8th Grade Science-Uddo
Math in science notes

Name: _____
Date: _____ Class Period: _____

The Metric System

- The two systems of measurement used in the world are _____ and _____
  - The US uses the _____ system
  - Most other countries use the _____ system
    - The metric system is based on powers of _____

English Units of Measure (and what they measure)	Metric Units of Measure (and what they measure)

- In science we **only** use the _____ system of measurement to collect data
  - Examples of units of measure in the metric system:
    - Length -- _____, centimeters, kilometers, the base unit is the meter
    - Mass- _____, milligrams, the base unit is the gram
    - Volume – liter, _____ the base unit is the liter

Converting with in the metric system

- When moving from one unit to a _____ unit

No. of units moved	Unit multiplied by
1	0.1
2	0.01
3	0.001
4	0.0001
5	0.00001
6	0.000001

1mm = .1cm
1 mm = .01 dm
1mm = .001 m
1mm = .0001dkm
1mm = .00001 hm
1mm = .000001 km

- When moving from one unit to a _____ unit

No. of units moved	Unit multiplied by
1	10
2	100
3	1000
4	10000
5	10000
6	100000

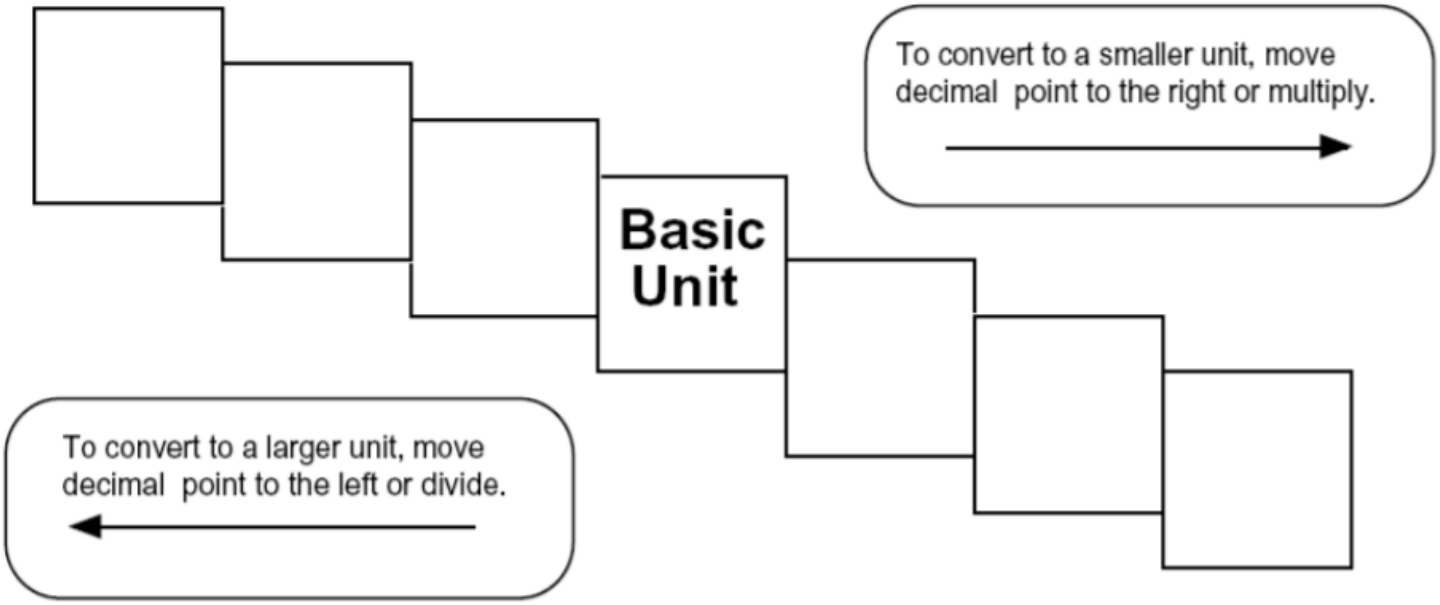
.1 cm = 1mm
.01 dm = 1 mm
.001m = 1mm
.0001dkm = 1mm
.00001 hm = 1mm
.000001 km = 1mm

There is an easier way to convert in the metric system!!!

You just have to remember this mnemonic device and fill in the stair steps….

King **H**enry **D**ied base unit **D**rinking **C**hocolate **M**ilk

Fill in the boxes in the stair step diagram.



In Class Practice

1.) 4 km = _____ m

2.) 2000 mg = _____ g

3.) 104 km = _____ m

4.) 480 cm = _____ m

5.) 5.6 kg = _____ g

6.) 8 mm = _____ cm

7.) 5 L = _____ mL

8.) 198 g = _____ kg

9.) 75 mL = _____ L

10.)50 cm = _____ m

11.) 5.6 m = _____ cm

12.) 16 cm = _____ mm

13.)2500 m = _____ km

14.) 65 g = _____ mg

15.) 6.3 cm _____ mm

16.)120 mg = _____g

Compare using >, < or =

17.)63 cm _____ 6 m

18.) 536 cm _____ 53.6 dm

19.) 5 g _____ 508 mg

19.)43 mg _____5 g

20.) 1500 mL _____ 1.5 L

21.) 3.6 m _____ 36 cm

Graphs and Graphing

First let's review….

https://www.youtube.com/watch?v=l0jTMDtX4WY

Experimental Design

Experiments are made up of two groups:

1.) Control Group - _____

2.) Experimental Group - _____

Variables

- Independent Variable- _____
- Dependent Variable - _____

A little practice--Identify the independent variable and dependent variable in each scenario.

1.) Does adding dimples to a car increase its gas mileage?
   a. Independent variable _____
   b. Dependent variable _____
   c. Control Group _____

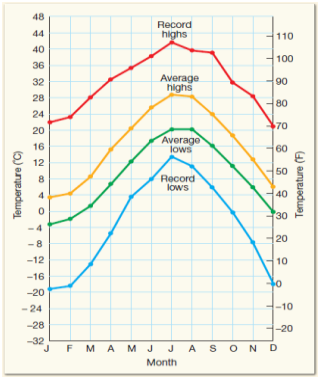
2.) Are elephants afraid of mice?
   a. Independent variable _____
   b. Dependent variable _____
   c. Control Group _____

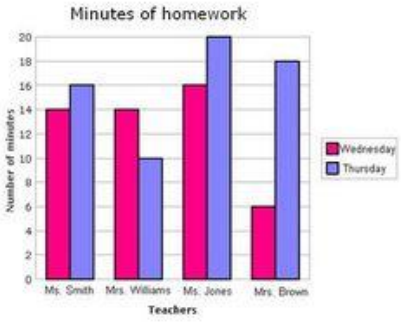
3.) Can a rock thrown in a lawn mower have the same force as a bullet shot from a gun?
   a. Independent variable _____
   b. Dependent variable _____
   c. Control Group _____

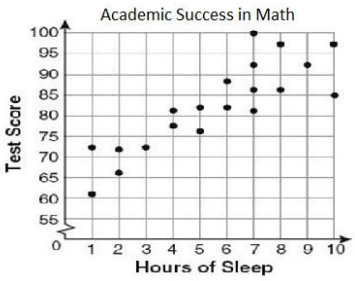
4.) Is it worth running in the rain?
   a. Independent variable _____
   b. Dependent variable _____
   c. Control Group _____

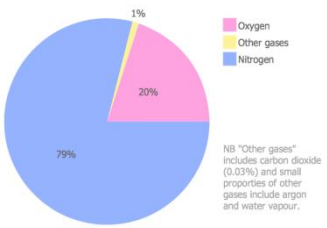
Types of graphs

1.) Line graph - _____
2.) Bar graph - _____
3.) Scatter plot - _____
4.) Circle graph - _____









Parts of the graph

When creating graphs in science make sure to follow the _____ checklist

Scale- graph should take up _____ page (>80%), each line is worth the _____ value, the numbers are _____ spaced; allows us to see the _____ in data easily

How to find the proper scale (for most cases)

1.) Count the number of _____ on each axis and jot that number down somewhere.

2.) Divide the range (range is _____ between the highest value and the lowest value for that data set) by the number of boxes on that axis.

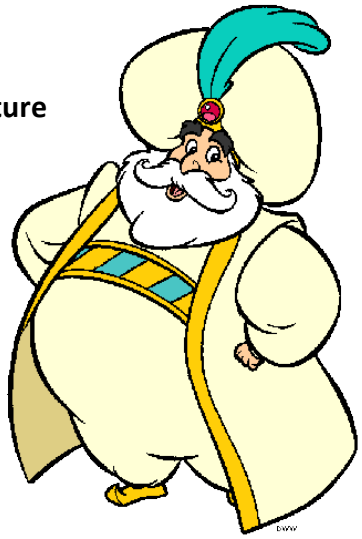
If the number is a decimal you will always _____ _____ to the next whole number.
You have to round up to keep your graph inside your axes, if you do not your data will go off of the page.

This number will be your scale for that particular axis.
**This step also has to be followed for each separate _____.

Scale = Range / Number of Boxes

Units- what the _____ on the scale are measuring, (m), (s), (^{o}C)

Labels- Describes what is being _____; length, time, temperature



Labeled Axis (title AND units)

a. X axis = _____ variable
b. Y axis = _____ variable

c. Remember DRY MIX
   i. D- _____
   ii. R - _____
   iii. Y - _____

   iv. M - _____
   v. I - _____
   vi. X - _____

Title- Placed across the top of the graph, short _____ of what the graph shows; DO NOT simply restate the _____ and _____ variables; ie. Number of waves vs. Time

Accuracy - data is plotted precisely, _____ included if necessary

Neatness – lines drawn with a _____, easy to read

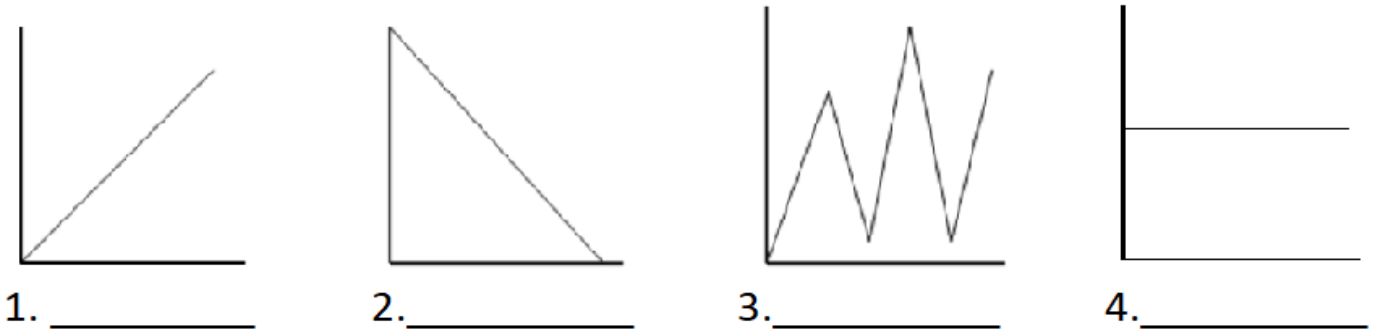
Line Graphs

- Used to show a _____ _____ _____
- Shows how the dependent variable is related to or changes due to the independent variable

Line Graph Relationships

- Descriptions of how two variables _____ to each other
  - Direct Relationship – BOTH variables _____ or BOTH variables _____
  - _____ – Pattern on graph repeats over time
  - Static – As the independent variable _____, the dependent variable _____ _____ _____
  - _____ Relationship – When one variable increases, the other decreases

Label the graphs below with the relationships from above



1. _____ 2._____ 3._____ 4._____

Determine which graph relationship (Direct, Indirect, Cyclic, Static) would illustrate the following data

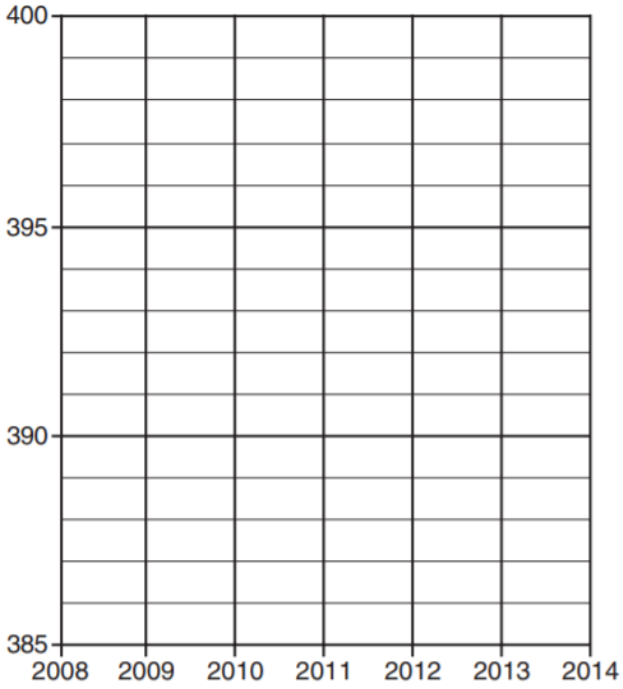
1.) Frequency of ocean tides _____
2.) As temperature increases, density decreases _____
3.) Seasonal Temperatures _____
4.) As mineral size increases, density stays the same _____
5.) Plants grow more with more sunlight _____

Let's Practice making a line graph….make sure to check <u>SULTAN</u> so that ALL required parts are included

1.) The data table shows the average level of atmospheric carbon dioxide (CO2), measured in parts per million (ppm), for the month of February at the Mauna Loa observatory in Hawaii from 2008 to 2014.

Create a graph that correctly represents this data
DON'T FORGET SULTAN

Year	Average February Atmospheric CO_2 Levels (ppm)
2008	386
2009	387
2010	390
2011	392
2012	394
2013	396
2014	398



a. What type of relationship is shown on the graph?

_____

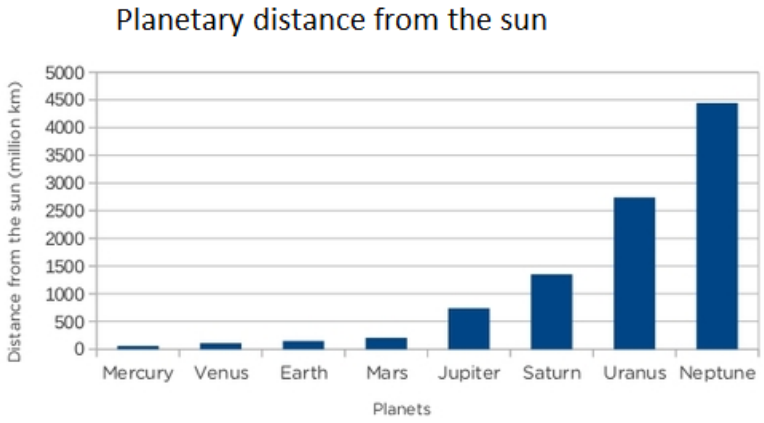
_____

b. What is the dependent variable?

_____

Bar Graphs ⟶

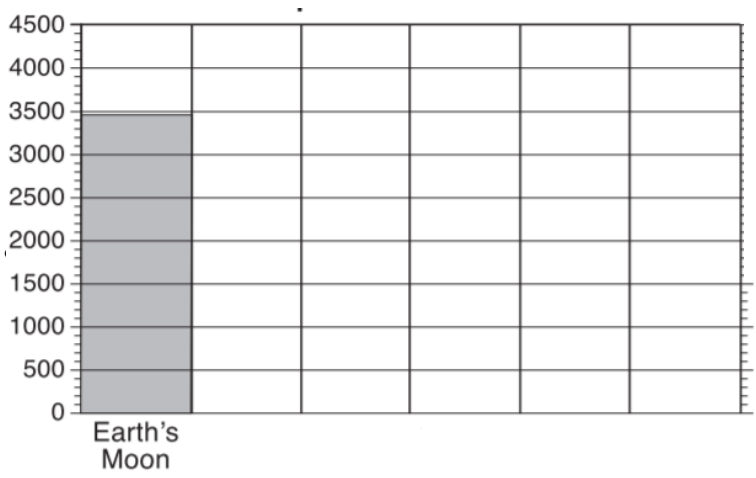
- Used to _____ things, good for _____
- If there is data for multiple groups, bars can be side by side or _____
- If there are multiple bars for a category a _____ is necessary



Let's Practice making a bar graph….make sure to check <u>SULTAN</u> so that ALL required parts are included

2.) The table below shows information about five large object in the Kuiper Belt. The Kuiper Belt is located approximately 30-100 astronomical units (AU) from the Sun. An astronomical unit is the average distance between the Earth and the Sun, 149.6 million kilometers.

Create a graph of the equatorial diameter of each of the Kuiper Belt objects listed in the table. The diameter of Earth's moon has been graphed for comparison.



Kuiper Belt Data

Kuiper Belt Objects	Orbit Characteristics: Closest Distance to the Sun (AU)	Orbit Characteristics: Farthest Distance from the Sun (AU)	Orbit Characteristics: Eccentricity	Approximate Equatorial Diameter (km)
Varuna	40.47	45.13	0.053	900
Eris	37.77	97.56	0.442	2400
Quaoar	41.92	45.28	0.039	1260
Sedna	76.15	975.05	0.855	1500
Ixion	30.04	49.36	0.243	1065

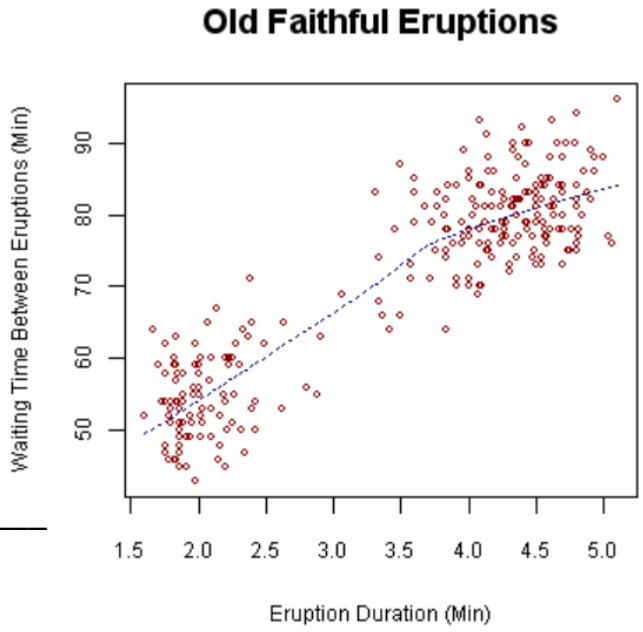
Scatter Plot

- Used to determine if there is a _____ or relationship between two variables

  a. _____**Correlation-** as one variable increases so does the other

  b. **Negative Correlation**- as one variable goes _____, the other goes _____

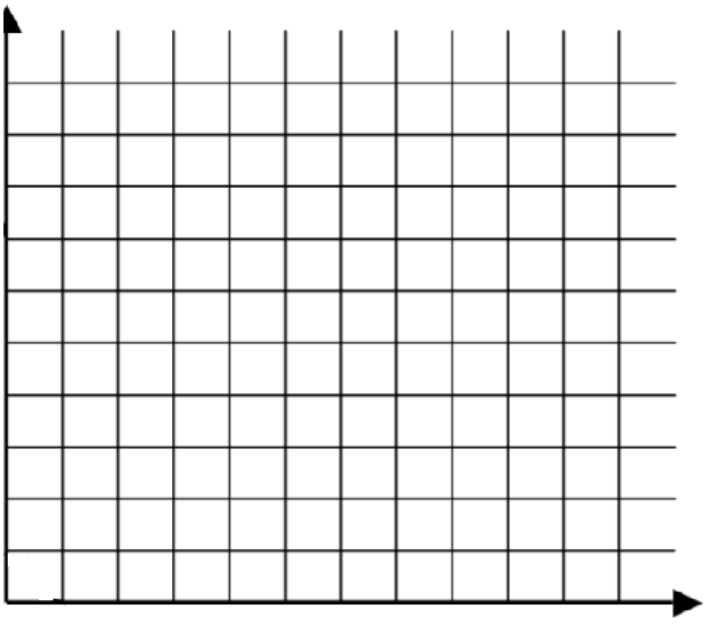
  c. **No correlation**- no apparent _____ between the variables



Let's Practice making a scatter plot….make sure to check SULTAN so that ALL required parts are included

3.) Assume that during a three-hour period spent outside, a person recorded the temperature and their water consumption. The experiment was conducted on 9 randomly selected dates during the summer. The data shown is shown in the table below.

Day	Temperature (^{o}F)	Water Consumption (oz)
1	99	48
2	85	27
3	97	48
4	75	16
5	92	32
6	85	25
7	83	20
8	92	40
9	83	23

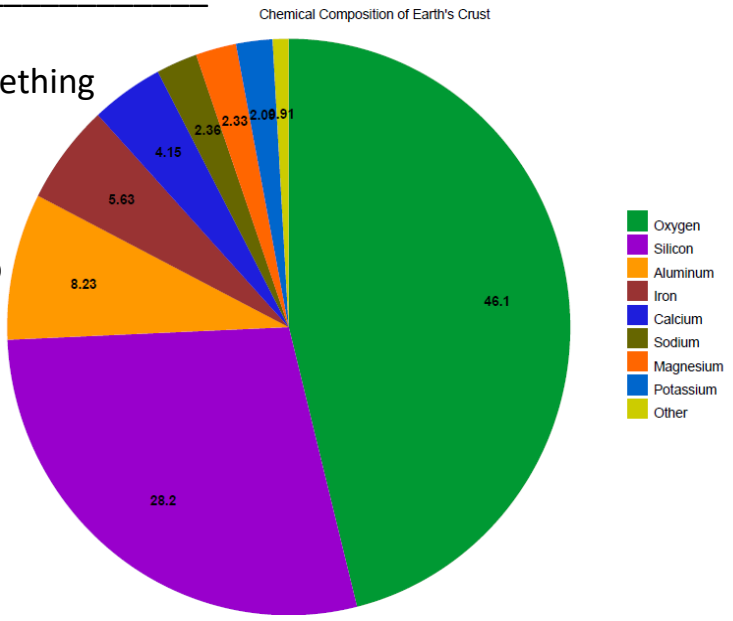


Circle one:

This graph shows a **Positive / Negative/ No correlation** between the data

Circle Graphs

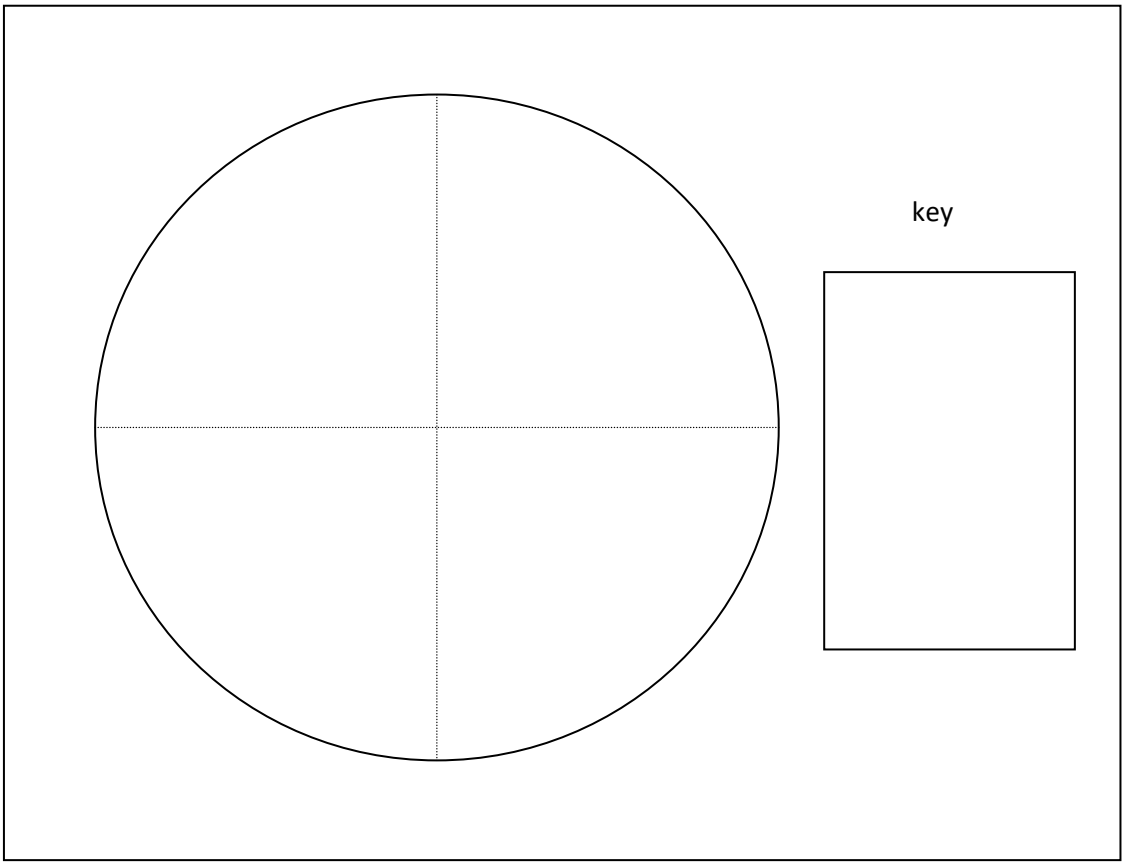
- Used to show parts of a whole – look for _____
- Good for showing the _____ of something
- Always include a _____
- Your _____ should be the value assigned to each slice



Let's Practice making a pie graph….make sure to check <u>SULTAN</u> so that ALL required parts are included

Make a pie chart to display the percentage of runs at Snow Ridge Ski Area. Some dashed lines have been placed in the chart to help you be as accurate as possible

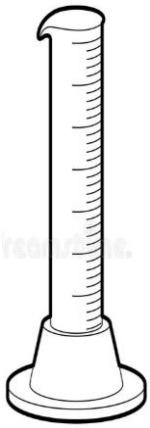
<u>Snow Ridge Ski Area</u>	
Beginner	50%
Intermediate	25%
Advanced	15%
Expert Only	10%



Mass, Volume and Density

Mass

- The amount of _____ in something
- Units = _____
- Tool used to measure = _____



Volume

- The amount of _____ something takes up
- Units = _____ or _____
- Tool used to measure = _____ or _____ _____

Two methods for finding volume:

1.) ***Regular object*** *(regular object =* _____*sides)*

- Use a ruler or meter stick and measure _____, width and _____

- Formula = _____

  cm x cm x cm = cm^3 → we measured _____ dimensions so units are _____

2.) _____ ***object*** *(for example a mineral or rock)*

- _____ _____– use a graduated cylinder

  1. Fill _____ _____ with water, leave room at the top, note the amount of water
  2. Put object in graduated cylinder, note new water level
  3. _____ value in #1 from value in #2
  4. Your answer for #3 is the volume with _____ as the units

Density

- The amount of _____ in a specific _____
- Can be used to help identify an _____ substance
- Units = _____or _____
- Tools used to measure = _____, and _____ or _____ _____
- Density of water is _____ or _____
  a. If an object is placed in water and _____, its density is _____ than 1 g/cm^3

  b. If an object is placed in water and it _____, its density is _____ than 1 g/cm^3

Density Formula

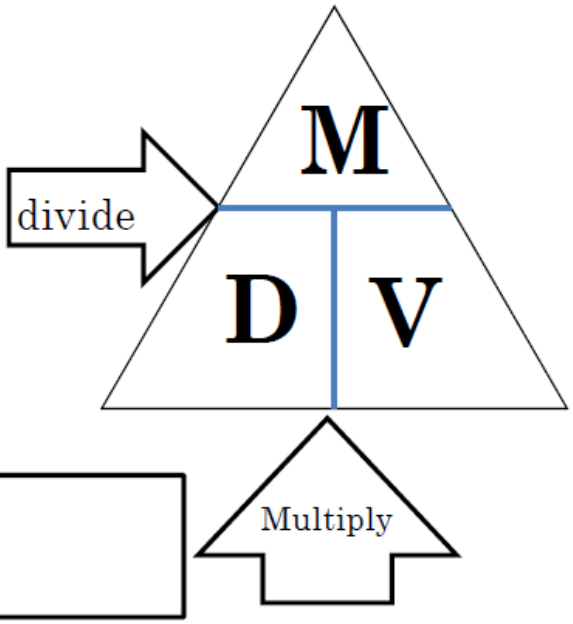
Using the one density formula you can rearrange the variables to solve for any factor.

Use the Density Triangle to complete the formulas below.

Density =

Volume =

Mass =



** Density of an _____ no matter how many pieces it's broken in to! **

Let's do some examples—for credit you must

a. **Write the formula**
b. **Show all work**
c. **Round to the nearest hundreth's place**
d. **Include proper units**

1.) What is the density of an object with a mass of 120 g and a volume of 7 mL?

2.) What is the volume of an object with 220 grams and a density of 55 g/cm^3?

3.) A block of wood has a mass of 180 grams. It is 10.0 long, 6.0 cm wide, and 4.0 cm thick. What is its volume and density?

4.) Mass = 34.1 g
Volume = 78.5 mL
Density = ?

5.) Mass = 27 g
Density = 0.76 g/cm3
Volume = ?

6.) Volume = 25 mL
Density = 2.5 g/mL
Mass = ?

Review--Measurement Table

Property	**Tool**	**Units**	**Formula**
Mass			
Volume (regular object)			
Volume (irregular object)			No formula but what is the method?
Density			
Length			