

Name Index Number /

232/2
PHYSICS
Paper 2
(Theory)
Oct./Nov. 2012
 2 hours

Candidate's Signature

Date.....



THE KENYA NATIONAL EXAMINATIONS COUNCIL

Kenya Certificate of Secondary Education

PHYSICS

Paper 2

(Theory)

2 hours

232/2 – Physics Paper 2

Monday 11.45 am – 1.45 pm
 12/11/2012 (2nd Session)

Instructions to candidates

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) This paper consists of **TWO** sections; **A** and **B**.
- (d) Answer **ALL** the questions in sections **A** and **B** in the spaces provided.
- (e) All working **MUST** be clearly shown.
- (f) Non-programmable silent electronic calculators and KNEC mathematical tables may be used.
- (g) **This paper consists of 16 printed pages.**
- (h) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

For Examiner's Use Only

Section	Questions	Maximum Score	Candidate's Score
A	1–13	25	
	14	12	
B	15	11	
	16	12	
	17	10	
	18	10	
Total Score		80	



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SECTION A (25 marks)

Answer **ALL** the questions in this section in the spaces provided.

1 **Figure 1**, shows a plane mirror XY placed equidistant from two parallel lines AB and PT.

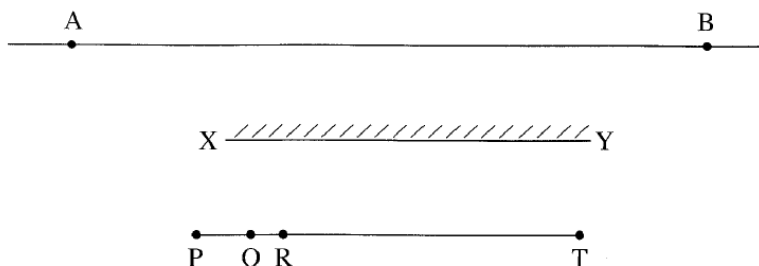


Figure 1

Four students stand at P, Q, R and T in front of the mirror

- (a) Indicate the positions of the images of students at Q, R and T on line AB. (1 mark)
- (b) State which of the three images are visible to the student standing at P. (1 mark)

.....

- (c) Using rays indicate on the figure, how (b) above is possible. (1 mark)

2 **Figure 2**, shows two mirrors PQ and QR inclined at an angle of 110° . A ray of light is incident on mirror PQ at an angle of 60° .

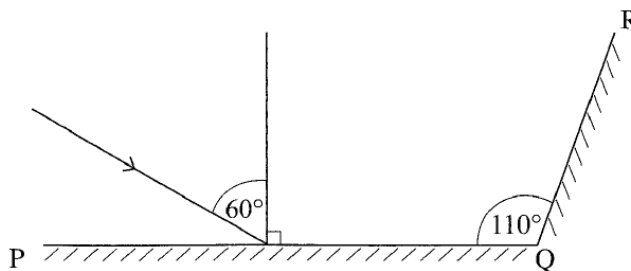


Figure 2

Complete the diagram to determine the angle of reflection of the ray in the mirror QR. (3 marks)

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- 3 **Figure 3**, shows four identical light bulbs connected to a 15 volt battery whose internal resistance is negligible.

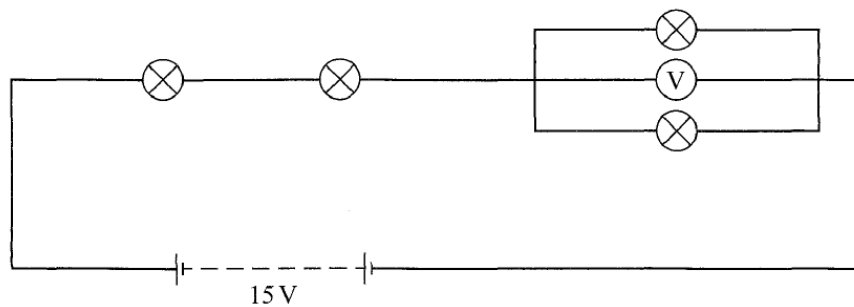


Figure 3

Determine the reading of the voltmeter V. (2 marks)

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- 4 **Figure 4**, shows a negative point charge placed near a positively charged rod.

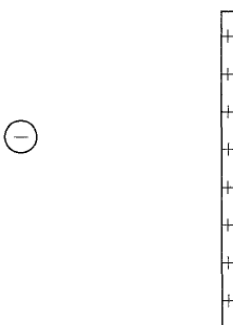


Figure 4

Draw on the diagram, the resulting electric field pattern. (2 marks)

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- 5 **Figure 5**, shows an object O at the bottom of a beaker full of a liquid. An observer above the beaker sees its image at point X inside the liquid.

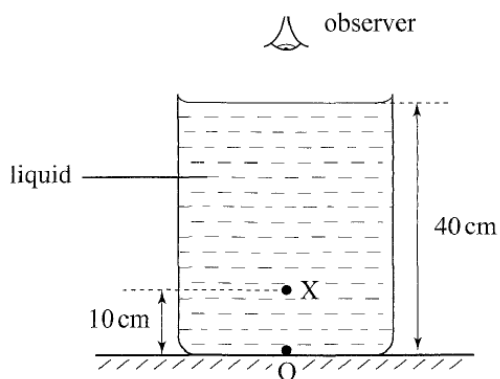


Figure 5

Determine the refractive index of the liquid. (3 marks)

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- 6 **Figure 6**, shows a narrow beam of radiation from a radioactive source, incident to a postcard. The emergent radiation passes through a magnetic field which is perpendicular to the plane of the paper, and into the paper.

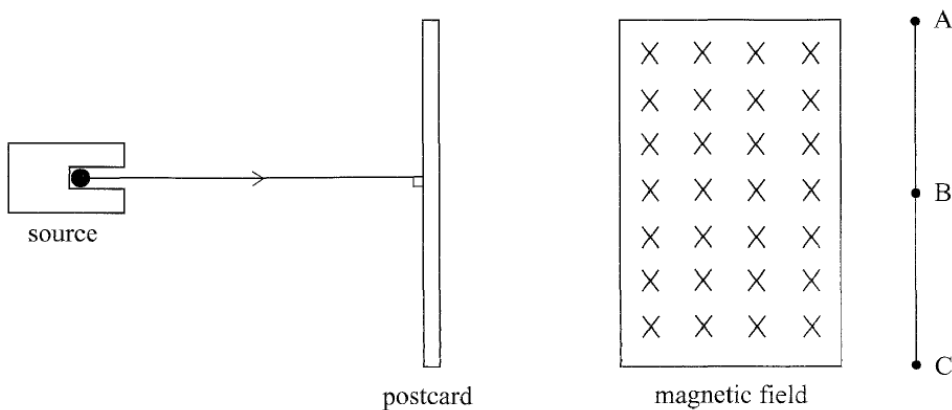


Figure 6

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A detector moved along line AC detects radiations only at points B and C. State the two types of radiations detected. (1 mark)

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7 **Figure 7**, shows two similar coils P and Q around the end L and M of a piece of soft iron. A steady current passes through the coils.

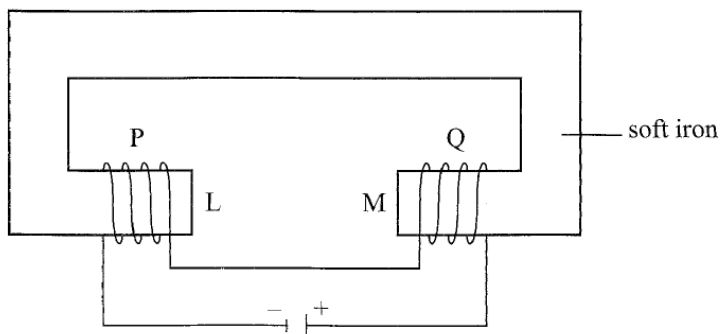


Figure 7

State the polarity of the resulting magnet at end L. (1 mark)

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8 Light from a lamp falls on the cap of a negatively charged electroscope. It is observed that the divergence of the leaf decreases. Explain the observation. (2 marks)

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- 9 **Figure 8**, shows an object O placed in front of a diverging lens whose principal focus is F.

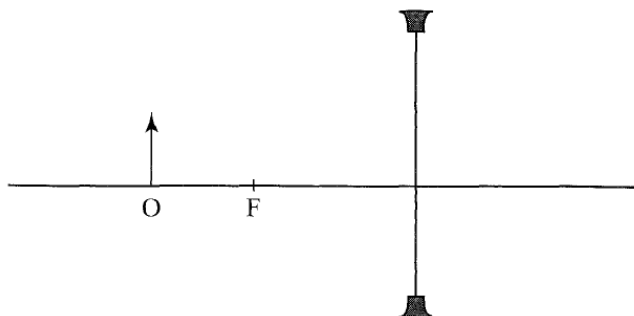


Figure 8

On the figure, draw a ray diagram to locate the image formed. (3 marks)

- 10 **Figure 9**, shows the cross-section of an optical fibre made of two types of glass, A and B. The refractive index of B is lower than that of A.

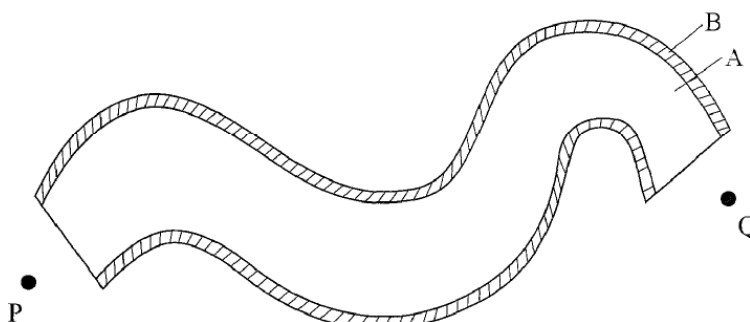


Figure 9

A ray of light enters the optical fibre at P and emerges from Q.

- (i) Sketch the path of the ray through the fibre. (1 mark)
- (ii) State the reason why light travels through the fibre as in (i) above. (1 mark)

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- 11 **Figure 10**, shows the cross section of a conductor held between two magnets and carrying a current out of the paper.



Figure 10

Indicate with an arrow on the diagram the direction in which the conductor will move when it is released. (1 mark)

- 12 State why alternating current (a.c.) is used for transmitting electricity over long distances. (1 mark)

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- 13 **Figure 11**, shows an alternating current (a.c.) connected across a diode D and a resistor R.

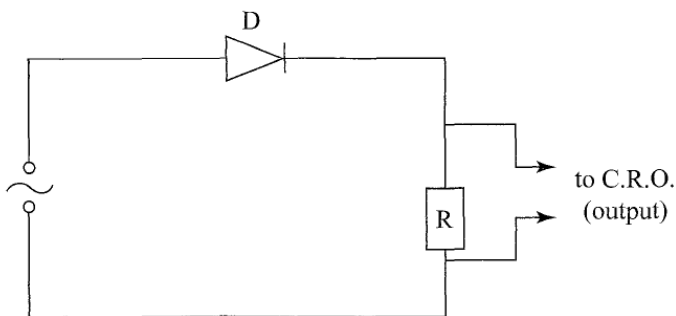


Figure 11

On the axes provided sketch the output as observed in the C.R.O. connected across R. (1 mark)



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SECTION B (55 marks)

Answer *ALL* the questions in this section in the spaces provided.

14 (a) **Figure 12**, shows a displacement – time graph for a progressive wave.

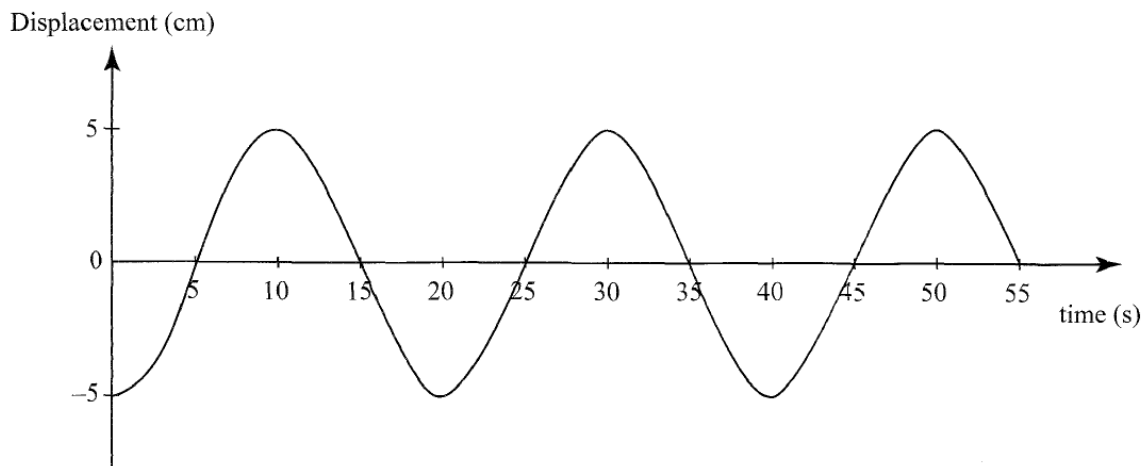


Figure 12

(i) State the amplitude of the wave. (1 mark)

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(ii) Determine the frequency of the wave. (4 marks)

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(iii) Given that the velocity of the wave is 20 ms^{-1} , determine its wavelength. (3 marks)

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- (b) **Figure 13** shows two identical dippers A and B vibrating in water in phase with each other. The dippers have the same constant frequency and amplitude. The waves produced are observed along line MN:

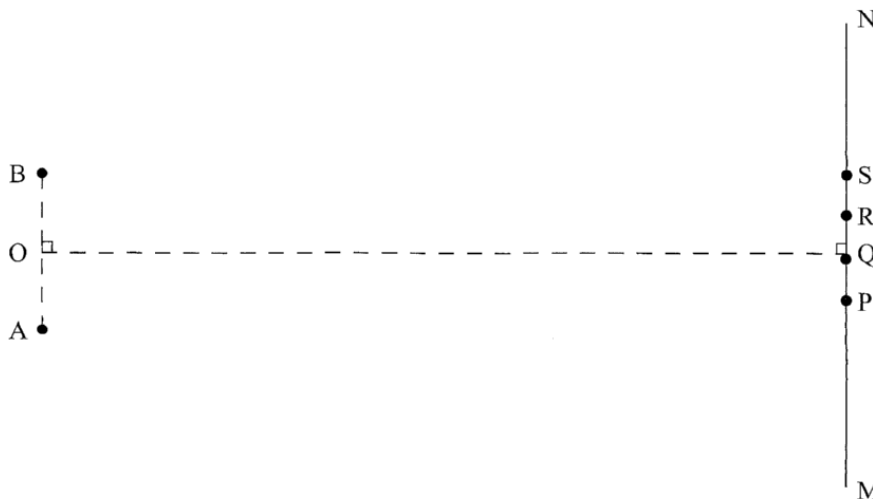


Figure 13

It is observed that the amplitudes are maximum at points Q and S, and minimum at points P and R.

- (i) Explain why the amplitude is maximum at Q. (2 marks)

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- (ii) State why the amplitude is minimum at R. (1 mark)

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- (iii) State what would happen if the two dippers had different frequencies. (1 mark)

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- 15 **Figure 14**, shows a circuit in which a battery, a switch, a bulb, a resistor P, a variable resistor Q, a voltmeter V and two ammeters A_1 and A_2 of negligible resistance are connected.

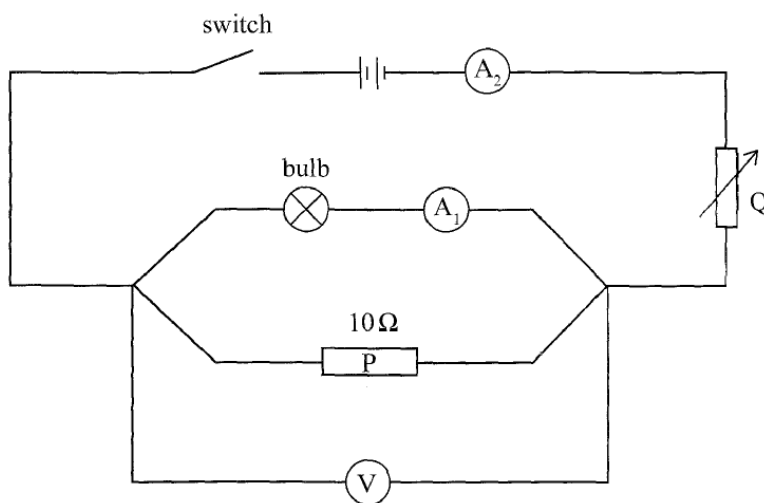


Figure 14

P has a resistance of $10\ \Omega$. When the switch is closed A_1 reads 0.10 A and the voltmeter reads 1.5 V .

- (a) Determine;
- (i) the current passing through P; (3 marks)
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-
- (ii) the resistance of the bulb. (2 marks)
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- (b) The variable resistor Q is now adjusted so that a larger current flows through A_2 .
- (i) State how this will affect the resistance of the bulb. (1 mark)
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- (ii) Explain your answer in (b)(i). (2 marks)
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-
- (c) A house has one 100 W bulb, two 60 W bulbs and one 30 W bulb. Determine the cost of having all the bulbs switched on for 70 hours, given that the cost of electricity is 40 cents per kilowatt hour. (3 marks)
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- 16 (a) **Figure 15**, shows two coils A and B placed close to each other. A is connected to a steady D.C. supply and a switch, B is connected to a sensitive galvanometer.

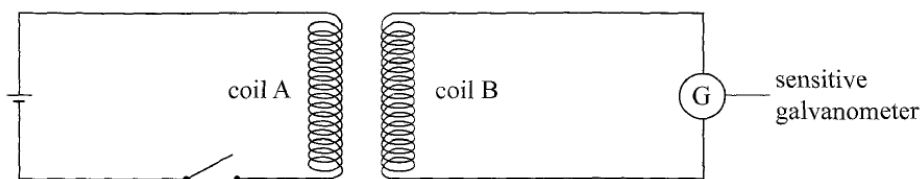


Figure 15

- (i) The switch is now closed. State the observation made on the galvanometer. (2 marks)
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- (ii) Explain what would be observed if the switch is then opened. (2 marks)

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- (b) The primary coil of a transformer has 1000 turns and the secondary coil has 200 turns.

The primary coil is connected to a 240 V a.c. mains, supply.

- (i) Explain how an e.m.f. is induced in the secondary coil. (2 marks)

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- (ii) Determine the secondary voltage. (3 marks)

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- (iii) Determine the efficiency of the transformer given that the current in the primary coil is 0.20 A and in the secondary coil it is 0.80 A. (3 marks)

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- 17 (a) **Figure 16**, shows a graph of magnification against object distance, for an object placed in front of a lens of focal length 20 cm.

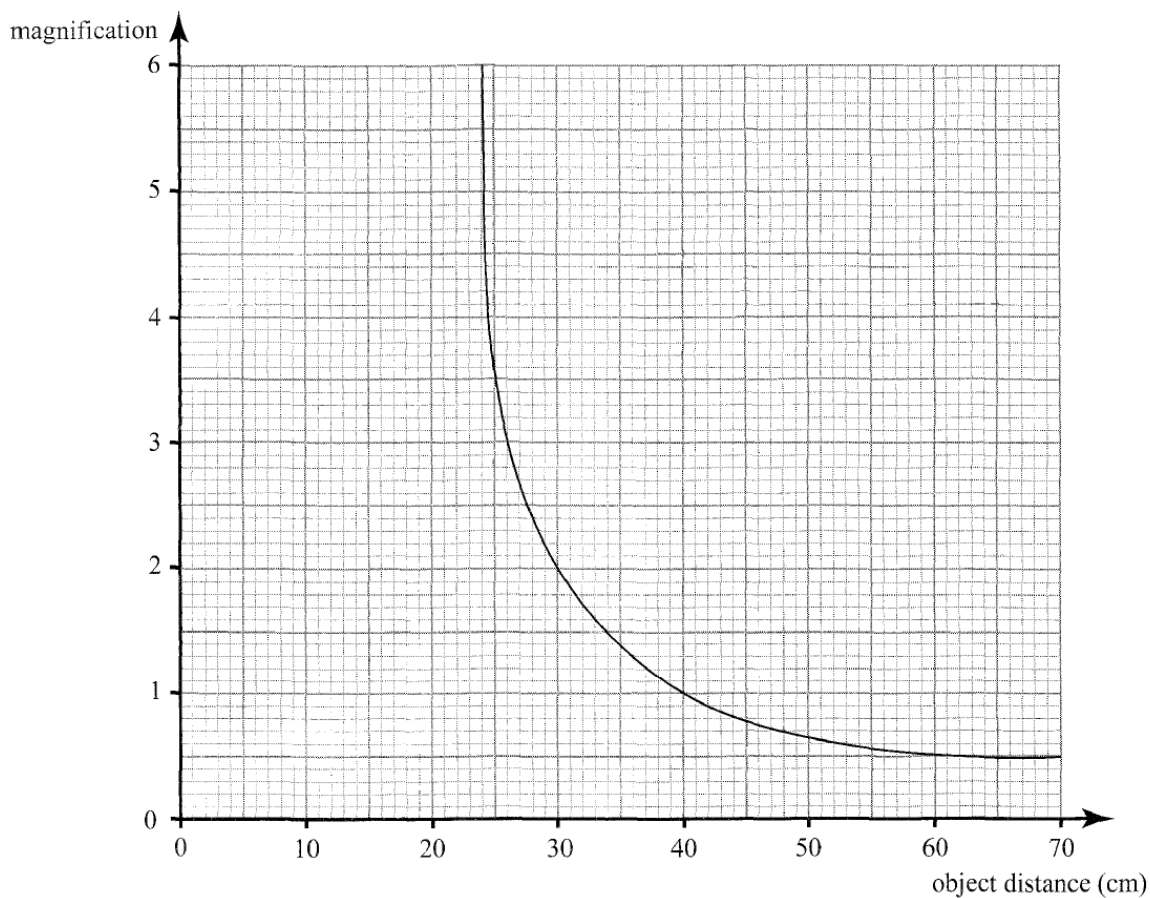


Figure 16

Using the graph;

- (i) State the effect on the size of the image when the object distance is increased from 25 cm. (1 mark)

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- (ii) Determine the distance between the object and the lens when the image is the same size as the object. (2 marks)

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- (iii) Determine the image distance when the object distance is 25 cm. (3 marks)

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- (b) **Figure 17** shows an object O placed in front of a converging mirror of focal length 15 cm.

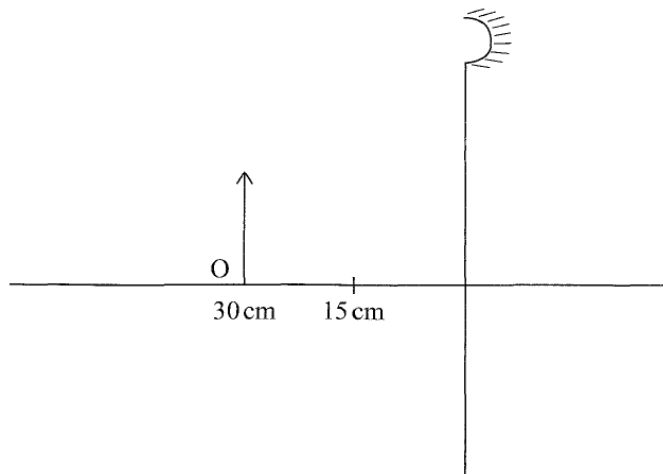


Figure 17

- Draw on the figure a ray diagram to locate the image formed. (3 marks)

- (c) State why parabolic reflectors are used in car headlights. (1 mark)

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18 Figure 18 shows the parts of an x-ray tube.

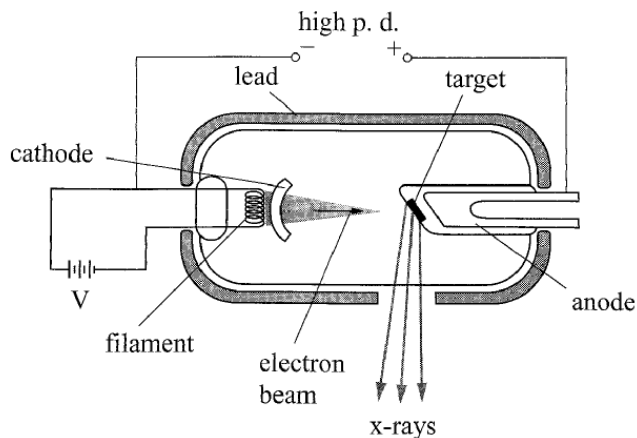


Figure 18

(a) Explain why:

(i) A potential difference is applied to the filament. (2 marks)

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(ii) A high potential difference is applied between the cathode and the anode. (2 marks)

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(iii) Most of the tube is surrounded by lead. (1 mark)

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- (b) State how the resulting x-rays are affected by increasing the potential difference between the anode and the cathode. (1 mark)

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- (c) Light of frequency 7.5×10^{14} Hz strikes a metal surface whose work function is 4.0×10^{-19} J. Determine the kinetic energy of the emitted photoelectrons. (4 marks)
(take planks constant $h = 6.63 \times 10^{-34}$ Js)

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