

Unit B: Safety in Agricultural Mechanics

Lesson 2: Using Personal Safety in Agricultural Mechanics

Student Learning Objectives:

Instruction in this lesson should result in students achieving the following objectives:

1. Explain how to create a safe place to work.
2. Describe what each safety color means and where it is used.
3. Describe how to select appropriate protective clothing and devices for personal protection.

Recommended Teaching Time: 1 hour

Recommended Resources: The following resources may be useful in teaching this lesson:

- Cooper, Elmer L. *Agricultural Mechanics Fundamentals & Applications*. Albany, New York: Delmar Publishers, 1992. (Unit 4)
- Phipps, Lloyd J., et al. *Introduction to Agricultural Mechanics*, Second Edition. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2004. (Textbook, Chapter 1)
- Smith, John E. *Safety in the Shop*. Urbana, Illinois: Vocational Agriculture Service.

List of Equipment, Tools, Supplies, and Facilities:

- Writing surface
- PowerPoint Projector
- PowerPoint Slides
- Transparency Masters
- Copies of student worksheets

Terms: The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slide 2):

- Decibel
- Focal color
- Noise duration
- Noise intensity

Interest Approach:

Ask someone from your community who has been a victim of a shop accident to come speak to your class. Ask them to highlight how they could have prevented the accident from occurring and how their life has changed since the accident.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

Objective 1: Explain how to create a safe place to work.

Anticipated Problem: How can I create a safe place to work?

- I. Work in the area of agricultural mechanics can be exciting and very challenging. Tasks in this area often involve the use of several different types of tools and machinery. Persons who work in this area must be especially aware of the hazards that exist and take special precautions to avoid accidents. The following is a list of precautions that if taken can create a safer work place not only for the worker but also those around him or her:

(PowerPoint Slide 3)

- A. Install all electrical devices according to the standards of the *National Electrical Code*.
 1. Install all machinery according to the manufacturer's specifications.
 2. Keep all tools and equipment adjusted or fitted according to specifications.
 3. Use tools and equipment skillfully.

(PowerPoint Slide 4)

4. Provide proper storage for tools, materials, fuels, chemicals, and waste materials.
5. Keep work areas clean and free of tools, materials, grease, and dirt.
6. Keep moving parts properly shielded.
7. Manage all situations to avoid the likelihood of falling objects.
8. Avoid areas where objects may fall.

(PowerPoint Slide 5)

9. Avoid the flight path of objects that could be thrown by machines.
10. Protect eyes, face, feet, and other parts of the body with protective clothing and devices.

(PowerPoint Slide 6)

11. Move slowly enough to avoid creating hazards to self and others.
12. Read and follow all precautions.

Provide scenarios to students where one of the above guidelines is not being followed. Ask the students to identify which guideline is not being followed and how the situation needs to be solved.

Objective 2: Describe what each safety color means and where it is used.

Anticipated Problem: What does each safety color mean and where is it used?

(PowerPoint Slide 7)

- II. National organizations have worked together to develop a safety color-coding system for shops. The American Society of Agricultural Engineers and the Safety Committee of the American Vocational Association have published such a code. In developing the code, materials published by the American National Standards Institute (ANSI), the United States Department of Transportation (DOT), and the National Safety and Health Act (OSHA) were used as references.

(PowerPoint Slide 8)

- A. Colors in the coding system are used to:
 1. Alert people to danger or hazards.
 2. Help people locate certain objects.
 3. Make the shop a pleasant place to work.
 4. Promote cleanliness and order.
 5. Help people react quickly to emergencies.
- B. Each color or combination of colors conveys a specific message. Students need to memorize the message conveyed by each color. The following descriptions show how each safety color is used in the agricultural mechanics shop. The safety colors are:

(PowerPoint Slide 9)

1. Red is used to identify areas or items of danger or emergency such as safety switches and fire equipment.

(PowerPoint Slide 10)

2. Orange is used to designate machine hazards such as edges and openings. Orange means warning. Orange is also used as background for electrical switches, levers, and controls.

(PowerPoint Slides 11 and 12)

3. Yellow, like the amber traffic light, means caution. It is used to identify parts of machines, such as wheels, levers, and knobs that control or adjust the machine. Yellow and black stripes are used in combination to mark stairs, protruding objects, and other stationary hazards.

(PowerPoint Slides 12 and 13)

4. Blue is used for signs if a warning or caution is intended. These are informational signs such as "OUT OF ORDER" or "DO NOT OPERATE". Such signs are made of white letters on a blue background.

(PowerPoint Slide 14)

5. Safety green is a special shade of green and indicates the presence of safety equipment, safety areas, first aid, and medical practice.
6. A black and yellow diagonal-striped pattern is designated as the marking for radiation hazards.

(PowerPoint Slide 15)

7. White is used to mark off traffic areas. White arrows indicate the direction of traffic. White lines also mark work areas around objects in the shop. Yellow may be used in place of white to mark areas and lanes.

8. White and black in alternate stripes or checkers are traffic markings. An example of such use is to mark traffic-stopping barricades.

(PowerPoint Slide 16)

9. Gray is used on floors of work areas in the shop. It is a restful color and provides good contrast for other safety colors. It is used to paint body areas of machines and may be used on the tabletops if painting is desired.
- C. The nationally accepted shop safety color-coding system includes three focal colors. A **focal color** is used to draw attention to large items such as machines, cabinets, and floors. The focal colors provide contrast for the safety colors and create pleasant surroundings for people using the shop. The focal colors are:
1. Ivory is used to highlight or improve visibility of certain items. These items include tool storage chests, table edges, and freestanding vises and anvils.
 2. Vista green is a special shade of green. It is used to paint bodies of machines, cabinets, and stationary tools such as vises. It is regarded as a pleasing color and contrasts with the safety colors.
 3. Aluminum is used on waste containers such as those for scrap wood, scrap metal, and rags.

To review this objective, say a certain color and have the students repeat aloud in unison what that color represents. Also, complete LS: 2-1 and LS: 2-2 to evaluate the level of safety in your shop.

Objective 3: Describe how to select appropriate protective clothing and devices for personal protection.

Anticipated Problem: What protective clothing and devices should be worn in the shop for personal protection?

(PowerPoint Slides 17 and 18)

- III. Personal safety is the most important aspect of work done in agricultural mechanics. Several different safety devices have been developed to protect individuals while working in the shop. These devices will only work when being used properly by the individual. There are four major types of safety devices:
- A. Eye protection—The face and the eyes are regarded as the most critical parts of the body to be protected. This is because the eyes are so easily damaged. Flying objects can easily cause blindness or result in death. The kind of eye protection to use varies with the work being done. Safety glasses and goggles offer minimum eye protection and are the first line of defense for the eyes. These glasses and goggles should have special impact-resistant lenses and side shields. They should fit the face and be kept clean for proper visibility. Special shaded lenses must be used when welding.
- B. Hearing protection—Many power tools and equipment used in agricultural mechanics make loud noises. Ear muffs or plugs are recommended when the intensity, frequency, or duration of noise reaches certain levels. **Noise intensity** refers to the energy in the sound waves. **Noise duration** refers to

the length of time a person is exposed to a sound. The **decibel (dB)** is the standard unit of sound. Time is an important factor on the effect of noise on hearing. The ears can stand a loud noise for a few minutes. That same noise may damage the ears if exposed for longer periods of time.

- C. Masks and Respirators—Masks that cover the nose and mouth are needed to filter out particles of dust or spray paint. Continuous inhaling of dust leads to lung diseases such as black lung and cancer. Effective dust masks are not expensive and should be worn when sanding, painting, welding, mixing soil, shoveling grain, or whenever dust is encountered.
- D. Protective clothing—The amount and types of protective clothing varies greatly depending on the work being done by the individual in either the general or welding shop. Suitable protective clothing should fit properly and should not have cuffs, strings, or ties. It should also not have frayed or ragged areas that could be burned or caught by turning machinery. Hair should be cut or covered to avoid being caught in equipment. Clean clothing is more fire resistant than oily or dirty clothing.
 - 1. General shop protective clothing—In addition to the use of safety glasses at all times, aprons, shop coats, or coveralls are appropriate shop attire.
 - 2. Welding shop protective clothing—Clothing that is not easily ignited should be worn. Gloves that protect from burns should be used. High topped leather shoes should be worn to avoid slag or sparks. Hardhats and steel-toed boots are also recommended.

Use TM: 2-1 to aid in discussion on this topic. Any of the objects shown in TM: 2-1, show to the students and have them tell what the purpose of that object is.

Review/Summary: Use the student learning objectives to summarize the lesson.

(PowerPoint Slide 19) 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.

Application: Complete LS: 2-1 and LS: 2-2.

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:

Matching

1. E
2. A
3. H
4. C
5. F
6. B
7. G
8. D

Fill-in-the-blank

1. Minimum
2. Masks

Short Answer

Review to Objective 1 in this lesson to score this question.

Using Personal Safety in Agricultural Mechanics

Name: _____

Matching: Match each word with the correct definition.

- | | | |
|--------------------|----------------|-------------------|
| a. decibel | b. focal color | c. noise duration |
| d. noise intensity | e. red | f. orange |
| g. yellow | h. blue | |

- 1. Danger.
- 2. The standard unit of sound.
- 3. Information.
- 4. The length of time a person is exposed to a sound.
- 5. Warning.
- 6. Used to draw attention to large items such as machines, cabinets, and floors.
- 7. Caution.
- 8. Refers to the energy in the sound waves.

Fill-in-the-blank: Complete the following statements.

1. Safety glasses and goggles offer _____ eye protection.
2. _____ that cover the nose and mouth are needed to filter out particles of dust or spray paint.

Short Answer: Answer the following question.

Lists five precautions that should be taken to make the shop environment a safe place to work.

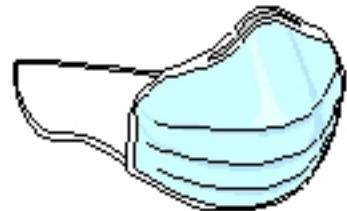
PROTECTIVE CLOTHING AND DEVICES FOR PERSONAL SAFETY



Hard Hat and Respirator



Ear (hearing) muffs



Particle mask



Face shield



Corded and uncorded ear plugs



Respirator



Safety glasses with side shields and brow guard



Goggles



Leather gloves
Protective clothing
Welding shield

SHOP SAFETY CHECKLIST

Program: _____		Instructor: _____		Comments	Instruc- tor's Initials		
Item of Equipment or Shop Area	Date	Condition for Use					
		Safe	Not Safe				
1. Fire extinguishers							
2. First aid kit							
3. General shop cleanliness							
4. Emergency exit plan							
5. Safety signs and charts							
6. Exhaust system							
7. Safety zone lines on floor							
8. Hammers							
9. Chisels and punches							
10. Sharp-edged hand tools							
11. Other hand tools							
12. Hoists							
13. Hydraulic jacks							
14. Portable circular saw							
15. Tilting arbor table saw							
16. Radial arm saw							
17. Saber saw							
18. Band saw							
19. Metal-cutting band saw							
20. Power hacksaw							
21. Router							
22. Planer							
23. Electric sanders							
24. Stationary grinders							
25. Portable grinders							
26. Drill press							
27. Portable electric drills							
28. Shielded metal arc welders							
29. Inert gas shielded arc welders							
30. Oxyfuel welders							

STUDENT SHOP SAFETY CHECKLIST

Program: _____		Instructor: _____ Student: _____			
Item of Equipment or Shop Area	Date of Testing	Score or Rating	Comments	Instructor's Initials	Student's Initials
1. General shop safety rules					
2. Hand tools					
3. Electricity					
4. Vehicle and machinery					
5. Soldering and sheet metal					
6. Portable circular saw					
7. Tilting arbor table saw					
8. Radial arm saw					
9. Saber saw					
10. Band saw					
11. Metal-cutting band saw					
12. Power hacksaw					
13. Router					
14. Planer					
15. Electric sanders					
16. Stationary grinders					
17. Portable grinders					
18. Drill press					
19. Portable electric drills					
20. Shielded metal arc welders					
21. Inert gas shielded arc welders					
22. Oxyfuel welders					