

**Directions: Fill in each blank with the correct word from the list. Not all words from the list will be used, and some may be used more than once.**

1. \_\_\_\_\_ is a way to describe matter with numbers and units.
2. \_\_\_\_\_ is the name of the system of measurement used by scientists around the world to measure matter.
3. The meter is the basic SI unit used to measure the \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ of objects and the \_\_\_\_\_ between objects.
4. The S.I. unit for weight is the \_\_\_\_\_.
5. \_\_\_\_\_ is the amount of space matter takes up.
6. \_\_\_\_\_ is the amount of matter per unit of volume.
7. Cotton balls have a \_\_\_\_\_ density, while lead has a \_\_\_\_\_ density.
8. Containers called \_\_\_\_\_ and \_\_\_\_\_ are often used by scientists to measure liquid.
9. \_\_\_\_\_ is a measure of heat, or average thermal energy of matter.
10. In the metric system, temperature is measured in degrees \_\_\_\_\_; in S.I., temperature is measured in \_\_\_\_\_.

beakers

density

newtons

measuring

temperature

length, width, height

Celsius

Fahrenheit

high

meter

volume

Kelvin

gases

distance

metric

S.I.

centimeter

grams

low

milliliter

graduated cylinders

# VOCABULARY

Directions: Match each vocabulary word to its definition.

1. Celsius _____	a. unit of measurement used on metric rulers and meter sticks - 100 to one meter
2. cubic centimeter _____	b. system of measurement used by scientists throughout the world to measure matter
3. density _____	c. the way to describe the characteristics of matter with numbers and units.
4. liter _____	d. unit in the metric system used for measuring the volume of liquids
5. measurement _____	f. one centimeter high by one centimeter long by one centimeter wide
6. volume _____	g. amount of space matter takes up
7. milliliter _____	h. amount of matter per unit of volume
8. centimeter _____	i. smaller SI unit used for measuring the volume of liquids, equal to 1/1000 <sup>th</sup> of a liter.
9. S.I. _____	j. S.I. unit of measure heat or thermal energy of matter
10. Kelvin _____	k. metric system unit of measure for heat or thermal energy of matter

**Part 1. Directions: Scientists must use a standard measurement system to accurately record observations and communicate their conclusions to other scientists. In everyday life, we normally use the “English” system of measurement, such as foot, mile, pound, etc. In the table below, write the SI unit for each measurement, its symbol or abbreviation, and an English unit we commonly use for each measurement.**

Measurement	Base Unit	Symbol	Common Unit
Length, Width, Height, Distance			
Volume			
Mass			
Weight			
Temperature			
Time			
Speed			

**Part 2 Directions: Write the standard SI prefix for each multiple/fraction.**

Multiple	Prefix
x 1000	k_____
x 100	h_____
x 10	d_____
Base unit (meter, gram, etc.)	(base unit)
x 0.1	d_____
x 0.01	c_____
x 0.001	m_____

**Part 3 Directions: Convert the following measurements.**

1. 2 kilograms = \_\_\_\_\_ grams
2. 8 liters = \_\_\_\_\_ milliliters
3. 6 kilograms = \_\_\_\_\_ grams
4. 400 centimeters = \_\_\_\_\_ meters
5. 70000 grams = \_\_\_\_\_ kilograms
6. 1000 milliliters = \_\_\_\_\_ liter
7. 5000 meters = \_\_\_\_\_ kilometers
8. 2 meters = \_\_\_\_\_ centimeters

**Directions: With your team, perform measurements and calculations, and record using the appropriate SI units.**

### **Length, Width, Height and Distance**

1. What is the SI unit for length, width, height and distance?
2. Use one of the available measurement tools to measure:
  - a. the length, width and height (from floor) of the table
  - b. the dimensions of one floor tile
  - c. the thickness of 20 pages of your textbook
  - d. the length, width, and depth of the blocks at the station.
  - e. your height.
3. Use one of your measurements to calculate the distance from the door to the front of the classroom.
4. Use your calculation from the last question and the school map to estimate the length of this building.
5. Estimate the distance between your home and school.

Challenge: How many kilometers thick are 20 pages of your textbook? Why would kilometers not be the best unit to use for this measurement?

### **Volume of Liquids**

1. What is the definition of volume?
2. Why do we have two S.I. units for volume?
3. Use a beaker to measure 0.5 liters of water.
4. Using a graduated cylinder, measure 20ml of water.
5. How many milliliters are in 1 liter?
7. What's the name of the curve at the top of the liquid in the graduated cylinder?
8. Which part of that curve do you use to measure liquid volume, bottom or top?
9. How many milliliters are in a 2-liter bottle of soda?

Challenge: How many cubic centimeters are in 500 milliliters?

## **Weight**

1. How is weight different from mass?
2. What is the SI unit for weight?
3. Use a spring scale to measure the weight of the five objects at the station.
4. Measure your weight using the floor scale. Convert that measurement to Newtons.

Challenge: What would your weight be if you were standing on the moon? On Jupiter (if it had a surface to stand on)?

## **Mass**

1. What is the SI unit for mass?
2. Use the 3-beam balance to measure the mass of the five objects at the station.
3. Measure your mass using the floor scale.

Challenge: Imagine you were on the moon performing these measurements. Would they change? Why or why not?

## **Volume of Solids**

1. What is the SI unit for volume of solids?
2. Calculate the volume of the blocks you measured in station 1.
3. Try to measure the dimensions and calculate the volume of the rock at the station.
4. Use the water displacement method to measure the volume of the rock.
5. Which way do you think is more accurate to measure the volume of the rock?
6. Use the water displacement method to measure the piece of Styrofoam at the station.
  - a. Do you think your measurement is accurate?
  - b. Why or why not?
  - c. If not, how can you make it an accurate measurement?
7. Mold a piece of modeling clay into 1cm x 1cm x 1cm cube. What is its volume?
8. Make a paper cube measuring 10cm x 10cm x 10cm. What is its volume?
9. How many of your clay cubes could fit inside the paper cube?

Challenge: Find the volume of the cylinder at the station. How many pieces of candy could fit in the cylinder if each piece is 2 cubic centimeters?

## **Density**

1. What is the definition of density?
2. What are the SI units for density? Why are there more than one?
3. Find the density of the objects at the station.
4. What's different about finding an object's density than finding its mass, volume, or weight?

Challenge: What does the size or volume of an object tell you about its density?

## **Temperature**

1. What is the SI unit for temperature?
2. Measure the temperature of the items at the station using the thermometers.
3. Measure your body temperature by carefully and gently closing your hand around the bulb of the thermometer. Be careful—the thermometers are made of glass! Do NOT put them in your mouth!
4. What is the temperature of the air in the room?
5. Convert your measurements to the proper SI units.

Challenge: Temperature is a measure of the average motion of the particles in an object. Thermal energy is the total motion of all the particles in an object. Which has more thermal energy: an ice cube or a lighted match? Which has a higher temperature?