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UGANDA CERTIFICATE OF EDUCATION
OCTOBER - NOVEMBER, 2020

DO NOT WRITE YOUR SCHOOL/CENTRE NAME OR NUMBER ANYWHERE IN THIS BOOKLET

Candidate's Name TR. NANYUMBA HAJI

Signature ~~WAKISHA~~

Subject PHYSICS Paper code 535/2

WAKISHA 2022

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READ THE INSTRUCTIONS BELOW CAREFULLY BEFORE USING THE ANSWER BOOKLET.

1. Use a blue or black ink ball pen. Work in pencil, other than graphs, maps and drawings, will **not** be marked.
2. List the question numbers, in the order attempted, in the left-hand column of the boxes opposite.
   Do **not** list the multiple choice questions.
3. Write your answers on both sides of each sheet.
4. Do your rough work in this answer booklet. Cross through any work you do not want marked.
5. Do **not** fold, dismantle or tear any part of the answer booklet. Do **not** accept an answer booklet with missing pages. Folding, dismantling or tearing of the answer booklet is a malpractice and shall lead to cancellation of results. All work must be handed in.
6. Check that you have written your name, signature, random number and personal number on each page of the answer booklet(s) used. Tie all the booklets used together.
7. Do **not** share your work with another candidate or expose your work such that another candidate can copy from it. Sharing or exposing your work may lead to cancellation of results.
8. Answer only the number of questions as instructed on the question paper. Answers to extra questions will **not** be marked.

Question number attempted	For Examiners' use only	
	Mark	Examiners' initials
Total		

Write here the number of answer booklets you have used.	

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1(a)(i)

Uniform velocity is a constant rate of change of distance moved in a specified direction.

(ii)

Length of the pendulum is the spacial/distance between two fixed points.

(b)(i)

Initially a body moving with a constant velocity of 60ms^{-1} for 8 seconds accelerated uniformly to a velocity of 80m/s in 4 seconds.
Then decerated uniformly from 80ms^{-1} to 0ms^{-1} in another 4 seconds.

(ii)

Distance is a scalar quantity, therefore directions are not considered i.e

Distance covered between 16th and 24th second

= area under graph

= ▯ + ◺

$= \frac{1}{2}h(a+b) + \frac{1}{2}bh$

$= \frac{1}{2} \times 4(60+80) + \frac{1}{2} \times 4 \times 80^{40}$

$= 280 + 160$

$= 440\text{M}$

(c)(i)

Let the horizontal component be Fx and vertical component be Fy.

$\vec{F}x = 8N - 3N$

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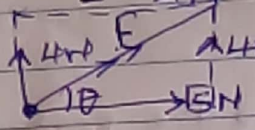
F_y $= 4N - 5N$

$= 4N$ upwards.



$\Rightarrow F = \sqrt{(5)^2 + (4)^2}$

$= \sqrt{25 + 16}$

$= \sqrt{41}\ N$

$= 6.40N$

$\theta = \tan^{-1}\left(\frac{4}{5}\right)$

$= 38.66°$ to the horizontal.

∴ The resultant force is 6.40N at angle of 38.66° to the horizontal.

(ii)

Air rushes out very fast and the balloon moves backward.

This is because high escaping air exerts high momentum onto the balloon making it to move backward this is due to the third newton's law of motion.

(d)

When a person sucks a liquid; air is removed in the straw; this creates a vacuum inside the bottle; thus reducing the pressure inside the bottle;

The atmospheric pressure forces the liquid to rise to the mouth through the straw; i.e

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NO2 (a) (i)

Mechanical advantage is the ratio of load to effort.

(ii)

Moment of a force is the ~~product of force~~ and its perpendicular distance ~~from the~~ line of action of the force from the pivot.

(b) (i)

Principle of moments states that when a ~~a body~~ is in equilibrium, the algebric sum of clockwise moment about the point from the pivot is equal to the algebric sum of anti clockwise moment about the same point from the pivot.

(ii)

For a crow bar;

M.A ≈ V.R.

$$M.A = \frac{\text{effort arm}}{\text{load arm}}$$

$$= \frac{90\ cm}{15\ cm}$$

$$= 6$$

(c) (i)

Density of a substance is the mass ~~p~~ r unit volume of a body.

(ii)

Since air occupies volume of room where it is; volume air in the room = volume of the room.

= bxwxh.

$V = 10m \times 12m \times 4m$

$= 480m^3$.

From $\rho = \frac{m}{V}$

$m = \rho V$

$= 1.26 \frac{kg}{m^3} \times 480m^3$

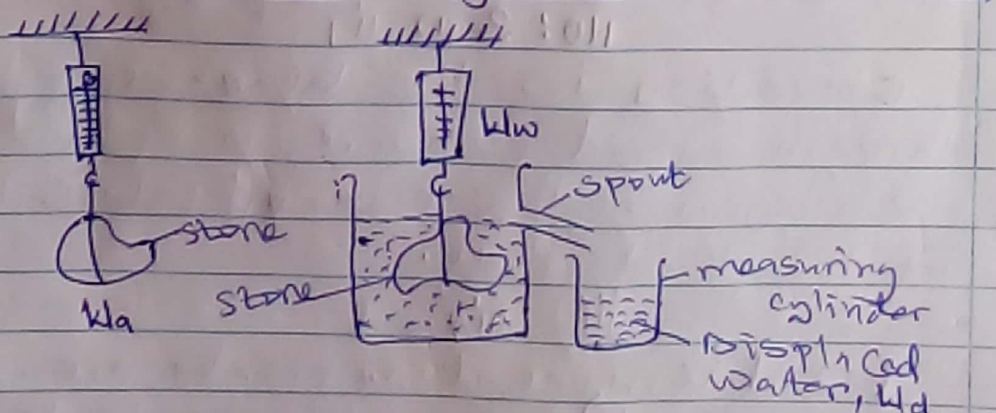
$= 604.8kg$

(d) (i)

Archimedes's principle states that when a body is partially or wholly immersed in a fluid, it experiences an upward force called upthrust which is equal to the weight of the fluid displaced.

(ii)

An experiment to verify Archimedes's Principle



- A stone is suspended on a spring balance and its weight, Wa is obtained in air.
- A stone still hanging on a spring balance is immersed in water placed in the overflow can upto the spout level.

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The reading of the spring balance is noted and recorded as Kw.

The weight of the water displaced, Kd and collected in the measuring cylinder below the spout is obtained by measuring it on the spring balance.

The apparent loss of the weight of the stone, Wf is obtained from $Ka - Kw$.

It is found out that the Kd is equal to the apparent loss, Wf. thus verifying archimandes principle.

(iii)

Over the side, the depth (height) of the boat to the bottom is at the same level with the water, hence have or experience same pressure below or at the bottom.

NO: 3 (a) (i)

Convection is the transfer of heat energy through a fluid from a region of high temperature to a region of lower temperature by the movement of the fluid itself.

(ii)

Fixed temperature points are temperatures at which we expect confidents of a particular physical properties to take place.

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(b) (i)

Pump/ compressor Pump

(ii) Because black paint is a good emitter of heat energy;

made of fins because they give out latent heat of vaporization to the surrounding.

(iii)

cools the liquid by the volatile evaporating liquid under reduced pressure in the pipe.

(c) (i)

- The uncalibrated thermometer is immersed in pure melting ice at lower fixed point, X_0 is noted.
- The uncalibrated thermometer is immersed in steam of boiling liquid and upper fixed point, X_{100} noted.
- The uncalibrated thermometer is inserted in a liquid of unknown temperature, θ and length, X_θ of the mercury thread noted.

The unknown temperature, θ is determined from $\theta = \frac{X_\theta - X_0}{X_{100} - X_0} \times 100^\circ C$.

(ii)

Advantages of mercury as thermometric liquid	Disadvantages of mercury as thermometric liquid
- Opaque i.e seen easily	- non uniform expansivity.
- Does not stick on glass	- low freezing point.

(d)

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NO: 4 (a)(i)

- Battery
- Bulb

(ii)

- Has scales which are poor conductors of electricity.

(b) (i)

Potential difference is the work done in joules when one coulomb of electricity moves from one point to another in a circuit.

(ii)

From definition, $V = \frac{W \cdot d}{Q}$; $W \cdot d = VQ$ by multiplying throughout by Q;

but $Q = It$;

Power, $P = \frac{W \cdot d}{t}$ — (i)

$\Rightarrow P = \frac{Q \cdot V}{t}$ — (ii)

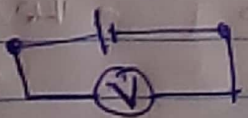
- Substituting VQ for work done in (i) to get power; we obtain (ii)
- Also substituting It for Q in eq (ii)

Also $P = \frac{It \times V}{t}$ — t cancel out

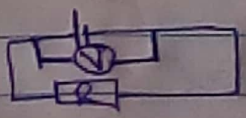
$\Leftrightarrow \boxed{P = IV}$ as required.

(iii) - Avoid electrical shock when using the
- Avoid damage of electric appliances

(c) (i)



(ii)



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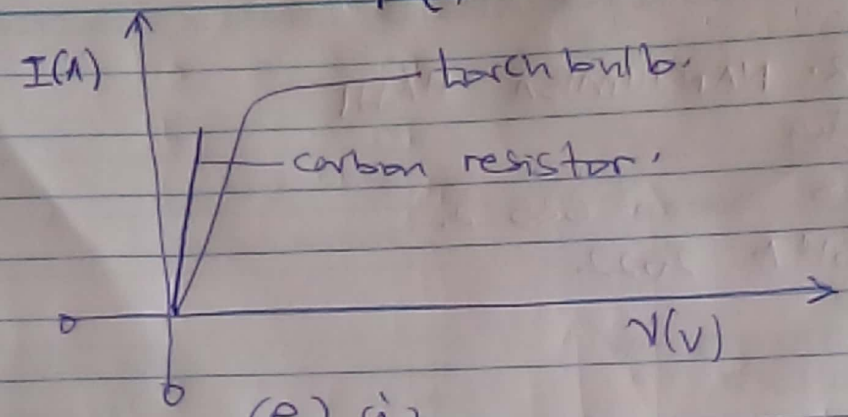
4 (d) (i)



(e) (i)

- Local actions; This when the Zinc plate dissolves in the dilute acid as it reacts with it.
- Polarization; is the accumulation of hydrogen gas around the copper plate.

(ii)

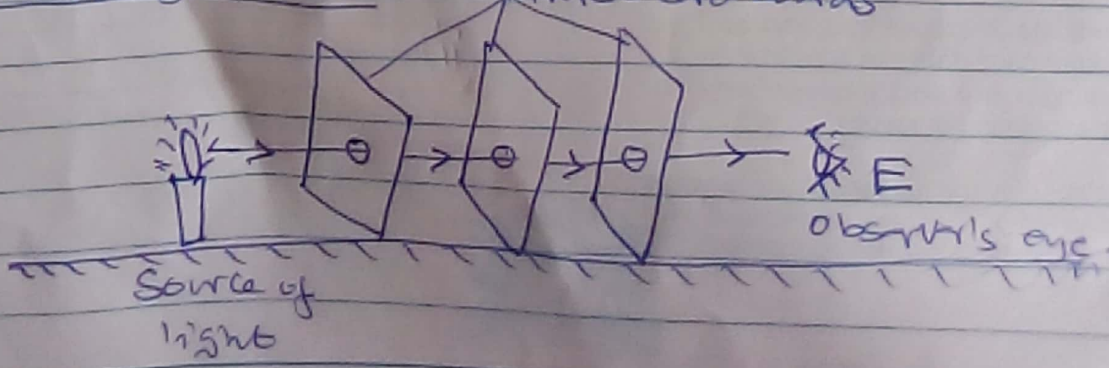
- Inspection of battery regularly to ensure that acid is kept at a certain level.
- Topping up using distilled water
- Charging regularly.

5 (a) (i)

Light is the form of energy which stimulates the sense of seeing.

(ii)

An experiment to show that light travels in a straight line.



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- Three card boards with holes at the centre are arranged in a straight line as shown above.
- The source of light is put infront of the card board and observer at the opposite end.
- A thread is passed through the holes to ensure that the card boards are in line.
- A thread is removed gradually and then observed.
- Observer at E sees light from the source.
- When one card board is displaced from the order; such that the hole is not in line with the other two card boards;
- The observer does not see light from the source.
- When the displaced cardboard is returned such that the hole is in line with the rest of hole of the card board;
- The observer sees light again.
- This shows that light travels in a straight line.

(b)

Primary colours are colours which cannot be got by mixing any two colors for example Red, blue, green. while

secondary colours are colours which can be got by mixing two primary colors for example, Yellow, magate, Cyan.

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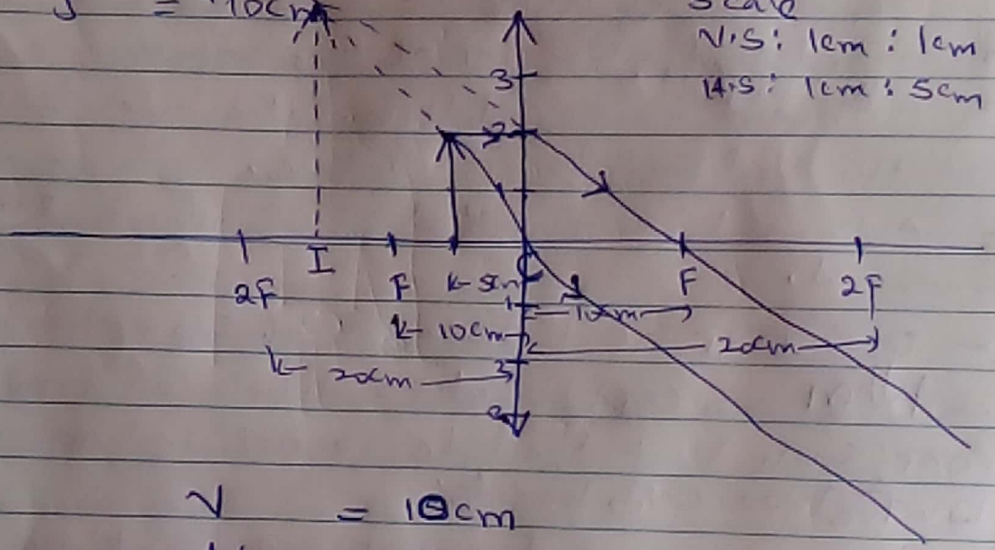
5(c)(i)

$h_o = 2cm$

$u = 5cm$

$f = +10cm$

Sketch



$v = 10cm$

$h_i = Hcm.$

(ii) - used in sun glasses to correct long sightedness to see distant objects.

- used in camera to focus light on the film.

(d) (i)

Total internal reflection

(ii)

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(To be fastened together with other answers to paper)

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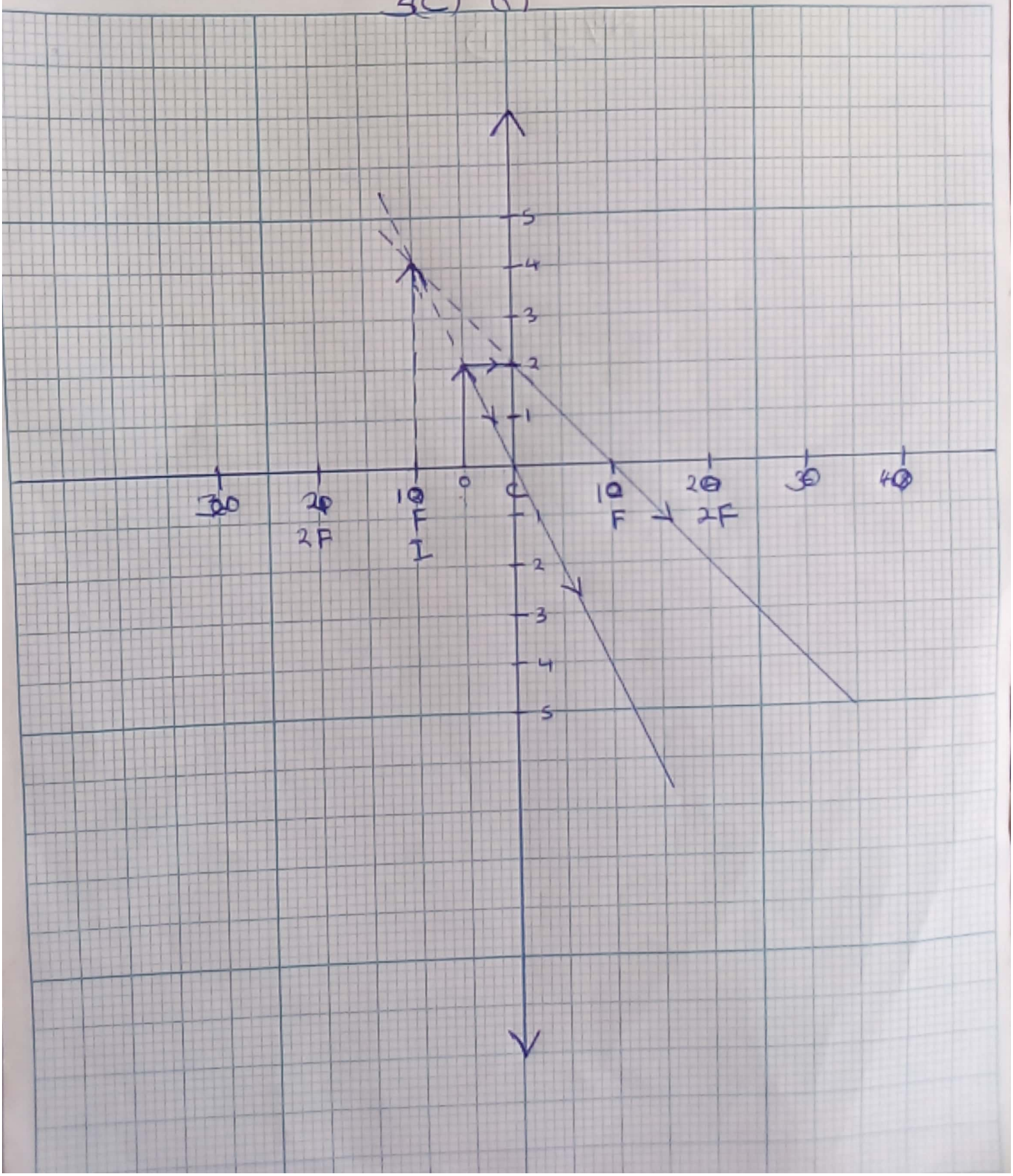
5(c) (i)



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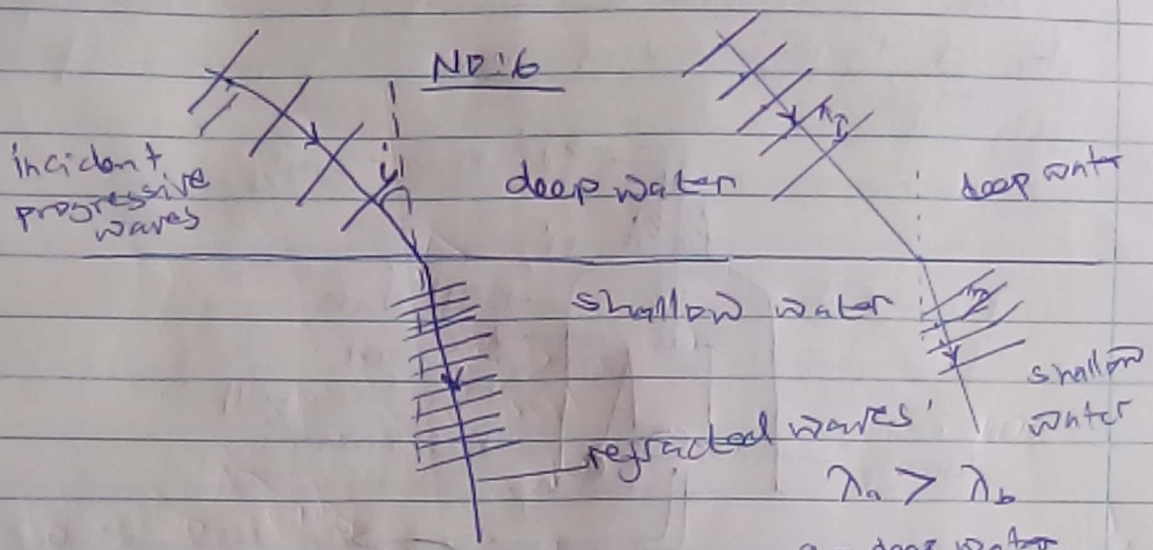

$\lambda_a > \lambda_b$

a = deep water

b = shallow water

(b)(i)

A transverse wave is a type of progressive waves in which the direction of travel of the particles is perpendicular to the direction of travel of the wave.

While

Longitudinal wave is a wave, in which the direction of travel of the particles are parallel to the direction of travel of the wave.

6(b)(ii)

$n = 11$;

$d = 33m$

$\lambda = ?$

from $d = (n-1)\lambda$

$33 = (11-1)\lambda$

$\frac{33}{10} = \frac{10\lambda}{10}$

$\lambda = 3.3m$

time taken for one complete cycle is period.

$T = 0.01S$

$\Rightarrow f = \frac{1}{0.01}$

$= 100Hz$

$\Rightarrow v = \lambda f$

$= 3.3 \times 100$

$= 330 m/s$

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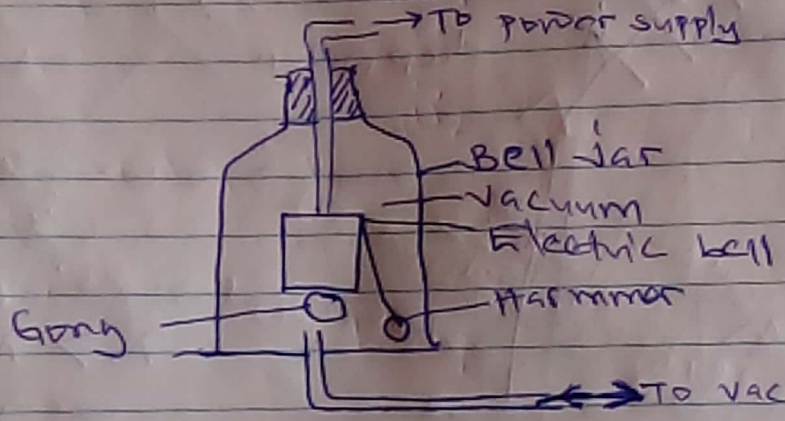
(c)(i)

An experiment to show that sound cannot travel through a vacuum.



- The apparatus are arranged as shown above.
- When the power supply is switched on, the hammer is seen hitting the gong and a loud sound is heard.
- The vacuum pump is turned on such that air is drawn gradually.
- The intensity of sound heard becomes faint and fainter until no more sound is heard though hammer is seen striking the gong.
- Then vacuum pump is turned off and air is allowed in again.
- The loud sound is heard again as before.
- This shows that sound cannot travel through a vacuum.

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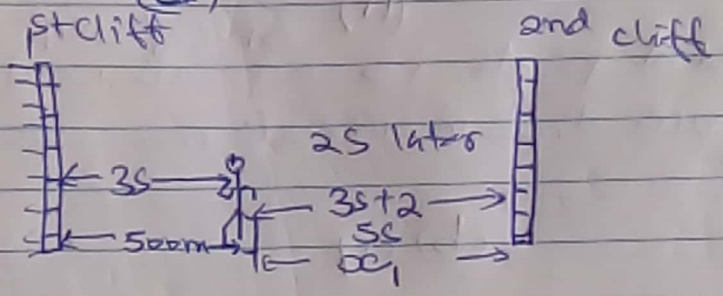
6(c)(ii) :-

- Enables bats, dogs, cats and dolphins to communicate.
- Used in medical diagnostic ultra sound scanning.

(d)



distance between cliffs = 500 m.

(i) 1st cliff;

$$v = \frac{2d}{t}.$$

$$= \frac{500 \times 2}{3}$$

$$= 333.33 \text{ m/s}.$$

(ii) 2nd cliff;

$$v = \frac{2d}{t}.$$

$$333.33 = \frac{2d}{5}$$

$$d = \frac{333.33 \times 5}{2}$$

$$= 833.33 \text{ m}$$

Distance between the cliffs

$$= 500 + 833.33$$

$$= 1333.33 \text{ m}$$

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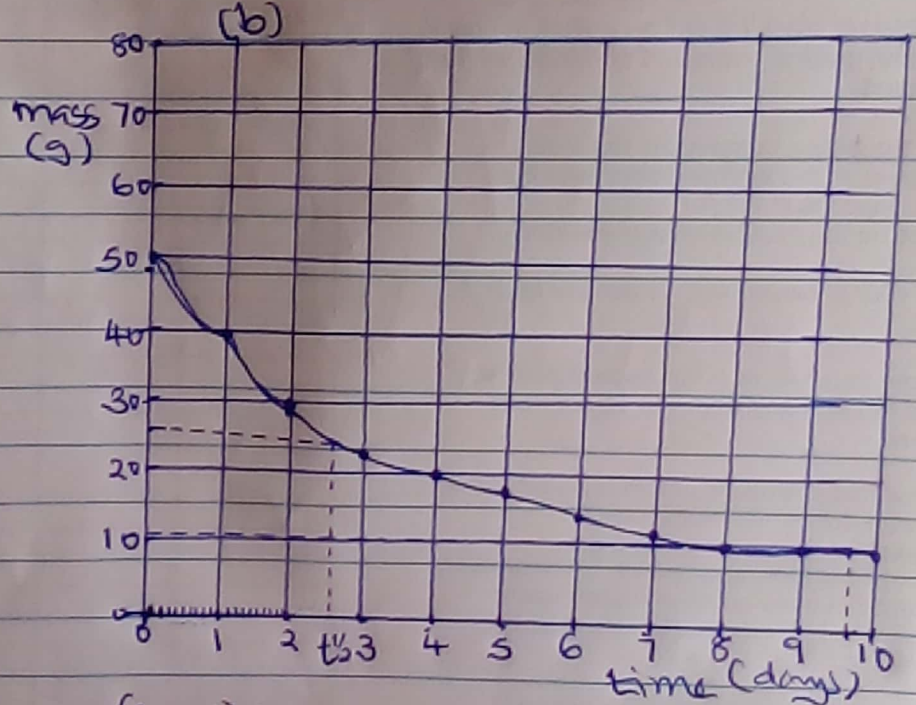
No: 8 (a) (i)

Activity is a spontaneous disintegration of unstable nucleus to form a stable nucleus with emission of radiations.

(ii)

Half life is the time taken for a radioactive nuclide to decay to half of its original mass or nuclei.

(b)



(i) $t_{\frac{1}{2}} = (6 \times 0.1) + 2$

$= 0.6 + 2$

$= 2.6$ days

(ii) mass left after 9.6 days $= 10g$.

mass have decayed after 9.6 days $= 50g - 10g$

$= 40g$

(c)

Gamma rays; High penetrating (frequency) of short wavelength.

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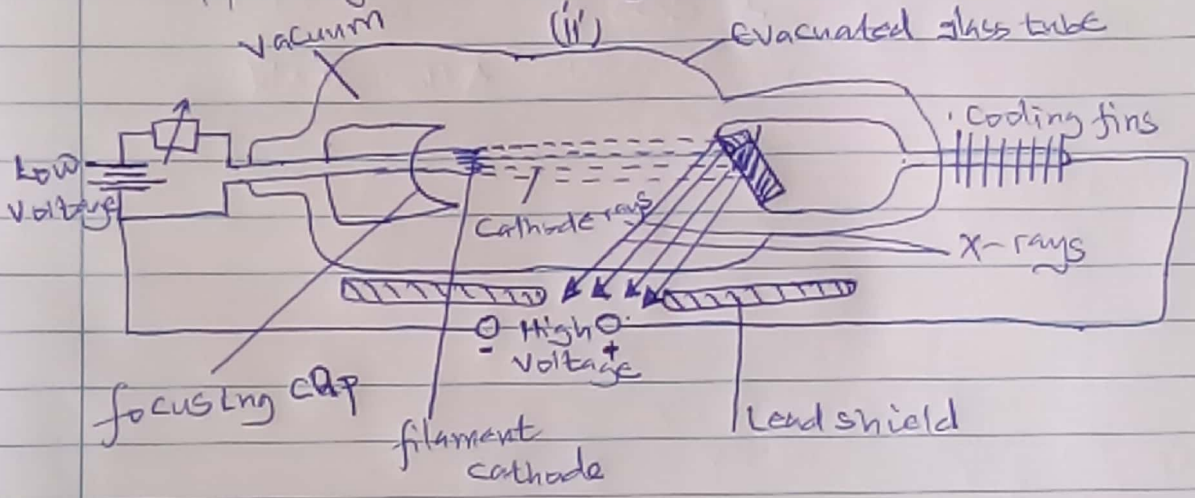
8 (d) (i)

X-rays are electromagnetic radiations (waves) produced when fast moving electrons (cathode rays) are stopped by matter (heavy metal).

(ii)



- A low voltage is applied across the cathode to emit electrons thermionically.
- High voltage is applied across the anode and the cathode to accelerate electrons across the vacuum.
- On reaching the cathode, 99% of kinetic energy of electrons is converted into heat energy while 1% of kinetic energy of electrons is turned into X-rays.

(iii)

- Diagnose stomach ulcers.
- Detect the complicated organs of the body.

(e)

- Avoid unnecessary exposure to X-rays
- X-rays should be shielded using thick lead.

END