

Katikamu SDA SS O'level Physics seminar solutions 2024

Item 1

(a) Type A is better

Metal plate. Metals are good conductors of heat.

Black surfaces are good absorbers of heat, the water will absorb that heat, get heated very fast.

The plate has larger surface area, it absorbs more heat which is used to heat the water very fast.

The white shiny surfaces are good reflectors of heat, it reflects the heat to the plate, the heat is absorbed by the water.

Type B

Small surface area of the pipe absorbs less heat, the water is heated slowly.

The plastic pipes are poor conductors of heat.

White surface reflects heat, less is absorbed by the pipe and water. Water is heated slowly.

Dull black surface absorbs the heat from the pipe and water.

(b) $W = 10 \times 10 = 100 \text{ N}$

$$P = \frac{F}{A} = \frac{100}{5 \times 10^{-4}} = 200,000 \text{ Pa} > 150,000 \text{ Pa}$$

The iron sheets will not remain safe, they might get damaged by the great pressure.

(c)

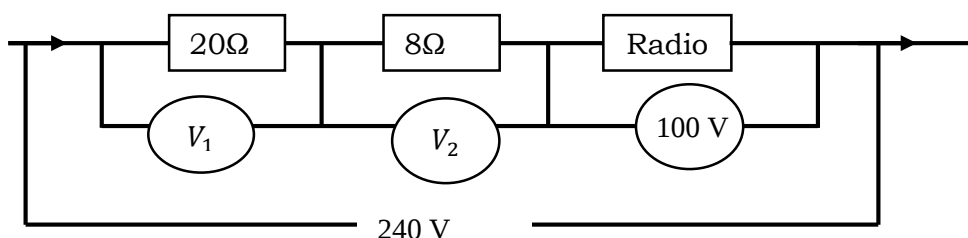
- ✓ Using a wide base for the frame to increase stability.
- ✓ Using a shorter frame to increase stability.
- ✓ Putting a heavy mass on the lower tray to increase stability.
- ✓ Using a stronger material.
- ✓ Fastening the frame on the roof.

(d) .

- ✓ Solar panels require very little maintenance to continue operating normally.
- ✓ Solar energy is usable even in overcast skies and cold weather.
- ✓ Solar power is safe to environment.
- ✓ Solar energy reduces spending on power.
- ✓ Solar energy is available everywhere across the country.

Item 2

The resistors are to be arranged in series because for series connection of resistors, the current is the same in resistors including the radio. The p.d is different across different resistors.



$$V_1 + V_2 + 100 = 240$$

$$V_1 = 5 \times 20 = 100 \text{ V p.d across } 20\Omega \text{ resistor}$$

$$V_2 = 5 \times 8 = 40 \text{ V p.d across } 8\Omega \text{ resistor}$$

It enables the radio to operate normally at 100 V and 5 A

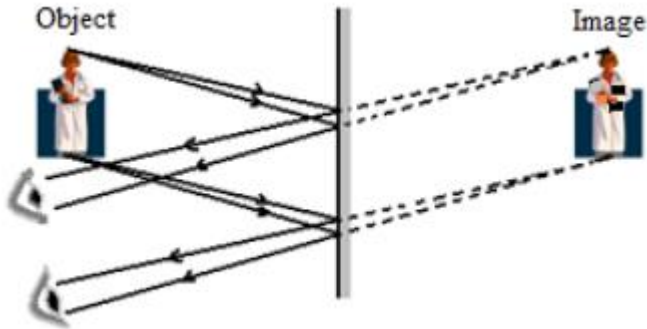
(b) For resistors in series

Current flowing through each resistor and the radio is the same.

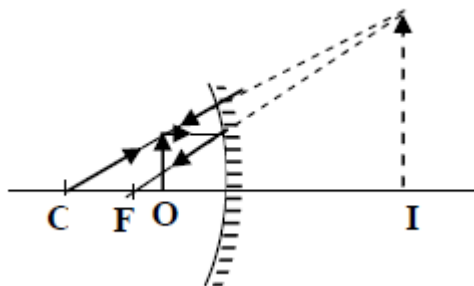
The p.d is different for different resistors including the radio.

Item 3

Mirror at home



Mirror at clinic



The mirror at home (plane mirror), the image produced is of the same size as the object. It is upright and virtual as in the diagram.

At the clinic, the concave mirror produces images which are magnified, upright and virtual when the object is between the focal point and the pole.

Item 4

- (a) As the train moves, the layers of air near the train move at the speed of the train with low pressure while the layers of air far away from the train (behind

the student) move slowly with high pressure according to Bernoulli's principle. The pressure difference acting on the student creates a force that is responsible for pushing them towards the moving train.

- (b) When water is heated, it expands and becomes less dense, it rises up and is replaced by the cold dense water.

This circulation makes the water to move upwards through the pipes without pumping it.

- (c) *pressure due to air column = pressure at the bottom – pressure at the top*

$$\frac{h}{100} \times 1.25 \times 10 = \left(\frac{760 - 740}{1000} \right) \times 13600 \times 10$$

$$h = 217,600 \text{ mm} = 217.6 \text{ m}$$

Height (h) of the mountain = 217.6 m at the point where the factory is constructed.

Item 5

- (a) 450 counts per second (450–50) = 400
 $400 \rightarrow 200 \rightarrow 100 \rightarrow 50 \rightarrow 25 \rightarrow 12.5 \rightarrow 6.25$
 2 days 2 days 2 days 2 days 2 days 2 days
 $2 \times 6 = 12 \text{ days}$

- (b)

- ✓ can cause skin burns.
- ✓ Can cause genetic mutation.
- ✓ Can cause sterility.
- ✓ Can cause cancer.

- (c)

- ✓ They should be handled with pair of tongs.
- ✓ They should be kept in lead boxes.
- ✓ People handling them should wear lead jackets.
- ✓ Radioactive waste should be disposed off carefully.
- ✓ Avoid unnecessary exposure.

Item 6

- (a)

$$\left(\frac{75.7 - 68.2}{100} \right) \times 13600 \times 10 = h \times 1.2 \times 10$$

$$h = 83.7 \text{ m.}$$

They would be allowed.

- (b) As the students climb, atmospheric pressure keeps on reducing and when it becomes lower than the body blood pressure, they are likely to nose bleed.
- (c) At A there is higher atmospheric pressure which results into boiling at higher boiling point, the food gets ready faster.

Item 7

- (a) Soft gloves increase the time the ball takes to come to rest. This reduces the force the ball would exert on the hands of the goal keeper hence reducing the pain on the hands.

It also reduces the risk of injuries to hands and fingers.

Shoes with spikes help in providing grip on the playing surface especially on slippery surfaces and also reduces injuries.

Smooth playing surfaces reduce injuries on the players when they slide, fall, roll on the ground (less frictional force).

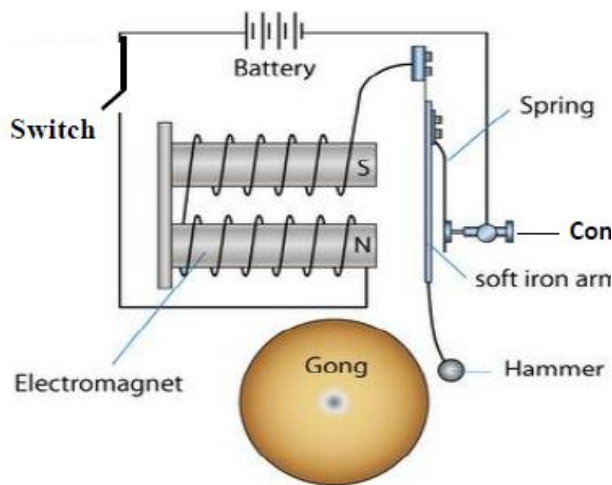
- (b)

$$F = \frac{m(v - u)}{t} = \frac{3(50 - 10)}{0.1} = 1200 \text{ N} > 1000 \text{ N}$$

The ball burst because the force exerted on it by the post was bigger than its maximum limit of 1000N.

- (c) Wool is a poor conductor of heat, traps the heat of the player.
Black colour absorbs heat from the sun and radiant heat.
Silvered surface inside reflects the radiant heat back towards the player, keeps the wearer warm.
The air pockets in wool add more insulation by trapping warm air.

Item 8



When the switch is closed current flows in the circuit and magnetizes the soft iron core which becomes an electromagnet. The electromagnet attracts the soft iron armature and then the hammer hits the gong and a loud sound is heard. When the armature is attracted the contact between the spring and the contact screw is broken and current is cut off, then electromagnet loses its magnetism and returns to its original position which makes the contact again. As long as the switch is closed the process is repeated and the hammer hits the gong repeatedly making continuous ringing sound.

- (b)

$$P = IV, \quad 40 = 240I \quad I = 0.167 \text{ A}$$

$$P = IV, \quad 40 = 120I \quad I = 0.333 \text{ A}$$

Since more current flows when a mains supply of 120 V is connected, a stronger magnet would be formed hence a louder sound as the hammer would strike the gong with a greater force.

(c)

- ✓ Using soft iron armature.
- ✓ Increasing the number of turns in the coil.
- ✓ Increasing amount of current through the coil.

Item 9

(a) $v = f\lambda$

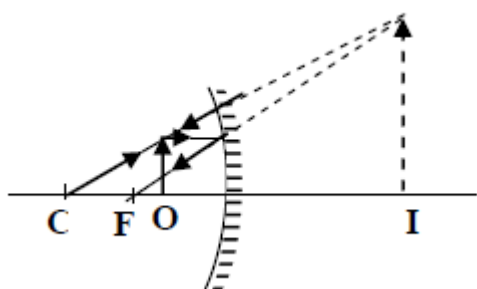
$$f = \frac{v}{\lambda} = \frac{3 \times 10^8}{3.40} = 88.2 \text{ MHz}$$

$$f = \frac{v}{\lambda} = \frac{3 \times 10^8}{3.33} = 90.1 \text{ MHz}$$

$$f = \frac{v}{\lambda} = \frac{3 \times 10^8}{3.37} = 89.0 \text{ MHz}$$

- (b) TV signals have shorter wavelength, it is less capable of diffracting (spreading) around the hills, hence becoming weaker.
Radio signals have long wavelength, it is more diffracted around hills hence becoming stronger.

(c)



His or her face is between the focal point of the concave mirror and pole of the mirror.
The image formed is magnified and erect.

(d).

- ✓ Use directional antennas to focus the signal in specific direction.
- ✓ Elevating the antenna to reduce obstructions.
- ✓ Use boosters to amplify the signals.
- ✓ Adjust the position of the antenna.

Item 10

(i) Origin

The gravitational potential energy is converted to kinetic energy. Upon hitting the ground, the egg comes to an abrupt stop, this exerts a large force on the egg. The egg shell is brittle, it has a limited capacity to absorb large forces, cracks and hence breaks.

Solution

- ✓ Place soft materials such as foam, cushions to absorb the impact energy reducing force exerted on the egg.
- ✓ Lower the height.
- ✓ Use guide rails/slides that direct the egg gently to the ground.

- (ii) Metals are good conductors of heat, heat travels from the hot stove to the skin through conduction. The skin absorbs heat causing the temperature of the skin to rise rapidly hence the skin getting burnt.

Solution

- ✓ Using clay stoves (poor conductors of heat).
- ✓ Install physical barriers so that birds can have direct access to the hot stove.

(iii) Origin

Molecules from the odour move from a region of high concentration (where the dung is) to regions of lower concentration (other rooms), odour spreads through diffusion. With heat the odour spreads faster.

Solution

- ✓ Using odour absorbers (active charcoal)
- ✓ Using well ventilated room – poor air flow.
- ✓ Using air purifiers.
- ✓ Using plants can absorb odour.
- ✓ Using some oils.

- (b) $3 \text{ cocks} = 3 \times 3 = 9 \text{ kg}$

$$W = mg = 9 \times 10 = 90 \text{ N}$$

$$\text{Total downward force } 90 + 20 = 110 \text{ N}$$

Since $110 \text{ N} > 90 \text{ N}$ (Tensional force)

The string or rope could not withstand the downward force of 110 N, so the ropes snapped.

Item 11.

- (a) When the wax is burnt, it produces vapour. The molecules of the vapour (fumes) move from a point of higher concentration to a region lower concentration, spreading through all the rooms by diffusion. The warm fumes rise up to the ceiling. The vapour/ fumes are able to chase away the mosquitoes.

(b) $V = Al = 3.0 \times 15.0 = 45.0 \text{ cm}^3$

$m = 39.0 \text{ g}$

$\rho = \frac{m}{V} = \frac{39.0}{45.0} = 0.87 \text{ gcm}^{-3} \text{ (Density of water)}$

Since the density of the wax is less than the density of water, 1 gcm^{-3} then the candles will float on the water.

(c) $2.0 \text{ cm per 30 minutes}$

$11:00 \text{ pm to } 8:00 \text{ pm} = 3 \text{ hours.}$

$4.0 \text{ cm per 1 hour}$

$3 \text{ hours} = 3 \times 4 = 12.0 \text{ cm}$

The boy has 10.0 cm length of candle yet he needs 12.0 cm length of candle.

The candle will not be able to reach $11:00 \text{ pm}$.

(d)

- ✓ By using length of the shadow.
- ✓ Using position of the sun.
- ✓ Using the cocks crowing or singing birds.

Item 12.

(a) $6 \text{ mg} \rightarrow 3 \text{ mg} \rightarrow 1.5 \text{ mg} \rightarrow 0.75 \text{ mg}$

5 days

5 days

5 days

Total time taken = 15 days

Next visit: $15 + 2 = 17^{\text{th}}$ June 2024.

(b) If the low voltage supply is faulty, the filament cathode will not be heated, the electrons will not be produced thermionically.

No electrons to be accelerated towards the metal target. If there are no electrons to hit the target, no X-rays will be produced at the target.

(c).

- ✓ Causes cancer
- ✓ Causes genetic mutation.
- ✓ Causes infertility.

Item 13.

The sun is formed from a giant molecular cloud (gas and dust)

The gravitational forces caused a region within the cloud to collapse forming a dense core called protostar.

Prostar stage

As a protostar contracted under gravity, it heated up, the temperature and pressure in the core initiated nuclear fusion.

Hydrogen nuclear began to fuse into helium releasing vast amounts of energy.

Main sequence (stable)

In this stable phase hydrogen fusion in the core produces helium and the inward gravitational force equals the outward thermal pressure.

Red giant phase

As the sun exhausts its hydrogen fuel in the core, the core contracts and heats up causing the outer layers to expand.

The sun will expand significantly becoming a red giant, its outer layers will cool and turn reddish.

The outer layers may engulf the inner planets including the earth.

Planetary nebular phase

After the helium in the core is exhausted the outer layers will become unstable and be ejected into space.

Death (white dwarf)

The core will remain very hot, dense, remount called a white dwarf.

Item 14

(a)
$$\text{Efficiency} = \frac{\text{power out put}}{\text{power input}} \times 100\% = \frac{240}{1.1 \times 240} \times 100\% = 90.9\%$$

He was not trustworthy since the efficiency of a transformer is 90.9% yet for him he stated at least 96%

- (b) When a negatively charged cloud passes over the spikes of a lightning conductor, a positive charge is induced on the spikes and negative charges on the earth plate. Since the spikes have sharp points, spikes experience a high charge concentration which create a strong electric field .As a result, the air molecules around the spikes are ionized into positive and negative ions . The positive ions are repelled towards a negatively charged clouds where they neutralize some charges on the cloud. The negative ions are attracted to the spikes where they neutralize some charges on the spikes.
A discharge from the cloud is safely conducted to the earth through the thick copper strip. This leaves the cloud with no charge and it becomes harmless.

Item 15

Artificial satellites	Natural satellites
Created and launched by human beings using rockets e.g hubble space telescope and GPS satellites	Naturally Formed through processes
Made from materials like metals and electronics	Composed of natural materials like rock ice and metals

Orbits are carefully planned and can be adjusted using on board propulsion system	Orbits can be determined by the gravitational forces and cannot be adjusted.
Have a limited operational life span due to fuel depletion and technical degradation	Exist for billions of years

(b).

- ✓ Telecommunications in enhancing communications, connectivity in remote areas.
- ✓ Internet access. It can provide high speed internet to rural areas.
- ✓ Climate and weather monitoring. Provide data for weather forecasting, predict natural disasters e.g floods, drought and earth quake.
- ✓ Agricultural management. Satellite images can monitor crop health, manage irrigation.
- ✓ Natural security. Gives images for monitoring and managing boarder areas.
- ✓ Commercial services. Broadcasting, data services for other countries, generating revenue.

(c) Planets it can land on

Mars .

- ✓ Mars has a solid surface, making it feasible for landing.
- ✓ Its gravity is manageable for landing and takeoff.

Mercury. It has a solid surface which is a basic requirement for landing.

Planets it cannot land on

Venus:

- ✓ it has a thicker atmosphere, extreme pressure and temperature.
- ✓ It contains sulphuric acid clouds which are highly corrosive.

Jupiter. Is a gas giant, no solid surface to land on. Extreme atmospheric pressure would crush any object landing on it.

Saturn: Is a gas giant, no solid surface to land on. Extreme atmospheric pressure and density.

Uranus: Is an ice gas giant, no solid surface to land on.

Neptune: Is an ice gas giant, no solid surface to land on.

SOLUTIONS TO PRACTICAL ITEMS.

Item 1

S/No	Items 1	Expected responses	code	Scores
1.	Aim.	✓ To determine the diameter d of the ball bearing (marble chip) so as to have right size of ball bearings purchased.		2 scores

2.	Variables	✓ Independent Variable; number of bearings. ✓ Dependent variable; volume of the water displaced		2 scores • Stating any 2 variable score																												
3.	Hypothesis	✓ The diameter of a ball bearing is about 2.0cm		1 score • for stating the hypothesis																												
4.	List of apparatus	✓ 6 ball bearing ✓ Water in a beaker ✓ A measuring cylinder		1score • for listing the apparatus																												
5.	Procedure:	✓ Water is filled half in a measuring cylinder and its surface allowed to settle. ✓ The initial level V_1 of the liquid in the measuring cylinder is noted. ✓ Gently, one ball bearing is rolled water contained in the measuring. ✓ The new level V_2 of the water read and recorded. ✓ The experiment is repeated with varying number of ball bearings i.e $n = 2, 3, 4, 5$ and 6 ball bearings. ✓ The results recorded in a suitable including the values of $(V_2 - V_1)$ ✓ A graph of $(V_2 - V_1)$ against n plotted and slope S calculated. ✓ From $S = \frac{1}{6}\pi d^3$ d can be calculated		8 scores ✓ For each correct step 1 score																												
6.	Presentation of data:	✓ Table of results. $V_o =$ cm^3 <table><tr><td>n</td><td>$V_1(\text{cm}^3)$</td><td>$V_2(\text{cm}^3)$</td><td>$(V_2 - V_1)(\text{cm}^3)$</td></tr><tr><td>1</td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td></tr></table>	n	$V_1(\text{cm}^3)$	$V_2(\text{cm}^3)$	$(V_2 - V_1)(\text{cm}^3)$	1				2				3				4				5				6					3 scores @ column
n	$V_1(\text{cm}^3)$	$V_2(\text{cm}^3)$	$(V_2 - V_1)(\text{cm}^3)$																													
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8.	Accuracy:	✓ Appropriate number of decimal points		3 scores @ correctly recorded value half																												
		Graph work on the graph paper. ✓ Title of the graph i.e A graph $(V_2 - V_1)$ against n ✓ Axes labeled with quantities units in bracket		8 scores: ✓ Title 1																												

9	Data analysis and interpretation;	✓ Suitable and convenient scale covering at least half graph page ✓ Correct plots ✓ Line of best fit ✓ Slope $S = \frac{\Delta(V_2 - V_1)}{\Delta n}$ and calculating d from $S = \frac{1}{6}\pi d^3$		✓ Drawing and labeling 1 ✓ Scale 1 ✓ Correct plots 1 ✓ Line fit 1 ✓ Slope 1 ✓ Calculating K 1
10.	Conclusion:	✓ The diameter is approximately equal to that on hypothesis hence the hypothesis is valid. Therefore ball bearing can now be replaced with a ball bearing with exact diameter.		2 scores
11.	Possible error:	✓ Error due to parallax ✓ Splashing of the liquid.		Any two 1 score
12.	Precautions:	✓ Repeating the experiment ✓ taking reading at right angles		Any two 1 score
13.	Advice:	✓ The spring used must not be deformed.		1 score
TOTAL				33 Scores

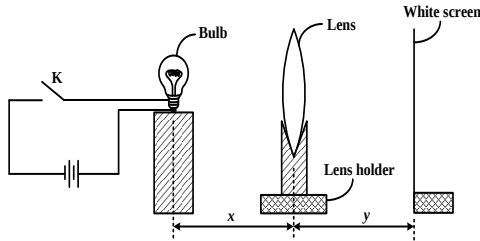
Item 2

S/No	Items 1	Expected responses	code	Scores
1.	Aim.	✓ To determine the mass of the sample metre rule provided to ascertain the total mass of the 35000 metre rule exceeds 20 tones.		2 scores
2.	Variables	✓ Independent Variable; the distance d of 20 g mass from A. ✓ Dependent variable; the distances x and y ✓ Fixed variable: the 20 g mass		2 scores • Stating any 2 variable score
3.	Hypothesis	✓ The mass of metre rule is between 75 g to 180 g		1 score • for stating the hypothesis
4.	List of apparatus	✓ 20 g mass ✓ Uniform metre rule ✓ A knife edge ✓ A piece of thread of about 30 cm ✓ Wooden block.		1score • for listing the apparatus

5.	Procedure:	✓ A uniform metre rule is placed on a knife with its graduated face upwards. ✓ The position of the knife edge adjusted until the metre rule balances horizontal. ✓ The balance point G noted as $G = (48.0 - 52.0)$ cm ✓ A known mass of 20 g suspended at a distance $d = 5.0$ cm from the end A of the metre rule. ✓ The position of the knife is adjusted until the metre rule balance horizontally again. ✓ The distances x and y are read and record. ✓ The experiment is then repeated for at least 3 more values of x i.e $x = 10.0, 15.0, 20.0$ and 25.0 cm. ✓ The results recorded in a suitable. ✓ A graph x against y plotted and slope S calculated. ✓ From the expression $M_R = 20 S$ the mass of metre rule is calculated.		8 scores ✓ For each correct step 1 score																					
6.	Presentation of data:	✓ Table of results. $G = (48.0 - 52.0)$ cm³ <table><tr><td>d(cm)</td><td>x (cm)</td><td>y (cm)</td></tr><tr><td>5.0</td><td></td><td></td></tr><tr><td>10.0</td><td></td><td></td></tr><tr><td>15.0</td><td></td><td></td></tr><tr><td>20.0</td><td></td><td></td></tr><tr><td>25.0</td><td></td><td></td></tr><tr><td>30.0</td><td></td><td></td></tr></table>	d(cm)	x (cm)	y (cm)	5.0			10.0			15.0			20.0			25.0			30.0				3 scores @ column
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9	Data analysis and interpretation;	Graph work on the graph paper. ✓ Title of the graph i.e A graph x against y ✓ Axes labeled with quantities units in bracket ✓ Suitable and convenient scale covering at least half graph page ✓ Correct plots ✓ Line of best fit ✓ Slope $S = \frac{\Delta x}{\Delta y}$ and calculating M_R from $M_R = 20 S$		8 scores: ✓ Title 1 ✓ Drawing and labeling 1 ✓ Scale 1 ✓ Correct plots 1 ✓ Line fit 1 ✓ Slope S1 ✓ Calculating $M_R = 20 S$																					

10.	Conclusion:	✓ The mass is within the range in hypothesis hence the hypothesis is valid. Therefore total mass of 35000 metre rule calculated as $35000 \times M_R$ in tones. ✓ The club qualifies for the offer since the result is above 20tonnes		2 scores
11.	Possible error:	✓ Error due to parallax ✓ Wind or resistance		Any two 1 score
12.	Precautions:	✓ Repeating the experiment ✓ taking reading at right angles		Any two 1 score
13.	Advice:	✓ carry out the experiment in closed doors		1 score
TOTAL				33 Scores

Item 3

S/No	Items 1	Expected responses	code	Scores
1.	Aim.	✓ To determine the focal length of convex lenses such that ones with power 10D are sorted to carryout biology experiment.		2 scores
2.	Variables	✓ Independent Variable; the object distance x. ✓ Dependent variable; the image distance y.		2 scores • Stating any 2 variable score
3.	Hypothesis	✓ The focal length of lens provided is 10.0 cm		1 score for stating the hypothesis
4.	List of apparatus	✓ convex lens ✓ a bulb ✓ a lens holder ✓ double cells in a holder ✓ connecting wires ✓ a switch ✓ a screen ✓ a metre rule.		1score • for listing the apparatus
	Procedure:	 ✓ The apparatus are arranged as shown in the diagram above. ✓ The lens is adjusted to a distances $x = 15.0$ cm from the bulb.		

5.		✓ The position of the screen is moved to and fro and until a sharp clear image the filament is obtained on the screen. ✓ The distance y of the screen from the lens is measured and recorded. ✓ The experiment is then repeated for at least 3 more values of x i.e $x = 20.0, 25.0, 30.0, 35.0$ and 40.0 cm. ✓ The results recorded in a suitable including the values xy and $(x + y)$. ✓ A graph xy against $(x + y)$ plotted and slope f calculated.		8 scores ✓ For each correct step 1 score														
6.	Presentation of data:	✓ Table of results. <table><tr><td>x (cm)</td><td>y (cm)</td></tr><tr><td>15.0</td><td></td></tr><tr><td>20.0</td><td></td></tr><tr><td>25.0</td><td></td></tr><tr><td>30.0</td><td></td></tr><tr><td>35.0</td><td></td></tr><tr><td>40.0</td><td></td></tr></table>	x (cm)	y (cm)	15.0		20.0		25.0		30.0		35.0		40.0			3 scores @ column
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10.	Conclusion:	✓ The focal length of lens is approximately equal to that in the hypothesis hence the hypothesis is valid. Therefore, the lens has required power as such can be sorted out and used to carry out the biology experiment.		2 scores														
11.	Possible error:	✓ Error due to parallax		Any two 1 score														

12.	Precautions:	✓ Repeating the experiment ✓ taking reading at right angles		Any two 1 score
13.	Advice:	✓ The experiment must be repeat for a number of times so as to minimize errors.		1 score
TOTAL				33 Scores

Item 4

S/No	Items 1	Expected responses	code	Scores
1.	Aim.	✓ To determine the internal resistance r of the sample cells provided to ascertain whether they now meet the minimum standards.		2 scores
2.	Variables	✓ Independent Variable; the length l of constant wire W ✓ Dependent variable; the p.d drop V and current I		2 scores • Stating any 2 variable score
3.	Hypothesis	✓ The internal resistance of a cell is less than 1.8Ω		1 score • for stating the hypothesis
4.	List of apparatus	✓ Ammeter ✓ Voltmeter ✓ Switch ✓ Connecting wires ✓ Doubles cells in a cell holder ✓ Constantine wire SWG 28 ✓ Crocodile clips ✓ Metre rule.		1score • for listing the apparatus
5.	Procedure:	✓ The apparatus are connected as shown in the diagram above. ✓ When the switch k is still open, the voltmeter reading, V_0 is read and recorded. ✓ The length l of wire between the crocodile clips is adjusted such that $l = 10.0$ cm and switch k closed. ✓ The voltmeter reading V_1 and ammeter reading I are read and recorded. ✓ The switch k is then opened. ✓ The above procedures are repeated with at least four values of l i.e $l = 20.0, 30.0, 40.0, 50.0$ and 60.0 cm ✓ The results recorded in a suitable including the values of $(V_0 - V_1)$		8 scores ✓ For each correct step 1 score

		✓ A graph ($V_o - V_1$) against ($x + y$) plotted and slope r calculated.																														
6.	Presentation of data:	✓ Table of results. ✓ $V_o = V$ <table><tr><td>$l(\text{cm})$</td><td>$V_1(\text{V})$</td><td>$I(\text{A})$</td><td>$(V_o - V_1)(\text{V})$</td></tr><tr><td>10.0</td><td></td><td></td><td></td></tr><tr><td>20.0</td><td></td><td></td><td></td></tr><tr><td>30.0</td><td></td><td></td><td></td></tr><tr><td>40.0</td><td></td><td></td><td></td></tr><tr><td>50.0</td><td></td><td></td><td></td></tr><tr><td>60.0</td><td></td><td></td><td></td></tr></table>	$l(\text{cm})$	$V_1(\text{V})$	$I(\text{A})$	$(V_o - V_1)(\text{V})$	10.0				20.0				30.0				40.0				50.0				60.0					3 scores @ column
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60.0																																
8.	Accuracy:	✓ Appropriate number of decimal points		3 scores @ correctly recorded value half																												
9	Data analysis and interpretation;	Graph work on the graph paper. ✓ Title of the graph i.e A graph ($V_o - V_1$) against I ✓ Axes labeled with quantities units in bracket ✓ Suitable and convenient scale covering at least half graph page ✓ Correct plots ✓ Line of best fit ✓ Slope $S = \frac{\Delta(V_o - V_1)}{\Delta I}$ and calculating r from $r = \frac{s}{2}$		8 scores: ✓ Title 1 ✓ Drawing and labeling 1 ✓ Scale 1 ✓ Correct plots 1 ✓ Line fit 1 ✓ Slope S 1 ✓ Calculating $r = \frac{s}{2}$																												
10.	Conclusion:	✓ The resistance of the cell less 1.8Ω , the hypothesis is valid. The new cells manufactured now meet the minimum standards		2 scores																												
11.	Possible error:	✓ Error due to parallax ✓ Insensitivity of instruments ✓ Over drained cells and stayed cells		Any two 1 score																												
12.	Precautions:	✓ Repeating the experiment ✓ taking reading at right angles		Any two 1 score																												
13.	Advice:	✓ use of depolarizing agent to improve on the efficiency		1 score																												
	TOTAL			33 Scores																												

