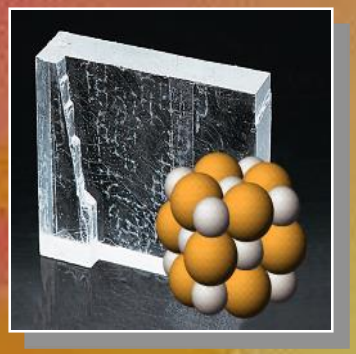
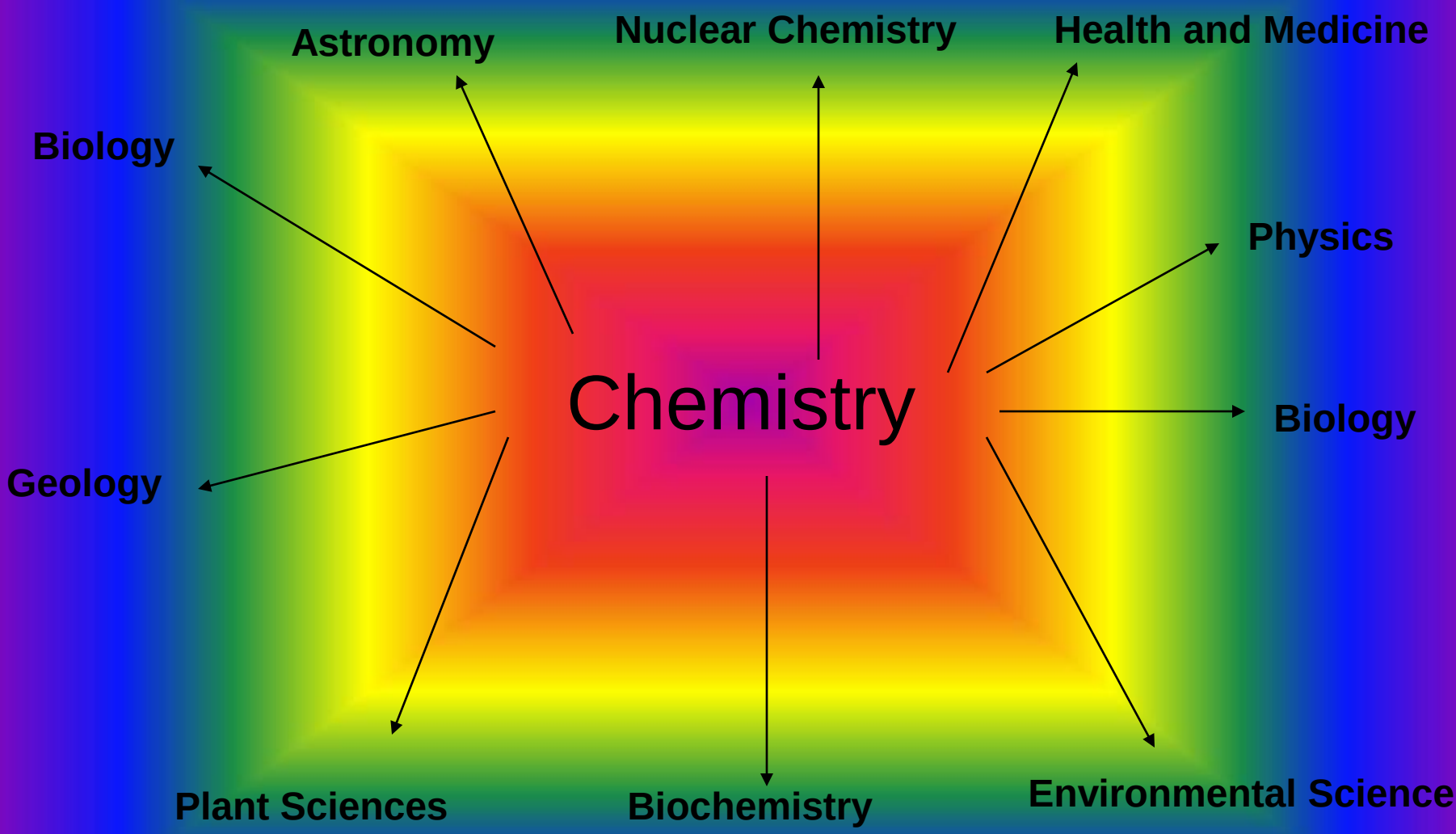
Welcome to the World of Chemistry



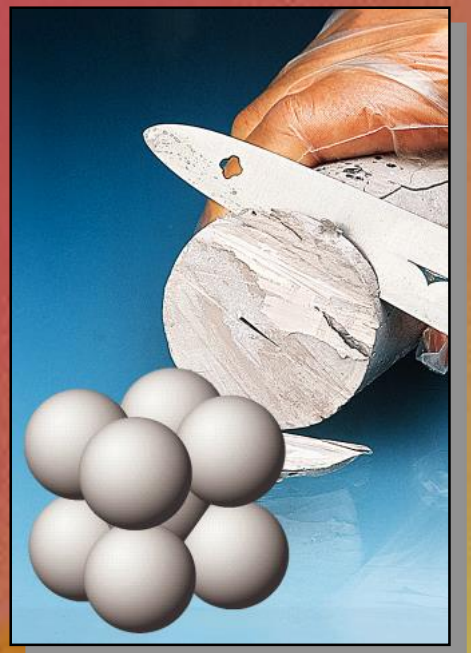
Mrs. Panzarella
Rm. 351

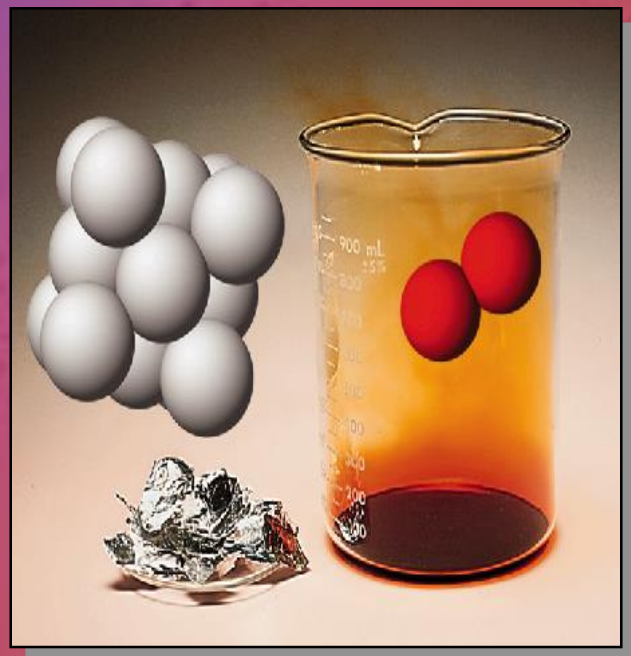
“The Central Science”



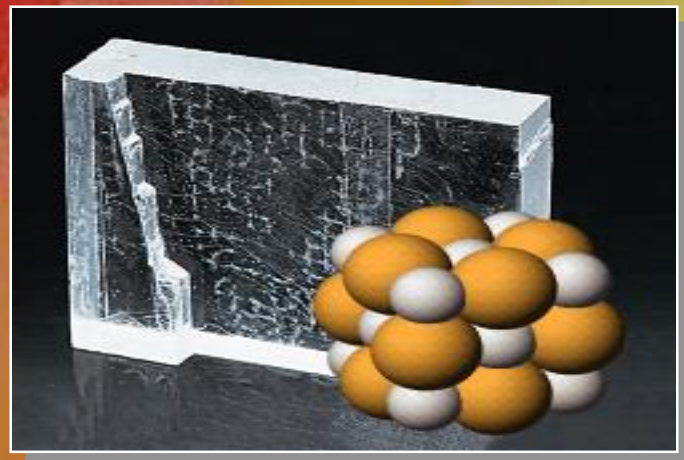
Chemistry

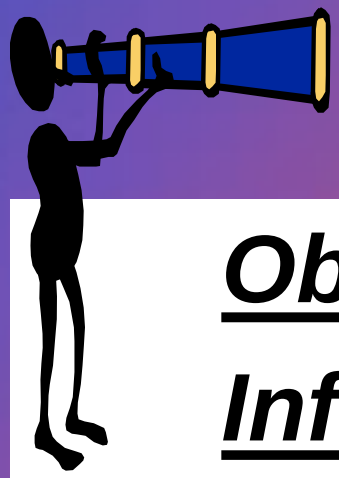
- Deals with the composition of matter, the changes matter undergoes, and the energy associated with these changes.





What is chemistry video





Collecting Data

Observations **–** ***info collected with the senses***

Inferences ***- a conclusion based on an observation***

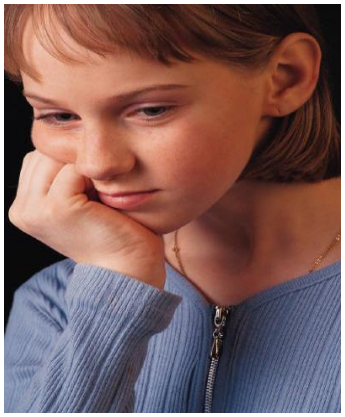
Two Types of Observations

1.Qualitative

- ***non-numeric form; uses the senses***
- ***Ex. Color, shape, odor, phase (s, l, g)***

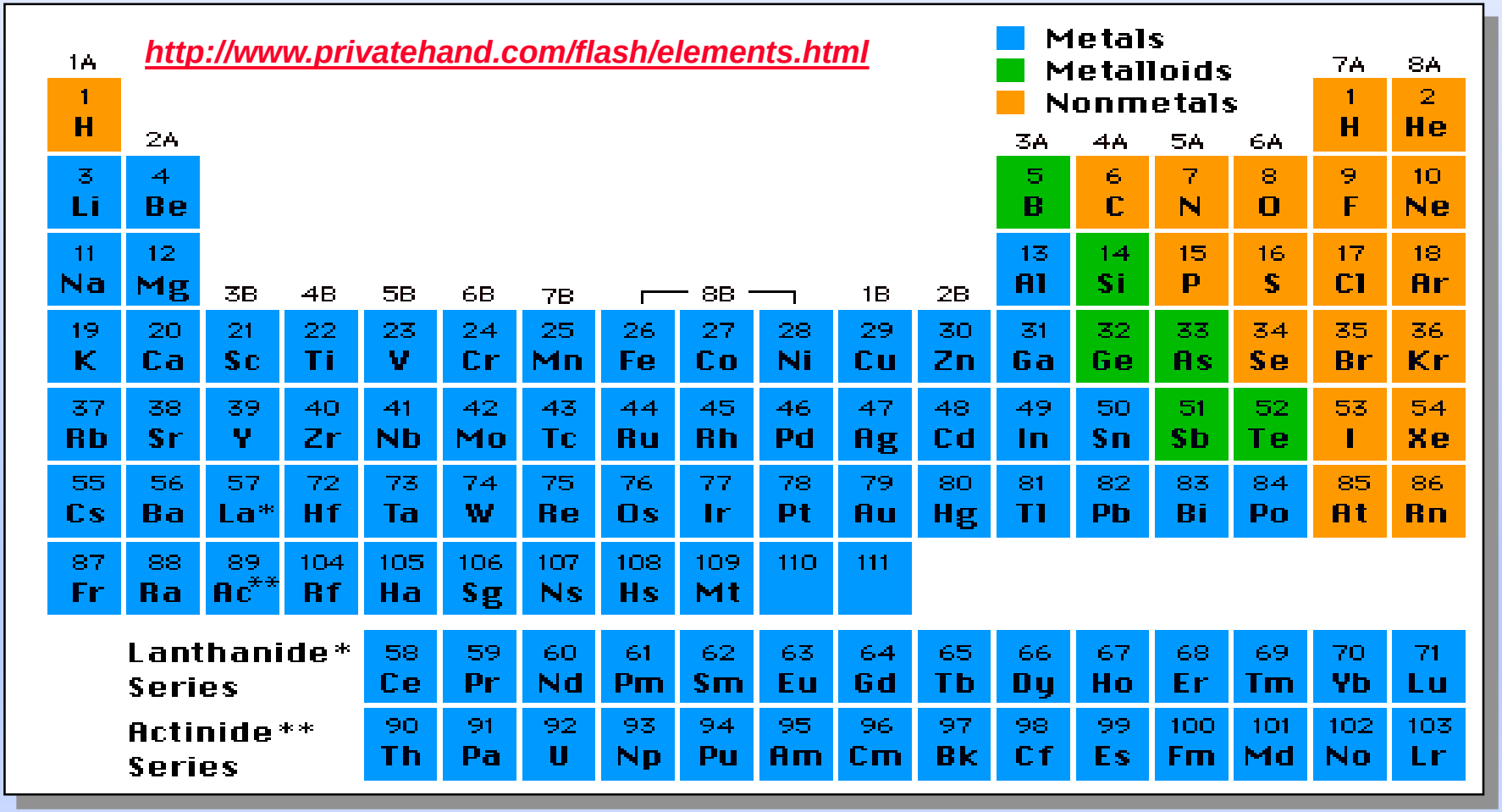
2. QuaNtitative

- ***involves Numbers; measurement***
- ***Ex. 20 grams, 10 cm, 273 K***



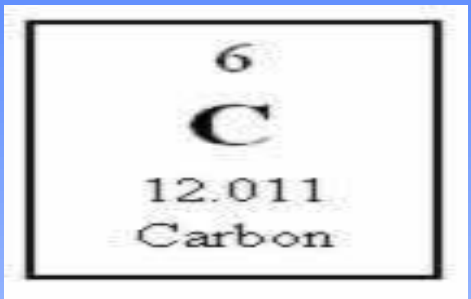
The Language of Chemistry

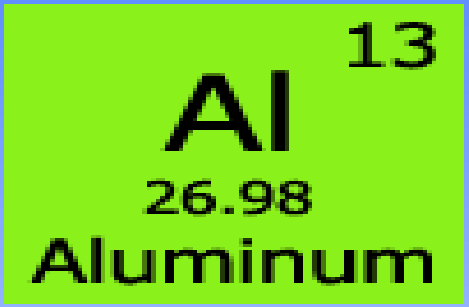
- Elements on the periodic table are represented by a chemical symbol based on their atomic number

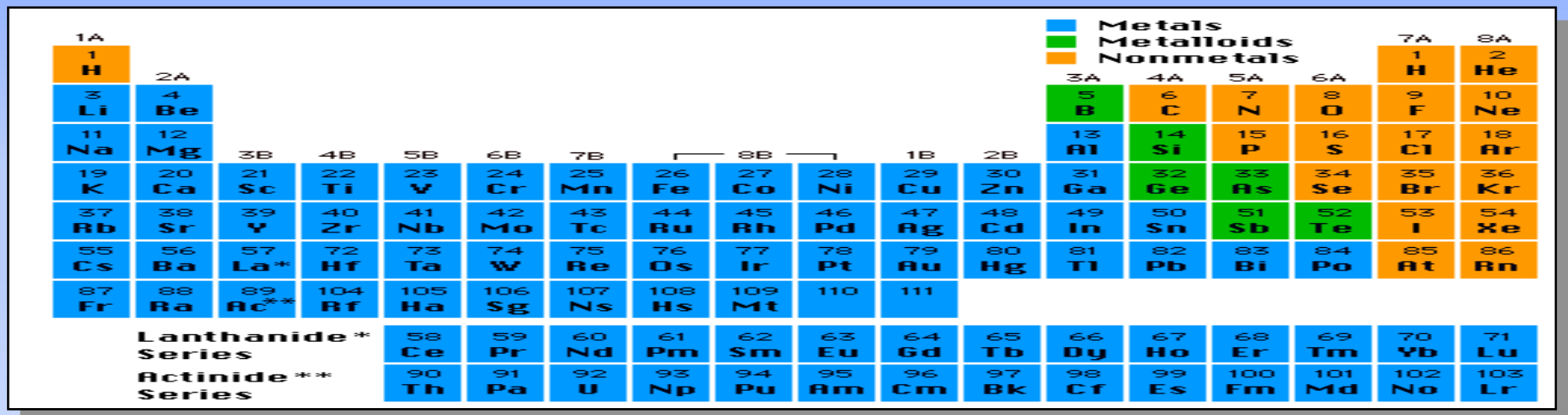


Writing Chemical Symbols

- All symbols BEGIN with a CAPITAL letter
- Symbols with two letters are written with a capital first letter followed by a lowercase letter
- Use the Periodic table, reference Table S (or your agenda R-11)

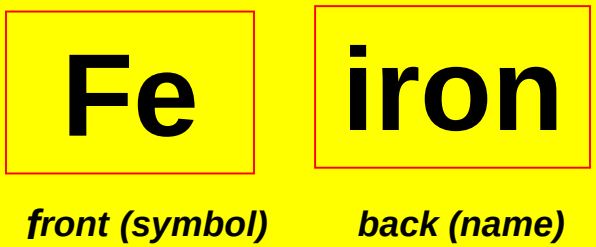






Element Assignment

- **Make Flash cards for the following elements (pg 3 of your guide)**
  - 1-36, 47, 50, 53, 54, 56-57, 74, 78-80, 82, 86, 90, 92, 94
  - Spelling counts!



front (symbol) ***back (name)***

- **Study Practice:**
  - Complete pages 2-3 in Learning Guide
  - Study flash cards

- **Quiz Tuesday** (will also include rules/procedures of the classroom and lab)

- element song #2: **https://www.youtube.com/watch?v=VgVQKCcfwnU**

Measurement

1) **N^3: No Naked Numbers. All measurements and answers to math problems must have units written after the numbers.**

2) **No Work, No Credit. You must show the math set-up when doing math problems.**

Measurement:

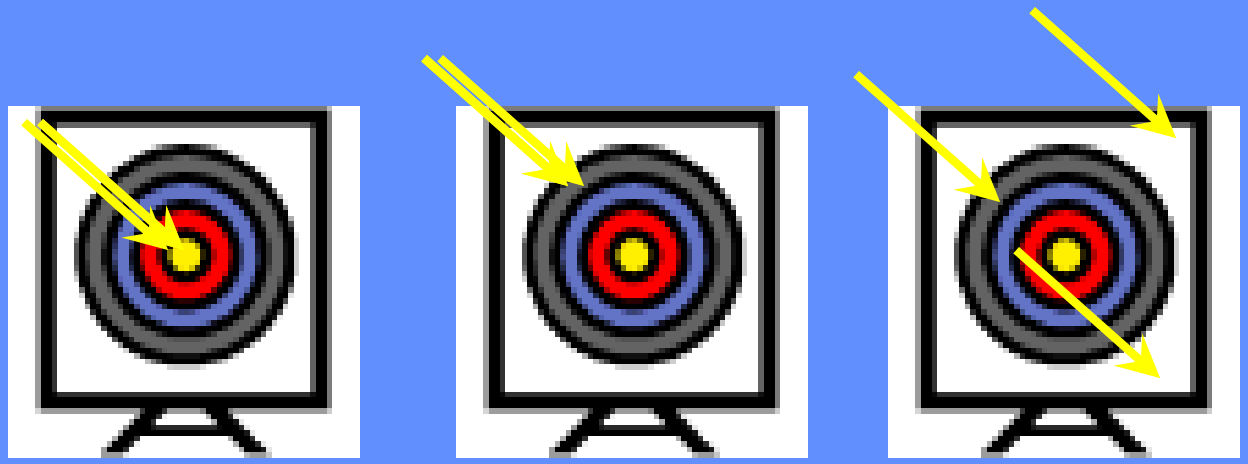
Accuracy vs. Precision

ACCURATE = CORRECT

PRECISE = CONSISTENT

Can you hit the bull's-eye?

Three targets with three arrows each to shoot.



How do they compare?

Both accurate and precise

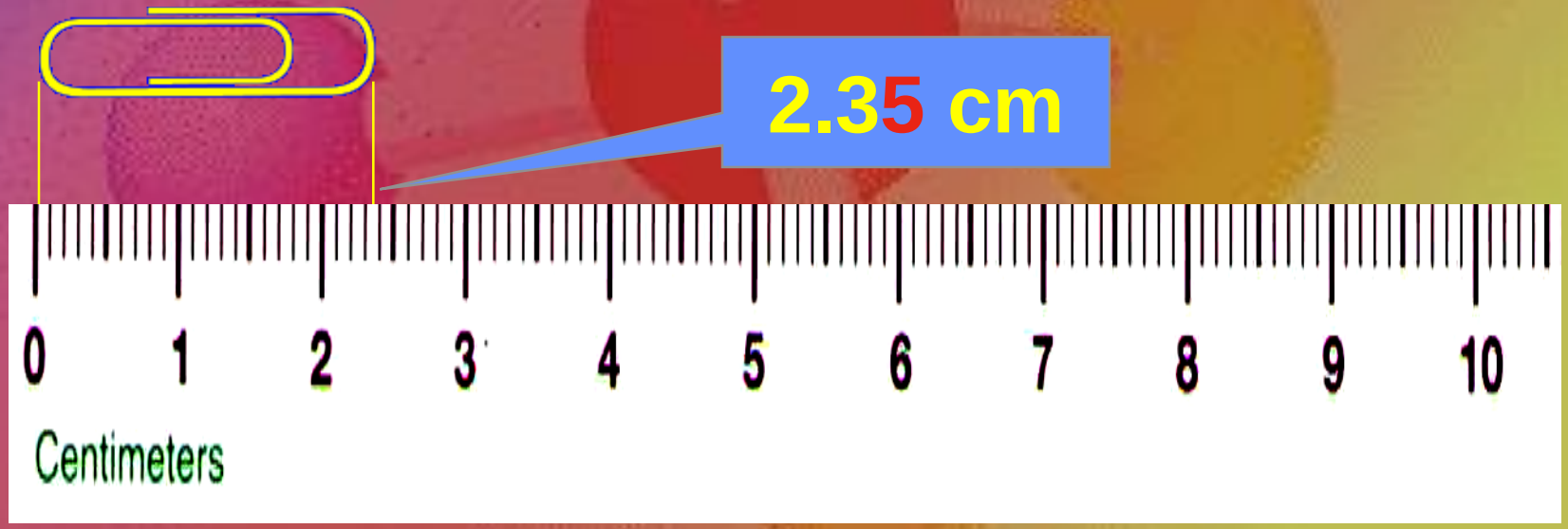
Precise but not accurate

Neither accurate nor precise

- **Accuracy -** how close a measurement is to the accepted value
- **Precision-** how close a series of measurements are to each other

Significant Figures

- Indicate precision of a measurement.
- Includes all digits that can be known precisely **plus a last digit that must be estimated**



Atlantic/Pacific Rule

Count from the ocean towards the coast starting with the first nonzero digit, and include *all* the digits that follow

Pacific = Decimal Present

Atlantic = Decimal Absent

Let's Practice….. *Significant Figures*

1. 23.50 — 4 sig figs
2. 402 — 3 sig figs
3. 5,280 — 3 sig figs
4. 0.080 — 2 sig figs

Significant Numbers in Calculations

An answer cannot be more precise than the least precise measurement

Adding and Subtracting

The answer has the same number of decimal places as the measurement with the fewest decimal places.

	25.2	*one decimal place*
+	1.34	*two decimal places*
	26.54	

answer 26.5 *one decimal place*

Multiplying and Dividing

- **Round to the calculated answer until you have the same number of significant figures as the least precise measurement.**

$$(13.91\text{g/cm}^3)(23.3\text{cm}^3) = 324.103\text{g}$$

4 SF **3 SF** **3 SF**

324 g

Scientific Notation

- Scientific notation is a way of expressing really big numbers or really small numbers.

$$65{,}000\ \text{kg} \rightarrow 6.5 \times 10^4\ \text{kg}$$

Move decimal until there's 1 digit to its left.

Places moved = exponent.

Large # (>1) ⇒ positive exponent

Small # (<1) ⇒ negative exponent

DENSITY

13.6 g/cm^3

- **physical property - standard values are found in reference Table S**

$$d = \frac{m}{V}$$

d = density
m = mass
V = volume

- **1 ml = 1 cm^3**

$$\text{Density} = \frac{\text{mass (g)}}{\text{volume (cm}^3\text{)}}$$

Did you know……Density usually decreases as temperature increases because volume increases making the mass more spread out, but the total mass stays the same.

- **One exception is WATER …..Density decreases as the temperature decreases in water**

Density example

- **An object has a volume of 825 cm^3 and a density of 13.6 g/cm^3. Find its mass.**

GIVEN:	WORK:
$V = 825\ cm^3$ $D = 13.6\ g/cm^3$ $M = ?$ $D = \frac{M}{V}$	$M = DV$ $M = (13.6\ g/cm^3)(825 cm^3)$ **$M = 11{,}200\ g$**

Percent Error

- **Indicates accuracy of a measurement**
- **Formula on Reference Table T**

$$\% \text{ error} = \frac{\text{measured value} - \text{accepted value}}{\text{accepted value}} \times 100$$

- A student determines the density of a substance to be 1.40 g/mL. Find the % error if the accepted value of the density is 1.36 g/mL.

$$\% \text{ error} = \frac{|1.40 \text{ g/mL} - 1.36 \text{ g/mL}|}{1.36 \text{ g/mL}} \times 100$$

% error = 2.9 %

SI Base Units

Physical Quantity (Dimension)	Unit Name	Unit Abbreviation
mass	kilogram	kg
length	meter	m
time	second	s
temperature	kelvin	K
electric current	ampere	A
amount of substance	mole	mol
luminous intensity	candela	cd

SI Prefix Metric Conversions

(based on powers of 10)

move left

move right

Prefix	Symbol	Factor
Kilo-	k	10^{3}
Hecto-	h	10^{2}
Deka-	da	10^{1}
BASE UNIT	**g, l, m, s**	10^{0}
deci-	d	10^{-1}
centi-	c	10^{-2}
milli-	m	10^{-3}
micro-	μ	10^{-6}
nano-	n	10^{-9}
pico-	p	10^{-12}

The "Factor Label" Method

aka Dimensional Analysis

Steps:

1. **Identify starting & ending units.**
2. **Line up conversion factors so units cancel.**
3. **Larger metric unit gets a value of 1**
4. **Multiply all top numbers & divide by each bottom number.**
5. **Check units & answer.**

set up:

known value with unit x $\frac{\text{unknown unit}}{\text{known unit}}$

$$\text{cm} \times \frac{\text{m}}{\text{cm}} = \text{m}$$

Table C
Selected Prefixes

Factor	Prefix	Symbol
10^{3}	kilo-	k
10^{-1}	deci-	d
10^{-2}	centi-	c
10^{-3}	milli-	m
10^{-6}	micro-	μ
10^{-9}	nano-	n
10^{-12}	pico-	p

Ex. A rattlesnake is 2.44 m long. How long is the snake in cm?

set up: known value with unit x $\frac{\text{unknown unit}}{\text{known unit}}$

$$2.44\ \text{m} \times \frac{\text{cm}}{\text{m}} = \text{cm}$$

**Larger metric unit gets a value of 1*

$$2.44\ \cancel{\text{m}} \times \frac{100\ \text{cm}}{1\ \cancel{\text{m}}} = ?\ \text{cm}$$

$$= 244\ \text{cm}$$

Table C
Selected Prefixes

Factor	Prefix	Symbol
10^{3}	kilo-	k
10^{-1}	deci-	d
10^{-2}	centi-	c
10^{-3}	milli-	m
10^{-6}	micro-	μ
10^{-9}	nano-	n
10^{-12}	pico-	p

Practice: *set up:* known value with unit x $\frac{\text{unknown unit}}{\text{known unit}}$

1) 20 cm to m

2) 500 ml to L

3) 0.032 L to mL

4) 45 m to km

5) 805 dm to km

6) 81 cm to mm

7) 5.29 cs to s

8) 3.78 kg to g

Graphs should contain the following features:

- Independent variable in the X axis (with units)
- Dependent variable on the Y axis (with units).
- Uniform numerical scale
- Include a title: (Dependent Variable) vs. (Independent Variable)
- Data points, circled with "point protectors".
- Data points connected with a line or a best fit line

Done on graph paper in pencil or on the computer