THE ABC's OF SCIENCE

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.

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

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
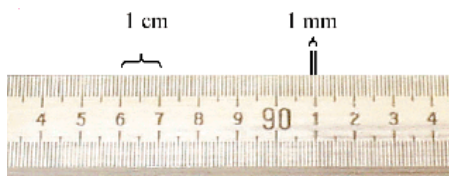
The second part is the type of _____.

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 1: the PREFIX

Prefix	Symbol	Meaning
_____	k	1000 (1 thousand)
centi	c	0.01 (1 one-hundredth)
_____	m	0.001 (1 one-thousandth)
micro	μ	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 = _____

Part 2: the UNIT

What are we measuring?	Unit	Symbol
Length		
Volume	**liter**	
Mass		
Temperature	**Kelvin**	

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 _____

1 cm   1 mm

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).**

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.

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
1. _____ 2. _____ 3. _____	1. _____ 2. _____ 3. _____	1. _____ 2. _____ 3. _____

100 m	Giant sequoia
10 m	
1 m	Teenage boy
10 cm	
1 cm	Grasshopper
1 mm	Bean seed

Visible to the human eye

100 µm	Human egg Amoeba
10 µm	Human red blood cell
1µm	Bacterium

Visible with a compound light microscope

100 nm	Large virus
10 nm	
1 nm	DNA double helix
0.1 nm	

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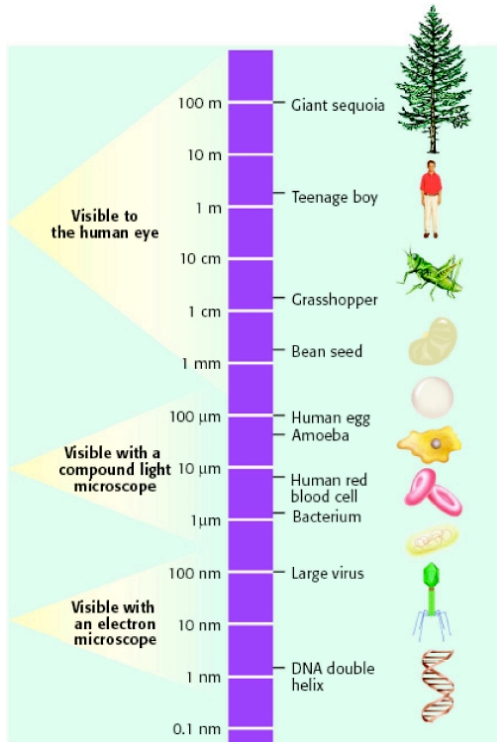
You Try It! Arrows A, B, & C are all pointing to a particular place on a meter stick.

A   B   C

9 50 1 2
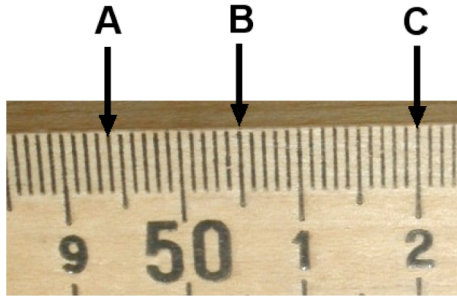
Name the value & *include units*.

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 :
1. Distance from San Diego to NYC _____
2. Length of your eyelash: _____
3. Distance from A306 to the office:_____
4. Length of your arm _____
5. Height of this building _____
6. Length of a grain of salt ___

You try it! Practice Measuring
1.Measure the length of the line on your paper in cm & mm. _____ cm & _____ mm
2. Draw a square with sides measuring 11cm.
3. Measure the height of your desk from the floor to the top in meters & centimeters.
   _____ cm & _____ mm

4. Measure the length of your desk in meters & cm. _____ cm &_____m

Smile Metric Lab

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)

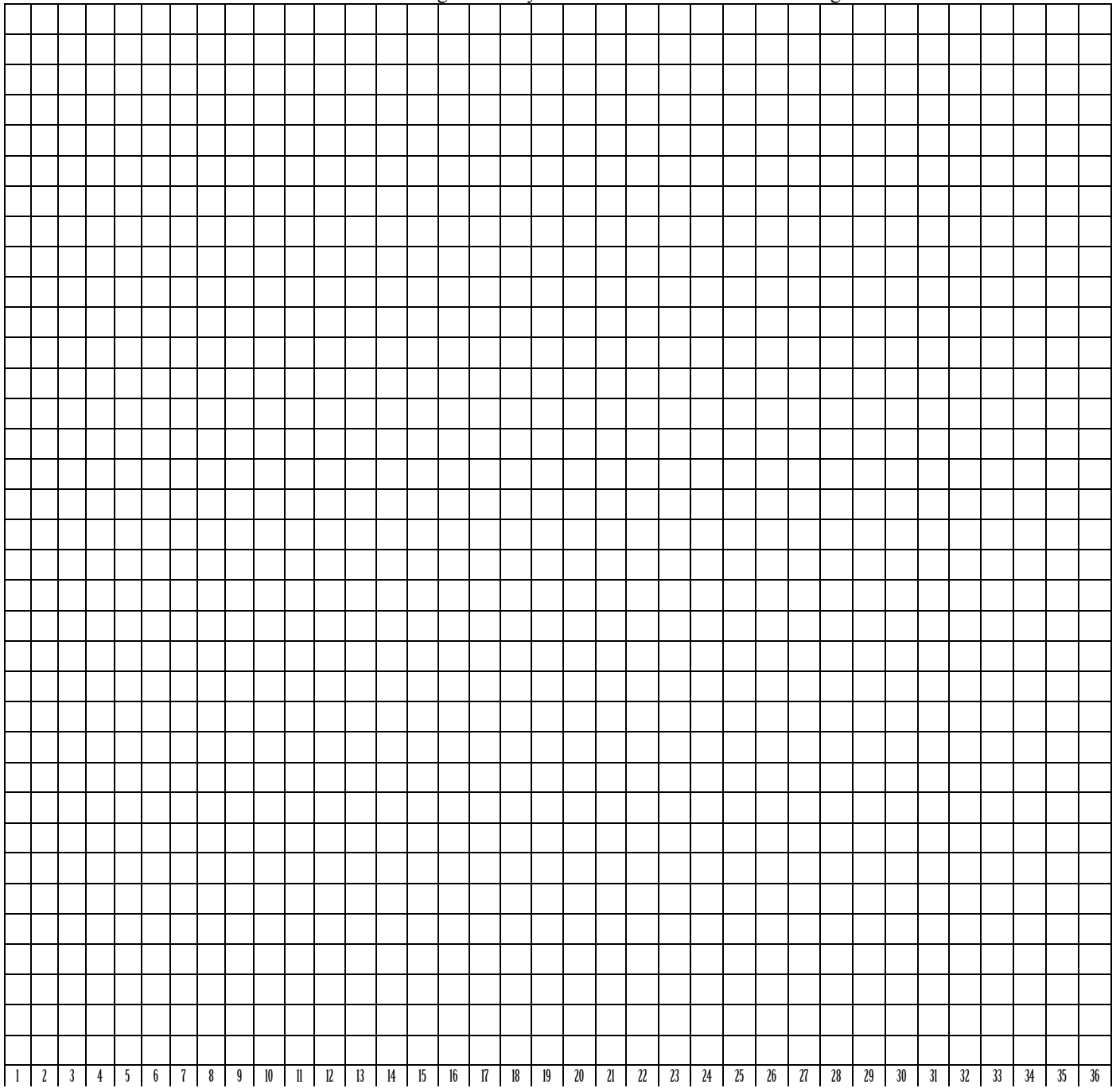| Student name	Measurement	Student name	Measurement	Student name	Measurement
Table 1		Table 3		Table 5	
1		13		25	
2		14		26	
3		15		27	
4		16		28	
5		17		29	
6		18		30	
Table 2		Table 4		Table 6	
7		19		31	
8		20		32	
9		21		33	
10		22		34	
11		23		35	
12		24		36	
Total Length		Total Length		Total Length	

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

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

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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