

Printing EC: 3pts

## ABC's Lecture 1:

### What is Physical Science?

Physical science is the study of \_\_\_\_\_ and \_\_\_\_\_.  
 The universe is composed of matter. Your body, this paper, and your desk are matter. In physical science, you will learn the properties of metals, water, air, and many other kinds of matter. This year we'll study chemistry, physics and space science.

### Why do I have to know this stuff?

Imagine humans when they first had fire, when they first made wheels, when they first established where they were going by looking at the stars. How did the things we consider basic - heat, light, navigation, transportation, entertainment - ever come to be? The answers all touch on physics and chemistry. \_\_\_\_\_ tells us how to make things and what things are made of. \_\_\_\_\_ tells us **how** and **why** things move.

**What are the ABC's Of Science?** a. the metric system b. safety c. the scientific method

**Let's Talk Metric:** Here in America we use an English system: foot, yard, and mile.


However, MOST people use another system called the **International System of Units or the** \_\_\_\_\_ (which stands for *Système Internationale d'Unités*). This is the modern form of the \_\_\_\_\_.

**It all depends on the foot!** Numbers and units are used to make measurements. The distance from your desk to my desk could be 25 shoe lengths or 30 shoe lengths. It depends on how big the shoe is. Think of Shaq's foot versus Mini-Me. You can see that to use practical measurements, a measurement standard HAS to be used. In other words, everyone has to use the SAME system or units. Otherwise, it just gets confusing. A \_\_\_\_\_ is a fixed quantity used by everyone when measuring.

### Advantages to using the metric system.

1: It helps scientists **share &** \_\_\_\_\_ their results & observations. If I conducted an experiment here in America, even a scientist in Zimbabwe would be able to understand my measurements.

1: All units are based on the number \_\_\_\_\_. Changing from one unit to another is easy!

Length	meter (m)	
	kilometer (km)	1 km = 1,000 m
	decimeter (dm)	1 dm = 0.1 m
	centimeter (cm)	1 cm = 0.01 m
	millimeter (mm)	1 mm = 0.001 m
	micrometer (µm)	1 µm = 0.000001 m
	nanometer (nm)	1 nm = 0.000000001 m

The second part is the type of \_\_\_\_\_.

### Part 1: the PREFIX

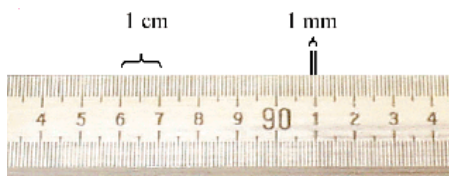
Prefix	Symbol	Meaning
_____	<b>k</b>	1000 (1 thousand)
<i>centi</i>	<b>c</b>	0.01 (1 one-hundredth)
_____	<b>m</b>	0.001 (1 one-thousandth)
<i>micro</i>	<b>µ</b>	0.000001 (1 one-millionth)

Try this: **1 kilometer is equal to \_\_\_\_\_ meters.**  
 kilo-meter: prefix=kilo or 1000 unit = meter, measuring distance

5 kilometers is equal to \_\_\_\_\_ meters

5 x 1000 meters = \_\_\_\_\_

10 kilometers is equal to \_\_\_\_\_ m 10 x 1000 m = \_\_\_\_\_



The prefix **milli-** means 1/1000, so... \_\_\_\_\_

Long distances are measured in kilometers (km). Note: here is the US, we measure speed by miles per hour, (mph). In most other countries, they measure in kilometers per hour.

**Think Metric** Learning metric without conversion tables www.think-metric.com

- CD ROM: 120 mm (12 cm)
- 65 mm (6.5 cm)
- 155 mm (15.5 cm)
- Dime Edge: 1 mm
- Basketball player: 200 cm (2 m)
- 4 year old child: 100 cm (1 m)
- 355 ml Soda can: 65 mm
- Golf ball: 43 mm
- Tennis ball: 65 mm
- 300 mm (30 cm)
- 1-story house: 300 cm (3 m)
- 11 Football fields = 1,000 m (1 km)
- Energy house: 1,000 cm (10 m)
- A 355 ml can of soda weighs 355 grams
- Soccer ball: 200 mm (20 cm)

Kilometer (kilometre) is pronounced KIL-oh-mee-ter, with the accent on the FIRST syllable

### Still Confused?

OK, let's get this as simple as we can. We are going to look at all of our metric measurement \_\_\_\_\_ as two-part words. The first part is the \_\_\_\_\_.

The second part is the type of \_\_\_\_\_

### Part 2: the UNIT

What are we measuring?	Unit	Symbol
Length		
Volume	<b>liter</b>	
Mass		
Temperature	<b>Kelvin</b>	

What unit would you use to measure each of the following?

Water in a bottle \_\_\_\_\_

The distance from my classroom to the bathroom \_\_\_\_\_

The amount of heat in the classroom? Kelvin or Celsius

How much matter is in a paperclip \_\_\_\_\_

**Metric System: Length** The \_\_\_\_\_ is the SI unit of length. A meter is about the distance from a doorknob to the floor. A driver golf club is also about a meter in length. The meter is divided into 100 equal parts called \_\_\_\_\_. There are 100 centimeters in a meter: 100cm = 1 m. An even smaller unit is a **millimeter (mm)**.

Name 3 things that are about one meter long.

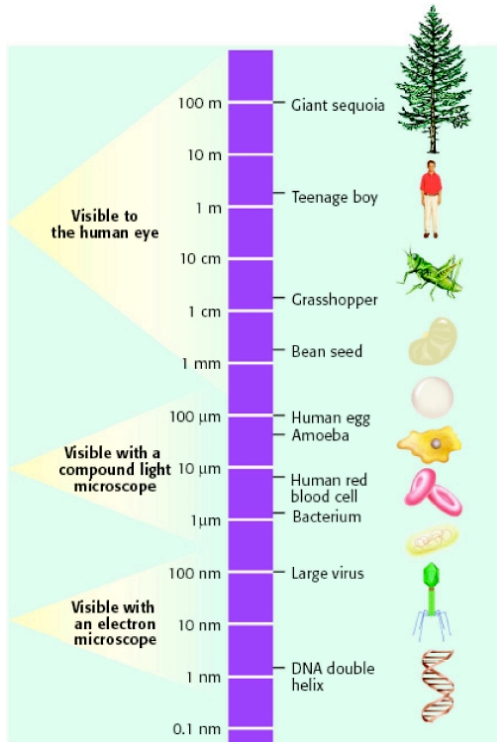
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Name 3 things that are measured in centimeters

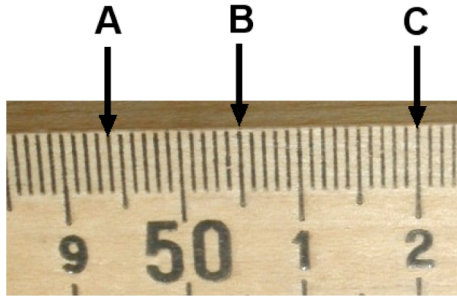
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Name 3 things that are small enough to be measured in millimeters

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



You Try It! Arrows A, B, & C are all pointing to a particular place on a meter stick.



Name the value & include units.

- Point A: \_\_\_\_\_ cm  
 \_\_\_\_\_ mm
- Point B: \_\_\_\_\_ cm  
 \_\_\_\_\_ mm
- Point C: \_\_\_\_\_ cm  
 \_\_\_\_\_ mm

You try it! What is the most appropriate unit for a scientist to use :

- Distance from San Diego to NYC \_\_\_\_\_
- Length of your eyelash: \_\_\_\_\_
- Distance from A306 to the office: \_\_\_\_\_
- Length of your arm \_\_\_\_\_
- Height of this building \_\_\_\_\_
- Length of a grain of salt \_\_\_\_\_

You try it! Practice Measuring

- Measure the length of the line on your paper in cm & mm. \_\_\_\_\_ cm & \_\_\_\_\_ mm
- Draw a square with sides measuring 1 cm.
- Measure the height of your desk from the floor to the top in meters & centimeters. \_\_\_\_\_ cm & \_\_\_\_\_ mm
- Measure the length of your desk in meters & cm. \_\_\_\_\_ cm & \_\_\_\_\_ m



# METRIC VS. CUSTOMARY

- Which units measure the same basic quantities?
  - Miles and liters
  - Gallons and kilograms
  - Ounces and centimeters
  - Meters and feet
- What is the system by which we can convert between metric and customary units?
  - None: It's different for every unit
  - A base-6 algorithm
  - A base-10 system
  - A mix between multiplication and division
- How do metric measurements differ from customary measurements?
  - Metric measurements are larger than customary measurements
  - Metric measurements are based on powers of 10; customary measurements are not
  - Metric measurements are divided into fractions; customary measurements are divided into decimals
  - Metric measurements are measured in base-6; customary measurements are measured in base-8
- A picoliter is three metric units larger than a femtoliter. How many femtoliters are in a picoliter?
  - 10
  - 100
  - 1,000
  - 10,000
- For the most part, the United States uses the customary metric system. Under what circumstance might Americans use the metric system?
  - Measuring distances between cities and states
  - Surveying large areas of land
  - Following cooking recipes
  - Trading with other countries
- Which of the following describes the length of a football field using the metric system?
  - 100 yards
  - Approximately 100 meters
  - 300 feet
  - Roughly 1/15 of a mile
- If a recipe calls for 3 and 1/4 cups of flour, you can tell that it's using:
  - The customary system
  - The metric system
  - Both the customary system and the metric system
  - Neither the customary system nor the metric system
- If it's 12 kilometers between your house and your school, how many meters is it between your house and your school?
  - 1.2 meters
  - 120 meters
  - 1,200 meters
  - 12,000 meters
- Which of the following is a true statement?
  - In the customary system, measurements are often expressed as decimals
  - In the metric system, measurements are often expressed as fractions
  - In the customary system, measurements are often expressed as fractions
  - Fractions are equally common in both the metric and customary systems
- If a granola bar has 5.7 grams of protein in it, how many centigrams of protein does it contain?
  - 57
  - 0.57
  - 570
  - 5,700

# Smile Metric Lab



Lab Score:
_____ /40 pts

## Objectives:

- \* to learn how to use a metric ruler to measure length
- \* to accurately read and record measurements taken in centimeters (cm) and millimeters (mm)

## Materials:

- rulers
- yarn
- smiles

## Procedures:

1. Take a piece of yarn and measure your partner's smile straight across from corner to corner
2. Keep your fingers on the yarn as you transfer the yarn to the ruler
3. Write the student name, and record measurements, cm and mm, in Data Table for your classroom table
4. Pick a table representative to complete the classroom data table on the projector
4. Complete your own data chart from the projector data
5. Throw yarn away
6. Complete the questions, graph and conclusion

## Data Table: (10 pts)

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

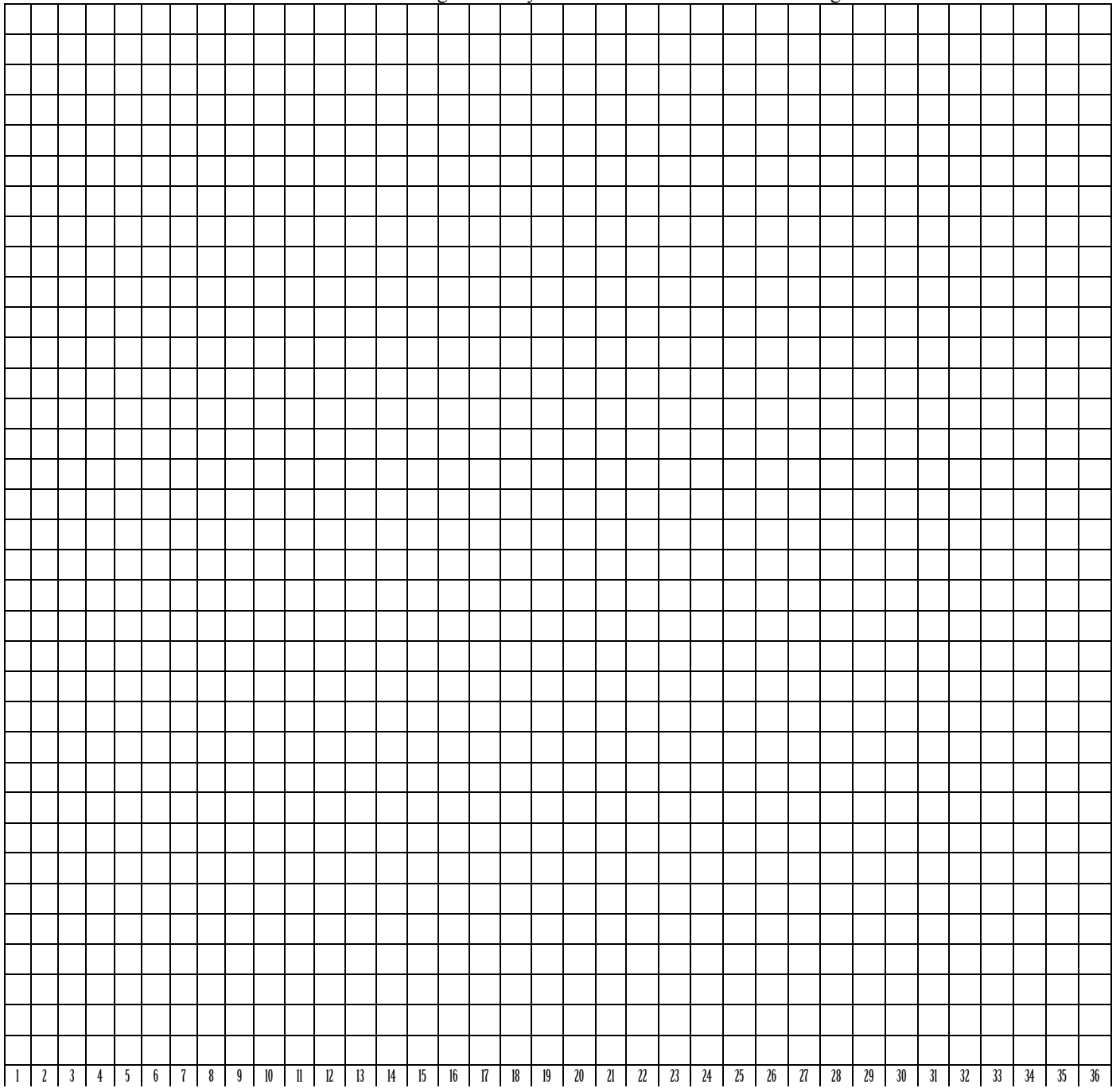
Total Length for the class: \_\_\_\_\_ Average Length in the class: \_\_\_\_\_

## Analysis/Results: (5pts)

1. Who had the largest smile? \_\_\_\_\_ cm: \_\_\_\_\_ mm
2. Smallest \_\_\_\_\_ cm? \_\_\_\_\_ mm
3. Whose smile is in the average range? \_\_\_\_\_
4. Including everyone, how big is our smile as a class?!?! \_\_\_\_\_ cm \_\_\_\_\_ mm
5. What is the connection between cm and mm?
6. How many centimeters are on your ruler? \_\_\_\_\_ Millimeters? \_\_\_\_\_

**Bar graph your results. (15pts)**

Student number is on the x-axis length on the y-axis Be sure to indicate the average with a color line



**Conclusion:** In 10 sentences write: what you learned, some concrete details, what you liked about this lab, what you would do different (10pts)

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