NAME……INDEX NUMBER……/……ADM NO…….

232/2
Physics
Paper 2
March /April 2013
2 hours

Candidate's Signature……

Date……

MOKASA JOINT EXAMINATION

Kenya Certificate of Secondary Education
PHYSICS
Paper 2
2 hours

INSTRUCTIONS TO CANDIDATES

*Write your **name** and **index** number in the spaces provided above.*

***Sign and write the date** of examination in the spaces provided above.*

*This paper consists of **TWO** sections: **A** and **B**.*

*Answer **ALL** the questions in sections **A** and **B** in the spaces provided.*

***ALL** working **MUST** be clearly shown.*

Non-programmable silent electronic calculators and KNEC mathematical tables may be used.

This paper consists of 15 printed pages.

***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	Question	Maximum Score	Candidate's Score
A	1 – 10	25	
B	11	11	
	12	12	
	13	12	
	14	10	
	15	10	
	Total Score	80	

SECTION A (25 marks)

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

1 Explain what happens to the leaf divergence when the cap of a charged electroscope is connected to the cap of a similar uncharged electroscope using a copper wire. (2marks)

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2 Eight dry cells can be arranged to produce a total e.m.f of 12V just like a car battery.

(a) What is the e.m.f of an individual cell? (2marks)

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(b) Why is it possible to start the car with the lead acid accumulator, but not with the eight dry cells in series? (1mark)

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3 The distance between a pin-hole and the screen of a pinhole camera is 10 cm. when the camera is placed 60 m away from a tree. A sharp image 3 cm high of the tree is formed on the screen. Determine the height of the tree. (3marks)

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4 **Figure 1,** shows a thermistor T and a bulb B connected to two identical ammeters A_1 and A_2.

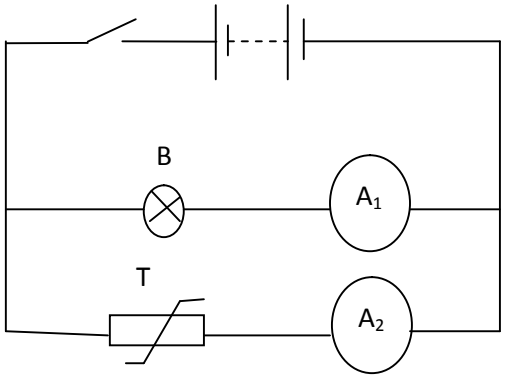

Figure 1

When the switch is closed both ammeters indicate the same reading initially. However as the current flows for some time A_2 increases and A_1 decreases, explain this observation. (2marks)

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5 **Figure 2** shows a ray of light incident on the surface AC of a right-angled glass prism ABC at right angle. The critical angle of the glass is 42^0. Complete the diagram to show the path of the ray until it leaves the prism. (3marks)

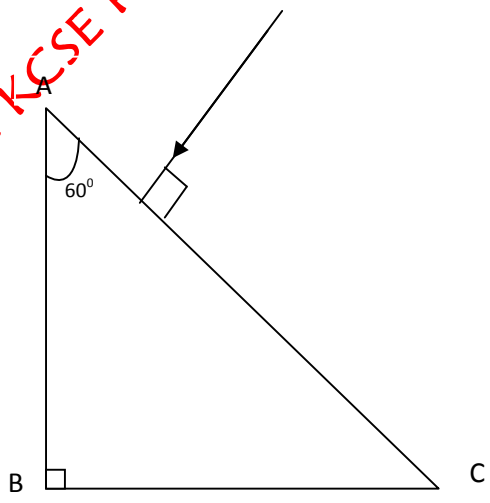

Figure 2

6 A soldier standing between two cliffs fires a gun. He hears the first echo after 2 seconds and the next after 5 seconds. Determine the distance between the two cliffs. (*Take Velocity of Sound in Air = 340 m/s)* (3marks)

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7 State two advantages and one disadvantage of a convex mirror when used as a driving mirror. (3marks)

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8 **Figure 3,** show bar magnets draw the pattern of the magnetic field around the bar magnets. (2marks)

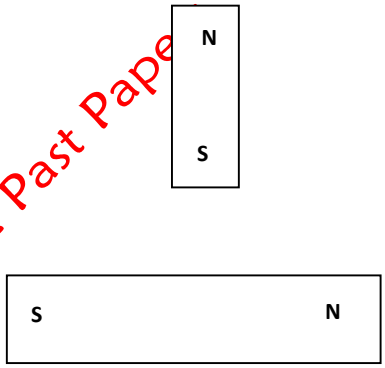

Figure 3

9 Calculate the wavelength of green light, of frequency 5.0 x 10^{14}Hz in air. *(Take Velocity of Light in Vacuum c = 3.0 x 10^{8} m/s)* (2marks)

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10 An electric bulb is marked 240V, 100 W. It contains a length of fine tungsten wire of about 1m long coiled. When switched on, the wire reaches a temperature of about 2500^0C.

(i) What is the meaning of (240V, 100 W)? (1mark)

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(ii) Why is the wire coiled? (1mark)

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SECTION B (55 marks)

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

11 A transformer with primary coils of 400 turns and secondary coil of 200 turns is connected to 240V a.c mains. Calculate

(a) The secondary voltage. (2marks)

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(b) If the primary current is 3.0A and secondary current is 5.0A, what is the efficiency? (2marks)

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(c) How is energy loss minimized in transformer due to

(i) Eddy current? (1mark)

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(ii) Hysteresis loss?

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(d) **Figure 4,** shows a simple generator. The coil is rotated in the clockwise direction as shown.

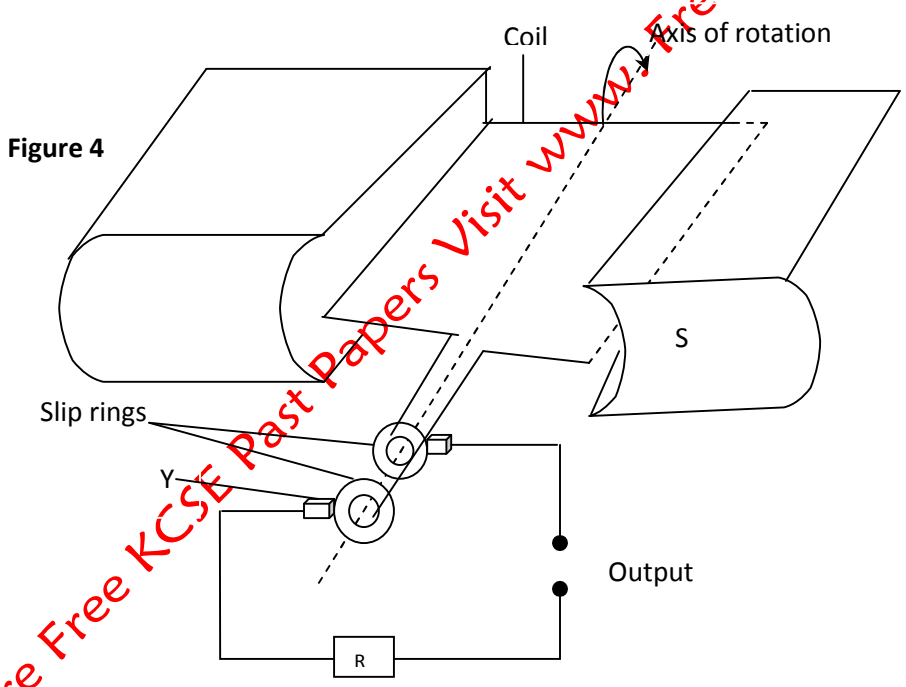

Figure 4

(i) Name the part labeled Y. (1mark)

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(ii) Indicate using an arrow on the figure, the direction of the induced current as the coil passes the position shown. (1mark)

(iii) State **two** ways of increasing the magnitude of the induced current in this type of generator. (2marks)

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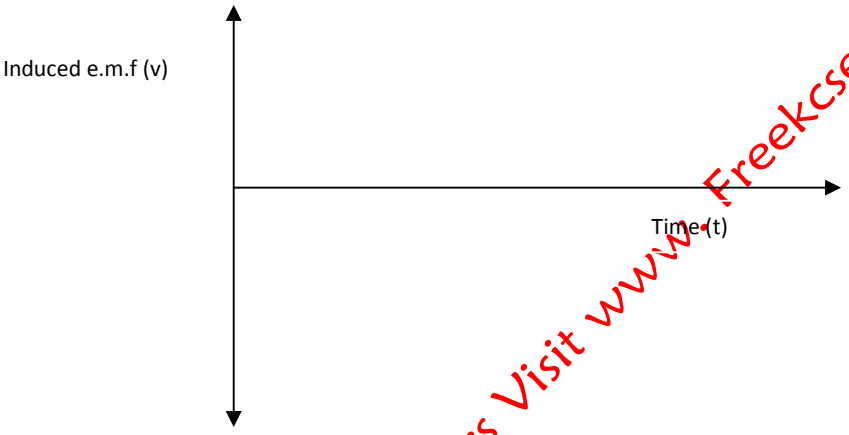
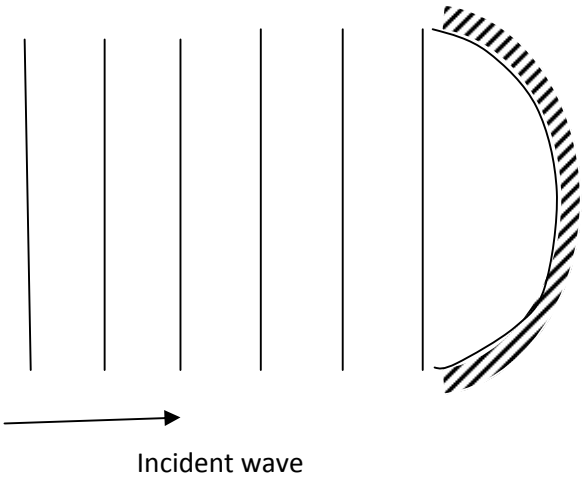
(iv) On the axis provided, sketch the graph of the induced e.m.f against time. (1mark)



12 (a) Complete the wave motion in **Figure 5 (i) and (ii)**. (4marks)

(i)

Figure 5(i)



(ii)

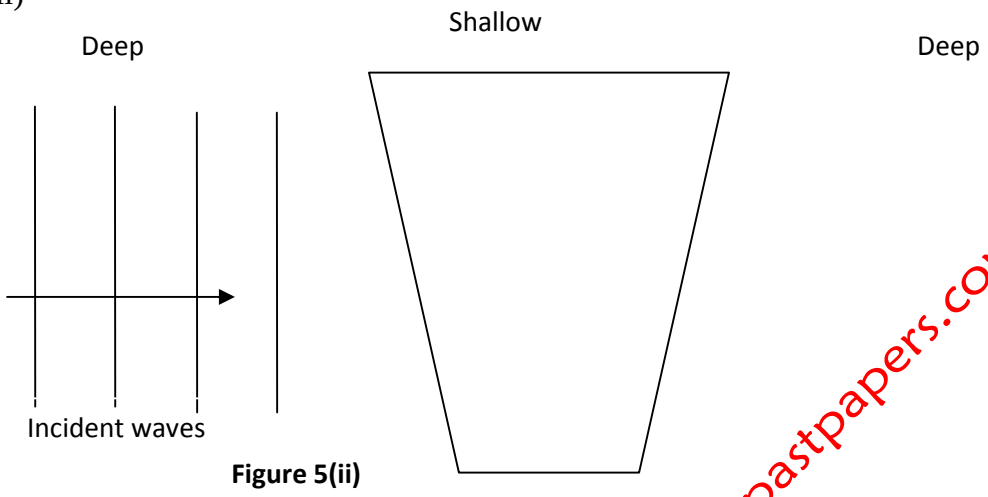


Figure 5(ii)

(b) **Figure 6,** shows two identical coherent sources S_1 and S_2 of light waves. What are the conditions for bright fringes to occur between two coherent sources S_1 and S_2 at P and dark fringes at R? (Assume S_1 and S_2 have the same amplitudes). (2marks)

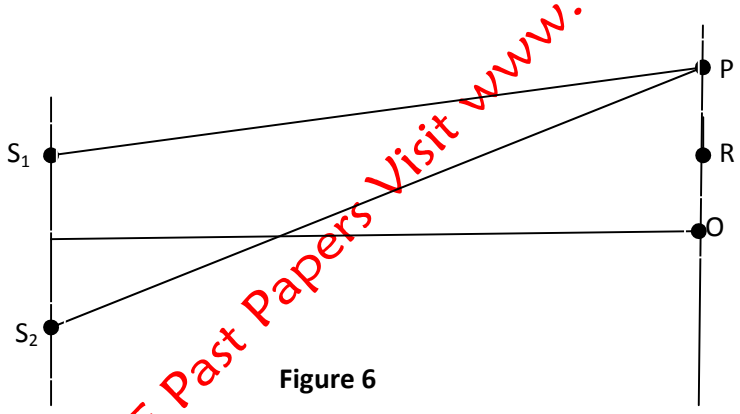


Figure 6

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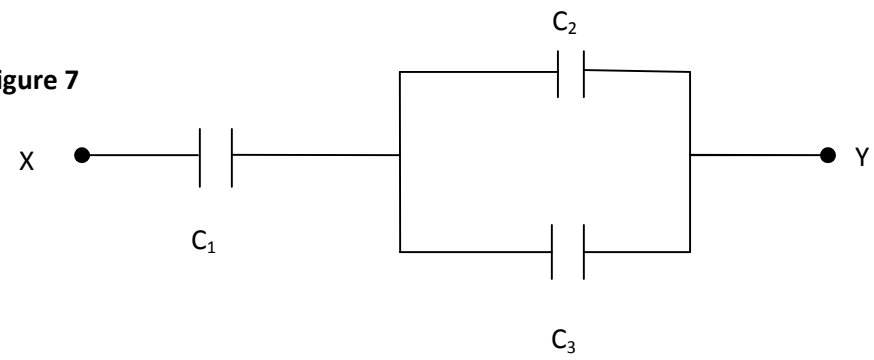
(c) **Figure 7** shows a circuit containing three capacitors C_1, C_2 and C_3.

Figure 7



(i) Write an expression for the effective capacitance between X and Y. (2 marks)

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(ii) If $C_1 = 6\mu F$, $C_2 = 4.5\mu F$ and $C_3 = 7.5\mu F$, Calculate the effective capacitance. (2 marks)

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(d) What are the effect on capacitance of a parallel plate capacitor when

(i) Increasing the area overlap of the plates? (1mark)

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(ii) Increasing the distance of separation between the plates? (1mark)

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13 (a) A student was provided with the following components: connecting wires, a battery, a variable resistor, a switch, an ammeter and a voltmeter. She was required to measure the voltage across the cell for various values of current drawn from it. Draw a possible circuit diagram for this experiment. (3marks)

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(b) **Figure 8,** show the voltage- current relationship for a certain battery used in the electrical circuit in (a) above.

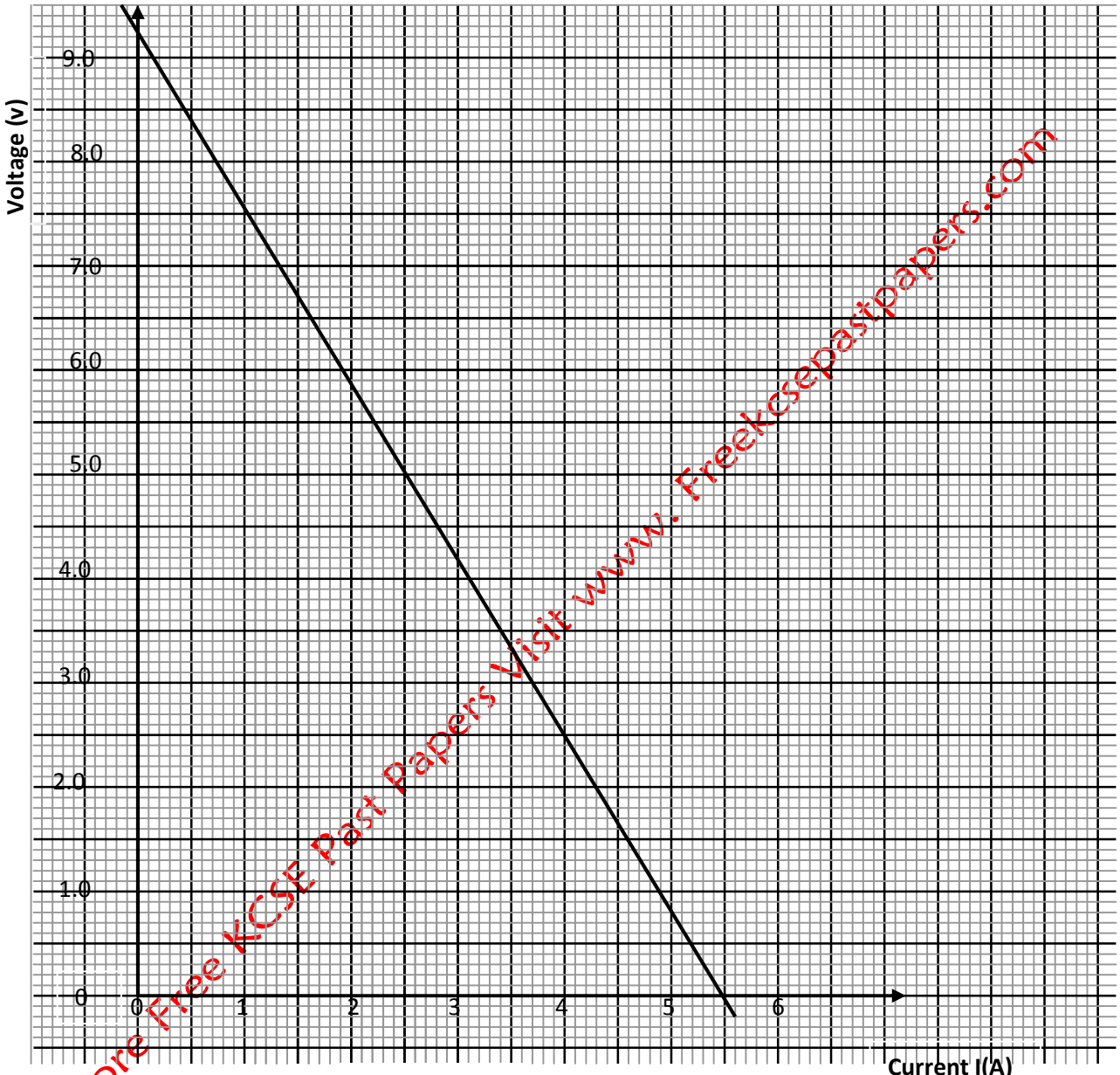

Figure 8

Given that the equation of the graph is **V = E – Ir**, from the graph, determine:

(i) The e.m.f of the battery. (1mark)

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(ii) The internal resistance of the battery used. (3marks)

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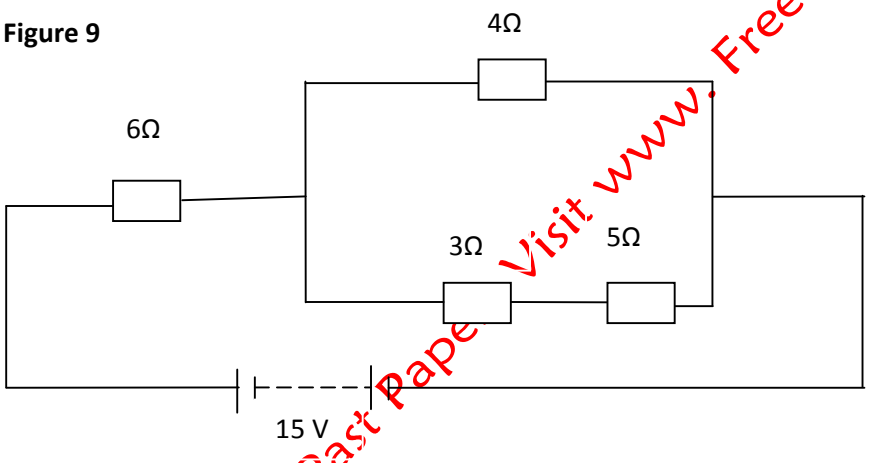
(c) **Figure 9**, shows a network of resistors connected to power supply of 15V.

Figure 9



Determine

(i) The effective resistance of the network. (2marks)

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(ii) The voltage across the 3 Ω resistor. (3marks)

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14 The image formed by a convex lens is erect.

(a) On **Figure 10** below, draw the object and using ray diagram, locate and draw the erect image. (3marks)

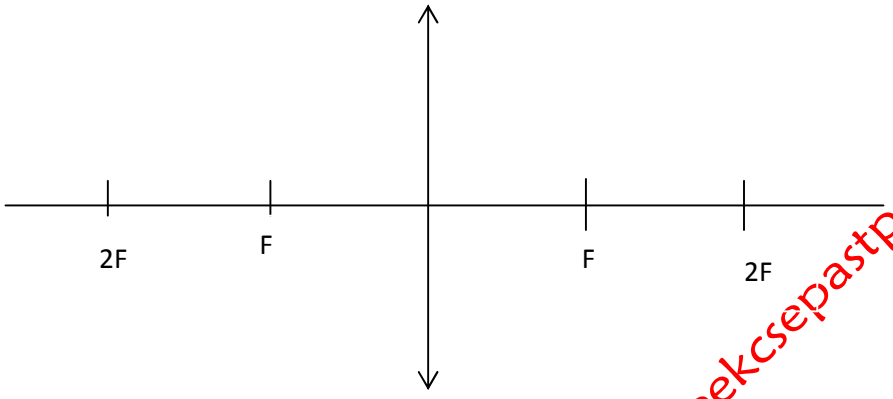

Figure 10

(b) Apart from being erect, state two other characteristics of the image. (2marks)

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(c) In an experiment to determine the focal length of a converging lens using the lens formula, several values of image distance corresponding to value of object distance U were determined and a graph of magnification *m* against image distance *v*, plotted as shown in **Figure 11** below.

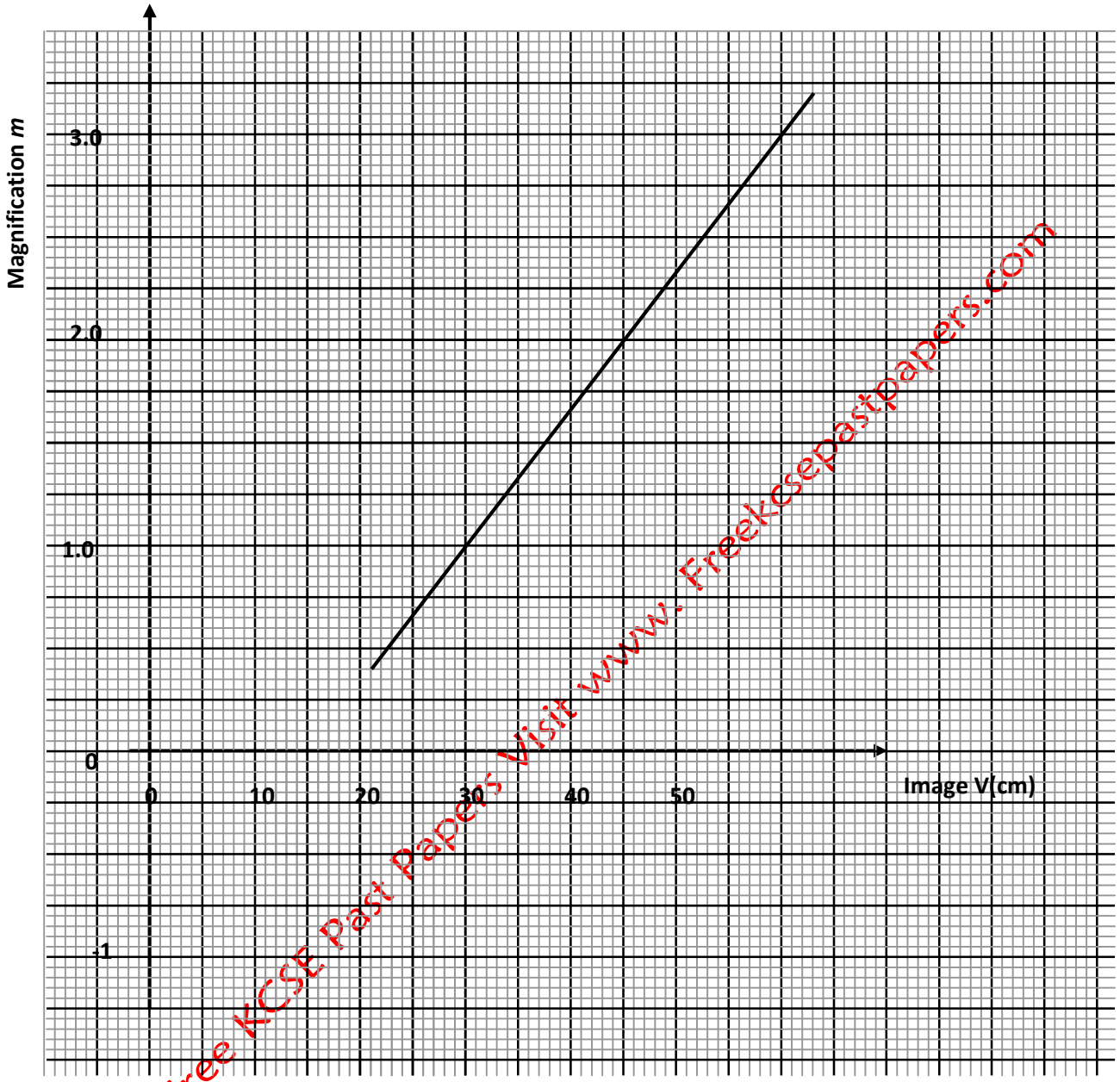

Figure 11

The equation of the graph can be represented by the equation

$$m = \frac{V}{f} - 1$$

(i) What does the gradient of the graph represent? (1mark)

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(ii) Determine the focal length of the lens. (2marks)

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(iii) Find the value of object distance for which the image is not magnified. (2marks)

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15 (a) State **two** factors that affect the strength of an electromagnet. (2marks)

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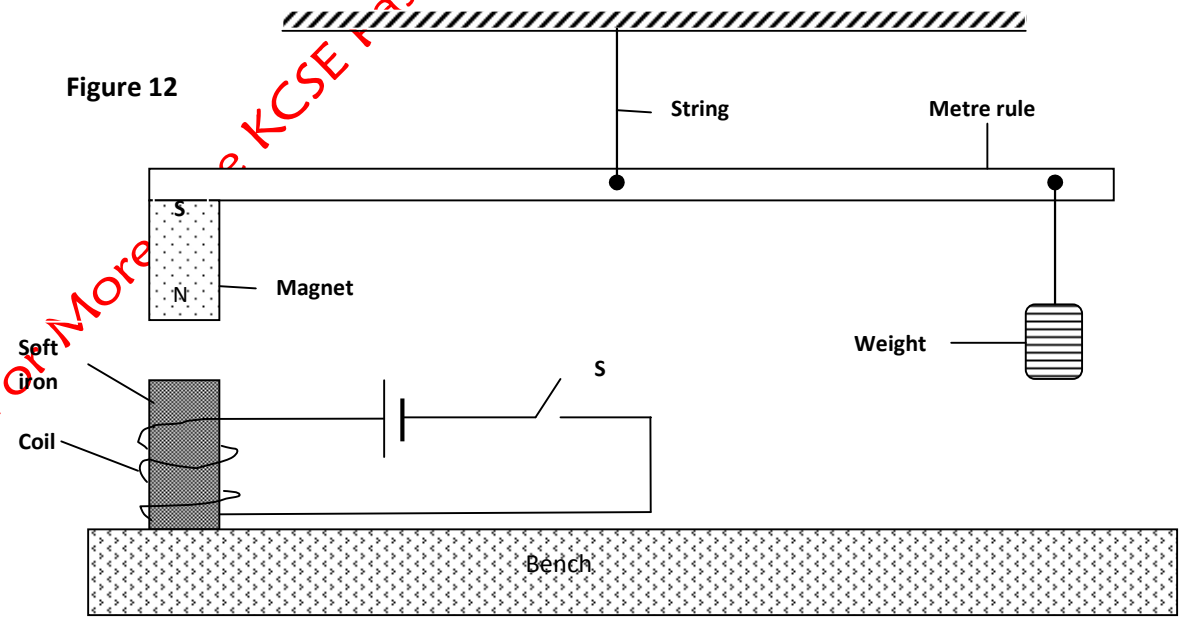
(b) In **Figure 12**; the suspended metre rule is balanced by the magnet and the weight shown. The iron core is fixed to the bench.

Figure 12



(i) State and explain the effect on the metre rule when the switch is closed. (3marks)

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(ii) What would be the effect of reversing the battery terminals? (2marks)

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Figure 13 shows the relationship between the magnetic strength and the magnetizing force.

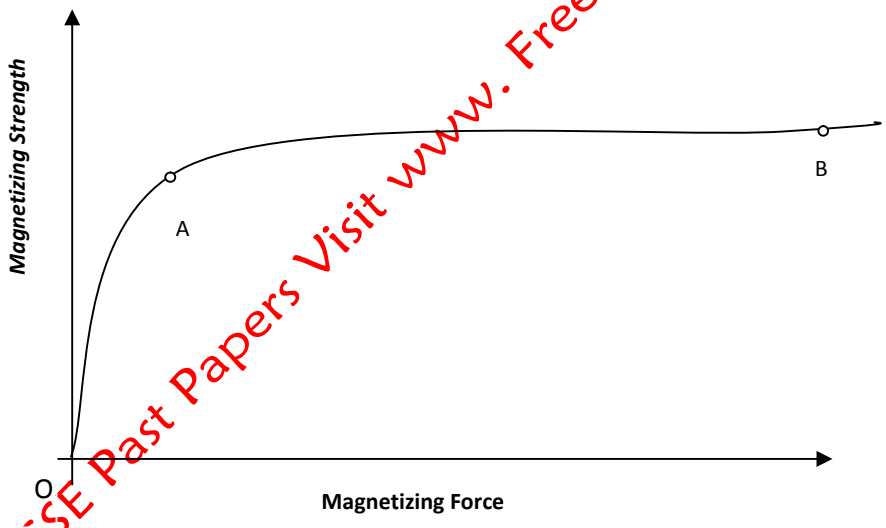

Figure 13

Give the reasons for the shape of the curve in terms of domains theory. (3marks)

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