemble, clean, and inspect fuel injection components	N/A	
K5	Repair or replace fuel injection components	N/A	
K6	Adjust computer-controlled fuel systems (injection and carburetion)	N/A	
K7	Diagnose and repair exhaust system problems	N/A	
L1	Clean, inspect/replace PCV system components	N/A	
L2	Clean, inspect/replace spark timing controllers	N/A	
L3	Clean, inspect/replace idle speed controllers	N/A	
L4	Clean, inspect/replace exhaust gas recirculation	N/A	
L5	Clean, inspect/replace air management system	N/A	
L6	Clean, inspect/replace inlet air temperature control	N/A	
L7	Clean, inspect/replace intake manifold heat controls	N/A	
L8	Clean, inspect/replace fuel vapor controls	N/A	
M1	Remove and replace engine (front- and rear-wheel drive)	N/A	
N1	Remove cylinder head(s)	N/A	
N2	Install cylinder head(s)	1,2,8	OJ
N3	Recondition cylinder head	1,2,8	OJ
N4	Inspect and replace cam and related components	1,2,8	OJ
O1	Inspect and replace pans, covers, gaskets, and seals	N/A	
O2	Disassemble, inspect, and clean short block assemble	N/A	
O3	Check and record short block measurements	1,2,3,4,5,6,7,8	OJ
O4	Check and record component measurements	1,2,3,4,5,6,7,8	OJ

O5	Clean and prep block and components for reassembly	N/A	
O6	Reassemble short block components using correct lubricants gaskets, sealers, and torque specifications	1,8	OJ
P1	Complete engine assemble and pre-lube	N/A	
P2	Start engine and set fuel and ignition system to manufacturers specifications	8	OJ
Q1	Inspect and repair oil system and components	N/A	
Q2	Perform cooling system tests; determine needed repairs	N/A	
Q3	Inspect, replace, and adjust drive belts and hoses	N/A	
Q4	Replace cooling system components (thermostat, radiator, controllers)	N/A	
Q5	Inspect coolant, drain, flush, and refill cooling system with recommended coolant	N/A	
Q6	Perform oil and lube service on normally aspirated and turbo-charged engines	N/A	
R1	Diagnose and determine needed repairs on steering systems	1,2,8	OJ
R2	Clean and inspect power and manual steering gear boxes	N/A	
R3	Reassemble, adjust and install power and manual steering gear boxes	N/A	
R4	Clean and inspect power and manual rack	N/A	
R5	Clean and inspect power and manual rack-and-pinion steering rack	N/A	
R6	Reassemble, adjust, and install power and manual rack-and-pinion steering rack	N/A	
R7	Inspect and repair steering columns	N/A	
R8	Inspect and replace steering linkage components	N/A	
R9	Inspect, repair, and replace power steering pumps	N/A	
S1	Diagnose and determine needed repairs on conventional front suspension systems	N/A	
S2	Inspect and repair control arm and spring assemblies on conventional systems	N/A	
S3	Inspect and repair wheel spindles and bearings	N/A	
S4	Inspect and replace shock absorbers and stabilizer bars	N/A	
S5	Diagnose and determine needed repairs on MacPherson Strut Assemblies	N/A	
S6	Clean, inspect, and assemble MacPherson strut assemblies	N/A	
T1	Diagnose and determine needed repairs on conventional rear suspension systems	N/A	
T2	Inspect and replace shock and spring assemblies	N/A	
T3	Inspect and replace MacPherson strut assemblies	N/A	

T4	Inspect and repair suspension linkage and bushings	N/A	
U1	Diagnose steering and tire wear problems, determine needed repairs	1,2,3,4,5,6,7,8	C
U2	Set correct alignment angles on front wheels	1,2,3,4,5,6,7,8	OJ
U3	Set correct camber and toe on rear wheels	1,2,3,4,5,6,7,8,	OJ
U4	Rotate and balance tire and wheel assemblies	1,8	OJ
V1	Diagnose hydraulic brake systems and determine needed repairs	N/A	
V2	Inspect and repair or replace master cylinders and lines of the hydraulic system	N/A	
V3	Inspect and replace switches and valving devices	N/A	
W1	Diagnose and determine needed repairs on drum brake systems	1,2,7e,8	OJ
W2	Remove, clean, and inspect drum brake assemblies	N/A	
W3	Repair, replace, and adjust drum brake components	N/A	
X1	Diagnose and determine needed repairs on disc brake systems	1,2,8	OJ
X2	Remove, clean, and inspect disc brake components	N/A	
X3	Repair, replace, and adjust disc brake components	N/A	
Y1	Diagnose and determine needed repairs on power-assist brakes	N/A	
Y2	Repair or replace power brake components	N/A	
Y3	Check operation of anti-skid braking systems; adjust or repair according to manufacturer's recommendations	N/A	
Z1	Diagnose, performance test, and determine needed repair for clutch assembly	N/A	
Z2	Replace and adjust clutch assembly	N/A	
ZAA1	Inspect, service and replace front axle shafts	N/A	
ZBB1	Diagnose and determine needed repairs on hub assemblies	N/A	
ZBB2	Disassemble, clean and inspect hub assemblies	N/A	
ZBB3	Reassemble and adjust hub assemblies	N/A	
ZCC1	Diagnose and performance test A/C systems for problems and determine needed repairs	N/A	
ZCC2	Clean, inspect, and repair A/C system components	N/A	
ZCC3	Evacuate and charge A/C system and performance test	N/A	
ZCC4	Diagnose and repair automatic and electrical temperature control units	N/A	
ZDD1	Diagnose and repair heating system problems and determine needed repairs	N/A	

ZDD2	Inspect and replace heating system components	N/A	
ZEE1	Demonstrate an understanding of VICA, its structure and activities	N/A	
ZEE2	Demonstrate an understanding of one's personal values	N/A	
ZEE3	Perform tasks related to effective personal management skills	N/A	
ZEE4	Demonstrate interpersonal skills	N/A	
ZEE5	Demonstrate etiquette and courtesy	N/A	
ZEE6	Demonstrate effectiveness in oral and written communication	N/A	
ZEE7	Develop and maintain a code of professional ethics	N/A	
ZEE8	Maintain a good professional appearance	N/A	
ZEE9	Perform basic tasks related to securing and terminating employment	N/A	
ZEE10	Perform basic parliamentary procedures in a group meeting	N/A	

Arcadia Valley CTC   Appendix D

Career Preparation

Name: _____

Vocational Program: _____

My career goal for one year after graduation from high school.

   This should be, one to three sentences that describe your career goal for one year after
   high school graduation.

My career goals for five years after graduation from high school.

   This can be a bulleted list, of one to three sentences that describe the career goals you
   would like to have accomplished within the first five years after high school graduation.

My current plans for next year: (Date)

Provide at least the following:

   - A paragraph description of your overall plan
   - List what steps you will need to complete your plan
        o Describe how the step will be completed
        o Include resources needed
        o List who will assist you with each step

Employment

   1. Find at least three want ads for a job in your local area (local area is defined as any where
      you would be willing to work upon graduation)
        a. Contact at least one of the potential work sites (letter, phone, personal contact)
        b. Complete at least one job application and place a copy of it in this folder

Post-Secondary Education

1. List your choices for post-secondary attendance
2. Contact at least one of your choices:
    a. Catalog/Bulletin
    b. Entrance requirements
    c. Application
    d. Financial assistance
    e. Estimated expenses (tuition, housing, transportation, books and fees)

Military
1. Branch of service
2. Contact recruiter
3. Choose a military occupation
    a. ASVAB score
    b. Training required
    c. Training that would be helpful

Appendix E

National Council of Teachers of Mathematics Standards

Number and Operations Standard

1. Understand numbers, ways of representing numbers, relationships among numbers, and number systems

    A. develop a deeper understanding of very large and very small numbers and of various representations of them;

    B. compare and contrast the properties of numbers and number systems, including the rational and real numbers, and understand complex numbers as solutions to quadratic equations that do not have real solutions;

    C. understand vectors and matrices as systems that have some of the properties of the real-number system;

    D. use number-theory arguments to justify relationships involving whole numbers,

2. Understand meanings of operations and how they relate to one another

    A. judge the effects of such operations as multiplication, division, and computing powers and roots on the magnitudes of quantities;

    B. develop an understanding of properties of, and representations for, the addition and multiplication of vectors and matrices;

    C. develop an understanding of permutations and combinations as counting techniques

3. Compute fluently and make reasonable estimates

    A. develop fluency in operations with real numbers, vectors, and matrices, using mental computation or paper-and-pencil calculations for simple cases and technology for more-complicated cases.

    B. judge the reasonableness of numerical computations and their results.

Algebra
4. Understand patterns, relations, and functions

    A. generalize patterns using explicitly defined and recursively defined functions;

    B. understand relations and functions and select, convert flexibly among, and use various representations for them;

C. analyze functions of one variable by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior;

D. understand and perform transformations such as arithmetically combining, composing, and inverting commonly used functions, using technology to perform such operations on more-complicated symbolic expressions;

E. understand and compare the properties of classes of functions, including exponential, polynomial, rational, logarithmic, and periodic functions;

F. interpret representations of functions of two variables

5. Represent and analyze mathematical situations and structures using algebraic symbols

A. understand the meaning of equivalent forms of expressions, equations, inequalities, and relations;

B. write equivalent forms of equations, inequalities, and systems of equations and solve them with fluency—mentally or with paper and pencil in simple cases and using technology in all cases;

C. use symbolic algebra to represent and explain mathematical relationships;

D. use a variety of symbolic representations, including recursive and parametric equations, for functions and relations;

E. judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology.

6. Use mathematical models to represent and understand quantitative relationships

A. identify essential quantitative relationships in a situation and determine the class or classes of functions that might model the relationships;

B. use symbolic expressions, including iterative and recursive forms, to represent relationships arising from various contexts;

C. draw reasonable conclusions about a situation being modeled

Geometry Standard

7. Analyze change in various contexts

A. approximate and interpret rates of change from graphical and numerical data.

8. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships

A. analyze properties and determine attributes of two- and three-dimensional objects;

B. explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them;

C. establish the validity of geometric conjectures using deduction, prove theorems, and critique arguments made by others;

D. use trigonometric relationships to determine lengths and angle measures.

9. **Specify locations and describe spatial relationships using coordinate geometry and other representational systems**

A. use Cartesian coordinates and other coordinate systems, such as navigational, polar, or spherical systems, to analyze geometric situations;

B. investigate conjectures and solve problems involving two- and three-dimensional objects represented with Cartesian coordinates.

10. **Apply transformations and use symmetry to analyze mathematical situations**

A. understand and represent translations, reflections, rotations, and dilations of objects in the plane by using sketches, coordinates, vectors, function notation, and matrices;

B. use various representations to help understand the effects of simple transformations and their compositions.

11. **Use visualization, spatial reasoning, and geometric modeling to solve problems**

A. draw and construct representations of two- and three-dimensional geometric objects using a variety of tools;

B. visualize three-dimensional objects and spaces from different perspectives and analyze their cross sections;

C. use vertex-edge graphs to model and solve problems;

D. use geometric models to gain insights into, and answer questions in, other areas of mathematics;

E. use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture.

Measurement Standard

12. **Understand measurable attributes of objects and the units, systems, and processes of measurement**

A. make decisions about units and scales that are appropriate for problem situations involving measurement.

13. Apply appropriate techniques, tools, and formulas to determine measurements

A. analyze precision, accuracy, and approximate error in measurement situations;
B. understand and use formulas for the area, surface area, and volume of geometric figures, including cones, spheres, and cylinders;
C. apply informal concepts of successive approximation, upper and lower bounds, and limit in measurement situations;
D. use unit analysis to check measurement computations.

Data Analysis and Probability Standard

14. Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them

A. understand the differences among various kinds of studies and which types of inferences can legitimately be drawn from each;
B. know the characteristics of well-designed studies, including the role of randomization in surveys and experiments;
C. understand the meaning of measurement data and categorical data, of univariate and bivariate data, and of the term variable;
D. understand histograms, parallel box plots, and scatterplots and use them to display data
E. compute basic statistics and understand the distinction between a statistic and a parameter.

15. Select and use appropriate statistical methods to analyze data

A. for univariate measurement data, be able to display the distribution, describe its shape, and select and calculate summary statistics;
B. for bivariate measurement data, be able to display a scatterplot, describe its shape, and determine regression coefficients, regression equations, and correlation coefficients using technological tools;
C. display and discuss bivariate data where at least one variable is categorical;
D. recognize how linear transformations of univariate data affect shape, center, and spread;
E. identify trends in bivariate data and find functions that model the data or transform the data so that they can be modeled.

16. Develop and evaluate inferences and predictions that are based on data

A. use simulations to explore the variability of sample statistics from a known population and to construct sampling distributions;

B. understand how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference;

C. evaluate published reports that are based on data by examining the design of the study, the appropriateness of the data analysis, and the validity of conclusions;

D. understand how basic statistical techniques are used to monitor process characteristics in the workplace.

17. Understand and apply basic concepts of probability

A. understand the concepts of sample space and probability distribution and construct sample spaces and distributions in simple cases;

B. use simulations to construct empirical probability distributions;

C. compute and interpret the expected value of random variables in simple cases;

D. understand the concepts of conditional probability and independent events;

E. understand how to compute the probability of a compound event.

18. Problem Solving

A. Build new mathematical knowledge through problem solving

B. Solve problems that arise in mathematics and in other contexts

C. Apply and adapt a variety of appropriate strategies to solve problems

D. Monitor and reflect on the process of mathematical problem solving

19. Reasoning and Proof

A. Recognize reasoning and proof as fundamental aspects of mathematics

B. Make and investigate mathematical conjectures

C. Develop and evaluate mathematical arguments and proofs

D. Select and use various types of reasoning and methods of proof

20. Communication

A. Organize and consolidate their mathematical thinking through communication

B. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others

C. Analyze and evaluate the mathematical thinking and strategies of others;

D. Use the language of mathematics to express mathematical ideas precisely

21. Connections

A. Recognize and use connections among mathematical ideas
B. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
C. Recognize and apply mathematics in contexts outside of mathematics

22. Representation

A. Create and use representations to organize, record, and communicate mathematical ideas
B. Select, apply, and translate among mathematical representations to solve problems
C. Use representations to model and interpret physical, social, and mathematical phenomena