**General Metal Shop Safety**

**Description**

The purpose of this activity is to introduce students to the metal shop environment while giving a brief description of tools, equipment, processes, and safety procedures. Safety is stressed at

all times in a working shop environment, and students are made aware of what safety equipment and procedures are to be followed.

This activity plan has two parts:

1. Teacher-led shop tour
2. Student-completed shop map and question sheet

## Lesson Objectives

* + Familiarize students with the metal shop
  + Review emergency procedures and how they relate to the metal shop environment
  + Introduce students to new tools and equipment
  + Inform students about use and location of all emergency equipment in the shop, including fire extinguishers, power shut-off buttons, fire blankets, first aid kits, emergency exits, and eyewash stations

## Assumptions

The student should:

* + Be attentive and participatory
  + Recognize that appropriate attitudes are the best insurance for safety The teacher should:
  + Be a certified technology education/industrial education teacher
  + Be familiar with the metal shop where this activity plan is being applied
  + Have experience with all aspects of the given metal shop, including machines, tools, and potential processes
  + Be able to introduce individual tool safety when demonstrating tool use
  + Be familiar with the individual school emergency preparedness plans and how to implement them appropriately in the metal shop environment



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## Terminology

**Emergency exit**: a marked exit door used when leaving a building during an emergency

**Eyewash station**: a safety device designed to rinse away debris, particulate, or chemicals from the eye.

**Fire blanket**: a blanket made of fire-retardant material that is placed over the fire to extinguish it.

**Fire extinguisher**: a portable safety device designed to extinguish a fire through the release of extinguishing material. There are several different types of extinguishers, each specific to the type of fire: Class A = wood, trash, and paper; Class B = liquid; Class C = electrical.

**First aid kit**: a container with bandages, gloves, cleaning solutions, and other first aid materials.

**Power shut-off button (emergency stop)**: a bright red switch that shuts off power to all equipment and outlets in the shop.

**SDS**: Safety Data Sheet, also known as *MSDS* (Material Safety Data Sheet). Provides detailed information on the composition, safe handling and storage, and first aid measures for products.

* + - WHMIS: Workplace Hazardous Material Information System

## Estimated Time

30–90 minutes

## Recommended Number of Students

20, based on the *BC Technology Educators’ Best Practices Guide*

## Facilities

Metal shop facility

## Tools

* + - Whiteboard
    - Overhead projector
    - Computer/laptop

## Materials

* + - Blank shop map: prepare a handout and attach to the activity handout
    - Pencil
    - Blank paper
    - Ruler

Textbook and a relevant safety chapter could be mentioned to supplement the lesson.

## Resources

### “HEADS UP! for Safety” handbook

https://[www.bced.gov.bc.ca/irp/resdocs/headsup.pdf](http://www.bced.gov.bc.ca/irp/resdocs/headsup.pdf)

### “BC Technology Education Association Best Practices Guide”

<http://www.bctea.org/best-practice-guide/>

## Assessment

**Please note**: Answers to the question sheet and shop map activity are specific to each shop. A general key is provided; however, the instructor may want to add additional answers. A general assessment guideline is provided below.

Consider co-creating the evaluation criteria with your students at the beginning of the activity/ project. You may want to include the following:

## Shop Map Activity

* + Student actively participated in the tour and discussions.
  + Overall map is neat and organized.
  + Symbols and labels are clear.
  + Map includes ALL necessary safety equipment locations.
  + All fixed pieces of equipment are included and in the correct location.

## Question Sheet

* + All questions are answered in full.
  + Explanations of procedures are clear and correct.
  + Student can clearly articulate where safety equipment is located.

## Optional Extension Activity

Tool mapping: Have students take pictures of tools and equipment and create a labelled document of the shop.

## Teacher-Led Activity

Conduct a shop tour introducing all equipment, tools, and appropriate safety measures, including WHMIS/SDS. Delivery is up to the individual teacher, as not all shops are the same. The information provided in this lesson is general in nature and should be expanded upon by the instructor.

# Student Activities:

**Shop Map and Safety Questions**

## Shop Map Instructions

Use the attached blank template to complete a map of your shop based on what you learned during the shop tour. Include all safety notations and tool and equipment labels.

1. With a pencil and ruler, sketch a birds-eye view of your metal shop classroom.
2. Using symbols of your choice, indicate the following on your map:
   * All fire extinguishers
   * All emergency exits
   * All emergency power shut-off buttons
   * First aid kit
   * Eyewash station
   * Fire blanket
   * Chemical shower
   * Flammables cabinet
   * SDS binder
   * Any other specialized emergency safety equipment
3. Next draw the following on your map. Simple squares would work well and are easy to draw.
   * All work tables
   * Tool cabinets
   * Material storage
   * Parts and equipment storage locations
4. Draw all of the fixed tools and equipment on your map. You may want to use a symbol or a colour-coded legend for this section. Use the following list as a guide to locate the tools in your shop:
   * Abrasive saw
   * Arc welder
   * Bar folder
   * Bead roller
   * Bench grinder
   * Beverly shear
   * Box and pan brake
   * Buffing wheel
   * Cold saw
   * Combination roller
   * Di-acro bender
   * Drill press
   * English wheel
   * Forge/foundry
   * Hossfeld bender
   * Horizontal band saw
   * Lathe
   * MIG welder
   * Milling machine
   * Oxyacetylene torch
   * Pipe bender
   * Plasma cutter
   * Sand blaster
   * Slip roller
   * Spot welder
   * Squaring foot shear
   * TIG welder
   * Vertical band saw
5. Review your map for any other important details or specialized equipment. Some things to include would be waste disposal containers and sinks.

## Shop map

**General Shop Safety Questions**

1. How many emergency shut-off buttons are there in the shop?
2. Where is the flammable storage cabinet located? Give two examples of products that may be stored in it.
3. In case of an earthquake where should you take cover in the metal shop?
4. What are three kinds of approved eye protection in the metal shop?
5. Where should oil-soaked rags/towels be placed when you are done using them? Why?
6. Why is it important to notify the instructor when an accident or injury has occurred?
7. Why is it important to have a clean and organized shop environment? Explain.
8. Explain why, when operating any piece of equipment, it is extremely important to not be under the influence of alcohol or drugs.
9. In case of a fire what is the first step you should take?
10. What is the purpose of a fire blanket? When should it be used?

**General Shop Safety Questions Answer Key**

1. How many emergency shut-off buttons are there in the shop? Site-specific
2. Where is the flammable storage cabinet located? Give two examples of products that may be stored in it.

Site-specific. Two examples: paint thinner, stains, paint

1. In case of an earthquake where should you take cover in the metal shop? Site-specific
2. What are three kinds of approved eye protection in the metal shop? Face shield, goggles, welding mask
3. Where should oil-soaked rags/towels be placed when you are done using them? Why? Should be placed in sealed fire bins, to ensure spontaneous combustion does not occur.
4. Why is it important to notify the instructor when an accident or injury has occurred?

To ensure that the hazard can be removed quickly and the students can receive appropriate medical attention if needed.

1. Why is it important to have a clean and organized shop environment? Explain.

It is important to have a well-organized shop environment, as it helps in the prevention of accidents and injuries. When materials and equipment are stored appropriately it provides a more efficient work environment.

1. Explain why, when operating any piece of equipment, it is extremely important to not be under the influence of alcohol or drugs.

Being under the influence of alcohol or drugs can impede a student’s judgment, and could cause significant injuries to the operator and others in the shop.

1. In case of a fire what is the first step you should take?

Turn off the power and evacuate the building in the safest, most direct way.

1. What is the purpose of a fire blanket? When should it be used?

The purpose of a fire blanket is to extinguish flames on a person. It should be used when a student has caught fire as a result of working in the shop environment.