



232/2 MS  
 PHYSICS **PDF Compressor Free Version**  
 Paper 2  
 MARKING SCHEME  
 MARCH 2021

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THE KENYA NATIONAL EXAMINATIONS COUNCIL  
 Kenya Certificate of Secondary Education

PHYSICS

Paper 2

MARKING SCHEME  
 (CONFIDENTIAL)

THIS MARKING SCHEME IS THE PROPERTY OF THE KENYA NATIONAL EXAMINATIONS COUNCIL AND IT MUST BE RETURNED TO THE KENYA NATIONAL EXAMINATIONS COUNCIL AT THE END OF MARKING.

This marking scheme consists of 11 printed pages.

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## SECTION A: (25 marks)

1.	The image size increases $\checkmark$ becomes larger / bigger / magnified $\checkmark$	(1 mark)
2.	a) Gold leaf $\checkmark$ Protect $\checkmark$ b) Protect the surrounding of the metal rod and leaf from damage or drought $\checkmark$ / Protecting the leaf from damage / drought / external effects.	(1 mark) (1 mark)
3.	- The e.m.f. across it's terminals $\checkmark$ / Voltage / p.d across - The relative density of the electrolyte $\checkmark$ / density of acid / electrolyte	(2 marks)
4.	From the relation $v = \lambda f$ , the speed increases $\checkmark$ since the wavelength $\lambda$ increases $\checkmark$ but the frequency is the same because source is the same $\checkmark$	(2 marks) Second mark second if 1st mark is $\checkmark$ (No. mark for context)
5.	$\eta = \frac{1}{\sin c} \checkmark$ $= \frac{1}{\sin 42^\circ} \checkmark$ $= \frac{1}{0.669}$ $= 1.495 \checkmark$ Accept 2d.p (1.49 / 1.50 / 1.494).	(3 marks)
6.	BV $\checkmark$ The two cells series provide a higher electromotive force / potential difference / current / voltage.	(2 marks)

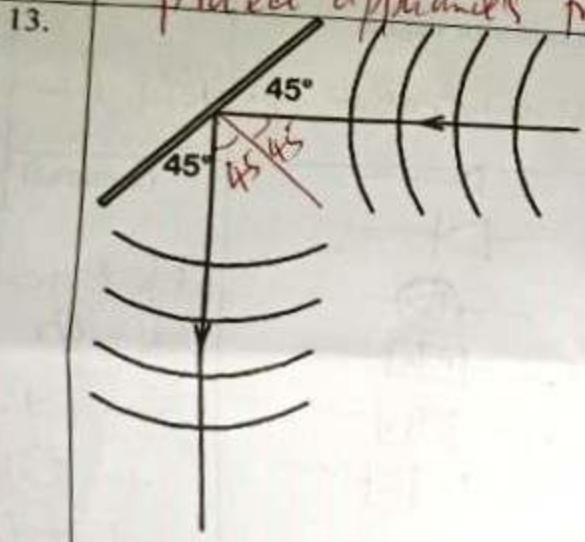
7.		(1 mark)
8.	<p>There is greater magnetic force at the ends due to increased field lines at the ends of the bar magnet than at the center of the bar magnet</p> <p><i>or due to higher concentration of field lines at the ends.</i></p>	(2 marks) <i>Higher flux density</i>
9.		(2 marks) <i>Refer incomplete circuits</i>
10.	$f = \frac{3 \times 10^8}{\lambda} \sqrt{\phantom{x}}$ $= \frac{3 \times 10^8}{800} \sqrt{\phantom{x}}$ $= 0.00375 \times 10^8 \text{ Hz}$ $= 3.75 \times 10^5 \text{ Hz} \checkmark$	(3 marks) <i>* - v = \lambda f only awarded at correct subst. Award implied formula at subst.</i>

11. - Electrons are produced by thermionic emission ✓  
 - The electrons are accelerated by a high voltage ✓  
 - Electrons are suddenly stopped to produce x-rays ✓

*fast moving*  
*stopped by a hard surface*  
 (2 marks)  
*(marking not kept)*

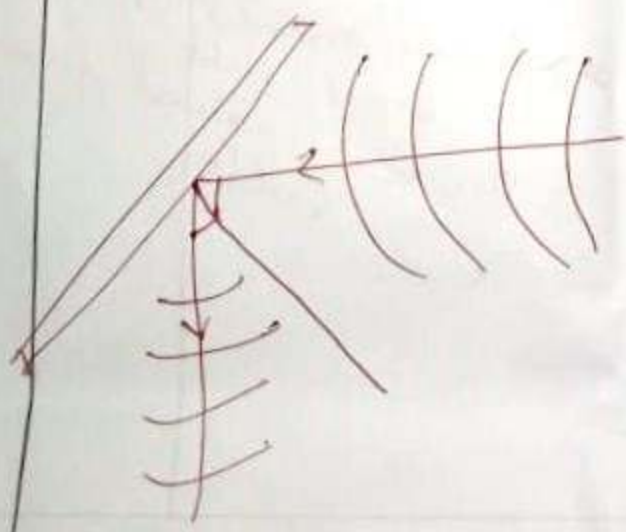
12. To disconnect the circuit when excess current flows. ✓  
 Protect/guard appliances from excess  
 Protect appliances from electrical fire

(1 mark)  
*(power supply not disrupted)*



3 reflected wavefronts ✓  
 \* Correct shapes  
 \* Correct wavelengths  
 correct angle (45°/90° E ba)

✓-curved correctly  
 ✓-angle of reflection



SECTION B: 55 MARKS

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14.

(a)

- Stepping up the voltage ✓
- Use of good conductor cables ✓

✓ 1 / Stopping down current. ✓  
/ thick cables. ✓

(2 mark)

(b)

The electric cooker has a power output of 2500W, <sup>When</sup> and operates at a potential <sup>of</sup> 250V, ie  $P=VI$

Electric cooker gives out/dissipates energy at a rate of 2500 J/s when operated at 250V.

(1 mark)

(c)

$$\begin{aligned} \text{Total power} &= 1500 + 2500 + 500 + (60 \times 3) \\ &= 4680 \text{ W} \checkmark \end{aligned}$$

$$\text{Total current required} = \frac{4680}{240} = 19.5 \text{ A} \checkmark \checkmark$$

$$\begin{aligned} \frac{1500}{240} &= 6.25 \\ \frac{500}{240} &= 2.08 \\ \frac{2000}{240} &= 10.42 \\ \frac{3 \times 60}{240} &= 0.75 \\ &= 19.5 \text{ A} \end{aligned}$$

Hence fuse blows and disconnects the current when it exceeds 10 A ✓  
ie all appliances can't be connected at the same time. ✓

OR Max <sup>sum of</sup> rating for all appliances connected is higher than fuse

(3 marks)

(ii)

$$\begin{aligned} I &= \frac{P}{V} \checkmark \quad \mathbf{1} \\ &= \frac{2500}{240} \end{aligned}$$

$$\begin{aligned} R &= 240 \div \left( \frac{2500}{240} \right) \checkmark \checkmark \\ &= \frac{240 \times 240}{2500} \\ &= 23.04 \Omega \checkmark \checkmark \end{aligned}$$

$$\begin{aligned} P &= I^2 R \checkmark \quad \mathbf{1} \\ 2500 &= \left( \frac{2500}{240} \right)^2 R \checkmark \end{aligned}$$

$$R = 23.04 \Omega \checkmark$$

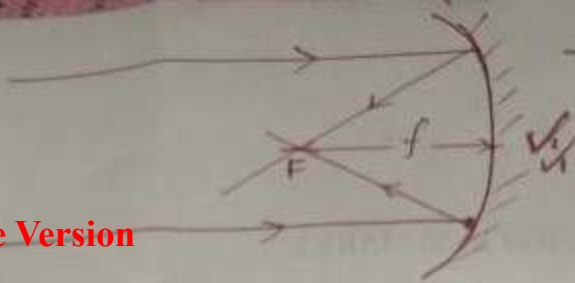
$$\begin{aligned} P &= \frac{V^2}{R} \checkmark \quad \mathbf{1} \\ R &= \frac{V^2}{P} \\ &= \frac{240^2}{2500} \checkmark \end{aligned}$$

$$= 23.04 \Omega \checkmark \quad \mathbf{1}$$

3 marks

OR  
Subst.  
NOV

OR



- Using the metre rule measure the distance between the screen and the mirror.

15.

- a) - Using the mirror focus a distant object onto the screen  $\checkmark$   
 - Adjust the distance between the screen & the mirror to obtain a sharp image  $\checkmark$   
 - Measure the distance between the screen & the mirror - this is the focal length of the mirror  $\checkmark$

Use the mirror to focus the image of a distant object. (3 marks)

using a metre rule.  $\checkmark$

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v} \quad \checkmark$$

$$\frac{1}{v} = \frac{4-5}{40} \quad \checkmark$$

$$\frac{1}{v} = \frac{1}{10} - \frac{1}{8} \quad \checkmark$$

$$v = -40 \text{ cm} \quad \checkmark$$

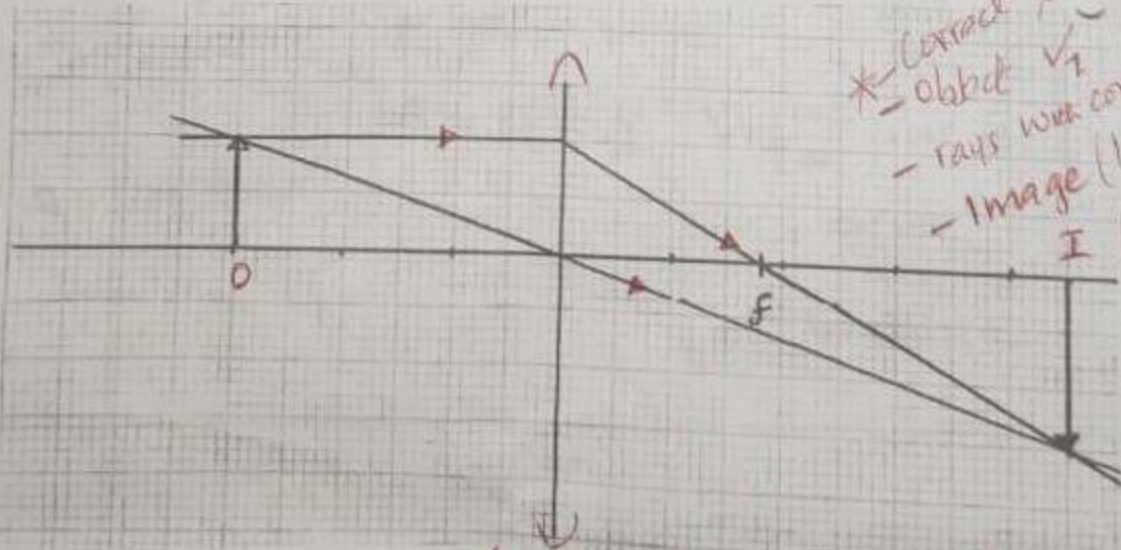
OR  $u = -8$   
 $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$   
 $\frac{1}{-8} + \frac{1}{v} = \frac{1}{-10}$   
 $v = 40 \text{ cm} \quad \checkmark$

(3 marks)

(Note must include virtual/blind the mirror).

OR Diagram:  
 choose scale  $\checkmark$

- (c) correct rays  $\checkmark$   
 correct image post  $\checkmark$   
 correct dist  $\checkmark$  ( $40 \pm 2 \text{ cm}$ )



\* - Correct lens used  $\checkmark$   
 - Object  $\checkmark$   
 - rays were correct  $\checkmark$   
 - Image (inverted)  $\checkmark$   
 (choose scale)  
 When it's wrong clear  $\checkmark$

- (ii) I) image height = 15  $\checkmark$   
 II) image distance = 45 cm  $\checkmark$

(No ET)

2 marks

2 marks

16 a) - Sterilization of surgical equipment ✓  
 - Treatment of malignant growths ✓

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Radiotherapy / killing cancerous cells /  
 treating cancer / ironing thyroid gland

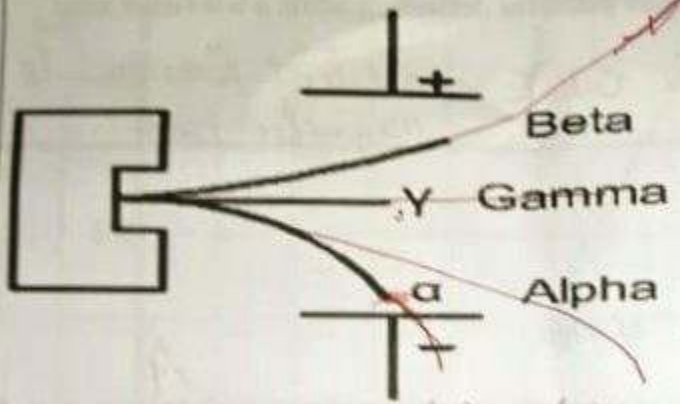
2 marks

1 marks

(b)  $x = 4$  ✓  
 $y = 2$  ✓

(c) (i)

3 marks



\* Don't award when passing through the plate.  
 \*  $\beta$  deflected earlier and moves further ✓  
 \*  $\alpha$  deflected later and doesn't move further. ✓

(ii) (I) To shield the radiations from moving to the other directions i.e direct them to one side ✓

1 mark

(II) To remove air particles & reduce collisions for clear vision of the effect of the field ✓

Prevent collection of clear vision on the effect of the field / minimise loss of the ionisation

1 mark

Prevent ionisation

d (i) Gamma rays, X-rays, microwaves, radio waves ✓

1 mark

(ii)  $64 \xrightarrow{24 \text{ day}} 32 \xrightarrow{48 \text{ day}} 16 \xrightarrow{72} 8$  ✓

$\rightarrow 3$  half lives  $\rightarrow 8g$  left ✓

$$N = N_0 \left(\frac{1}{2}\right)^{t/t_{1/2}}$$

$$\frac{N}{N_0} = \frac{8}{64} = \frac{1}{8} = \left(\frac{1}{2}\right)^3$$

$$N = 64 \times \left(\frac{1}{2}\right)^3$$

$$= 64 \times \frac{1}{8}$$

$$= 8g \quad \checkmark$$

2 marks

17

a) (i)

(3marks)

- The heating coil ✓ / cathode ✓
- Grid ✓
- The anodes ✓

(ii) the cathode ray tube uses plates for deflection while a television tube uses coils ✓

1 mark

OR CRT - electric fields while TV uses magnetic fields

b) (i)  $eVs = hf - hf_0$  ✓

$$\text{at } Vs = 0, \quad hf = hf_0 \quad \checkmark$$

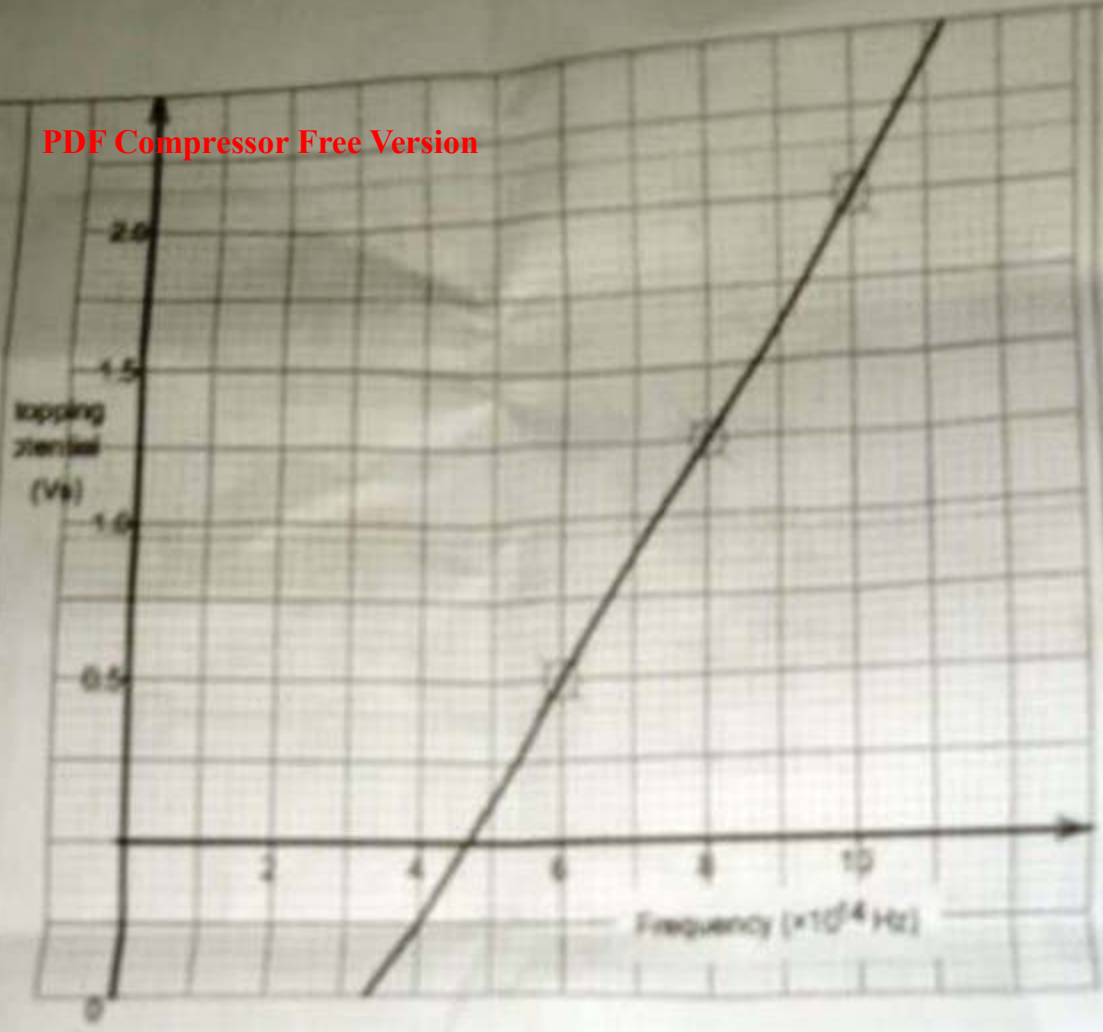
$f = f_0$  which is obtained by extrapolating the graph to obtain the ✓ value of  $f_0$  when  $Vs = 0$

$$4.6 \times 10^{14} \text{ Hz} \pm 0.1 \quad \checkmark 1.$$

Second mark check is stud has used graph (extrapolates / put a mark) ✓ 1

2 marks





or  
 $hf = hf - hf_0$  ✓  
 $h = \frac{eVs}{f - f_0}$  ✓  
 Read off ✓  
 $V_s$  and ✓  
 Subst. ✓  
 = Ans ✓

(ii)  $V_s = \frac{hf}{e} - \frac{hf_0}{e}$

$\frac{h}{e}(f - f_0)$

$\therefore \frac{h}{e} = \text{gradient}$  ✓

$= \frac{1.25 - 0.5}{(8 - 6) \times 10^{14}}$  ✓

$= \frac{0.75}{2} \times 10^{-14}$

$= 0.375 \times 10^{-14}$

$\therefore h = 3.75 \times 10^{-15} \times 1.6 \times 10^{-19}$  ✓

$= 6.0 \times 10^{-34} \text{ Js } \pm(0.8)$  ✓

or  $E = hf$  ✓

$h = \frac{E}{f}$

$= \frac{1.6 \times 10^{-19}}{f}$  ✓

Read  $f$  from graph = Ans ✓

$f = (4.6 \times 10^{14} - 1.0 \times 10^{14})$  Range of  $f$   
 Range  $(1.6 \times 10^{-34} - 3.473 \times 10^{-34}) \text{ Js}$

(4 marks)

(iii)

$W_0 = hf_0$  ✓

$= 6.0 \times 10^{-34} \times 4.3 \times 10^{14}$  ✓

$= 25.8 \times 10^{-24}$   $2.76 \times 10^{-19} \text{ J}$  ✓

$25.8 \times 10^{-24} \text{ J}$  ✓

E.T.

$W_0 = hf_0 = eVs$  ✓

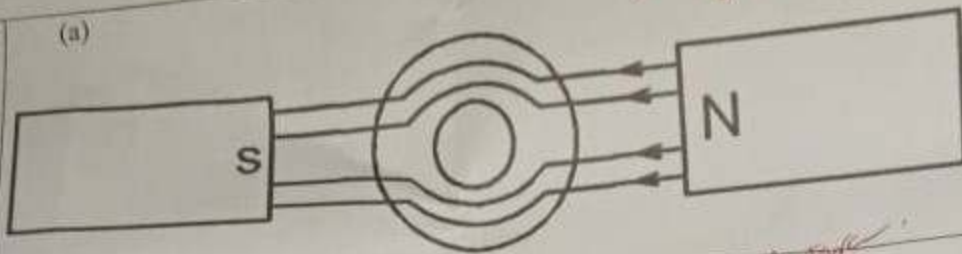
$=$

(3 marks)

2 field lines ✓  
 ✓ direction ✓  
 ✓ independent ✓

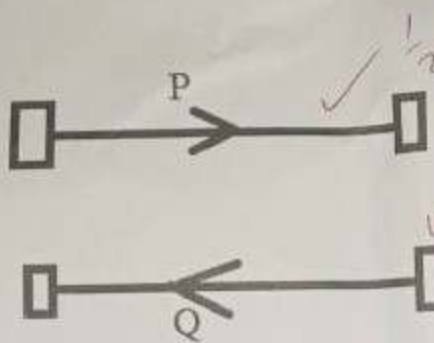
18

(a)



(2 marks)

b(i)



on the diagram ✓  
 Both correct ✓

(1 mark)

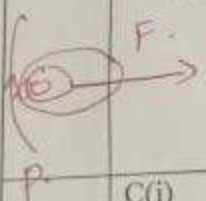
(ii) the two conductors repel ✓

move away / distance between conductors increases ✓

(1 mark)

(iii) As the current flows a magnetic field develops around each conductor ✓

such that the direction of the fields such that the fields repel another pushing the conductors away from each other ✓  
 field from the conductor reinforce @ other creating a stronger force ✓



(3 marks)

C(i)

By laminating the core ✓

(1 Mark)

(ii)  $\frac{N_s}{N_p} = \frac{V_s}{V_p}$  ✓

$\frac{N_s}{600} = \frac{24}{120}$  ✓

$N_s = 120 \text{ turns}$  ✓

(3 mark)