UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Lesson 1: Electricity

***Competency/Objective:*** Understand electricity and explain precautions for the safe use of electricity.

***Study Questions***

1. **What is electricity?**
2. **How is electricity generated and transported?**
3. **How is electricity measured?**
4. **What is the difference between a fuse and a circuit breaker?**
5. **What are hot, neutral, and ground wires?**
6. **What are the different types of lightbulbs?**
7. **What hazards are associated with the use of electricity in the farm and home?**

***References***

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit VII.
2. Bergwall Productions, Inc. *Working Safely With Electricity,* (T&I Video Kit I). Chadds Ford, PA, 1997. Available from Missouri Resource Center for Career & Technical Education, University of Missouri-Columbia.
3. Transparency Masters

   TM 1.1 Reading an Electric Meter
   TM 1.2 Fuses and Circuit Breakers

5. Activity Sheets

   AS 1.1 Daily Use of Electricity in My Home
   AS 1.2 Electrical Safety Checklist

UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Lesson 1: Electricity

TEACHING PROCEDURES

*A.* ***Introduction***

Electricity has so many uses, it is difficult to imagine life without it. Electrical energy improves the quality of life in our homes, on the farm, in agricultural industry, and nearly everywhere else. It is important for all people to gain an understanding of electricity and safety precautions associated with its use around the house as well as the farm.

*B.* ***Motivation***

1. Begin the lesson by asking students to write all of the ways in which they use electricity in a typical day. Challenge them to think of an instance in their daily lives in which they don't use electricity either directly or indirectly. Have students describe how their daily lives would change if they did not have electricity. Discuss and stress the importance of electricity in improving quality of life.

2. Begin the lesson by asking students to define electricity in their own words. Ask leading questions and generate thoughts on subjects such as:

   What is electricity?
   Is lightning a form of electricity?
   Is static electricity really electricity?
   Why can someone "shock" you after dragging his/her feet across the carpet?

*C.* ***Assignment***

*D.* ***Supervised Study***

*E.* ***Discussion***

**Q1.** **<u>What is electricity</u>?**

**A1.** **Electricity is a form of energy created by the flow of negatively charged particles in a circuit through a conductor.**

Explain an electric conductor and circuit and the flow of electrons. Compare it to water flowing in a river or stream.

**Q2.** **<u>How is electricity generated and transported</u>?**

**A2.**

- **a) Electricity is generated by mechanically passing coils of wire through a magnetic field.**
  - **1) Water power is created by flowing water from a higher level to a lower level to turn the generator.**
  - **2) Steam power is created by heated water, which causes steam that turns the generator. Ways to heat water include the following.**
    - **(a) Burning fossil fuels - burning coal, oil, and natural gas**
    - **(b) Nuclear fission - splitting atoms**
    - **(c) Geothermal - steam rising from cracks in the earth**
    - **(d) Burning waste - burning solid waste products**

3) **Wind power uses air currents to turn the generator.**
4) **Solar power uses solar cells to convert sunlight to electricity.**

b) **Electricity is transported from the power plant where it was generated through power lines to the local electric company. It then travels through distribution lines to the customer.**

Discuss the positive and negative aspects of each energy form used to generate electricity.

- Water power requires a water source so it would not be effective in a desert.
- Steam power creates a great deal of energy. The burning process may create air pollution. Burning solid wastes may be an effective way to create energy from waste products as well as dispose of wastes.
- Wind and solar power are effective ways of using natural sources of energy; however, both require a steady supply of wind and/or sunlight.

**Q3.** **How is electricity measured?**

**A3.** **Electricity is measured in units of watt-hours called kilowatt-hours.**

If possible, locate a meter within walking distance of the classroom to show what it looks like. Discuss how the kilowatt-hours are read from the meter. Electrical use is computed by multiplying the pressure times the flow (i.e., volts times amps), which yields watts. Kilowatt-hours are the amount of kilowatts of electricity used over time. One kilowatt-hour represents the use of 1,000 watts of electricity over a 1-hour time period. Use TM 1.1 to illustrate how to read an electric meter. Distribute AS 1.1 and direct students to do a daily meter reading over a 1-week or a 2-week time period. Discuss home usage of electricity at the conclusion of the activity.

**Q4.** **What is the difference between a fuse and a circuit breaker?**

**A4.**

a) **A fuse is a short piece of metal that will melt at a predetermined number of amps. It is a disposable device designed to be replaced when blown.**
b) **A circuit breaker is a switch that trips when excess current passes through it. When a circuit breaker is tripped, it only needs to be reset.**
c) **Both devices are designed to limit the amount of current passing through them.**

Provide examples or pictures of fuses and circuit breakers. Show TM 1.2 to show students the difference between fuses and circuit breakers. Explain to the class that the purpose of a fuse and a circuit breaker is to protect a wiring system. If there is an overload or short in a circuit, the fuse or circuit breaker will keep the wiring system from overheating.

**Q5.** **What are hot, neutral, and ground wires?**

**A5.** **Electricity travels from its source to electrical tools and appliances through a series of wires.**

a) **Hot wires - These are the positive wires that conduct the electrical power to the appliance or tool. They are usually coated with red or black plastic.**
b) **Neutral wires - These wires help to complete the electrical circuit by carrying the electrical current from the appliance or tool back to its source. Neutral wires are usually coated with gray or white plastic.**
c) **Ground wires - These wires, usually coated in green plastic, serve as a connection from the electrical appliance or tool to the earth. If that**

**electricity travels outside its normal path, ground wires help provide an alternate path for the electricity back to its source.**

Provide examples or pictures of hot wires, neutral wires, and ground wires. Explain their purpose and color coding.

**Q6.** **<u>What are the different types of lightbulbs</u>?**

**A6.**

**a) Incandescent - a filament wire heated inside the bulb**
**b) Fluorescent - light radiated from a gas contained in the bulb after electricity has passed through it**
**c) Halogen - gases inside the bulb forming a very bright hot light**
**d) Mercury vapor - an inner bulb with a tube containing sodium with a mixture of argon and neon gas**
**e) Metal halide - compounds of metal and halogen with a basic two-bulb design**
**f) Sodium - an arc tube made of aluminum oxide containing a solid mixture of sodium and mercury**

Have each type of lightbulb available for the class and discuss uses of each. Discuss which bulbs are the safest and most energy efficient. Emphasize the importance of choosing the appropriate bulb for a task while considering safety hazards and energy costs of each bulb.

**Q7.** **<u>What hazards are associated with the use of electricity in the farm and home</u>?**

**A7.** **The main source of injuries associated with electricity occurs from fire or electrical shock. The following situations can create some of these electrical hazards.**

**a) Installation hazards - Always turn off the main power source and follow all instructions and codes when working with electricity.**
**b) Overuse of extension cords - Extension cords should be used only for short periods when cords on equipment will not reach an outlet. They should never be used permanently due to a lack of wall outlets.**
**c) Misuse of fuses and circuit breakers - A blown fuse or a tripped circuit breaker indicates a problem in an electrical circuit. Always attempt to find the source of the problem before replacing a fuse or resetting the breaker.**
**d) Using electricity in wet areas - Water is an excellent conductor of electricity and can cause electrical shock. Never work with electrical items near wet or damp areas.**

Discuss safe practices for electricity usage. Distribute AS 1.2 for students to complete to emphasize safety in handling electricity. View T&I videos 1 and 4 in *Working Safely With Electricity* (available from Missouri Resource Center for Career & Technical Education, University of Missouri-Columbia) and discuss the dangers involved with electricity.

F. ***Other Activities***

1. Refer to the Alliance to Save Energy web site for educators at <www.ase.org/educators> for an activity titled "Making Choices." This activity will expand on the first motivation listed at the beginning of this lesson where students are challenged to evaluate the impact that electricity has on their daily lives.

2. Visit a local power plant to show students the generation and transport of electricity in their areas.

3. Invite various guest speakers including electricians and utility company employees to discuss how to handle minor electrical emergencies at home and on the farm.

4. Ask a local Rural Electric Cooperative representative to visit and speak with the class.

G. ***Conclusion***

Conclude the lesson by having students provide answers to the questions they generated from the first motivation. Electricity is created by a flow of electrons. There are many sources of electrical power. It is measured in kilowatt-hours. Safe use of electric power requires precautions to avoid shock and fire hazards.

H. ***Answers to Activity Sheets***

AS 1.1 Daily Use of Electricity in My Home

The instructor should determine if the answers are appropriate.

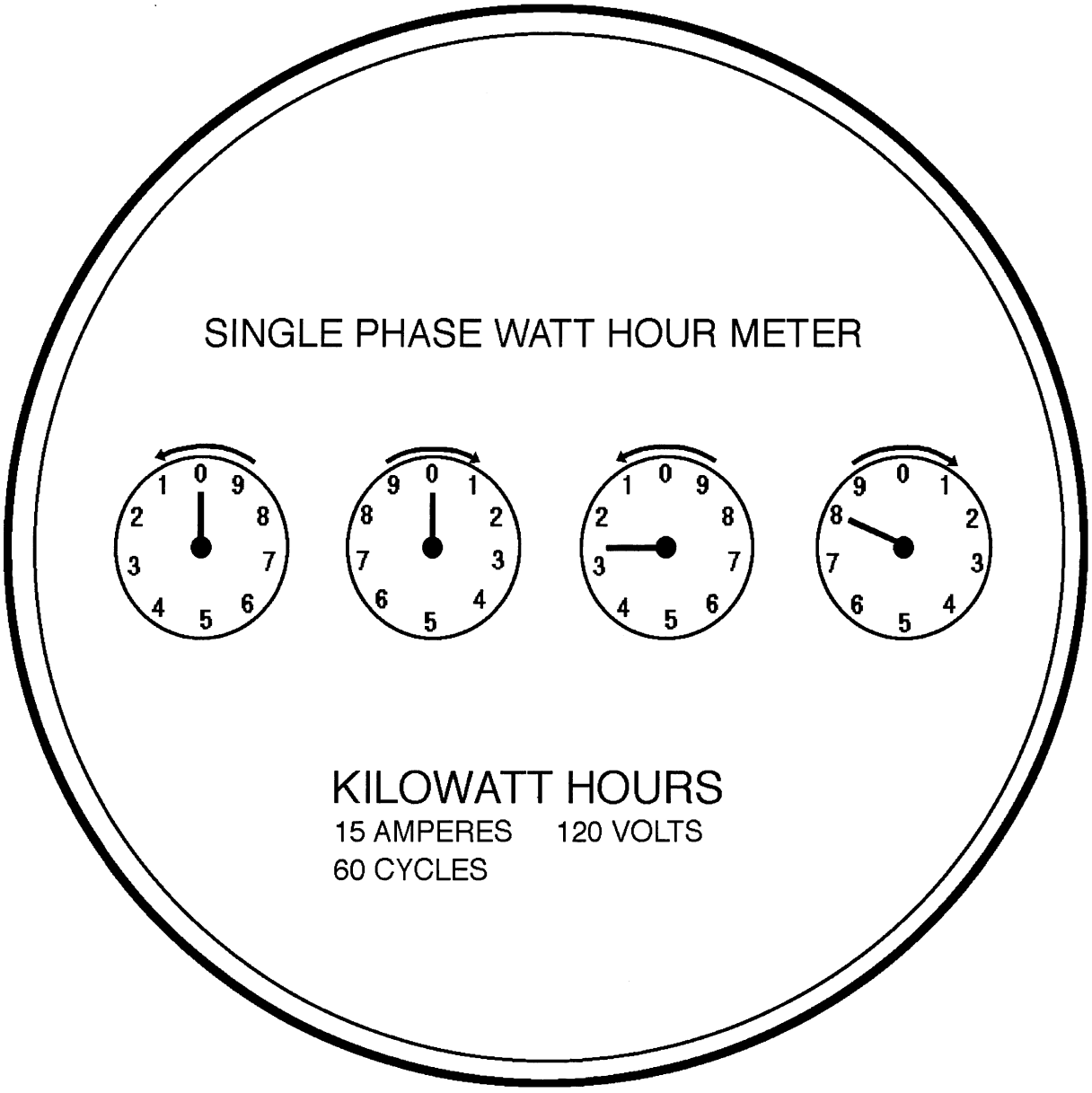
AS 1.2 Electrical Safety Checklist

The instructor should determine if the answers are appropriate.

I. ***Answers to Evaluation***

A unit test is provided at the end of this unit. If a lesson quiz is needed, use questions pertaining to this lesson from the unit test.

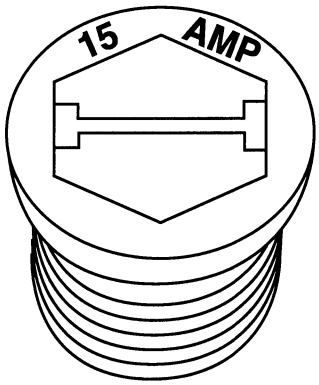
# Reading an Electric Meter



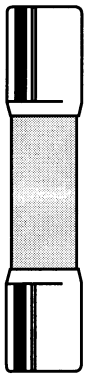

## Reading = 0028

Note: The arrow denotes the rotation of the hands on each dial.

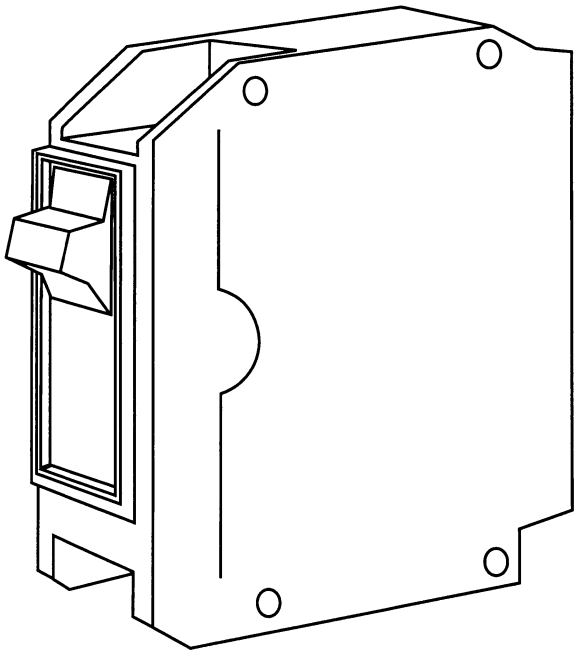
# Fuses and Circuit Breakers




Edison - Base Plug Fuse



Cartridge Fuse



Single Pole Circuit Breaker

Lesson 1: Electricity Name_____

## Daily Use of Electricity in My Home

**Objective**: Students will determine daily and weekly usage of electricity in their homes.

**Directions**: To analyze your family's electricity use, read your meter daily for 2 weeks at approximately the same time each day. Record the readings on the following table. By subtracting the previous day's reading from the current reading each day, you get the number of kilowatt-hours used during that 24-hour period. By adding the daily figures into a weekly total, you can see how much and when your family used electric power. If there are large variances during a day or week, consider what additional electricity may have been used that contributed to the differences.

| DATE | TIME | READING | kWh USED DAILY |
|---|---|---|---|
| Day 1 | | | |
| Day 2 | | | |
| Day 3 | | | |
| Day 4 | | | |
| Day 5 | | | |
| Day 6 | | | |
| Day 7 | | | |
| **WEEKLY TOTAL** | | | |
| Day 8 | | | |
| Day 9 | | | |
| Day 10 | | | |
| Day 11 | | | |
| Day 12 | | | |
| Day 13 | | | |
| Day 14 | | | |
| **WEEKLY TOTAL** | | | |

Lesson 1: Electricity Name_____

## Electrical Safety Checklist

***Objective:*** Students will identify potential electrical hazards in the home.

***Directions:*** Survey your home using the following list of safety precautions to identify potential electrical hazards. Place a check mark in the blank before each statement properly observed in the home.

___ 1. Do not tamper with or bypass safety features on electrical tools and/or appliances.

___ 2. Do not touch electrical tools or appliances with wet hands or feet.

___ 3. Do not remove the third prong (ground prong) on a three-prong plug.

___ 4. Do not use extension cords that are worn, frayed, or get warm during use.

___ 5. Do not place extension cords under a rug or carpet.

___ 6. Use only double-insulated or three-prong (grounded) cord power tools and appliances.

___ 7. Correct problem before resetting circuit breaker or replacing fuse.

___ 8. Use the appropriate size fuse or circuit breaker for each circuit.

___ 9. Do not leave heat-producing appliances unattended while operating (e.g., toaster, iron, hair dryer).

___ 10. Keep heaters and lamps away from combustible materials.

___ 11. Keep electric motors well lubricated and free of dirt and grease buildup.

___ 12. Keep electric appliances and tools dry to avoid shock hazards.

___ 13. Replace switches, outlets, fixtures, or extension cords that are cracked or damaged.

___ 14. Do not operate electrical equipment in wet conditions.

___ 15. Use caution when handling long objects (e.g., ladders, pipe, lumber) to avoid overhead power lines.

___ 16. Use caution when digging in areas where power lines may be buried.

___ 17. Avoid the use of multiple plug adapters in electrical outlets.

What electrical hazards did you identify? How were they corrected?

UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Lesson 2: Common Measurements and Their Uses

***Competency/Objective***: Identify common measurements and give examples of their uses.

***Study Questions***

1. **What are common linear measurements and their uses?**
2. **What are common area measurements and their uses?**
3. **What are common volume measurements and their uses?**
4. **What are common weight measurements and their uses?**

***References***

1. E*xploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit VII.
2. Transparency Masters

   TM 2.1 Reading a Ruler
   TM 2.2 Measures of Length, Area, Volume, and Weight
3. Activity Sheets

   AS 2.1 Reading a Ruler
   AS 2.2 Area Calculations
   AS 2.3 Volume Calculations
   AS 2.4 Calculating Board Feet
   AS 2.5 Weight Calculations

UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Lesson 2: Common Measurements and Their Uses

TEACHING PROCEDURES

A. ***Review***

Performing accurate measurements and converting from one unit of measure to another are important in the study of agricultural mechanics. There are two common systems used today. The English system of measurement is the most commonly used in the United States. However, the metric system is used widely around the world and its practices are becoming more prevalent in the United States, namely, in the automotive industry.

B. ***Motivation***

1. Begin the lesson with the following problem. "This weekend, the maintenance department will be putting new commercial tile on the classroom floor. However, it has requested that this class figure out how many boxes will be needed to cover the floor. They have told us that the local home improvement store sells the tiles we need. Each tile is 1 square foot, and they are packaged 25 to a box. How many tiles will we need in the classroom?"

   Let the students work through this problem for a few minutes.

   On the board, write the students' questions about what they would need to know in order to solve the problem:

   a) How long is the room?
   b) How wide is the room?
   c) How do I read a tape measure (or ruler)?
   d) What is a square foot?
   e) What is area?

   Explain to the students that the questions they have posed in this discussion will be the kinds of questions they will learn to answer in the lesson. Students should leave the discussion with the understanding that once they are able to answer the general questions they have posed, they will (1) have a solid understanding of the lesson and (2) be able to solve this word problem and similar problems in their daily lives dealing with measurements.

2. Begin discussion by bringing an extension cord, a carpet sample, a soda bottle, and a pound of hamburger to class. Have students identify the units in which they would buy these products in a store. They should be feet, square yards, liters, and pounds, respectively. Point out that in this example, there are four different ways to measure units of each product. These correspond with the four different types of measurements they will study in this lesson: linear, area, volume, and weight. In addition, there are differences between the systems of measurement. Two different systems are English and metric. See if students can point out which is the metric system in the product examples. (It should be the soda bottle - liter.)

C. ***Assignment***

D. ***Supervised Study***

E. ***Discussion***

**Q1.** **<u>What are common linear measurements and their uses</u>?**

**A1.**

**a) Common English linear measurements**
- **1) Inches**
- **2) Feet**
- **3) Yards**

**b) Common metric linear measurements**
- **1) Millimeters**
- **2) Centimeters**
- **3) Meters**
- **4) Kilometers**

Explain to students that linear measurement is straight-line measurement. Have students identify items in the room that would be measured in a linear fashion. Display TM 2.1 and instruct class on ruler reading while they look at the ruler on AS 2.1. Have students complete the activity sheet and check answers to be sure they have a good understanding of this process. Display TM 2.2 and explain English equivalents and metric equivalents. Be sure that students understand that the metric system is used around the world and is important to understand.

**Q2.** **<u>What are common area measurements and their uses</u>?**

**A2.** **Common area measurements include square feet and square yards.**

Area is calculated by multiplying the length of an object by the width of the object. Display TM 2.2 and explain the calculation of area equals length times width (A=LxW). Give students AS 2.2 and allow them to work alone or in partners to solve the area problems. Discuss the answers in a class forum. Include in the discussion the uses of area measurements.

**Q3.** **<u>What are common volume measurements and their uses</u>?**

**A3.** **Common volume measurements include board feet, cubic yards, and cubic feet.**

Volume is calculated by multiplying the length of an object times the width of an object times the object's thickness (V=LxWxT). Display TM 2.2. Explain that cubic feet and cubic yards are directly related to one another. Board feet is a special calculation that deals with calculating a volume of wood. Have students complete AS 2.3 and discuss answers. When students are comfortable with the concept of volume, have them complete AS 2.4 and discuss the answers. Board feet is calculated by multiplying the length of a board in feet times the width of a board in feet times the thickness of a board in inches. If you have more than one board, multiply the board feet by the number of boards to get total board feet.

**Q4.** **<u>What are common weight measurements and their uses</u>?**

**A4.**

**a) Common measurements of weight in the English system are ounces and pounds.**

**b) Common measurements of weight in the metric system are grams and kilograms.**

Explain that there are 16 ounces in 1 pound and there are 1,000 grams in 1 kilogram. Display TM 2.2 and distribute AS.2.5. Have students practice converting weights in metric and English. Discuss results as a class.

F. ***Other Activities***

1. Set up 10 to 15 stations around the room or laboratory. Place a different item at each station to be measured in one of the four ways discussed. Have students alone or in pairs rotate from station to station measuring and calculating their answers, e.g., put a 2x4 at one station and have students calculate the board feet.

2. Set up English and metric scales and have students practice measuring small objects in grams-kilograms or in ounces-pounds. For further comprehension, have students practice converting ounces and pounds or grams and kilograms.

3. Have students bring different types of food packages from home to examine how different types of food are measured and what units of measure they are packaged and sold in. For further practice, have them convert the unit on the package to the other unit discussed.

4. Reread the tile problem that was introduced in the motivation. See how quickly students can calculate this problem.

G. ***Conclusion***

Calculating and converting measurements are important skills in agricultural mechanics as well as in everyday life. Construction projects such as the one discussed in the Motivation, gardening projects, and even grocery shopping involve some degree of measurement and the ability to convert one type of measurement into another.

H. ***Answers to Activity Sheets***

AS 2.1 Reading a Ruler

a. 1/16
b. 1/8 (2/16)
c. 3/16
d. ¼ (4/16)
e. 5/16
f. 3/8 (6/16)
g. 7/16
h. ½ (8/16)
i. 9/16
j. 5/8 (10/16)
k. 11/16
l. ¾ (12/16)
m. 13/16
n. 7/8 (14/16)
o. 15/16
p. 1
q. 1 3/8
r. 2 5/16

AS 2.2 Area Calculations

1. a. 8 ft. x 16 ft. = 128 sq. ft. x 2 walls = 256 sq. ft.
   8 ft. x 12 ft. = 96 sq. ft. x 2 walls = 192 sq. ft.
   256 sq. ft. + 192 sq. ft. = 448 sq. ft. of surface
   b. door area: 3 ft. x 6 ft. = 18 sq. ft.
   window area: 2 ft. x 3 ft. = 6 sq. ft.
   448 sq. ft – (18 sq. ft. + 6 sq. ft.) = 424 sq. ft. of surface to paint
   c. 424 sq. ft. divided by 200 sq. ft./gallon = 2.12 gallons of paint
   You would need to purchase 2 gallons and 1 quart of paint.

2. a. 18 ft. x 20 ft. = 360 sq. ft.
360 sq. ft divide by 9 sq.ft. /sq. yd = 40 sq. yd. of carpet
b. 18 ft. x 20 ft. = 360 sq. ft
360 sq. ft divide by 9 sq. ft/ sq. yd. = 40 sq. yd. of padding
c. carpet: 40 sq. yd. X $6.00/sq.yd. = $240.00
padding: 40 sq. yd. x $1.00/sq.yd.= $40.00
$240.00+$40.00 = $280.00 total cost

3. a. 10 ft. x 8 ft. = 80 sq. ft. for one wall
15 ft. x 8 ft. = 120 sq. ft. for second wall
80 sq. ft. + 120 sq. ft. = 200 sq. ft. to be covered with paneling
b. area of sheet of paneling: 8 ft. x 4 ft. = 32 sq. ft.
200 sq. ft. divided by 32 sq. ft./sheet = 6.25 sheets of paneling
You would need to buy 7 sheets of paneling to complete this job.
c. $9.00/ sheet x 7 sheets = $63.00

AS 2.3 Volume Calculations

1. 5 ft. x 3 ft. x 1 ft. = 15 cu. ft.
2. 1 cu. yd. = 27 cu. ft., 150 cu. ft./27 = 5.5 cu. yd.
5.5 cu. yd. divide by 2 cu. yd./bag = 2.7 bags
You will need to buy 3 bags.
3. Home supply = $4.99 for 3 cu. yd.
Discount = $ 6.50 for (81cu. Ft/27) = 3 cu. yd.
Home Supply is cheaper.
4. 3 ft. = 1 yd.
5 yd. x 2 yd. X 1 yd. = 10 cu. yd.
5. Steve: 20 cu. yd.
Andy: (500 cu. ft./27) = 18.5 cu. yd.
Steve used more mulch.

AS 2.4 Calculating Board Feet

1. 2 in. x .67 ft. x 14 ft. = 18.76 bd. ft.
18.76 bd. ft. x 2 pieces = 37.52 bd. ft. total
2. 2 in. x .5 ft. x 8ft. = 8 bd. ft.
8 bd. ft. x 8 pieces = 64 bd. ft. total
3. 2 in. x .3 ft. x 14 ft. = 8.4 bd. ft.
8.4 bd. ft. x 2 pieces = 16.8 bd. ft. total
4. 1 in. x .5 ft. x 14 ft. = 7 bd. ft.
7 bd. ft. x 16 pieces = 112 bd. ft. total
5. 2 in. x .3 ft. x 6 ft. = 3.6 bd. ft.
3.6 bd. ft. x 4 pieces = 14.4 bd. ft. total
6. 2 in. x .3 ft. x 5 ft. = 3 bd. ft.
3 bd. ft. x 4 pieces = 12 bd. ft. total
7. 1 in. x .5 ft. x 8 ft. = 4 bd. ft.
4 bd. ft. x 10 pieces = 40 bd. ft. total
8. 1 in. x .5 ft. x 6 ft. = 3 bd. ft.
3 bd. ft. x 4 pieces = 12 bd. ft. total

Board feet each: 18.76 + 8 + 8.4 + 7 + 3.6 + 3 + 4 + 3 = 55.76 bd. ft.
Total board feet: 37.52 + 64 + 16.8 + 112 + 14.4 + 12 + 40 + 12 = 308.72 bd. ft. total

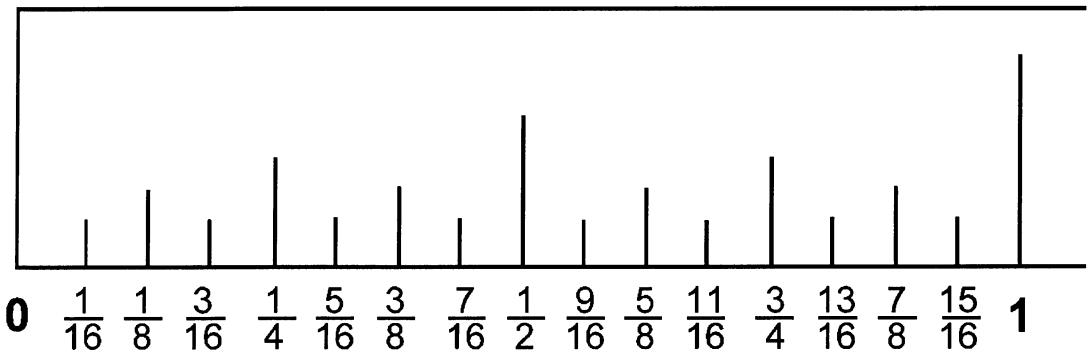
AS 2.5 Weight Calculations

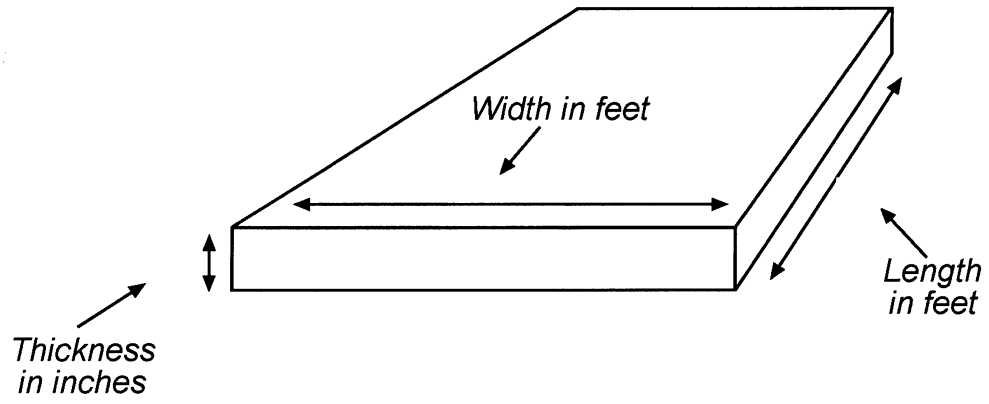
1. 2 lb. x 16 oz./lb = 32 oz.
2. 55 oz/16 oz. per lb = 3.4 lb of cat food x $1.50/lb.= $5.10
3. $.25/oz. x 16 oz./lb.= $4.00/lb. The store uptown is cheaper.
4. 6.5 lb x 16 oz/lb. = 104 oz. Divide by 8 oz./bag = 13 bags
5. 1.5 kg x 1000 g/kg = 1500

I. ***Answers to Evaluation***

A unit test is provided at the end of this unit. If a lesson quiz is needed, use questions pertaining to this lesson from the unit test.

# Reading a Ruler




## L′ x W′ x T″ = Bd. Ft.

# Measures of Length, Area, Volume, and Weight

## ENGLISH

### Measures of Length

| | |
|---|---|
| 12 in. | = 1 ft. |
| 3 ft. | = 1 yd. |
| 5 ½ yd | = 1 rod |
| 320 rods | = 1 mile |
| 5,280 ft. | = 1 mile |
| 1,760 yd. | = 1 mile |
| 6,080 ft. | = 1 knot |

### Measures of Area

| | |
|---|---|
| 144 sq. in. | = 1 sq. ft. |
| 9 sq. ft. | = 1 sq. yd. |
| 30 ¼ sq. yd | = 1 sq. rod |
| 160 sq. rods | = 1 acre |

### Measures of Volume

*(solids)*

| | |
|---|---|
| 1,728 cu. in | = 1 cu. ft. |
| 27 cu. ft | = 1 cu. yd. |
| 128 cu. ft. | = 1 cord |

*(liquids)*

| | |
|---|---|
| 16 fluid oz. | = 1 pt. |
| 2 pt. | = 1 qt. |
| 32 fl. oz. | = 1 qt. |
| 4 qt. | = 1 gal. |
| 31 ½ gal. | = 1 bbl. |
| 231 cu. in | = 1 gal. |
| 7 ½ gal. | = 1 cu. ft. |

### Measures of Weight

| | |
|---|---|
| 7,000 grains (gr.) | = 1 lb. |
| 16 oz. | = 1.lb. |
| 100 lbs. | = 1 cwt. |
| 2,000 lbs. | = 1 short ton |
| 2,240 lbs. | = 1 long ton |

## METRIC

### Measures of Length

| | |
|---|---|
| 10 millimeters | = 1 centimeter |
| 10 centimeters | = 1 decimeter |
| 100 centimeters | = 1 meter |
| 1000 meter | = 1 kilometer |

### Measures of Volume

| | |
|---|---|
| 100 cubic centimeters | = 1 liter |
| 100 liters | = 1 hectoliter |

### Measures of Weight

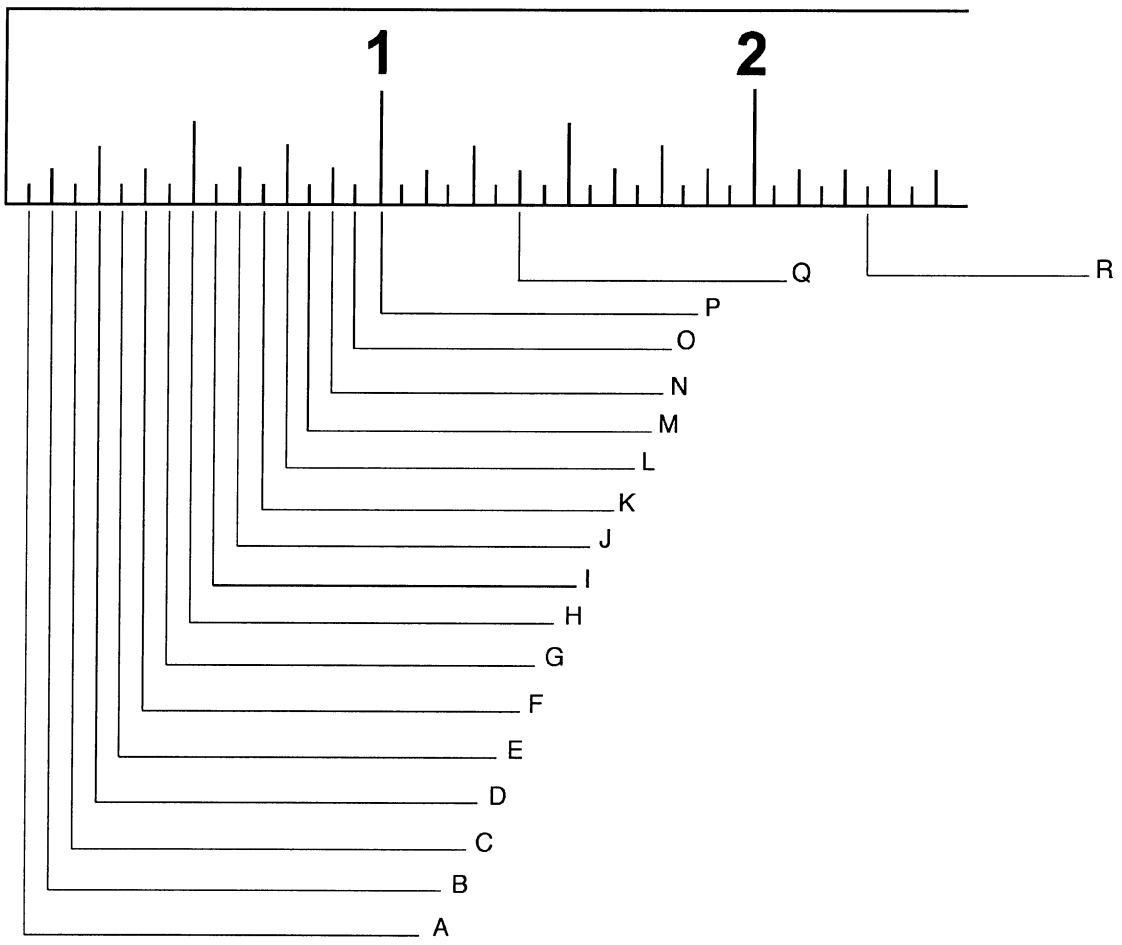
| | |
|---|---|
| 100 milligrams | = 1 gram |
| 1000 grams | = 1 kilogram |
| 1000 kilograms | = 1 metric ton |

Lesson 2: Common Measurements and Their Uses Name_____

## Reading a Ruler

***Objective:*** Students will practice reading an English ruler.

***Directions:*** Fill in the blanks on the accompanying figure with the correct inch readings in the simplest terms.



Lesson 2: Common Measurements and Their Uses Name_____

## Area Calculations

***Objective***: Students will calculate areas to determine the amount of materials needed.

***Directions***: Correctly calculate each problem. (Show your work.)

When purchasing materials to complete a home maintenance project, the exact amount of materials cannot always be purchased because of the way materials are packaged. Therefore accurate calculations are important in order to purchase enough materials without purchasing too much. The following information is provided:

Floor area = length x width
Wall area = length x height
9 sq. ft. = 1 sq. yd.

1. If 1 gallon of paint covers 200 sq. ft., how many gallons of paint will you need to purchase to completely cover a room that has two walls that measure 8 feet tall by 16 feet long and two walls that measure 8 feet tall by 12 feet long? There is one window that measures 2 feet by 3 feet and one door that measures 3 feet by 6 feet that will not need painting.

   a. Total square feet of wall space =

   b. Total square feet to be painted =

   c. Total gallons of paint required =

2. You have decided to carpet the living room. The room measures 18 feet wide by 20 feet long. You will need padding and carpet. The padding costs $1.00 per square yard and the carpet costs $6.00 per square yard.

   a. How many square yards of carpet will be needed?

   b. How many square yards of padding will be needed?

   c. How much will the materials cost?

3. You want to panel two walls in a room in your house. One wall measures 10 feet long by 8 feet tall. The other wall measures 15 feet long by 8 feet tall. Your paneling comes in sheets 4 feet by 8 feet and costs $9.00 per sheet.

   a. How many square feet have to be covered by paneling?

   b. How many sheets of paneling would you need to purchase to cover these areas?

   c. What is the cost for the paneling only?

Lesson 2: Common Measurements and Their Uses Name_____

## Volume Calculations

***Objective:*** Students will calculate volume.

***Directions:*** Calculate the following problems.

1. If a flower bed is 5 feet long, 3 feet wide, and 1 foot thick, how many cubic feet of potting soil must be purchased to fill the bed?

2. You are doing a landscaping project and have calculated that you need 150 cubic feet of topsoil to complete the project. The local supplier sells topsoil in bags with 2 cubic yards of soil per bag. How many bags will you need?

3. The home supply store is having a sale on cedar mulch for $4.99 a bag with 3 cubic yards. The discount store is also selling cedar mulch for $6.50 for a bag with 81 cubic feet. Who has the best buy on cedar mulch?

4. When mulching a garden that is 5 yards long, 2 yards wide, and 3 feet deep, how many cubic yards of mulch would you need to buy?

5. Steve used 20 cubic yards of mulch on Garden A and Andy used 500 cubic feet of mulch on Garden B. Who used the most mulch?

Lesson 2: Common Measurements and Their Uses Name_____

## Calculating Board Feet

***Objective:*** Students will accurately calculate board feet.

***Directions:*** Calculate the number of board feet in the following list of lumber materials for a hayrack.

| ITEM | NUMBER | SIZE | BD. FT. EACH | TOTAL BD. FT. |
|---|---|---|---|---|
| Sills | 2 | 14' x .67' x 2" | | |
| Joists | 8 | 8' x .5' x 2" | | |
| Side rails | 2 | 14' x .33' x 2" | | |
| Floor | 16 | 14' x .5' x 1" | | |
| Standards | 4 | 6' x .33' x 2" | | |
| Standards | 4 | 5' x .33' x 2" | | |
| Ends | 10 | 8' x .5' x 1" | | |
| Braces | 4 | 6' x .5' x 1" | | |
| **TOTAL BOARD FEET** | | | | |

Lesson 2: Common Measurements and Their Uses Name_____

## Weight Calculations

***Objective:*** Students will apply and understand weight calculations.

***Directions:*** Calculate the following problems.

1. If you buy 2 pounds of chicken from the store, how many ounces of chicken would you have?

2. Susan purchased 55 ounces of cat food at the local pet store. This cat food sold for $1.50/pound. How many dollars' worth of cat food did she buy?

3. The local grocery store is selling shrimp for $5 per pound. Another store uptown had a special on shrimp that ran $0.25 per ounce. Which store offered the better buy on shrimp?

4. Vikki needed 6.5 pounds of chocolate chips for a recipe she was making. The store sold chocolate chips in 8-ounce bags. How many bags of chocolate chips must Vikki buy?

5. If the local Super Discount Warehouse sells mega bags of chips with 1.5 kilograms per bag, how many grams of chips are in each bag?

UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Lesson 3: Common Tools and Their Uses

***Competency/Objective***: Identify common tools and their uses.

***Study Questions***

1. **What are common hand tools and their uses?**

2. **What are common power tools and their uses?**

***References***

1. E*xploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit VII.

2. Transparency Masters

   TM 3.1 Common Hand Tools
   TM 3.2 Common Power Tools

3. Activity Sheets

   AS 3.1 Common Hand Tools
   AS 3.2 Common Power Tools

UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Lesson 3: Common Tools and Their Uses

TEACHING PROCEDURES

A. ***Review***

The previous lesson discussed units of measure and their uses. In this lesson common hand tools, common power tools, and the uses of each will be presented.

B. ***Motivation***

Display a variety of hand tools on the tables in the classroom. Divide the students into small groups. Award bonus points or give a prize to the group that identifies the name and uses of the most tools.

C. ***Assignment***

D. ***Supervised Study***

E. ***Discussion***

**Q1. <u>What are common hand tools and their uses</u>?**

**A1.**

- **a) Hammers - driving and removing nails or shaping another object**
  - **1) Ball peen**
  - **2) Ripping claw**
  - **3) Curved claw**
- **b) Pliers - gripping and/or turning objects**
  - **1) Needle-nose**
  - **2) Slip-joint**
- **c) Screwdrivers – turning bolts or screws**
  - **1) Flat head**
  - **2) Phillips head**
- **d) Handsaws - cutting wood, metal, or plastic materials**
  - **1) Hacksaw**
  - **2) Common handsaw**
  - **3) Backsaw**
- **e) Wrenches - tighten and loosen bolts and nuts**
  - **1) Combination wrenches**
  - **2) Socket wrenches**
  - **3) Adjustable wrenches**
- **f) Measuring tools - determine dimensions of specific areas**
  - **1) Retractable steel tape**
  - **2) Folding wooden rule**
  - **3) Steel tape**
- **g) Squares - used to lay out a 90° corner**
  - **1) Combination square**
  - **2) Carpenter's square**
- **h) Levels - gauge the straightness or levelness of a line or object**
- **i) Wood chisels - cutting tools used to cut, shave, or carve wood**
- **j) Hand drills - used to drill holes in surfaces**
  - **1) Hand drill**

2) **Push drill**
3) **Bit brace**

Use TM 3.1 or display the actual tool when explaining the identification and use of each tool. Explain that each tool is designed for a specific job and should only be used for its intended purpose. Using tools for purposes other than for what they were intended may cause personal injury or damage to the tool. Have students complete AS 3.1.

**Q2.** **<u>What are common power tools and their uses</u>?**

**A2.**

a) **Portable drill - used to drill holes or drive screws into or out of materials**
b) **Router - used to create a groove or cut in wood**
c) **Jig saw - used to cut curved lines in wood**
d) **Band saw - used to cut straight or curved lines in different types of materials**
e) **Drill press - used to cut or drill holes in different types of materials**
f) **Circular saw- used to rip or cross-cut boards**

Use TM 3.2 or the actual tool to describe the identification and use of each power tool. Careful instruction on the operation and safety procedures is essential before operating any power tool. Have students complete AS 3.2.

F. ***Other Activities***

1. Build a small wood project such as a toolbox or a sawhorse with hand tools. Note: Do not begin this project until the safety unit has been addressed and students have passed any required safety evaluations.

2. Display different hand tools at numbered stations around the lab. Have students identify the appropriate tool and its use at each station.

3. Display different power tools at numbered stations around the lab. Have students identify the appropriate tool and its use at each station.

G. ***Conclusion***

Knowing how to operate and use various hand and power tools is essential for mechanic and repair operations around the home and farm. It is important for the operator to know the proper use and safety procedures for each tool to avoid injury or damage to the tool.

H. ***Answers to Activity Sheets***

AS 3.1 Common Hand Tools

1. Hacksaw - used to cut wood, metal, or plastic materials
2. Combination square - used to lay out a 90° corner
3. Curved claw hammer - used to drive and remove nails or shape another object
4. Bit brace - used to drill holes in surfaces
5. Adjustable wrench - used to tighten and loosen bolts and nuts
6. Combination wrench - used to tighten and loosen bolts and nuts
7. Needle-nose pliers - used to grip and/or turn objects
8. Level - used to gauge the straightness or levelness of a line or object
9. Phillips head screwdriver - used to turn bolts or screws
10. Push drill - used to drill holes in surfaces

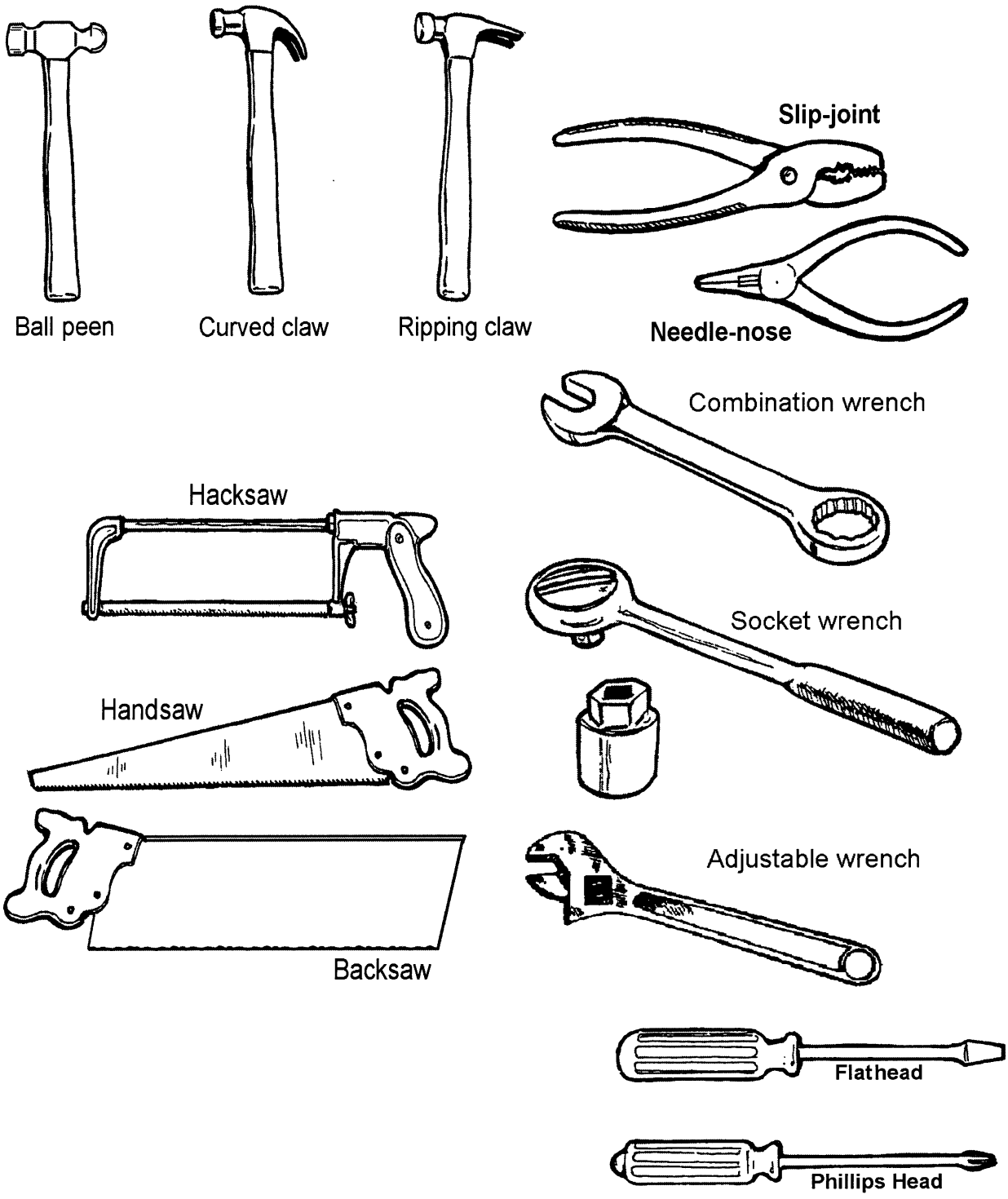
AS 3.2 Common Power Tools

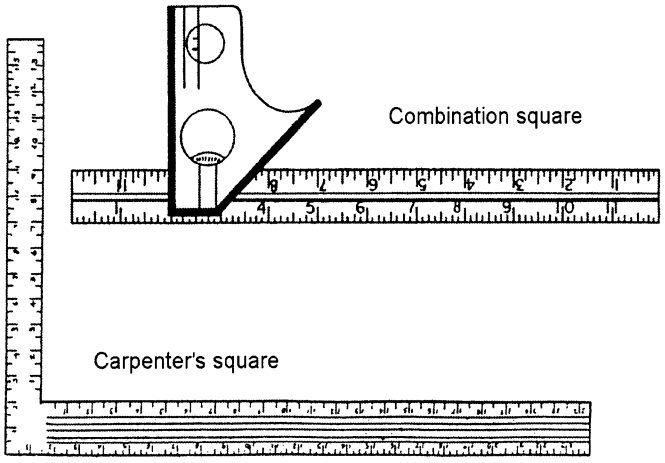
1. Band saw - used to cut straight or curved lines in different types of materials
2. Jig saw - used to cut curved lines in wood
3. Router - Used to create a groove or cut in wood
4. Drill press - used to cut or drill holes in different types of materials
5. Portable drill - used to drill holes or drive screws into or out of materials

## I. *Evaluation*

A unit test is provided at the end of this unit. If a lesson quiz is needed, use questions pertaining to this lesson from the unit test.

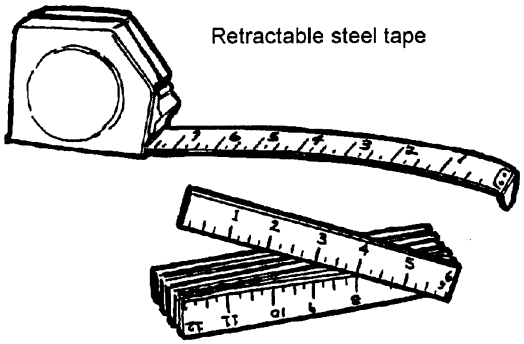
# Common Hand Tools





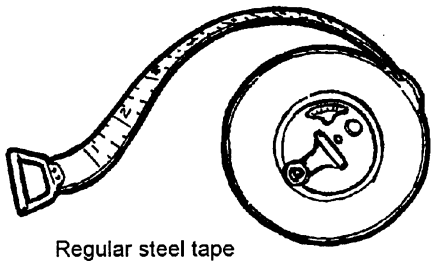
Combination square

Carpenter's square



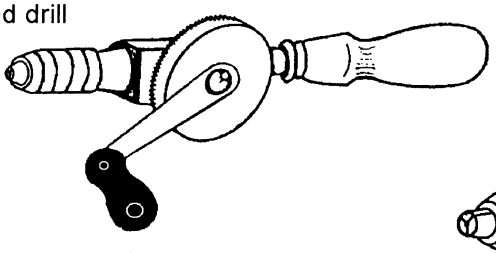
Retractable steel tape

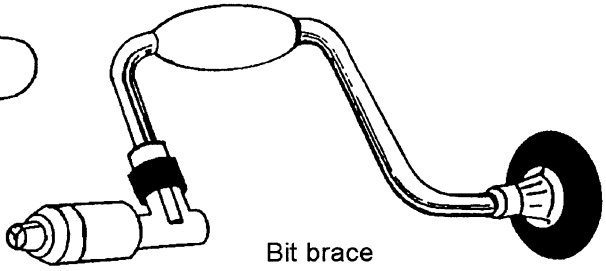
Folding wooden ruler



Regular steel tape

Hand drill

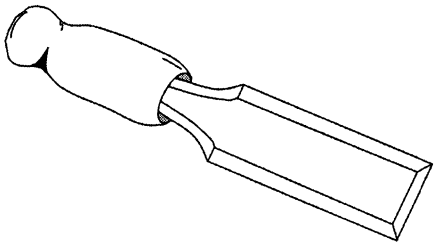




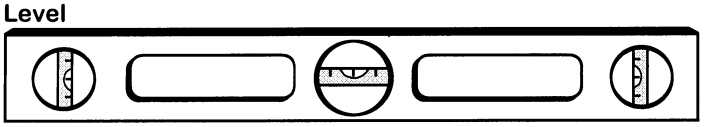
Bit brace

Push drill

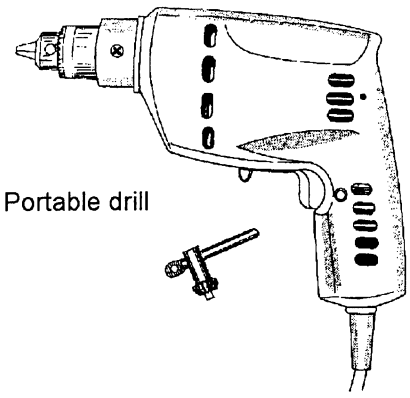
**Wood chisel**



**Level**

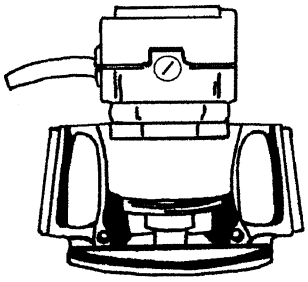


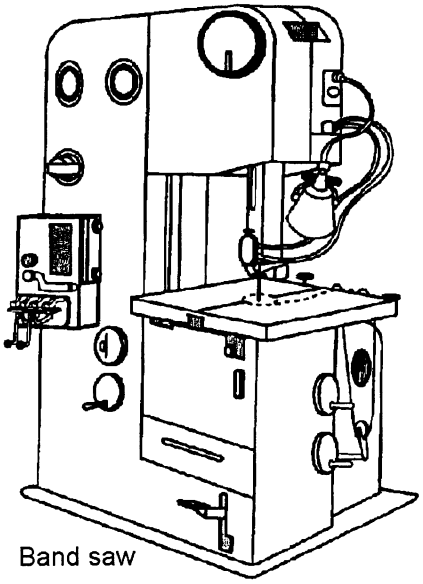
# Common Power Tools



Portable drill

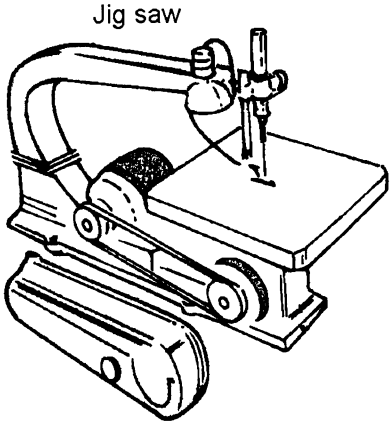
Router



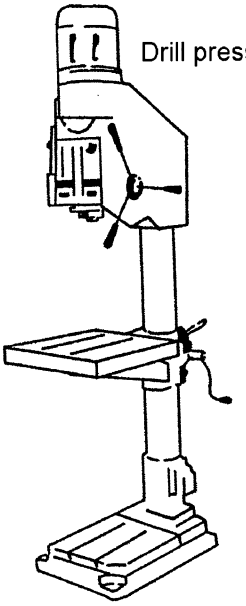


Band saw

Jig saw



Drill press



Lesson 3: Common Tools and Their Uses Name_____

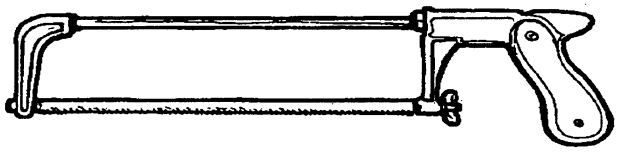
## Common Hand Tools

***Objective:*** Students will identify common hand tools used on the farm or in the home and explain how each is used.

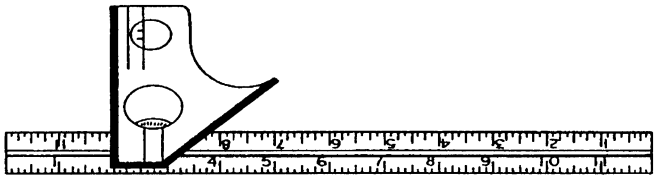
***Directions:*** Identify each numbered tool and explain one use for each tool.

1. _____
_____
2. _____
_____
3. _____
_____
4. _____
_____
5. _____
_____
6. _____
_____
7. _____
_____
8. _____
_____
9. _____
_____
10. _____
_____

1.

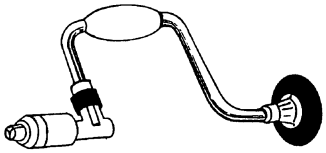


2.



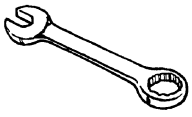
3.

4.

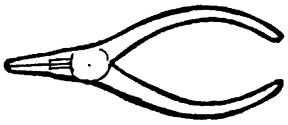


5.

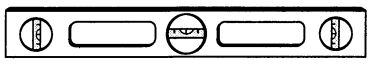
6.



7.



8.



9.

10.

Lesson 3: Common Tools and Their Uses Name_____

## Common Power Tools

***Objective:*** Students will identify common power tools used on the farm or in the home and explain how each is used.

***Directions:*** Identify each numbered tool and explain one use for each tool.

1._____
_____

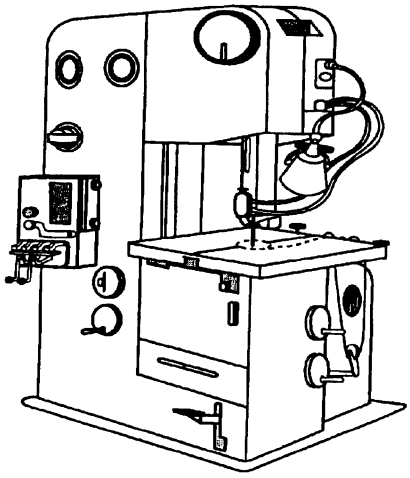
2._____
_____

3._____
_____

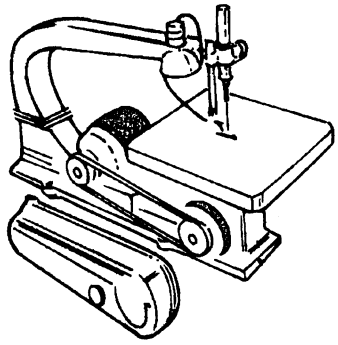
4._____
_____

5._____
_____

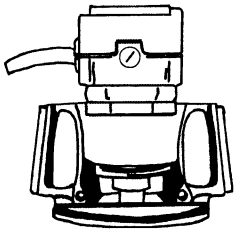
1.



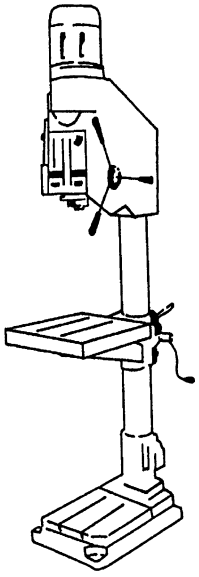
2.



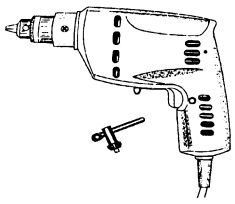
3.



4.



5.



UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Lesson 4: Personal Safety Practices

***Competency/Objective:*** Identify personal safety practices when using hand and power tools.

***Study Questions***

1. **How do I protect my eyes?**
2. **What must be worn to be safe?**
3. **Why is cleanliness important to safety?**
4. **How do I use hand tools safely?**
5. **How do I use power tools safely?**

***References***


1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit VII.
2. *Safety First: Wood Shop Safety* (T&I Video 149). Missouri Resource Center for Career & Technical Education, University of Missouri-Columbia.

UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Lesson 4: Personal Safety Practices

TEACHING PROCEDURES

A. ***Review***

Review the previous lesson, identifying common tools and their uses. Students should be able to identify a tool and describe the appropriate use for that tool. The next step in becoming familiar with hand and power tools is to become familiar with safe tool use and personal safety practices. Tools are ineffective and dangerous if not used in a safe and proper manner.

B. **Motivation**

Begin by viewing the safety video entitled *Safety First*: *Wood Shop Safety* (T&I Video 149) and discuss the importance of using hand and power tools safely. Ask students to share examples of people that they know who have been injured in accidents involving hand or power tools. Discuss how they think these accidents could have been prevented.

C. ***Assignment***

D. ***Supervised Study***

E. ***Discussion***

**Q1. How do I protect my eyes?**

**A1. Safety glasses/goggles should be used. These should have side shields to protect the eyes from debris that could enter from the side.**

Explain to the students that safety glasses/goggles should be used. Ask students to predict what would occur without these safety glasses/goggles.

**Q2. What must be worn to be safe?**

**A2.**

**a) Clothing must fit well and be free from tears. Loose, baggy, or frayed clothing is a safety hazard.**
**b) Protective clothing such as coveralls, shop aprons, or shop coats are highly recommended to protect clothing from damage.**
**c) If hair is long, hair restraints must be worn to keep hair out of the way of machines that have moving parts.**
**d) Leather shoes with steel toes and high tops are recommended to protect feet from injury.**
**c) Face masks should be worn when working around fumes or dust.**

Ask students to describe clothing of professionals in various machine shops. What do they have in common.

**Q3. Why is cleanliness important to safety?**

**A3. Cleanliness is important to safety for a number of reasons.**
**a) Materials strewn about a shop are obstacles.**
**b) People risk falling over tools or materials on the floor.**
**c) Debris can be a fire hazard.**

Ask students why cleanliness is important to safety. List their responses on the board.

**Q4.** **How do I use hand tools safely?**

**A4.**

**a) Protect eyes and clothing.**
**b) Be certain that the operator is using the correct tool for the job.**
**c) Before using a hand tool, be certain that the tool is not damaged in any way.**
**d) Understand the operation of the tool and conduct the operation correctly and carefully.**
**e) Store hand tools in their proper place after use to keep the shop clear from hazards.**
**f) Be sure that the tool is clean and undamaged before storage. A damaged tool should be repaired, not put away for the unsuspecting person to use later.**

Ask students to restate the major points they observed in the video shown during the Motivation about using hand tools safely.

**Q5.** **How do I use power tools safely?**

**A5.**

**a) Obtain permission from the instructor before using any power tool.**
**b) Conduct an inspection of the tool to meet the following standards:**
  **1) The blade or cutter is clean and sharp.**
  **2) The power cord and switch are in good condition.**
  **3) All guards are in place.**
**c) Protect eyes and clothing properly.**
**d) The operator should use a power tool only after obtaining instruction in and mastering a safety test on the proper use of the tool.**
**e) Be sure to let others in the shop know when a tool is in use.**
**f) Make any adjustments to a power tool when the switch is off and the tool is unplugged.**
**g) After use, power tools should be properly cleaned and stored.**

Ask students to restate the major points they observed in the video shown during the Motivation about using power tools safely.

F. ***Other Activities***

1. Instruct students in the proper and safe use of each of the hand and power tools mentioned in the previous lesson.

2. Administer a general safety test, a hand tool safety test, and a safety test on the power tools mentioned in the previous lesson. Have students retake the test to 100% competency.

3. Have a guest speaker from a local machine shop, agri-business, or Cooperative Extension office speak on shop safety.

4. Have students create general, hand tool, or power tool safety posters to display around the classroom and shop.

G. ***Conclusion***

Once students have attained knowledge of hand and power tools, it is essential that they know the safety practices associated with working with or around such types of tools. Safety not only

prevents injury to the operator, it also prevents injury to others in the area and extends the life of the equipment.

H. ***Answers to Activity Sheets***

I. ***Answers to Evaluation***

A unit test is provided at the end of this unit. If a lesson quiz is needed, use questions pertaining to this lesson from the unit test.

UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Lesson 5: Safety and Maintenance Procedures for Lawn and Garden Equipment

***Competency/Objective:*** Identify safety and maintenance procedures for lawn and garden equipment.

***Study Questions***

1. **What are common lawn and garden hand tools?**
2. **What are examples of common power lawn and garden equipment?**
3. **What is the difference between a two- and four-stroke engine?**
4. **What safety guidelines should be followed when using hand lawn equipment?**
5. **What safety guidelines should be followed when using power lawn equipment?**
6. **What are maintenance procedures for hand lawn equipment?**
7. **What are maintenance procedures for power lawn equipment**?

***References***

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit VII.
2. Activity Sheets

   AS 5.1 Hand Lawn Tool Identification
   AS 5.2 Power Lawn Tool Identification
   AS 5.3 Two- vs. Four-Stroke Engines
   AS 5.4 Mower Safety Demonstration (Instructor)
   AS 5.5 Mowing Obstacle Course (Instructor)
   AS 5.6 Lawn Mower Safety Guidelines

UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Lesson 5: Safety and Maintenance Procedures for Power Lawn and Garden Equipment

TEACHING PROCEDURES

A. ***Review***

Review the previous lesson and inform students that safety applications are crucial in many operations around the home and farm. This lesson stresses proper safety procedures used when working with hand and power lawn and garden equipment.

B. ***Motivation***

Bring several different types of hand and power lawn tools to the classroom. Divide students into groups. Have each group identify as many tools as they can and describe the use for each tool. Reward the group with the most correct answers.

C. ***Assignment***

D. ***Supervised Study***

E. ***Discussion***

**Q1. <u>What are common lawn and garden hand tools</u>?**

**A1.**

**a) Turf edger**
**b) Weed cutter**
**c) Garden hoe**
**d) Push hoe**
**e) Lawn or leaf rake**
**f) Garden rake**
**g) Pitchfork**
**h) Spading fork**
**i) Cultivators**
**j) Pruning shears**
**k) Hedge shears**
**l) Hand trowel**
**m) Round-pointed shovel**
**n) Wheelbarrow**
**o) Sod roller**

Refer to the drawings in the Student Reference. Explain to students that hand tools work well where large power tools cannot fit. Stress the importance of keeping hand tools clean and well maintained to ensure the safety of the operator and the longevity of the tool. Have students complete AS 5.1 to identify hand lawn tools.

**Q2. <u>What are examples of common power lawn and garden equipment</u>?**

**A2.**

**a) Walk-behind mower**
**b) Riding mower**
**c) Leaf blower**
**d) String trimmer**
**e) Hedge trimmer**

**g) Tiller**

Refer to the drawings in the Student Reference and describe the various types of power lawn and garden equipment. Ask students which types they have at home and which types they have personally operated. Have students complete AS 5.2 to identify power lawn tools.

**Q3. <u>What is the difference between a two- and four-stroke engine</u>?**

**A3. The two-stroke engine requires an oil-fuel mixture directly in the fuel chamber whereas the four-stroke engine strictly requires fuel in the fuel tank and oil in the oil reservoir.**

Refer to Table 5.1 in the Student Reference, which displays the differences between a two- and four-stroke engine. Discuss the differences, making it clear that one is not necessarily better than another. They are both extremely useful for different power requirements. Be sure that students clearly understand that two- and four-stroke engines have extremely different fuel requirements. Regular fuel cannot be used in a weed-eater, and conversely, fuel-oil mixture for a weed-eater cannot be used in a riding lawn mower. Demonstrate the correct mixing of a two-stroke fuel-oil mixture. Have students complete AS 5.3 to identify differences between two- and four-stroke engines.

**Q4. <u>What safety guidelines should be followed when using hand lawn equipment</u>?**

**A4.**

**a) Use the appropriate tool for the job.**
**b) Avoid baggy, loose-fitting clothing.**
**c) Wear safety glasses, particularly when sharpening tools.**
**d) Wear gloves to protect the hands.**
**e) Inspect the tool to ensure that it is sharp and in good working condition.**
**f) Be conscious of others' locations before swinging sharp tools to avoid injuring others.**

Review the safety guidelines and express the importance of safety. Explain that even though the equipment is not power equipment, it can still be dangerous.

**Q5. <u>What safety guidelines should be followed when using power lawn equipment</u>?**

**A5.**

**a) Carefully read the instructions and operating procedures in the owner's manual before attempting to operate any power lawn tool.**
**b) Avoid loose or baggy clothing because it may become entangled in moving parts of the equipment.**
**c) Wear safety goggles to protect the eyes.**
**d) Inspect tools before use to be sure they are sharp and in good working condition.**
**e) Alert others that a power tool is in use.**
**f) Keep hands and feet away from all moving parts.**
**g) Remove debris and large objects from areas where mowers and trimmers will be operated.**
**h) Never smoke or attempt to refill the fuel tank while the tool is running.**
**i) Keep all safety shields in their proper places.**
**j) Use caution when mowing on slopes to avoid falling or overturning equipment.**
**k) Mow only dry grass and cut grass 1 1/2 to 3 inches depending upon time of year and type of grass.**

Review the safety guidelines and discuss the importance of safe operations for power lawn equipment. Perform AS 5.4, the mower safety demonstration and AS 5.5, the mower obstacle course. When questions are answered and students have mastered safety, have them complete AS 5.6 to identify mower safety guidelines.

**Q6.** **<u>What are maintenance procedures for hand lawn equipment</u>?**

**A6.**

- **a) Clean and inspect hand tools for any damage after each use.**
- **b) Restore rough, dry, and splintered wooden handles by sanding and rubbing with linseed oil.**
- **c) Prevent rusting by keeping all metal surfaces dry.**
- **d) Remove existing rust by wire brushing metal surfaces and then shining with light oil.**
- **e) Sharpen blades with files, stones, or grinders.**

Discuss maintenance procedures for hand-operated lawn equipment. Continue to emphasize the use of safe handling while maintaining the tools.

**Q7.** **<u>What are maintenance procedures for power lawn equipment</u>?**

**A7.**

- **a) Check air cleaners and filters every 25 hours of operation or sooner when working in extremely dusty conditions.**
- **b) Check oil in four-stroke engines before each use and change oil every 25 hours of use.**
- **c) Always use the correct fuel-oil mixture in a two-stroke engine.**
- **d) Check spark plugs frequently and change after 100 hours of use.**
- **e) Follow proper procedures when storing power tools for long periods of time.**
  - **1) Drain the fuel tank.**
  - **2) Change oil and filters.**
  - **3) Clean and lubricate the exterior and chains.**
  - **4) Loosen the belts.**

Discuss maintenance procedures for power lawn equipment. Always consult the owner's manual. If equipment is available, illustrate the necessary procedures to the students. After procedures have been explained and they understand safety precautions to be followed, have them perform the procedures.

F. ***Other Activities***

1. Have students perform a general power lawn maintenance procedure whereby they clean an air filter, clean a spark plug, and change the oil.

2. Demonstrate to students how to correctly mix fuel for a particular two-stroke tool such as a weed eater.

3. Invite a guest speaker from a local lawn and garden dealership to speak about different types of lawn equipment and their safety.

4. Have students create lawn safety posters to display in the shop, around the school, or at various locations throughout the community.

G. ***Conclusion***

It is very important as a homeowner to know the proper use, maintenance, and safety procedures for lawn and garden equipment. Appropriate practices will help ensure the safety of the operator, the ease of operation, and the longevity of the tool.

H. ***Answers to Activity Sheets***

AS 5.1 Hand Lawn Tool Identification

1. c
2. f
3. h
4. d
5. a
6. m
7. b
8. l
9. k
10. i
11. n
12. o
13. j
14. e
15. g

AS 5.2 Power Lawn Tool Identification

1. c
2. b
3. d
4. e
5. a

AS 5.3 Two- vs. Four-Stroke Engines

| | Four-Cycle Engine (equal hp) One Cylinder | Two-Cycle (equal hp) One Cylinder |
|---|---|---|
| Number of moving parts | Nine | Three |
| Running | Cooler running | Hotter running |
| Overall | Larger | Smaller |
| Engine | Heavier construction | Lighter in weight |
| Fuel and Oil | No mixture required | Must be premixed |
| Fuel Consumption | Fewer gallons per hour | More gallons per hour |
| Oil Consumption | Oil recirculates and stays in engine | Oil is burned with fuel |
| Sound | Generally quiet | Louder in operation |
| Operation | Smoother | More erratic |
| Acceleration | Slower | Very quick |
| General maintenance | Greater | Less |
| Initial Cost | Greater | Less |
| Versatility of operation | Limited slope operation (Receives less lubrication when tilted) | Lubrication not affected at any angle of operation |

AS 5.4 Mower Safety Demonstration

There are no answers to this exercise.

AS 5.5 Mowing Obstacle Course

There are no answers to this exercise.

AS 5.6 Lawn Mower Safety Guidelines

1. a) No loose/baggy clothing
   b) Safety goggles

2. a) Inspect for sharpness/good condition
   b) Alert others
   c) Remove debris from the area
   d) Read instructions/owner's manual

3. a) Keep hands and feet away from moving parts.
   b) Use caution on slopes
   c) Mow dry grass and cut 1 ½ to 3 inches
   d) Keep safety shields in place

4. a) Don't smoke.
   b) Turn off engine.

I. ***Answers to Evaluation***

1. b
2. c
3. a
4. d
5. b
6. b
7. a
8. c
9. d
10. b
11. c
12. c
13. b
14. a
15. d
16. a
17. d
18. d
19. b
20. a
21. a
22. c
23. c
24. a
25. d
26. b
27. e
28. e
29. c
30. a
31. b
32. d
33. a
34. d
35. e

36. c
37. b
38. a
39. d
40. e
41. c
42. b
43. Any two of the following:
    a. Protect eyes and clothes.
    b. Use right tool for the job.
    c. Inspect tool for damages.
    d. Know how to use correctly.
    e. Store in proper place after use.
    f. Be sure tool is clean and undamaged before storing.

44. Any two of the following:
    a. Get permission.
    b. Inspect tool.
    c. Protect eyes and clothes.
    d. Master the safety and operating techniques.
    e. Let others know.
    f. Make adjustments with the tool unplugged.
    g. Clean and store after use.

45. Any three of the following:
    a. Do not wear loose, baggy clothing.
    b. Wear safety glasses.
    c. Wear gloves.
    d. Inspect tool before use.
    e. Be aware of others when using sharp tools.

46. Any three of the following:
    a. Do not wear baggy clothes.
    b. Wear safety goggles.
    c. Inspect tool for sharpness and condition.
    d. Alert others.
    e. Hands away from moving parts.
    f. Remove debris from area to be mowed.
    g. Never smoke when fueling a running engine.
    h. Keep safety shields in place.
    i. Know owner's manual operating procedures.
    j. Use caution on slopes.
    k. Mow dry grass only.

47. One of the following:
    a. Clean after each use and inspect for damage.
    b. Rub linseed oil on rough, dry handles.
    c. Remove rust on metal surfaces with a wire brush and apply oil.
    d. Keep tools dry to prevent rust.
    e. Sharpen blades with files, stones, or grinders.

48. Any two of the following:
    a. Check air filters every 25 hours of use or after very dusty conditions.
    b. Check oil in 4-stroke engines before each use and change oil every 25 hours of use.
    c. Use correct fuel-oil mix in a 2-stroke engine.
    d. Check spark plugs frequently and change every 100 hours of use.
    e. Follow correct steps for winter storage of power tools.

Lesson 5: Safety and Maintenance Procedures for Lawn and Garden Equipment Name_____

## Hand Lawn Tool Identification

***Objective***: Students will identify common lawn and garden hand tools.

***Directions***: Match the correct hand lawn tool with the correct picture on the following page.

_____ 1. Garden hoe

_____ 2. Lawn or leaf rake

_____ 3. Garden rake

_____ 4. Spading fork

_____ 5. Pitchfork

_____ 6. Cultivator

_____ 7. Turf edger

_____ 8. Hedge shears

_____ 9. Scissor-type pruning shears

_____10. Weed cutters

_____11. Hand trowel

_____12. Wheelbarrow

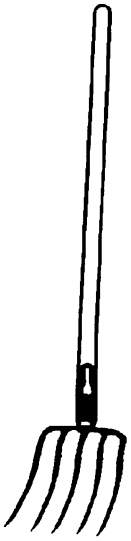
_____13. Sod roller

_____14. Round-pointed shovel

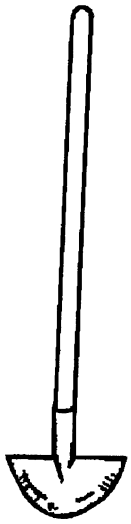
_____15. Push hoe

Lesson 5: Safety and Maintenance Procedures for Lawn and Garden Equipment

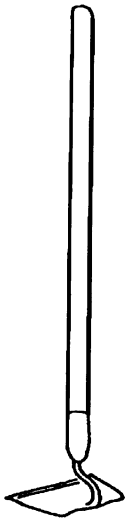
a.



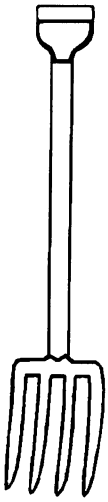
b.



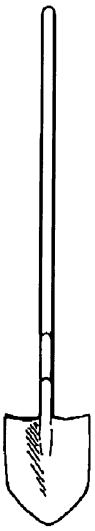
c.



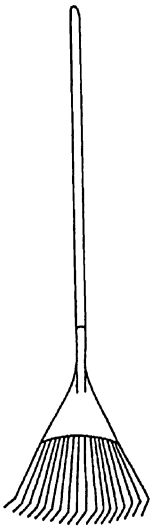
d.



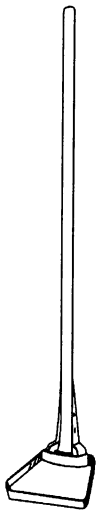
e.



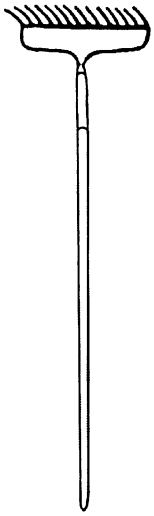
f.



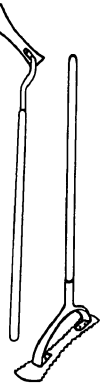
g.



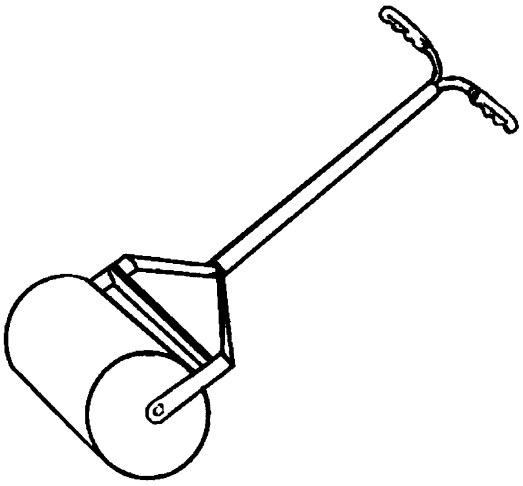
h.



i.

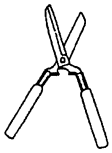


j.

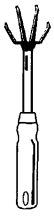


k.

l.

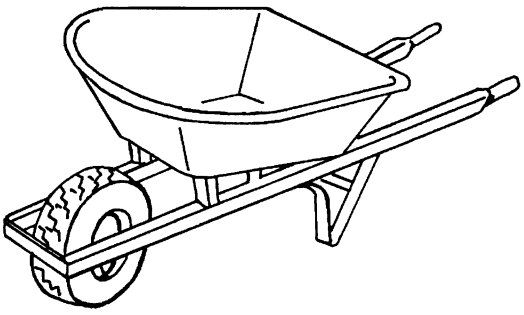


m.



n.

o.



Lesson 5: Safety and Maintenance Procedures for Lawn and Garden Equipment

Name_____

## Power Lawn Tool Identification

***Objective:*** Students will identify common power lawn equipment.

***Directions:*** Match the correct power lawn equipment with the correct picture.

_____ 1. Walk-behind mower

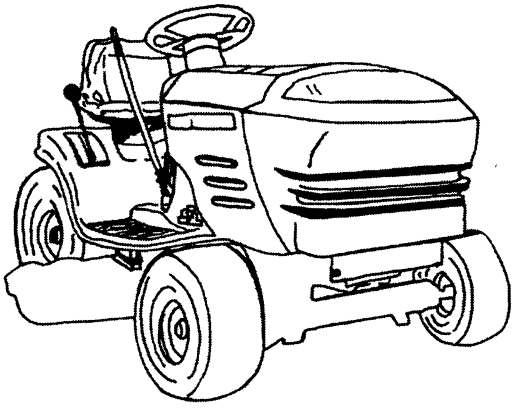
_____ 2. Hedge trimmer

_____ 3. Line or string trimmer

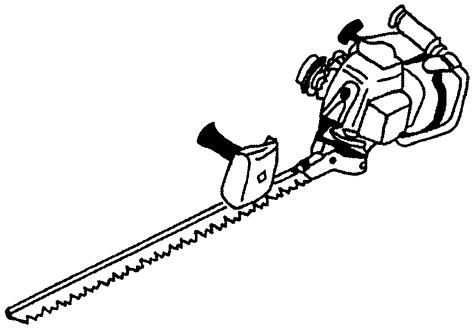
_____ 4. Leaf blower

_____ 5. Riding lawn mower

a.

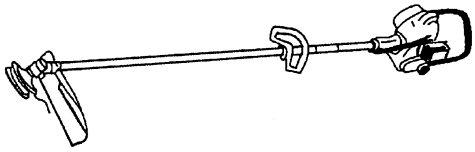


b.

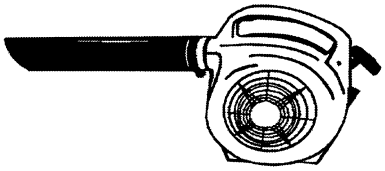


c.

d.



e.



Lesson 5: Safety and Maintenance Procedures for Lawn and Garden Equipment Name_____

## Two- vs. Four-Stroke Engines

***Objective:*** Students will identify differences between two- and four-stroke engines.

***Directions:*** Place the appropriate characteristic in the appropriate blank.

| | **FOUR-CYCLE ENGINE (EQUAL HP) ONE CYLINDER** | **TWO-CYCLE (EQUAL HP) ONE CYLINDER** |
|---|---|---|
| Number of moving parts | | |
| Running | | |
| Overall | | |
| Engine | | |
| Fuel and oil | | |
| Fuel consumption | | |
| Oil consumption | | |
| Sound | | |
| Operation | | |
| Acceleration | | |
| General maintenance | | |
| Initial cost | | |
| Versatility of operation | | |

Lesson 5: Safety and Maintenance Procedures for Lawn and Garden Equipment Instructor

## Mower Safety Demonstration

***Objective:*** Students will observe why safety features are so important on lawn mowers.

***Directions:*** Use a lawn mower equipped with the four safety features, including the rear guard, to demonstrate how objects can be thrown from a lawn mower.

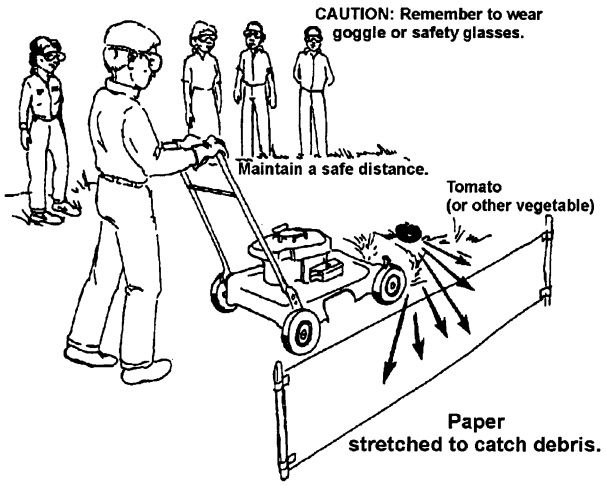
***Materials and Equipment:***

Lawn mower
Safety goggles or safety glasses (for all students and the instructor)
2 stakes
6' of paper
Soft vegetable or fruit (tomato)

***Procedure:***

CAUTION: Emphasize to students that they should not try this at home. This is only a demonstration.

1. The instructor and students should wear goggles to prevent injury.
2. Students should be a safe distance away from the demonstration and on the opposite side of the discharge chute.
3. Using two stakes set 6 feet apart, stretch paper across alongside the mowing area to emphasize the effect of the thrown object.
4. Use a soft vegetable or fruit such as a tomato as the object to be run over.
5. Adjust the mower deck at a low setting. (Make sure the mower is off when adjusting.)
6. Mow over the vegetable or fruit.
7. Discuss what would happen if the object had been a rock, stick, or toy.
8. Discuss what would happen to a foot or hand that was accidentally run over.



Lesson 5: Safety and Maintenance Procedures for Lawn and Garden Equipment Instructor

## Mowing Obstacle Course

***Objective:*** Students will be able to put the mower through a mowing obstacle course.

***Directions:*** Set up a mowing obstacle course to enable students to know how to properly use a lawn mower. The instructor needs to determine if students will go through the course with the mower running. If students go through the course without the mower running, explain starting and stopping procedures instead of doing them. The course should not be timed.

The obstacle course should include:

1. Adjusting mower height
2. Clearing the mowing area of people and objects
3. Starting the mower
4. Mowing around trees or posts
5. Mowing around a curved bed
6. Stopping the mower

Lesson 5: Safety and Maintenance Procedures for Lawn and Garden Equipment Name_____

## Lawn Mower Safety Guidelines

***Objective:*** Students will be able to identify mower safety guidelines.

***Directions:*** Use owner manuals and basic lawn mower books to help find the following information. Describe safety guidelines that should be followed for each of the following power mower operations.

| PROCEDURE | SAFETY GUIDELINES |
|---|---|
| Selecting proper attire | a.<br>b. |
| Pre-operational procedures | a.<br>b.<br>c.<br>d. |
| Operational procedures | a.<br>b.<br>c.<br>d. |
| Refueling | a.<br>b. |
| **PROCEDURE** | **MAINTENANCE GUIDELINES** |
| Changing oil | a.<br>b. |
| Sharpening blades | a.<br>b. |
| Check spark plug | a.<br>b. |
| Lubricating parts | a.<br>b. |

UNIT VII - BASIC HOME AND FARMSTEAD SAFETY AND MAINTENANCE

Name _____

Date _____

UNIT EVALUATION

**Circle the letter that corresponds to the best answer.**

1. Select the correct definition of electricity.

   a. An uncontrolled burst of energy
   b. The flow of negatively charged atoms
   c. Lightning
   d. The flow of a substance under pressure

2. Which of the following is a form of power used to generate electricity?

   a. Battery power
   b. Horse power
   c. Steam power
   d. Human power

3. Select the unit of measurement commonly used to measure electricity usage.

   a. Kilowatt-hour
   b. Kilogram
   c. Amperage
   d. Ohms

4. Select the statement that best describes the difference between a fuse and a circuit breaker.

   a. A blown fuse indicates a problem in a circuit whereas a tripped circuit can be ignored.
   b. Fuses can be replaced with a fuse of any amperage whereas circuits are exact.
   c. Circuits must be replaced on a regular basis whereas fuses last permanently.
   d. A fuse is replaced when blown whereas a circuit is switched to the "on" position when tripped.

5. Select the common hazard associated with the uses of electricity.

   a. Drowning
   b. Electric shock
   c. Electric stroke
   d. Electric hazard

6. What piece of safety equipment must be worn to protect the eyes while working?

   a. Gloves
   b. Safety glasses or goggles
   c. Contacts
   d. Safety shield

7. Identify the safety equipment worn for protection from dust and fumes.

   a. Face mask
   b. Safety goggles
   c. Safety shield
   d. Dust buster

8. Identify the type of shoe that provides the best protection from injury.

   a. Moccasins
   b. High-topped sneakers
   c. High-topped leather, steel-toed boots
   d. Cowboy boots

9. What method is safest for wearing long hair in a shop or work area?

   a. Braided
   b. Left long
   c. Teased
   d. Pulled back and tied up

10. Tools strewn about on the floor _____.

    a. Can be stolen.
    b. Create a safety hazard.
    c. Will not work.
    d. Can be easily located.

11. Select the answer that best describes the difference between a two-stroke and a four-stroke engine.

    a. The two-stroke engine is a battery and the four-stroke is a motor.
    b. The two-stroke is fast and the four-stroke is slow.
    c. The two-stroke uses a fuel-oil mixture and the four-stroke has separate compartments for fuel and oil.
    d. The four-stroke engine does not require oil and the two-stroke relies on diesel.

**Match the light bulb to its appropriate description.**

12. _____ Fluorescent
13. _____ Halogen
14. _____ Metal-halide
15. _____ Sodium

a. Contains compounds of metal and halogen with a basic two-bulb design.
b. A mixture of gases inside the bulb forms a very bright, hot light.
c. Radiates light from a gas inside the bulb, commonly used in greenhouses.
d. Composed of an aluminum oxide arc tube containing a mixture of sodium and mercury.

**Match each type of measurement with the appropriate category.**

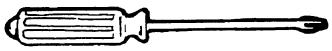
16. _____ Inch
17. _____ Gram
18. _____ Ounce
19. _____Square foot
20. _____ Yard
21. _____ Meter
22. _____ Board feet

a. Linear
b. Area
c. Volume
d. Weight

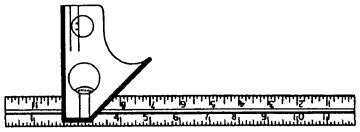
**Match the name with the correct hand tool.**

23. _____ Curved claw hammer
24. _____ Phillips screwdriver
25. _____ Combination wrench
26. _____ Combination square
27. _____ Level

a.

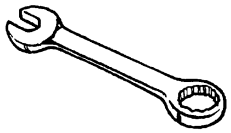


b.

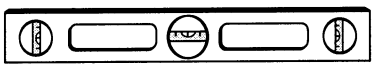


c.

d.



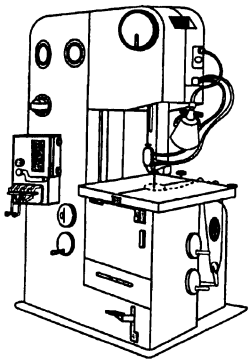
e.



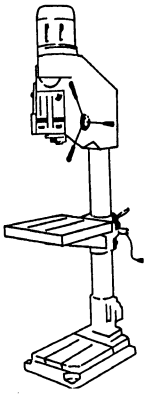
**Match the name with the correct power tool.**

28. _____ Portable drill
29. _____ Jig saw
30. _____ Band saw
31. _____ Drill press
32. _____ Router

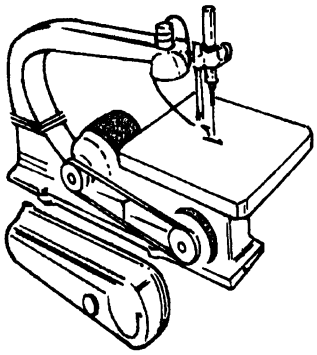
a.



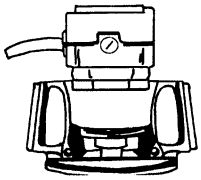
b.



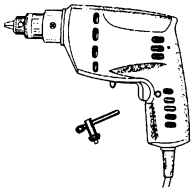
c.



d.



e.

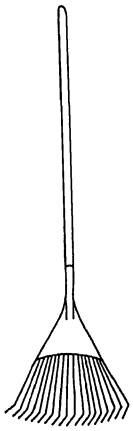


**Match the name with the correct lawn tool.**

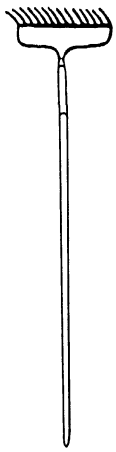
33. _____ Garden hoe
34. _____ Pitchfork
35. _____ Wheelbarrow
36. _____ Garden rake
37. _____ Lawn rake

a.

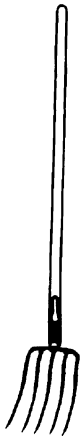
b.



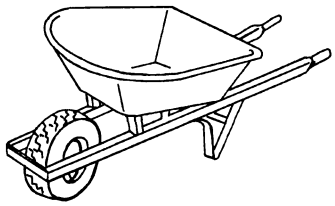
c.



d.



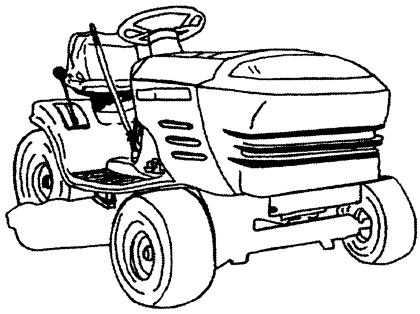
e.



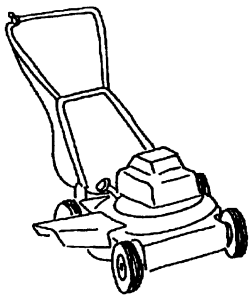
**Match the name with the correct power lawn equipment.**

38. _____ Riding mower
39. _____ Leaf blower
40. _____ String trimmer
41. _____ Hedge trimmer
42. _____ Walk-behind mower

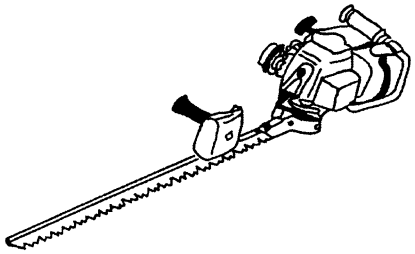
a.



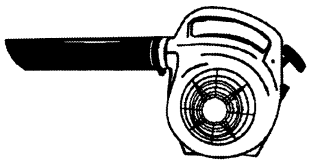
b.



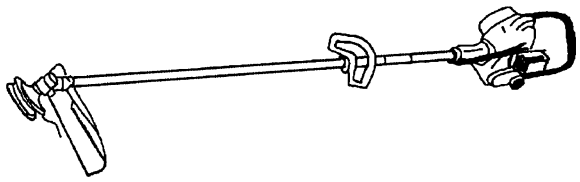
c.



d.



e.



**Complete the following short answer questions.**

43. List two important safety tips for using hand tools.

    a.

    b.

44. List two important safety tips for the use of power tools.

    a.

    b.

45. List three safety guidelines for lawn and garden hand tools.

    a.

    b.

    c.

46. List three safety guidelines for power lawn and garden tools.

    a.

    b.

    c.

47. List one proper maintenance procedure for hand lawn equipment.

48. List two maintenance procedures for power lawn equipment.

    a.

    b.