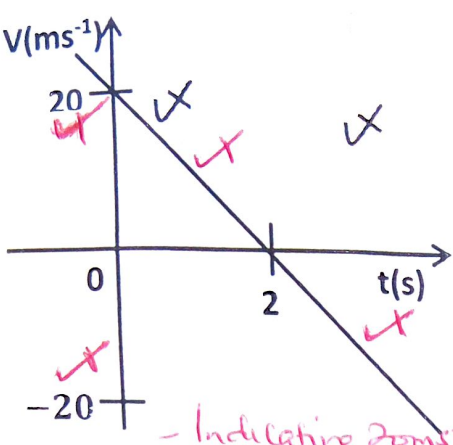


	SCORING POINTS	COMMENTS	MARK
1.	a. (i) The rate of change of velocity of a freely falling body. ✓ (ii)  - Indicating 20ms^{-1} ✓ - Shape - 01 ✓ - Indicating -20ms^{-1} ✓		01
	(b) The rate of change of momentum ^{of a body} is directly proportional to the applied force and takes place in the direction of force. ✓ (c) (i) $F = ma$ $20 = 50a$ $a = 0.4\text{ms}^{-2}$ $v = u + at$ $= 0 + 0.4 \times 4$ $= 1.6\text{ms}^{-1}$ ✓ (ii) $S = ut + \frac{1}{2}at^2$ $= 0 + \frac{1}{2} \times 0.4 \times 4^2$ $= 3.2\text{m}$ ✓ (d) (i) $PE \rightarrow KE + PE \rightarrow KE$ ✓ (ii) Energy loss due to <u>air resistance</u>. ✓ <i>Handwritten calculations for (c):</i> $\frac{F}{m} + u = v$ $\frac{20 \times 4}{50} + 0 = v$ $\frac{80}{50} = v$ $v = 1.6\text{ms}^{-1}$ $v^2 = u^2 + 2as$ $v^2 = 0^2 + 2 \times 0.4 \times 4$ $v = 3.2\text{m}$	Shape 01	02 1 03 02 02

- Damping
- Friction.

(e) (i) A loaded truck has exerts more pressure so there is more grip on the road surface and there is increased normal reaction so more friction than an unloaded one.

(ii) advantage

- aids motion

- walking

- writing

disadvantage

- wears surfaces of moving objects

- unnecessary heat

- noise

- Weight ✓
- More ~~friction~~ grip ✓
- More ~~friction~~ ✓
- Conclusion ✓

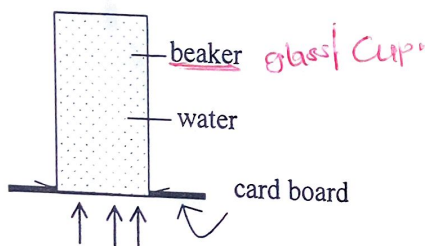
- More weight ✓
- More friction ✓

16

2.(a) (i) Pressure is the force acting normally per unit area ✓

Atmospheric pressure is the pressure exerted by weight of air on surfaces of all objects. ✓

(ii)



Water does not pour out of the beaker because Card board is pushed by atmospheric pressure.

(iii) Pressure = $H + h$

$$= \frac{760}{10} + 22.3 = 98.3 \text{ cmHg.}$$

$$P = h\rho g$$

$$= \frac{98.3}{100} \times 13600 \times 10$$

$$P = 133688 \text{ Nm}^{-2}$$

- Vacuum pump
- Magdenburg hemispheres.
- Crushing can expt.
-

02

- A glass is filled with water and a card board is gently placed at the top of the glass. ✓
- The glass together with card board is inverted and after some time the card board will remain touching the glass thus showing that air exerts a pressure. ✓

✓ Pour some water in a metallic can.
✓ Heat the water until it boils.
✓ Stop heating and close its can.
✓ Pour cold water over the can.
✓ The can crasht inwards.

- This is due to atmospheric pressure.

$$\frac{76}{100} \times 12600 \times 10 + \frac{44.6}{100} \times 13600 \times 10$$

$$\frac{760}{10} + 44.6 = 120.6$$

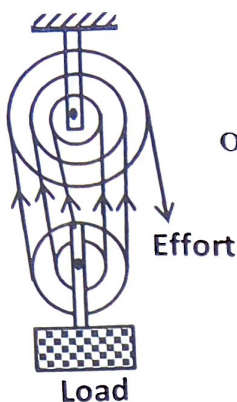
$$P = h\rho g$$

$$\frac{120.6}{100} \times 13600 \times 10$$

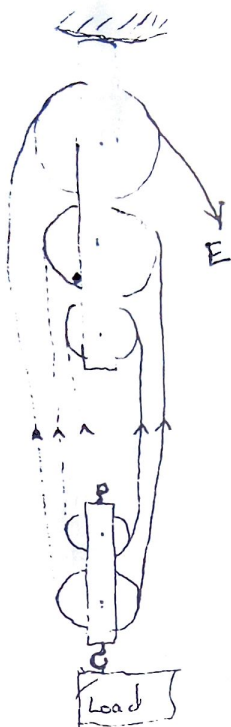
$$= 164016 \text{ Pa.}$$

$$= 164016 \text{ Nm}^{-2}$$

b(i)



OR



70 23
66
120

Correct diagram ✓

Arrows ✓

Effort ✓

Load ✓

Arrows - ✓

HE - ✓

Arrangement - ✓

02

b.(ii) For a pulley system of the velocity ratio

5. Known weights are put on a load scale pan ✓
whose weight is known. ✓

Other known weights are put on the effort scale until the load rises slowly with a uniform speed. ✓

MA is calculated from $MA = L/E$ ✓

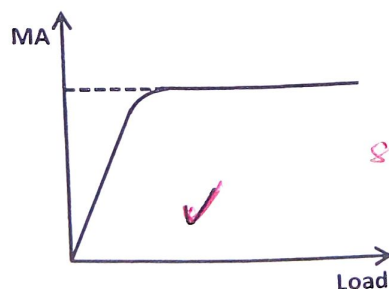
Formula ✓

Procedure is repeated for a series of increasing Loads and their corresponding efforts tabulated. ✓

Procedure 4

04

A graph of MA against Load is plotted.



shape ✓

Graph ①

uses

25



	<u>Conclusion</u> M.A increases with the load until it reaches a Constant. (iii)-Lifts ✓ <i>First two</i> - Cranes ✓ <i>(Any two)</i> <i>- Raising flags</i> <i>- Braking water from under pump.</i> <i>- Raising materials or seeds.</i> <i>- Brake down</i>		02
			16
3.a	Evaporation occurs at the surface while boiling	<i>For a correct pair</i>	01
b)	taken ✓ through the liquid. ✓	<i>- Boiling occurs when</i>	01
	Evaporation occurs at any temperature while boiling takes place at fixed temperature. ✓	<i>SVP equal to atm</i>	02
(b)(i)	Lowest the boiling point ✓	<i>while evaporation</i>	02
(ii)	raises the boiling point ✓	<i>takes place at</i>	
		<i>any pressure.</i>	
(c)(i)	a good conductor of heat ✓		
-	It should be opaque ✓	<i>First four</i>	02
-	It should have a high expansivity rate ✓	<i>Each 1/2</i>	
-	It should have a high boiling point ✓		
(b)(ii)	from ✓ <i>it should not be wet the glass</i> <i>- Regular expansivity.</i>		
	$= \frac{(l-l_0)}{(100-l_0)} \times 100^\circ C$	$or R = \frac{x}{y} \times 100^\circ C$	03
	$-10 = \frac{(l-50)}{(230-50)} \times 100^\circ C$	$x = l - 50$	
	$-10 \times 180 = (l - 50) 100$	$y = 230 - 50$	
	$l = 50 - 18 = 32cm.$	$-10 = \frac{(l-50)}{(230-50)} \times 100^\circ C$	04
3.(d) (i)	Dry ice is wrapped into a wire gauze and placed in a boiling tube filled with water. ✓	$l = 32cm$	
-	Boiling tube is then tilted and heated close to the top for some time. ✓		
	The water starts to boil while the ice remains unmelted. ✓		
	Heat cannot be conducted from the top to the ✓ <i>is not easily</i>		

at the bottom.

(ii) -metallic wall which is a good conductor of heat.

- painted black to absorb and radiate heat
because black bodies are good absorbers.
- made of fins to increase surface area.

- Metal cooling fan
- Painted black
- Horse pipe

Any three

- Working diagram (exams).

02 03

16

4.

a.(i) Sound is a form of energy produced as a result of vibrating matter. ✓

(ii) A tuning fork of known frequency f is set to **vibrate** and held at the mouth of a glass tube. *dipped into water.*

- The glass tube is slowly raised until a loud sound is heard. ✓

- The length l of the air column is measured. ✓

- Speed of sound v is got from $v = 4fl$ ✓

- Experiment is repeated to get the average of speed of sound. ✓

(b) $l = \frac{\lambda}{4}$ but $v = f\lambda$ ✓

$v = 4fl$ ✓

$340 = 4 \times 425 \times l$ ✓

$l = 0.195m.$ ✓

$l = 0.2m$ ✓

(c) The reflected sounds (echoes) are **absorbed** therefore reverberation is **reduced**. ✓

- prolonged sound.

(d) A transverse wave is one where the vibrations are perpendicular to the direction of travel of the wave while a longitudinal wave is where the vibrations are parallel to the

04

03

02

02

$\lambda = \frac{v}{f}$

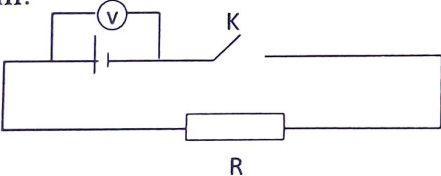
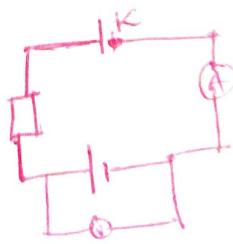
$\frac{340}{425}$ ✓

$\lambda = 0.8m$

But $l = \frac{\lambda}{4}$ ✓

$l = \frac{1}{4} \times 0.8$ ✓

$l = 0.2m$ ✓

	direction of travel of the wave. (e) (i) $f = \frac{n}{t} = \frac{3.5}{0.7} = 5\text{Hz}$ ✓ $v = f\lambda$ ✓ (ii) $70 = 3.5 \times \lambda$ ✓ $\lambda = 20\text{m}$ ✓ $v = \frac{x}{t} = \frac{70}{0.7} = 100\text{ms}^{-1}$ ✓ $\lambda = 70/3.5 = 20\text{m}$ ✓	or $2.5\text{osc} = 0.7\text{s}$ ✓ $1\text{osc} = \frac{0.7}{2.5} = 0.28\text{s}$ ✓ $T = 0.28\text{s}$ ✓ $f = \frac{1}{T}$ ✓ $= \frac{1}{0.2}$ ✓ $f = 5\text{Hz}$ ✓	02 02
	$f = v/\lambda = 100/20 = 5\text{Hz}$ ✓		16
5.	(a)(i) The resistance of a conductor in which a current of 1A flows when a pd of 1V is applied across its ends. ✓ (ii) The opposition to the flow of current within a cell. ✓ (b)(i) - A voltmeter connected across the terminals of a cell and its reading E noted. ✓ ✓ - A known resistor R is connected across the terminals of the cell ✓ ✓ dgm:  - close the switch K, the reading of voltmeter V is noted. ✓ ✓ - Internal resistance r is calculated from $r = \frac{(E-V)}{V} \times R$ OR $r = \frac{(E-V)}{I}$ ✓ <i>Take about R in the circuit</i> (ii) $E = 1.5\text{V}$ ✓ ✓ $r = \frac{(1 \times 1)}{(1+1)} = 0.5\Omega$ ✓ ✓	diagram 1 01 01 01 01 	01 01 01 05 05

total resistance $R = \frac{(4 \times 6)}{(4+6)} + 0.5 = 2.9 \Omega$

$I = \frac{E}{R} = \frac{1.5}{2.9}; I = 0.52 A$

(c)(i) Process of charging a conductor by bringing another charged body near it.

01

(ii) The GLE is charged

- The test body is Placed in Contact brought near the cap of the electroscope.

- If the divergence of the leaf decreases, the body is a conductor

- If the divergence of the leaf remains, the body is an insulator

02

(d) Metal is insulated so that it is not in

contact with the earth. The metal is put on an insulating handle. (Stand).

01

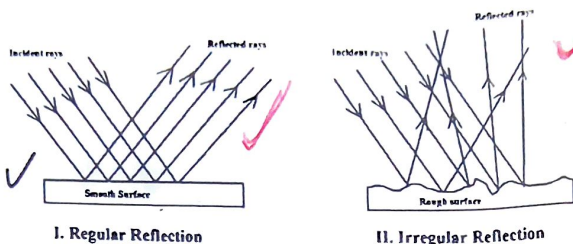
- Moist free environment (Dry environment)

16

6.

(a) (i) Angle of incidence is equal to the angle of reflection. ✓ ✓

The incident ray, the reflected ray and the normal at the point of incidence all lie in the same plane. ✓ ✓



(ii) Regular reflection

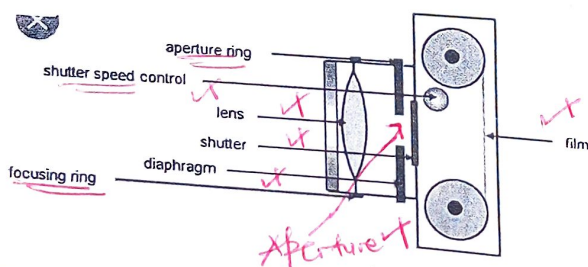
Parallel light rays incident on a smooth surface, light rays are reflected as parallel. ✓ ✓

Diffuse reflection

Parallel light rays incident on a rough surface produce light rays that are reflected as scattered. ✓ ✓

(iii) If the object is 5m from its image in the plane mirror, then it is 2.5m in front of the plane mirror therefore it has fallen through 7.5m ✓ ✓

(b)



Focus screw is adjusted to move the convex lens to keep the image in focus on the film. ✓

Convex lens converges light rays onto the film, diaphragm controls the amount of light entering the camera. ✓

Film is the screen where the image is focused. ✓

01

01

Diagram 1
mark each

02

description 1
mark each

02

Diagram 2
marks

02

Any four labeled parts ✓

$4 \times 1 = 4$ marks ✓

- light from the object is focused by the convex lens onto the film where the image is formed. ✓
- Diaphragm controls the amount of light entering the camera. ✓
- shutter determines the exposure time. ✓

02

✓ Distance b/w lens and film varies - Distance b/w lens and retina is fixed

6. (b)(ii) Lens camera has a diaphragm while a human eye has iris.

The lens in the lens camera is artificial while the lens in a human eye is biological.

(iii) During day the uses cones mainly cones see colour. *limited exposure to light*

At night the eye uses rods mainly rods see shape. *focusing by moving the lens*
- focus on image on film

Any first two. 02

Continuous exposure to light. 01

Focusing is by changing the focal length. 01
- focus on image on film

✓ - Constant focal length

✓ - Variable focal length.

7. (a) (i) A piece of a material that attracts ferromagnetic materials.

- A body that exerts magnetic force on magnetic material.

01

(ii) A region around a magnet where a magnetic force can be experienced. *field*

- voltmeter - Ammeter - galvanometer.

01

02

(b) (i) Used in cores of

- electric bells ✓

lifting magnets.

- electromagnets ✓

each ½

- transformers ✓

- Magnetic keepers

- loudspeakers.

- Relay switches

- Receivers.

- lifting magnets.

- magnetic field

(ii) Heating makes the domains to vibrate causing the dipole facing different directions. *disorganising the dipoles.*

02

(c) - strength of the magnetic field ✓

- length of the coil ✓ *Conductor / No of turns*

- speed of *rotation* of the coil ✓ *Conductor*

any two each 1

mark

02

First two.

(d)

01

- During the day, much light enters into eyes from the objects.
- At night little or no light is reflected into our eyes from objects.
(light from the object)

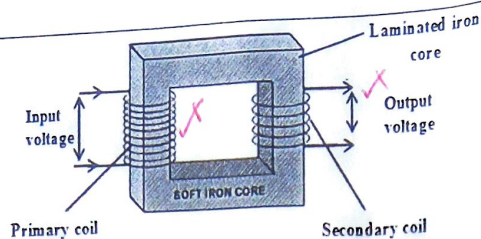


diagram 1

When an alternating voltage is fed into the primary coil it produces a changing magnetic field in the coil.

Description 1

01

The changing field in the primary coil links up the secondary coil hence in turn inducing e.m.f in the secondary coil.

Turns 1

01

Since the number of turns in the secondary is less than the number of turns in the primary coil, the e.m.f induced in the primary is smaller thus voltage is stepped down.

emf 1

01

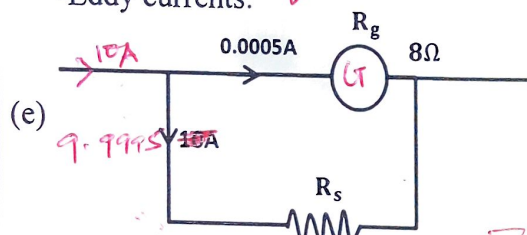
- hysteresis/magnetic reversals.
- flux leakage.

(ii) -Resistance of coils

each 1/2 mark

01

-Eddy currents.



Any first two.

$$V_1 \times I_2 = (52 \text{ mV})$$

$$I_s R_s = I_g R_g$$

$$R_s = \frac{0.0005 \times 8}{9.9995}$$

$$R_s = 0.0004 \Omega$$

$$10 R_s = 0.0005 \times 8$$

$$10 R_s = 0.004$$

$$R_s = 0.0004 \Omega$$

03

8.a (a) (i) Cathode rays are fast moving electrons.

16

(ii) Cathode rays are negatively charged while x-rays carry no charge.

01

- Cathode rays are deflected in the electric or magnetic field but x-rays are not deflected.

01

01

- Cathode rays are more ionising than x-rays.

Cathode rays have low penetrating power while x-rays have high penetrating power.

Cathode rays have momentum/mass/kinetic energy while x-rays don't have any.

Beta particles are stopped by aluminium sheet.

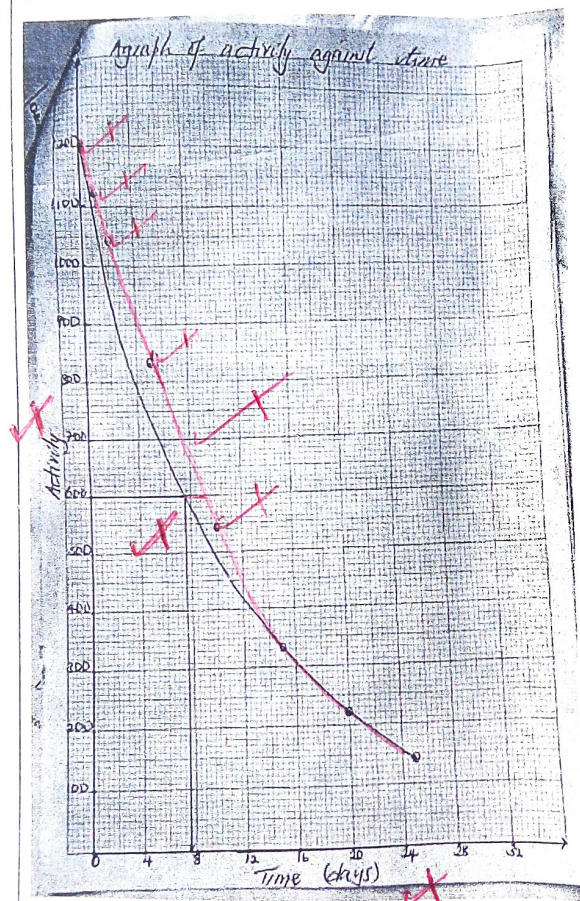
The particles are next to Beta rays.

Gamma rays are stopped by lead sheet pass to through the thick paper but cannot pass through aluminium sheet and Lead sheet.

Alpha particles have least penetrating power.

They will not pass through even thick paper. ✓

(c) Refer to the graph paper below:



Correct plotting of the points ✓

α is least penetrating and stopped by thick paper.

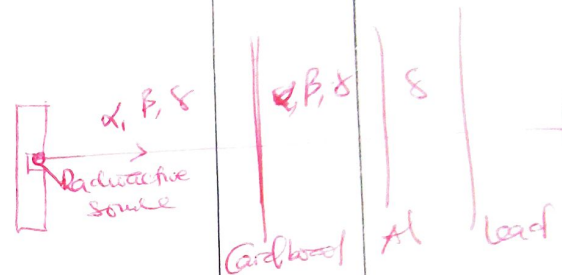
β particles are more penetrating than α but can be stopped by an

01 Aluminium sheet

γ are the most penetrating and can pass through thick paper and Aluminium sheets but are stopped by lead block.

01

01



Smooth curve ✓
 Location ✓
 Four correctly plotted points. ✓
 of.

01

01

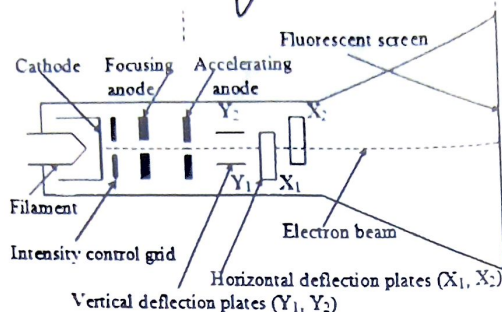
- Smooth curve

(ii) - Finding the half-life from the graph. ✓

Correct value of half-life 7.6 days. ✓

(8-9) days ✓

(c)(ii) No effect



Any 4 labelled parts @ 1 mark

- Diagram = 2 marks

01

01

01

8(d)(i) Filament is heated with low voltage to eject electrons. ✓
by thermionic emission ✓

- Emitted electrons are repelled by the grid to regulate the use only number of electrons moving to the screen. ✓
Controls the electron
therefore controls brightness ✓

- Anode is to attract and accelerate the emitted electrons. ✓
Electrons are accelerated and focused by the anode

(ii) - Measure p.d. ✓

- produce x-rays
- Displays wave forms
- Compare frequency
- Time intervals
- Computer monitor
- Measurement of wave length

- Deflecting system ✓

- Anode ✓

- Screen ✓

- Grid ✓

01

01

1/2

1/2

02

END

Graph of activity against time

