

Name: \_\_\_\_\_

Safety in the Science Lab

Why are safety rules important in the lab?

-because the lab is a \_\_\_\_\_

AND

-safety rules ensure that \_\_\_\_\_ and everyone knows what to do if \_\_\_\_\_.

Safety precautions:

1. Never enter the science lab without \_\_\_\_\_
2. Wait for \_\_\_\_\_ before doing any experiments.
3. Never \_\_\_\_\_, \_\_\_\_\_ or \_\_\_\_\_ in the lab.
4. Never \_\_\_\_\_ in the lab.
5. Report any \_\_\_\_\_ to your teacher immediately.
6. When doing experiments -  
\_\_\_\_\_  
\_\_\_\_\_  
Wear \_\_\_\_\_ that cover your feet. Wear \_\_\_\_\_ and \_\_\_\_\_ when using chemicals.
7. Learn how to \_\_\_\_\_ substances in the lab properly.
8. Never pour chemicals \_\_\_\_\_ - check with your teacher for disposal.

9. If any part of your body comes in contact with chemicals -

---

---

---

10. Do not touch any substances before

---

---

11. Know where all \_\_\_\_\_ is located and the nearest

---

Scientific Method  
Science Safety Rules

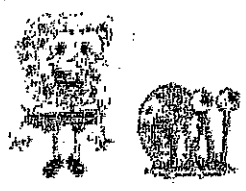
Name \_\_\_\_\_

The Bikini Bottom gang has been learning safety rules during science class. Read the paragraphs below to find the broken safety rules and underline each one. How many can you find?

SpongeBob, Patrick, and Gary were thrilled when Mr. Krabbs gave their teacher a chemistry set! Mr. Krabbs warned them to be careful and reminded them to follow the safety rules they had learned in science class. The teacher passed out the materials and provided each person with an experiment book.



SpongeBob and Gary flipped through the book and decided to test the properties of a mystery substance. Since the teacher did not tell them to wear the safety goggles, they left them on the table. SpongeBob lit the Bunsen burner, then reached across the flame to get a test tube from Gary. In the process, he knocked over a bottle of the mystery substance and a little bit splashed on Gary. SpongeBob poured some of the substance into a test tube and began to heat it. When it started to bubble he looked into the test tube to see what was happening and pointed it towards Gary so he could see. Gary thought it smelled weird so he took a deep whiff of it. He didn't think it smelled poisonous and tasted a little bit of the substance.



They were worried about running out of time, so they left the test tube and materials on the table and moved to a different station to try another experiment.

Patrick didn't want to waste any time reading the directions, so he put on some safety goggles and picked a couple different substances. He tested them with vinegar (a weak acid) to see what would happen even though he didn't have permission to experiment on his own. He noticed that one of the substances did not do anything, but the other one fizzed. He also mixed two substances together to see what would happen, but didn't notice anything. He saw SpongeBob and Gary heating something in a test tube and decided to do that test. He ran over to that station and knocked over a couple bottles that SpongeBob had left open. After cleaning up the spills, he read the directions and found the materials he needed. The only test tube he could find had a small crack in it, but he decided to use it anyway. He lit the Bunsen burner and used tongs to hold the test tube over the flame. He forgot to move his notebook away from the flame and almost caught it on fire.



Before they could do another experiment, the bell rang and they rushed to put everything away. Since they didn't have much time, Patrick didn't clean out his test tube before putting it in the cabinet. SpongeBob noticed that he had a small cut on his finger, but decided he didn't have time to tell the teacher about it. Since they were late, they skipped washing their hands and hurried to the next class.

Lab Safety Equipment

	Purpose (What is it for?)	Location (Where is it in the lab?)
Fire Blanket		
Eye Wash Station		
Fire Alarm		
Chemical Shower		
Fire Extinguisher		
First Aid Kit		

**Science Lab Safety Questions:**

1. What are the proper exiting steps to use in case of a fire alarm? Remember to list ALL of the steps.

---

---

---

---

---

2. List five things that students should do in the lab to remain safe. Use your text book, lab safety section, to help you with your answer.

---

---

---

---

---

---

---

3. What should you do if your eye comes in contact with a harmful chemical?

---

---

---

4. How do you 'smell' a substance in the science lab?

---

---

---

5. How should you heat a liquid that is placed in a test tube?

---

---

---

---

6. After each experiment, what should every student do before they leave?

---

---

---

---

# WHMIS: Workplace Hazardous Materials Information System

## What is WHMIS?

WHMIS helps employees and employers know their rights about safety and health hazards of the materials they use in the workplace. This helps to inform and protect people in their workplace.

### Three main components:

1. **Labels:** These alert the user about possible dangers and precautions that they should take for safe use, handling and storage. These labels must include: product identifier, Hazard symbols, risk phrases, precautionary measures, first aid measures, reference to the material safety data sheet, supplier identification.

### HHPS (Hazardous Household Product Symbols):

Danger

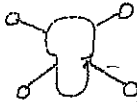
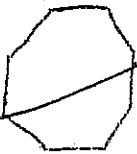
Caution

Warning

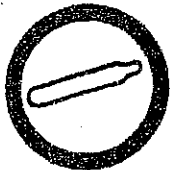
Poison

Flammable

Explosive



### WHMIS Symbols:



Class A -  
Compressed Gas



Class D - Poisonous  
and Infectious Material

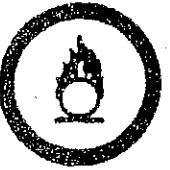
1. Materials Causing  
Immediate and  
Serious Toxic  
Effects



Class B - Flammable  
and Combustible  
Material



2. Materials Causing  
Other Toxic Effects



Class C - Oxidizing  
Material



3. Biohazardous  
Infectious Material



Class E - Corrosive  
Material



Class F -  
Dangerously Reactive  
Material

## 2. MSDS (Materials Safety Data Sheets)

These sheets are prepared by product suppliers to provide detailed information about:

- product information
- reactivity data
- preventive measures
- toxicological properties
- preparation measures
- physical data
- Hazardous ingredients
- physical data
- fire and explosion data

## 3. Education and Training

The employer must inform employees about all hazard information known about controlled products they may encounter in the workplace.

The education should include information about specific products, MSDS. Hazard information about specific products, emergency procedures, procedures for safe handling, storage and disposal of controlled products.

## Summary:

### What is the purpose of WHMIS?

1. Identifies the possible hazards caused by substances that are used at work.
2. Shows workers how to protect themselves against those hazards.


### Where does WHMIS apply?

According to law, this system must be used in all workplaces where hazardous substances are used. This system of information is regulated by the federal government of Canada.

## A Safety Conventions and Symbols

### Safety Conventions in *NELSON Science 10: Concepts and Connections*

When you perform the investigations in *NELSON Science 10: Concepts and Connections*, you will find them challenging, interesting, and safe. However, you should be aware that accidents can happen. In this text, chemicals, equipment, and procedures that require extra caution are highlighted in red

and are preceded either by the appropriate WHMIS (Workplace Hazardous Materials Information System) symbol (Table 1) or by .

Always read cautions carefully and make sure you understand what they mean before you proceed. If you are not sure about anything, ask someone who knows, such as your teacher, a parent, or a classmate.

**Table 1** WHMIS Symbols for Hazardous Materials

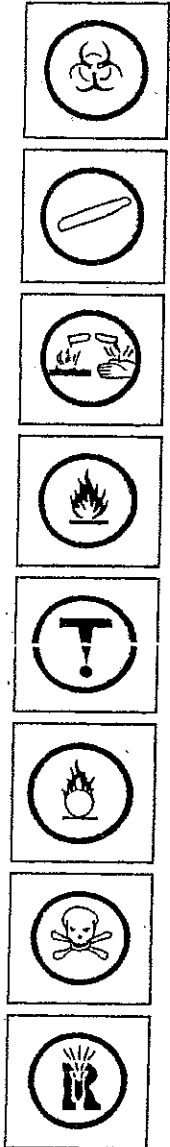
WHMIS symbol	Risks	Precautions
 compressed gas	<ul style="list-style-type: none"> <li>could explode due to pressure</li> <li>could explode if heated or dropped</li> </ul>	<ul style="list-style-type: none"> <li>ensure container is always secured</li> <li>do not drop or allow to fall</li> <li>store in a proper area</li> </ul>
 flammable and combustible material	<ul style="list-style-type: none"> <li>may ignite without warning</li> <li>may release flammable products when exposed to water</li> </ul>	<ul style="list-style-type: none"> <li>work in a well-ventilated area</li> <li>avoid heating</li> <li>avoid sparks and flames</li> <li>store in a proper area</li> </ul>
 oxidizing material	<ul style="list-style-type: none"> <li>may cause skin and eye burns</li> <li>increase fire and explosion hazards</li> <li>may cause combustible material to explode</li> </ul>	<ul style="list-style-type: none"> <li>wear body, hand, face, and eye protection</li> <li>store away from combustible materials</li> <li>store in a proper container</li> </ul>
 poisonous and infectious material causing immediate and serious toxic effects	<ul style="list-style-type: none"> <li>may be fatal if swallowed or inhaled</li> <li>may be absorbed through the skin</li> <li>small amounts are toxic</li> </ul>	<ul style="list-style-type: none"> <li>avoid breathing dust or vapours</li> <li>avoid contact with eyes or skin</li> <li>wear protective clothing, and face and eye protection</li> <li>work in a well-ventilated area and wear breathing protection</li> </ul>
 poisonous and infectious material causing other toxic effects	<ul style="list-style-type: none"> <li>may cause death or permanent injury</li> <li>may cause cancer</li> <li>may cause allergic reactions</li> </ul>	<ul style="list-style-type: none"> <li>use hand, body, face, and eye protection</li> <li>avoid direct contact</li> <li>work in a well-ventilated area</li> <li>store in appropriate area</li> </ul>
 biohazardous infectious material	<ul style="list-style-type: none"> <li>may cause anaphylactic shock (severe allergic reaction)</li> <li>includes viruses, yeasts, moulds, bacteria, and parasites that affect humans</li> <li>includes cellular components (e.g., infected blood plasma)</li> </ul>	<ul style="list-style-type: none"> <li>avoid breathing vapours</li> <li>avoid contamination of people and area</li> <li>work and store in special areas</li> <li>special training is required to handle materials</li> </ul>
 corrosive material	<ul style="list-style-type: none"> <li>cause eye and skin irritation on contact</li> <li>severe burns/tissue damage after long period of contact</li> <li>lung damage if inhaled</li> <li>may cause blindness if splashed in eyes</li> </ul>	<ul style="list-style-type: none"> <li>wear body, hand, face, and eye protection</li> <li>avoid all direct body contact</li> <li>use breathing apparatus</li> <li>work in a well-ventilated area</li> <li>use proper storage containers</li> </ul>
 dangerously reactive material	<ul style="list-style-type: none"> <li>may react with water</li> <li>may explode if exposed to shock or heat</li> <li>may release toxic or flammable vapours</li> <li>may burn unexpectedly</li> </ul>	<ul style="list-style-type: none"> <li>handle with care, avoiding vibration, shocks, and sudden temperature changes</li> <li>store in appropriate, sealed containers</li> </ul>



Name: \_\_\_\_\_

## WHIMIS Symbols

Directions: Match the items on the right with the items on the left.



Toxic, Poisonous and Infectious

Dangerously Reactive

Oxidizing Material

Biohazardous Infectious Material

Compressed Gas

Immediately Poisonous and  
Infectious

Corrosive Material

Flammable and Combustible

# MSDS-Material Safety Data Sheet

What are Material Safety Data Sheets (MSDS)?

A Material Safety Data Sheet (MSDS), is a \_\_\_\_\_ which describes the physical and chemical properties of \_\_\_\_\_.

The MSDS helps people understand the health risks and physical hazards of using a chemical and describes how to respond if a person is exposed to the chemical in a way that could be harmful to the person.

A MSDS should include the following information:

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

# MSDS for Ethanol

Manufacturer ACME Manufacturing, 123 Forest Road, Dallas, Texas, USA 54321

Emergency Telephone Number 1-800-555-1234

Product Name: Ethanol

Chemical Family Alcohol

Use: Laboratory reagent and solvent

## Physical Data

- physical state: liquid
- appearance and odor: colorless, alcohol
- boiling point: 65°C
- freezing point: -94°C

## Fire or Explosion Hazard

- flammability: readily ignited in all conditions
- extinguishing media: water, dry chemical, foam, carbon dioxide
- flash point: 12°C
- combustion products: carbon dioxide, water
- explosion data: not sensitive to mechanical impact, may be ignited by static electricity

## Reactivity

- conditions of instability: normally stable
- incompatibilities: strong oxidizers
- hazardous decomposition products: none

## Health Hazard Data

- routes of entry to body
  - skin contact, possible irritant
  - skin absorption: possible in toxic amounts
  - inhalation: vapour may be inhaled in toxic amounts
  - ingestion: toxic
- LD 50: 5628 mg/kg (oral)
- exposure limits 200 ppm
- effects of acute exposure: irritation, dizziness, nausea, blindness, coma, death
- effects of chronic exposure: dermatitis, impaired vision, may damage heart, kidneys and other organs

## First Aid Measures

- skin: flush contact area with water, remove contaminated clothing, get medical help if large skin area is affected
- eye: flush eyes thoroughly with running water for 15 minutes, get medical help
- inhalation: remove patient to fresh air, apply artificial respiration if breathing as stopped, call physician
- ingestion: give two to three glasses of milk or water to dilute, get medical help, do NOT induce vomiting

## Preventive Measures

- engineering controls: use exhaust or fume hood
- personal protective equipment: rubber gloves, respiratory protection recommended, safety glasses or goggles, coveralls and boots as appropriate
- storage: store tightly closed in a well-ventilated area
- handling procedures: use non-sparking tools around containers during transfer
- spill clean-up: provide ventilation, keep away from open flames, soak up minor spills with absorbent solids
- disposal: burn small amounts of solid absorbed waste

19  
**MATERIAL SAFETY DATA SHEET**

1. What is the product listed on the Material Safety Data Sheet?
2. Would you use this material in hot water? Why or why not?
3. What Material Should not be stored with this material? Why?
4. Is this a valid M.S.D.S Why?
5. How would you describe this material?
6. What types of Personal Protective Equipment would you wear when working around this product?
7. If you splashed this product in your eyes - What First Aid measures would you take?
8. If you swallowed some of this product would you induce vomiting? Why or why not?

# 15

## Commonly Used Lab Equipment

### Beaker

Glass, various sizes — 100ml, 250ml, 500ml etc.  
Used like a measuring cup  
May be heated

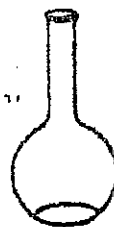


### Flasks

Glass, various sizes and shapes — 50ml, 100ml, 500ml, etc.  
Two types differing in shape  
May be heated



Erlenmeyer



Florence or Volumetric

### Graduated Cylinder

Glass, various sizes — 10ml to 1000ml etc.  
Used to measure volume usually of liquids  
Marked with a scale for accurate measuring



### Test tube

Glass, several sizes  
Can be heated  
Many uses



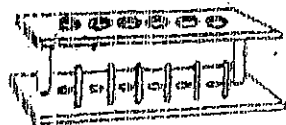
### Test tube clamp

Metal clamp with a spring handle  
Used to hold a test tube



### Test tube rack

Wooden, metal or plastic  
Used to hold test tubes in  
an upright position



Test tube brush

Brush with a long wire handle  
Used to scrub glass apparatus



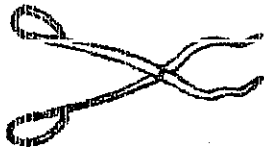
Watch glass

Curved glass often used to cover  
a beaker or for evaporating liquids



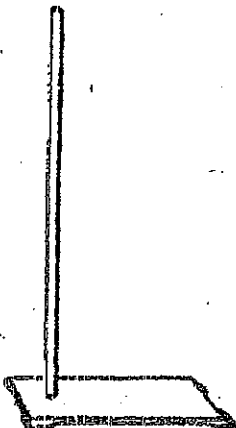
Tongs

Made of metal, may be covered with  
rubber to prevent glassware from slipping  
Used to hold on to hot objects — beakers



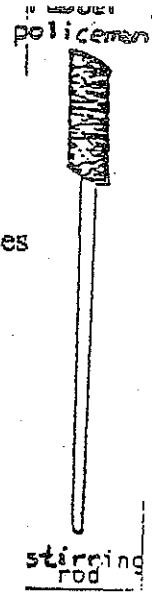
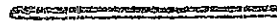
Ring stand

Upright metal rod with heavy base  
A support with many uses



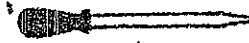
Stirring rod

Long glass rod for mixing substances



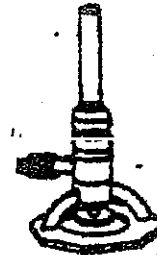
Medicine dropper

Glass with a rubber bulb  
Used to transfer small amounts of  
liquid



Bunsen burner

Metal device connected to gas  
and used as a heat source  
to heat beakers/test tubes etc.



Iron ring

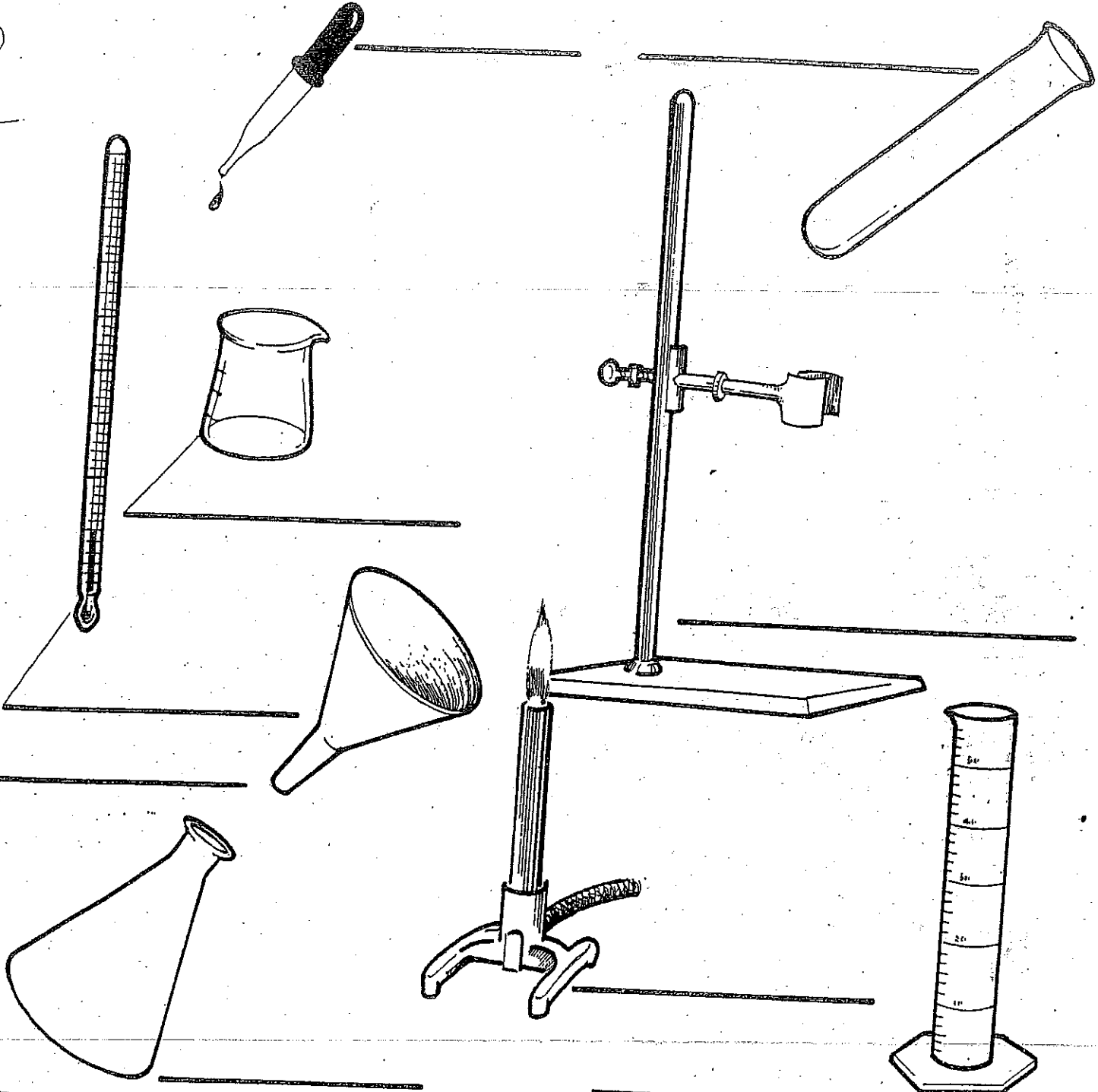
Iron ring with screw fastener  
Many sizes, fastened to the ring  
stand as a support for apparatus



Wire Gauze



17 Scientists use many different kinds of special equipment in a laboratory. Label the equipment below.

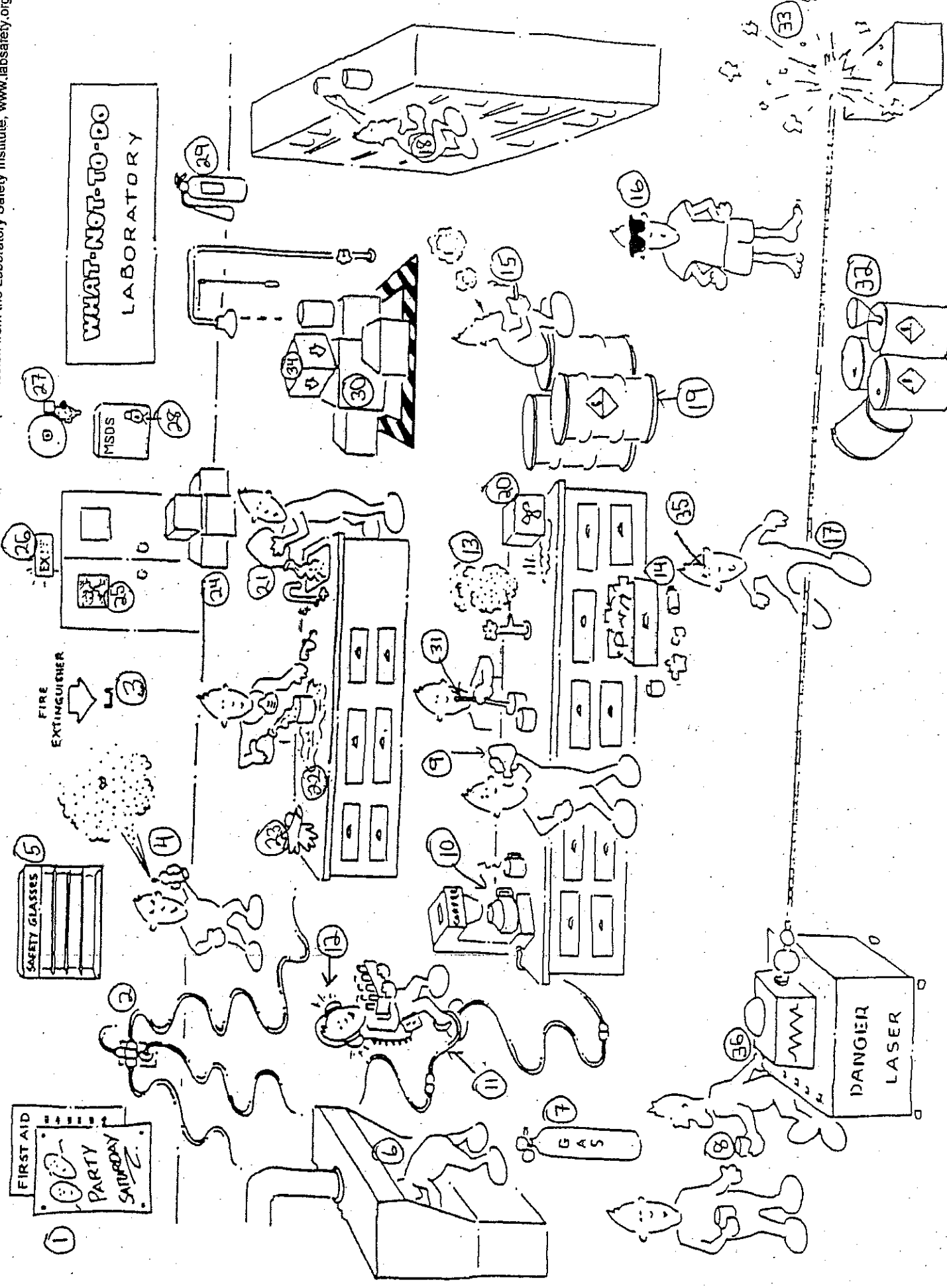


WORD BANK

beaker  
test tube  
thermometer  
Bunsen burner

ringstand  
funnel  
flask-erlenmeyer

graduated cylinder  
dropper



**WHAT-NOT-TO-DO**  
LABORATORY

MSDS

DANGER  
LASER



Name: \_\_\_\_\_

Hour \_\_\_\_\_

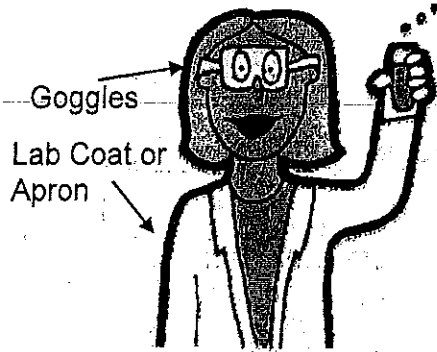
Date: \_\_\_\_\_

What is wrong with each numbered spot in the WHAT-NOT-TO-DO Lab?

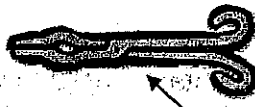
1.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.
15.	16.
17.	18.
19.	20.
21.	22.
23.	24.
25.	26.
27.	28.
29.	30.
31.	32.
33.	34.
35.	36.

# WORKSHEET – Lab Equipment

A number of items you will be using in the laboratory are shown below. Study this page and decide what the items may be used for, then, match the correct equipment pictured on this page to the tasks asked for on the other side of this paper.

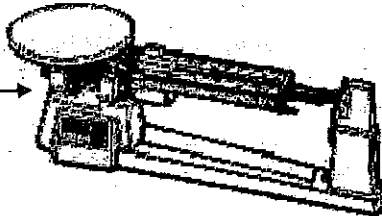


Graduated cylinder

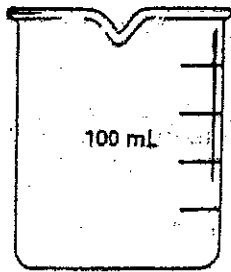


Tongs

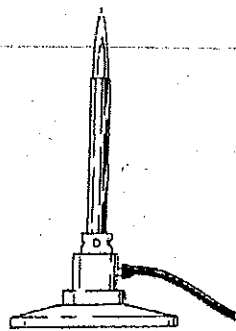
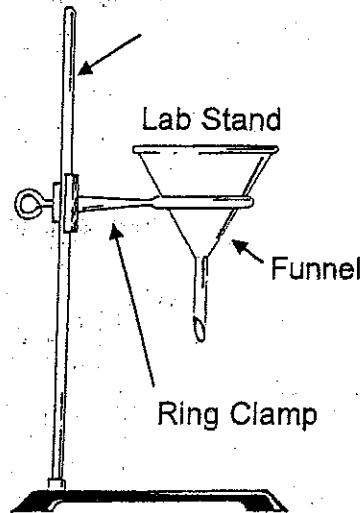
Triple Beam Balance



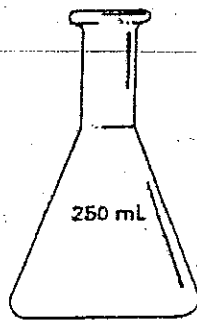
Test Tube



Beaker



Bunsen burner



Erlenmeyer flask



Striker



Eye Dropper

Object Name	Used For
	Used to pick up or hold hot objects
	Protects the eyes from flying objects or chemical splashes
	A wide-mouthed container used to transport, heat or store substances
	A small glass container used to view chemical reactions or to heat small amounts of a substance
	A device to measure the mass or "mass out" and object or substance.
	Protects the scientist and the scientist's clothes from hazardous or hot chemicals
	Used to dispense a very small amount of a liquid
	Used to light a Bunsen burner
	Attaches to a lab stand and used to hold a variety of lab equipment
	Used to measure volume very precisely
	Used to hold a variety of lab equipment
	Used to pour liquids into containers with small openings or to hold filter paper
	Used to heat objects
	A narrow-mouthed container used to transport, heat or store substances, often used when a stopper is required

Name \_\_\_\_\_

# Laboratory Safety

Each drawing below shows some safe lab behavior and some unsafe lab behavior. Identify at least one safe behavior and one unsafe behavior in each drawing.



Safe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Unsafe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Safe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Unsafe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



Safe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Unsafe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



Safe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Unsafe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Safe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Unsafe: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

