

VI. METRIC MEASUREMENT: The Most Common System of Measurement

A. Introduction:

1. A standard provide something for comparison.
2. Measurement standards should have certain characteristics.
 - a. They should be easy to use.
 - b. They should be related to each other.
 - c. They should be used all over the world.
3. The metric system is a system of measurement with units based on multiples of 10. The units of mass, length, and volume are related.
 - a. It is easy to use because it has decimal divisions, (Like our Money System).
 - b. The metric system is used throughout the world, (except of the U.S.)

B. THE UNIT OF LENGTH

1. The unit of length in the metric system is the METER.
2. The meter is divided into tenths, hundredths, and thousandths.
 - a. Tenth of a meter = decimeter (dm); hundredth of meter = centimeter (cm); thousandth of meter = millimeter (mm).
 - b. When naming metric units, the same prefixes are used over and over again.
 - c. Tenth = deci; hundredth = centi; thousandth = milli.
 - d. 10x = Deka; 100x = Hecto; 1000x = Kilo
 - e. 1 meter = 1m; 1000 meter = 1 km; $1/100^{\text{th}} = 1 \text{ cm}$; $1/1000^{\text{th}} \text{ meter} = 1 \text{ mm}$
 - f. Micro = $1/1000000^{\text{th}}$ of a unit (or tiny) or μm . Mega = 1000000x or Mm

C. CONVERTING UNITS

1. To convert to larger or smaller divisions of a meter, just move the decimal point.
 - a. The decimal point moves two places to the right for hundredths and three places to the right for thousandths..
 - b. If a man is 1.816 meters tall, he is also 181.6 centimeters tall, and 1816 millimeters tall.
 - c. A distance of 2600 meters is also 2.6 kilometers.
2. The decimal moves to the right when the new unit is smaller and to the left when the new unit is larger.
3. The U.S. Customary, or English, system of yards, feet, and inches is harder to use.
 - a. With this system, the man measured above is 1 yard, 2 feet, 11 $\frac{1}{2}$ inches tall. Or 5 feet 11 $\frac{1}{2}$ inches tall or 71 $\frac{1}{2}$ inches tall.
 - b. Changing from one unit to another requires doing more arithmetic in this system.

D. THE UNIT OF VOLUME:

1. For big projects, such as building of a skyscraper, concrete is measured in cubic meters.
2. For daily use, the unit of volume is the liter.
3. Volume is the amount of space an object occupies.
4. The liter is related to the meter.
 - a. The liter is the amount of space taken up by a cube 10 cm long by 10 cm wide and 10 cm high.
 - b. $V = l \times W \times h$
 - c. So a liter holds 1000 cubic centimeters
 - d. Cubic centimeters are sometimes used to express volume and are abbreviated cm^3 or cc.
 - e. A liter may be divided into 1000 milliliters or 1000 ml.
 - f. If 1000 milliliters and 1000 cubic centimeters both equal 1 liter, the 1 milliliter must equal 1 cubic centimeter.
 - g. Milliliters and cubic centimeters are interchangeable.

E. QUESTIONS:

1. What are some advantages of the metric system?
2. What is the unit of length in the metric system?
3. How many meters are in one kilometer?
4. What does mm stand for?
5. Is 100 mm larger or smaller than 1 meter?
6. Which system uses less arithmetic to change units?
7. What is the metric unit of volume in everyday use?
8. How many milliliters are in a liter?
9. How many cubic centimeters are in a liter?
10. A student poured 875 ml of water into a jar. Then 647 ml were added. How many ml of water were in the jar? How many liters of water were in the jar?
11. A plastic box measured 16 cm long by 12 cm wide by 8 cm high. How many ml of liquid can it hold? How many liters can it hold?

F. ACTIVITY:

PART-A- (Materials: meter stick, nail, comb, tool, string)

1. You will be given a meter stick. It is exactly as long as it's name, 1 meter. You should notice there are 100 numbered divisions. The number 100 itself is usually left off the end.
2. Count how many small spaces there are between number 22 and 23. The numbers are centimeters. The tiny spaces are millimeters.

3. How many small spaces did you count?
4. Without counting, tell how many small spaces, or millimeters, are on the whole stick.
5. Work with your team partner to measure each other's height in meters. Remember, only decimals are used; fractions are not.
6. What is your height in meters?
7. What is your height in centimeters?
8. What is your height in millimeters?
9. What is the length of the nail in millimeters?
10. What is the length of the tool in centimeters?
11. What is the length of the string in millimeters?
12. What is the length of the comb in centimeters?
13. What is the length of the string in meters?

PART-B- (Materials: Graduated Cylinder, Bottles or containers of various sizes)

1. Liquids are measured in the laboratory with a graduated cylinder. It is named by its shape, a cylinder, and the marks down the sides, called graduations. It is often called a graduate. Inspect the graduate given to your team.
2. What units are marked on the graduate?
3. How much would it hold to the top of the graduations?
4. Put some water in the graduate. Bend over so your eye is level with the water line. Always use the very bottom of the curved water line as the measuring point. This curved line is called the meniscus.
5. What is the shape of the water line?
6. There will be several bottles or other containers in the room. Choose four of them and measure how much water each will hold. You will have to count how many times you fill the graduate for the larger bottles.
7. Identify each of the bottles or other containers you measured and list their volumes.

G. KEY FACTS AND CONCEPTS

1. The metric unit of length is the meter.
2. The unit of volume is the liter.
3. The units of the metric system are multiplied or divided by 10's , 100's, 1000's, and so on.
4. The metric system is a decimal system. Fractions are not used.
5. Metric units are related. One cubic centimeter is equal to one milliliter.

