Chem 106: Class/ Lab

Week 2

1. Please sign in: Roster @ front of lab
2. Turn in Safety Questions if not turned in last week.
3. Sit at lab station next to your name on the roster. (Same as last week)

Chem 106: Class/ Lab

[Today's Calendar]

Take out your i-clicker or smart phone and turn it on

Look for your name on the screen; only the 1st 25 names on the roster appear, the remaining names will appear next

1. Click the i-clicker with the 2 letters below your name in the order that they are listed
2. If you make an error and register someone else's name enter DD and re-enter with your name

You're i-clicker should be registered (Your name disappears); this process will not need to be repeated again. Bring your i-clicker to every class/lab meeting for credit

Question

Measurements & Relative Scale

- Macroscopic vs. Microscopic
- Charles & Ray Eames

- TRUE (A) / FALSE (B)

Macroscopic stuff is visible to the naked eye. Microscopic objects require magnification.

http://chemconnections.org/general/movies/Powers Of Ten (Charles & Ray Eames) 1.mp4

https://www.youtube.com/watch?v=0fKBhvDjuy0

Slide #39

SF MOMA

Charles & Ray Eames

https://www.sfmoma.org/

Question

Measurements & Relative Scale

Carbon Dating is a method of determining the age of artifacts of once living organisms that are not older than 40 thousand years.

The statement is True or False?

- TRUE (A) / FALSE (B)

Slide #55

Chem 106 Lab: Week 2

Experiment: Using Fundamental Measurements
(Course/ Lab Manual pg. 5; pp. 7-8)

Record Unknown bag number provided by Dr. R. on page 7 of both partners pages; data will be recorded on both partner's sets of pages

Chem 106 Lab: Week 2

Background for
Using Fundamental Measurements

Units of Measure

Units	*U.S.*	*SI*	*Chemistry*
Mass (weight)	Pound (lb)	Kilogram (kg)	"Gram" (**g**, mg)
Volume	Gallon (gal)	Liter (L)	"Liter" (**mL**, L)
Temperature	Fahrenheit (^{O}F)	Kelvin (K)	K & Celsius (^{O}C
Length	Mile (mi), Feet(**ft**), Inches (in)	Meter (m)	"Meter" (**cm**, mm, nm)
Time		Second (s)	Second (s)
			Mole (mol)

Measurement & Units

SI units & common units in General Chemistry

Quantitative vs. Qualitative

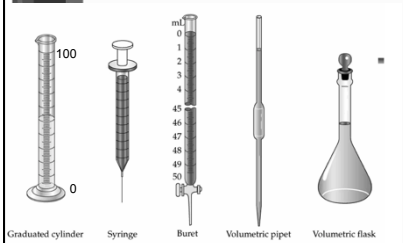
- *MASS (Chem 106: gram; SI: kg; other mg)*
- *LENGTH (Chem 106: cm & mm; SI: m; other km)*
- *TEMPERATURE (Celsius & Kelvin; SI: K)*
- *VOLUME (Chem 106: mL; SI: Liter; other dL)*
- *CHEMICAL AMOUNT: mole (mol); SI: (mol); other (mmol)*

Mass Determination

(Weighing Devices: Balances)

Volume

(Liquid Measurement Tools)



(CHEM 106) METRIC UNITS: milliliter

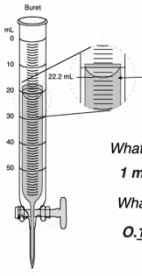
mL
m = milli
L = liter

These 2 have only one single volume (1 graduation mark)

Volume UNITS: milliliter / mL / m = milli L = liter

Chem 106 Lab: Week 2

Background for
Reading Graduation Scales



APPLIES to ANY scale (volume, length, temperature, etc.):
always estimate one decimal place beyond the graduation mark (between the lines)

What does each line represent?

1 mL

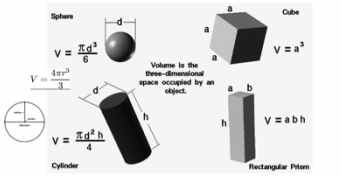
What can be estimated?

O.1 mL

Chem 106 Lab: Week 2

Background for
Using Fundamental Measurements

Volumes of regular shapes



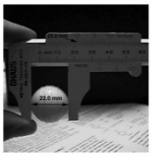
$V = \pi r^2 h$

Euclid ~300 B.C.E.

Chem 106 Lab: Week 2

Background for
Using Fundamental Measurements

What is the volume the sphere?



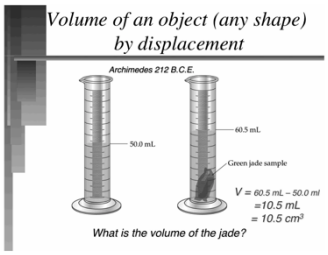
$$V = \frac{4\pi r^3}{3}$$

$V = 4/3 \times 3.14 \times (11.0\ mm)^3$
$= 5{,}570\ mm^3$

Chem 106 Lab: Week 2

Background for
Using Fundamental Measurements

Volume of an object (any shape) by displacement



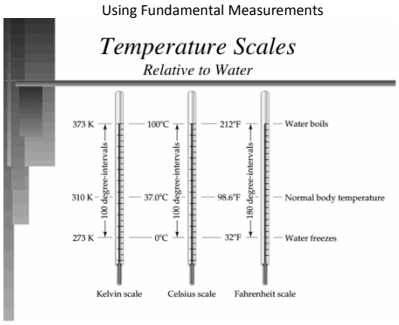
$V = 60.5\ mL - 50.0\ ml$
$= 10.5\ mL$
$= 10.5\ cm^3$

What is the volume of the jade?

Chem 106 Lab: Week 2

Background for
Using Fundamental Measurements

Temperature Scales
Relative to Water



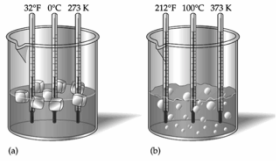
Chem 106 Lab: Week 2

Background for
Using Fundamental Measurements

UNITS: Celsius (°C) & Kelvin (K)

Temperature is NOT Energy

*"**Temperature** (sometimes called thermodynamic **temperature**) is a measure of the average kinetic energy of the particles in a system. Adding heat to a system causes its **temperature** to rise."*



August. 15, 2015
+142°F Manama, Bahrain

°C? = 61.7°C
K? = 61.7°C +273.15
= 334.85 K

"hella-hot"

Language describes scale (prefixes)

Shorthand Prefixes

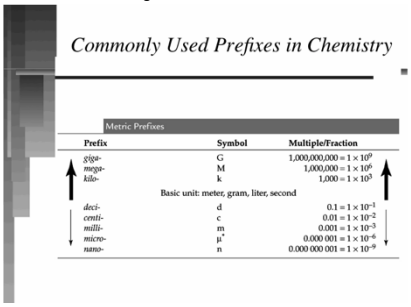
Table: SI prefixes

Factor	Name	Symbol	Factor	Name	Symbol
10^{24}	yotta	Y	10^{-1}	deci	d
10^{21}	zetta	Z	10^{-2}	centi	c
10^{18}	exa	E	10^{-3}	milli	m
10^{15}	peta	P	10^{-6}	micro	μ
10^{12}	tera	T	10^{-9}	nano	n
10^{9}	giga	G	10^{-12}	pico	p
10^{6}	mega	M	10^{-15}	femto	f
10^{3}	kilo	k	10^{-18}	atto	a
10^{2}	hecto	h	10^{-21}	zepto	z
10^{1}	deka	da	10^{-24}	yocto	y

Hella is a prefix associated with Northern California: UC Davis, UC Berkeley, LBL, LLNL & adopted by Google (2010) & Wolfram Alpha (2011)
"hella-" = 10^{27}

Chem 106 Lab: Week 2

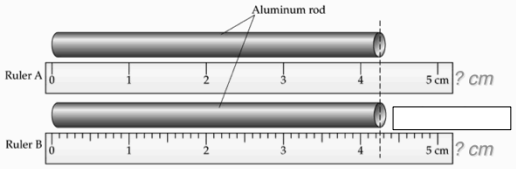
Background for
Using Fundamental Measurements



Using Fundamental Measurements

What is the length of the rod?

Different measurement tools give different numbers: Which ruler is better?



Unlike pure mathematics, which uses only numbers, science requires a unit + a number

Using Fundamental Measurements

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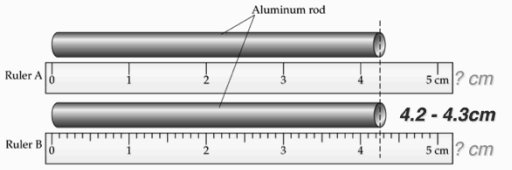

Unlike pure mathematics, which uses only numbers, science requires a unit + a number

Using Fundamental Measurements

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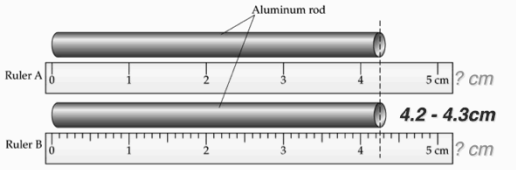
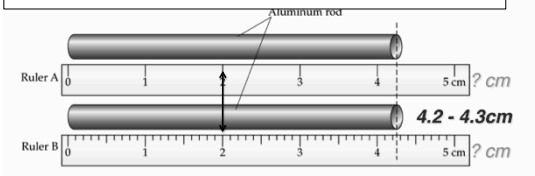


Unlike pure mathematics, which uses only numbers, science requires a unit + a number **4.24 - 4.25cm**

Question



What are correct (acceptable) measurements that could be recorded for A & B if the rod were the length @ the red line?

4.24 - 4.25cm

A) Ruler A=2cm, Ruler B=2cm

B) Ruler A=2cm, Ruler B=2.0cm

C) A=2.0cm, B=2.00cm

D) A=2.00cm, 2.00cm

Question

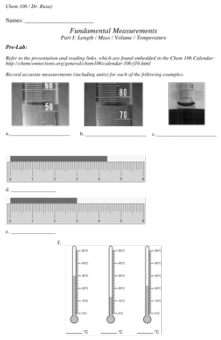
Measurements & Relative Scale

Consider the following scales below from two different syringes that are used to administer insulin to treat diabetes. (True/False) Both of them are designed to deliver equally accurate ½ unit doses.

- TRUE (A) / FALSE (B)

Using Fundamental Measurements
(Correctly Complete Pre-lab Course/ Lab Manual pg. 5)

Complete forms with your name and partner's. May consult with other groups. Turn in one form with both names.



Additional instructions will follow when all forms from the entire class are turned in. Feel free to assist others after your forms are completed and turned in.

Chem 106 Lab: Week 2

(Experiment: Course/ Lab Manual pp. 7-8)

Fundamental Measurements
Part I: Length / Mass / Volume / Temperature

Reading & Viewing:
http://chemconnections.org/general/chem106/106-Meas-I-2016.pdf
http://chemconnections.org/general/chem106/ Chem%20106%20Lab_Techniques-2016.htm
https://www.youtube.com/watch?v=QtnPiKSKKtI

You are to complete the following data tables for a set of unknowns. Working with your lab partner, you will pick up an unknown set and ruler from Dr. R.

You must plan a procedure using any equipment from your lab drawer and the top loading balances in the lab and adjoining balance room.

Write a brief outline of the procedure specifying the equipment to be used. Bring the outline and answers to Dr. R. for review and discussion of the procedure and equipment that you plan to use before you begin.

Use data tables on pp. 7-8 to guide you.

Chem 106 Lab: Week 2

(Experiment: Course/ Lab Manual pp. 7-8)

Fundamental Measurements
Part I: Length / Mass / Volume / Temperature

Planning experiments getting data: what to use and how to use it.

Liquid:

Volume	Boiling Point °C

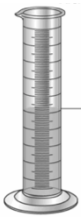
Mass of container + liquid	
- Mass of container	
Mass of liquid	

Chem 106 Lab: Week 2

(Experiment: Course/ Lab Manual pp. 7-8)

Fundamental Measurements
Part I: Length / Mass / Volume / Temperature

100 mL Graduate



Sketch equipment set up for boiling point measurement.

Liquid:

Volume	Boiling Point °C

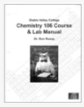
Mass of container + liquid	
- Mass of container	
Mass of liquid	

Weigh empty then add and weigh again, and then measure volume.

Chem 106: Class/ Lab

[NEXT WEEK'S ASSIGNMENTS]

Lab/Class Meeting ((ATTENDANCE REQUIRED)



- (GQ) Viewing/ Doing: Density Simulation Pre-lab (Course/ Lab Manual pg. 11) *Guiding Questions* DUE Today
- (GQ) Reading: Measurement Units & Standards *Guiding Questions* DUE before Lab Today
- Doing: *Worksheet: Units, Measurements, & Conversions* (Course/ Lab Manual pp. 3-4) Due Today
  Refer to Crash Course /Unit Conversions & Signifcant Figures