Objective Sheet

Unit Objective

After completing this unit, the student should be able to interpret a material safety data sheet and identify and follow correct shop safety practices. The student should demonstrate these competencies by completing the assignment sheets and job sheets and by scoring a minimum of 100 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to shop safety with their definitions.
2. Select true statements concerning proper safety rules to be practiced in the shop.
3. Complete statements concerning maintaining a safe and orderly shop.
4. List examples of personal protective equipment which might be required in a print shop.
5. Select true statements concerning toxic chemical safety rules.
6. Interpret Hazardous Materials Identification System (HMIS) labels.
7. Complete statements concerning purposes of a material safety data sheet (MSDS).
8. List the five kinds of safety hazards.
9. Select true statements concerning things OSHA expects of an employer.
10. Select true statements concerning things OSHA expects of an employee.
11. Match the colors of the safety color code with their designations.
12. Select true statements concerning the characteristics of lockout/tagout.
13. Label the components of the fire triangle.
14. Match the classes of fires with their descriptions.
15. Match types of fire extinguishers with their uses.
16. Match fire extinguisher symbols with their meanings.
17. List the general guidelines for first aid emergencies.
18. Complete statements concerning bloodborne pathogens and special first aid precautions.

Objective Sheet

19. Complete statements concerning lifting and carrying items safely.
20. Complete statements concerning approved methods of disposing of graphic communications waste materials.
21. Complete a student safety pledge form. (Assignment Sheet 1)
22. Survey the shop and identify correct safety practices. (Assignment Sheet 2)
23. Interpret a material safety data sheet. (Assignment Sheet 3)
24. Draw a floor plan and locate safety equipment in your shop. (Assignment Sheet 4)
25. Operate a fire extinguisher. (Job Sheet 1)
26. Lift a heavy object properly. (Job Sheet 2)

Information Sheet

Objective 1

Terms and definitions

a. **Accident**---Any suddenly occurring, unintentional event which causes personal injury or property damage

b. **Combustibles**—Materials or liquids that catch fire easily

c. **First aid**—Immediate, temporary care given the victim of an accident or sudden illness until the services of a physician can be obtained

d. **Hazard**—A potential source of danger

e. **Material safety data sheet (MSDS)**—Written or printed material concerning a hazardous chemical

f. **Occupational Safety and Health Administration (OSHA)**—Federal agency established to ensure safe and sanitary working conditions for employees

g. **Right-To-Know**—Statutory right of access to every public record of a state or federal agency

h. **Safety**—State or condition of being safe; freedom from danger, risk, or injury

Objective 2

Shop safety rules

a. Conduct yourself in a manner conducive to safe shop practices.

b. **Do not** use any equipment until you understand how to use it.

c. Operate any presses or electrically powered equipment only after obtaining the approval of your instructor.

d. **Never** walk away from equipment that is running.

e. Always keep your hands away from a machine's moving parts.

f. Use the correct tools and equipment when doing a job.

g. Limit the operation of the paper cutter, paper drill, and stitcher to one person at a time.

h. Tie back long hair prior to operating any press or power equipment.

i. Remove ties, scarves, loose clothing, rings and other jewelry before operating any press or power equipment.

j. **Do not** sit or lean on light tables.

k. Avoid touching or looking directly at light sources.

l. Wear eye protection in areas where flying objects and splashing solutions are possible.

m. Wear hearing protection when subjected to continuous loud noise.

n. Wash hands and arms with soap and water frequently to help prevent skin irritation from inks and solvents.

o. **Do not** engage in horseplay, scuffling, or practical joking in the classroom or shop.

p. Use the "buddy system" when working in the graphics laboratory.

Objective 3 **Maintaining a safe and orderly shop**

a. Report any unsafe condition in the shop immediately.

b. Arrange all machinery and equipment to permit safe and efficient operation.

c. Keep materials and supplies safely stacked and stored.

d. Keep all tools and accessories in cabinets or tool racks.

e. Dispose of or store all combustible materials in safe containers.

f. Keep all floors clean and free of debris at all times.

g. Check that adequate housekeeping equipment and cleaning materials are on hand to ensure that maximum cleaning efficiency can be maintained.

h. Participate in daily cleanup periods.

Objective 4 **Personal protective equipment**

a. Safety glasses

b. Earplugs

c. Face shields

d. Steel-toe shoes

e. Protective gloves

Objective 5

Safety rules regarding toxic chemicals

Note: Depending upon the size of the printing plant and the types of waste products generated there, regulations concerning how wastes are to be disposed differ. Many operations recycle paper, trimmings, lithography film, and processing fluids to recover some costs from wastage. Others, in addition to recycling, may be mandated to maintain approved containers for storage of used inks, solvents, and press washdown fluids. In any case, the astute employee will be interested in the employer's policies concerning the disposal of wastes and materials various agencies might label toxic, hazardous, or otherwise worthy of special handling.

a. Work in a well-ventilated area.

b. Wear protective gloves and aprons when handling chemicals.

c. Wear protective splash-proof goggles when working with acids and caustic chemicals.

d. Know the dangers of each chemical.

e. Pour chemical into water, never water into chemical.

   Note: Some chemicals react violently to water or to having water added to them. Pouring the chemical into water ensures a rapid dilution, whereas pouring water into a chemical could cause splashing or boiling.

f. Read container labels carefully before using products.

   Caution: Do not use products that are not labeled.

g. Store chemicals on lower shelves of locked metal cabinets.

   Note: Be sure cabinets are located in an area that meets local, state, and national code.

Objective 6

Hazardous Materials Identification System (HMIS) labels

a. HMIS is a coding system used by the graphics industry to alert workers about potential health or physical hazards that may be created when using certain chemicals. Suggested personal protection devices are also part of the labeling system.

b. The HMIS common labeling system as used by many printing plants consists of identifying hazardous material by using numbers, colors, symbols, and/or letters. The HMIS labeling system specifically identifies four areas which include the following:

- **Health hazard**: Identified by the color **blue** and the letter **H**. The numbers 0–4 are used to indicate the severity of the health hazard as indicated below.

  4H—severe hazard
  3H—serious hazard
  2H—moderate hazard
  1H—slight hazard
  0H—minimal hazard

- **Flammability hazard**: Indicated by the color **red** and the letter **F**. Severity of hazard indicated below.

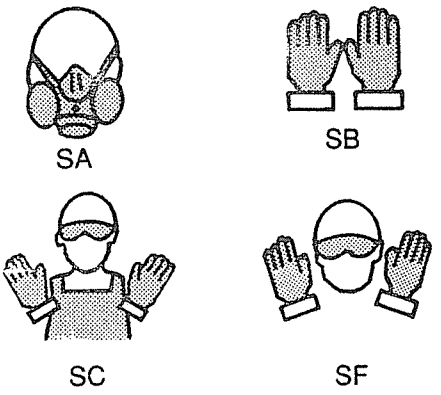
  4F—extremely flammable
  3F—flammable
  2F—combustible
  1F—slightly combustible
  0F—will not burn

- **Reactivity hazard**: Indicated by the color **yellow** and the letter **R**. Severity of hazard indicated below.

  4R—may detonate or explode
  3R—shock or heat may detonate
  2R—violent chemical change
  1R—unstable if heated
  0R—stable

- The fourth section of the HMIS label consists of a combination of alphabetic characters and/or illustrations to recommend personal protection equipment as indicated below.

Figure 1—HMIS Personal Protection Symbols



Objective 7

Purposes of a material safety data sheet (MSDS)

Note: The Federal Occupational Safety and Health Administration, administered by the U.S. Department of Labor, requires employers to keep material safety data sheets on all hazardous substances used by employees. Employees should be aware of their responsibilities and those of their employers concerning access to MSDS information and training.

a. To inform the user of the material's physical properties or fast-acting health effects that make it dangerous to handle

b. To tell the user the level of protective gear needed

c. To tell the user the first aid treatment necessary if exposed to the product or its hazards

d. To tell the management and the user the preplanning needed for safely handling spills, fires, and day-to-day operations with the material

e. To tell the user how to respond to accidents

Objective 8

Kinds of safety hazards

a. Mechanical

b. Fire

c. Chemical

d. Light

e. Noise

Objective 9

Things OSHA expects of an employer

a. Provide a hazard-free workplace and comply with occupational safety and health standards.

b. Inspect job sites to ensure they meet safety standards.

c. Use properly color-coded signs to warn of danger.

d. Obtain a material safety data sheet (MSDS) for each hazardous chemical present in the workplace and make sure any chemical containers are properly labeled and that MSDSs are readily accessible to employees.

e. Formulate and implement a training program for employees that informs them of any and all chemical substances to which they are exposed and trains them in the proper handling of such substances.

f. Keep required records of work-related injuries and post an annual summary in February of each year.

g. Report to OSHA within 48 hours any accident which is fatal or hospitalizes five or more workers.

h. Post in a prominent place OSHA poster #2203 informing workers of their rights and responsibilities.

Objective 10

Things OSHA expects of an employee

a. Read the OSHA poster #2203 and comply with its standards.

b. Follow employer safety and health rules and wear prescribed clothing or protective equipment on the job.

c. Report any hazardous conditions to a supervisor.

d. Report all job-related injuries to a supervisor and seek prompt treatment if required.

e. Report to OSHA in a responsible manner any hazardous working situations which you feel the employer has not attended to properly.

Objective 11

Colors and designations of the safety color code

a. Green—Designates location of safety and first aid equipment

b. Yellow—Designates caution and marks physical hazards

Examples: Operating levers, handles, areas where tripping would be hazardous, waste containers for combustible materials

c. Orange—Designates dangerous parts of equipment which may cut, crush, shock, or otherwise injure

Examples: Electrical switches, fuses, electrical power boxes, movable guards

d. Red—Designates location of firefighting equipment

Examples: Emergency fire exits, fire extinguishers; also emergency stop switches on machinery, portable containers of flammable liquids

e. Ivory—Highlights an area that might otherwise not be noticed

Examples: Edges of tools, vise jaws, label edges

Objective 12

Characteristics of lockout/tagout

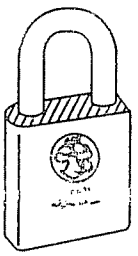
a. Lockout/Tagout is a standard established by the Occupational Safety and Health Administration (OSHA).

b. The purpose of lockout/tagout is to prevent people from being injured while repairing, maintaining, inspecting, and adjusting equipment by controlling all energy sources used, stored, or produced by the equipment.

c. Locking out equipment is the only sure way to prevent serious or fatal injuries that could result from unexpected energizing or start-up of the machine.

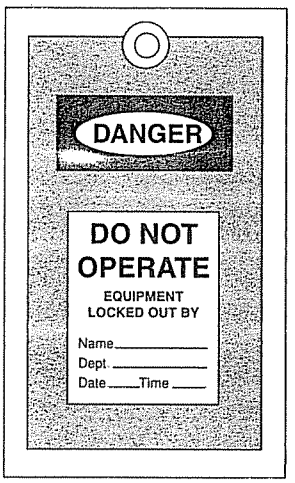
d. Lockout devices utilize a key or combination-type lock to hold an energy-isolating device (such as a manually operated electrical circuit breaker) in the safe position to prevent machine from energizing.

Figure 2—Lockout device



e. Tagout devices are prominent warnings, such as a tag securely attached to an energy-isolating device. When you find a tagged power box, make no attempt to restore the power until repairs are made and the tag is removed by the person who placed it there.

Figure 3—Tagout device

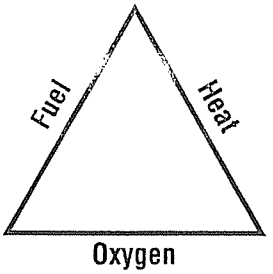


Objective 13

Components of the fire triangle

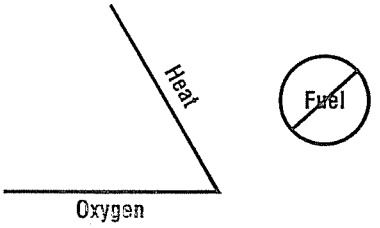
Note: The fire triangle represents the three elements necessary for fire. Combustion can occur only when all three elements are present at the same time and the triangle is complete. A fire will stop if any part of the fire triangle is missing.

Figure 4



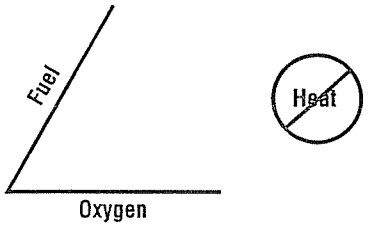
a. Fuel—Any combustible material

Figure 5



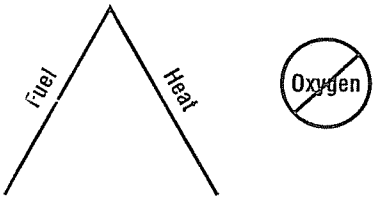
b. Heat—Enough to raise the fuel to its ignition temperature

Figure 6



c. Oxygen—Necessary to sustain combustion

Figure 7



Objective 14

Classes of fires and their descriptions

a. **Class A**—Fires that involve ordinary combustible materials such as wood, rags, paper, and trash

b. **Class B**—Fires that involve flammable liquids such as blanket wash, gasoline, oil, and grease

> **Caution:** Never apply water to a flammable liquid or gas fire; such action can cause the fire to spread.

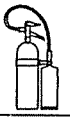
c. **Class C**—Fires that involve electrical or electronic equipment such as motors, switchboards, and electrical wiring

d. **Class D**—Fires that involve combustible metals such as powdered aluminum and magnesium

Information Sheet

Objective 15

Types of fire extinguishers and their uses

Type of Fire	Approved Type of Extinguisher				
	Pressurized Water	Carbon Dioxide	Multi-Purpose Dry Chemical	Halon Gas	Foam
Class A Fires ORDINARY COMBUSTIBLES • Wood • Paper • Cloth, etc.					
Class B Fires FLAMMABLE LIQUIDS, GREASE • Gasoline • Paints • Oils, etc.					
Class C Fires ELECTRICAL EQUIPMENT • Motors • Switches, etc.					
Class D Fires COMBUSTIBLE METALS • Magnesium • Phosphorus • Iron					

a. **Foam**—Spray foam above fire, allowing foam to fall lightly on the fire; use for class A or class B fires.

> **Caution:** Do not spray a stream directly into the fire.

b. **Carbon dioxide (CO_2)**—Direct discharge as close to fire as possible, first at the edge of flames, then gradually forward and upward; use for class B or class C fires.

c. **Pressurized water**—Direct stream at base of fire; use for class A fires only.

d. **Dry chemical**—Direct at the base of the flames, then follow up by directing at remaining materials that are burning; use for all classes of fires.

e. **Halon**—Stand back several feet, hold container upright and direct at the base of fire, sweeping from side to side; use for class B or class C fires.

Note: Halon is a clean, pressurized, liquefied gas which does not leave a residue.

> **Caution:** A high concentration of burned halon gas may be hazardous to your health.

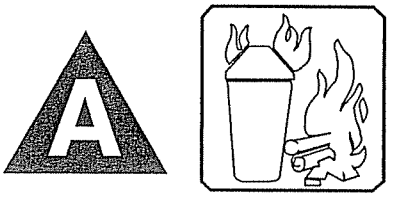
Objective 16

Fire extinguisher symbols and their meanings

Note: All portable fire extinguishers are labeled with picture and shape symbols. Each of the shape symbols contains the letter of the fire class for which the extinguisher is effective. Because speed is important when a fire is discovered, you should be able to glance at the symbols and know immediately whether the extinguisher is appropriate for the fire on hand.

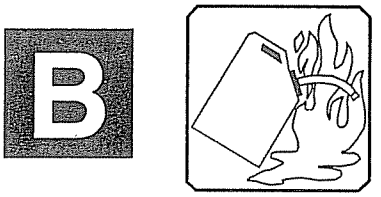
a. Class A—Green triangle

Figure 8



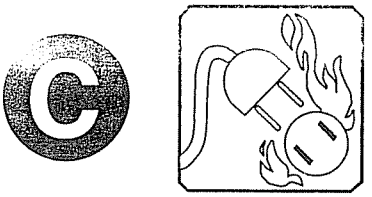
b. Class B—Red square

Figure 9



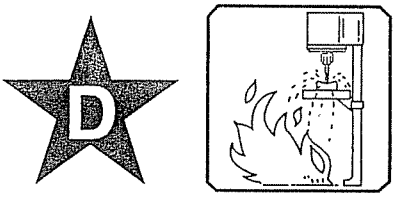
c. Class C—Blue circle

Figure 10



d. Class D—Yellow star

Figure 11



Objective 17

General guidelines for first aid emergencies

a. Turn off power.

b. Administer first aid.

> **Caution:** Be sure you have a valid reason for any first aid you administer.

c. Reassure the injured person that everything possible is being done.

Note: Hearing the concerned voice of a coworker is psychologically comforting to an injured person and may actually lessen the possibility of the onset of shock.

d. Report all accidents and injuries to your instructor or jobsite supervisor, no matter how minor they may seem.

Note: Follow emergency procedures that have been adopted by the local school board.

e. Make accurate notes about the accident including name of victim, time, place, cause or nature of the accident, and any first aid that was administered.

Note: It is the responsibility of the school, the jobsite supervisor, or the medical facility to notify the victim's family.

Objective 18

Bloodborne pathogens and special first aid precautions

a. In any situation involving blood or body fluids, there is a small, but real, risk of infection from very serious bloodborne pathogens.

b. Bloodborne pathogens are disease-causing microorganisms carried in the blood. These include:

- HIV (human immunodeficiency virus), which eventually develops into AIDS (acquired immune deficiency syndrome), a fatal disease, and
- Hepatitis B (HBV), a virus that causes serious and sometimes fatal liver disease.

c. Special precautions must be followed to protect you when giving first aid.

- Treat all victims as if they were infected because you cannot tell by looking at someone if they are infected with HIV or HBV.
- Always wear latex or vinyl rubber gloves as a barrier. These should be included in every first aid kit. If latex gloves are not available, use the most waterproof material available (such as plastic bags) or extra gauze dressings to form a barrier.

- Cover all wounds with dressings to prevent both the victim and the first aider from coming in contact with each other's blood.
- Use face masks with a one-way valve for protection when doing mouth-to-mouth breathing, especially if there is blood in the mouth. Every first aid kit should have one.
- Do not eat, drink, or touch your mouth, nose, or eyes when giving first aid.

d. Special clean-up procedures must also be followed.

- Vigorously wash your skin in hot, soapy water, and rinse well.
- Notify designated personnel in your facility to clean up any materials or surfaces contaminated by blood or body fluids. They will:
  - — Wash all clothing and other items contaminated by blood or body fluids in hot, soapy water.
  - — Wash floors and other blood-contaminated surfaces with a solution of one part liquid chlorine bleach to nine parts of water, and rinse well.
  - — Dispose of cleanup materials properly in plastic biohazard bags. Any sharp materials such as broken glass, razor blades, etc. must be disposed of in a properly labeled puncture-proof container.

Note: If you have other questions, call the national AIDS hot line at 1-800-342-AIDS.

Objective 19

Guidelines for lifting and carrying items safely

a. Before lifting

- Inspect the item to be lifted for jagged edges, splinters, grease, or other slippery surfaces.
- Wear gloves for protection.
- Wear lower back support.

  Example: Leather lower back support belt
- Plan your route before you lift.
- Clear any obstacles from your path.
- Assess the weight of the load.
- Get help for heavy loads.

b. Lifting

- Place your feet as close to the load as possible, one foot alongside the load and the other behind it.
- Bend your knees, keeping your back and neck straight and your chin tucked in.
- Grasp the load firmly with your fingers and hands.
- Draw your arms in close to your body.
- Stand slowly and lift smoothly, using your legs.

c. Carrying

- Hold items close to your body.
- Do not allow load to block your vision.
- Do not change your grip or twist your body to change direction.

  Note: Twisting the back while carrying a load (even a small one) can result in severe back injury.

d. Setting down the load

- Bend your knees.
- Keep your back and neck straight and aligned.
- Place load carefully where you want it, taking care not to allow it to rest on your feet or fingers.

Objective 20

Approved methods of disposing of graphic communications waste materials

a. Chemical solvents and waste ink are the primary wastes associated with the printing process.

b. Typically, printers manually clean the printing equipment with a rag wetted with organic solvents. These solvents normally contain alcohol and low flash points.

c. Dirty rags containing solvents, waste ink, oil, dirt and other contaminants are often sent to commercial laundries. Ink and spent solvents in the towels cause two major concerns for laundries and local sanitary sewer systems handling the laundry's effluent: volatility and flammability which cause laundries to charge the printer additional fees for handling the dirty rags.

d. Some viable pollution measures include using a less volatile solvent and applying solvents sparingly using squeeze bottles or plunger cans

e. Ink recovery machines make on-site reclaiming an option.

f. Solvent recycling companies can also perform the task for printing operations that generate small quantities of ink and solvent wastes.

g. Most of the waste from finishing operations is scrap paper.

h. Scrap or waste paper from printing operations can be recycled into new paper.

i. Printers can send waste paper to commercial paper recyclers.

Note: Often commercial paper recyclers will provide containers and pick up the paper for recycling.