

Science 9

unit 1: science skills & safety



book 2: safety & equipment in the laboratory

name: _____

block: _____

Prepare For Lab

- ✓ Always use _____ in the lab.
- ✓ Handle chemicals _____.
- ✓ No _____ in the lab!
- ✓ _____ and _____ all directions.
- ✓ Learn _____ procedures.
- ✓ Know where emergency _____ is stored.
- ✓ Push lab stools in out of the way—Keep _____ clear!



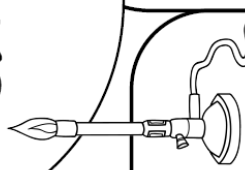
Dress For Lab



- ✓ No shorts, skirts, or _____.
- ✓ Roll up _____.
- ✓ Long hair MUST be _____.
- ✓ No _____ jewelry.
- ✓ Wear _____ goggles, lab coat, or _____.
- ✓ No books, _____, or purses in the lab area.

The Lab Burner

- ✓ Never leave a lit _____ unattended.
- ✓ Use caution when handling heated _____.
- ✓ Do not place hot glassware _____ on the lab desk or in cold _____.
- ✓ Never heat a closed _____.
- ✓ Keep _____ away from open _____.
- ✓ Point the end of a _____ being heated away from yourself and _____!



In Case of Accident



- ✓ Always notify _____.
- ✓ Dispose of broken glass as directed _____.
- ✓ Clean up any spills _____.
- ✓ Report any spills, _____ immediately!
- ✓ For a chemical spill on you skin, _____.
- ✓ For a chemical splash in you eyes _____.
- ✓ In case of a large area of spill _____.
- ✓ **In case of fire:** List 4 items that can be used depending on the size of the fire.

End of Lab

- ✓ Clean and put away all _____ at the end of the lab period.
- ✓ Dispose of _____ according to instruction.
- ✓ Always wash _____ after each lab!

Lab Safety

Handling Chemicals

- ✓ Don't use chemicals that aren't _____.
- ✓ Don't taste anything in the lab unless _____.
- ✓ Smell by _____.
- ✓ No _____ experiments!
- ✓ Always add _____ to water—never add water to _____.
- ✓ Never return spilled or unused _____ to the _____ bottle!
- ✓ Don't touch your face, eyes, or mouth while _____.
- ✓ No food, _____ allowed in the lab.



Laboratory Safety Rules



1. Students are not to enter the lab (*ie: be at lab benches with lab materials*) unless a teacher is present. Students are NEVER to enter the lab prep room.
2. Never run or 'muck around' in the laboratory. During a lab, you **MUST** remain at your own bench.
3. There is no food or drink permitted in the laboratory. *At desks is OK.*
4. Water bottles & bags/backpacks are to be left at your desk during labs.
5. NEVER taste or smell any substance in the lab, unless instructed to do so safely by your teacher.
6. Always listen carefully and follow instructions specifically. If there is anything you don't understand, ask your teacher. It is very important for your safety that you understand all instructions.
7. Always clean up and return equipment to the correct place when finished an experiment.
8. Keep benches and floor areas tidy. This means all chairs must be pushed in when working at the lab benches, and extra books/equipment is never to be placed on the floor.
9. Breaks and accidents (even minor) must always be reported to your teacher immediately.
10. NEVER attempt to pick up broken glass. Inform your teacher, and keep others clear of the area.
11. Laboratory equipment and chemicals are **ONLY** to be used as directed by your teachers' instructions.
12. Waste products/remains from experiments are to be disposed of as instructed by your teacher. Remember, not everything is safe to rinse down the sink, or throw away in the bin.
13. Be sure any burning material (eg. Match) is put out completely before throwing away.
14. All hot equipment is to be placed to a heatproof mat, **NOT** directly on the benchtop.
15. **ALWAYS** wear safety glasses during experiments with hazardous materials or when heating.
16. Long hair and loose clothing must be tied back during experiments.
17. Long pants & closed toed shoes must be worn during experiments
18. **ALWAYS** wash your hands after any experiments in the laboratory.
19. Use gas taps & water for **EXPERIMENTS** only.
20. Bench tops are to be cleaned and disinfected following **EVERY** practical experiment.
21. When heating or mixing substances, **NEVER** point towards yourself or others.
22. Never mix chemicals or do your own experiments unless you have permission from your teacher. This is wasteful, and could be very dangerous.
23. Always rinse/clean glassware following an experiment.
24. Always use tongs to pick up equipment/objects that have been heated
25. If you need to leave a Bunsen Burner, **ALWAYS** turn it to the visible orange/yellow safety flame



Misbehaviour & breach of safety rules in the laboratory will result in immediate consequences, including a ban from participation in any further practical experiments.



Lab Safety Poster Project



Directions: Before you can do any more labs in this class, you need to be aware of the lab safety rules. For this project, you are going to make a poster to illustrate *one safety rule*.

Your poster must include:

- illustration of the lab safety rule
- reason why lab safety rule is important
- Show the consequences of not following the rule

You will have time in class today to brainstorm and start drawing sketches for your poster, but the remainder will be completed for homework.

Have a plan, work hard, and **be sure to follow the rubric below!**

You may tear out this page to hand in this rubric when you hand in your poster!

Safety Poster Rubric

	Novice (1pt)	Apprentice (2pt)	Practitioner (4pts)	Expert (5pts)
Organization and Presentation	<ul style="list-style-type: none"> • Poorly Presented • Unplanned • Thrown Together • Cluttered • Confusing 	<ul style="list-style-type: none"> • Neat • Illustration covers less than 50 % of paper • Needs better use of space 	<ul style="list-style-type: none"> • Attracts attention • Effort is evident • Illustration covers 50 % of paper 	<ul style="list-style-type: none"> • Attracts attention • Poster shows balance between rule and illustration • Well Planned • Good use of space • Illustration covers more than 50% of paper • Shows Care to detail
Statement of Rule	<ul style="list-style-type: none"> • Rule is unclear and or incorrectly stated 	<ul style="list-style-type: none"> • Limited information or not clearly stated • Details not evident or accurate • 	<ul style="list-style-type: none"> • Clearly stated • Sufficient facts and details 	<ul style="list-style-type: none"> • Precise and Thorough • Clearly and accurately stated • All details and key facts included
Illustration Represents Rule	<ul style="list-style-type: none"> • Illustration does not reflect the rule 	<ul style="list-style-type: none"> • Illustration somewhat reflects objective chosen • Lacks detail 	<ul style="list-style-type: none"> • Illustration reflects rule chosen • Matches adequate detail of rule 	<ul style="list-style-type: none"> • Illustration reflects accurately rule • Clearly matches much detail
Use of Color, Texture and Creativity	<ul style="list-style-type: none"> • Limited use of color and texture • Little creative energy • Bland 	<ul style="list-style-type: none"> • Good use of Color • Lacks "Pizzazz" • Contains a few original touches 	<ul style="list-style-type: none"> • Colorful • Draws attention the information • Some originality- take off on other examples • Thoughtfully presented 	<ul style="list-style-type: none"> • Vivid • Well planned use of color and texture • Draws attention the information • Doesn't overwhelm it • Original • Unique • Clever
Errors	3 spelling/grammar errors	2 spelling/grammar errors	1 spelling/grammar errors	No spelling/grammar errors

TOTAL _____/25

Think Safety First Worksheet

Directions: Work with a partner and take turns identifying *what is the potential accident?* and "*What is the prevention action that should be taken?*"

Use this worksheet to record each person's response during the "Think Safety First" game.

1. You are using a microscope to view a wet mount of skin cells.

Accident: _____

Prevention: _____

3. Your lab station is messy, covered with papers and supplies. You need to heat water on a Bunsen burner.

Accident: _____

Prevention: _____

5. While measuring chemicals for a solution, you accidentally spill a large amount.

Accident: _____

Prevention: _____

7. You are using a Bunsen burner to heat a chemical. You need your notebook, which is on the other side of the flame.

Accident: _____

Prevention: _____

2. You wash your hands, and don't dry them. You pick up a beaker to carry it to your lab station.

Accident: _____

Prevention: _____

4. The class before you left a beaker sitting on a hot plate at you lab station. The hot plate is off.

Accident: _____

Prevention: _____

6. You need to measure the mass of a large, heavy rock. You decide to use a spring scale.

Accident: _____

Prevention: _____

8. You discover that the test tube you are using has a crack in it.

Accident: _____

Prevention: _____

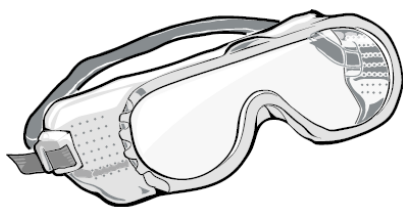
Dress the Part in the Laboratory

A scientist works in a _____. Laboratories are where scientists run most of their _____ and make most of their observations, measurements and discoveries. Your idea of a laboratory is probably a large room equipped with Bunsen burners, sinks, glassware, balances and chemicals and occupied by people in white coats and safety glasses. This is the type of laboratory that chemists tend to work in and the type of laboratory that you will eventually work in at school.

There are several pieces of clothing that have been developed specifically for use in the science laboratory. These pieces of clothing are referred to as _____ (PPE)

You have probably already used protective goggles, a lab apron, and protective gloves while working in the classroom science lab. In this activity you will identify different pieces of protective equipment, and think of situations in which you should use them.

Directions: Below are three pictures of protective equipment for the science lab. First, write the name of each item, then write a scenario in which you would need that protection.



Name: _____
When to Wear: _____



Name: _____
When to Wear: _____







Name: _____
When to Wear: _____

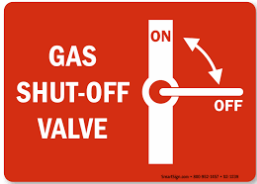




Name: _____
When to Wear: _____

SAFETY EQUIPMENT

- Every laboratory has a number of items “built in” to the facility for use in case of an accident or simply to ensure the safest laboratory operation possible.
- It is **important to** _____ and _____
_____ of each of these items.
- If you think you might need to use any of the equipment in this table for an emergency, don’t hesitate. Call out to inform others of the situation and immediately use the equipment as instructed.
- You **DO NOT HAVE TO ASK TO USE EMERGENCY SAFETY EQUIPMENT!** (*unless it IS NOT an emergency*)

What does It look like?	What is it called?	How do I use it?
		
		
		
		

What does It look like?	What is it called?	How do I use it?
		
		
		

Working with various chemicals...

- If any part of your body comes in contact with a substance _____ and thoroughly with water.
- If you get anything in your eyes, do not touch them. Wash them immediately and continuously for _____ inform your _____.
- Always handle substances carefully. If you are asked to smell a substance, never _____. Hold the container slightly in front of and beneath your nose, and _____.
- _____ thoroughly after doing an activity or an investigation.
- Dispose of materials as directed by your teacher. Never discard materials _____.



ASSIGNMENT #1: SAFETY EQUIPMENT MAP

Question Where is the safety equipment located in your chemistry laboratory?

Procedure Draw an outline map of your science laboratory, including every item from the table above.

It is important to know the location of the fire extinguisher, fume hood, broken glass container, broom and dustpan, fire blanket, first-aid kit, eye wash station, safety shower, goggles and aprons.

Have a look around your classroom:

Can you see/identify where this equipment is located?

In the space below draw a map of the classroom and label where the equipment listed above is located.

Back of Room

A large empty rectangular box with a black border, intended for drawing a map of the classroom.

Front of Room

What is the evacuation route from your classroom in the event of an emergency?

WORKING WITH CHEMICALS: WHMIS











What does WHMIS stand for?

W _____ H _____ M _____ I _____
S _____ (WHMIS) is the Canadian system for communicating information about the safety requirements for working with chemicals.

What is WHMIS?

It is a system for providing health and safety information on hazardous products intended for _____, _____, or _____ in workplaces (including schools).

Safety Symbols

* The GHS system also defines an Environmental hazards group. This group (and its classes) was not adopted in WHMIS 2015. However, you may see the environmental classes listed on labels and Safety Data Sheets (SDSs). Including information about environmental hazards is allowed by WHMIS 2015.

Household Chemical Symbols



The shape of the frame around the hazard symbol tells you what part of the product is dangerous:

If it's a **triangle**, it means the container is _____.

If it's an **octagon**, it means the _____ are dangerous.

SAFETY WITH MATERIALS

A S _____ D _____

S _____ (SDS) must be provided with every chemical purchased in Canada.

These sheets contain hazard information and

_____ associated with each and every chemical. *can also be found online*

This image shows an **excerpt from an SDS** for hydrochloric acid solution. This is only an excerpt.

An actual SDS may contain more than 15 sections, each of which may be quite detailed.



QUICK CHECK-IN









Task: Read over the SDS provided for your material and answer the questions below:








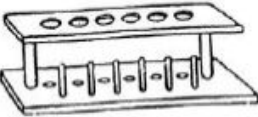
1. What are the purposes of a SDS?
2. What types of materials are required to have a SDS?
3. How is the information on an SDS categorized?
4. What is the name of your material?
5. What are the general hazard categories for this substance?
6. What are four of the chemical and physical properties of your material?
7. What first-aid measures are recommended if one of the following occurs:
inhalation
 - a. inhalation:
 - b. skin contact:
 - c. eye contact:
 - d. ingestion:
8. What precautions are listed for safe handling and storage?

MATERIAL SAFETY DATA SHEET	
1. Product Identification	
<ul style="list-style-type: none">• Hydrochloric Acid• Synonym: Muriatic Acid	
2. Composition/Information on Ingredients	
<ul style="list-style-type: none">• Hydrogen Chloride• Water	<ul style="list-style-type: none">38% by weight62% by weight
3. Hazards Identification	
<ul style="list-style-type: none">• Potential acute health effects<ul style="list-style-type: none">• Skin Contact: Corrosive, irritant, permeation causing itching, reddening, scaling, or blistering• Eye Contact: Corrosive, irritant causing redness, watering, and itching• Inhalation: Irritation of respiratory tract, coughing, choking, or shortness of breath• Potential chronic health effects<ul style="list-style-type: none">• May be toxic to: kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, circulatory system, and teeth	
4. First Aid Measures	
<ul style="list-style-type: none">• Eye contact: Remove contact lenses, rinse with cold water for 15 minutes, get medical attention immediately.• Skin contact: Remove effected clothes, rinse with cold water for 15 minutes, get medical attention immediately.• Inhalation: Remove to fresh air, if breathing is difficult; give oxygen, if not breathing; give artificial respiration.• Ingestion: If swallowed, do not induce vomiting, loosen tight clothing, get medical attention immediately.	
5. Handling and Storage	
<ul style="list-style-type: none">• Storage: Keep container tightly closed in a cool, well-ventilated area.	
6. Stability and Reactivity Data	
<ul style="list-style-type: none">• Is highly reactive with metals.• Reactive with oxidizing agents, organic materials, alkalis and water	

equipment in the lab

Visit the lab stations around the room and look at the lab equipment that is on display to complete the chart below:

PICTURE	NAME	FUNCTION
		
		
		
		
		
		
		
		

PICTURE	NAME	FUNCTION
		
		
		
		
		
		
		
		



ASSIGNMENT #2: Complete the following worksheets to review your lab safety & equipment knowledge. You may write your answers in the space provided.

Lab Equipment Matching

Match the lab equipment with its function. Using the word bank below place the name of the lab equipment below its function.

Graduated cylinder	Funnel	Thermometer	Watch glass
Glass stirring rod	Dropper	Test tube holder	Wash Bottle
Beaker	Test tube rack	Beaker tongs	Safety glasses
Erlenmeyer flask	Test tube	Scoopula	Electronic balance

LAB EQUIPMENT FUNCTIONS

to aid in pouring a liquid from a wide-mouth container into a small opening; to filter substances when filter paper is used

for measuring and pouring liquids; for heating or mixing substances

for lifting hot beakers

for holding one or more test tubes

for measuring and pouring liquids; **not** for heating or mixing

for rinsing or adding water

for moving samples of solid, not used for stirring

for transferring a small amount (drops) of liquid

for measuring weight

for mixing or stirring substances, made of glass to resist heat, stains and corrosion

for holding or covering chemicals; holds chemicals while drying and cover beaker to prevent evaporation

to protect the eyes

for heating or mixing a small amount of chemicals

for measuring and pouring liquids; for heating or mixing substances; shape avoids loss due to splashing

for holding individual test tubes

for measuring temperature

What is wrong with this picture?

There are many unsafe situations in the science lab shown below. In the first column of the chart, identify seven unsafe situations. In the second column, describe an injury that might occur as a result of each situation.



Unsafe situation	Possible injury
1.	
2.	
3.	
4.	
5.	
6.	
7.	

Safety do's and don'ts

Each of the following situations could happen in a science classroom.

Describe the unsafe practices and explain what should be done.

1. You mix two chemicals and notice that a bright yellow gas is produced. You were told to make some observations, so you hold the beaker up close to your face so you can see the gas and smell the fumes.

Unsafe practice: _____

Correct thing to do: _____

2. Your partner's shirt catches on fire while using the Bunsen burner. You tell your partner to stay still while you run to get a cup of water from the sink to put out the fire.

Unsafe practice: _____

Correct thing to do: _____

3. After finishing a lab, you have some chemicals left over. You do not want to waste them, so you carefully pour them back into the container you got them from.

Unsafe practice: _____

Correct thing to do: _____

4. You accidentally spill some water on the classroom floor. You leave it because it is only water and it will quickly evaporate.

Unsafe practice: _____

Correct thing to do: _____

5. You were talking with your partner and did not hear the teacher's instructions on how to do the lab. You figure that it will be okay if you and your partner copy what everybody else is doing.

Unsafe practice: _____

Correct thing to do: _____

6. You need to use some copper (II) sulfate, which is a blue liquid. You go to the shelf and find a flask with blue liquid in it and use that. There is no label on the flask, but it is the only one with a blue liquid in it.




Unsafe practice: _____

Correct thing to do: _____

What is WHMIS?

In the second column, write the name of each WHMIS symbol. Then choose the correct meaning of the symbol from the list below. Write the meaning in the third column.

- ◆ Likely to cause illness or death if ingested or spilled on skin
- ◆ Will readily burst into flame
- ◆ May cause harmful health effects
- ◆ Will corrode substances with which it comes in contact, including human flesh

WHMIS symbol	Name of the symbol	What the symbol means
1. 		
2. 		
3. 		
4. 