Designed to assist instructors to be consistent with the Fair Labor Standards Act, which requires schools to provide safety instruction to students involved in any type of work experience or on-the-job training program, this curriculum guide presents a program to prepare students to perform their job function in a safe and healthy fashion. There are four units of content, each with two or three lesson plans consisting of the time allotment, terminal objectives, list of teaching materials (including transparencies), list of references, two to seven pages of content outline and script, and an examination with a key. The titles of the four instructional units and associated lesson plans are (1) Fire Safety (What Fire Is, Its Hazards, Sources, and Prevention; Recognition of Classes of Fire—Controlling Fire—Extinguishing Fire); (2) Material Handling (Manual Handling of Materials, Machine Handling of Materials, Handling of Hazardous Materials); (3) Safety Guarding (Personal Protective Equipment, Machine Guards); and (4) Housekeeping and Review (Housekeeping, Review and Evaluation). Sixty-five transparency masters, most of them containing drawings or illustrations, are appended. (EM)
SAFETY AND YOU ON THE JOB

Developed By:

The Department of Occupational, Adult, and Safety Education,
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and the
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INTRODUCTION

In order to qualify for employment at sub-minimum wages and not to be in conflict with specific government hazard regulations, students are required to have safety instruction by the school consistent with the Fair Labor Standards Act. The following unit of instruction can be used to provide that instructional requirement.

These instructional units will provide an instructor with the necessary information to present lessons. Accompanying the instruction are numerous transparencies. Objective tests may be kept on file to prove the safety instruction was presented and serve as a record of the student's performance.

Keep in mind that all students involved in any type of work experience or on-the-job training program must be prepared to perform their job function in a safe and healthy fashion consistent with the Fair Labor Standards Act.

John E. Cook, Supervisor
Distributive Education, Cooperative Education and Work Study Programs
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Lesson Title: What Fire Is, Its Hazards, Sources, and Prevention.

Clock Hours: 90 minutes

Terminal Objectives: After participating in this presentation the students will be able to demonstrate their knowledge of what fire is, its hazards, sources, and prevention by completing a 10-question multiple choice examination on the subject with 100% accuracy.

Teaching Materials: 1. This lesson plan
2. Transparency pack 1-1
3. Overhead projector
4. Blackboard


### Lesson Outline

<table>
<thead>
<tr>
<th>A. What Fire Is:</th>
<th>Lesson Script</th>
</tr>
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<tbody>
<tr>
<td><strong>Introduction:</strong></td>
<td>Did you ever see a fire and wonder just what it is, what it is made up of, why it keeps burning, and why it goes out. If so, this is natural curiosity and part of the learning process. Also, this knowledge is essential to the understanding of fire protection, fire control, and fire extinguishment. So, let's find out just what fire is by answering the four questions just mentioned.</td>
</tr>
</tbody>
</table>

1. **What is a fire?**

   **Teacher Note:** Question several students, list their answer -- have the class discuss the answers given and compile them into a class definition -- compare class definition with the script definition.

2. **What is fire made up of?**

   **Teacher Note:** Question students -- list answers -- have class discuss and compile. Compare class answer with script answer.

### Transparency 1-2

- **Fire is made up of three components which must be present in the proper proportions in order for it to exist:**
  1. Oxygen (air)
  2. Fuel
  3. Heat

   **Explanation:** To explain proper proportions give the following examples:
   - a. Paper laying in open air on a desk at room temperature will not burn, but if you add the heat from a burning match it will, (proper proportion).
   - b. Oil in open air at room temperature will not burn, but if you add oxygen you reduce the temperature at which it will burn, and it will burn at room temperature.
<table>
<thead>
<tr>
<th>Lesson Outline</th>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Why does fire keep burning?</td>
<td>The answer is derived from the answer to question 2. Fire will continue to burn so long as all three components are present in the proper proportions to sustain combustion.</td>
</tr>
<tr>
<td>Teacher Note: Use a technique as in 2.</td>
<td></td>
</tr>
<tr>
<td>4. Why does fire go out?</td>
<td>The answer is derived from the answers to questions 2 &amp; 3. Fire can no longer exist when one or more of its components is not of the proper proportion to sustain combustion.</td>
</tr>
<tr>
<td>Teacher Note: Use same techniques as in 2.</td>
<td></td>
</tr>
<tr>
<td>B. The Hazards of Fire:</td>
<td>Fire hazards can be defined as the dangers that exist in coming in contact with fire, or being in an environment which is created by a fire. These are two categories of fire hazards:</td>
</tr>
</tbody>
</table>
| Introduction: | 1. Physical hazards  
2. Health hazards |
| Transparency 1-3 | Physical Hazards are further broken down into two types: |
| 1. Physical Hazards | a. Damage to property  
b. Injury |
| Teacher Note: Give student the list from the lesson script and discuss injury or disease which might occur from either a or b. | |
| Transparency 1-4 | The Health Hazards are: |
| 2. Health Hazards | A. Oxygen deficiency  
B. Toxic fumes, vapors, mists, gasses, which are created from increased heating of chemicals, liquids, and metals. |
C. Sources of Fire and Preventative Measures

Introduction:

To eliminate unwanted fires it is important to know how and where fires start and how to prevent them. A 10 year study on the sources of unwanted fires and how to prevent them was recently conducted by the Factory Mutual Engineering Corporation. They listed sixteen sources that were responsible for 99% of fires. The other 1% was listed under unusual or unimportant sources. These are the sixteen sources and their preventative measures.

Transparency 1-5
1. Electrical (23%)

The leading cause of unwanted fires. Most start in electrical motors and wiring. Prevented by proper maintenance and use.

Transparency 1-6
2. Smoking (18%)

A potential cause of fire almost everywhere. Prevented by education and control. (No smoking areas and designated smoking areas).

Transparency 1-7
3. Friction (10%)

Hot bearings, misaligned or broken machine parts, cooking or jamming of material and poor adjustment of machinery all cause friction heat to be produced. Prevented by inspection, maintenance, and oiling or greasing.

Transparency 1-8
4. Overheated Materials (8%)

Caused by abnormal process temperatures such as those involving flammable liquids and materials in dryers, etc. Prevented by temperature controls, and well-trained operators and supervisors.

Teacher Note: Remark at this point that the first four sources of fires are responsible for 59% of fires, 1/4 of sources cause well over 1/2.
Lesson Outline

5. Hot Surfaces (7%)

6. Burner Flames (7%)

7. Combustion Sparks (5%)

8. Spontaneous Ignition (4%)

9. Cutting and Welding (4%)

Lesson Script

Normal heat from surfaces of boilers, furnaces, electric lamps, irons, ovens, etc., igniting flammable solids and liquids. Prevented by proper storage of flammable materials, and ample clearance between flammable materials and hot surfaces.

Improper use of ovens, furnace boilers, torches, heating units, and etc., that have exposed flames. Prevented by ventilation, design, and by keeping combustible material away from the flames.

Sparks and glowing embers released from incinerators, fire boxes, and industrial trucks. The incomplete burning of fuels. Prevented by well designed equipment and spark arrestors.

Fire in oily waste and rubbish, and in materials subject to heating. Prevented by good housekeeping. Remove waste daily and isolate storage subject to spontaneous heating.

Sparks, arcs and hot metal from welding operation. Prevented by the use of the licensing of qualified welders and the Permit System.
## Lesson Outline

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Exposure (3%)</td>
<td>Fires communicating from adjacent properties. Prevented by space, walls, or water screens.</td>
</tr>
<tr>
<td>11. Incendiaryism (3%)</td>
<td>Also called arson. Fires set on purpose by owners, employees, intruders. Prevented by watch and guard service, and isolation.</td>
</tr>
<tr>
<td>12. Mechanical Sparks (2%)</td>
<td>Sparks caused by ferrous materials being struck such as hammering operations and foreign material (metal) in machines. Prevented by keeping stock clean and removing foreign matter by magnet or other separating methods.</td>
</tr>
<tr>
<td>13. Molten Substances (2%)</td>
<td>Caused by spills of molten metals, glass, etc. escaping from fractured furnaces or spilled during handling. Prevented by proper operation, handling, and isolation from each other, heat, electrical shock and jarring.</td>
</tr>
<tr>
<td>14. Chemical Action (1%)</td>
<td>Chemical processes getting out of control. Reacting with each other or decomposing creating high heat and fire. Prevented by proper operation, handling, and isolation from each other, heat, electrical shock and jarring.</td>
</tr>
<tr>
<td>15. Static Sparks (1%)</td>
<td>Ignition of flammable vapors, dusts, fibers, and gasses by the arcing of accumulated static electricity from machinery materials or the human body. Prevented by grounding, bonding, and the humidification of air.</td>
</tr>
<tr>
<td>16. Lightning (1%)</td>
<td>Direct lightning strokes, arcing from one object to another, and high current being induced into electrical circuits. Prevented by lightning rods, grounding, arrestors, and surge devices.</td>
</tr>
</tbody>
</table>
Examination

This is a multiple choice examination. Place the letter designator for the most correct answer in the space provided to the left of the question.

1. In scientific terms a fire is defined as:
   a. heat
   b. oxygen and fuel
   c. the rapid oxidation of matter
   d. the slow oxidation of matter

2. The three components of a common fire are:
   a. oxygen, fuel, heat
   b. oxygen, fuel, hydrogen
   c. liquid, solid, gas
   d. light, fuel, heat

3. How long will a fire burn?
   a. Until the fuel is used up
   b. Until the fire department arrives
   c. Until you throw water on it
   d. So long as oxygen, fuel, and heat are present in the proper proportion.

4. The two categories of fire hazards are:
   a. Oxygen deficiency and toxic fumes
   b. Toxic fumes and physical
   c. Physical and health
   d. Health and crippling

5. Which of the following would not be considered a health hazard?
   a. Toxic fumes
   b. Gases
   c. Vapors
   d. Property damage

6. These are the four most frequent causes of fire:
   a. Electrical, hot surfaces, welding, friction
   b. Smoking, lightning, spontaneous ignition, electrical
   c. Electrical, smoking, friction, overheated materials
   d. Burner flames, welding, lightning, exposure
7. Which of the following would you as a worker have the most control over?
   a. Engineering
   b. Housekeeping
   c. Operating methods
   d. Type of material

8. To prevent fire from excessive friction you as a worker would:
   a. re-engineer
   b. change operating methods
   c. oil and grease properly
   d. change the type of material being processed

9. Fire caused by smoking, a potential cause of fire everywhere can be stopped or reduced by:
   a. Well designed equipment
   b. control and education
   c. spark arrestors
   d. ventilation

10. Most fires are caused by which source?
    a. Friction
    b. electrical
    c. hot surfaces
    d. smoking
Examination Key

C  1.
A  2.
D  3.
C  4.
D  5.
C  6.
B  7.
C  8.
B  9.
B  10.
Lesson Title: Recognition of Classes of Fire - Controlling Fire
Extinguishing Fire - Steps to Take When You Discover A Fire

Clock Hours: 90 minutes

Show Transparency #1

Terminal Objectives: At the conclusion of this lesson the students will be able to identify the four major classifications of fire, select the proper control method and extinguishing agent(s) for each classification, and will show their ability to do so by actually demonstrating without error the steps to take when you discover a fire and by completing with 100% accuracy a 15 question multiple choice examination on the subject.

Teaching Materials:
1. This lesson plan
2. Overhead projector
3. Transparency pack #1-2 (included)
4. Block #1 Lesson Plan #2 Examination (included)
5. Block #1 Lesson Plan #2 Examination Key (included)
6. Student Learning Experiences (included)
(Note: To be correlated with lesson plan)

References:
Strasser, Aaron, Bohn, Eales - Fundamentals of Safety Education, Macmillan, N.Y. 1965, pp. 332-360


Federal Register, Occupational Safety and Health Standards, 1910. 157 -- 1910. 162.
In our lesson covering what a fire is, we learned that in order for a fire to exist, there must be three components in the proper quantities present:

1. Oxygen  
2. Heat  
3. Fuel

We are now ready to use this knowledge as a basis to help us in identifying classifications of fire, and selecting proper control methods and extinguishing agents.

<table>
<thead>
<tr>
<th>A. Classifications of Fires:</th>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparency 1-11</td>
<td>There are four general classifications of fires. (Class A, B, C, and D) Class A fires are those fires which occur in ordinary solids such as wood, paper, cloth, rubbish, etc.</td>
</tr>
<tr>
<td>I. Class A (Ordinary Solids)</td>
<td></td>
</tr>
<tr>
<td>Transparency 1-12</td>
<td>Class B fires are those fires which occur in the vapor-air mixture above the surface of flammable liquids such as gasoline, solvents, thinners, liquid fuels, and paint.</td>
</tr>
<tr>
<td>2. Class B (Liquids)</td>
<td></td>
</tr>
<tr>
<td>Transparency 1-13</td>
<td>Class C fires are those that occur in or near electrical equipment.</td>
</tr>
<tr>
<td>3. Class C (Electrical)</td>
<td></td>
</tr>
<tr>
<td>Transparency 1-14</td>
<td>Class D fires are those which occur in inorganic matter such as the combustible metals -- magnesium, titanium, sodium, lithium and zirconium -- and certain reactive chemicals.</td>
</tr>
<tr>
<td>4. Class D (Metals, Reactive Chemicals)</td>
<td></td>
</tr>
</tbody>
</table>
### Transparency 1-15

#### B. Fire Control Methods

Knowledge of what fire is, forms the basis for the study of fire control methods. Since we know that there must be three components present in the proper quantity for fire to exist, it should be evident that by removing or limiting any of the components we are able to control fire. There are four methods used to accomplish fire control.

1. **Cooling**
2. **Removing Fuel**
3. **Removing Oxygen**
4. **Inhibiting the Reaction**

### Transparency 1-16

#### I. Cooling

Cooling: in order to extinguish a fire by cooling it is necessary to reduce the heat of the fire to some temperature below the flash point. The flash point is the lowest temperature at which a material gives off enough gasses to form an ignitable mixture with air and produce flame when a source of ignition is present.

### Transparency 1-17

#### Removing Fuel

Removing the fuel from an existing fire is usually a dangerous process, although it is used as a method of controlling fire. Forest fire fighters use it when they remove the fuel from an area around a fire -- called a fire break. This way the fire is extinguished when the available fuel is used up. Shut off valves in gas or liquid lines accomplish the same purpose.

### Transparency 1-18

#### Removing Oxygen

Once again we call upon our knowledge of the chemistry of fire for our third method of fire control. Limit or shut-off the oxygen supply. This is usually accomplished by blanketing the area above the fire with nonflammable material which will prevent the flammable gasses and oxygen from uniting in a flammable mixture.

Up to this point we have discussed fire and fire control from the standpoint of the basic fire triangle:
<table>
<thead>
<tr>
<th>Lesson Outline</th>
<th>Lesson Script</th>
</tr>
</thead>
</table>
| 4. Inhibiting the Reaction | Up to this point we have discussed fire and fire control from the standpoint of the basic fire triangle:  
Oxygen + Heat + Fuel = Fire  
The above formula is often referred to as the fire triangle. |
| Show Transparency 1-19 | In the past since it was recognized that there were only three components of a fire, it was assumed that there were only three methods that would control the fire:  
1. Removal of heat (cooling)  
2. Removal of oxygen  
3. Removal of fuel  
Recent studies however, have shown that the chemical reaction which takes place in a fire is more complex than the basic formula. In fact several reactions take place during the course of a fire which produce combustible gasses. Experimentation has shown that it is possible to introduce certain substances into an existing fire which will more readily unite with gasses than oxygen does, and that the resultant substance is nonflammable. This process serves the same purpose as removing the fuel supply, oxygen supply, or reducing the heat (cooling) |
| Show Transparency 1-20 | There are numerous agents used for the purpose of extinguishing fires and there are two primary systems. The two primary systems are fixed and portable. Since fixed systems are installed and usually work automatically or are actuated by trained personnel we will concentrate our studies in the area of portable fire extinguishing agents. In the course of your work you are likely to discover a fire and you will have to use your knowledge of the chemistry of fire to extinguish it. This will require the selection of the proper fire extinguishing agent for the type of fire |
| C. Extinguishing Agents: | (Teacher note: Around most schools you will find several fire extinguishers. A display of these to be referred to during the lesson would add interest). |
### Lesson Outline

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pump Type</td>
</tr>
<tr>
<td>2.</td>
<td>Soda Acid</td>
</tr>
<tr>
<td>3.</td>
<td>Dry Chemical</td>
</tr>
<tr>
<td>4.</td>
<td>Carbon Dioxide (CO2)</td>
</tr>
<tr>
<td>5.</td>
<td>Foam</td>
</tr>
</tbody>
</table>

**D. Steps to take when you discover a fire.**

#### Introduction

Although those who understand fire hazards conscientiously attempt to eliminate or compensate for them can minimize the possibility of fire, they cannot eliminate it. They cannot prevent fires caused by lightning, arson, and the carelessness of others, and once in a while a useful fire gets out of control despite all precautions. A fire safety program, therefore, must cover not only preventative measures but must include steps to take when you discover a fire.

#### Step #1 Sound the Alarm

Each year, many fires discovered in their early stages become uncontrollable because of the failure of the individual who discovered it to turn in a prompt alarm; usually because he attempted to extinguish it by himself and it got out of control.
### Lesson Outline

<table>
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<tr>
<th>Step #2</th>
<th>Check the extent of the fire to see if you are capable of extinguishing it.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step #3</td>
<td>Selecting the proper extinguisher</td>
</tr>
<tr>
<td>Step #4</td>
<td>Attempt to extinguish fire</td>
</tr>
</tbody>
</table>

#### A. Operation and Use of Pump-type extinguisher

This can be vitally important, for fire fighting efforts during the first five minutes of a fire are worth more than the work of the next five hours.

#### B. Operation and use of Soda Acid extinguisher

Decide from your knowledge of fire the class of fire you will be fighting, then choose the proper extinguishing agent. Remember the wrong type of extinguishing agent on a fire could spread it or injure you.

#### C. Operation and use of Dry Chemical extinguisher

Before starting, plan your escape route in case the fire should spread--always have an out. Each type of fire extinguisher has a specific method of putting it into operation and a specific method of use. These are the operating instructions and methods of use for the types of extinguishers covered in this lesson plan.

- **Operation** - place foot on foot bracket and operate pump with 6 to 8 inch strokes.
- **Use** - direct the stream of water at the base of the fire and then follow the flames up while moving stream from side to side or around fire.

- **Operation** - Invert extinguisher, hold by bottom handle
- **Use** - Direct stream at base of fire - follow up after flames while moving from side to side or around if possible.

- **Operation** - Remove nozzle from holster and press puncturing lever (if locking pin is present ring must be pulled out).
- **Use** - Direct spray into the flame itself with a fanning motion - allow spray to fall into the fire.
### D. Operation and use of Carbon Dioxide Extinguisher

**Operation** - Hold in upright position pull locking ring pin - squeeze the discharge lever.

**Use** - Direct the spray at base of flame-use fanning motion - start at near edge and work to rear.

### E. Operation and use of Foam Type Extinguisher

**Operation** - Invert the cylinder hold by bottom handle

**Use** - For liquid (Class B) fires direct the stream in an arc and let it fall against the back of the container or into the fire. For class A fires aim at base of fire working from side to side.

### Student learning experiences

The following learning experiences should accompany the lesson plan and be synchronized with it. The accomplishment of each of the experiences should be arranged by individual students or groups of students. This will give the students the opportunity to apply and extend their knowledge of fire prevention and extinguishment, and will give the teacher a basis upon which to estimate the extent of their learning.

1. **Demonstration of Spontaneous Combustion**
   - With the assistance of the chemistry or general science teacher, arrange a demonstration of spontaneous combustion and report to the class steps that you would use to prevent it at home, at work, or at school.

2. **Collection and Evaluation of Fire Date**
   - Collect newspaper, radio, and television data on fires for a one week period. List the causes and consequences of the fires. List the steps that might have been effective in preventing them. Make report to class.

3. **Demonstration of Effect of Electrical Overloading**
   - With the aid of the general science teacher or electrical shop teacher arrange for a demonstration of the effect of overloading an electrical circuit. Report to class on methods to use in preventing overloading.
<table>
<thead>
<tr>
<th>Lesson Outline</th>
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</thead>
<tbody>
<tr>
<td>4. Lecture on Fire Prevention</td>
<td>Arrange with the local fire department for a representative to talk before an assembly or the class on Fire Prevention.</td>
</tr>
<tr>
<td>5. Checklist Development</td>
<td>Develop a checklist which can be used to prevent fires at home, at work, at school. List existing hazards, what can be done to remove them or to prevent them from causing fires.</td>
</tr>
</tbody>
</table>
Examination

This is a multiple choice examination. Choose the best answer from the four possible and place the letter designator for that answer in the space provided at the left of the question.

1. How many general classifications of fire are there:
   a. one
   b. two
   c. three
   d. four

2. The classification of an electrical fire is:
   a. Class A
   b. Class B
   c. Class C
   d. Class D

3. The classification of fire in paper, wood or cloth is:
   a. Class A
   b. Class B
   c. Class C
   d. Class D

4. Flammable liquid fires are:
   a. Class A
   b. Class B
   c. Class C
   d. Class D

5. Which of the following fire control methods is the most dangerous.
   a. Cooling
   b. Removing fuel
   c. Removing or replacing oxygen
   d. Inhibiting the reaction

6. A stream of water would not be used to extinguish a fire in:
   a. rags
   b. wood
   c. trash
   d. oil
7. Carbon Dioxide is not very effective against:
   a. electrical fires
   b. small trash fires
   c. large trash fires
   d. flammable liquid fires

8. Interrupting the chemical reaction of a fire is accomplished by:
   a. cooling
   b. removing the fuel
   c. removing the oxygen
   d. introducing another ingredient

9. The newest method of controlling fire is called:
   a. cooling
   b. removing fuel
   c. removing oxygen
   d. Inhibiting the reaction

10. The type of extinguishing agent which is highly effective against Class A, B, and C fires is:
    a. water
    b. carbon dioxide
    c. soda acid
    d. dry chemical

11. The time when a fire can best be controlled is:
    a. during the first five minutes
    b. during the first five hours
    c. while the fire department is present
    d. before the alarm is given.

12. Each year, many fires discovered in their early stages become uncontrollable because of:
    a. Failure to remove flammables
    b. Failure to give alarm
    c. Failure to attempt to extinguish it
    d. Failure to notify supervisors
The last of the four major steps to take when you discover a fire is to:
   a. Check the extent of the fire
   b. sound the alarm
   c. attempt to extinguish it
   d. select the proper extinguishing agent

The two types of extinguishers discussed which must be inverted to operate are:
   a. soda acid and foam
   b. foam and dry chemical
   c. dry chemical and carbon dioxide
   d. pump type (water) and soda acid

The type of extinguishing agent which must be sprayed into the flame itself and allowed to fall into the fire is:
   a. Soda Acid
   b. Foam
   c. Dry Chemical
   d. Carbon Dioxide
Examination Key

1. d
2. c
3. a
4. b
5. b
6. d
7. c
8. d
9. d
10. d
11. a
12. b
13. c
14. a
15. c
Lesson Title: Manual Handling of Material

Title Transparency 2-1

Clock Hours: 60 minutes

Show Transparency #1

Terminal Objectives: After participating in this lesson the students will demonstrate their knowledge of the manual handling of materials completing with 100% accuracy a ten question multiple choice examination on the lesson matter.

Teaching Materials: 1. This lesson plan
2. Overhead Projector
3. Blackboard
4. Transparency Pack #2-1 Plan #1.
5. Examination
6. Examination Key


Lesson Outline

A Manual Handling of Materials

Introduction

Teacher Note: Prepare three boxes of different weights and same size - have student demonstrate proper methods of lifting. Each student should participate.

1. Muscular strain and physical over exertion.

Show transparency #2-2

Injuries

2. The Pinching or smashing of toes and fingers.

Show transparency #2-3

3. Horseplay

Show transparency #2-4

Lesson Script

The three most common causes of accidents to young people in industry are:

1. Muscular strain and physical over-exertion
2. Pinching or smashing of toes and fingers.
3. Horseplay

Muscular strain and physical over exertion are caused by improper lifting and handling procedures.

Improper lifting procedures can cause serious and painful injuries such as:

1. Slipped spinal disc—painful and crippling.
2. Pulled and strained muscles and ligaments.
3. Hernia
4. Ruptures
5. etc.

The pinching or smashing of toes and fingers is not only painful and sometimes crippling, but usually results in the temporary inability to work. Employers do not continue to employ habitually careless people—or those who cannot produce to make a profit.

Playing games, pushing, shoving others, throwing or pulling practical jokes on others is the one greatest cause of accidents among young people in business and industry. It not only can but does result in injury to personnel and damage to equipment.

Most accidents can be prevented by using proper handling methods.

These methods are:

1. Proper lifting method
2. Proper method for moving material at arm level
3. Proper method for moving material at higher than head level.
4. Proper method for using simple hand tools.
<table>
<thead>
<tr>
<th>Lesson Outline</th>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Proper Lifting Method</strong></td>
<td>a. Always test the weight of item to be lifted. If too heavy get help or use a lifting device.</td>
</tr>
<tr>
<td>Show transparency #2-5</td>
<td>b. Be sure you have good footing.</td>
</tr>
<tr>
<td><strong>2. Proper method for moving material at arm level.</strong></td>
<td>c. Squat with knees straight in front and slightly apart, back straight, and arms extended. Lift with legs.</td>
</tr>
<tr>
<td>Show transparency #2-6</td>
<td>d. Hug load to you keeping back straight. Let your legs support the weight.</td>
</tr>
<tr>
<td><strong>3. Proper method for moving material at higher than head level.</strong></td>
<td>a. Always use assistance of another person regardless of weight involved.</td>
</tr>
<tr>
<td>Show transparency #2-7</td>
<td>b. Use special handling equipment for heavy material.</td>
</tr>
<tr>
<td>Show transparency #2-8</td>
<td>c. Use ladders with care.</td>
</tr>
<tr>
<td><strong>4. Proper method for using simple hand tools.</strong></td>
<td>(1) never carry up and down ladders.</td>
</tr>
<tr>
<td>Show transparency #2-9</td>
<td>(2) hand boxes to person on floor.</td>
</tr>
<tr>
<td>Show transparency #2-10</td>
<td>a. Opening paper cartons.</td>
</tr>
<tr>
<td></td>
<td>(1) Use proper tool for cutting. Never use double edge razor.</td>
</tr>
<tr>
<td></td>
<td>(2) Cut with slow firm stroke keeping other hand clear.</td>
</tr>
<tr>
<td></td>
<td>b. Opening wooden boxes and crates.</td>
</tr>
<tr>
<td></td>
<td>(1) Use proper tools for prying. Pry bars, crow bars, etc. are designed for this purpose. Do not use screw-drivers or tools designed for other purposes.</td>
</tr>
<tr>
<td></td>
<td>(2) Cut wire with wire cutters.</td>
</tr>
<tr>
<td></td>
<td>(3) Remove nails with claw hammer or mechanical nail puller.</td>
</tr>
<tr>
<td></td>
<td>(4) Use extreme care in handling boxes and boxing material as injury may be caused by splinters, loose wires, nails, or other projecting objects.</td>
</tr>
</tbody>
</table>
Examination

1. Of the following, which is not one of the three most common causes of accidents to young people in industry?
   a. Muscular strain and physical exertion
   b. Pinching or smashing of toes and fingers.
   c. Operation of material handling equipment
   d. Horseplay

2. Lifting should be done with:
   a. The legs
   b. The arms
   c. The back
   d. The neck

3. If the load is too heavy to lift you should:
   a. Rock backwards
   b. Jerk upwards quickly
   c. Lift one side before the other
   d. Get help or use a lifting device

4. In handling material you should never:
   a. Use assistance of another person
   b. Use lifting devices
   c. Carry up or down a ladder
   d. Test weight

5. When lifting from above ground level the weight should be directed:
   a. Toward you
   b. Away from you
   c. Up
   d. Down

6. The proper tool for removing the nailed down lid of a wooden box is:
   a. Pliers
   b. Screwdrivers
   c. Hammer
   d. Pry bar
7. The following tool is never to be used opening cardboard containers.
   a. Razor Knife
   b. Hawkbill Knife
   c. Box Cutter
   d. Double edge razor blade

8. When handling material at over the head height you should always:
   a. Lift with your back
   b. Use a ladder
   c. Use assistance of another person
   d. Test the weight to see if you can handle it by yourself.

9. The one action which covers the most injuries to young people in industry is:
   a. Improper lifting procedures
   b. Improper use of hand tools
   c. Improper handling methods
   d. Horseplay

10. Before squatting to lift you should first:
    a. Use special handling equipment
    b. Let your legs support the weight
    c. Be sure you have good footing
    d. Use proper hand tools
Examination Key

1. c
2. a
3. d
4. c
5. b
6. d
7. d
8. c
9. d
10. c
Lesson Title: Machine handling of materials.

Clock Hours: 90 minutes

Terminal Objectives: At the conclusion of this lesson the students will know how to safely use hand material handling equipment, and know the general rules for using all types of powered material handling equipment. They will demonstrate their knowledge by completing examination on the subject.

Teaching Materials:
1. This lesson plan
2. Overhead projector
3. Transparency pack #2-2
4. Block #2 Lesson Plan #2 Examination
5. Block #2 Lesson Plan #2 Examination Key
6. Collection of hand material handling equipment

References:


Eninger, M.U. *Accident Fundamentals.* Armco Steel Corporation 1963, Chapter 12, pp. 17-21
Lesson Outline

Machine Handling of Material

Definition:

Has one or more moving parts and any device which is used to make the handling of material easier and safer for the worker is classed as a machine.

The machine or equipment which is used in material handling is broken down into two categories:

Transparency 2-12
1. Hand equipment
2. Powered Equipment

Teacher note: A display of the types of hand equipment discussed in this lesson plan should be made during this presentation. Most if not all are available in most schools or school systems. Check with maintenance personnel and shop teachers. At conclusion of lesson have students inspect and operate each piece of equipment.

1. Hand Equipment

Any material handling equipment that replaces direct hand lifting and carrying is a step in the direction of safety. Such equipment, however, is not without its own characteristic hazards. These must be made a matter of knowledge to the user and must be understood by them. The five most commonly used pieces of hand equipment are:

a. wheelbarrows
b. two wheel handtrucks
c. four wheel handtrucks
d. dollies
e. jacks.
### Lesson Outline

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) If more than one type is available, select the one best suited for the work to be done.</td>
<td>(1) There are many special purpose types. Some, for example, designed for kegs, drums, and barrels. Select the correct type for the material to be hauled.</td>
</tr>
<tr>
<td>(2) Check its condition for safe operation: (a) handles not cracked (b) bolts secure (c) tires inflated properly (d) handguards in place</td>
<td>(2) Check for defects</td>
</tr>
<tr>
<td>(3) Place weight of load over wheel</td>
<td>(3) Keep center of gravity low as possible (place heavy items on bottom)</td>
</tr>
<tr>
<td>(4) Use two steps for starting to move: (a) lift slowly to balance point (b) accelerate slowly</td>
<td>(4) Don't overload</td>
</tr>
<tr>
<td>(5) Walk do not run</td>
<td>(5) Balance load laterally</td>
</tr>
<tr>
<td>(6) Check path for obstacles</td>
<td>(6) Secure the load</td>
</tr>
<tr>
<td>(7) Drop it if it gets out of control (better a spilled load than a sprained back)</td>
<td>(7) Push - except uphill</td>
</tr>
<tr>
<td>(8) Walk, don't run</td>
<td>(8) Walk, don't run</td>
</tr>
</tbody>
</table>

### Lesson Script

<table>
<thead>
<tr>
<th>Transparency 2-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) If more than one type is available, select the one best suited for the work to be done.</td>
</tr>
<tr>
<td>(2) Check its condition for safe operation: (a) handles not cracked (b) bolts secure (c) tires inflated properly (d) handguards in place</td>
</tr>
<tr>
<td>(3) Place weight of load over wheel</td>
</tr>
<tr>
<td>(4) Use two steps for starting to move: (a) lift slowly to balance point (b) accelerate slowly</td>
</tr>
<tr>
<td>(5) Walk do not run</td>
</tr>
<tr>
<td>(6) Check path for obstacles</td>
</tr>
<tr>
<td>(7) Drop it if it gets out of control (better a spilled load than a sprained back)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transparency 2-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) There are many special purpose types. Some, for example, designed for kegs, drums, and barrels. Select the correct type for the material to be hauled.</td>
</tr>
<tr>
<td>(2) Check for defects</td>
</tr>
<tr>
<td>(3) Keep center of gravity low as possible (place heavy items on bottom)</td>
</tr>
<tr>
<td>(4) Don't overload</td>
</tr>
<tr>
<td>(5) Balance load laterally</td>
</tr>
<tr>
<td>(6) Secure the load</td>
</tr>
<tr>
<td>(7) Push - except uphill</td>
</tr>
<tr>
<td>(8) Walk, don't run</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transparency 2-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Check for defects</td>
</tr>
<tr>
<td>(2) Block wheels when loading</td>
</tr>
<tr>
<td>(3) Balance the load</td>
</tr>
<tr>
<td>(4) Keep load below eye level or use another worker as a safety guide</td>
</tr>
<tr>
<td>(5) Push-unless pull handle is provided</td>
</tr>
<tr>
<td>(6) When parked insure that pull handle is locked in up position</td>
</tr>
</tbody>
</table>
### Lesson Outline

<table>
<thead>
<tr>
<th>d. Rules for safe operation of dollies.</th>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparency 2-16</td>
<td>A dollie is a small platform-on-low coaster wheels which will turn 360° in one spot. It is used mostly for carrying heavy single objects for short distances over a level path, and for moving objects that are too heavy to lift to the bed of a truck.</td>
</tr>
<tr>
<td></td>
<td>(1) check for defects</td>
</tr>
<tr>
<td></td>
<td>(2) move and guide by pushing</td>
</tr>
<tr>
<td></td>
<td>(3) if item is bulky and heavy use second man for better control</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e. Rules for safe operation of jacks</th>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparency 2-17</td>
<td>(1) Select a jack that has a capacity as great or greater than the load</td>
</tr>
<tr>
<td></td>
<td>(2) Check for defects</td>
</tr>
<tr>
<td></td>
<td>(3) Set on level base (level by blocking underneath)</td>
</tr>
<tr>
<td></td>
<td>(4) Use wooden shim between jack head and load</td>
</tr>
<tr>
<td></td>
<td>(5) Never jack at an angle</td>
</tr>
<tr>
<td></td>
<td>(6) Operate jacking handle from the side</td>
</tr>
<tr>
<td></td>
<td>(7) Operate slowly checking to see that load is secure</td>
</tr>
<tr>
<td></td>
<td>(8) Block load when lifted, don't depend on jack to hold load up</td>
</tr>
<tr>
<td></td>
<td>(9) Never work under an unblocked load</td>
</tr>
</tbody>
</table>

### 2. Powered Equipment

**Teacher Note:** A visit to a construction site, material storage facility should be made. Students should observe safe operation of equipment and if possible inspect safe maintenance.

<table>
<thead>
<tr>
<th>a. General Categories of Powered Material Handling Equipment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cranes</td>
<td></td>
</tr>
<tr>
<td>2. Hoists</td>
<td></td>
</tr>
<tr>
<td>3. Conveyors</td>
<td></td>
</tr>
<tr>
<td>4. Power Trucks</td>
<td></td>
</tr>
<tr>
<td>5. Tractors</td>
<td></td>
</tr>
<tr>
<td>6. Elevators</td>
<td></td>
</tr>
<tr>
<td>7. Railroad Engines</td>
<td></td>
</tr>
<tr>
<td>8. Lifts</td>
<td></td>
</tr>
</tbody>
</table>
### Lesson Outline

b. General rules for the safe operation of powered material handling equipment.

### Lesson Script

The following rules for the safe operation and use of powered material handling equipment would have equal importance for the use of all machinery. If these rules are followed, accidents and injuries caused by the operation and use of machinery can be reduced or eliminated.

1. Before operating equipment perform walk around inspection.
   a. Check oil and grease
   b. Check all friction points for signs of wear
   c. Check all tension devices (ropes, cables, etc.) for fraying, kinks, or bends
   d. Check all pressure points for cracks or chipping
2. Make sure equipment is in proper working order before using.
3. Do not use broken, excessively worn, or improperly operating equipment.
4. Know the limitations of the equipment.
5. Remove all foreign matter from the equipment before operating.
6. Never operate equipment unless authorized and thoroughly instructed in its use.
7. Never misuse or mishandle equipment.
8. Never permit an unauthorized person to use the equipment.
Examination

This is a multiple choice examination. Place the letter designator for the correct answer in the left of the question number.

1. The two categories of material handling equipment are:
   a. Hand equipment and dollies
   b. Trucks and powered equipment
   c. Trucks and dollies
   d. Hand equipment and powered equipment

2. The following are examples of hand material handling equipment.
   a. Dollies, jacks, wheelbarrows
   b. Hand Trucks, fork lifts, elevators
   c. Wheelbarrows, fork lifts, hoists
   d. Hoists, cranes, tractors

3. Two wheel or four wheel hand trucks should always be pushed except when:
   a. going uphill
   b. going downhill
   c. having load above eye level
   d. empty

4. The piece of equipment used to transport heavy material on a level surface and that will turn 360° in one spot is a:
   a. Tractor
   b. Hand truck
   c. Dollie
   d. Wheelbarrow

5. When using a two wheel hand truck, the center of gravity should be:
   a. low
   b. high
   c. in the center
   d. its unimportant
Examination

6. If more extension is needed for a jack you should:
   a. Buy a longer extension
   b. Place a shim between the jack head and load
   c. Place blocks under the jack
   d. Add more hydraulic fluid

7. A jack should never be:
   a. Placed in a vertical position
   b. Placed at an angle
   c. Placed in a horizontal position
   d. Placed on wooden support blocks

8. When operating a jack handle you should always stand:
   a. Above the jack
   b. Straddle of the handle
   c. To the side of the handle
   d. Below the jack head

9. Due to the fact that its casters move in all directions, this piece of equipment should never be pulled by a rope:
   a. Dollie
   b. Hand truck
   c. Four wheel cart
   d. Crane
Examination Key


d 1.
a 2.
b 3.
c 4.
a 5.
c 6.
b 7.
c 8.
a 9.
Lesson Title: Handling of Hazardous Materials

Terminal Objectives: At the conclusion of this lesson plan the students will know the major types of hazardous materials, the methods of identifying hazardous materials, and the effects of exposure to hazardous materials; and will demonstrate their knowledge by completing with 100% accuracy a ten question multiple choice examination on the subject.

Teaching Materials: 1. This lesson plan
2. Overhead projector
3. Transparency Pack #2-3
4. Examination
5. Examination Key

References:

- Occupational Safety and Health Administration, Instructor Manual OSHA-2073, A Guide to Voluntary Compliance. pp. 6-1 to 7-1 and 13-1 to 14-1.


- Federal Register, Occupational Safety and Health Standards, 29CFR 1910 sub parts G,J,K.
### Definition of Hazardous Materials

Any substance that might in any way cause injury to or impair the health of an employee.

### Types of Hazardous Materials

1. Air contaminating materials.
   a. Dust
   b. Fumes
   c. Mists
   d. Vapor
2. Flammable Materials
3. Radio Active Materials
4. Explosive Materials

### Handling of Hazardous Materials

1. Before handling materials read markings or labels to learn contents.
2. All hazardous materials require special handling. Check with your supervisor for advice and directions.
3. All materials that present a radiation hazard should be marked with the standard radiation warning sign.
4. Hazardous materials are normally labeled or tagged. These labels or tags are color coded.
   1. Red is for flammable material or extremely dangerous situations.
   2. Orange is for dangerous areas or energized equipment.
   3. Yellow is for caution and marks physical hazards.
   4. Green designates safety and first aid equipment.
   5. Blue designates caution limited to warning against equipment being repaired.
   6. Purple designates radiation hazard.
<table>
<thead>
<tr>
<th>Lesson Outline</th>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show Transparency #2-21</td>
<td>1. Air contaminates</td>
</tr>
<tr>
<td>Effects of exposure to hazardous materials. (coal, dust, silica, &amp; etc.)</td>
<td>a. Pneumoconiosis - coats the lungs and interferes with breathing may result in cancer.</td>
</tr>
<tr>
<td>(Toxic materials entering mouth and nose)</td>
<td>b. Poisoning</td>
</tr>
<tr>
<td>(Contact of skin with organic dusts)</td>
<td>c. Skin irritations and allergic reactions.</td>
</tr>
<tr>
<td>(Anthrax from furs or skin)</td>
<td>d. Bacterial and fungi infections.</td>
</tr>
<tr>
<td>(Caused by breathing mists or fumes of acids or alkalies)</td>
<td>e. Nose and throat irritations.</td>
</tr>
<tr>
<td>(Chief cause asbestos dust)</td>
<td>f. Cancer</td>
</tr>
</tbody>
</table>
This is a multiple choice examination. Place the letter designator for the correct answer in the space at the left of the question.

1. Dusts, fumes, mists, vapors are examples of:
   a. Flammable materials
   b. Air contaminating materials
   c. Water pollutants
   d. Radioactive materials

2. "Any substance that might in any way cause injury to or impair the health of an employee," is the definition of:
   a. Air contaminants
   b. Hazardous materials
   c. Radioactive materials
   d. Biological hazards

3. Which of the following is a correct statement?
   a. Only certain hazardous materials require special handling.
   b. Hazardous materials are handled the same as other materials.
   c. Radioactive materials are only dangerous if contacted.
   d. All hazardous materials require special handling.

4. The color designator for radiation is:
   a. purple
   b. red
   c. green
   d. blue

5. A purple sign with a yellow background designates:
   a. Explosive hazard
   b. Air contaminates
   c. Radiation hazard
   d. Water hazard

6. The color which designates extreme danger or fire equipment is:
   a. purple
   b. red
   c. green
   d. blue
Examination

7. The color which denotes caution and marks physical hazards is:
   a. purple
   b. red
   c. orange
   d. yellow

8. Pneumoconiosis interferes with breathing, coats the lungs, and is caused by:
   a. organic dusts
   b. coal dust & silica
   c. poisoning
   d. asbestos dust

9. Contact of skin with organic dusts causes:
   a. bacterial and fungi infection
   b. cancer
   c. poisoning
   d. skin irritation

10. Nose and throat blistering is normally caused by breathing:
    a. coal dust and silica
    b. organic dusts
    c. mists from acids and alkalies.
    d. inorganic dusts
Examination Key

b 1.

b 2.

d 3

a 4.

c 5.

b 6

d 7.

b 8

d 9.

c 10.
Lesson Title: Personal Protective Equipment

Terminal Objectives: At the conclusion of this lesson the student will have a working knowledge of personal protective equipment types, and their use; and will demonstrate this knowledge by completing with 100% accuracy a 10 question multiple choice examination on the subject.

Teaching Materials: 1. This lesson plan
2. Overhead projector
3. Transparency Pack #3-1
4. Blackboard
5. Examples of Equipment

References:
Blake, Roland P. Industrial Safety, Prentiss-Hall, N.J. 1963, pp. 320-349
### Lesson Outline

**Personal Protective Equipment**

*Teachers note:* If possible, gather examples of each type of personal protective equipment covered in this lesson plan. Have students practice using them and adjusting them.

### Lesson Script

It falls directly upon the employer to furnish a safe work place for employees. While the above statement is true it does not follow that work will be accomplished in a safe manner. The safe accomplishment of work falls directly upon the employee and his adherence to sound safety practices. Probably one of the most important practices that an employee can develop is that of selecting and using proper personal protective equipment.

Although the Williams-Sleiger Occupational Safety and Health Act of 1970 requires employers to provide a safe work place for employees, it does not require them to furnish all items of personal protective equipment. In fact some businesses will require that you furnish some or all of your personal protective equipment.

Whether your personal protective equipment is employer furnished or self furnished it is extremely important that it be of sufficient quality to accomplish its design functions.

Knowledge of the types of personal protective equipment available and the use for which they are designed will assist you in making good purchases or in determining the adequacy of furnished equipment.
### Lesson Outline

<table>
<thead>
<tr>
<th>Types of Personal Protective Equipment</th>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Head Protectors</td>
<td>There are basically 7 types of personal protective equipment:</td>
</tr>
<tr>
<td></td>
<td>1. Head protectors</td>
</tr>
<tr>
<td></td>
<td>2. Ear protectors</td>
</tr>
<tr>
<td></td>
<td>3. Face and Eye protectors</td>
</tr>
<tr>
<td></td>
<td>4. Respiratory System Protectors</td>
</tr>
<tr>
<td></td>
<td>5. Hand, foot, and leg protectors</td>
</tr>
<tr>
<td></td>
<td>6. Protective clothing</td>
</tr>
<tr>
<td></td>
<td>7. Safety belts</td>
</tr>
<tr>
<td><strong>Show Transparency #3-2</strong></td>
<td>In general there are two names for head protectors, safety hats and safety helmets. For simplicity we will refer to them only as safety hats. Safety hats are of two general types</td>
</tr>
<tr>
<td><strong>Types</strong></td>
<td>1. brimless</td>
</tr>
<tr>
<td></td>
<td>2. full brimmed</td>
</tr>
<tr>
<td><strong>Classes</strong></td>
<td>Each type is further broken down into four classes.</td>
</tr>
<tr>
<td>1. Class A--- general service - for protection against impact, and voltages up to 600 volts.</td>
<td></td>
</tr>
<tr>
<td>2. Class B--- Utility Service, for protection against impact and high voltage (up to 30,000 volts and 9 mil. amps).</td>
<td></td>
</tr>
<tr>
<td>3. Class C--- Special Service- light impact and no protection against electricity. Sometimes referred to as a bump helmet.</td>
<td></td>
</tr>
<tr>
<td>4. Class D--- Limited protectors- usually used by firefighters.</td>
<td></td>
</tr>
<tr>
<td><strong>Safety caps</strong></td>
<td>In addition to safety hats, hair protective devices are sometimes required to be worn by those people who have long hair. Caps have been specially designed for this purpose.</td>
</tr>
<tr>
<td><strong>Show Transparency #3-3</strong></td>
<td></td>
</tr>
</tbody>
</table>

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**Block #3**

**Lesson Plan #1**

**Page #3**
**Lesson Outline**

<table>
<thead>
<tr>
<th>Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ear Protection</strong></td>
</tr>
<tr>
<td><strong>Types</strong></td>
</tr>
<tr>
<td><strong>Insert Types</strong></td>
</tr>
<tr>
<td><strong>Muff (Cup) Type</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety hats should be inspected before each use for cracks, dents, and signs of wear which might reduce the degree of protection. Special attention should be given to the suspension because of the important part it plays in the absorption of shock.</td>
</tr>
</tbody>
</table>

2. Ear Protection

Increasing attention is being given to the problem of excessive noise in industry. It can cause loss of hearing and intense pain.

Types

Other than engineering or mechanical methods of reducing noise level, there are currently only two basic types of ear (hearing) protective equipment:

1. Insert Types (Ear Plugs)
2. Ear Muffs

Insert Types

The insert types, placed into the ear canal, offers ample protection against most noise when properly fitted and constructed of the proper material.

Muff (Cup) Type

Additional protection may be attained by the use of muffs.

Note: In addition to the two basic types of ear protectors a protective helmet has been developed that shields the entire bony structure of the head from sound vibrations of very high intensity. (Bones conduct these vibrations to the inner ear).
### Lesson Outline

| 3. Face and Eye Protection | In general there are four types of face and eye protection:
|                           | 1. Goggles
|                           | 2. Spectacles
|                           | 3. Shields
|                           | 4. Hoods

#### Eye Protection
Spectacles may be worn for limited hazards involving only frontal protection. Even with side shields they provide only minimal side protection. Their lightness and neat appearance make them more acceptable where they afford adequate protection.

#### Goggles
Goggles afford better protection than spectacles since they are designed to protect the eye from flying particles from all directions (above, below, side, and frontal).

#### Additional Advantage of Face and Eye Protection
Special colored glass or plastic may be used in all types of face and eye protection to filter out light rays or radiation which might be injurious to the eye. Special shields and helmets have been fabricated to protect the face and eyes from damage due to heat, or chemical exposure.

### Lesson Script

4. Respiratory System Protectors

There are literally hundreds of respiratory protective devices, and there is not time in this course to cover all devices so no attempt will be made to do so.
<table>
<thead>
<tr>
<th>Lesson Outline</th>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Two Types</strong></td>
<td>In general, respiratory protective devices are designed either to purify the air being inhaled by removing the contaminates or to supply the user with clean air from an outside source.</td>
</tr>
<tr>
<td>Air purifying devices</td>
<td>The equipment that purifies the air is designated as air purifying. Examples:</td>
</tr>
<tr>
<td>Show Transparency #3-8</td>
<td>1. Those that make use of mechanical filters for removing particulate matter such as dusts, fumes, and mists from the air.</td>
</tr>
<tr>
<td></td>
<td>2. Those that make use of chemical sorbents for removing gases and vapors from the air.</td>
</tr>
<tr>
<td>Air supplying devices</td>
<td>The equipment that supplies fresh air from an outside source is designated as air supplying. Example:</td>
</tr>
<tr>
<td>Show Transparency #3-9</td>
<td>1. Types in which fresh air is brought to the user from a distant point through a hose or pipe.</td>
</tr>
<tr>
<td>Remote Type</td>
<td>2. Types in which compressed air or oxygen is supplied from a tank carried by the user.</td>
</tr>
<tr>
<td>Self Contained</td>
<td>The following factors should be considered in choosing a respirator.</td>
</tr>
<tr>
<td>Selection of Respiratory System Protectors</td>
<td>1. Nature of hazard</td>
</tr>
<tr>
<td></td>
<td>2. Severity of hazard</td>
</tr>
<tr>
<td></td>
<td>3. Type of contaminant</td>
</tr>
<tr>
<td></td>
<td>4. Concentration of contaminant</td>
</tr>
<tr>
<td></td>
<td>5. Period of time protection required</td>
</tr>
<tr>
<td></td>
<td>6. Distance from pure air source</td>
</tr>
<tr>
<td></td>
<td>7. Expected activity of user</td>
</tr>
<tr>
<td></td>
<td>8. Characteristic and limitations of the choice of respirators.</td>
</tr>
</tbody>
</table>
### 5. Hand, Foot and Leg Protectors

**Lesson Outline**

- **Show Transparency #3-10**

**Lesson Script**

Although there are many ointments and creams on the market which are reputed to furnish protection to the hands they have not proven to be effective in most cases. Gloves are the best personal protective device for the hands. They are manufactured to supply protection from many hazards such as heat, chemicals, sharp objects, acids, caustics, oils, solvents and friction. The choice of gloves depends upon the hazard and its intensity.

#### Feet and Legs

**Show Transparency #3-11**

- **Feet**
  - The great majority of foot injuries is caused by dropping objects upon them. Steel toed safety shoes will protect against most foot injuries from this cause. The accepted standard for strength is that the toe box must withstand the impact of 50 lbs. dropped from 1 foot. For impacts greater than this special guards are required.

- **Legs**
  - Protection for the legs depends upon the hazard to be guarded against. The device most commonly used is leggings ranging from waist length to those that reach only part way to the knee.

### 6. Protective Clothing

**Show Transparency #3-12**

- Industrial operations present such hazards as burns, abrasions, or skin irritation from chemicals or detergents. Protection from these hazards sometimes necessitates the wearing of protective clothing such as asbestos suits, rubber aprons, special coveralls. In selecting such clothing two rules must be followed.
7. Safety Belts

The wearing of safety belts when working high above ground level is mandatory. The selection of a safety belt should be based on the following criteria:

1. Does it have sufficient strength to stop the wearer after a maximum free fall.
2. Will it absorb the shock without undue injury to the wearer.
3. Is the stopping distance short enough to prevent the wearer from striking some dangerous obstruction.
This is a multiple choice examination. Place the letter designator for the most correct answer or phrase in the space provided to the left of the question.

1. The number of basic types of personal protective equipment is:
   a. 7
   b. 4
   c. 3
   d. 6

2. The class of safety hat which furnishes protection against up to 30,000 volts of electricity is:
   a. class A
   b. class B
   c. class C
   d. class D

3. The class of safety hat which furnishes protection against light impact only is:
   a. class A
   b. class B
   c. class C
   d. class D

4. The insert type of ear protector must be:
   a. made of wax
   b. made of cotton
   c. fitted
   d. ventilated

5. The best face and eye protector to use when welding is:
   a. goggles
   b. hood
   c. spectacles
   d. shield (hand type)

6. The two general types of respiratory protective devices are:
   a. face mask and air purifying
   b. air purifying and air supplying
   c. hose type and remote
   d. self contained and air supplying
Examination

7. The best protective device for hands is:
   a. gloves
   b. ointments
   c. creams
   d. none

8. The accepted standard for strength of steel-toed safety shoes is that they withstand the impact of:
   a. 100 lbs. dropped from 2 feet
   b. 100 lbs. dropped from 1 foot
   c. a thousand pound weight
   d. 50 lbs. dropped from 1 foot

9. The device which is designed to protect the eye from flying particles from all directions is:
   a. spectacles
   b. hand shield
   c. goggles
   d. face mask

10. Safety belts are to be worn at all times when:
    a. there is danger of a fall
    b. working on electrical circuits
    c. working above ground level and there is danger of a fall
    d. working on a slick surface
Examination Key

a  1.
b  2.
c  3.
c  4.
b  5.
b  6.
a  7.
d  8.
c  9.
c  10.
Lesson Title: Machine Guards  

Clock Hours: 60 minutes

Show Transparency #1

Terminal Objectives: At the conclusion of this lesson the students will know the hazards of operating machinery and the importance of using guards to prevent injury; and will demonstrate their knowledge by completing with 100% accuracy a 10 question multiple choice examination on the subject.

Teaching Materials:
1. This lesson plan
2. Overhead projector
3. Transparency Pack #3-2
4. Examination for Lesson Plan #1 Block #3
5. Examination Key for Lesson Plan #1 Block #3

References:
A guide to Voluntary Compliance, U.S. Dept. of Labor, Occupational Safety and Health Administration, Instructors Manual, pp. 15-1 to 16-1.

Blake, Roland P. Industrial Safety, Prentiss Hall, N.J. 1963, pp. 175-211.

Federal Register, Occupational Safety and Health Standards, 29CFR 1910 Subpart O.
Lesson Outline

A. Critical Hazards

Show Transparency #3-15

Lesson Script

The machine operator should be aware of the following critical hazards in machine operations and take steps to eliminate them if they exist:

1. No enclosure or interlock system on revolving container.
2. Exposed fan blades.
3. Fixed location machines not securely anchored.
4. Belts, pulleys or gears not guarded.
5. Inadequate or improperly adjusted guards.
6. Inadequate or no automatic cutoff.
7. Awkward location of controls or adjustments.
8. Operating-treadle not-covered
9. No workrest or improperly adjusted workrest.
10. Safety devices bypassed
11. Excessive travel
12. Improper maintenance
13. Improper electrical ground
14. Inadequate eye protection
15. etc.

If any of the above conditions are noticed the machine should not be operated. If in operation, shut down the machine and notify your supervisor.

B. Importance of guarding

Teacher Note: At this point a tour through the school shops or a local shop should be made for the purpose of observing machine guards and safety hazards. Each student should observe, list and report any machine guarding hazards noted.

Unguarded machinery is a principal source of accidents which cause injury. The severity of injury is normally high. Machines designed to cut wood or metal have little trouble amputating fingers, arms, or legs. Remember that even a temporary lapse of caution can result in severe injury from an unguarded machine.
### Block #3

#### Lesson Plan #1

<table>
<thead>
<tr>
<th>Lesson Outline</th>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guard Construction</td>
<td>Guards must be so constructed that they will give optimum protection against:</td>
</tr>
<tr>
<td></td>
<td>1. shock</td>
</tr>
<tr>
<td></td>
<td>2. burns</td>
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<td></td>
<td>3. cuts</td>
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<td></td>
<td>4. bruises</td>
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<td></td>
<td>5. pinches</td>
</tr>
<tr>
<td></td>
<td>6. crushing</td>
</tr>
<tr>
<td>Shock</td>
<td>There are three major causes of electrical shock which must be guarded against.</td>
</tr>
<tr>
<td></td>
<td>a. ungrounded equipment</td>
</tr>
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<td></td>
<td>b. inadequate guarding of exposed circuitry</td>
</tr>
<tr>
<td></td>
<td>c. inadequate insulation of electrical conductors.</td>
</tr>
<tr>
<td>Burns</td>
<td>Burns are caused by contacting sources of heat such as:</td>
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<td></td>
<td>1. material super heated by friction.</td>
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<td>2. overheated electrical systems or devices.</td>
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<td>3. flames</td>
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<td>Properly guarded equipment would prevent these injuries.</td>
</tr>
<tr>
<td>Cuts, Bruises, Pinches and Crushing</td>
<td>The causes of cuts, bruises, pinches, and crushing when operating machines are improperly guarded:</td>
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<tr>
<td></td>
<td>1. pinch points - points where two moving parts of a machine separate and come together.</td>
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<td>2. shear points - points where two moving parts of a machine pass each other closely. (like scissors)</td>
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<tr>
<td></td>
<td>3. catch points - moving parts of machines which have sharp corners or rough shapes.</td>
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<tr>
<td></td>
<td>4. Run in points - points where two objects are in contact with each other and rotating inward.</td>
</tr>
</tbody>
</table>
There are four basic types of machine guards:

1. Fixed - The guard is stationary.
2. Interlocking - The guard must be in place before the machine can be operated.
3. Automatic - The guard moves the operator away from the danger point.
4. Tripping - A photo-electric device or a trip bar keeps the machine cut off until hands are clear, or both hands must be used to actuate the equipment at a point remote from the work.
Examination

This is a multiple choice examination. Place the letter designator for the correct answer or phrase in the space provided at the left of the question.

1. The severity of injury from accidents caused by operation of unguarded machinery.
   a. low
   b. high
   c. negligible
   d. favorable

2. Shock, burns, cuts, and pinches are examples of injuries which could be prevented by:
   a. larger nursing staffs
   b. closer supervision
   c. machine guarding
   d. foremen

3. The three major causes of electrical shock.
   a. ungrounded equipment, high voltage, inadequate insulation.
   b. high current, high voltage, ungrounded equipment.
   c. ungrounded equipment, high current, inadequate guarding of exposed circuitry.
   d. ungrounded equipment, inadequate guarding of exposed circuitry, inadequate insulation.

4. Where two moving parts of a machine come together and then separate is known as:
   a. shear point
   b. pinch point
   c. catch point
   d. run in point

5. Moving parts of a machine which have sharp corners or rough shapes are known as:
   a. run in points
   b. catch points
   c. pinch points
   d. shear points
Examination

6. The point where two objects (such as gears) are in contact with each other and are rotating inward is called:
   a. pinch point
   b. catch point
   c. shear points
   d. run in points

7. The point where two moving parts of a machine pass each other closely like scissors is called:
   a. catch point
   b. shear point
   c. run in point
   d. pinch point

8. A stationary guard is known as a/an:
   a. automatic guard
   b. tripping guard
   c. interlocking guard
   d. pinch point

9. "The guard must be in place before the machine can be operated," describes a/an:
   a. automatic guard
   b. tripping guard
   c. interlocking guard
   d. fixed guard

10. "The guard moves the operator away from the danger point," describes a/an:
    a. automatic guard
    b. tripping guard
    c. interlocking guard
    d. fixed guard
Examination Key

b 1.

c 2.

d 3.

b 4.

b 5.

d 6.

b 7.

d 8.

c 9.

a 10.
Lesson Title: Housekeeping Title Transparency 4-1

Clock Hours: 30 minutes

Show Transparency #1

Terminal Objectives: Upon completion of this lesson plan the students will understand the reasons for good housekeeping, know typical accidents caused from poor housekeeping, and what constitutes good housekeeping; and will demonstrate their knowledge by completing with 100% accuracy a 5 question multiple choice examination on the subject.

Teaching Materials:
1. This Lesson plan
2. Transparency Pack #4-1
3. Overhead Projector
4. Examination Block #4 Lesson Plan #1
5. Examination Key Block #4 Lesson Plan #1

References:

### Lesson Outline

<table>
<thead>
<tr>
<th>Lesson Outline</th>
<th>Lesson Script</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Good Housekeeping</strong>&lt;br&gt;Show Transparency #4-2</td>
<td>Good housekeeping not only signifies cleanliness, but a place for everything and everything in its place. In order for this condition to exist constant and proper attention must be given to the condition of the work area. A clean place &lt;br&gt;An orderly place</td>
</tr>
<tr>
<td><strong>B. Typical Accidents Due to Poor Housekeeping</strong>&lt;br&gt;Show Transparency #4-3</td>
<td>1. Tripping over loose objects &lt;br&gt;2. Falling articles &lt;br&gt;3. Slipping on wet or oil floors. &lt;br&gt;4. Bumping into misplaced materials. &lt;br&gt;5. Cutting hands or other parts of body on sharp materials. &lt;br&gt;6. Fires</td>
</tr>
</tbody>
</table>

Note: A clean and orderly work area is not only a safe area, but will impress superiors with your competent management and efficient workmanship.
Lesson Outline

D. Methods of Preventing Poor Housekeeping Accidents

Lesson Script

1. Plan and layout your work area.
2. Anticipate items that will clutter or otherwise make the work area dangerous such as wax, dust, spillage, etc, and provide for their control:
   a. Receptacles for trash
   b. Drip pans for liquid spills
   c. Container for chips, shavings, etc.
   d. Storage bins
3. Use cabinets and holders which are provided for tools.
Examination

This is a multiple choice examination. Place the proper letter designator for the most correct answer or phrase in the space provided at the left of the question number.

1. Good Housekeeping is:
   a. Cleanliness  
   b. A place for everything  
   c. Everything in its place  
   d. All of the above

2. A place is clean when:
   a. Dust is removed  
   b. Oil is removed  
   c. Free of dirt and oil  
   d. Free from unnecessary things

3. Of the following, which is not an example of an accident caused by poor housekeeping?
   a. Slipping on an oily floor  
   b. Cutting fingers on a saw while working with it.  
   c. Cutting hands or other parts of body on loose scrap material.  
   d. Tool falling on foot from workbench

4. Most oil spillage on floors can be prevented by use of:
   a. Oil cans  
   b. Use of rags  
   c. Trash receptacles  
   d. Drip pans

5. Loss of or damage to tools by falling can be prevented by:
   a. Proper cleaning  
   b. Using them for the proper job  
   c. Returning them to their proper place or container  
   d. Placing them on bench
OCCUPATIONAL SAFETY AND HEALTH
FOR
WORK EXPERIENCE AND O.J.T. PROGRAMS

Lesson Plan #1
Page #1

Examination Key

1. d
2. d
3. b
4. d
5. c
Terminal Objectives: At the conclusion of this lesson plan the students should know the general safety rules covered, be able to apply the general safety rules covered to a given area; and will demonstrate their ability for participating in the construction of safety rules for elevators, ladders, scaffolds, and offices; and by completing with 100% accuracy a 50 question true/false examination on the subject.

Teaching Materials:
1. This lesson plan.
2. Examination #4-2
3. Examination Key #4-2

References:
General Safety Instructions

**Teachers note:** For each block of instruction have class give as many rules as possible - list class rules - add any from lesson script list that they have missed - have each class member make a copy of the list.

<table>
<thead>
<tr>
<th>Block #1 Fire Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inspect all electrical equipment and wiring for proper grounding, signs of wear, cuts, poor connections, etc., before use.</td>
</tr>
<tr>
<td>2. Smoke only in designated smoking areas. (better yet - do not smoke at all).</td>
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<tr>
<td>3. Keep close check on temperature controls of equipment.</td>
</tr>
<tr>
<td>4. Lubricate all friction points on a regular schedule.</td>
</tr>
<tr>
<td>5. Keep open flames away from combustible material and vice-versa.</td>
</tr>
<tr>
<td>6. Control sparks when open burning.</td>
</tr>
<tr>
<td>7. Dispose of oily waste or oil impregnated materials in proper container to prevent spontaneous combustion.</td>
</tr>
<tr>
<td>8. Know the location of fire doors, etc., to be closed in case of fire.</td>
</tr>
<tr>
<td>9. Keep working stock clean and remove foreign materials from equipment to prevent sparking.</td>
</tr>
<tr>
<td>10. Keep combustible liquids and chemicals away from sources of heat, shock, pressure, and other chemicals.</td>
</tr>
<tr>
<td>Lesson Outline</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>11. Use extreme caution when handling molten substances.</td>
</tr>
<tr>
<td>12. Insure grounding of all equipment subject to the building and discharge of static electricity especially in a flammable or explosive environment.</td>
</tr>
<tr>
<td>13. When welding or cutting metals insure that all flammable objects are removed or protected.</td>
</tr>
<tr>
<td>14. Use only sparkproof tools and explosion proof lights and electrical equipment in an environment with a heavy concentration of fumes, dusts, vapors, or gasses.</td>
</tr>
<tr>
<td>15. Use only the proper type of extinguisher and/or agent on fires.</td>
</tr>
<tr>
<td>16. Sound the alarm immediately when fire is discovered.</td>
</tr>
<tr>
<td>17. Do not carry strike matches anywhere.</td>
</tr>
<tr>
<td>18. Unless fire is extremely small and can be extinguished immediately without aid of an extinguishing agent - do not attempt to extinguish until alarm is sounded.</td>
</tr>
<tr>
<td>1. Do not handle manually if a machine or equipment can better do the job.</td>
</tr>
<tr>
<td>2. If lifting and carrying by hand first:</td>
</tr>
<tr>
<td>a. inspect for slivers, jagged edges, burrs, rough or slippery surfaces</td>
</tr>
<tr>
<td>b. wipe off greasy, wet, slippery, or dirty objects</td>
</tr>
<tr>
<td>c. remove oil or grease from hands</td>
</tr>
<tr>
<td>d. remove all trip obstacles in path and insure that there is no spillage to cause slipping.</td>
</tr>
</tbody>
</table>
Lesson Outline

3. To lift an object:
   a. bend legs about 90° at knees
   b. crouch do not squat
   c. bend at the hips
   d. keep back straight
   e. grip object firmly
   f. if grip must be changed set
      object down first
   g. lift by straightening the legs
   h. keep back straight

4. To carry an object:
   a. do not carry a load that you
      cannot see over or around
   b. make sure path is clear
   c. carry close to the body
   d. to change direction use the feet
      do not twist at the waist
   e. keep the back straight
   f. balance the load
   g. if load is too heavy or clumsy
      get help
   h. if two people are carrying balance
      load and keep level
   i. when carrying objects on shoulders,
      use shoulder pads

5. When using hand operated material
   handling equipment:
   a. select the equipment best suited
      to the job
   b. always wear gloves and safety
      shoes
   c. use only two wheeled trucks and
      wheelbarrows which have been
      equipped with handguards
### Lesson Outline

6. **Machine Handling**

- d. keep the center of gravity low
- e. keep feet from under wheels
- f. set brakes or chock wheels when loading
- g. balance, let the truck carry the load
- h. move at safe speed
- i. never walk backwards
- j. equipment should always be pushed - except when going up an incline
- k. secure load
- l. never pull a load with rope, chain, or cable
- m. never move equipment which you cannot see over or around unless a second person is being used as a spotter
- n. store equipment with handles locked in up position
- o. keep hands inside sides of equipment or load when moving
- p. use only jacks that have a capacity rating for the job
- q. do not jack at an angle
- r. do not use extra extenders between jack head and load
- s. always use a piece of wood between jack head and load to prevent slipping and damage to load
- t. always block load before moving underneath it
- u. always wear proper protective equipment when handling hazardous materials

### Lesson Script

- a. Before using, perform walk around inspection to determine condition.
  
  1. check for wear
  2. check for broken or cracked parts
  3. check for lubrication
  4. check for safety guards
  5. check cables, ropes, for fraying or other signs of wear
  6. check water level in batteries
  7. check for unsafe wiring and electrical connections
Lesson Outline

7. Handling of Hazardous Materials

Lesson Script

(8) check tires for proper inflation
(9) check for gas, oil, brake fluid, transmission fluid, and water levels and leaks

b. never operate equipment when an unsafe condition exists
c. never operate equipment when not authorized or trained to operate it
d. never perform service or maintenance on operating equipment - turn it off
e. never operate at high rate of speed
f. check all systems for proper operation
g. do not use if not operating correctly
h. remove all foreign matter before operating

a. observe warnings on labels and markings
b. if uncertain ask your supervisor
c. know and observe warnings
d. wear proper protective equipment

In hazardous environments where safety engineering is not adequate:

a. always wear proper hand protectors - gloves - pads - etc.
b. always wear proper protective clothing - aprons - coveralls - suits - etc.
c. always wear proper foot and leg protectors - safety shoes - steel footguards - chemical resistant shoes - non-conductive shoes - leggings - boots - etc.
d. always wear proper eye and face protectors - spectacles, goggles - shields - hoods - etc.
e. always wear proper hearing protective devices - plugs - muff
Lesson Script

2. Machine Guards

f. always wear proper head protectors - hard hats - safety caps

g. always use proper respiratory equipment - air supplied - air purifying

h. always use proper safety belt when working at heights above ground level

i. if in doubt as to the proper equipment, request instruction from qualified person

j. if in doubt as to how to use equipment, request instruction from qualified person

a. assure that all moving parts are shielded from contact

b. assure that all electric equipment is grounded

c. assure that all electrical contacts are shielded

d. never disable safety or interlocking devices

e. never remove a guard

f. replace guards that have been removed

g. never reach into danger zones

h. clean guards before use

i. do not readjust guard

j. do not start unless guards are in place

k. lock or tag switches when guards are removed for maintenance

l. do not wear loose fitting clothing - necklaces - neckties - etc., while operating a machine

m. report any unguarded equipment to supervisor

Block #4

1. Housekeeping

a. keep work area clean

b. keep work area orderly

c. keep loose objects off of floor
Teacher note: Have students study their safety rules. Have class in a joint effort construct a set of safety rules for ladders and scaffolds elevators and offices.

Teacher Note: The evaluation for this lesson plan may be used as a final examination and could be used as a pre-exam also - comparison of the pre-test and post-test could then be used to evaluate the program.
**Examination**

This is a true/false examination. Place a (√) check mark in the appropriate space provided at the left of the statement.

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>True</strong></td>
<td><strong>False</strong></td>
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OCCUPATIONAL SAFETY AND HEALTH

WORK EXPERIENCE AND J.O.T. PROGRAMS.

Lesson Plan #2

Examination

True  False
T   F   19. The proper method of moving hand trucks, dollies, etc., is to push—except up hill.
T   F   20. If jack is not high enough, use extra wooden extender between jack head and load.
T   F   21. Since time is money in business all material handling should be done as rapidly as you can move.
T   F   22. If material handling equipment has handles, the handles should be stored in the up position.
T   F   23. Most jacks are dangerous, however, it is safe to work under a load supported by a hydraulic jack without blocking.
T   F   24. To operate material handling material one should have proper instruction and direction.
T   F   25. It is permissible to use frayed cables and ropes since they are usually under-rated.
T   F   26. It is O.K., to operate equipment with unsafe conditions as long as they are tagged.
T   F   27. Since maintenance personnel are responsible to maintain equipment, you may assume that it is safe to operate.
T   F   28. Since electricity is dangerous, only a qualified electrician may check for unsafe wiring.
T   F   29. Checking the proper inflation of tires is the users responsibility.
T   F   30. All hazardous materials require special handling.
T   F   31. Safety glasses take the place of goggles.
T   F   32. Hazardous materials are always in special containers, thereby, protective equipment need not be worn.
T   F   33. Asking your supervisor questions about safety is not a good idea.
T   F   34. Wearing gloves causes clumsiness and should not be done when handling materials.
Examination

True False

35. Hard hats, safety caps, etc., are only to be worn by construction workers.  
   T   F

36. Personal protective equipment is a second line of defense and should only be used when engineering cannot eliminate a hazard.  
   T   F

37. Hearing protective devices do not eliminate all noise hazards.  
   T   F

38. All moving parts of machines must be shielded from contact.  
   T   F

39. Modern machinery is constructed so that safety guards are not needed.  
   T   F

40. After equipment is placed in operation safety guards must be adjusted.  
   T   F

41. Interlocking safety devices may safely be disabled once machines are operating.  
   T   F

42. Locking or tagging electrical switches is required when machines are being repaired.  
   T   F

43. If machines have no guards, you may assume that they are so designed and thereby safe to operate.  
   T   F

44. Inspection of your work area for hazards is your employer's responsibility only.  
   T   F

45. Cleaning your work area is the job of janitorial personnel.  
   T   F

46. Tools should not be returned to racks or containers until the end of the day as you might need them again.  
   T   F

47. Wipe up oil spills and empty trash or scrap containers only at the end of your shift.  
   T   F

48. Loose fitting clothing is dangerous and should not be worn when operating machinery.  
   T   F

49. Common sense will tell you when a health hazard exists.  
   T   F

50. Do not report minor injuries as you will be considered an unsafe worker.  
   T   F
Exam Key

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NARRATIVE

Introduce the topic and go over the attached questions in class. Ask that each student complete the form as it applies to his job and return it completed next week.
SAFETY ON THE JOB

1. List possible safety/health hazards of your position at the place you work:

2. Possible ways to avoid or neutralize these hazards/reducing accidents:

3. List safety measures you have learned specifically for your job/equipment you handle:

4. List safety clothing and/or equipment you should use:

5. Are there safety rules for driving company vehicles? If yes, list:

6. Should an accident occur, what is the procedure to be used at your job:

7. Where is first aid equipment, fire extinguisher, fire alarm (draw area and label those items asked for above on reverse side):

8. Who among your coworkers has First Aid training? List:

9. Accidents should be reported to: (Name and position)

10. What are emergency phone numbers to be used at your work:
    Fire________________
    Police______________
    Ambulance__________

**Check these answers with your supervisor, please, and get his signature.

(Signature of Supervisor)
The following transparency masters are numbered at the bottom of each page, to correspond with the block they are designed for. (Example: 1-1 is the first transparency for Block 1).
LESSON TITLE:
What Fire Is, Its Hazards, Sources, and Prevention?
Fire Formula

Oxygen + Heat + Fuel = Fire
Physical Hazards are further broken down into two types:

a. Damage to property

b. Injury
   (1) pain
   (2) blistering or charring of flesh
   (3) possible disfigurement
   (4) possible crippling
   (5) blindness from heat or light of fire
   (6) scorching of lungs and air passaaes
   (7) Asphyxiation
The health hazards are:

a. Oxygen deficiency

b. Toxic fumes, vapors, mists, gases, which are created from increased heating of chemicals liquids, and metals.
23% of all fires are electrical fires
SMOKING (18%)

Smoking cigarettes cause 18% of all fires
FRICTION (10%)

Third leading cause of fire is caused by hot bearings, broken machine parts, etc. resulting in friction heat.
Overheated Materials 8%

Flammable liquids and materials in dryers, etc. is the fourth leading cause of fire.
(LISTINGS OF OTHER CAUSES OF FIRE)

HOT SURFACES--BURNER FLAMES--
COMBUSTION SPARKS--EXPOSURE--
INCENDIARISM--MECHANICAL SPARKS--
ACTION--STATIC SPARKS--LIGHTING
MOLTEN SUBSTANCES--CHEMICAL
Recognition of Classes of Fire--
Controlling Fire-- Extinguishing
Fire-- Steps to Take When You
Discover a Fire.
CLASS "A" FIRES
(Ordinary Solids)

wood

paper

cloth

excelsior

furniture

trash

e tc.
Class "B" Fires
(Liquid)

- Diesel Oil
- Solvents
- Paint
- Oil
- Thinner
Class "C" Fires
(Electrical)
Class "D" Fires
(Metals, Reactive Chemicals)

Very Intense Light

Magnesium
Titanium
etc.
Four Fire Control Methods

1. Cooling

2. Removing Fuel

3. Removing Oxygen

4. Inhibiting the Reaction
Cooling

Fire

Water Absorbs Heat of Fire

Fuel Will Not Burn

High Temp.

Low Temp.
Removing Fuel
Removing Oxygen

Grease Fire

Cover Stopping Oxygen Supply

Wood Fire

Cover With Sand Stopping Oxygen Supply
CLASS A FIRES
USE THESE EXTINGUISHERS
ORDINARY COMBUSTIBLES
• WOOD
• PAPER
• CLOTH ETC.
CLASS B FIRES
USE THESE EXTINGUISHERS
FLAMMABLE LIQUIDS,
GREASE
○ GASOLINE
○ PAINTS
○ OILS, ETC.
CLASS C FIRES

USE THESE
EXTINGUISHERS

ELECTRICAL
EQUIPMENT

• MOTORS
• SWITCHES
  ETC.
<table>
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<th>KIND OF FIRE</th>
<th>APPROVED TYPE OF EXTINGUISHER</th>
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<td>Decide the class of fire you are fighting...</td>
<td>MATCH UP PROPER EXTINGUISHER WITH CLASS OF FIRE</td>
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<tr>
<td>...Then check the columns to the right of that class</td>
<td>FOAM</td>
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<tr>
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<td>Solution of Aluminum Sulphate and Bicarbonate of Soda</td>
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HOW TO OPERATE

**FOAM:** Don't play stream into the burning liquid. Allow foam to fall lightly on fire.

**CARBON DIOXIDE:** Discharge as close to fire as possible. First forward and upward.

**SODA-ACID, GAS CARTRIDGE:** Direct stream at base of flame.

**PUMP TANK:** Place foot on footrest and direct stream at base of flames.

**DRY CHEMICAL:** Direct at the base of the flames. In the case of class A fires, follow up by directing the dry chemicals at remaining material that is burning.
(Manual Handling of Materials)
Muscular strain and physical overexertion.
Pinching or smashing of toes and fingers is painful and sometimes crippling.
Horseplay also causes injuries on the job.
Proper Lifting Method

a. Test weight of item
b. Have good footing
c. Squat with knees in front and slightly apart, back straight, arms extended.

LIFT WITH LEGS
Proper method for moving material at arm level.

a. Test weight of item
b. Lift side of material toward you
c. Slide to edge of support
d. Let legs support the weight
MOVING MATERIALS AT HIGHER THAN HEAD LEVEL---

a. Use assistance of another person

b. Use special handling equipment for heavy material

c. Use ladders with care
NEVER CARRY MATERIALS UP AND DOWN LADDERS--HAND BOXES TO PERSON ON FLOOR
NEVER USE DOUBLE EDGE RAZORS FOR OPENING PAPER CARTONS
OPEN WOODEN BOXES AND CRATES
WITH PROPER TOOLS
EQUIPMENT USED IN MATERIAL HANDLING:

1. Hand Equipment

2. Powered Equipment
a. Rules for safe operation of wheelbarrows.

1. If more than one type is available, select the one best suited for the work to be done.

2. Check its condition for safe operation
   a. handles not cracked
   b. bolts secure
   c. tires inflated properly
   d. handguards in place

3. Place weight of load over wheel

4. Use two steps for starting to move
   a. lift slowly to balance point
   b. accelerate slowly

5. Walk do not run

6. Check path for obstacles

7. Drop it if it gets out of control.
b. Rules for safe operation of two-wheel hand trucks.

1. There are many special purpose types. Some, for example, designed for kegs, drums, and barrels. Select the correct type for the material to hauled.

2. Check for defects

3. Keep center of gravity low as possible (place heavy items on bottom)

4. Don’t overload

5. Balance load laterally

6. Secure the load

7. Push - except uphill

8. Walk don’t run
c. Rules for safe operation of four-wheel handtrucks.

1. Check for defects
2. Block wheels when loading
3. Balance the load
4. Keep load below eye level or use another worker as a safety guide
5. Push-unless pull handle is provided
6. When parked, ensure that pull handle is locked in up position.
d. Rules for safe operation of dollies.

1. Check for defects

2. Move and guide by pushing

3. If item is bulky and heavy use second man for better control
e. Rules for safe operation of jacks.

1. Select a jack that has a capacity as great or greater than the load

2. Check for defects

3. Set on level base

4. Use wooden shim between jack head and load

5. Never jack at an angle

6. Operate jacking handle from the side

7. Operate slowly checking to see that load is secure

8. Block load when lifted, don't depend on jack to hold load up

9. Never work under an unblocked load
LESSON TITLE:
Handling of Hazardous Materials
Materials that present a radiation hazard should be marked with a radiation warning sign.
LABELS FOR BOTTLES

☐ RED    - Flammable materials or extremely dangerous

☐ ORANGE - Dangerous area or energized Equipment

☐ YELLOW - Caution

☐ GREEN  - First aid equipment

☐ BLUE   - Equipment being repaired
Air Contaminates

a. Pneumoconiosis - coats the lungs and interferes with breathing may result in cancer.

b. Poisoning

c. Skin irritations and allergic reactions.

d. Bacterial and fungi infections.

e. Nose and throat irritations.

f. Cancer
LESSON TITLE:
Personal Protective Equipment
Safety Hats are of 2 general types:
Brimless --- Full Brimmed
Hair protective devices are required by those persons with long hair.

Safety Caps
Ear Protection
a. Insert Types
(Ear Plugs)
Ear Protection

b. Ear Muffs
Eye Protection
Goggles
Eye and Face Protection
(Shields and Hoods)
Air Purifying Equipment

a. Make use of mechanical filters to remove particulate matter such as dust, fumes, etc.

b. Use chemical sorbents for removing gases and vapors from air.
Air Supplying Devices--
Supplies fresh air from an outside source.
Hand Protectors
Hand Protectors
Feet and Leg Protectors
Protective Clothing
Wearing safety belts is mandatory when working high above the ground.
Lesson Title:
Machine Guards
Critical Hazards
Three major causes of electrical shock

a. Ungrounded equipment

b. Inadequate guarding of exposed circuitry

c. Inadequate insulation of electrical conductors
Burns are caused by contacting sources of heat

a. Material super heated by friction

b. Overheated electrical systems or devices

c. Flames
Operating Machines Improperly Causes Cuts, Bruises, Pinches and Crushing
Four types of machine guards:
Fixed--Interlocking--Automatic--Tripping
Lesson Title:

Housekeeping
Good Housekeeping
Typical Accidents Due to Poor Housekeeping
Typical Items of Unsafe Housekeeping
Lesson Title:
Review and Evaluation
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