

Mardi, 27 octobre 2015

COURSE OBJECTIVE AND PROGRAM

It aims at reinforcing the students the basic language skills, measuring for effective oral and written communication in english based on materials and topics obtained from physics and related areas emphasis is on the building of communicative competence. So that the students should use acceptable english words and forms its explain, define and describe basics scientific forms, notions, concepts and phenomena with more

Topics to be discussed include:

- I - Matter and measurement
- II - Liquids
- III - Gases
- IV - Force
- V - Motion
- VI - Work, Energy and Power
- VII - Heat (Properties + effects)
- VIII - Wave motion and sound
- IX - Wave motion and light
- X - Light reflection & refraction
- XI - lenses
- XII - Colour
- XIII - Magnetism
- XIV - Electric charges
- XV - Electric current
- XVI - Electromagnetic induction
- XVII - Electrons
- XVIII - Radioactivity
- XIX - Nuclear Energy

Chap1: MATTER AND MEASUREMENT

Matter is everything anything that has mass and occupies space.

Matter exists in different states: Solid, liquid, gas. Liquid and gas constitute fluid

- solid matter

A definite solid is a solid that has a definite shape and volume

- liquid matter

It has a definite volume but has the shape of its container.

It doesn't have a definite shape Ex: Water

- gas matter

It doesn't have neither a definite shape nor a definite volume

It is compressible

Ex: H₂, Oxygen

Some matters can exist ⁱⁿ at the three states. It can exists as liquid, solid or gas Ex: Water

Each matter has building blocks

It can be made up of only one element : it is called element

It can be made up of two or more elements. We call it compound.

The smallest particle of matter which exists as an element

is called atom

The

The smallest particle of matter which exists as a compound
is called molecule.

We can measure quantity of matter and express the result
in an unit.

We have fundamental units and derive units

Ex: g/cm^2 : derive unit

s: fundamental unit

Density of a substance is obtained by dividing its mass by
its volume.

The relative density of a substance is obtained by dividing
its density by the density of a reference (water) matter

$D = 13.6 \text{ g/cm}^3 \Leftrightarrow$ it has 13.6 times the density of water

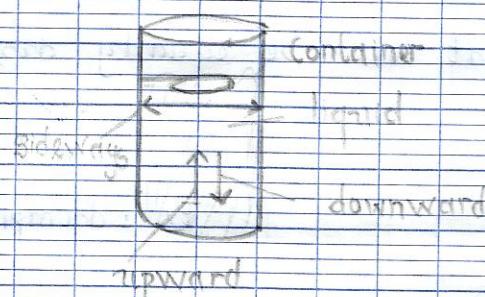
Different matters have different densities

The unit for density is g/cm^3

Substance	density (g/cm^3)
Gold	19.3
Mercury	13.6
Aluminium	2.7
Water	1.0
Ice	0.92

chap2: LIQUIDS

It takes the shape of its container. Inside the container a liquid pushes in three directions



Sideways (adj and adverb)

- upward / upwards
- downward / downwards

adj adverb

adj does not take "s"

The liquid pushes sideways against the sides of the container

It pushes downwards ~~against~~ on the bottom -//--

-//--- upwards against the walls -//---

The existence of an upward force in all liquids is known as buoyancy (buoyant force)

The liquid exerts a force ^{in the} on three directions. (to exert)

The law that governs buoyancy is the Archimedes law.

"An object immersed in a liquid appears to lose an amount of weight which is equal to the weight of the liquid it displaces"

adj: deep (deeper comp)

In a liquid the pressure at any point is directly proportional to the depth below the surface.

Volume and surface are inversely proportionnal

Applications:

1. The Lomp pangar dam

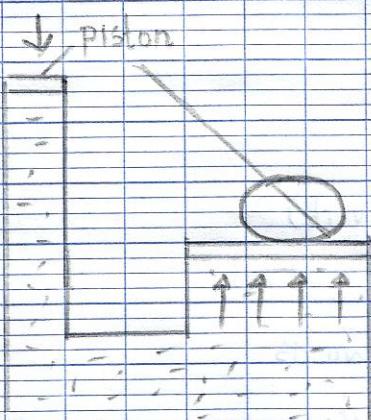


area

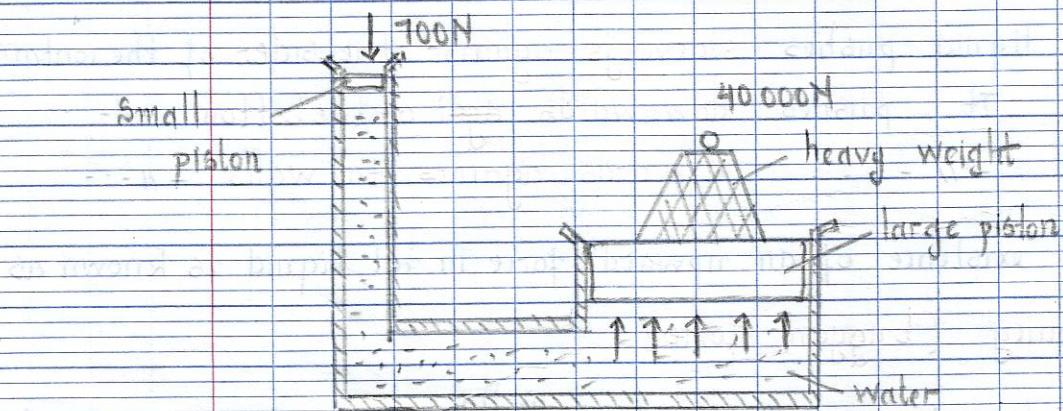
2. When pressure is applied at a confined point it would of a liquid it will be equally distributed to the liquid (it is ~~equal~~ undiminished) (Pascal)

3- hydraulic

press



Principle of hydraulic press



sink: if $F_e < P$

float: if $F_e = P$

Explain why it is easier to float on water when your lungs are inflated...

Q: What will happen to the water line ^{on} when a big ship leave from sea water to fresh water (River) (to sail)

R: The water line will increase

chap 3: GASES

The Earth's atmosphere, the air we breathe consists of a mixture of gases. Air has mass and it exerts pressure.

To weigh : measure the weight

At sea level this pressure is sufficient to support a 76 cm column of mercury in a vacuum tube. (bear, withstand)

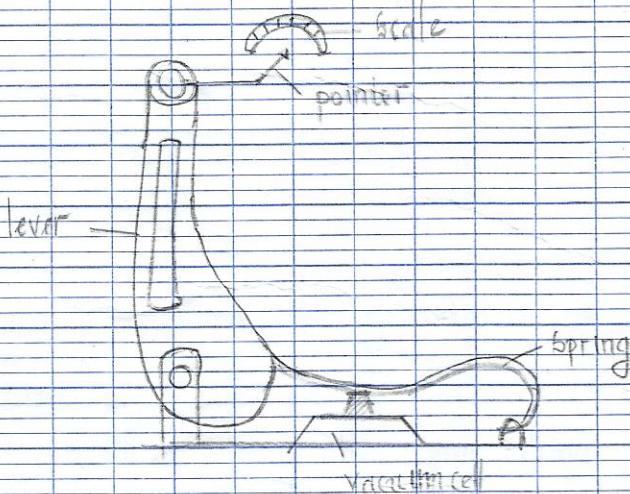
Air is consist of (to be composed of, to comprise, to be made up of)

Vacuum : An empty space with no air

Changes in weather will cause more changes in atmospheric pressure. These changes can be measured using a **barometer**.

Barometer is an instrument which uses a vacuum cell

Aneroid barometer is the common type of barometer. It consists a vacuum cell which is attached to a pointer by levers. It also has "scale".



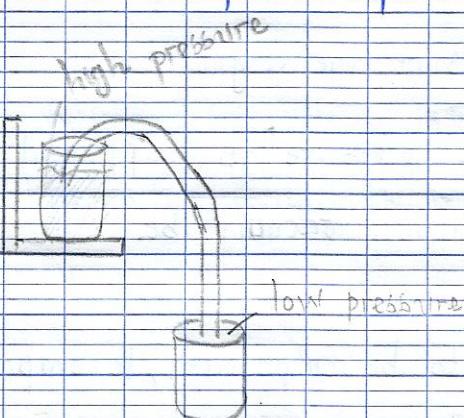
No. Volume and pressure are in inverse proportion or indirect proportion or indirectly (inversely) proportional.

- Boyle's law

if the temperature of a fixed mass of gas remains constant, the volume of this gas is inversely proportional to the pressure.

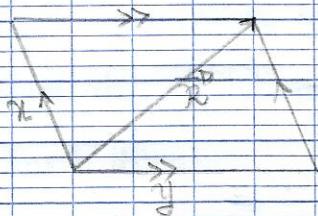
Siphon

used to transfert a liquid from a higher level to a lower level



chap 4: FORCE

- A force has:
 - a direction : it is a pull or a push toward a direction
 - a magnitude
- If a quantity has both magnitude and direction, it is a vector quantity.
- Many forces acting on a body can be represented by one force called **resultant force**. It can be expressed using the **parallelogram of forces rule**



The arrow represents or indicates the direction of the force

The magnitude of the force is equivalent to the length

"Force R is the resultant of forces x and y"

- If forces x and y make a body to be at rest, the resultant force is ~~null~~ zero and we say that the body is ~~at~~ in equilibrium
- Force of gravitation \neq force of gravity

The force is also proportional to the mass of the body and inversely proportional to the distance between the object's two bodies.

mass: The amount of matter that the body contains.

Weight: force of gravity; it is the opposite of the buoyant force.

Center of gravity: point where the force of the gravity is highest on the body.

« A ship is more stable loaded than at empty »

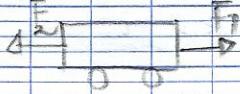
Why:

When the ship is loaded the level of water increase the buoyant force acts and its resultant with the force of gravity is null, it is at rest but when it is empty

« A piece of wood floating is at equilibrium »

Why:

chap5: MOTION



If one force is greater than the other, the body will move toward the direction of that force; it is in motion.

But if the resultant is zero the body is said to be at rest or in equilibrium.

If a body is not at rest, it is in motion.

The rate at which a body is moving is called speed.

We can calculate it by dividing the distance by the time he took to cover it.

The unit is m/s (meter per second); it is a derived unit.

Velocity is a speed in a giving direction; it is a particular type of speed; it is a vector quantity.

The product of the mass and the velocity is momentum.

acceleration: is a rate at which the speed of the body changes.

Out of physics deceleration is an negative acceleration.

We obtain it by dividing the variation of speed at a given time by the given time.

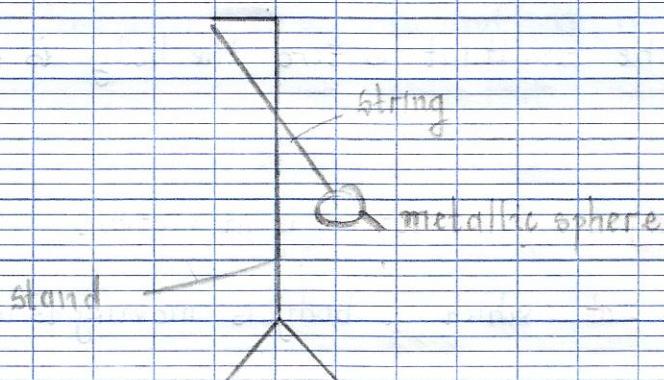
Ex: If the speed changes from x to y at a given time,

then the acceleration will be $\frac{y-x}{t}$
standard value

The gravity ($g = 9.8 \text{ m/s}^2$) is greater decreases when the altitude increases; because of the particles of gas in air which make friction when it

• Pendulum (simple)

We can measure g by using it



a pendulum can swing } from side to side
} to and fro (to and from)
} back and forth (forward)

friction is a force of resistance to motion which reduce the real value of the gravity

We can measure the period; the time for a complete per swing

$$\text{We have } T = 2\pi \sqrt{\frac{l}{g}}$$

$$g = \frac{4\pi^2 l}{T^2} \quad \text{by changing the variable}$$

Chapt : HEAT

- * In general, when heat is applied to a material its temperature rises

rise / raise

when Heat raises the temperature of materials

We measure the change of temperature by a thermometer

- * When heated, some substances expand and contract when cold.

Ex: clinical thermometers are constructed on this principle.

It consists of a calibrated glass tube containing mercury when exposed to heat the level of the mercury inside the tube rises.

Some thermometers use alcohol or gases because of its coefficient of thermal expansion (amount at which it expand when exposed to a certain temperature range)

Substance	Coefficient of expansion (m/degree)
Lead (Pb)	0,000029
Aluminum	0,000024
(copper) Copper	0,000017
(iron) Steel	0,000017
Glass	0,000009
Pyrex glass	0,000004
(below) Concrete	0,000007

The movement of heat is known as heat transmission.

It can take place in three different ways.

- **Conduction**

Only with solid materials

One way heat transmission in either in heated material to another material in contact or from one end of a material to another.

- **Convection**

Only with fluid materials.

either if we heat a part of a liquid after some time the whole liquid is heated

Or if we heat a ~~room~~ part of a room and because of air after some time the whole room is heated.

- **Radiation**

It is to produce heat or light

heat is transmitted by electromagnetic waves

The energy which comes from sun is called radiation.

Poor conductors of heat are called **heat insulator**.

The best heat insulator is **vacuum**. We use it to construct **thermos** or **vacuum flask**.

We have

- Specific heat capacity
- Thermal capacity
- Latent capacity

If we apply heat of the same intensity to Fer and lead, lead will absorb heat faster than Fe and release heat faster than iron

Some materials can absorb and give off much more heat than others.

Ex: A piece of iron and a piece of lead at the same size

if a piece of iron and piece of lead are heated and left to cool, the lead will release much more heat than the iron.

Specific capacity is the heat required by a substance to raise the temperature of a unit mass through 1°C

Substance	Specific heat capacity
Water	4200
Alcohol	2625
Aluminium	900
Glass	700
Steel	460
Copper	400
Mercury	140
Lead	130

Calories is the amount of heat absorbed or given off by one gram of water when its temperature changes by one degree Celsius.

Thermal capacity is the amount of heat required to change the temperature of a body by one degree Celsius

Heat is formally measured in Calories

$$1 \text{ cal} = 4,2 \text{ Joules}$$

Heat can change the state of a substance without changing its temperature.

If we crush ice and we apply heat to it, it will change to water.

The point is the point when

All substances change their state without change in temperature at a fixed point.

It is the heat required by a substance to change its state without a corresponding change in temperature is called latent point.

Melting point

Frosting point

Vaporization / boiling point

Condensation / dew point

Fusion is the ability to melt

WAVES MOTION AND SOUND

When we hit a material, its particles vibrate and oscillate.

The highest point a particle can reach is called the **amplitude of the wave**.

The amount of vibration is determined by the intensity you heat the material

or

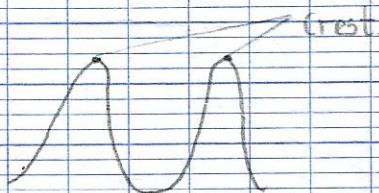
Sound waves are waves of compression, waves; they need a medium to move through. As they move through the medium, particles vibrate.

Sound can pass through different materials with different speed.

Sound travels fastest in iron

The maximum amount that a particle moves is called the **particle amplitude of the wave**.

The distance between two particles at the same state of compression is called **wave length**, measured in meters.



The number of complete oscillations in one second is called **frequency** measured in hertz (Hz)

Tuesday, 5th April 2016

light travels faster than sound

Light travels the fastest
(verb) adverb

Light ~~travel~~ has the fastest speed
adj

WAVE MOTION AND LIGHT

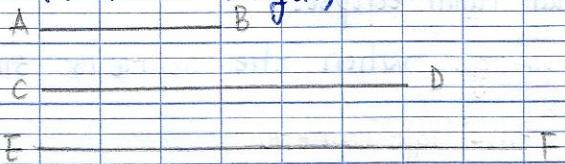
among
part of

To radiate: To emit light or heat

We have light radiation, like the radiation of heat and radio waves, is an example of electromagnetic radiation.

light radiation \equiv the radiation of light

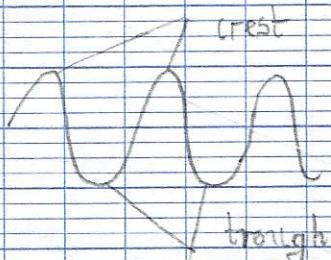
Light waves are much shorter than radio waves (we compare wave length)



line CD is shorter than line EF

line AB is shorter than line CD

line AB is much shorter than line EF



light waves have a much higher frequency - - -

light waves travels much faster than radio waves

irregular verb
cast

past tense

cast

straight straight straight

(light of the sun are called sun rays)

the light ray travels in straight lines

It is observed when an object cast a shadow on the screen when the object is between the light source and the screen.

When the source is extended, when we have another partial shadow around the first one called penumbra, the first shadow (ray shadow) is called umbra.

Blurred image: is when we cannot see the image clearly; it happens when the source is extended

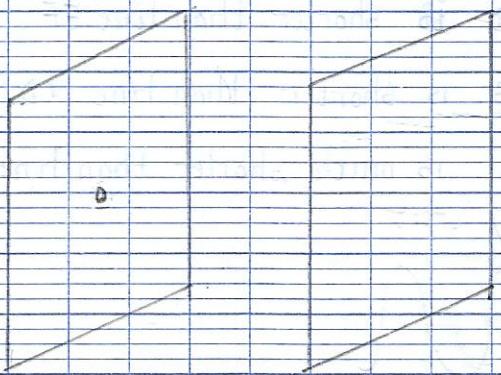
If the Earth came in between the sun and the moon, it's cast shadow on the moon: we call it lunar eclipse

partial
total

If the shadow of the Earth covers all the moon, we will talk about total lunar eclipse, but if it isn't we will talk about partial lunar eclipse.

We have sharp image when the source is small

The Pin-hole camera



It consists of a light-proof box with a small hole at one side of the box.

When an object is placed in front of the hole, light

raised from the different parts of the object will go in through the small hole and project an image on the screen behind the pin-hole

Since light rays travel in straight line and the pin-hole is too small, only one ray can pass at a time; rays from different parts of the object will pass through the the pin-hole crossing each other. Consequently, the image will be inverted (the image of the upright object is upside down)

light-year: distance covered by the light in one year in vacuum

LIGHT: REFLECTION AND REFRACTION

Light is a form of energy which induces a sensation of vision in our eyes and allows us to see things.

Surfaces of reflection

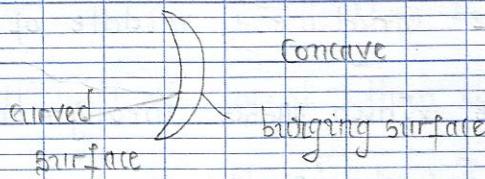
* Mirror

It is a piece of glass with at least two surfaces a reflecting surface and a polished one.

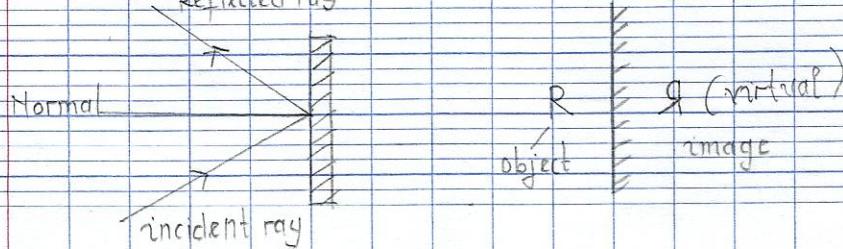
We have plane mirror and spherical mirror (convex concave)

when a ray strikes the surface of a mirror, three things can happen:

- It can be reflected back to the medium
- It could pass through the medium and be refracted
- It can be absorbed by the medium



In a plane mirror the angle of reflection is equal to the angle of incidence.



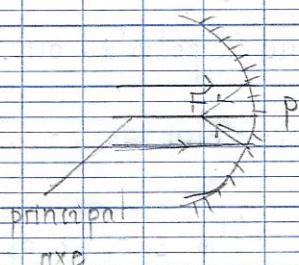
The image is virtual because it is not in front of a screen, it is formed by apparent intersection of rays

The line which is perpendicular to the mirror at a point is called the normal
P is the point of incidence

The image is inside the mirror, it appears to come from behind the mirror.

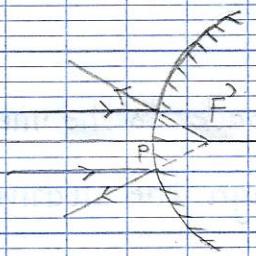
Reflection in Spherical mirrors

Point of apparent intersection of reflected rays



F is the focus (real) :

point of actual intersection of reflected rays



F' is a virtual focus:

Point of apparent intersection of reflected rays

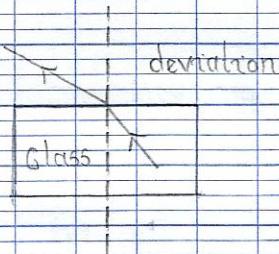
Centre of curvature: middle of the curve

The line which passes through the centre of curvature is called the principal axis

The point at which reflected rays meet is the principal focus or the focal point.

* Refraction

When the medium allow the ray to pass through it. The rays might change direction



Reflection: Phenomenon when a ray of light moving in a medium strikes a surface and is sent back.

Refraction: When a ray of light moving in a homogenous medium strikes a separating surface between two media and passes through it into the second medium.

The deviation is determined by the index of refraction or the refractive index (ratio of the speed in the two media)

If the image is formed above the principal axis, it is direct, and if it is below the principal axis, it is inverted

Diminished image: smaller than the object

Magnified image: greater than the object

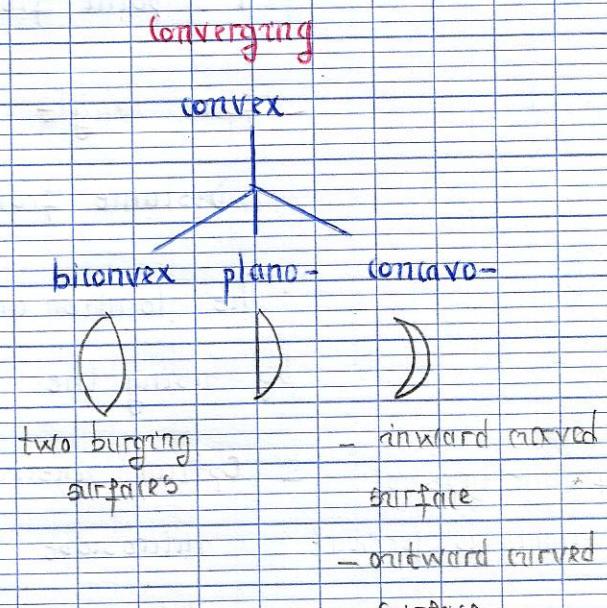
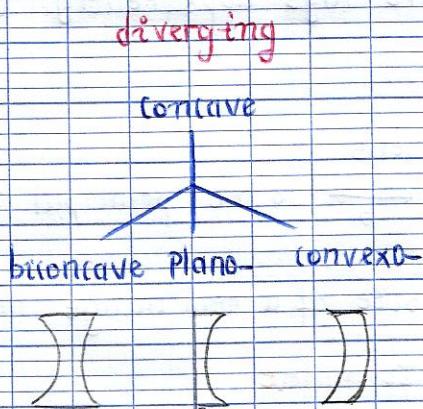
One application of reflection of light is periscope by mirrors

LIGHT: LENSES

A lens is a piece of glass having two spherical surfaces.

Lenses are used to control refraction of light

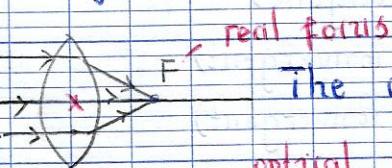
There are two main types of lenses: diverging and converging:



A concave lens can have two inwardly curved surfaces

A convex lens can have two bulging surfaces

Light rays will always pass through lenses (\neq mirror)



The central point of division) is called the optical centre O

The converging point for all the parallel rays passing through the lens is the Principal focus

To

converge: come together
diverge: spread out

Point of the principal axis where the rays converge or appear to diverge: Principal focus



Virtual focus

halves

Any line perpendicular to the two surfaces drawn through the optical center is the principal axis

F' : point from where rays apparently diverge.

- focal length

lens

Distance from the lens to the principal focus

The location and the size of a real image may be found by using the lens formulae

* What type of - Optical instruments

image is formed? microscope

size

upright

telescope

posture

inverted

optical camera.

or upside

eyesight (to correct eyesight defects)

down

- myopia (divergent)

- hyperopia (convergent)

- presbyopia (convergent)

- astigmatism