Essential Learning: I can use the scientific method to solve problems.

How do I use the scientific method in my everyday life.

1. State and define the PROBLEM.

2. Make a HYPOTHESIS. A hypothesis is a possible solution based on what you already know. It is also called a PREDICTION or EDUCATED GUESS.

3. Test your hypothesis by doing an EXPERIMENT.

4. Study and ANALYZE the RESULTS. Did your hypothesis work? If not, if must be changed and tested again.

5. State the CONCLUSION. Explain your solution to the problem.

Essential Learning: I can use the scientific method to solve problems.

How do I write a <u>Hypothesis?</u>

-Use If, then statements

-If _____ [*I do this*], then _____ [*this will happen*]

-Focus on one variable only.

Why do we only test one variable?

To make sure that it is a fair test and scientific.

Essential Learning: I can use the scientific method to solve problems.

Susan said, "If I fertilize my geranium plants, then they will blossom."

Jose saw bats catching insects after dark. He asked, "How do bats find the insects in the dark?"

Scott said, "If acid rain affects plants in a particular lake, then it will affect small animals like crayfish that live in the same water."

Essential Learning: I can use the scientific method to solve problems.

How do I set up a valid Experiment?

-You can only change one variable at a time for a fair test.

-These are the steps you will use to test your hypothesis over and over.

Three types of variables:

Independent: This is what is tested and changed.

Dependent: This is what is observed, measured and the effect caused by the Independent variable.

Control: These are not changed, kept constant and allow for a fair test.

Essential Learning: I can use the scientific method to solve problems.

Kathy used a survey to determine how many of her classmates were left-handed and how many were right-handed.

Alice soaked six different kinds of seeds in water for 24 hours. Then she planted the seeds in soil at a depth of I cm. She used the same amount of water, light, and heat for each kind of seed.

Bob placed different kinds of seed into a bird feeder to see the variation of bird species.

Essential Learning: I can use the scientific method to solve problems.

Analyze and Record your data.

-Record your data in a data table.

-Reduce the data

-Average (Mean)

-Graph

Graph the data to look for trends & relationships.

Essential Learning: I can use the scientific method to solve problems.

What is a Conclusion:

-Summary of your experiment.

-After your experiment, analyze your data to see if your hypothesis was accepted or rejected.

-If hypothesis is rejected, give possible reasons for the difference between your hypothesis and the experimental results.

-Then start over again by tweaking one or the other.

Essential Learning: I can use the scientific method to solve problems.

Time to test out the Scientific Method with Thumb Wars.

Question: Which trait is best to help someone win a thumb war tournament?
Three choices: Wrist C. Thumb C, Thumb Length

Hypothesis:If_____, then_____.

Example: If a person has a thumb longer then 5 cm, then they will win.

Essential Learning: I can use the scientific method to solve problems.

The Rules!!!!!!!!!

Procedures: To play the game, a player hooks the four fingers of their right (or left) hand to the four fingers of the other players right (or left) hand and clasps firmly. To start the game both student say "one, two, three, four, I declare a thumb war." Both students try to *trap, pin, or capture* the opponent's thumb for three seconds to win. Females play females and males play males. Students can conduct only one thumb war per round. No cheating! Twisting the opponent's arm, use of the opposite hand, or use of the index finger is not allowed. When the thumb is pinned, the counting should be at the same speed. Students should not hurt the other student.

Materials: Ruler, String and Notebook.

Essential Learning: I can use the scientific method to solve problems.

Experient Data: use cm. Tally your wins and loses. When you lose three times go back to your desk.

Your measurements -
Wrist: _____Thumb circumference: _____Thumb length: _____

Independent variable (IV): _____
Dependent variable (DV): _____
Controlled variables:_____

We will finish this after we talk about Graphs.

Essential Learning: I can use the the metric system to take measurements accurately.

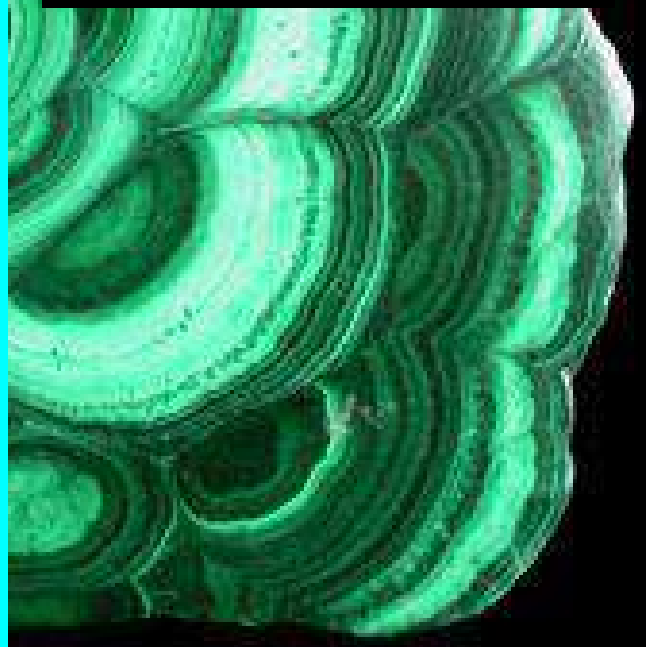
In the late 1700's, the French Academy of Sciences set out to make a simple and reliable measurement system.

Over the next 200 years, the metric system was formed.

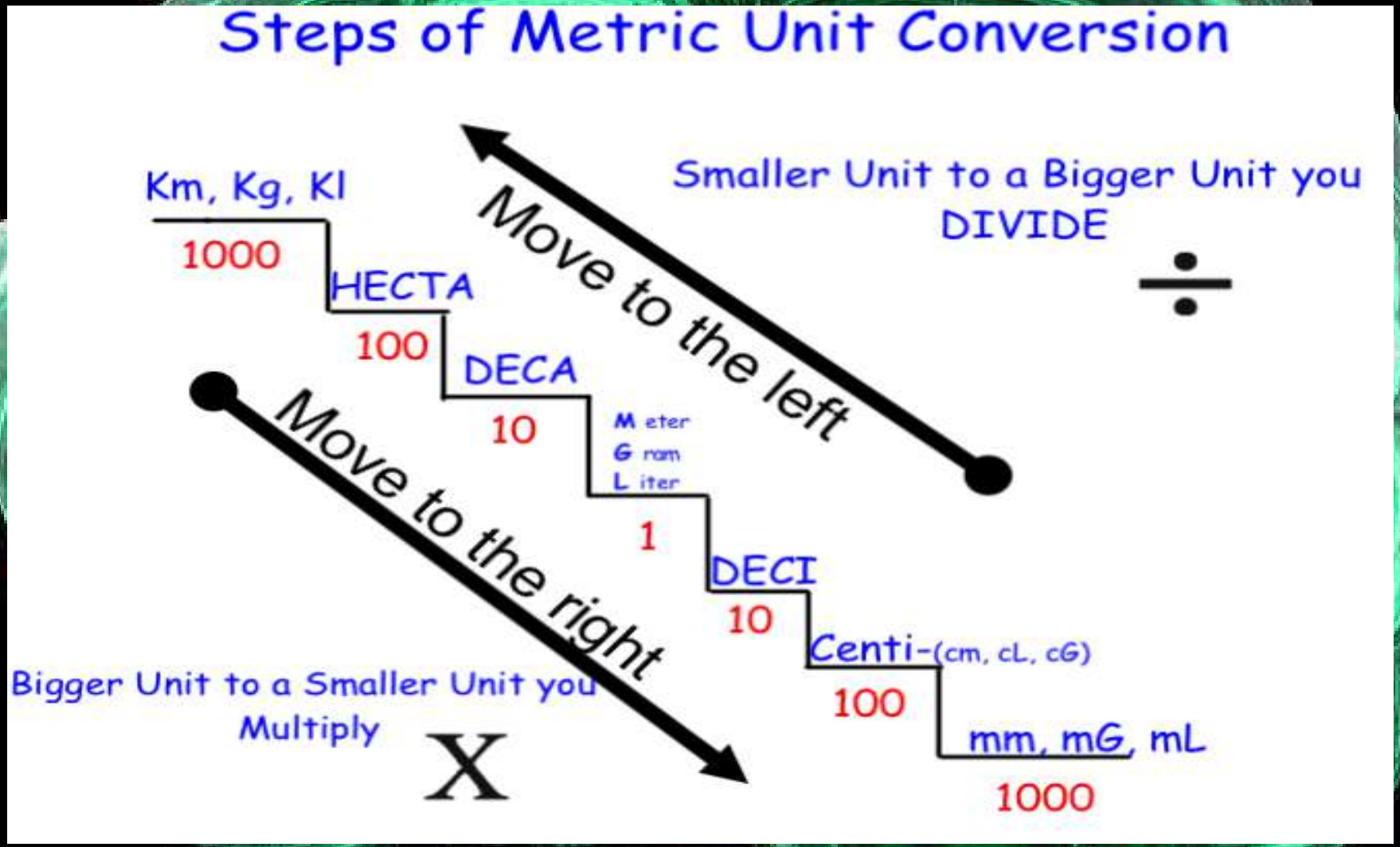
This system is now the International System of Units (SI).

Because all SI units are expressed in multiples of 10, changing from one unit to another is easy.

Prefixes are used to express SI units that are larger or smaller than basic units such as meter, liter and gram.



Essential Learning: I can use the the metric system to take measurements accurately.



Essential Learning: I can use the the metric system to take measurements accurately.

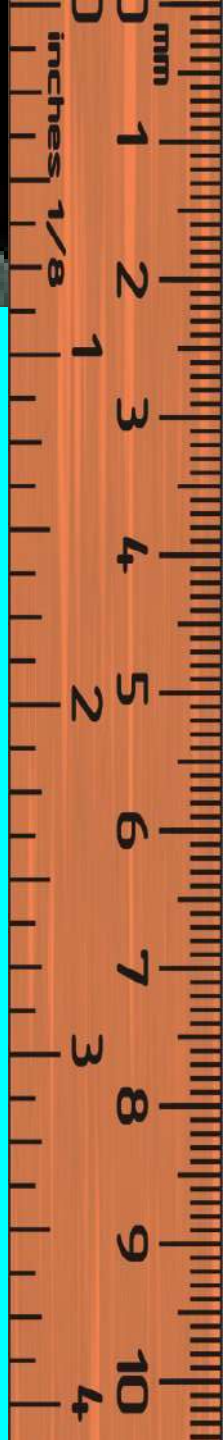
LENGTH

To describe the length of an Olympic-sized swimming pool,a scientist would use meters (m).

A meter is the basic SI unit of length.

If you were to divide 1 m into 1,000 parts, each part equals=1 millimeter (mm).

So, 1 mm is one-thousandth of a meter.



Essential Learning: I can use the the metric system to take measurements accurately.

Notebook: Make These Conversions First.

1,000 m = _____ km

1,000 km = _____ m

1,000 cm = _____ m

1,000 m = _____ cm

1,000 mm = _____ m

Then use the meter stick and ruler to measure these objects. Work in a group of 2 or 3. Make sure you are using meters, cm and millimeters. Put in notebook.

Your height.

Length of arm.

Length of thumb.

Height of desk.

Width of room.

Length of room.

Essential Learning: I can use the the metric system to take measurements accurately.

Temperature, a measure of how hot (or cold) something is; specifically, a measure of the average kinetic energy of the particles in an object.

Degrees Fahrenheit (℉) and degrees Celsius (℃) are used to describe temperature.

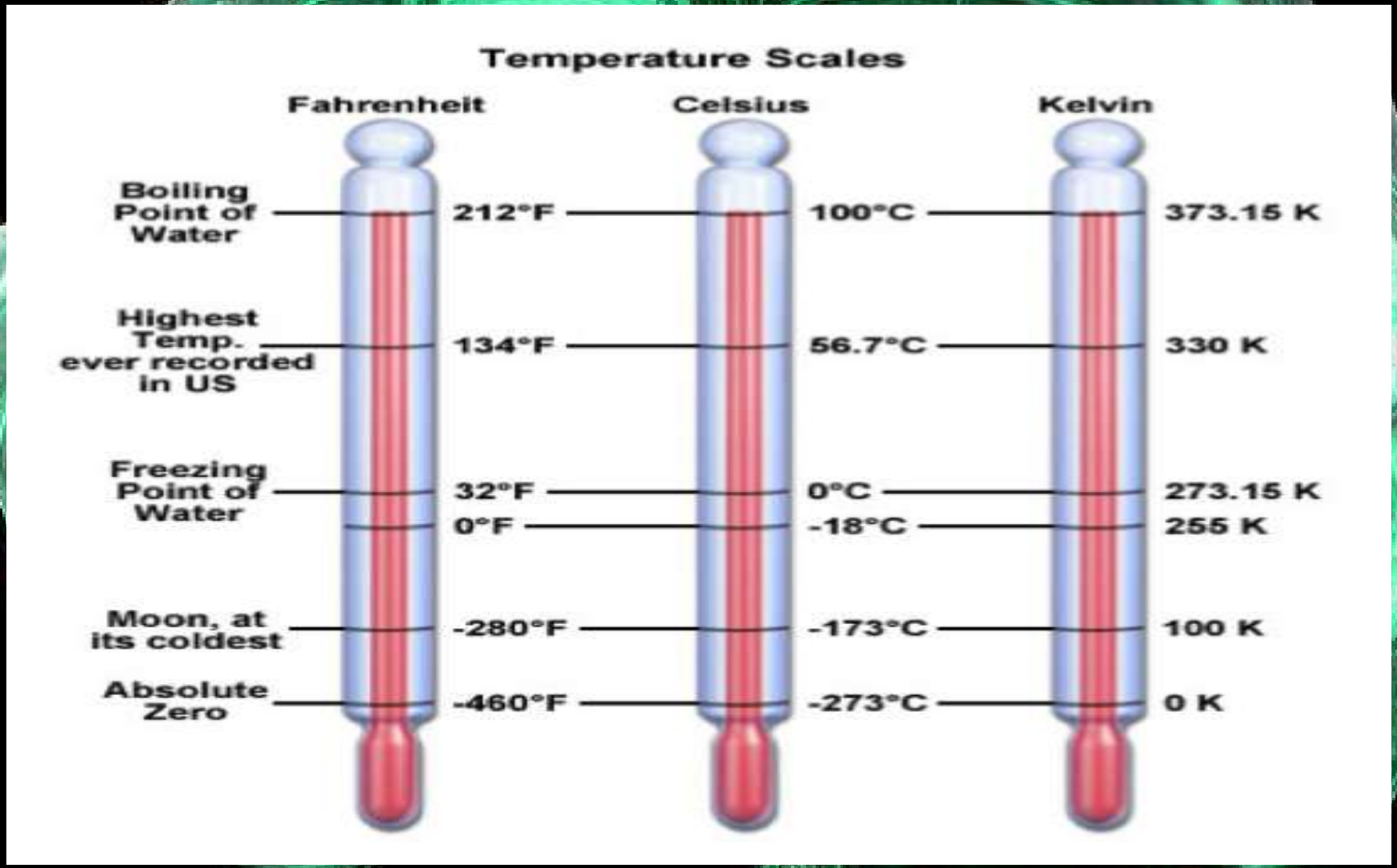
However, the kelvin (K), is the SI unit for temperature.

$$°F = (1.8 * °C) + 32$$

$$°C = \frac{°F - 32}{1.8}$$

$$K = °C + 273$$

Essential Learning: I can use the the metric system to take measurements accurately.



Essential Learning: I can use the the metric system to take measurements accurately.

The Conversion of Tempertures

$$°F = (1.8 * °C) + 32$$

$$°C = \frac{°F - 32}{1.8}$$

$$K = °C + 273$$

Make the conversions using these formulas.

°F = 99
°C = 12
°F = 40
°C = 60
°F = -25
°C = -10

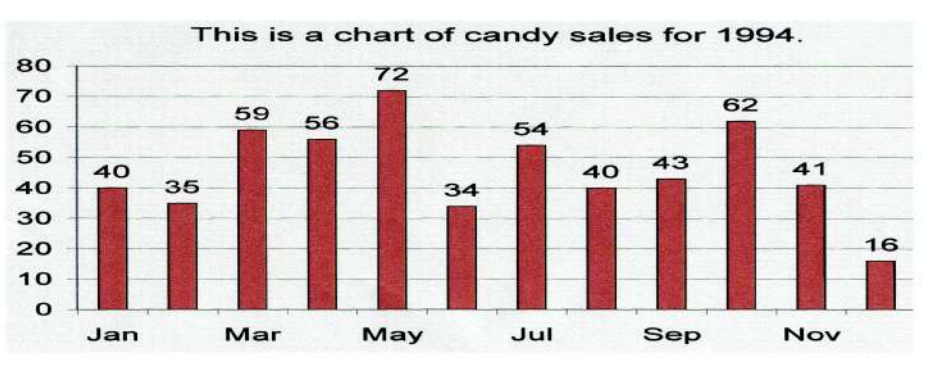
Fahrenheit	Celcius	Kelvin

Essential Learning: I can use the the metric system to take measurements accurately.

How to set up a graph.

Why do we use graphs?

What do graphs tell us about data?



- **Bar graphs**

-Used to show data that are not continuous.

-Allows us to compare data like amounts or frequency or categories

-Allow us to make generalizations about the data

-Help us see differences in data

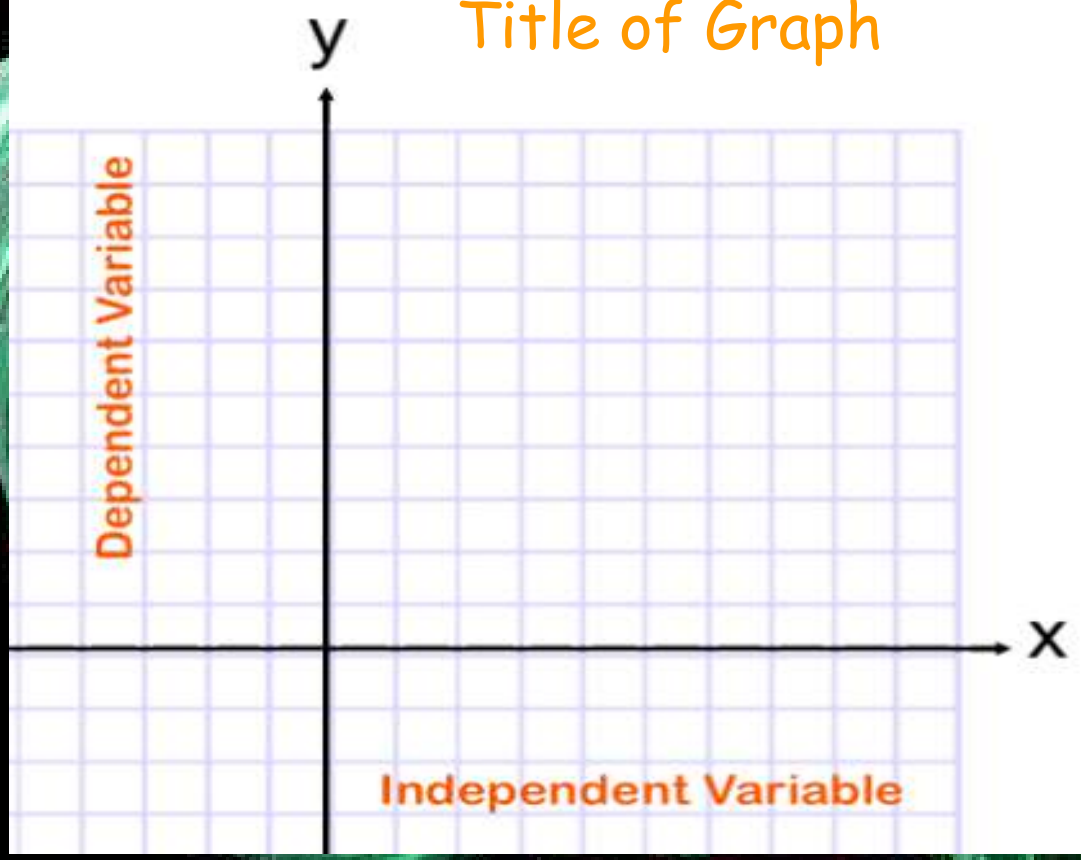
- **Line Graphs**

-For continuous data

-useful for showing trends over time

Essential Learning: I can use the the metric system to take measurements accurately.

Graphing: How do we graph the Data?



Days	Temp
1	60
2	65
3	80
4	60
5	55

Essential Learning: I can use the the metric system to take measurements accurately.

Create a bar graph with the wrist, thumb length, and thumb circumference of male winner, female winner and the class average as the IV and 0-30 centimeters as the DV. The legend should have male winner, female winner and the class average as the categories.

Conclusion: What trait was the most important for winning?

_____

What were the experimental errors in this lab?

_____

Why is it important to identify sources of experimental errors or uncontrolled conditions?

_____

Essential Learning: I can use conduct myself in a safe manner during LABS.

Lab Safety:

1. Treat all labs and equipment with respect.
2. Wear protective safety equipment when needed.
3. Tie back hair and loose clothing.
4. Aim test tubes away from you and others.
5. Never eat or drink in the lab.
6. Know what to do in case of fire.
7. Report any injury to the teacher.
8. Always wash your hands after a lab.

Essential Learning: I can use conduct myself in a safe manner during LABS.

In groups of four or five, demonstrate a lab safety issue.

-You will present this to the class.

-Make sure you use an IF/Then statement.

-Make a poster prompting it.

Groups:

1. A spill on the ground.
2. Broken glass.
3. A fire.
4. Something in the eye.
5. How to Waft the smell of a solution.
6. NO Gum or Pop in the lab.

Essential Learning: I can use the the metric system to take measurements accurately.

Mass is the amount of matter in an object.

The kilogram (kg) is the basic SI unit for mass.

One kilogram = 1,000 gram (g)

Kilograms (kg) are used to describe large objects.

Grams (g) are used to describe small objects.

Milligrams (mg) are used for the smallest objects.

Masses of very large objects are expressed in metric tons.
One metric ton = 1,000 kg

How do we find mass of an object?

Is weight the same as mass?

No, Weight is the gravitational force exerted on a person or object at the surface of the planet.

Essential Learning: I can use the the metric system to take measurements accurately.

Notebook: Make these conversions:

5,000 g = _____ kg

5,000 kg = _____ g

5,000 g = _____ mg

5,000 mg = _____ g

5,000 kg = _____ mg

5,000 mg _____ kg

Find the mass of these objects using the triple balance. Make sure that you are using mass units. Groups of 2-3 people.

Mass of pencil or pen.
Mass of your notebook.
Mass of wood block.
Mass of the rock sample.
Mass of your cellphone.

Essential Learning: I can use the the metric system to take measurements accurately.

Volume

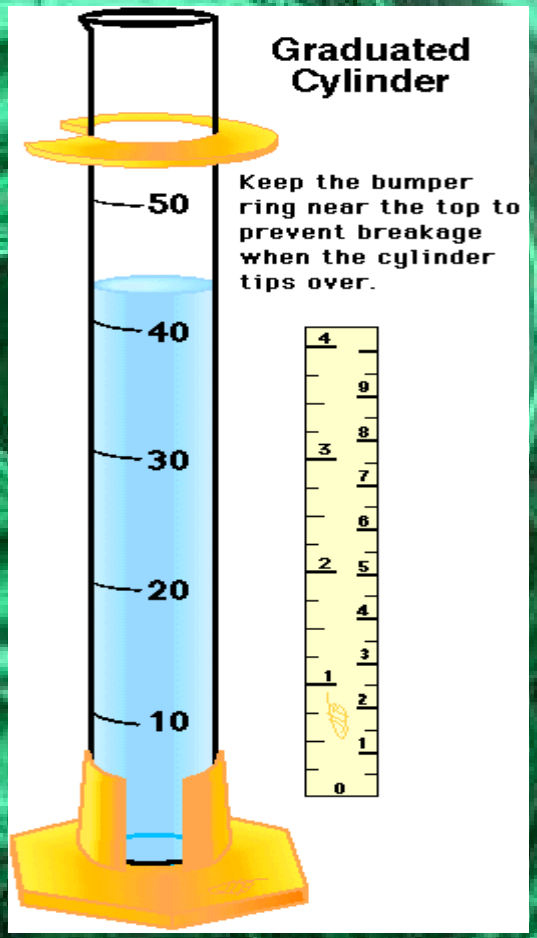
Volume is the amount of space that something occupies.

Liquid volume is expressed in liters (L).

Liters are based on the meter.

One cubic meter (1 m^3) is equal to 1,000 L.

So, 1,000 L will fit perfectly into a box that is 1 m on each side.

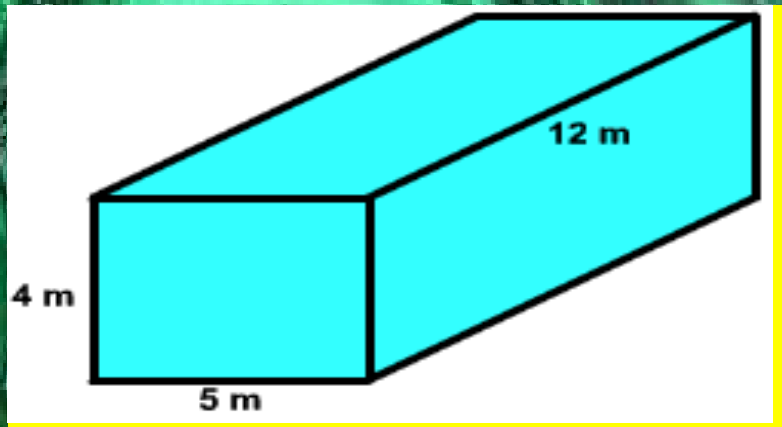


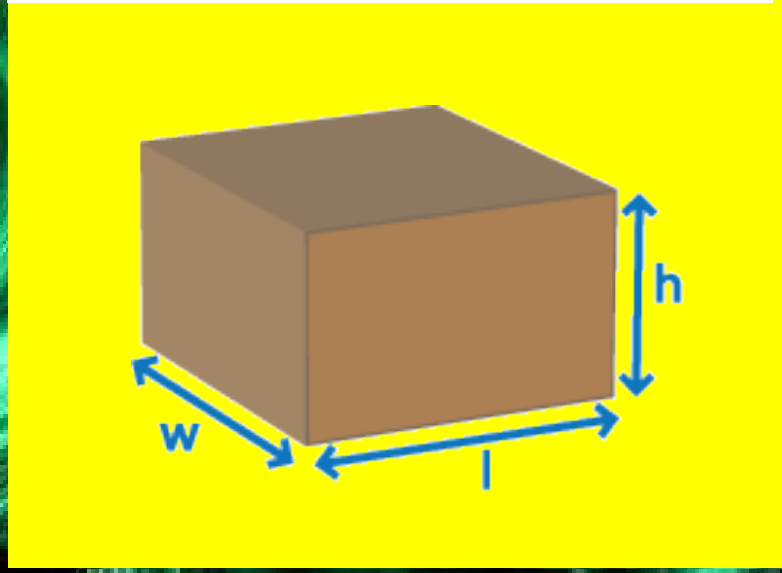
Essential Learning: I can use the the metric system to take measurements accurately.

Volumes of solid objects are usually expressed in cubic meters (m^3).

To find the volume of any cube or rectangular shaped object, you would use,
Length x Width x Height

What is the Volume?





Essential Learning: I can use the the metric system to take measurements accurately.

Volume of an Irregularly Shaped Solid Object

You cannot use the equation

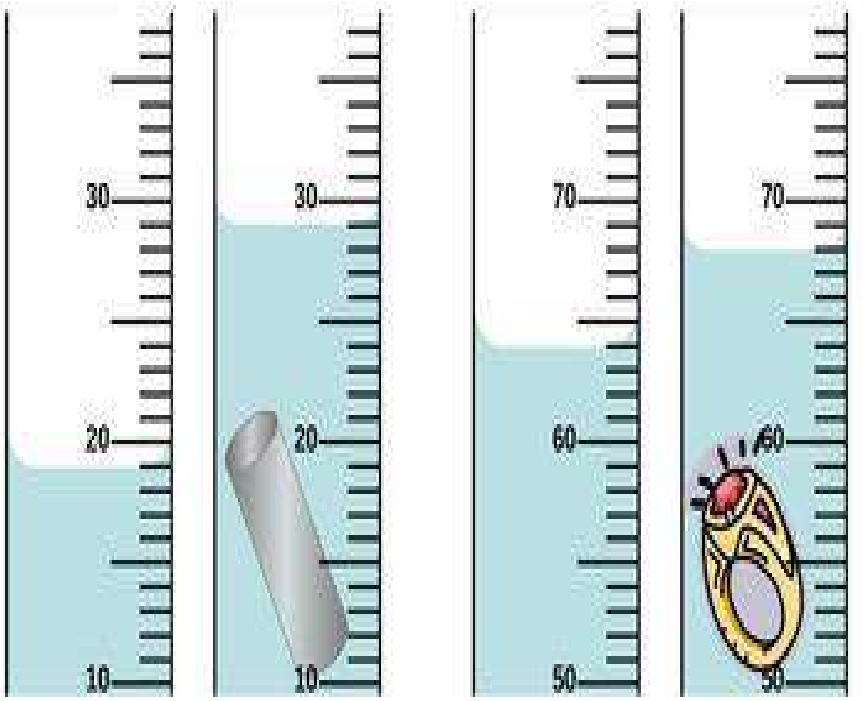
$V=LxWxH$

But you can measure the volume of any solid object by measuring the volume of water that the object displaces.

This is called Displacement.

The volume of water displaced by the object is equal to its volume.

$mL = cm^3$



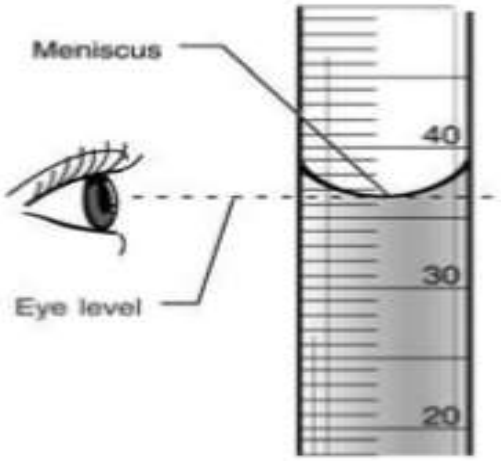
Essential Learning: I can use the the metric system to take measurements accurately.

Measuring the Volume of Liquids

Graduated cylinders are used to measure the liquid volume when accuracy is important.

The surface of a liquid in any container is curved.

The curve at the surface of a liquid is called a **MENISCUS.**



To measure the volume of most liquids, such as water, you must look at the bottom of the meniscus.

You may not be able to see a meniscus in a large container because it looks flat, due to the width of the container.

Essential Learning: I can use the the metric system to take measurements accurately.

On the lab tables, find the volume of the different objects. Be careful when you are using the graduated cylinders.

Solid volume:
Small wooden block
larger wooden block
Textbook
Lab Table

Irregular shape:
A pen
Rubber brain
Marble
Mineral sample

Essential Learning: I can use the the metric system to take measurements accurately.

Density is the amount of matter in a given volume.
The density of liquid water is normally given as 1000 kg/m^3
or 1 g/cm^3

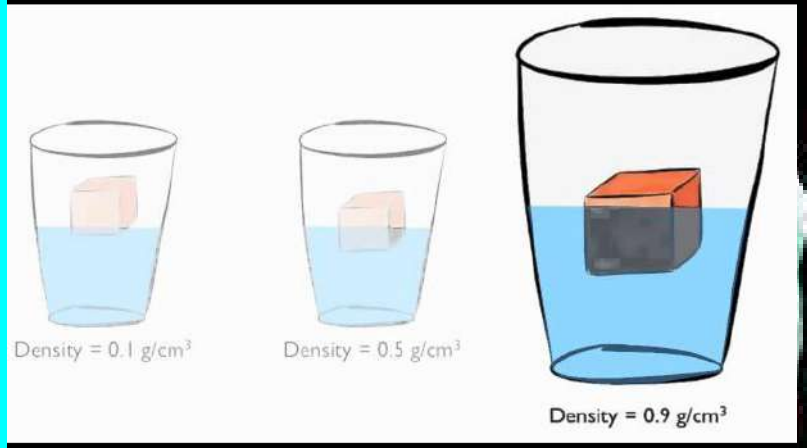
After you measure the mass and volume, you can calculate density by dividing the mass by the volume.

$D = m/V$

$D = g/cm^3$

$D = g/mL$

$1\ mL = 1\ cm^3$



Essential Learning: I can use the the metric system to take measurements accurately.

Density is called a derived quantity because it is found by combining two basic quantities, mass and volume.

What is the density on an object whose mass is 25g and whose volume is 10 mL?

D = m/V

D = 25 g/ 10 mL

D = 2.5 g/mL

D = m/V

An object has a mass of 45 g and a volume of 100 mL, what is its density?

An object has a mass of 75 g and a volume of 75 mL, what is its density?

An object has a mass of 100g and a cubic volume of 10 cm^3, what is its density?

An object has a mass of 1,500 g and cubic volume of 100 cm^3, what is its volume?

Essential Learning: I can use the the metric system to take measurements accurately.

Find the density of the different objects. First find the mass and volume and then calculate the density.

$D=m/V$

Samples to find:

Small Wooden block

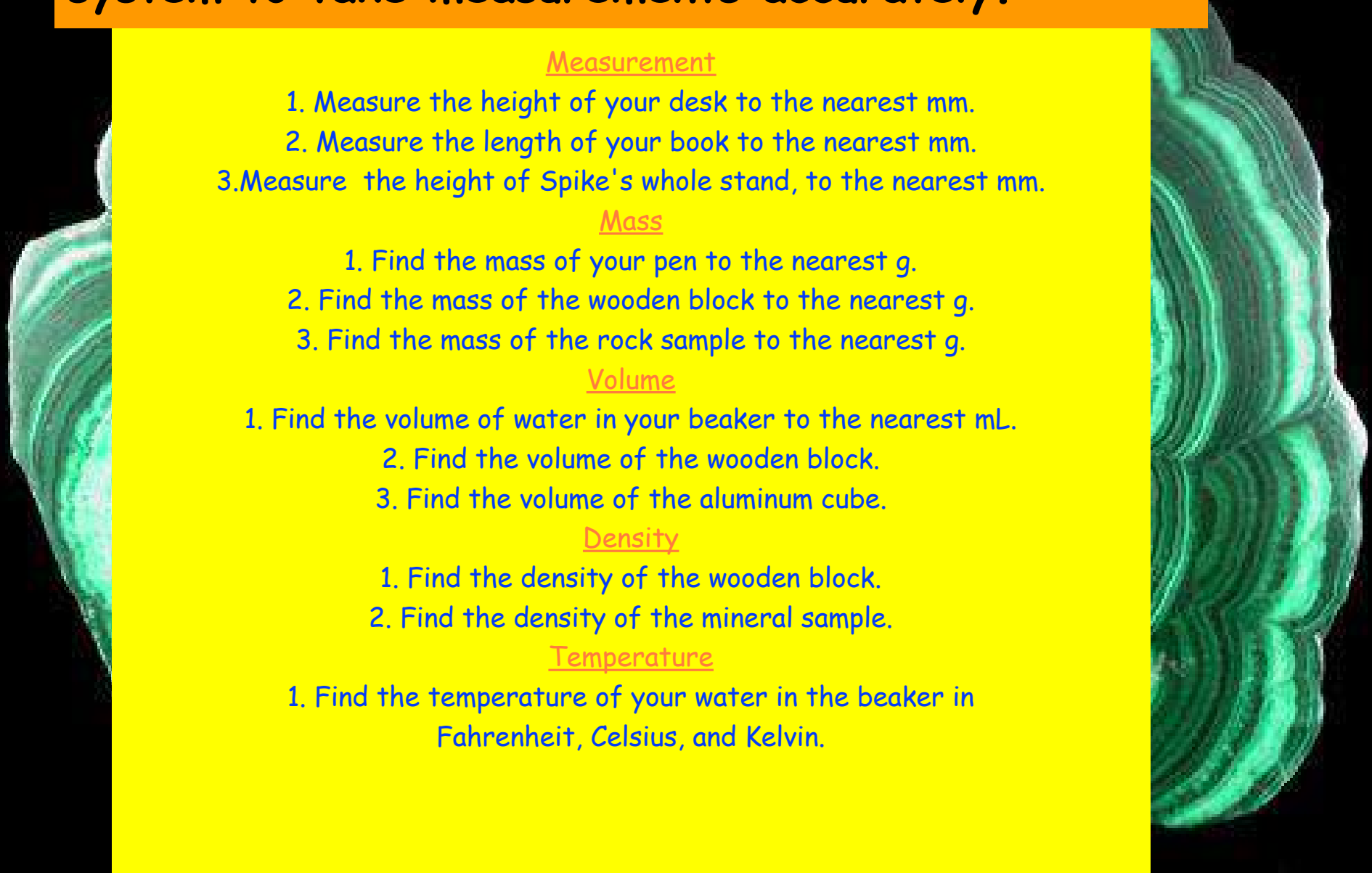
Larger Wooden block

Notebook

Mineral

Rubber Brain

Essential Learning: I can use the the metric system to take measurements accurately.



Measurement

1. Measure the height of your desk to the nearest mm.
2. Measure the length of your book to the nearest mm.
3. Measure the height of Spike's whole stand, to the nearest mm.

Mass

1. Find the mass of your pen to the nearest g.
2. Find the mass of the wooden block to the nearest g.
3. Find the mass of the rock sample to the nearest g.

Volume

1. Find the volume of water in your beaker to the nearest mL.
2. Find the volume of the wooden block.
3. Find the volume of the aluminum cube.

Density

1. Find the density of the wooden block.
2. Find the density of the mineral sample.

Temperature

1. Find the temperature of your water in the beaker in Fahrenheit, Celsius, and Kelvin.

Essential Learning: I can use the the metric system to take measurements accurately.

Essential Learning: I can use the the metric system to take measurements accurately.

Essential Learning: I can use the the metric system to take measurements accurately.