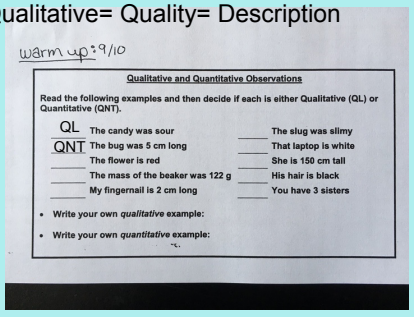
Warm Up: Glue into the RIGHT side. Then, try to answer the questions using the following as your guide.

Quantitative vs. Qualitative Observations:

Quantitative= Quantity= #s

Qualitative= Quality= Description



warm up: 9/10

Qualitative and Quantitative Observations

Read the following examples and then decide if each is either Qualitative (QL) or Quantitative (QNT).

QL	The candy was sour	____	The slug was slimy
QNT	The bug was 5 cm long	____	That laptop is white
____	The flower is red	____	She is 150 cm tall
____	The mass of the beaker was 122 g	____	His hair is black
____	My fingernail is 2 cm long	____	You have 3 sisters

- Write your own *qualitative* example:
- Write your own *quantitative* example:

What is a qualitative observation?

Observation that uses only words to describe something.

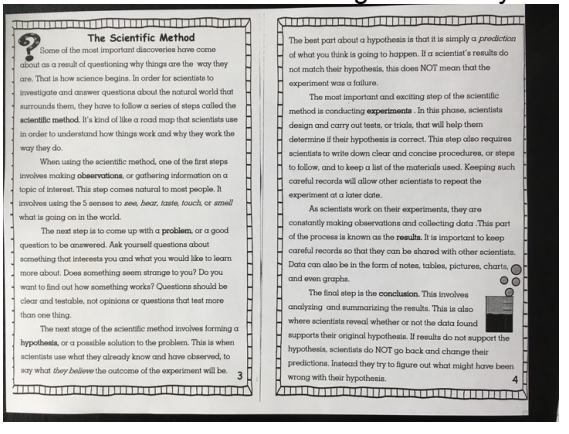
- The puppy is ~~soft and~~ brown.

What is a quantitative observation?

Observation that uses numbers as well as words to describe how much of something there is.

- The puppy is 32 cm tall and weighs 15 kg.

Read & Annotate the reading individually.



The Scientific Method

Some of the most important discoveries have come about as a result of questioning why things are the way they are. That is how science begins. In order for scientists to investigate and answer questions about the natural world that surrounds them, they have to follow a series of steps called the **scientific method**. It's kind of like a road map that scientists use in order to understand how things work and why they work the way they do.

When using the scientific method, one of the first steps involves making **observations**, or gathering information on a topic of interest. This step comes natural to most people. It involves using the 5 senses to *see, hear, taste, touch,* or *smell* what is going on in the world.

The next step is to come up with a **problem**, or a good question to be answered. Ask yourself questions about something that interests you and what you would like to learn more about. Does something seem strange to you? Do you want to find out how something works? Questions should be clear and testable, not opinions or questions that test more than one thing.

The next stage of the scientific method involves forming a **hypothesis**, or a possible solution to the problem. This is when scientists use what they already know and have observed, to say what *they believe* the outcome of the experiment will be. 3

The best part about a hypothesis is that it is simply a *prediction* of what you think is going to happen. If a scientist's results do not match their hypothesis, this does NOT mean that the experiment was a failure.

The most important and exciting step of the scientific method is conducting **experiments**. In this phase, scientists design and carry out tests, or trials, that will help them determine if their hypothesis is correct. This step also requires scientists to write down clear and concise procedures, or steps to follow, and to keep a list of the materials used. Keeping such careful records will allow other scientists to repeat the experiment at a later date.

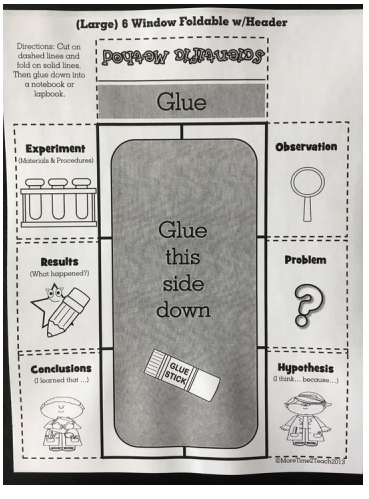
As scientists work on their experiments, they are constantly making observations and collecting data. This part of the process is known as the **results**. It is important to keep careful records so that they can be shared with other scientists. Data can also be in the form of notes, tables, pictures, charts, and even graphs.

The final step is the **conclusion**. This involves analyzing and summarizing the results. This is also where scientists reveal whether or not the data found supports their original hypothesis. If results do not support the hypothesis, scientists do NOT go back and change their predictions. Instead they try to figure out what might have been wrong with their hypothesis. 4

When you finish...

Scientific Method Foldable:

-Cut all dotted lines - Glue into the ***left side*** of your ISN.



(Large) 6 Window Foldable w/Header

Directions: Cut on dashed lines and fold on solid lines. Then glue down into a notebook or lapbook.

Scientific Method

Glue

Experiment (Materials & Procedures)

Observation

Glue this side down

Results (What happened?)

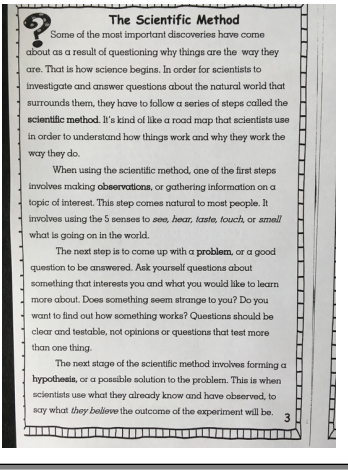
Problem

Conclusions (I learned that ...)

GLUE STICK

Hypothesis (I think... because...)

Let's go through the reading together, writing important information in our foldable!



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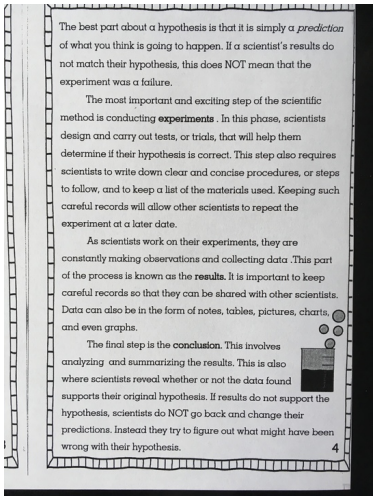

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4

Is the observation qualitative or quantitative?

Warm Up: NEW next page (pg 10)

Oobleck Lab Conclusion

RERUN

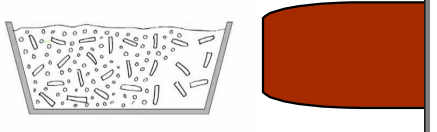
- **Recall:** *Describe* what you did during the Oobleck lab.
  - > What did you make?
  - > How did you make it?
  - > What did you do with it and what happened?
- **Explain:** *Explain* the purpose of the study.
  - > How did you use the scientific method during the lab?

Oobleck Lab Explanation

How did it's liquid-like and solid-like properties correspond to how quickly or slowly you moved the oobleck?

Sir Isaac Newton proposed that fluids should flow at a predictable, constant rate. While this is true for many fluids, like water, some fluids like our oobleck behave differently when different rates of forces are applied to them. These types of fluids are called "non-Newtonian" fluids.

What forces did you apply, and how did the Oobleck react?



RERUN

- **Results:** State the results, including which hypothesis was supported by the study.
  - > Was your hypothesis correct? Why/ Why not?
- **Uncertainty:** Describe uncertainties that exist, if any.
  - > Is there anything you still do not understand?
- **New:** Write two new things you learned.

Physics

If it's green or wriggles, it's biology.
If it stinks, it's chemistry.
If it doesn't work, it's physics!

Physics Anticipation Guide

- Fill out the anticipation guide for the Physics Unit.
  - > Indicate whether or not you agree or disagree with the statement by circling the appropriate shuttle.
  - > Fold and glue into your ISN.
  - > Write: **PHYSICS- Force & Motion** on front.

Let's read through the basics of force and motion.

Warm Up

1.) What is motion?

-the state in which the distance from another object is changing; a change in position

2.) Explain why everything is constantly in motion.

-because the Earth is in constant motion as it rotates around the sun, so everything on Earth moves with it

3.) What type of object makes a better reference point?

-a stationary object

Warm Up: Think-Pair-Share

-No writing today- just talking! (on topic) ;)

1.) How do you describe "motion" in your own words?

-the state in which the distance from another object is changing; a change in position.

2.) Describe where you are located in the classroom to your partner.

3.) Discuss why you think we are constantly moving, even if we are sitting still?

-because the Earth is in constant motion as it rotates around the sun, so everything on Earth moves with it

Key Terms- Copy Notes on Right

Direction: a position to which motion or another position is referred.

Motion: change in position

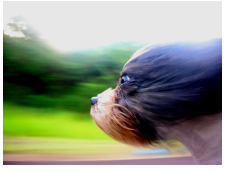
Position: a condition with reference to place or location

Speed: rate of change of an object's position

Glue Motion Notes Under Key Terms

- Motion is defined as *the state in which the distance from another object is changing.*
  - > Motion is typically determined by use of stationary reference points.
    - > Reference points are *a place or object used for comparison to determine if something is in motion.*
      - – *Stationary* or permanent fixed objects *make good reference points* because their position is fixed, it doesn't change.
      - – *Moving objects make poor reference points* because objects in motion make it difficult to determine the motion of another object.

- Relative motion
  - > Motion depends on the reference point that you choose.
  - > All things are in constant motion.
    - – This is due to the fact that the *Earth is in constant motion around the sun*.
    - – Everything on Earth is moving at the same speed (30 km/s) however, *because it is all riding on Earth and traveling at the same speed even "stationary" objects appear to not be moving*.



Left Side Output

Use the **Key Terms & Underlined words** from your notes to fill in your vocabulary chart. This should be on the LEFT side of your ISN.

Term	Definition	Your Words	Drawing

Warm Up

1.) How do we measure speed in a car?

mph or miles per hour
miles/hours
miles divided by hours

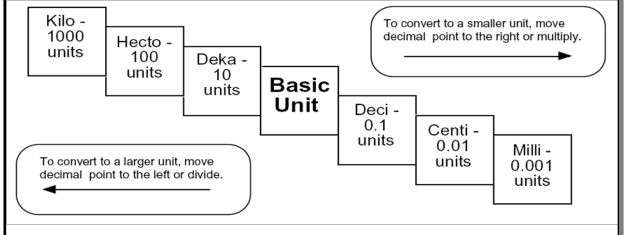
2.) What are other units of measurement? (think cooking, rulers, etc.)

- cups, ounces, feet & inches, meters, gauss, liters, pounds, grams, etc.

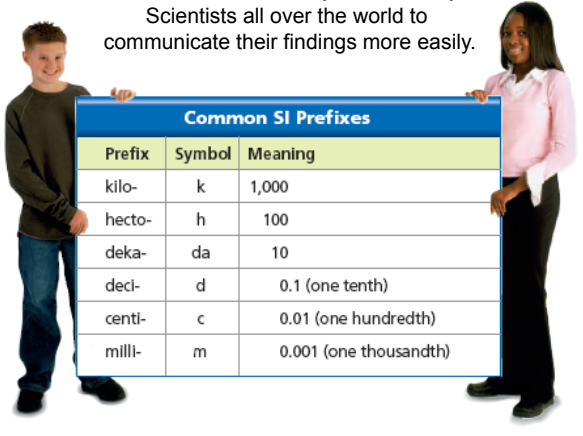
3.) How tall are you?

Before going any further in physics... we need to review and practice our math skills with conversions and units!

Remember this?



The SI system of measurement is a version of the metric system used by Scientists all over the world to communicate their findings more easily.



Common SI Prefixes

Prefix	Symbol	Meaning
kilo-	k	1,000
hecto-	h	100
deka-	da	10
deci-	d	0.1 (one tenth)
centi-	c	0.01 (one hundredth)
milli-	m	0.001 (one thousandth)

- What are the basic units of measurement in the SI system?
  - meter, liter, gram
- What number is the SI system based upon?
  - 10
- Why do we use this system in science?
  - Scientists use this common system to easily convert numbers and share data all of the world. The sharing of information would be much more difficult if we all used different systems.

- What is the French name for the S.I. System?
  - Systematic International
- What do the following prefixes mean....
  - Kilo- 1,000
  - Centi- 1/100
  - Milli- 1/1,000
- What is the basic unit in the S.I system for the following?
  - Length- Meter
  - Mass- Gram
  - -Volume- Liter

Pneumonic Device

King	Kilo-	KiloMeter	km
Henry	Hecto-	HectoMeter	hm
Died	Deca-	DecaMeter	dam
By	BASE	Meter	m
Drinking	Deci-	DeciMeter	dm
Chocolate	Centi-	CentiMeter	cm
Milk	Milli-	MilliMeter	mm

Now, let's practice!

- At your table, you should have 1 covered worksheet, 1 dry erase marker, and 1 calculator.
- Work together to get as many calculations completed as you can.
- Be ready to get called on as we go over the answers in class!

Metric Olympics

Read Over your Lab sheet.

Warm Up

1.) Convert 5.23hm to cm: 52300.0cm

2.) Convert 730mg to g: .730g

3.) Convert 4kl to ml: 4000000.0ml

4.) Using the formula d=m/v, calculate density with a mass of 150g and a volume of 125cm^3 d=1.2g/cm^3

More Practice

Work together with your seat partner to complete questions 10-14 on the "Customary to SI" conversion side of the worksheet.

Now that we have finished conversions, let's move on to more physics!

Warm Up

1.) Why do you think direction is more important when flying in an airplane than driving in a car?

52300.0cm

.730g

2.) If you litter, and drop a piece of paper out of your car window while you are driving, will the paper go straight down, fly backwards or fly forward?

4000000.0ml

$d=1.2 g/cm^3$

• Speed

> Ratio of the distance traveled to the time it takes.

> The unit for distance is always the unit for distance in the problem over the unit for time given in the problem.

> Speed typically measured in m/s in S.I. system & mi/hr. in the Customary System.

> Ex.) A cyclist traveled 50 km in 2 hours.

$Speed = Dist./Time$

$Speed = 50km/2hr$

Answer:

$Speed = 25\ km/hr$

> The speed formula can be manipulated to solve for both time & distance.

$Time = Dist./Speed$ $\qquad$ $Dist. = Speed \times Time$

> Speed typically is not always constant.

– Average speed: is the overall rate at which an object travels.

« To determine average speed you take the total distance divided by the total time including any stops or breaks.

$Avg.Speed = Tot.Dist./Tot.Time$

> Instantaneous Speed Video! -->

– Rate an object is moving at a particular instant or moment in time.

Warm Up

1.) What is the speed of a car that traveled 120 km in 2 hours?

60 km/hr

2.) How long does it take for a car to travel 75 miles while traveling at 45 mi/hr?

1.6 hr

3.) What is the difference between average speed and instantaneous speed?

An objects <u>average speed</u> is the overall rate with which that object traveled (including any breaks); <u>instantaneous speed</u> is an object's speed at a particular time or location.

• Velocity

> Is the speed of an object in a given direction.

> If the speed changes, either increases or decreases, then the velocity changes.

> If the direction changes then the velocity changes.

Video! -->

• Slope

> The steepness of a line on a graph.

> Tells how fast one variable is changing in relation to the other.

> In a distance versus time graph the steeper the slope the greater the speed.

> A constant slope means a constant speed.

Let's Practice Calculating Speed

You will work through the worksheet in sections. Be prepared to be called upon.

Basic:

-Work independently without a calculator.

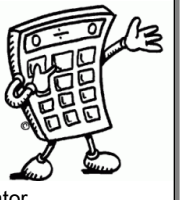
-Check answers with a calculator.

Intermediate:

-Work independently with a calculator.

Challenge:

-Work with seat partner and with a calculator.



Warm Up

1.) What is the difference between speed and velocity?

velocity is speed but includes the direction in which the object is traveling

2.) What is the formula for slope?

$$Slope = \frac{y_2 - y_1}{x_2 - x_1}$$

3.) What is the symbol for "a change in"?

a triangle

Warm Up

Make sure your lab sheets are turned in!

Warm Up

Make sure your homework is turned in!

1.)

2.) What is the speed of an object that travels 52km in 20 mins?

3.) How far does an object go if it is traveling at 32 mi/hr for 2 hours?

Marble Madness Lab

- You will work in your cooperative groups to complete the lab activity.
- Group Roles:
  - > Group Leader
  - > Time Keeper
  - > Distance Measurer
  - > Ramp Holder/Marble Retriever

- **You will be responsible for completing your own lab sheet. All boxes must be filled in, all questions must be answered, and both graphs must be complete and attached. Lab sheets are due on Wednesday!**

- **Acceleration**
  - > in everyday terms it's described as the process of "*speeding*" up.
  - > Scientifically it is the rate a which velocity changes.
  - > Velocity is speed in a given direction and can change in 3 ways.
    - > Increase speed
    - > Decrease speed
    - > Change directions

Video! -->

  - > Deceleration is "*negative*" acceleration.

- **Calculating acceleration**

$$Acc. = \frac{Fin.Spd - Int.Spd}{Time}$$

  - Fin. Spd = the final speed of the object.
  - Int. Spd = the beginning or initial speed of the object.
  - Time = the overall time it takes.

  - > Ex.) An airplane reaches a take off speed of 70 m/s in 15 seconds, how fast is the plane accelerating?

$$Acc. = \frac{70\,m/s - 0\,m/s}{15s} \qquad Acc. = \frac{70\,m/s}{15s} =$$ Answer

The unit for acceleration incorporates the unit for speed with the unit for time squared.

  - Ex.) m/s^2 Ex.) mi/hr^2 Ex.) km/day^2

Variations on the acceleration formula given, speed & time.

$$\text{Acceleration} = \frac{\text{Final speed} - \text{Beginning speed}}{\text{Time}}$$

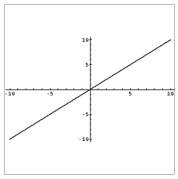
Finding acceleration --> $a = \frac{v_2 - v_1}{t}$

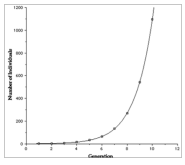
Finding final speed --> $v_2 = v_1 + (a \times t)$

Finding time --> $t = \frac{v_2 - v_1}{a}$

Finding beginning speed --> $v_1 = v_2 - (a * t)$

- **Graphing acceleration**
  - > Can be displayed on both a distance versus time graph & a speed versus time graph.
    - – Distance vs. Time
      - « The slope of the line will indicate the acceleration or deceleration *between* the points.
    - – Speed vs. Time
      - « The *exponential curve* will indicate the acceleration or deceleration between points.
      - « The exponential curve also indicates that with each second you are traveling farther than you did the previous second.





Warm Up

1.) What is acceleration?
- the rate at which velocity changes; speeding up

2.) What is negative acceleration?
- slowing down; deceleration

3.) Calculate the acceleration of an object as it goes from 5 m/s to 20 m/s in 18 seconds.
- .83 m/s^2

Quiz Time!

- When you have completed your quiz, turn it over and place it on the corner of your desk.
- Work on the acceleration worksheet.
- The worksheet will be homework if not completed in class.

Let's Practice!

How Fast Are You?

Balancing Act Demo

Watch as I squeeze the bottle.

What happened?

What forces are being applied?

When I placed the cup on the bottle, the force of gravity was pushing down. Squeezing the bottle forced air up into th cup, causing the cup to move up, and then back down due to gravity. Air resistance or Friction is also acting upon them.