

## 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]

Week	Mon	Tues	Wed
8/2	8/3	8/4	8/5
8/6	8/7	8/8	8/9
8/10	8/11	8/12	8/13
8/14	8/15	8/16	8/17
8/18	8/19	8/20	8/21
8/22	8/23	8/24	8/25
8/26	8/27	8/28	8/29
8/30	8/31	9/1	9/2
9/3	9/4	9/5	9/6
9/7	9/8	9/9	9/10
9/11	9/12	9/13	9/14
9/15	9/16	9/17	9/18
9/19	9/20	9/21	9/22
9/23	9/24	9/25	9/26
9/27	9/28	9/29	9/30
10/1	10/2	10/3	10/4
10/5	10/6	10/7	10/8
10/9	10/10	10/11	10/12
10/13	10/14	10/15	10/16
10/17	10/18	10/19	10/20
10/21	10/22	10/23	10/24
10/25	10/26	10/27	10/28
10/29	10/30	10/31	11/1
11/2	11/3	11/4	11/5
11/6	11/7	11/8	11/9
11/10	11/11	11/12	11/13
11/14	11/15	11/16	11/17
11/18	11/19	11/20	11/21
11/22	11/23	11/24	11/25
11/26	11/27	11/28	11/29
11/30	12/1	12/2	12/3
12/4	12/5	12/6	12/7
12/8	12/9	12/10	12/11
12/12	12/13	12/14	12/15
12/16	12/17	12/18	12/19
12/20	12/21	12/22	12/23
12/24	12/25	12/26	12/27
12/28	12/29	12/30	12/31

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



Look for your name on the screen; only the 1<sup>st</sup> 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](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

### THE INFORMATION ENVIRONMENTS OF CHARLES AND RAY EAMES

by Jennifer Steinkamp, curator of the exhibition and design  
and Robert Hood, curator of the exhibition and design



Charles and Ray Eames, 1941. Photo: Steinkamp.

Charles and Ray Eames were a husband and wife team of designers and architects. They were known for their innovative and functional designs, including the famous Eames chair and the Eames house.

The exhibition at SF MOMA explores the information environments of Charles and Ray Eames, from their early work in the 1940s to their later work in the 1960s and 1970s.

The exhibition is divided into three main sections: the Eames office, the Eames house, and the Eames chair.

The Eames office section features a large-scale model of the office, showing the Eameses' collaborative workspace and their use of technology and design.

The Eames house section features a large-scale model of the house, showing the Eameses' innovative use of materials and their commitment to sustainable design.

The Eames chair section features a large-scale model of the chair, showing the Eameses' innovative use of materials and their commitment to functional design.

The exhibition is a must-see for anyone interested in design, architecture, and the Eameses' legacy.

For more information, visit the SF MOMA website at <https://www.sfmoma.org/>.

<https://www.sfmoma.org/>



The Eames office, 1941. Photo: Steinkamp.

"Whether it's a house or film or chair—it must have a structural concept!"  
— CHARLES EAMES

Charles and Ray Eames were a husband and wife team of designers and architects. They were known for their innovative and functional designs, including the famous Eames chair and the Eames house.

The exhibition at SF MOMA explores the information environments of Charles and Ray Eames, from their early work in the 1940s to their later work in the 1960s and 1970s.

The exhibition is divided into three main sections: the Eames office, the Eames house, and the Eames chair.

The Eames office section features a large-scale model of the office, showing the Eameses' collaborative workspace and their use of technology and design.

The Eames house section features a large-scale model of the house, showing the Eameses' innovative use of materials and their commitment to sustainable design.

The Eames chair section features a large-scale model of the chair, showing the Eameses' innovative use of materials and their commitment to functional design.

The exhibition is a must-see for anyone interested in design, architecture, and the Eameses' legacy.

For more information, visit the SF MOMA website at <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

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) "Liter" (mL, L)
Volume	Gallon (gal)	Liter (L)	"Liter" (mL, L)
Temperature	Fahrenheit (°F)	Kelvin (K)	K & Celsius (°C)
Length	Mile (mi), Feet (ft), Inches (in)	Meter (m)	"Meter" (cm, mm, nm)
Time		Second (s)	Second (s) <b>Mole (mol)</b>

*Measurement & Units*

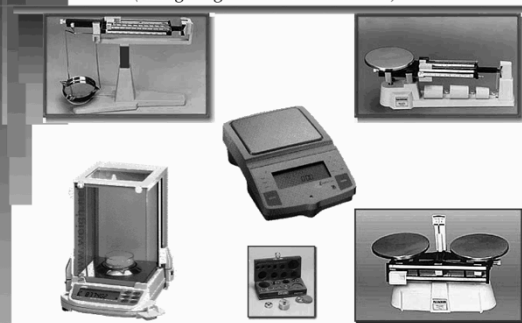
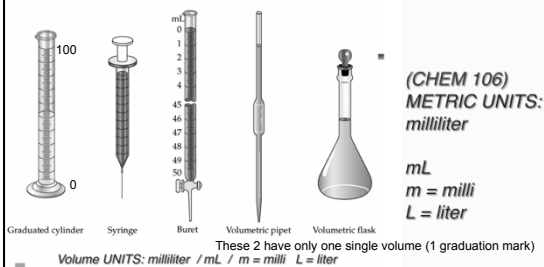
SI units & common units in General Chemistry

*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 Lab: Week 2

Background for  
Reading Graduation Scales

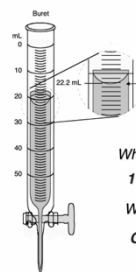
APPLIES to ANY scale (volume, length, temperature, etc.):  
always estimate one decimal place beyond the graduation mark (between the lines)

What does each line represent?

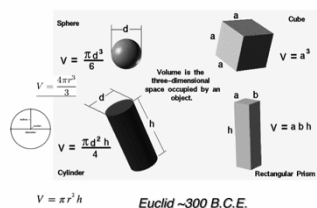
1 mL

What can be estimated?

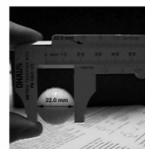
0.1 mL



## Chem 106 Lab: Week 2

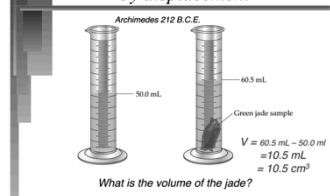
Background for  
Using Fundamental Measurements*Volumes of regular shapes*

## Chem 106 Lab: Week 2

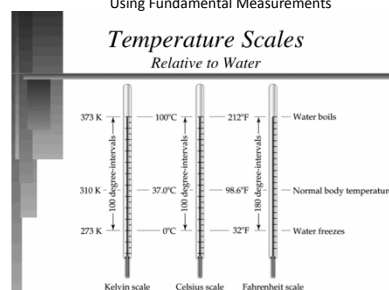
Background for  
Using Fundamental Measurements*What is the volume the sphere?*

$$V = \frac{4\pi r^3}{3} \quad V = \frac{4\pi}{3} \times 3.14 \times (11.0 \text{ mm})^3 = 5,570 \text{ mm}^3$$

## Chem 106 Lab: Week 2

Background for  
Using Fundamental Measurements*Volume of an object (any shape)  
by displacement*

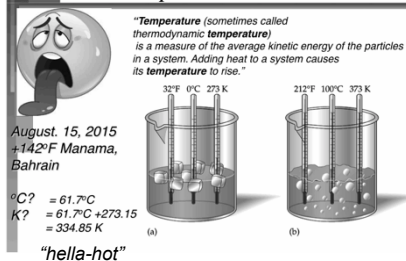
## Chem 106 Lab: Week 2

Background for  
Using Fundamental Measurements*Temperature Scales  
Relative to Water*

## Chem 106 Lab: Week 2

Background for  
Using Fundamental Measurements

UNITS: Celsius (°C) &amp; Kelvin (K)

*Temperature is NOT Energy*

Language describes scale (prefixes)

*Shorthand Prefixes*

Table: SI prefixes

Factor	Name	Symbol	Factor	Name	Symbol
10 <sup>24</sup>	yotta	Y	10 <sup>-1</sup>	deci	d
10 <sup>21</sup>	zetta	Z	10 <sup>-2</sup>	centi	c
10 <sup>18</sup>	exa	E	10 <sup>-3</sup>	milli	m
10 <sup>15</sup>	peta	P	10 <sup>-6</sup>	micro	μ
10 <sup>12</sup>	tera	T	10 <sup>-9</sup>	nano	n
10 <sup>9</sup>	giga	G	10 <sup>-12</sup>	pico	p
10 <sup>6</sup>	mega	M	10 <sup>-15</sup>	femto	f
10 <sup>3</sup>	kilo	k	10 <sup>-18</sup>	atto	a
10 <sup>2</sup>	hecto	h	10 <sup>-21</sup>	zepto	z
10 <sup>1</sup>	deka	da	10 <sup>-24</sup>	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<sup>27</sup>

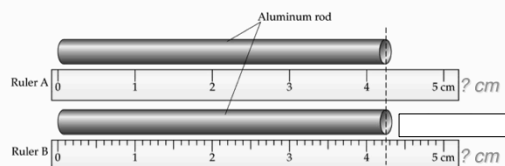
## Chem 106 Lab: Week 2

Background for  
Using Fundamental Measurements

## Commonly Used Prefixes in Chemistry

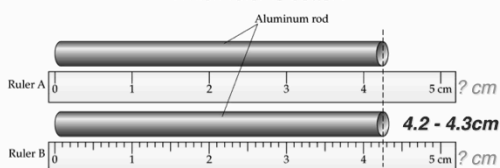
Prefix	Symbol	Multiple/Fraction
giga-	G	$1,000,000,000 = 1 \times 10^9$
mega-	M	$1,000,000 = 1 \times 10^6$
kilo-	k	$1,000 = 1 \times 10^3$
Basic unit: meter, gram, liter, second		
deci-	d	$0.1 = 1 \times 10^{-1}$
centi-	c	$0.01 = 1 \times 10^{-2}$
milli-	m	$0.001 = 1 \times 10^{-3}$
micro-	$\mu$	$0.000\,001 = 1 \times 10^{-6}$
nano-	n	$0.000\,000\,001 = 1 \times 10^{-9}$

## Using Fundamental Measurements

*What is the length of the rod?*Different measurement tools give different numbers:  
Which ruler is better?

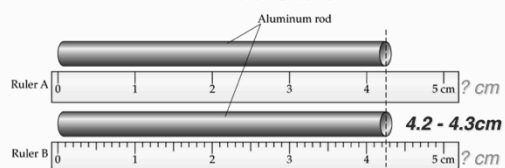
Unlike pure mathematics, which uses only numbers, science requires a unit + a number

## Using Fundamental Measurements

*What is the length of the rod?*Different measurement tools give different numbers:  
Which ruler is better?

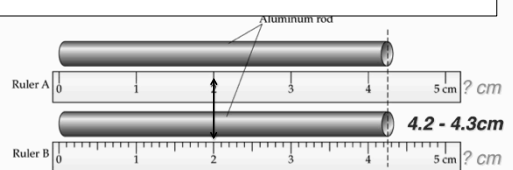
Unlike pure mathematics, which uses only numbers, science requires a unit + a number

## Using Fundamental Measurements

*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

## Question



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

- 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, B=2.00cm

## Question

## Measurements &amp; 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  $\frac{1}{2}$  unit doses.

- TRUE ( A ) / FALSE ( B )

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

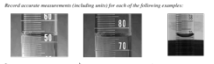
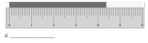
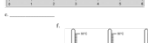
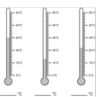
Chem 106 / Dr. Beatty

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

**PreLab:**

Read the pre-lab course and reading 106, which are found embedded in the Chem 106 Course/ Lab Manual. (http://chemconnections.org/general/chem106/106PreLab.html)

Record accurate measurements (including units) for each of the following examples:

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)

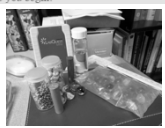
**Fundamental Measurements**  
Part I: Length / Mass / Volume / Temperature

**Reading & Viewing:**  
<http://chemconnections.org/general/chem106/106-Meas-I-2016.pdf>  
[http://chemconnections.org/general/chem106/Chem%20106%20Lab\\_Techniques-2016.htm](http://chemconnections.org/general/chem106/Chem%20106%20Lab_Techniques-2016.htm)  
<https://www.youtube.com/watch?v=QmPAK3KK3I>

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



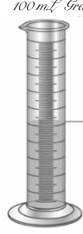
**Sketch equipment set up for boiling point measurement.**

**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 & Significant Figures