SCIENCE FORM 1
CHAPTER 1 INTRODUCTION TO SCIENCE

Science
- is the systematic study of nature and how it affects us and our environment
- understand the natural phenomenon allows us to improve our life and overcome problems

Scientific knowledge
- The information produced from the study of science
- understanding natural phenomena help us to improve our life and overcome problems

Technology
- the application of scientific knowledge for the use of mankind

Importance of science
- helps us to understand ourselves
- knowing our body: for better care our health and live longer
- knowing our environment: improve our quality of life and conserve it for future generation
- made our life more comfortable: machines help us to do work faster and more efficient

Field of Science
Science is divided into a number of areas of study, namely
i. Biology - the study of life
ii. Physics - the study of matter, energy, force and motion.
iii. Chemistry - the study of the composition and chemical properties of substances.
iv. Astronomy - the study of planet and stars in the Earth.
v. Geology - the study of rocks, minerals and the structure of the universe.
vi. Meteorology - the study of weather and climate.
vii. Biochemistry - the study of chemical process in living organisms.

Careers in Science
-Science offers various career opportunities according to one's area interest. Listed below are few examples:
i. Doctor
ii. Engineer
iii. Veterinarian
iv. Pharmacist
v. Architect
vi. Chemist

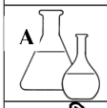
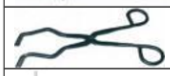
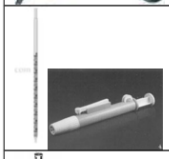
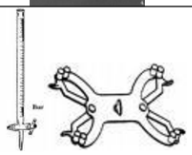
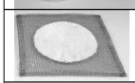
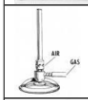
vii. Computer programmer

Science laboratory

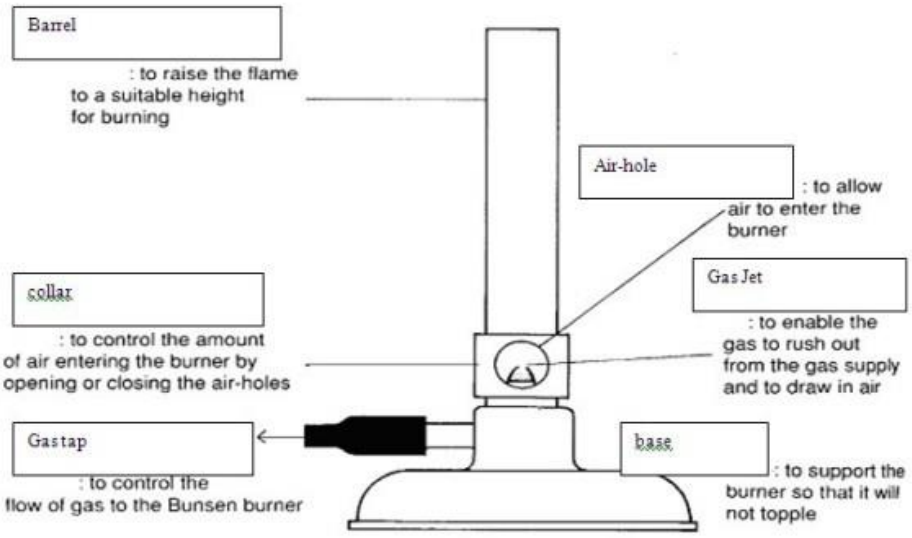
Every laboratory apparatus has its precise use and the people should have the knowledge about the proper use of **laboratory apparatus** or laboratory glassware.

Common laboratory apparatus

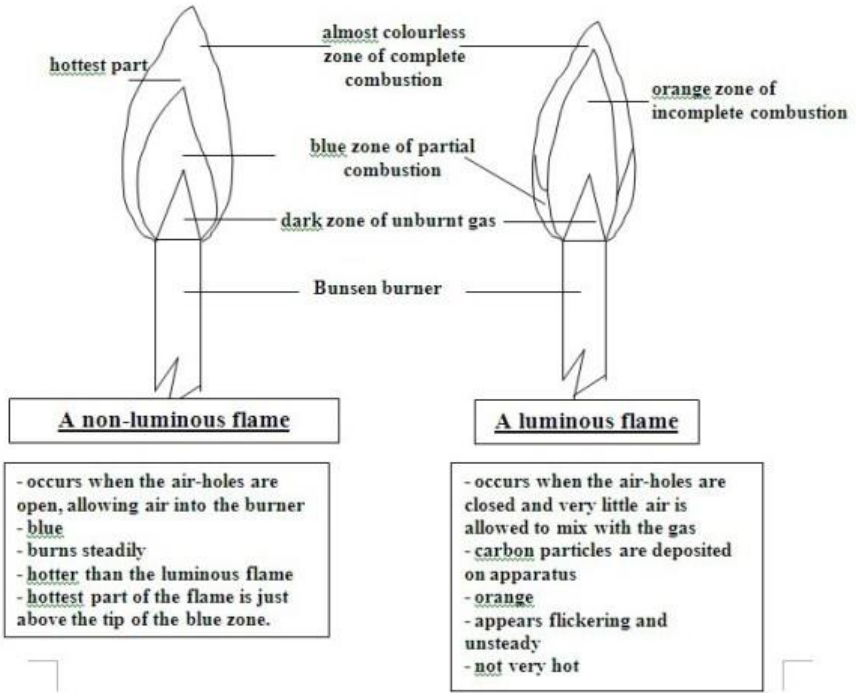
Science Lab Equipment Study Sheet

Apparatus	Description	Use	Name
	Glass Common Sizes: 100, 250, 400, & 1000 mL	As a container, cup Stirring, Mixing, Pouring, Heating	BEAKER
	Glass Usually marked with a milliliter (mL) scale	To measure volume	GRADUATED CYLINDER
	Glass Common Sizes: 125, 250, 500 ml	May be heated	a. ERLENMEYER FLASK b. ROUND BOTTOM FLASK
	Glass Several Sizes	Many uses: Can be heated Mixing/Watching reactions	TEST TUBE & TEST TUBE BRUSH
	Wood, metal, plastic	To hold test tubes upright	TEST TUBE RACK
	Metal Clamp with a spring handle	Used to hold a test tube	TEST TUBE HOLDER
	Metal Clamp with screws, nut, & curved clamp	To hold test tubes securely on the ring stand	TEST TUBE CLAMP
	Metal	To pick up and hold a crucible	CRUCIBLE TONGS
	Glass	Used to collect/add specific volumes of liquids Used for suction to pull liquids into the apparatus	PIPETTE PUMP
	Glass Marked in milliliter scale Fitted with a stopcock, pinch clamp, or glass bead Metal Clamp With flexible clips	Used to hold liquids for titration To hold burets when titrating	a. BURET b. BURET CLAMP
	10 cm _____ Used to measure length Divided into cm and mm divisions	To measure length	METRIC RULER
	Triangular wire frame with clay material coverings	To support the crucible	CLAY TRIANGLE
	Small porcelain dish with cover	To heat small amounts of solid material at high temperature	CRUCIBLE AND COVER
	Wire screen with ceramic fibered center	To spread the heat of a flame Rests on the ring for the ring stand	WIRE GAUZE
	Metal heating device connected to gas outlet with rubber tubing	To heat chemicals in beakers or test tubes	BUNSEN BURNER
	Metal rod upright, heavy base	A support with many uses	RING STAND and RING

Bunsen burner



Barrel: To raise the flame to a suitable height
Collar: Control the air flowing into the Bunsen Burner
Air-hole: To allow air to enter the Bunsen Burner
Jet: To enable gas to rush out of the gas supply and to draw in air
Base; To support the Bunsen Burner so that it would not topple
Gas Tap: To control the flow of gas to the Bunsen Burner

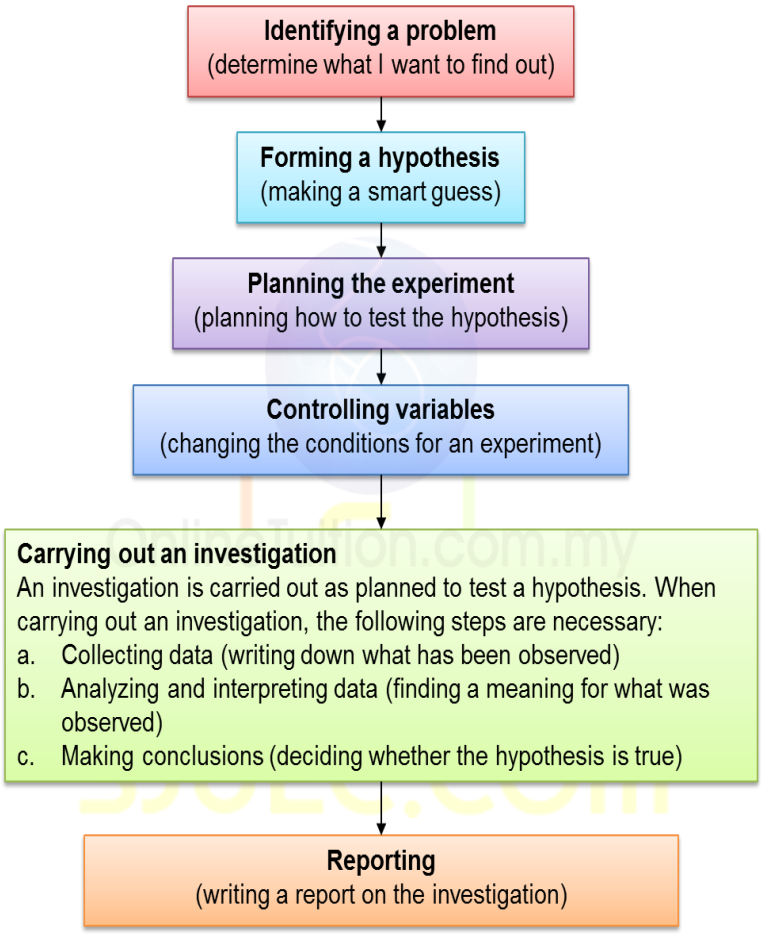


- A bunsen burner is an apparatus that ignites fire for the experiments in the Science lab.
- A bunsen burner , can produce a non- luminous and a luminous flame. A luminous flame is the flame that isn't really hot. It is flickering, orange/yellow in colour, and can be seen from afar.
- A non- luminous flame is steady, blue in colour and cammot be seen from afar. We use a non-luminous flame for experiments as not only is it hotter than a luminous flame, there is sufficient gas for the fire to burn completely.

The correct way to light up a Bunsen burner

1. Close the air- hole
2. Put a gas lighter above the barrel
3. Turn on the gas tap
4. Strike the lighter to ignite the gas
5. Open the air- holes until a n0n-luminous flame is obtained.

Scientific investigation



PHYSICAL QUANTITIES AND THEIR UNITS

- There are five physical quantities which can be measured, that is length, mass, time, temperature and electric current.
- Physical quantities can be measured in System International d'Units (SI) units. Its means International System of Units.
- The following table shows the physical quantities and their SI unit.

Base Quantity	Unit	Symbol
Length	meter	M
Mass	kilogram	Kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K

Prefix

- use to express a physical quantity that is either very big or very small
- writing quantities in the standard form

Prefix	Symbol	Multiplication factor		
exa	**E**	10^{18}	=	1 000 000 000 000 000 000
peta	**P**	10^{15}	=	1 000 000 000 000 000
tera	**T**	10^{12}	=	1 000 000 000 000
giga	**G**	10^{9}	=	1 000 000 000
mega	**M**	10^{6}	=	1 000 000
kilo	**k**	10^{3}	=	1 000
hecto	h	10^{2}	=	100
deca	da	10^{1}	=	10
deci	d	10^{-1}	=	0.1
centi	c	10^{-2}	=	0.01
milli	**m**	10^{-3}	=	0.001
micro	**μ**	10^{-6}	=	0.000 001
nano	**n**	10^{-9}	=	0.000 000 001
pico	**p**	10^{-12}	=	0.000 000 000 001
femto	**f**	10^{-15}	=	0.000 000 000 000 001
atto	**a**	10^{-18}	=	0.000 000 000 000 000 001

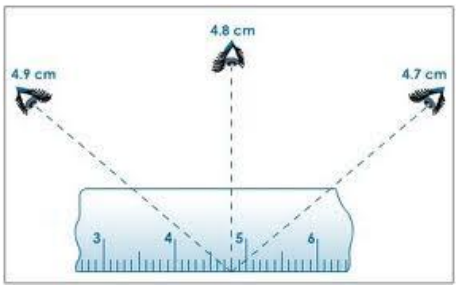
The concept of weight and mass.

- Weight is the gravitational force acting on anobject.
- The greater the force pulling the object towards the centre of Earth, the heavier of object.
- Spring balance is used to measure weight.
- Weight is measured in Newton (N)
    - 1 N = 0.1 kg
    - 1 kg = 10 N
- Mass is the amount of matter in an object.
- Mass of an object can be measured by using beam balance, a lever balance or electronic balance.
- The SI unit for mass is kilogram (kg). Mass can also be measured in gram (g) and milligram (mg).
    - I kg = 1000 g
    - 1 g = 1000 mg

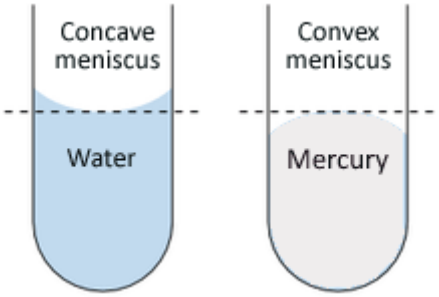
Measuring tools

- The S.I. unit for length is the metre (m).
- The unit `metre' is used to measure objects such as cloth, tables, poles and running tracks.
- Longer distances are measured in kilometres (km) and shorter distances are measured in centimetres (cm).

- The length of a curve is measured using a ruler and a thread, or opisometer (measuring tool for maps).
    - Measuring regular shape area using mathematical formulae
    - Measuring irregular shape area using graph paper
- Avoid parallax errors

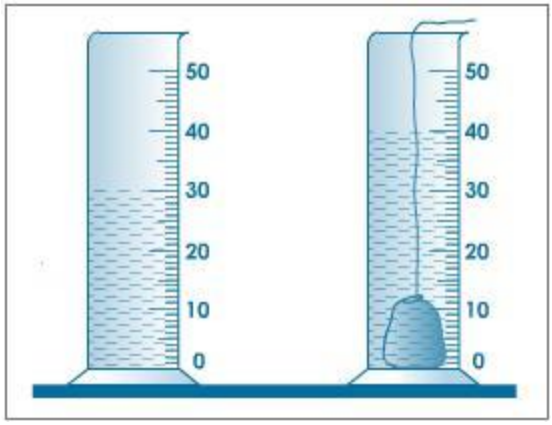


- Liquid measuring tools has a level curved known as meniscus
    - 1 cm^3 = 1 ml
    - 1 l = 1000 ml = 1000 cm^3



- a meniscus can go up or down. It all depends on if the molecules of the liquid are more attracted to the outside material or to themselves.
- A concave meniscus, which is what you normally will see, occurs when the molecules of the liquid are attracted to those of the container. This occurs with water and a glass tube.
- A convex meniscus occurs when the molecules have a stronger attraction to each other than to the container, as with mercury and glass.
- A flat meniscus occurs when water in some types of plastic tubes; tubes made out of material that water does not stick to.

- Temperature is the degree of hotness or coldness.
- The S.I. unit for temperature is the Kelvin (k).
- However, in daily usage, temperature is measured in the Celsius scale which is named after the Swedish scientist, Anders Celsius. The unit used for temperature is degrees Celsius (0C).
- The volume of regular shape or irregular shape solids can be measured using water displacement method. The volume of water
- displaced is equal to the volume of the object.



Measuring skills

- accurate :meaning very close to actual value
- ways to increase accuracy
    - use suitable measuring tools
    - using right techniques
    - taking several readings