Using Scientific Tools Lesson

Objectives
Conduct scientific investigations
Estimate and measure length
Make and explain predictions
Collect, record, and analyze data
Use scientific tools
Apply lab safety rules as they relate to specific science lab activities

Materials
Chart Paper
Markers
Scientific Tools PowerPoint
Pennies
Pipettes
Water
Soap Water
Gummy Worms
Kidney Beans
Cheerios
Rulers (customary/metric)
Paper Towels
Salt Water
Plastic Knives

Engagement
Introduce the team. Begin the PowerPoint. Direct students to their student journal. Give them a few minutes to list any lab equipment they might know on the Lab Equipment List page (2nd page). Have them discuss what they listed with a partner then have a class discussion about their lists. Continue on with the PowerPoint with the most common lab equipment. Be sure to talk about any equipment you may use in the performance of your job.

Say: Today we are going to practice being scientists by using some of the scientific tools that you would find in a laboratory. Now break down into activity groups.

One group will do Who Can Get the Most Drops and the other will do Measuring Worms.

If time permits at the end of the activities students can complete the last 3 pages of the journal, Lab Equipment Worksheet and the lab safety word find. For the Lab Equipment Worksheet they look at the pictures on the first page and try to match it with a description on the second page.

Who Can Get the Most Drops?

Prior to the lesson get the cups of liquids and other materials set up for groups. The liquids are in labeled bottles in the bins. Students can work with a partner to complete this activity.

Explain that they are going to do an activity to see how many drops of water a penny can hold. Read through the journal with them. Complete the hypothesis statement before conducting the experiment. This activity consists of 2 experiments and questions to be completed at the end.

Procedures for experiment 1:

- 1 Penny
- 1 Plastic Pipette
- paper towel
- cup of water

1. Predict how many drops of water each side of a penny holds. Write your prediction in the table below.
2. Take your time and use a pipette to drop water onto the heads side of a penny, one drop at a time. Count each drop as you go. When the water spills over, stop counting and record your results. Do 2 trials for the heads side.
3. Repeat the procedure two more times, but now use the tails side of the penny.

Data Table 1: Number of drops of water that a penny can hold

Side of Penny	***Prediction***	***Trial 1***	***Trial 2***
Heads			
Tails			

Procedures for experiment 2:

Materials:

- 1 Penny
- 3 Plastic Pipette
- Paper towels
- Cup of salt water
- Cup of soapy water

1. Predict how many drops of soap and salt water the **heads** side of a penny holds. Write your prediction in the table below.
2. Take your time and use a pipette to drop soapy water onto the heads side of a penny, one drop at a time. Count each drop as you go. When the water spills over, stop counting and record your results. Do 2 trials for the heads side.
3. Repeat the procedure two more times, but now use the salt water.
4. Record all data in the table below

Data Table 2: Number of drops of regular and soapy water that a penny can hold on the heads side.

Type of Water	Prediction	Trial 1	Trial 2
Soapy Water			
Salt Water			

At the end have students answer the activity questions in their student journal.

Measuring Worms Activity

First have students compare a gummy worm with an earthworm. Hand each student a gummy worm and each pair a picture of the earthworm to help in completing the T-chart on the Describing Worms page of their journal. Students can work together to complete the T-chart. Using chart paper and markers record what the students discuss.

Ask: If you were to create a list of words to describe an earthworm, what words would be on the list? Would the list be the same for a gummy worm? What words would you use to describe the gummy worm? Keep the lists visible in the room.

Students will also draw a picture of their gummy worm on the bottom of this page. Hand out the magnifying glasses for them to use to observe their worms in detail.

Experiment 1 – Measuring Worms
Students will measure their gummy worms using standard and non-standard tools.

Students can work in pairs during this activity. Volunteer needs to model with the students how to properly stretch the gummy worms without breaking them, how to measure the worms, and how to cut them using a plastic knife.

At the end have students answer the activity questions.

Materials:

- Gummy worms
- Kidney beans
- Cheerios
- Ruler (customary and metric)
- Paper towels
- Plastic Knives

Procedures:

1. Take your gummy worm and lay it on your paper towel. Predict how many kidney beans and cheerios it will take to measure your gummy worm. Record your prediction in the table.
2. Now take the kidney beans and cheerios and actually measure the gummy worms using these non-standard tools.

	Prediction	Actual
Kidney Beans		

Cheerios		

3. Now predict how many centimeters and inches long your gummy worm is. Record your prediction in the table.
4. Measure your gummy worm in centimeters and inches using your ruler. Record your data in the table.

	Prediction	Actual
Centimeters		
Inches		

Stretchy Worms

Use your gummy worm to answer the following questions.

1. **Measure your gummy worm in cm.**

   _____ cm

2. **Double the length of your gummy worm.**

   _____cm + _____cm = _____cm

3. **Stretch the worm to double its length. Let it go and measure it again.**
   _____ cm

4. **Did it stay stretched? _____**

5. **How much did it change?**

   _____cm - _____ cm = _____cm

   Original **Stretched** **Difference**

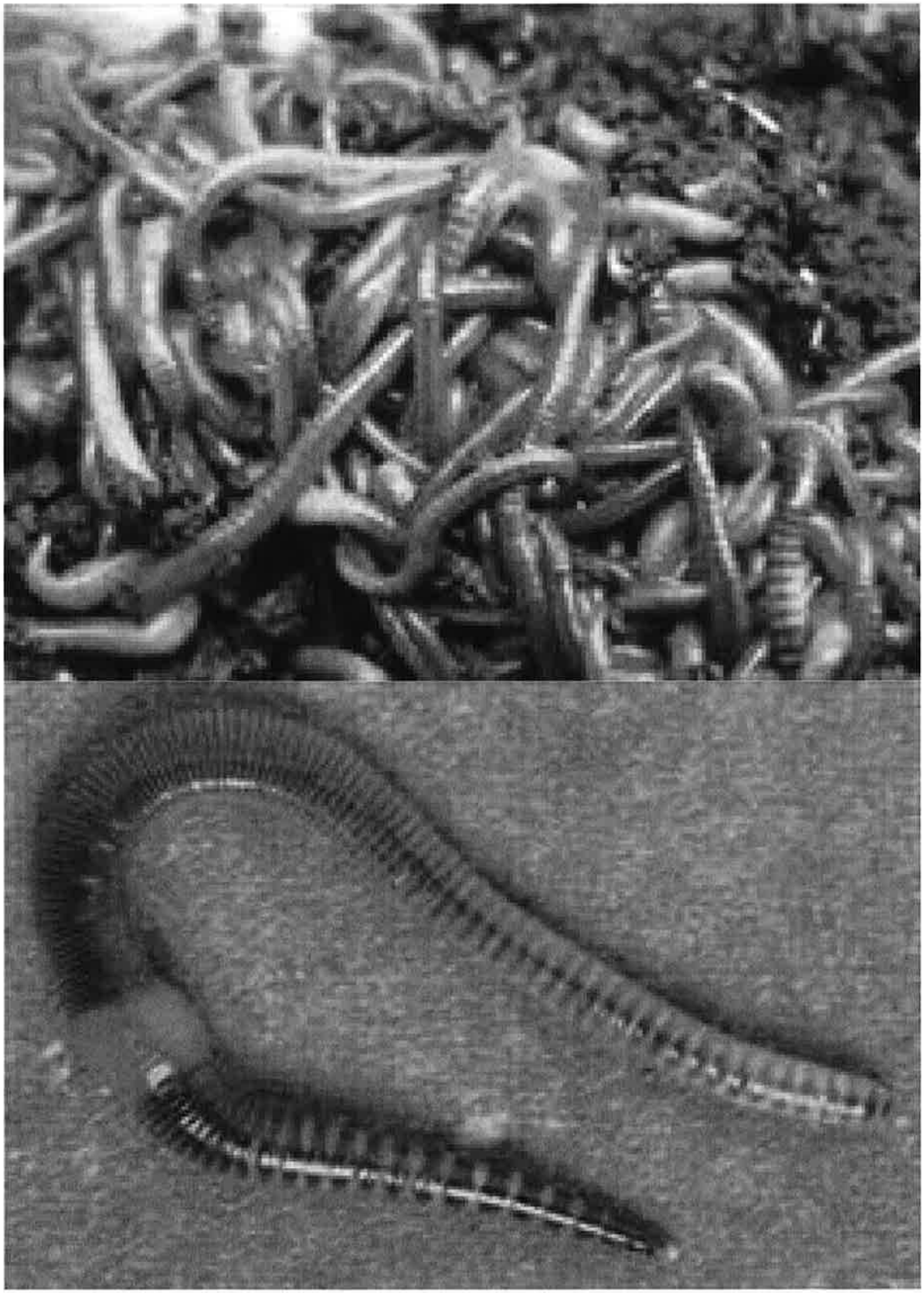
6. **Try and cut your gummy worm in 2 pieces. How long is each piece?**

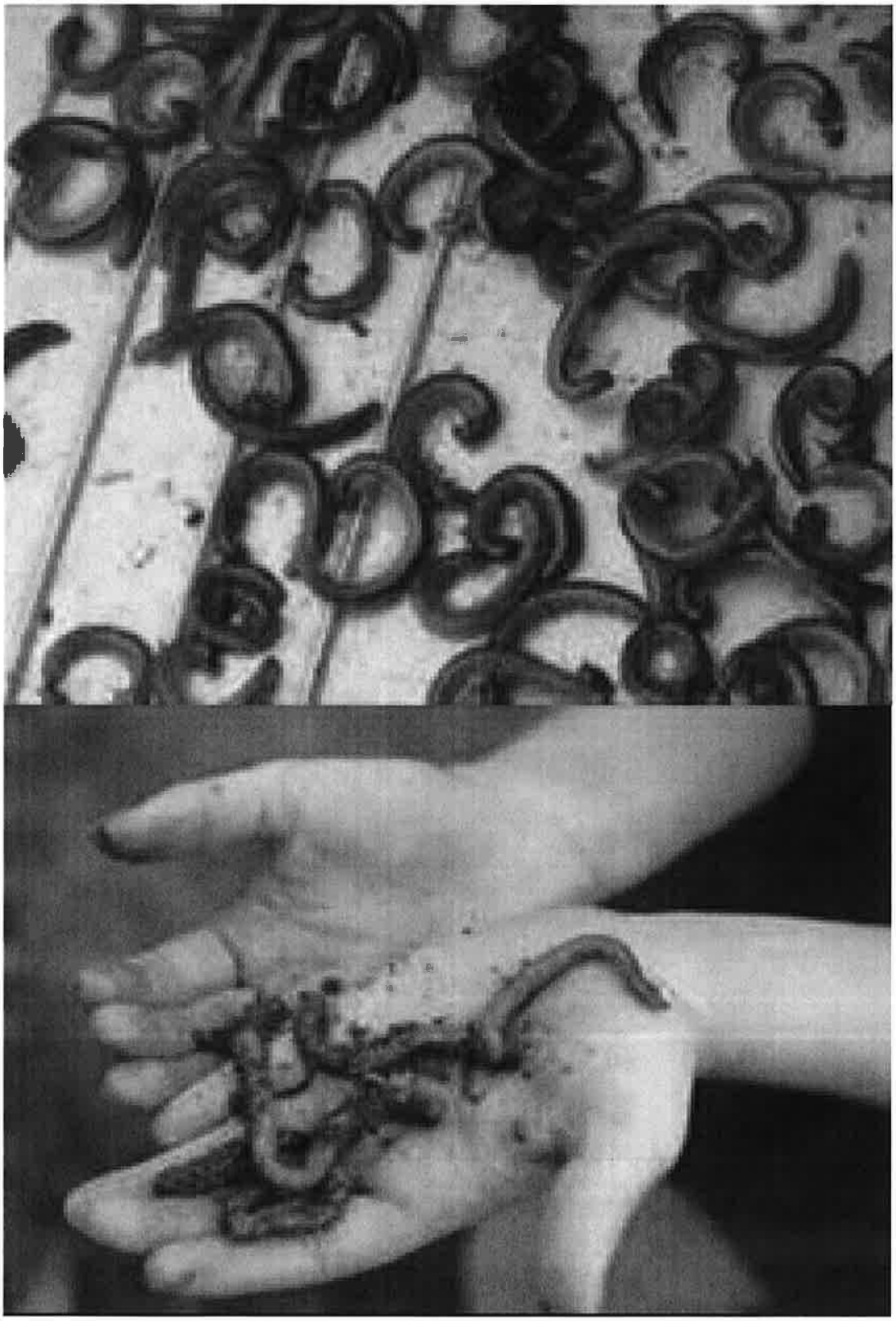
   _____cm _____cm

7. **Are both halves equal?**

8. **What is the difference between the shortest and longest piece?**

   _____cm - _____ cm = _____cm





Science Tools

- To become a successful scientists, we must be able to identify and use scientific instruments or tools.
- These tools are for collecting data, taking measurements, and recording observations.
- Scientists use a variety of tools to do investigations.

SCIENCE TOOLS

Can you name some tools scientist might use

Computer

- An electronic tool that performs tasks by processing and storing information.

Calculators

- An electronic device for solving mathematics problems

Hand Lens

A tool that magnifies objects or makes objects look larger than they are.

Microscope

- A tool that magnifies at a much higher power than a hand lens.
- It magnifies smaller objects or makes smaller objects larger.

Telescope

- A tool used to see objects in the sky.
- It magnifies or makes objects in the sky larger.

Meter Stick

- A meter tool that is used to measure distance and the length of objects.
- It tells how long an object is.
- In science, we use the metric system for measuring.

Thermometer

- A tool used to measure temperature.
- It measures the temperature of air and most liquids.
- The Greek prefix "therm" means "heat".

Stopwatch

- A tool used to measure time.

Balance

- A tool used to measure the mass of an object.
- A balance tells the amount of matter an object contains.

Magnet

A magnet attracts and repels substances.

It is attracted or pulled to items with iron, nickel, or steel.

Collecting Net

- A tool used to gather animal samples or specimens such as butterflies.

Safety Goggles

- Eyewear that protects the eyes during a science experiment or investigation from hazardous or dangerous materials.

Test Tube

- A test tube is smaller than a beaker.
- It is open at one end and closed at the other.
- It is cylindrical in shape.

Beaker

- An open cylindrical container with a pouring lip.
- It measures volume or the amount that is being held.

Graduated Cylinder

Petri Dish

- A container used for samples or specimens.
- A tool to culture microorganisms.

Hot Plate

- A tool used to heat objects.

Lab Coat, Apron and Gloves

- Tools used to protect your body

SECOND GRADE ELEMENTARY OUTREACH PROGRAM (EOP)

Using Scientific Tools

STUDENT JOURNAL

NAME: _____

NATIONAL CANCER INSTITUTE

eop@mail.nih.gov

Lab Equipment List

Who Can Get the Most Drops!?!

Experiment 1

Purpose: How many drops of water can a penny hold? Which side of a penny can hold the most drops of water?

My Hypothesis:
The _____ side will hold the most water because
_____
_____
_____

Vocabulary: Surface Tension – force present within the surface (outer) layer of a liquid that causes the layer to behave as an elastic sheet

Materials:

- 1 Penny
- 1 Plastic Pipette
- paper towel
- cup of water

Procedures:

1. Predict how many drops of water each side of a penny holds. Write your prediction in the table below.
2. Take your time and use a pipette to drop water onto the heads side of a penny, one drop at a time. Count each drop as you go. When the water spills over, stop counting and record your results. Do 2 trials for the heads side.
3. Repeat the procedure two more times, but now use the tails side of the penny.

Data Table 1: Number of drops of water that a penny can hold on the heads and tails side.

Side of Penny	***Prediction***	***Trial 1***	***Trial 2***
Heads			
Tails			

Experiment 2

Purpose: Will the penny hold more drops of salt water or water with soap?

My Hypothesis:
The penny will hold the more _____water because
_____
_____
_____

Materials:

- 1 Penny
- 2 3 Plastic Pipette
- Paper towels
- Cup of salt water
- Cup of soapy water

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Procedures:

1. Predict how many drops of soap and salt water the **heads** side of a penny holds. Write your prediction in the table below.
2. Take your time and use a pipette to drop soapy water onto the heads side of a penny, one drop at a time. Count each drop as you go. When the water spills over, stop counting and record your results. Do 2 trials for the heads side.
3. Repeat the procedure two more times, but now use the salt water.
4. Record all data in the table below

Data Table 2: Number of drops of regular and soapy water that a penny can hold on the heads side.

Type of Water	Prediction	Trial 1	Trial 2
Soapy Water			
Salt Water			

Activity Questions

Which side of the penny could hold more drops of water? Why?

Draw what you observed during the experiment.

What makes the drops of water "stick" together?

Were your predictions correct for both experiments?

Describing Worms

Create a list describing earthworms and gummy worms.

Earthworms	Gummy Worms

Draw a picture of your gummy worm using the magnifying glass. Write words describing your gummy worm.

Measuring Worms

Purpose: To measure objects with non-standard and standard tools

Materials:

- Gummy worms
- Kidney beans
- Cheerios
- Ruler (customary and metric)
- Paper towels
- Magnifying Glasses

Procedures:

1. Take your gummy worm and lay it on your paper towel. Predict how many kidney beans and cheerios it will take to measure your gummy worm. Record your prediction in the table.
2. Now take the kidney beans and cheerios and actually measure the gummy worms using these non-standard tools.

	Prediction	Actual
Kidney Beans		
Cheerios		

3. Now predict how many centimeters and inches long your gummy worm is. Record your prediction in the table.
4. Measure your gummy worm in centimeters and inches using your ruler. Record your data in the table.

	Prediction	Actual
Centimeters		
Inches		

Stretchy Worms

Use your gummy worm to answer the following questions.

1. **Measure your gummy worm in cm.**

   _____ cm

2. **Double the length of your gummy worm.**

   _____cm + _____cm = _____cm

3. **Stretch the worm to double its length. Let it go and measure it again.**
   _____ cm

4. **Did it stay stretched? _____**

5. **How much did it change?**

   _____cm - _____ cm = _____cm

   Original Stretched Difference

6. **Try and cut your gummy worm in 2 pieces. How long is each piece?**

   _____cm _____cm

7. **Are both halves equal?**

8. **What is the difference between the shortest and longest piece?**

   _____cm - _____ cm = _____cm

Activity Questions

What are some similarities between earthworms and gummy worms?

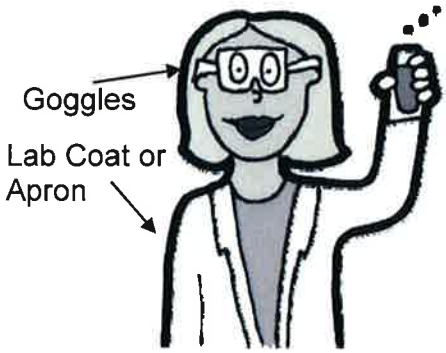
What are some differences between earthworms and gummy worms?

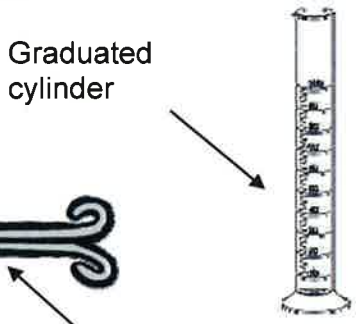
Which tool gives you the best measurement and why?

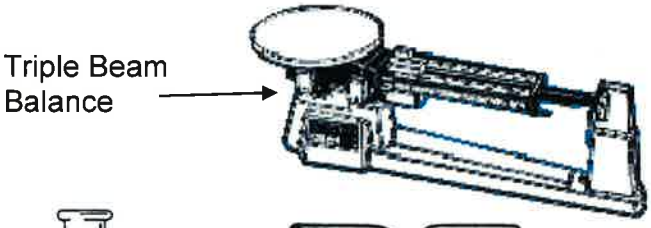
Would you want to measure the length of the classroom with these "tools"? Why? Why not?

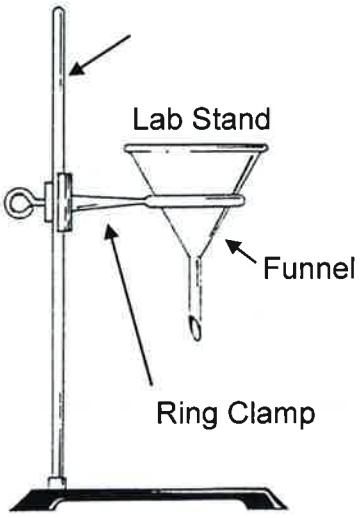
WORKSHEET – Lab Equipment

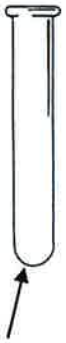
A number of items you will be using in the laboratory are shown below. Study this page and decide what the items may be used for, then, match the correct equipment pictured on this page to the tasks asked for on the other side of this paper.

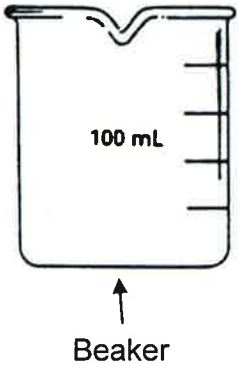


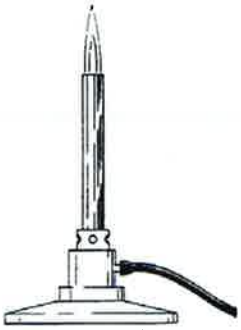


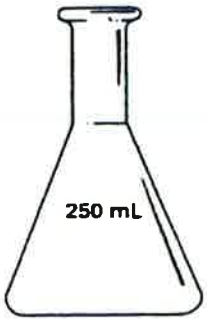


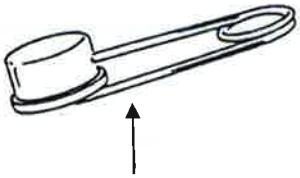






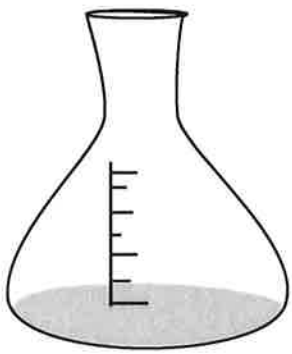






Object Name	Used For
	Used to pick up or hold hot objects
	Protects the eyes from flying objects or chemical splashes
	A wide-mouthed container used to transport, heat or store substances
	A small glass container used to view chemical reactions or to heat small amounts of a substance
	A device to measure 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

Lab Safety



1. Keep your work area clean and clear.
2. Follow your teacher's directions and experiment instructions.
3. Do not touch equipment or chemicals until instructed.
4. Use a waving motion with your hand instead of smelling chemicals directly.
5. Do not eat or drink in the lab.
6. Tie back long hair to avoid accidents.
7. Clean spills as directed immediately.
8. Wear safety goggles, lab coat, and closed-toe shoes.
9. Know where the fire extinguisher, eyewash fountain, fire alarm, and safety shower is located.
10. After working, dispose of materials and chemicals in appropriate containers.

Find the following words below:

autoclave	crucible	gas	lab coat	solution
balance	dropper	gloves	laboratory	stirring rod
beaker	flask	graduated cylinder	microscope	test tube
burner	forceps	gram	milliliters	tongs
centrifuge	funnel	hot plate	petri dish	watch glass

S E V O L G H B W B E A K E R C G
Y R O T A R O B A L F U N N E L R
W M B O V A T F T N Y R P W P J A
M M A R G Z P S C O Z L X Q P U D
I F L A S K L I H I C A N R O K U
L T A T B L A W G T Z B O E R D A
L E N A O G T G L U L C D P D O T
I S C S R N E V A L C O T U A R E
L T E R O N G E S O P A R M S G D
I T T E Y T D S S S U T U A L N C
T U W N E P O C S O R C I M Z I Y
E B L R O O F A E R N D O L P R L
R E G U F I R T N E C M E F S R I
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P E T R I D I S H B O N R X I T D
S A G S A L F O R C E P S R K S E
A M T O V E R F T N Y R P W P J R