

Science Skills Unit Notes

Name:

DO NOT LOSE!

Area of Focus: Lab Safety

- Handle everything as if it's pathogenic.
 - Pathogenic means that what you are handling could be an infective agent that could cause disease.
 - Clean work station periodically with proper disinfectant.
- Do not breathe vapors or put anything close to your nose to smell unless instructed.
 - When smelling, do not hold smell below nose. Make a pass from one side to the other.
- Avoid blood and other bodily fluids.
 - If you are bleeding then please contact teacher immediately to get wound cleaned and covered.
- Please check glassware for cracks or chips prior to use.
 - If glassware is broken please contact teacher.
 - Please be safe with glassware to avoid dropping and breaking. Clean immediately.
- Clean spills from the outside in.
 - Apply paper towels over the spill, then, carefully starting from the outside, wipe in.
- Please do not eat food or drink in the classroom.
 - No gum
 - Cough drops
 - Or putting strange things in your mouth.

Keep flammable solutions away from flame.

- If you have long hair then please arrange it so that it will not hang down and catch on fire.
- Know where the fire extinguisher is and how to use it.
 - We have a Carbon Dioxide all purpose fire extinguishers.
 - Find key.
 - Pull it out. (Stand back)
 - Pull handle / trigger.
 - Point at the fire until extinguished.

- Keep electrical equipment away from water and vice versa.
- Use proper safety protection.
 - Goggles covering eyes.
 - Gloves (Non-latex) for allergy reasons.
- Know where the eyewash station is and how to use it. Where is the station?
 - If you get something in your eye
 - Get it out now!
 - Hold eyelid open.
 - Gently run water over your eyes
 - Go to school nurse immediately.
- Clean glassware before and after use to avoid harmful residue.
- Avoid cutting yourself if we are using sharp objects.
 - Never cut toward yourself or others.
 - A pencil and other pointed objects can be very dangerous.
- Use common sense at all times.
 - No horseplay.
 - No pushing.
 - No running.
 - No squirting with droppers.

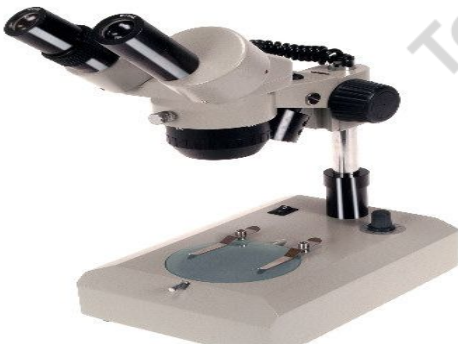
Area of Focus: Magnification

Magnification: The act of expanding something in apparent size.

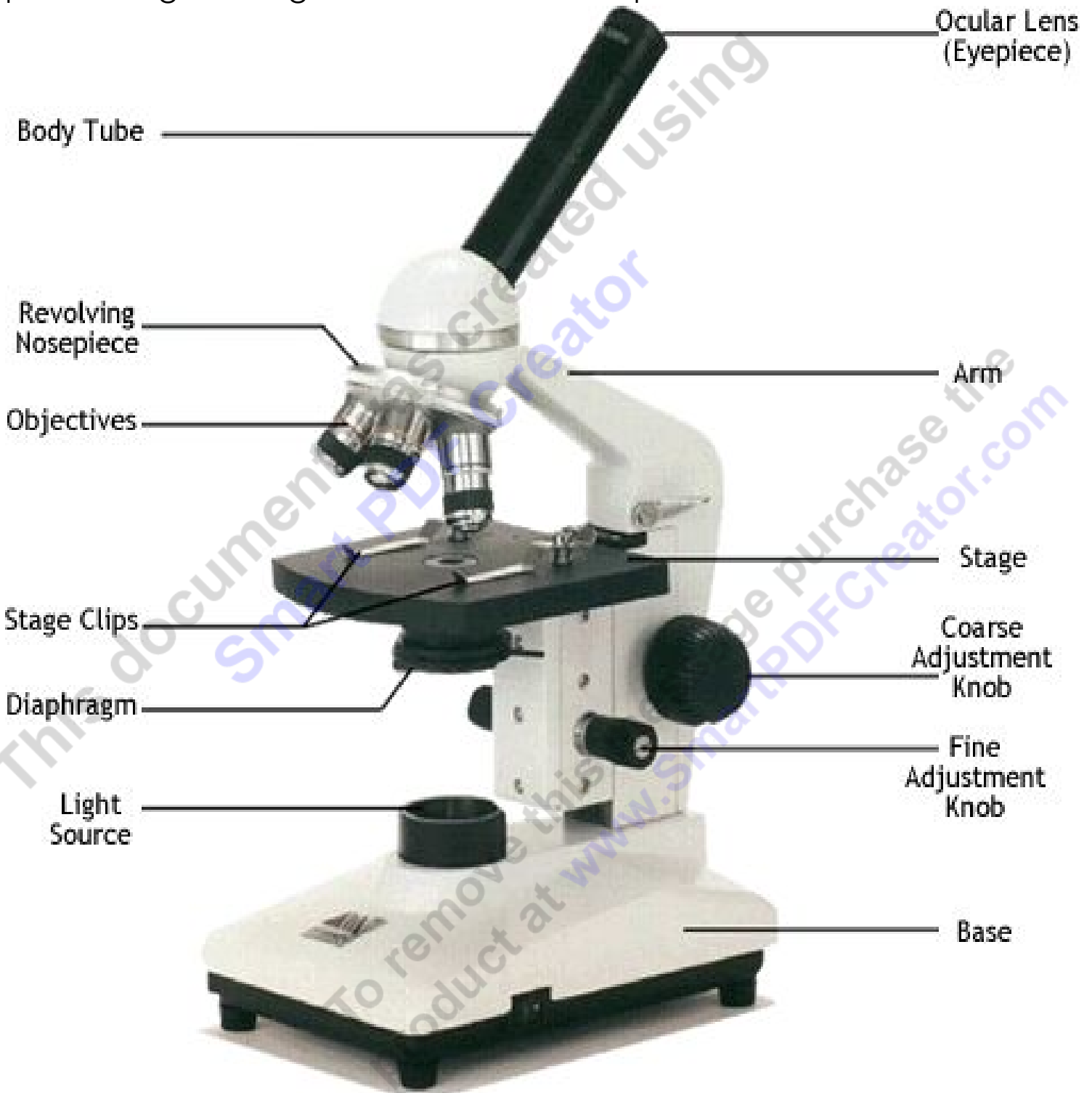
- The object does not change in size.

De-magnification: To make something smaller in appearance.

This is a stereoscopic microscope. It looks at things in which light cannot pass like a bumble bee. Lets you see the image in 3D.



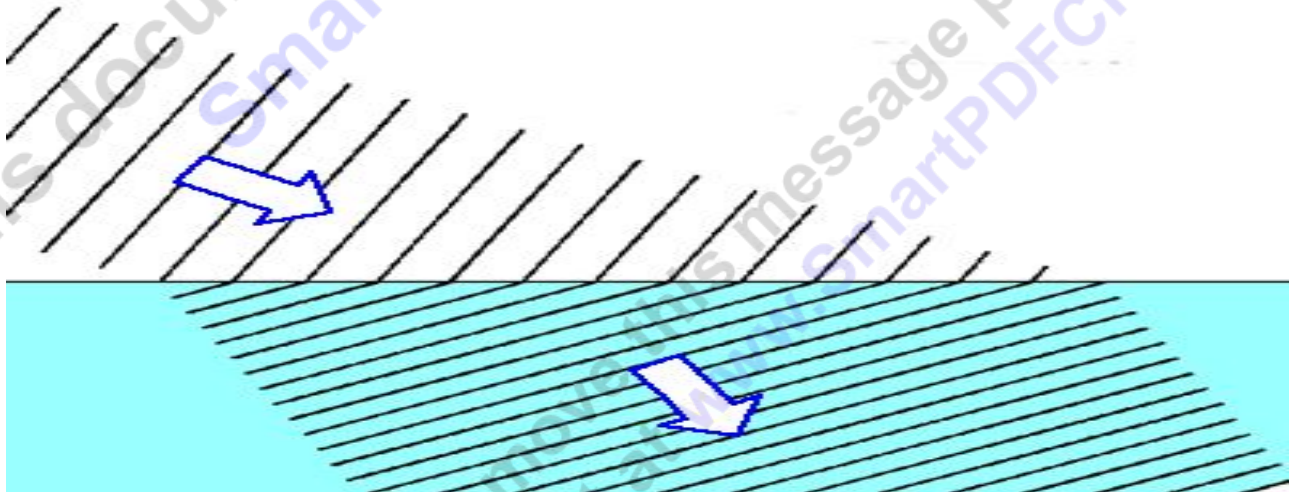
This is a light microscope. It lets you magnify images that light can pass through. Uses glass slide and cover slip.



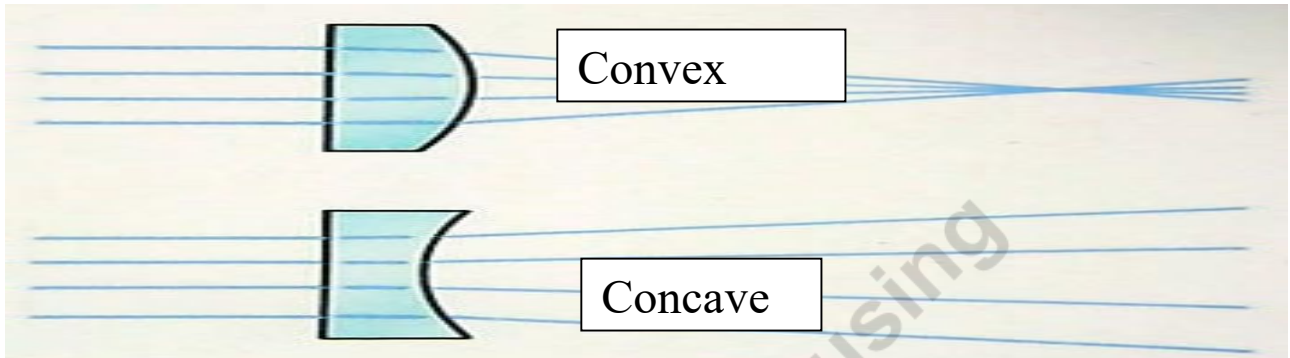
This is an electron microscope. It can magnify specimens much smaller than a light, or stereoscope, but doesn't usually view live cells or specimens



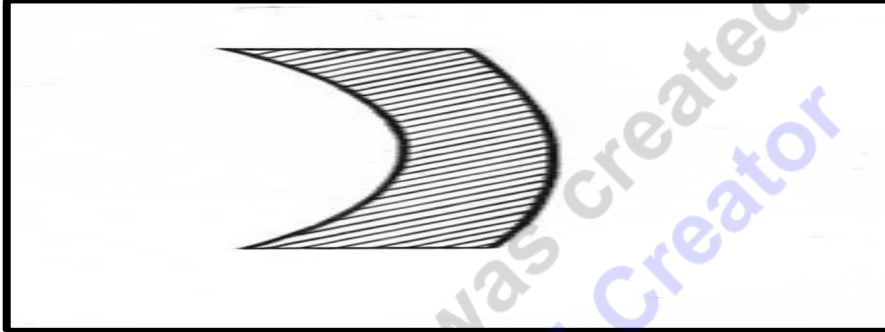
- Light is a particle and a wave and goes out in a straight line unless it bumps something.
- **Refraction:** The bending of a wave when it enters a medium where it's speed is different.



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- **Diffraction:** Bending of waves.
- **Lens:** A transparent optical device used to converge or diverge transmitted light and to form images.
- Convex top / Concave bottom



Concavo-convex

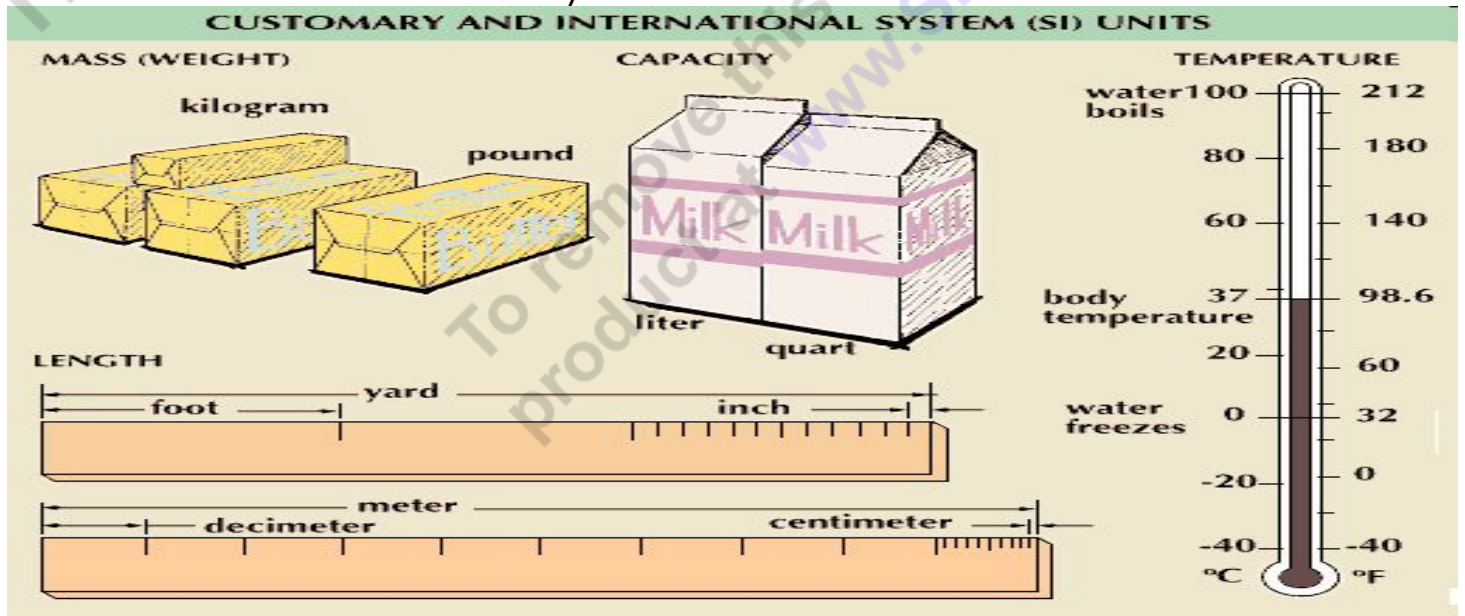


When carrying a microscope, carry it by the arm, and have one hand under the base.

Always lower the stage after use so the gears are not strained.

- Remove any slide as well.
- The finely tuned gears are what make microscopes expensive.

Area of Focus: The Metric System.



The international System of Units (SI) also known as the metric system.

Quantity	Base Unit	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric Current	ampere	A
Temperature	Kelvin	K
Light intensity	candela	cd
Amount of substance	mole	mol

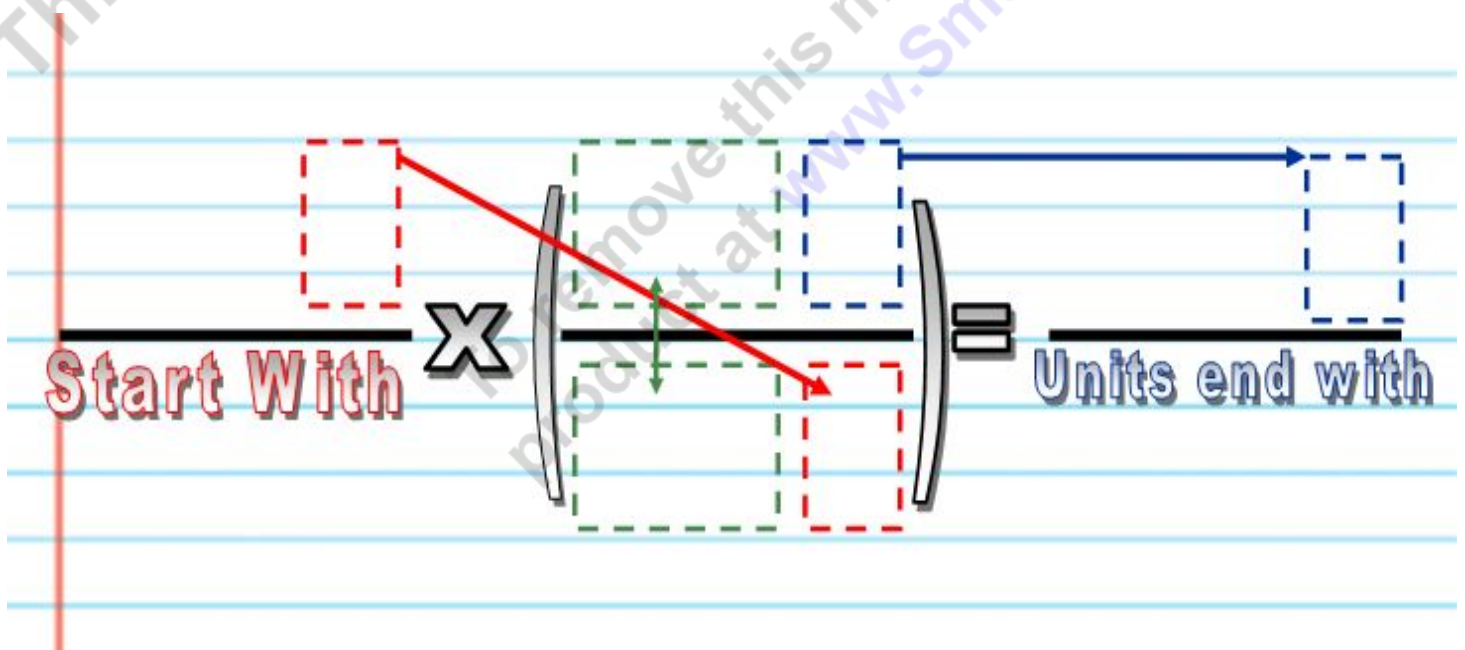
The Metric System: A measurement system based on the powers of ten.

Converting Units

Write the conversion as a fraction

Multiply

Cancel units from the top and bottom



Scientific notation: A method for expressing, and working with, very large or very small numbers.

$$5.7 \times 10^6 = 57000000$$

1 2 3 4 5 6

yotta [Y]	1 000 000 000 000 000 000 000 000 000	= 10 ²⁴
zetta [Z]	1 000 000 000 000 000 000 000 000	= 10 ²¹
exa [E]	1 000 000 000 000 000 000 000	= 10 ¹⁸
peta [P]	1 000 000 000 000 000 000	= 10 ¹⁵
tera [T]	1 000 000 000 000	= 10 ¹²
giga [G]	1 000 000 000	(a thousand millions = a billion)
mega [M]	1 000 000	(a million)
kilo [k]	1 000	(a thousand)
hecto [h]	100	(a hundred)
deca [da]	10	(ten)
	1	
deci [d]	0.1	(a tenth)
centi [c]	0.01	(a hundredth)
milli [m]	0.001	(a thousandth)
micro [μ]	0.000 001	(a millionth)
nano [n]	0.000 000 001	(a thousand millionth)
pico [p]	0.000 000 000 001	= 10 ⁻¹²
femto [f]	0.000 000 000 000 001	= 10 ⁻¹⁵
atto [a]	0.000 000 000 000 000 001	= 10 ⁻¹⁸
zepto [z]	0.000 000 000 000 000 000 001	= 10 ⁻²¹
yocto [y]	0.000 000 000 000 000 000 000 001	= 10 ⁻²⁴

- "I am 1828.80 mm tall."
- "I am 182.80 cm tall."
- "I am 1.8280 meters tall."
- "I am .001828 km tall."

● King -	Kilometer	1000m	10^3
● Henry -	Hectometer	100m	10^2
● Died -	Decameter	10m	10^1
● While -	Standard	1m	100
● Drinking -	Decimeter	.1m	10^{-1}
● Chocolate -	Centimeter	.01m	10^{-2}
● Milk -	Millimeter	.001m	10^{-3}

● <u>Quantity</u>	<u>Base Unit</u>	<u>Symbol</u>
● Length	Meter	M
● Mass	Kilogram	kg
● Temperature	Kelvin	K
● Time	Second	s
● Amount	Mol	mol
● Force	Newton	N
● Electric Current	Ampere	a
● Luminous Intensity	Candela	cd
● Volume	Liter	l

Area of Focus: Mass

Mass: The amount of matter in an object. Weight has to do with gravity. On earth, mass and weight are the same.

Metric Ton: A cubic meter filled with water or 1,000 kilograms.

The standard unit of mass in the metric system is the gram.

1 milligram = 0.001 grams

1 centigram = 0.01 grams

1 decigram = 0.1 grams

1 kilogram = 1000. grams

Area of Focus: Volume, Liter, l

Volume: The three-dimensional space an object occupies.

The standard unit of volume in the metric system is the liter.

- 1 milliliter = 0.001 liter
- 1 centiliter = 0.01 liter
- 1 deciliter = 0.1 liter
- 1 kiloliter = 1000. liters

Volume is also the space that matter occupies.

- Matter is anything that has mass and takes up space.

How to find the volume of a cube?

- Length x Width x Height - ____cm³

Volume of a cylinder: Where Pi = 3.14

Density: How much mass is contained in a given volume. We use grams/cm³(grams per cubic centimeter)

- Density – mass divided volume

Mass

- $D = \frac{\text{Mass}}{\text{Volume}} = \text{grams/cm}^3$

An object will float in water.

- Density of less than one = float.
- Density of more than one = sink.

New Area of Focus: Temperature.

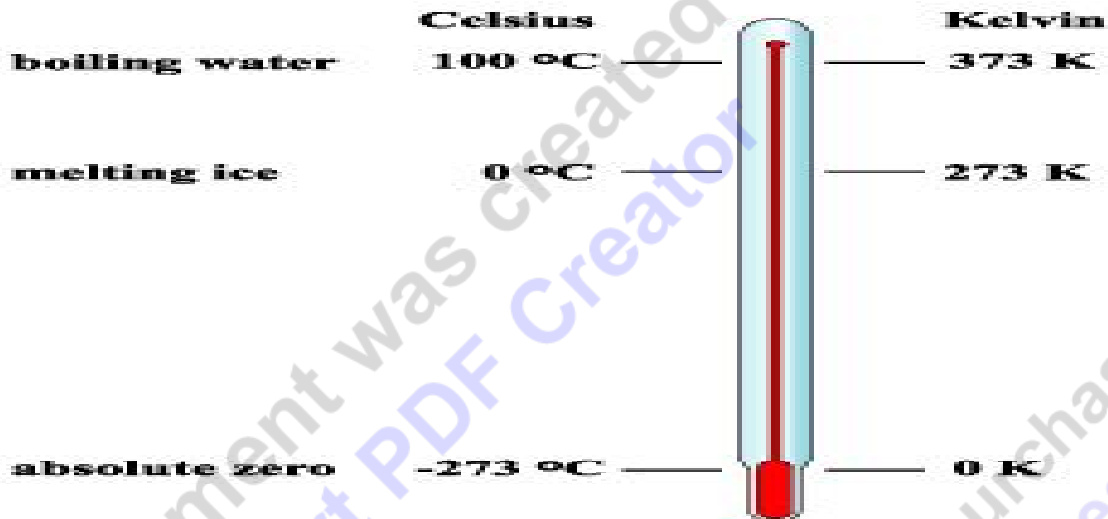
Temperature: The degree of hotness or coldness of a body or environment.

- Corresponds to its molecular activity.

Temperature:

- Measured in degrees Celsius.

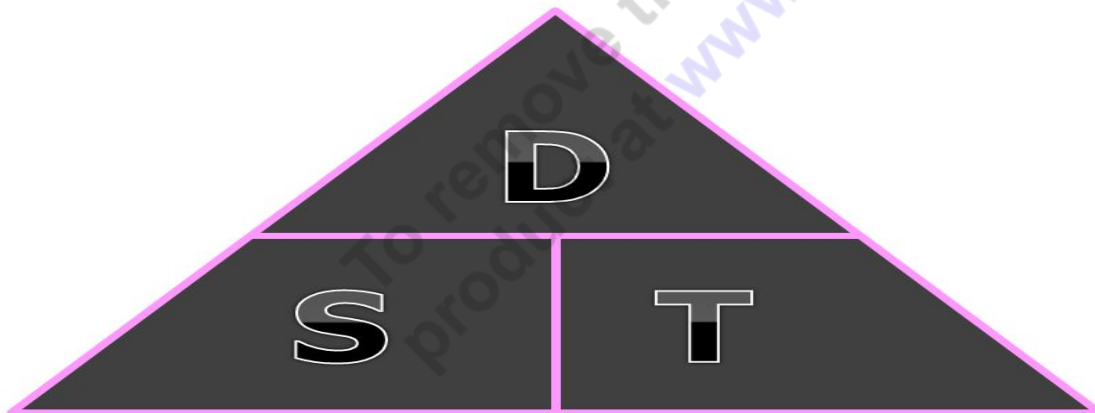
- Zero Degrees Celsius is freezing point of water, 100 degrees Celsius is boiling point.
- Kelvin Scale: Zero Kelvin is absolute zero where molecular motion stops. That is the coldest something can be. (never been reached.)
 - Water freezes at 273.16K; water boils at 373.16K. $K = C + 273.16^\circ$



New Area of Focus: Time.

Time: A measuring system used to sequence events, to compare the durations of events and the intervals between them, and to quantify the motions of objects.

- Speed: A measure of motion, = distance divided by time. D/T



Distance = Speed * time (Multiply)
 Speed = Distance divided by time

Time = Distance divided by Speed

- Velocity = Speed (distance / time) and direction.
- velocity = Distance Divided by Time
- Acceleration = The rate of change in velocity. (m/s)
The final velocity – the starting velocity, divided by time.
also... $a = (v_2 - v_1) / (t_2 - t_1)$
The SI Unit for acceleration is m/s^2
- Deceleration – To slow velocity.
The same formula but value will be negative. $-m/s^2$
- Momentum: A measure of the motion of a body equal to the product of its mass and velocity.
 - Momentum = Mass times velocity
 - Law Conservation of Momentum: The momentum of an object is the product of its mass and its velocity.
 - Angular momentum: Rotating objects tend to remain rotating at the same speed / direction unless acted upon.
 - When you draw the weights inward, your moment of inertia decreases, and your velocity increases (spin faster).
- Amount of Work (w) done depends on two things:
The amount of Force (F) exerted.

The Distance (d) over which the Force is applied.
- Equation for Work - $w = F \times d$
- Joule: Unit of energy, work, or amount of heat.
 - Equal to the energy expended in applying a force of one newton through a distance of one meter.

New Area of Focus: Some of the other SI units.

The mole: The molecular weight of a substance expressed in grams.

Ampere: The unit of measurement of electric current, equal to one coulomb per second.

- Coulomb: The measurement of a number of electrons.

Candela: The unit of luminous intensity. One candela is equivalent to 12.57 lumens.

- Use to be the light of a standard candle.

New Area of Focus: Observation, Inferences, and the Scientific Method.

Science is...

A study of natural phenomenon.

A systematic study and method.

Knowledge through experience.

A good Scientist is....

- Is safe!
- Is accurate, precise and methodical.
- Is unbiased, a seeker of the truth.
- Can observe and question.
- Can find solutions, reasons, and research.
- Works in all weather conditions if safe.
- Can overcome obstacles.
- Collaborates (talks) with others.

Science is a systematic attempt to get around human limitations.

- Science tries to remove personal experience from the scientific process.

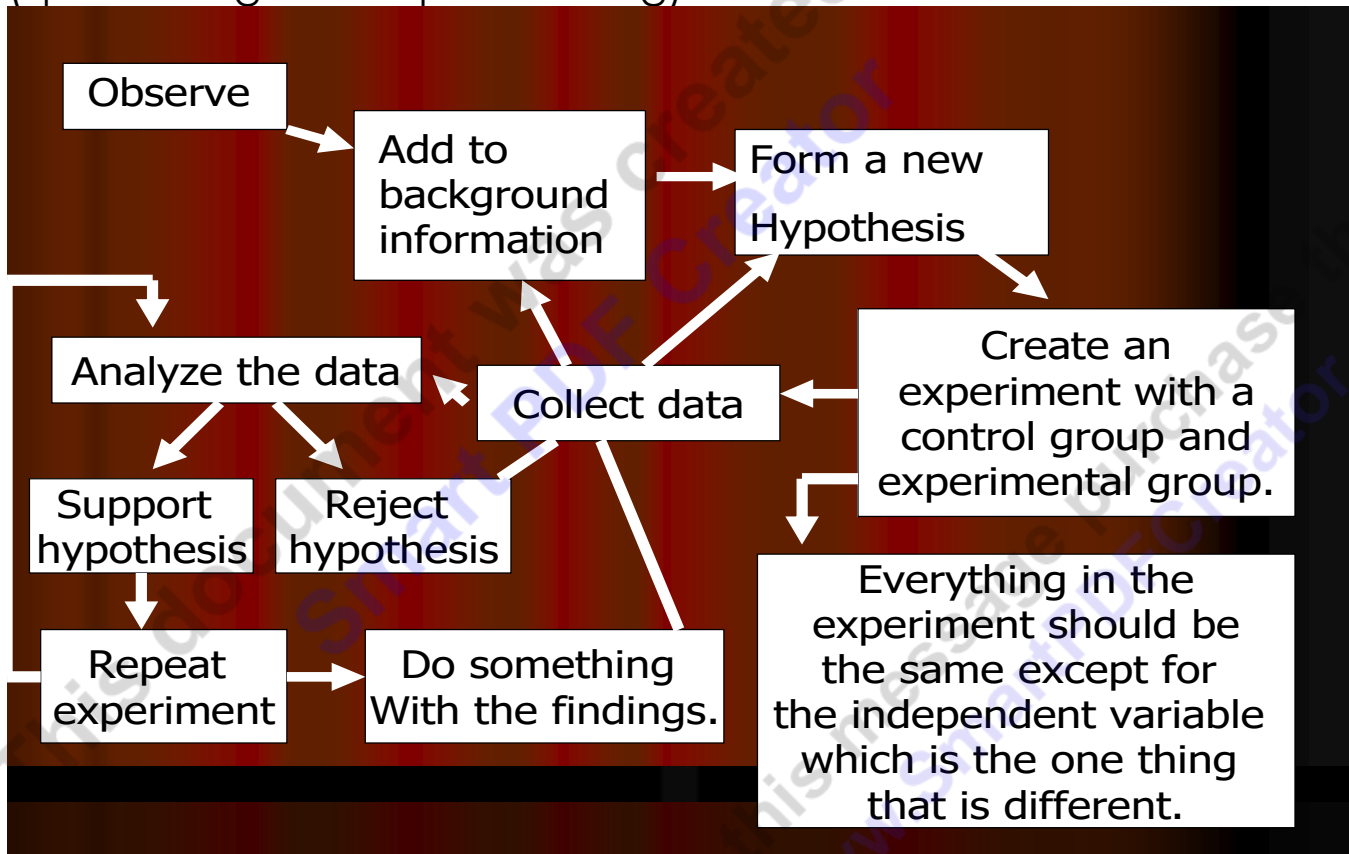
TRY AND WRITE WITHOUT PERSONAL PRONOUNS.

- DO NOT USE...I, me, you, he, she, we, you, they, them, theirs, names, etc

Types of scientists...

- Biology – The study of life.
- Geology – The study of earth.
- Chemistry – The study of Matter.
- Physics – The study of matter and energy.
- Many more...

Scientific method: A process that is the basis for scientific inquiry (questioning and experimenting).



Variable: Changing quantity of something.

- Independent: (Change) The variable you have control over, what you can choose and manipulate.
- Dependent: (Observe) What you measure in the experiment and what is affected during the experiment.
- Control: (Same) Quantities that a scientist wants to remain constant so it a fair test.

Observation – Anything you can see, hear, smell, touch, taste, (Using your senses).

Inference: A conclusion based on your observations.

Hypothesis: An educated guess to your problem / question that is testable.

HOLD ON TO THESE NOTES. DO NOT LOSE!

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