

## Lesson A1–2

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# Identifying Hazards in Agricultural Mechanics

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**Unit A.** Mechanical Systems and Technology

**Problem Area I.** Introduction to Agricultural Mechanics and Technology Systems

**Lesson 2.** Identifying Hazards in Agricultural Mechanics

### **New Mexico Content Standard:**

**Pathway Strand:** Power, Structural and Technical Systems

**Standard: III:** Apply principles of service and repair to mechanical equipment, structures, biological systems, land treatment, power utilization, and technology.

**Benchmark: III-A:** Troubleshoot problems and evaluate performance to service and repair the components of internal combustion engines.

**Performance Standard:** 1. Describe principles of operation. 2. Identify engine systems and components. 3. Analyze and troubleshoot engine. 4. Perform overhaul procedures. 5. Evaluate engine performance through post-rebuild testing.

**Student Learning Objectives.** Instruction in this lesson should result in students achieving the following objectives:

1. Identify the three conditions necessary for combustion.
2. Explain how to prevent fires in agricultural mechanics.
3. Identify the different classes of fires and the different types of fire extinguishers.
4. Describe the proper use of fire extinguishers.
5. Describe the different types of burns that can occur in agricultural mechanics.

**List of Resources.** The following resources may be useful in teaching this lesson:

**Recommended Resources.** One of the following resources should be selected to accompany the lesson:

Cooper, Elmer L. *Agricultural Mechanics Fundamentals & Applications*. Albany, New York: Delmar Publishers, 1992. (Unit 5)

**Other Resources.** The following resources will be useful to students and teachers:

Jeffus, Larry. *Welding Principles and Applications*. Albany, New York: Delmar Publishers, 1988. (Chapter 2)

## List of Equipment, Tools, Supplies, and Facilities

Writing surface  
Overhead projector  
Transparencies from attached masters

**Terms.** The following terms are presented in this lesson (shown in bold italics):

Combustible metals  
Fire triangle  
Flammable liquids  
Fuel  
Heat  
Ordinary combustible  
Oxygen

**Interest Approach.** Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

*Light a small piece of paper with a match in front of the class. Then place the burning paper inside a glass jar and close the lid. When the flame goes out, ask the students why this happened. Explain to them that the fire burned all the available oxygen in the jar. Use this discussion to lead to the first objective of the lesson.*

# Summary of Content and Teaching Strategies

**Objective 1:** Identify the three conditions necessary for combustion.

**Anticipated Problem:** What are the three conditions necessary for combustion?

- I. To produce fire, three components must be present at the same time and location. These three components are fuel, heat, and oxygen. They are known as the *fire triangle*.
  - A. **Fuel** is any combustible material that will burn. Common fuels are gasoline, diesel fuel, wood, paper, and propane. Most materials will burn if they are made hot enough in the presence of oxygen.
  - B. **Heat** simply refers to a type of energy that causes the temperature to rise. If the temperature of a room is changed from 50 degrees to 70 degrees, it is done by using heat.
  - C. **Oxygen** is a gas in the atmosphere. It is not a fuel, but must be present for fuels to burn. Oxygen is nearly always present except in airtight conditions. This fact is important to remember in fire safety and control.

*A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand the three conditions necessary for combustion. Unit 5 in Agricultural Mechanics Fundamentals & Applications is recommended. Use TM: A1–2A to assist in discussion on this topic.*

**Objective 2:** Explain how to prevent fires in agricultural mechanics.

**Anticipated Problem:** How can fires be prevented in agricultural mechanics?

- II. The prevention of fire goes hand-in-hand with safe use of equipment and efficient management of work areas. Proper storage of materials decreases the chance of fire and keeps materials readily available when needed. Clean work areas also decrease the chance of a fire.
  - A. If any one of the three components of the fire triangle is eliminated, fire will be prevented from starting; or it will be stopped if it has started. The basic steps in fire prevention and control are:
    1. Store fuels in approved containers.
    2. Store fuels away from other materials that burn easily.
    3. Store materials in areas that are cooler than their combustion temperature.
    4. Use fire only in safe surroundings.
    5. Put out fires by removing one or more elements in the fire triangle.

*A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand how to prevent fires in agricultural mechanics. Unit 5 in Agricultural Mechanics Fundamentals & Applications is recommended. Use TM: A1–2B to assist in discussion on this topic.*

**Objective 3:** Identify the different classes of fires and the different types of fire extinguishers.

**Anticipated Problem:** What are the different classes of fires and different types of fire extinguishers?

III. To effectively and safely put out a fire with a fire extinguisher, the class of fire must be known. Fire classification is based on how to safely extinguish each type of material. A firefighter can be electrocuted if the stream of water hits exposed electrical wires, plugs, or controls. Water is not suitable on fires involving petroleum products, since the fuel floats to the top of the water and continues to burn.

A. The fire classes are:

1. Class A—Ordinary Combustibles. **Ordinary combustibles** include wood, papers, and trash. Class A combustibles do not include any item in the presence of electricity or any type of liquid.
2. Class B—Flammable Liquids. **Flammable liquids** include fuels, greases, paints, and other liquids as long as they are not in the presence of electricity.
3. Class C—Electrical Equipment. Class C fires involve the presence of electricity.
4. Class D—Combustible Metals. **Combustible metals** are metals that burn. Burning metals are very difficult to extinguish. Only Class D extinguishers will work on burning metals.

B. In order to extinguish a fire as quickly as possible, the proper fire extinguisher must be used immediately. It is important to be able to recognize extinguishers by their type and by the class of fire they extinguish. The common types of extinguishers are:

1. Water with pump or gas pressure used for Class A fires.
2. Carbon dioxide gas used for Class B and C fires.
3. Dry chemical used for Class A, B, and C fires.

*A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand the different classes of fires. Unit 5 in Agricultural Mechanics Fundamentals & Applications is recommended. Use TM: A1–2C to assist in discussion on this topic.*

**Objective 4:** Describe the proper use of fire extinguishers.

**Anticipated Problem:** How do you properly use a fire extinguisher?

IV. The safe and proper use of a fire extinguisher is a simple yet very important step in controlling a fire.

A. The basic steps are as follows:

1. Hold the extinguisher upright and pull blocking pin.
2. Move within 6 to 10 feet of the fire.
3. Aim the nozzle of the extinguisher toward the base of the fire.

4. Squeeze lever and discharge contents using a side to side sweeping motion.
  5. Have extinguishers serviced after each use.
- B. A monthly inspection of all fire extinguishers should be made to ensure that the extinguishers are useable in case of an emergency.
- C. Have extinguishers inspected and serviced annually by a qualified service technician.

*A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand the proper use of fire extinguishers. Unit 5 in Agricultural Mechanics Fundamentals & Applications is recommended. Use TM: A1–2D and TM: A1–2E to assist in discussion on this topic.*

**Objective 5:** Describe the different types of burns that can occur in agricultural mechanics.

**Anticipated Problem:** What are the different types of burns that can occur in agricultural mechanics?

- V. Sadly, burns are one of the most common injuries that occur in agricultural mechanics. Burns can be caused by ultraviolet light rays as well as by contact with hot materials. The chance of infections is high with burns because of the dead tissue.
- A. Burns are divided into three classifications, depending upon the degree of severity. The three classifications are:
1. First-degree burns—These occur when the surface of the skin is reddish in color, tender and painful and do not involve any broken skin. This should be treated by placing the burn area under cold water or applying a cold compress. Then cover the area with non-fluffy sterile or clean bandages. Do not apply butter or grease.
  2. Second-degree burns—This is when the surface of the skin is severely damaged, resulting in the formation of blisters and possible breaks in the skin. To treat a second-degree burn, first put burn area under cold water or apply cold compress until the pain decreases. Then cover dried area with clean bandage to prevent infection. Seek medical attention. Do not apply ointments, spray, antiseptics, or home remedies.
  3. Third-degree burns—This has occurred when the surface of the skin and possibly the tissue below the skin appear white or charred. Little pain is present because nerve endings have been destroyed. Do not remove any clothes that are stuck to the burn. Do not put ice water or ice on the burns. Do not apply ointments, spray, antiseptics, or home remedies. Place cold cloth or cool (not ice) water on burns. Cover burned area with thick, sterile dressings. Call for an ambulance immediately.

*A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand the different types of burns that can occur in agricultural mechanics. Chapter 2 in Welding Principles and Applications is recommended. Use TM: A1–2F to assist in discussion on this topic.*

**Review/Summary.** Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the end of each chapter in the recommended textbooks may also be used in the review/summary.

**Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activity. A sample written test is attached.

## **Answers to Sample Test:**

### **Part One: Matching**

1 = b, 2 = d, 3 = a, 4 = f, 5 = e, 6 = c

### **Part Two: Completion**

1. monthly
2. Class C
3. one
4. difficult

### **Part Three: Short Answer**

Review Objective 5 in this lesson for grading.

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# Test

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## Lesson A1–2: Identifying Hazards in Agricultural Mechanics

### Part One: Matching

*Instructions.* Match the term with the correct response. Write the letter of the term by the definition.

- |                  |                         |           |
|------------------|-------------------------|-----------|
| a. fire triangle | b. combustible metals   | c. fuel   |
| d. heat          | e. ordinary combustible | f. oxygen |

- \_\_\_\_\_ 1. Metals that burn.
- \_\_\_\_\_ 2. A type of energy that causes the temperature to rise.
- \_\_\_\_\_ 3. The three components must be present at the same time and location to produce fire.
- \_\_\_\_\_ 4. A gas in the atmosphere.
- \_\_\_\_\_ 5. Include wood, papers, and trash.
- \_\_\_\_\_ 6. Any combustible material that will burn.

### Part Two: Completion

*Instructions.* Provide the word or words to complete the following statements.

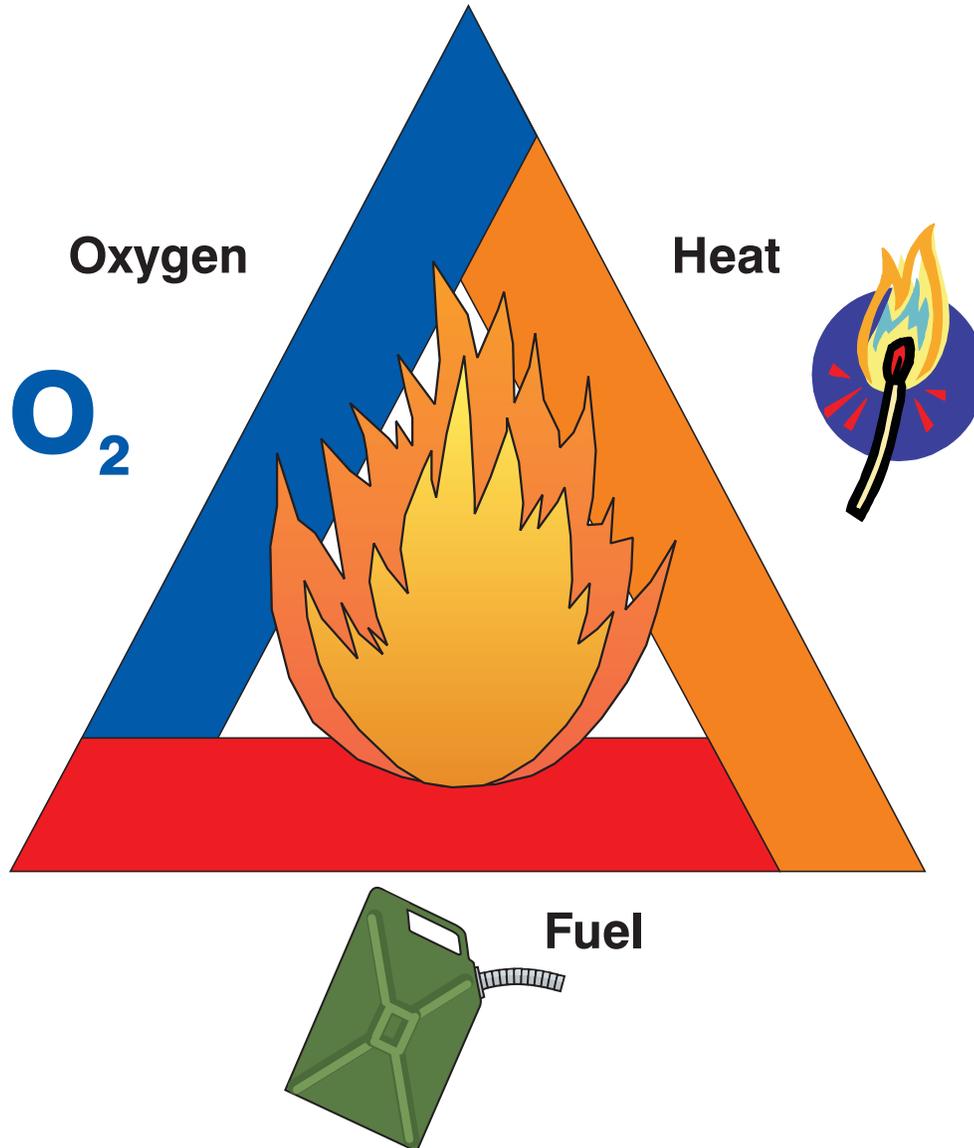
1. A \_\_\_\_\_ inspection of all fire extinguishers should be made to ensure that the extinguishers are useable in case of an emergency.
2. \_\_\_\_\_ fires involve the presence of electricity.
3. If any \_\_\_\_\_ of the three components of the fire triangle is eliminated, fire will be prevented from starting; or it will be stopped if it has started.
4. Burning metals are very \_\_\_\_\_ to extinguish.

### Part Three: Short Answer

*Instructions.* Provide information to answer the following question.

Identify the three classifications of burns and how to properly treat them.

# FIRE TRIANGLE



**If any one of the three components is missing, a fire cannot be started. With the removal of any one component, the fire will be extinguished.**

*(Courtesy, Interstate Publishers, Inc.)*

# **STEPS IN FIRE PREVENTION AND CONTROL**

- ◆ **Store fuels in approved containers.**
- ◆ **Store fuels away from other materials that burn easily.**
- ◆ **Store materials in areas that are cooler than their combustion temperature.**
- ◆ **Use fire only in safe surroundings.**
- ◆ **Put out fires by removing one or more elements in the fire triangle.**

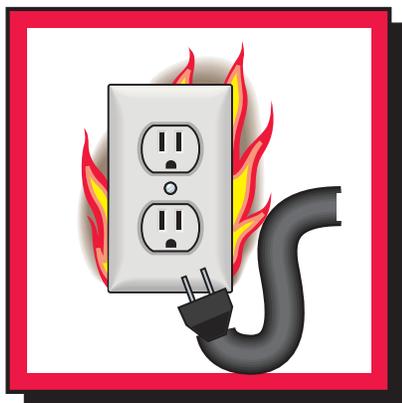
# FOUR CLASSES OF FIRE



ORDINARY  
COMBUSTIBLES



FLAMMABLE  
LIQUIDS

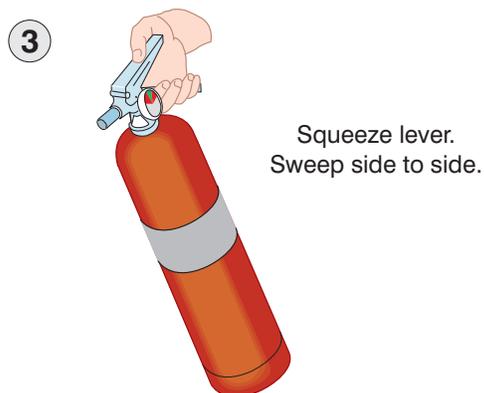
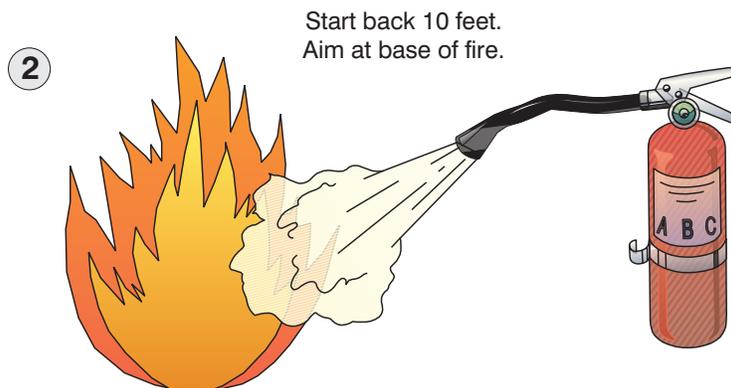


ELECTRICAL  
EQUIPMENT



COMBUSTIBLE  
METALS

# BASIC STEPS FOR PROPER USE OF A FIRE EXTINGUISHER



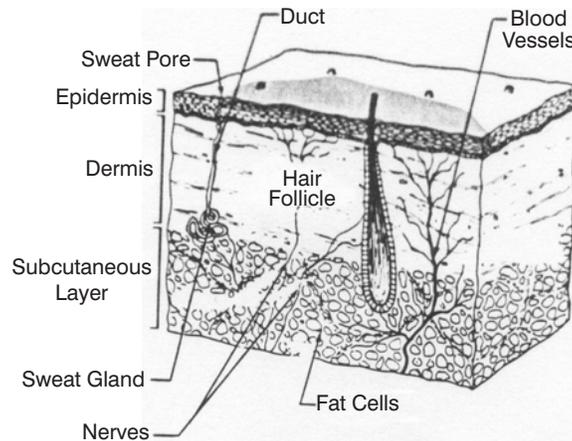
# MONTHLY FIRE EXTINGUISHER CHECK

- ◆ Make sure the proper class of fire extinguisher is in the area of fire class risk.
- ◆ Verify that the extinguisher is in its designated place.
- ◆ Make sure there is no obvious mechanical damage or corrosive condition to prevent safe reliable operation.
- ◆ Examine visual indicators (safety seals, pressure indicators, gauges) to make certain the extinguisher has not been used or tampered with.
- ◆ Check the nameplate for readability and lift or weigh the extinguisher to provide reasonable assurance that the extinguisher is fully charged.
- ◆ Examine the nozzle opening for obstruction. If the extinguisher is equipped with a shut-off type nozzle at the end of the hose, check the handle for free movement.

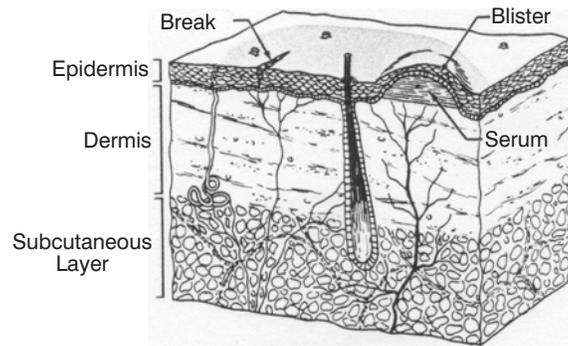
## CHECK LIST

- Locate in a proper place
- Safety seals
- Gauge or indicator in operable range
- Proper weight

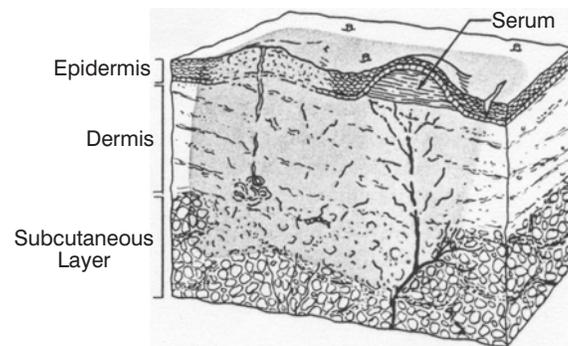
# DEGREE OF BURNS



**First-degree burn—only the skin surface (epidermis) is affected.**



**Second-degree burn—the epidermal layer is damaged, forming blisters or shallow breaks.**



**Third-degree burn—the epidermis, dermis, and subcutaneous layers of tissue are destroyed.**