

Hands-On Minds-On Science Explorations
Grades 3-5

Measurement, Microscopes and Consumer Product Testing



Hands-On Minds-On Publications

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Name_____ Date_____

NON-STANDARD MEASURE

In this activity you will use animal footprint stamps to see how many prints will equal 6 inches. First, predict how many of each print it will take to reach 6 inches. Next, stamp the prints across the line and count how many it took. Record your data on the data table and graph your results.

animal name	prediction	results
beaver		
gorilla		
bear		
fox		
tiger		
dog		

animal name	Place the stamps across the box below
beaver	

gorilla	
bear	
fox	
tiger	
dog	

GRAPH YOUR RESULTS

Number of steps	15											
	14											
	13											
	12											
	11											
	10											
	9											
	8											
	7											
	6											
	5											
	4											
	3											
	2											
	1											
		beaver		gorilla		bear		fox		dog		tiger

Results: Tell which animal took the most steps to get to the 6 inch mark.

WEIGHING USING BALANCE SCALES

Name _____

Date _____

Use the balance scale to weigh the items on your table. Record the weights on the data table and graph your results.

Problem Statement: Which item on your table will be the heaviest?

Materials: List the items you will weigh here:

Hypothesis: Which item do you predict will be the heaviest?

Procedure:

1. Place an item on one side of the scale.
2. Place gram masses on the other side until the scale is balanced.
3. When the scale is balanced, remove the weights and count them.
4. Record your data on the table below. Graph your results.

Data Table

____ grams	____ grams	____ grams
____ grams	____ grams	____ grams

List the items from lightest to heaviest:

1.	
2.	
3.	
4.	
5.	
6	

Results: Tell which item was the heaviest:

[illegible][illegible]

INVESTIGATING TEMPERATURE

In the activities that follow, you will use the probe or thermometer to test the temperature of certain items. All measurements will be made taken in Celsius. Celsius is a metric unit used to measure temperature. First let's compare a Celsius thermometer to a Fahrenheit thermometer. Fahrenheit is the customary unit used to measure temperature.

Celsius (°C)	item measured	Fahrenheit (°F)
-20°C	temperature in a freezer	0°F
0°C	water freezes	32°F
20°C	room temperature	68°F
30°C	hot summer day	84°F
38°C	normal body temperature	98°F
100°C	boiling water	212°F

Practice using the probe or thermometer to measure the temperature of a glass of water from the tap, the water fountain, and tap water with ice. Place the probe in the glass, record the temperature of each and graph the results.

item	temperature
1. tap water	°C
2. tap water with 5 ice cubes	°C
3. water from fountain	°C

	22					
	21					
	20					
	19					
	18					
	17					
	16					
	15					
	14					
	13					
	12					
	11					
	10					
	9					
	8					
	7					
	6					
	5					
	4					
	3					
	2					
	1					
	0					
		Tap Water		Water Fountain		Ice Water
	Liquid type					

Summarize the data here:

Temperature Graph

Name_____

Date_____

PENDULUMS AND VARIABLES

Background Information: A pendulum is a body that is suspended at a fixed point that swings freely because of the pull of gravity. The weight at the end of a pendulum is called a bob. Pendulums can be used to demonstrate potential and kinetic energy. Potential energy is energy at rest. When the pendulum is held upright and not swinging, it is demonstrating potential energy. Kinetic energy is energy in motion. When the pendulum is released, and is moving back and forth, it is displaying kinetic energy. Variables play an important role in experiments. A variable is anything that is changeable. Changing one variable can change the outcome of an experiment. In trying to measure the number of swings per minute of a pendulum, several variables can be changed. Some variables include the length of the string, the mass of the weight used for the bob, and the angle in which the pendulum is dropped. Changing any of these variables could change the outcome of the experiment.

Problem Statement: Which variable will change the number of swings the pendulum will make in one minute; length of string, mass of the bob, or angle of the drop?

Hypothesis: Which variable(s) do you think will affect the number of swings in one minute?

Materials: pendulum, weights, protractor

Procedure: Testing the mass of the bob

Step 1: Tape the pendulum to the table so that 12 inches are hanging under the table.

Step 2: Place one washer on the bob.

Step 3: Bring the bob to the end of the table.

Step 4: Let go and count the number of swings in one minute.

Step 5: Repeat more time.

Step 6: Repeat steps 1-5 using two and three washers.

Data Table: Mass of the bob:

	trial 1	trial 2
one washer		
two washers		
three washers		

Testing the angle of the drop:

Step 1: Tape the pendulum to the table so that 12 inches are hanging under the table.

Step 2: Place one washer on the bob.

Step 3: Hold the bob at a 180 degree angle.

Step 4: Let go and count the number of swings in one minute.

Step 5: Repeat one more time.

Step 6: Repeat steps 1-5 dropping the string at a 45- and 65-degree angle.

Data Table: Angle of the drop:

	trial 1	trial 2
180 degree angle		
45 degree angle		
65 degree angle		

Testing the length of the string:

Step 1: Tape the pendulum to the table so that 12 inches are hanging under the table.

Step 2: Place one washer on the bob.

Step 3: Hold the bob at a 180 degree angle.

Step 4: Let go and count the number of swings in one minute.

Step 5: Repeat one more time.

Step 6: Repeat steps 1-5 with a string length of 8 and 4 inches.

Data Table: Length of the string

	trial 1	trial 2
12 inch string		
8 inch string		
4 inch string		

Results: (Tell which variable affected the number of swings per minute.)

Conclusion: (Was your hypothesis supported? Why or why not, and what did you learn today?)

Draw the pendulum displaying potential energy (energy at rest).

Draw the pendulum displaying kinetic energy (energy in motion).

NAME _____ DATE _____

USING A PROBE TO MEASURE TEMPERATURE

PROBLEM STATEMENT: How long will it take for the temperature of an arm to return to normal after ice is removed from the arm?

HYPOTHESIS:

MATERIALS: CBL temperature probe or thermometer, ice

PROCEDURE:

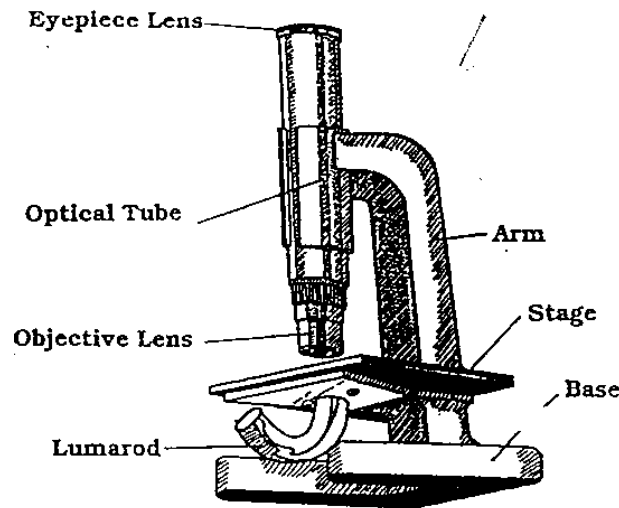
1. Place the probe or thermometer on your forearm and bend it closed. Find the temperature and record it.
2. Hold the ice pack on your arm for two minutes. Remove the ice and find the new temperature.
3. Every 15 seconds, record the temperature on the data Table as the arm warms up.

Temperature of the arm with no ice: _____ Temperature of arm after ice: _____

Time	Temp.	Time	Temp.	Time	Temp.	Time	Temp.
15sec.		30 sec.		45sec.		60sec.	
1min.		1min.		1min.			
15sec.		30sec.		45sec.		2min.	
2min.		2min.		2min.			
15sec.		30sec.		45sec.		3min.	
3min.		3min.		3min.			
15sec.		30sec.		45sec.		4min.	

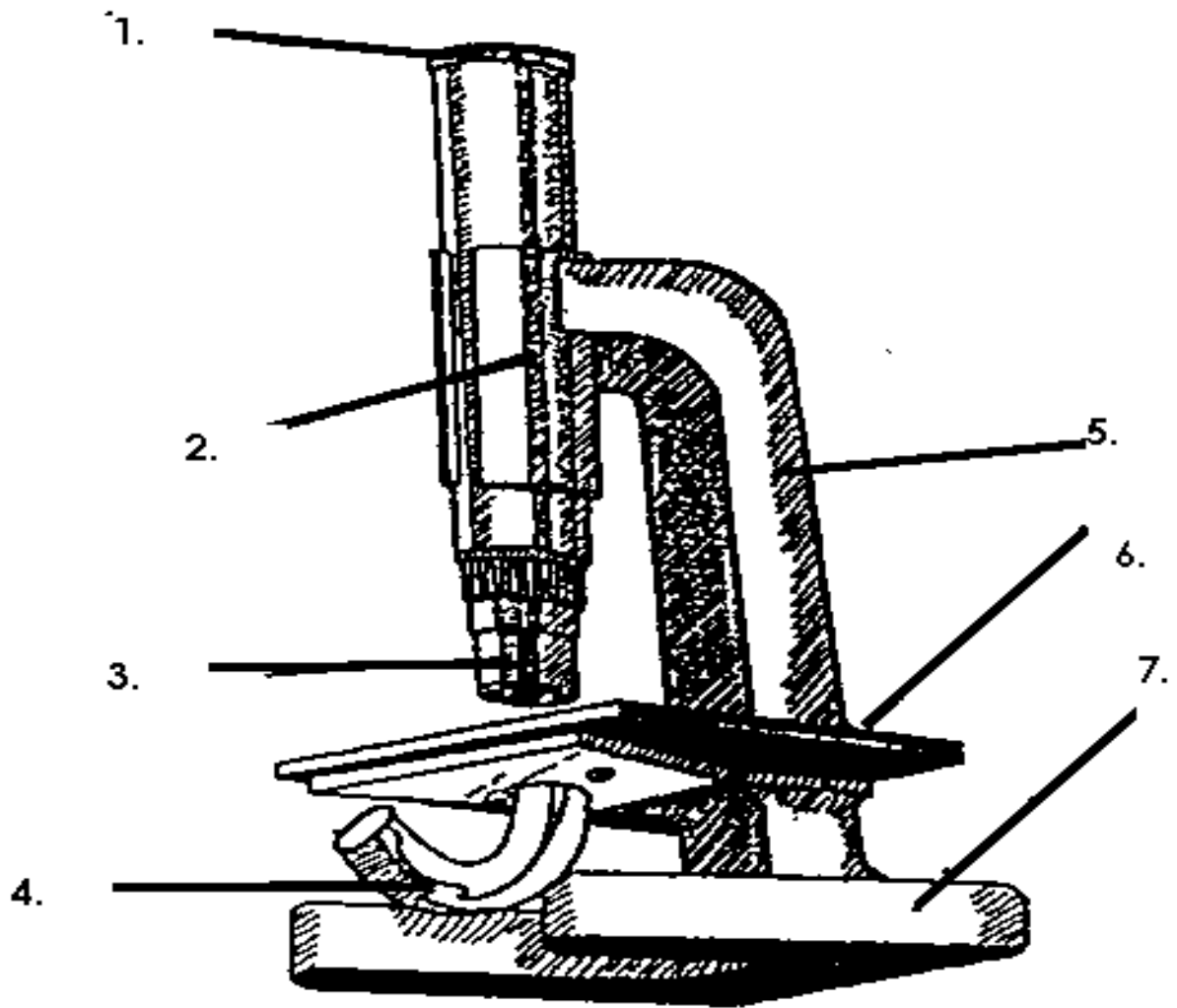
MICROSCOPE STUDY

A microscope is used to view things that cannot be seen with the eye alone. A specimen is what you are viewing; it is placed on a slide. A microscope has several parts. The microscope sits on a **BASE**. The microscope is held by its **ARM**. You place the slide on the flat part of the microscope which is called the **STAGE**. You place your eye on the **EYEPiece LENS** so that you can view the specimen. Light is set to illuminate the slide through the **LUMAROD**. The slide is magnified by the **OBJECTIVE LENS**. Sometimes when you look through the microscope, it may look unclear or blurry. You can focus, or make the slide clear by turning the **OPTICAL TUBE**.



Use the vocabulary words from the paragraph at the top of the page to complete the sentences.

1. You place the slide on the _____ of the microscope.
2. The _____ is what you are viewing.
3. The _____ lets light through the optical tube.
4. You hold the microscope by the _____.
5. The _____ magnifies the slide.
6. You focus the microscope by turning the _____.



Use the words from the word bank to label the parts of the microscope.

ARM
STAGE
OBJECTIVE LENS
LUMAROD
BASE
OPTICAL TUBE
EYEPIECE LENS

NAME _____ DATE _____

MICROSCOPIC PARTICLES

Scientists use microscopes to view things that cannot be seen with the eye alone. Items that are so small you need a microscope to view them are called **microscopic**. Sand, sugar, salt, and iron filings are all microscopic particles. In this lab you will use a microscope to view the particles and try to identify each.

Problem statement: Can you identify the microscopic particles?

PROCEDURE:

1. Use a stick to place a TINY amount of the particle in the deep well slide.
2. Place the slide on the stage of the microscope.
3. Focus the microscope and view the slide, draw it in the space below.
4. After viewing the slide, predict what the particle was that you were looking at.

item #1	Item #2	item #3	item #4
prediction:	prediction:	prediction:	prediction:
results:	results:	results:	results:

How many items supported your hypothesis?

For homework, pretend that you drank magic shrinking juice and you woke up the next morning as a microscopic person. Tell about the adventure you had from the time you woke up to the time you went to sleep.

Name _____ Date _____

CONSUMER PRODUCT TESTING: DISH SOAP

Problem Statement: Which brand of dish soap will produce the largest bubbles?

Hypothesis:

Materials: 4 brands of dish soap, water, corn syrup, straws, plastic garbage bags, ruler or tape measure

Procedure:

1. Cover the table with a garbage bag.
2. Mix equal amounts of water, corn syrup, and soap in a container.
3. Use a straw to place a small amount of the mixture on the garbage bag in front of you.
4. Mix the mixture with the straw until you see tiny bubbles.
5. Place your straw in the bubbles and gently blow to make a bigger bubble.
6. When the bubble pops, measure how many centimeters wide the soap stain was on the garbage bag.
7. Record all the soap measurements on the data sheet and find the average size.
8. Repeat steps 2-7 for each color.

Data Table:

soap color	brand name	trial 1	trial 2	trial 3	trial 4	total	÷	avg.
							4	
							4	
							4	
							4	

Results:

Conclusion:

Application: Why is important to know which one made the biggest bubbles?

NAME _____

DATE _____

CONSUMER PRODUCT TESTING: PAPER TOWELS

Advertisers use tricks to get consumers to buy their products. They depend on the power of persuasion to make you think their brand is the best. Sometimes they are not truthful when they claim their product is "THE BEST". One way to test products is scientifically. In this activity, you will test paper towels using the scientific method to find out which one is REALLY the strongest.

PROBLEM STATEMENT: Which brand of paper towels will be the strongest?

HYPOTHESIS:

MATERIALS: 4 brands of paper towels, water, washers or other weighted item,

Graduated cylinder, syringe (Each washer weighs 5 grams)

PROCEDURE:

1. Have two students hold the ends of a paper towel, holding all four corners. Hold the paper towel tightly.
2. Another student should pour 50 ml of water on the center of the paper towel.
3. Stack one washer at a time on the center of the paper towel.
4. Record how many washers the paper towel held before breaking.
5. Repeat steps 1-4 with each brand of paper towel.

VARIABLES	CONTROLS

DATA TABLE:

	Brand name	Trial 1 (# of washers X 5 grams=total grams)	Trial 2 (# of washers X 5 grams=total grams)	Total	. - .	average
1		___ x ___ = ___	___ x ___ = ___		2	
2		___ x ___ = ___	___ x ___ = ___		2	
3		___ x ___ = ___	___ x ___ = ___		2	
4		___ x ___ = ___	___ x ___ = ___		2	

Graph Your Results

grams	95						
	90						
	85						
	80						
	75						
	70						
	65						
	60						
	55						
	50						
	45						
	40						
	35						
	30						
	25						
	20						
	15						
	10						
	5						
	0						
		Brand 1		Brand 2		Brand 3	Brand 4

Paper towel

brand

Results: Summarize your data

Conclusion:

Application:

NAME _____

DATE _____

CONSUMER PRODUCT TESTING: THE TOOTHPASTE TEST

Advertisers use tricks to get consumers to buy their products. They depend on the power of persuasion to make you think their brand is the best. Sometimes they are not truthful when they claim their product is "THE BEST". One way to test products is scientifically. In this activity, you will test toothpaste using the scientific method to find out which one REALLY cleans teeth better.

PROBLEM STATEMENT: Which brand of toothpaste will clean the best?

HYPOTHESIS:

MATERIALS: 4 brands of toothpaste, 4 toothbrushes, eggs stained with blueberry pie filling

PROCEDURE:

1. Place eggs in a bowl with blueberry pie filling and leave overnight.
2. Rinse the eggs and dry them.
3. Put toothpaste brand one on the toothbrush.
4. Brush back and forth 5 times.
5. Repeat with the other brands of toothpaste. Be sure to use the same amount of toothpaste, brush the same amount of times, and use the same force.
6. Repeat for a second trial with a new egg and compare the results the second time.

List the variables and controls used in this experiment. Remember, variables change and controls are something that stays exactly the same in the experiment to ensure a fair test.

VARIABLES	CONTROLS

--	--

DATA TABLE: Using a scale of 1 to 5, 1 being the cleanest and 5 being the most stained, rate how each toothpaste cleaned the stains from the eggs.

	Brand name	Trial 1	Trial 2	Total	average
1					
2					
3					
4					

Results: Summarize your results using the data table. Tell how each one scored. Be sure to tell which one cleaned the best and which did the worst.

Conclusion: Was your hypothesis supported?

Application: Why is it important to know which toothpaste cleans stains better?
