

KCSE 2023 PREDICTION CYCLES



PHYSICS PAPER 2



KCSE 2023 TOP PREREDICTION CYCLE 1-10

CLASS OF KCSE 2023 NOVEMBER

The set Comprises of 10 Prediction Cycles prepared by a panel of Top Writers from KNEC Nairobi HQ

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NAME..... CLASS..... ADM.....
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PHYSICS
FORM 4
PP2

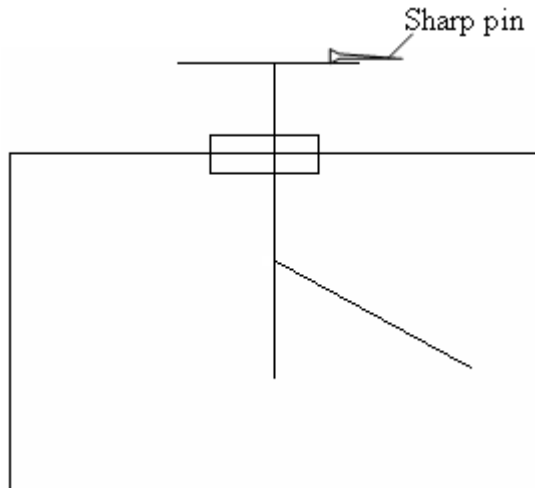
KCSE TOP PREDICTION MASTER CYCLE 1

SECTION A

1. State the property of light suggested by the formation of shadows.
(1 mark)

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2. The figure **below** shows a sharp pin fixed on a cap of leaf electroscope. The electroscope is highly charged and then left for sometime.



Explain why the leaf collapses.
(2 marks)

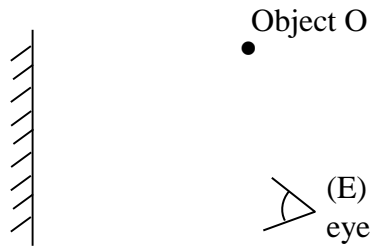
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The figure **below** shows an object O placed in front of a plane mirror.



On the same diagram, draw rays to locate the position of the image I as seen from the eye E. (2 marks)

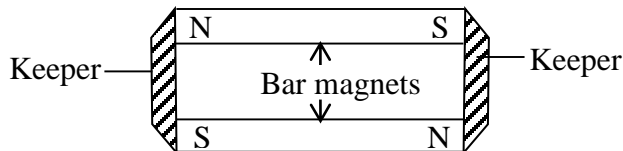
4. (a) State the basic law of magnetism. (1 mark)

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- (b) The figure **below** shows how magnets are stored in pairs with keepers at the ends.



Explain how this method of storing helps in retaining magnetism longer. (2 marks)

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5. Why is a convex mirror better than plane mirror when used as a driving mirror? (1 mark)

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6. The figure 2 shows a circuit diagram with cells in parallel. Each cell has e.m.f of 1.5V and internal resistance of 0.5Ω and the resistance of the bulb is 6Ω each. Determine the ammeter reading when the switch is closed. **(3mks)**

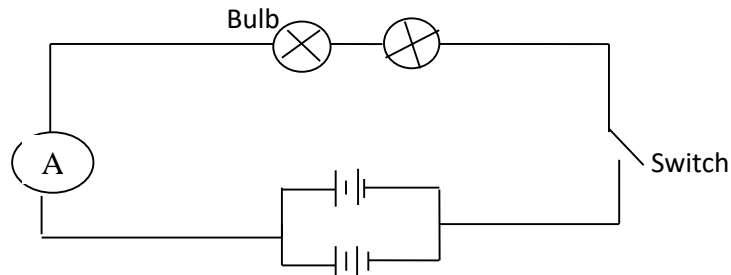


Fig2

7. An appliance is rate 2.5KW, 240V a.c 50Hz. Explain the meaning of the rating (figures) on this appliance. **(2mks)**

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8. The following are electromagnetic waves. Arrange them according to their increasing frequency. Gamma rays, microwaves, ultra-violet, TV waves and blue light. **(1mk)**

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9. Distinguish between a transformer and induction coil. **(2mks)**

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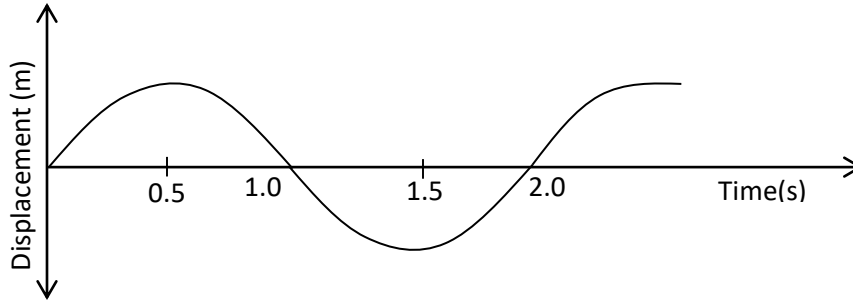
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10. Distinguish between a transverse and a longitudinal wave.

(1 mark)

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(b) Determine the frequency of the wave shown below.
(2 marks)



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11. An electric heater rated 240V, 3000W is to be connected to a 240V mains supply, through a 10A fuse. Determine whether the fuse is suitable or not.
(3 marks)

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(c) State **one** reason why ultrasound is preferred to audible sound in echo-sounding.
(1 mark)

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12. An electric heater rated 240V, 3000W is to be connected to a 240V mains supply, through a 10A fuse. Determine whether the fuse is suitable or not.
(3 marks)

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13. Kiai noticed that any time he a light from his car and close the door holding the metallic hand he get a slight shock. Explain.
(2mks)

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SECTION B (55 MARKS)

Answer all the questions from this section in the spaces provided.

14. A transformer with 2000 turns in the primary circuit and 150 turns in the secondary circuit has its primary circuit connected to a 800V a.c. source. It is found that when a heater is connected to the secondary circuit it produces heat at the rate of 1000W.

Assuming 100% efficiency, determine the:

(i) Voltage in the secondary circuit. **(2 marks)**

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(iii) Current in the secondary circuit.
(1 mark)

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(iv) State the type of transformer represented above.
(1 mark)

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high (b) (i) State the reason why long distance power transmission is done at a very voltage and using thick cables.
(1 mark)

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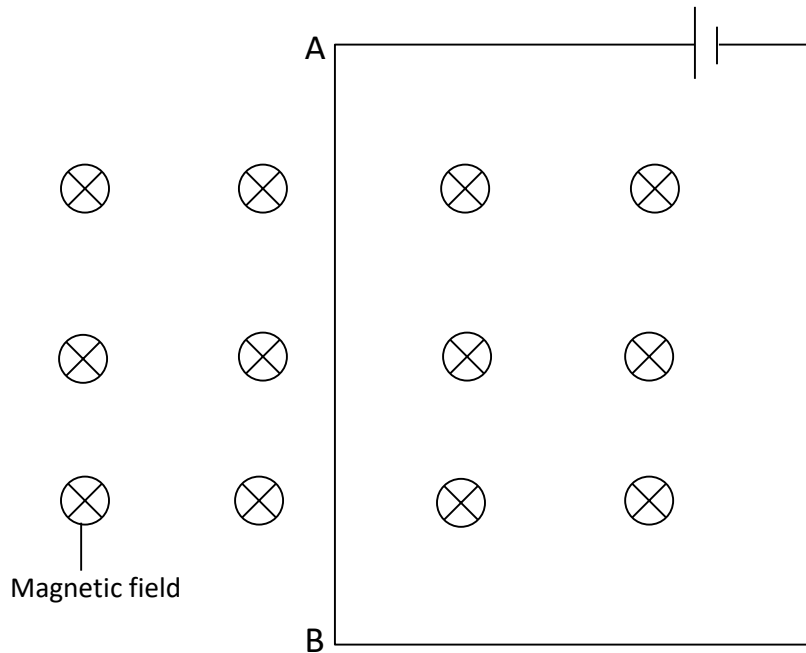
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15. (a) State **two** ways in which one can increase the strength of an electromagnet.
(2 marks)

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- (b) The following figure shows a conductor placed in a magnetic field. Indicate on the diagram the direction of motion of part AB of the conductor.
(2mks)



- (b) A cell drives a current of 5A through a 1.6Ω resistor. When connected to a 2.8Ω resistor, the current that flows is 3.2A. Find E and r for the cell.
(4 marks)

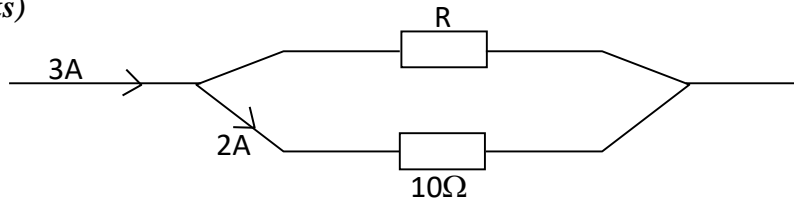
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- (c) Calculate the length of a nichrome resistance wire of cross-sectional area $7 \times 10^{-8}m^2$ required to make a resistor of 10 ohms. (Take resistivity of nichrome = $1.10 \times 10^{-6}\Omega m$).

(3 marks)

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(e) In figure below, calculate the p.d across resistor **R**.
(2 marks)

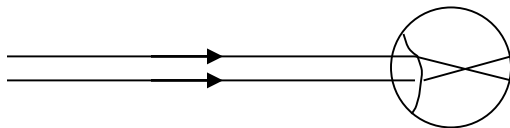


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(ii) Current in the primary circuit.
(2 marks)

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16. The figure below shows rays of light entering a human eye which has a defect.



i) Name the defect. (1mk)

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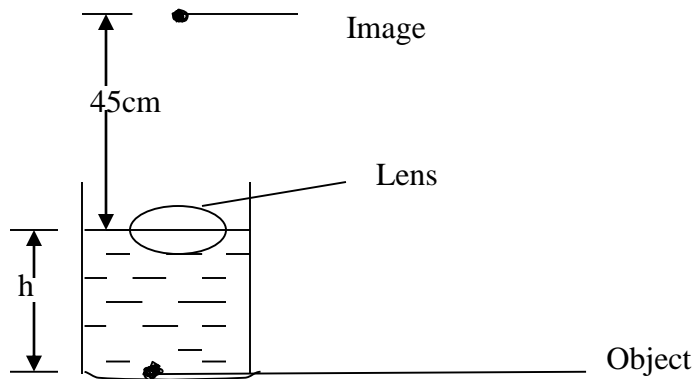
ii) State 2 possible causes of the defect. (1mk)

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b) Define the accommodation. (1mk)

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c) A small bright object O lies at the bottom of a beaker containing water of depth h cm. A convex lens of focal length 15cm is held at the surface of water. The lens forms an image of O at 45cm from the surface of water.



Taking the refractive index of water to be $4/3$, determine:

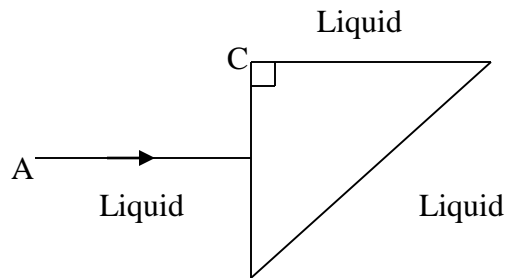
(i) the apparent depth of the object (2mks)

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(ii) the real depth h , of the object (2mks)

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d. A ray of light is incident at right angles to the face AB, of a right angled isosceles prism of Refractive index 1.6 as shown in the figure below.



If the prism is surrounded by a liquid of refractive index 1.40, determine:

(i) The angle of incidence on the face BC. (2mk)

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(ii) The angle of refraction on the face BC. (3mks)

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17. State **two** ways through which the rate of evaporation of a liquid may be increased. (2 marks)

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(b) A metal of mass 10kg is heated to 120°C and then dropped into 2kg of water. The final temperature of the mixture is found to be 50°C. Calculate the initial temperature of the water. (Specific heat capacity of the metal and water is 450JK⁻¹K⁻¹ and 4200JK⁻¹K⁻¹ respectively). (3mks)

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(c) Give the property of water which makes it suitable for use as a coolant in machines. (1 mark)

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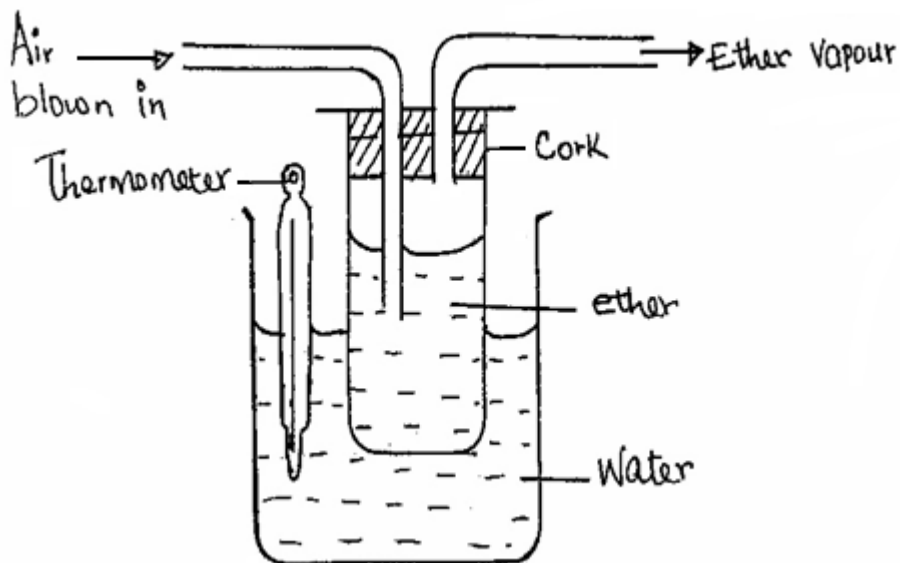
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(d) Formation of ice on roads during winter in cold countries is known to hamper vehicles.

State **two** ways in which the melting point of ice may be lowered to solve this problem. (2 marks)

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(f) Some ether is put in a combustion tube and two glass tubes inserted into the tube through a cork as shown in the figure **below**. The combustion tube is then put into a small beaker containing some water and a thermometer dipped in the water. When air is blown into the ether as shown, the reading in the thermometer lowers. Explain this observation. (2 marks)



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18. (a) An object is released to fall vertically from height of 100m. At the same time another object is projected vertically upward with velocity of 40m/s.

(i) Calculate the time taken before the objects meet *(3mks)*

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(ii) At what height do the objects meet? *(2mks)*

(b) A string of negligible mass has a bucket tied at the end. The string is 60cm long and the bucket has a mass of 45g. The bucket is swung horizontally making 6 revolutions per second. Calculate

(i) The angular velocity *(2mk)*

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(ii) The angular acceleration *(2mks)*

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(iii) The tension on the string *(2mks)*

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(iii) The linear velocity *(1mk)*

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NAME.....INDEX NO.....

CANDIDATE'S SIGN.....DATE.....

SCHOOL.....CLASS

232/2

PHYSICS

PAPER 2

TIME: 2 HOURS

KCSE TOP PREDICTION MASTER CYCLE 2

INSTRUCTIONS TO CANDIDATES.

- 1) Write your name and index number in the spaces provided above.
- 2) Sign and write the date of examination in the spaces provided above.
- 3) This paper consists of section A and B.
- 4) Answer **ALL** questions in section A and B.
- 5) All your workings must be clearly shown as must be awarded for correct working even if the answer is wrong.
- 6) Non programmable silent scientific calculators and KNEC mathematical tables may be used.

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SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATES SCORE
A	1 - 12	25	
B	13	13	
	14	12	
	15	09	
	16	09	
	17	12	
		80	

This paper consists of 12 printed pages.

Candidates should check the question paper to ascertain that all pages are printed as indicated and no questions are missing

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SECTION A (25MARKS)

Answer all the questions in this section

1. Figure (1) below shows two rays of light from an object reflected on a plane mirror

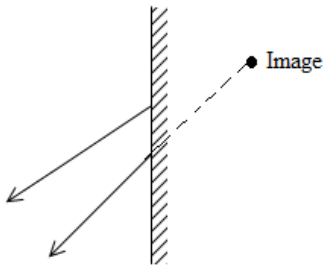


Fig 1.

Using proper ray construction, show the object position

(2marks)

2. The fig 2 below shows a ray of light incident on a glass prism

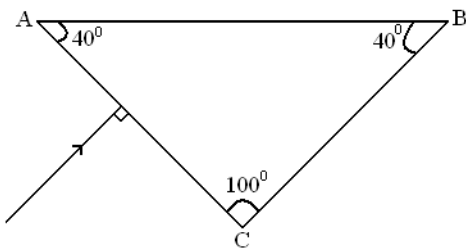


Fig2

Given that the critical angle for the glass is 39°, **sketch** on the diagram the path of the ray through the prism. *(2 marks)*

3. The diagram on figure 3 shows the National Grid system.

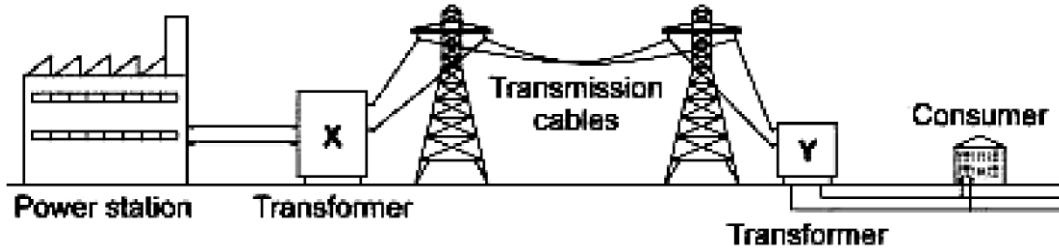


Fig3.

(a) What type of transformer is;

X.....

(1mark)

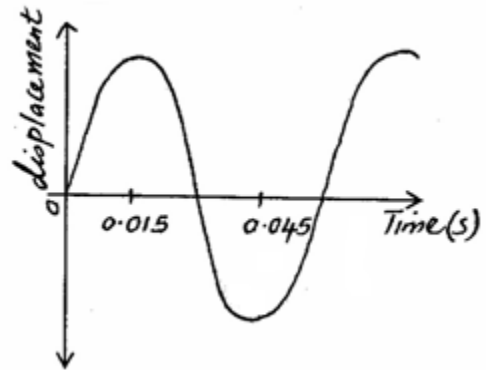
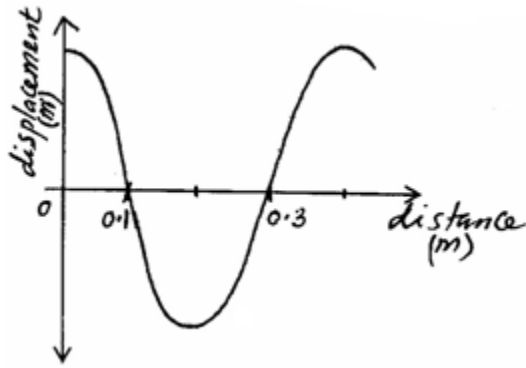
Y.....

(1mark)

4. State **one** advantages of using circuit breakers in the consumer unit than using fuse wire. (1marks)

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5. The figures **below** shows two waveforms representing the same wave motion.



Determine the velocity of the wave.

(3mks)

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6. Figure 4. Below shows a 6V battery connected to an arrangement of resistors. Determine the current flowing through the 2Ω resistor. (3marks)

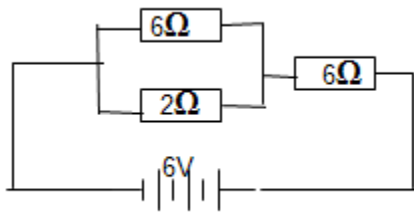


Fig 6.

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7. The figure 7 below shows the electromagnetic spectrum.

radio waves	infra-red	A	ultraviolet	B	gamma rays
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Fig 7.

(a) Identify A (1 mark)

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(b) State one industrial use of B (1 mark)

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8. The diagram (Fig 8) shows a positively charged acetate strip and a negatively charged polythene strip that are freely suspended.



Fig8.

Two rods X and Y are brought up in turn to these two strips. Rod X attracts the acetate strip but repels the polythene strip. Rod Y does not repel either the acetate strip or the polythene strip.

State the type of charge is on each rod. (2mks)

X.....

Y.....

9. State **two** advantages of an alkaline accumulator over lead acid accumulator. (2mks)

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10. Figure 9 below show a **concave** lens and object.

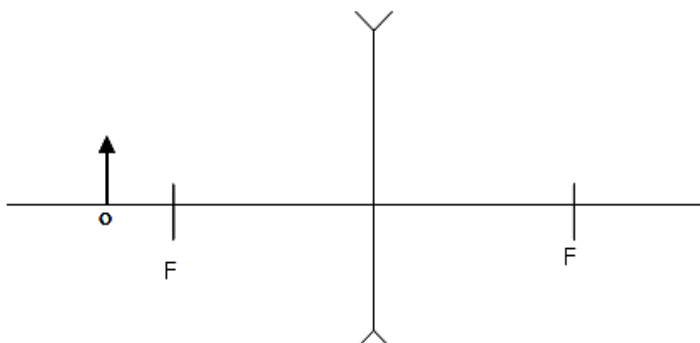


Fig 9.

Sketch the rays to show the image formed.

(2marks)

11. Two similar razor blades were placed on a wooden block and the other on an iron block as in **figure 10**.

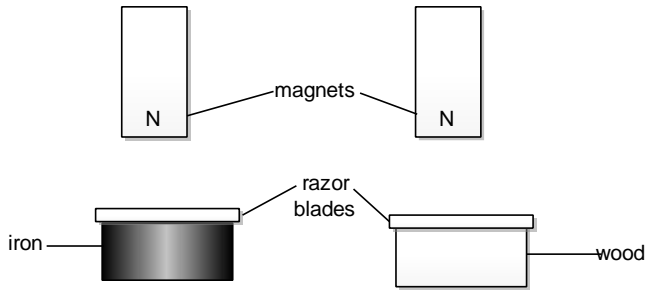


Fig 10.

It was observed that the razor blade on the wooden block is attracted by the magnet while that on the iron block was not. Explain. (2 marks)

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12. The **figure 11** below shows water waves about to pass through a gap. One wave front is shown after it has passed through the gap.

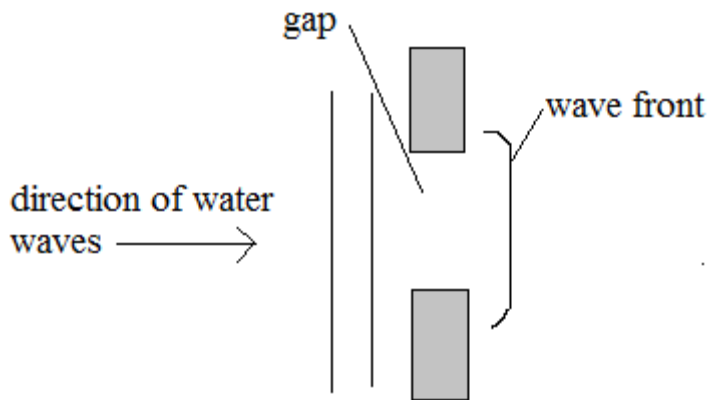


Fig 11

(i) On the diagram, draw two more wave fronts that have passed through the gap. (1 mark)

(ii) State two changes which would each make the wave fronts become more curved after passing through the gap. (1 mark)

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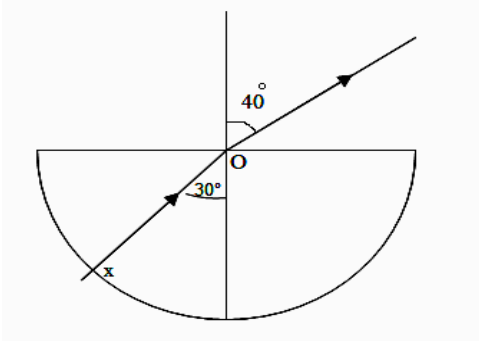
SECTION B (55MARKS)
ANSWER ALL THE QUESTIONS IN THIS SECTION.

13.(a) State what is meant by refractive index of a material. *(1 mark)*

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(b) Figure 12 represents a ray of light falling normally on the curved surface of a semi-circular plastic block at X, meeting the opposite face at an angle of incidence of 30° and emerging into the air at an angle of 40° .

Fig 12



(i) State and explain what happens to the ray as it moves from:

I) Air to glass at X. *(1marks)*

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II) From glass to air at O. *(1marks)*

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(ii) Calculate refractive index of the plastic. *(3marks)*

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(iii) State the conditions to be satisfied for total internal reflection to occur. *(2marks)*

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(iv) Describe how the apparatus above could be used to find the critical angle experimentally. *(3marks)*

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(v) Calculate the critical angle for this plastic. *(2marks)*

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14. (a) State what is meant by the term capacitance. *(1marks)*

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(b) Distinguish between a paper capacitor and an electrolyte capacitor. *(1marks)*

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(c) State **two** factors that determine capacitance of a parallel plate capacitor *(2mks)*

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(d) Figure 10 below shows a network of capacitors in series.

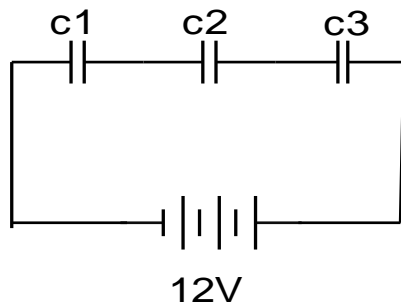


Fig 10.

(i) Derive an expression for their effective capacitance C_E from first principles. **(3marks)**

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(ii) Given that $C_1=10.5\mu\text{F}$, $C_2 =2\mu\text{F}$ and $C_3= 3\mu\text{F}$.
Calculate effective capacitance C_E in (2) above and hence
Determine the charge stored on each capacitor.

(3marks)

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(e) State two applications of capacitors. **(2marks)**.

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15.(a) Use the **figure 11** below to answer the questions that follows.

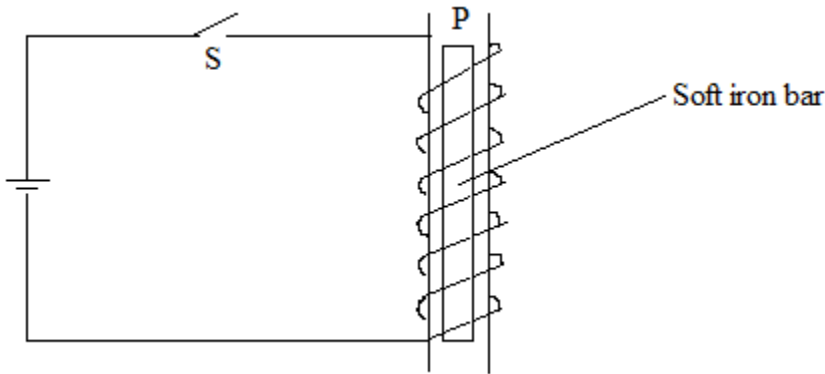


Fig.11

(i) Show the direction of the current on the turns when the switch S is closed. *(1marks)*

(ii) State the polarity at P *(1marks)*

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(iii) Explain using domain theory what happens on the soft iron bar. *(1marks)*

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(iv). If steel bar was used instead, what could be the difference? *(2marks)*

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(b) The following diagram (**figure 12**), shows a part of an electric d.c motor.

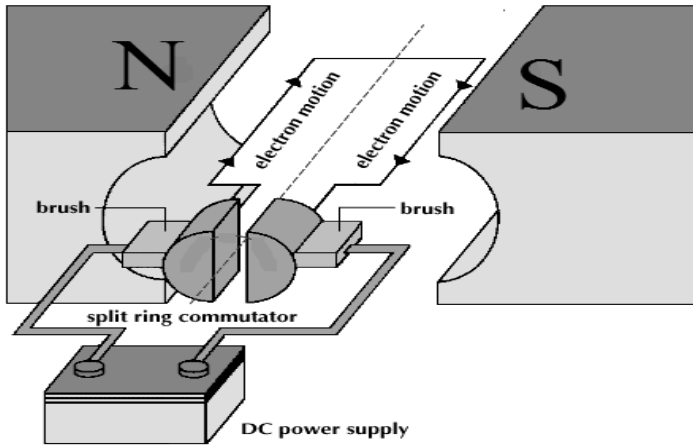


Fig 12.

(i) On the diagram above show the direction of rotation of the coil. *(1marks)*

(ii) State the effect of increasing the number of turns of the rotating coil of an electric motor. *(1marks)*

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(c) Sketch the magnetic field pattern around the conductor carrying current on figures 13 and 14 shown below. *(2marks)*

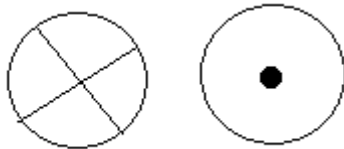


Fig 13.

Fig 14

16(a) Distinguish between real image and a virtual image. *(2mks)*

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(b) The distance between an object and its upright image produced by a curved mirror is 40cm. the image is 3 times as tall as the object

(i) State the type of mirror used. *(1mk)*

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(ii) Determine the object distance *(2mks)*

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(iii) Determine the radius of curvature of the mirror *(3 mks)*

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(iv) State **one** application of the mirror as used in (b) above *(1mk)*

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17(a) State **Ohm's Law**. *(1mk)*

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(b) Explain why a 12V car battery is able to start the motor car engine while eight dry cells of 1.5 v each connected in series will not. (2mks)

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(c) In figure 15 the current in the circuit is 1.80A

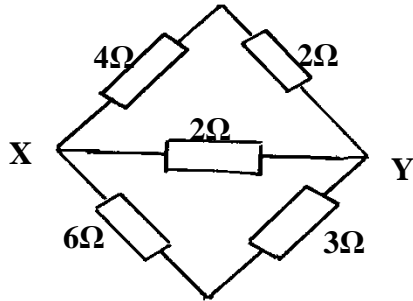


Fig 15

(i) Find the effective resistance between X and Y. (3mks)

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(ii) The p.d of the source. (2mks)

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(iii) Current through the 3Ω resistor (2mks)

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(iv) Give two differences between a primary and a secondary cell (2mks)

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Name..... Adm No.....
Class..... Date.....
School
232/2

PHYSICS
PAPER 2
2 HOURS

KCSE TOP PREDICTION MASTER CYCLE 3

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 shown clearly
- (f) Mathematical tables and silent electronic calculators may be used.
- (g) This paper consists of **14** 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.

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SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1 – 13	25	
B	14	11	
	15	12	
	16	09	
	17	10	
	18	12	
TOTAL SCORE		80	

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SECTION A (25 MARKS)

Answer ALL the questions in this section in the spaces provided

1. (a) Distinguish between real and virtual Image (1mark)

.....
.....
.....

b) A pinhole camera forms an image of size 10cm. The object is 5m tall and 20m away from the pinhole. Find the length of the pinhole camera. (2marks)

.....
.....
.....

2. Why is it safer to carry explosive fuels in metal cans instead of plastic can? (1mark)

.....
.....

3. The **figure 1** below shows a cross section of a dry cell.

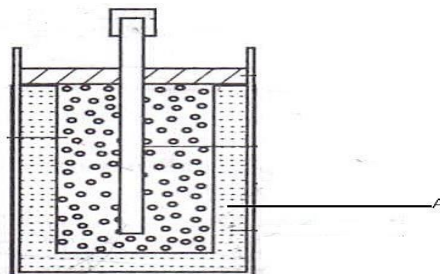


Figure 1

(i) Name the part labeled A (1 mark)

.....
.....

(ii) State the use of manganese (iv) oxide in the cell (1 mark)

.....
.....

4.a) The **figure 2** below shows a soft iron bar that's placed in a coil near a free suspended magnet.

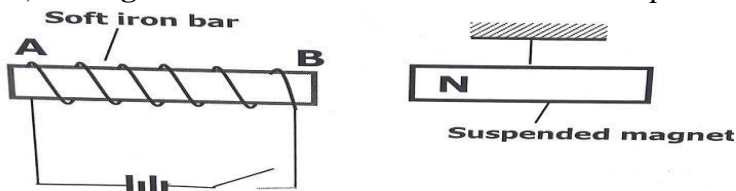


figure 2

State and explain the observation made when the switch is closed. (2marks)

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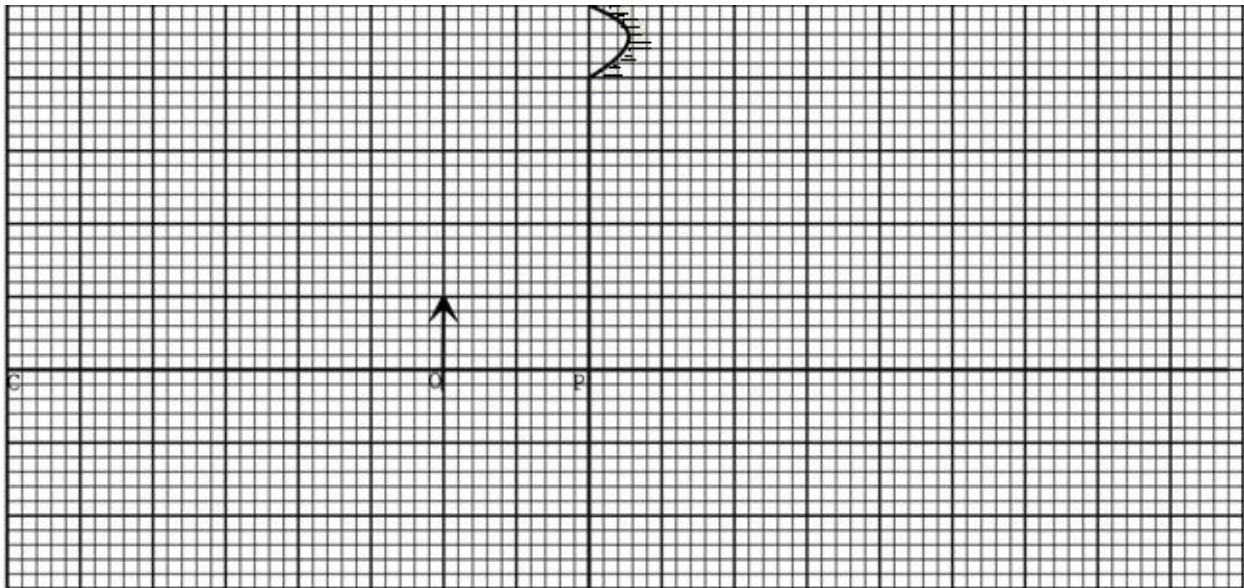
b.) Give a reason why attraction in magnetism is not regarded as a reliable method of testing for polarity. (1mark)

5.Explain the term wavelength in terms longitudinal wave (1mark)

6.(a) State the effect of pressure on the speed of sound in air. (1mark)

(b) A boy stands 190m from a high wall and claps his hands. If he hears an echo 1.3 Seconds later, calculate the speed of sound in air. (2marks)

7. Figure 3 below shows an object, O placed 10 cm in front of a concave mirror whose radius, C is 40 cm.



On the same figure, draw a ray diagram to show the position of the image formed. (3 marks)

8.State any factor that determine the heating effect by an electric current.

(1mark)

9. Figure 4 shows the table of electromagnetic. Spectrum in the increasing order of wavelengths.

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P	x-rays		Q	Infra-red		

a).Identify the radiation marked (1mark)

Q.

b) State the application of radiation marked P (1mark)

10.Light travels from glass to air as shown in figure 5. The refractive index of glass 1.5

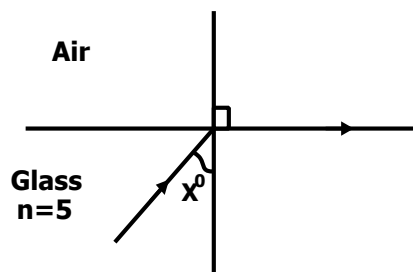


figure 5.

(a)Determine angle x (2marks)

angle

11.Figure 6 shows air molecules in front of a hollow, wooden box B set vibrating by a tuning fork.



figure 6

i)State the reason of mounting the tuning fork on the box which is open at one end. (1mark)

ii)What is the name given to this kind of wave? (1 mark)

12. The **figure 7** below shows an isolated negative charge placed closer to a negatively charged plate. Draw the electric field patterns. (1mark)

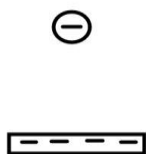


figure 7

13. Kenya launched the use of optical fibres in communication recently. State why optical fibres are preferred to ordinary cables (1mark)

.....
.....

SECTION B(55MARKS)

14.(a) State **two** ways in which the speed of rotation of a motor can be increased (2marks)

.....
.....

b) The **figure 8** below shows a simple electric bell circuit

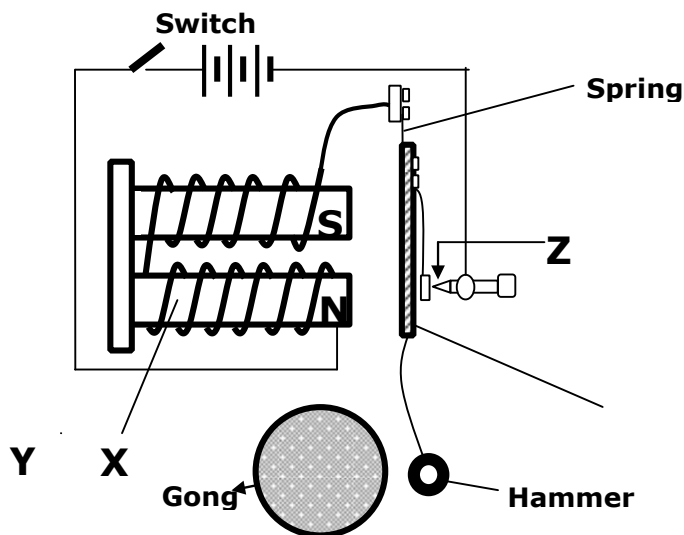


figure 8

i) Name the parts labeled.

(2marks)

I) X.....

II) Y

ii) When the switch is closed, the hammer hits the gong repeatedly. Explain why:

I) The hammer hits the gong. (2marks)

.....
.....
.....

II) The hammer hits the gong repeatedly (2marks)

.....
.....
.....

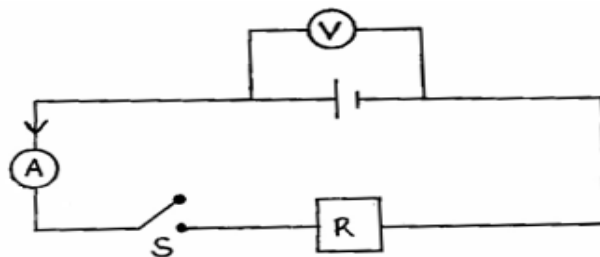
iii) If the armature is made of steel metal, it is observed that the bell will take longer to ring. Explain this observation. (1 mark)

.....
.....

iv) Nametwo adjustment should be done to the system to make it operate effectively with a lower voltage battery? (2mark)

.....
.....

15. (a) In an experiment to determine the internal resistance of a cell, the following circuit was used.



It was noted that when S is open, the voltmeter reads 1.5V and when S is closed the voltmeter reads 1.3V and ammeter reads 0.2A.

(i) Define the term e.m.f of the cell. (1mark)

.....

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(ii) Determine the lost voltage.

(1mark)

.....
.....

(iii) Determine the value of R.

(2marks)

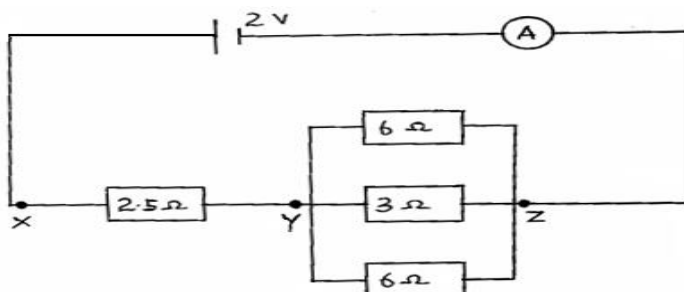
.....
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(iv) Determine the internal resistance of the cell.

(3marks)

.....
.....
.....

(b) Study the circuit **below** and answer the questions that follow.



(i) Determine the effective resistance of the circuit.

(3marks)

.....
.....

(ii) Determine the p.d between X and Y.

(2marks)

.....
.....

16.(a) (i) Define capacitance of capacitor

(1mark)

.....
.....

(ii) A positively charged rod with a pointed end is brought near a candle flame as shown in **fig. 9**.

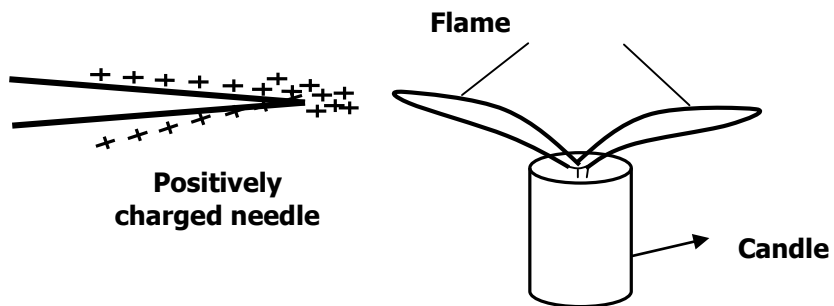


fig.9
(1mark)

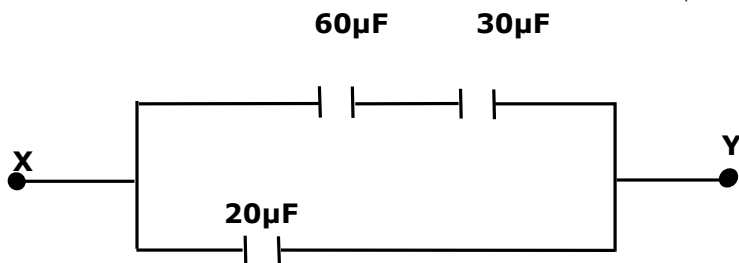
Explain why the flame burns in the direction shown

.....
.....

b). One of the factors which affect the capacitance of a parallel plate capacitor is the area of overlap of the plates. Name **two** other factors. **(2marks)**

.....
.....

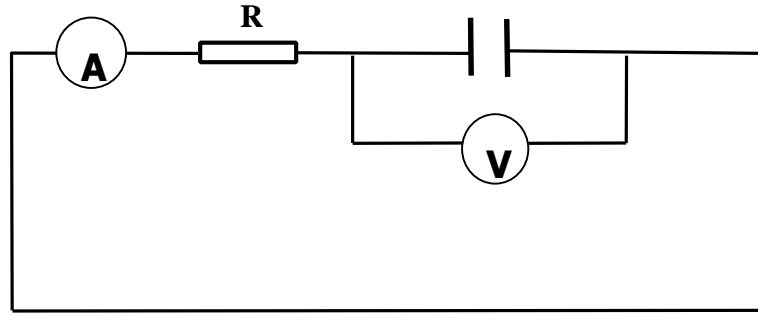
c). Calculate the effective capacitance of the capacitors shown across points X and Y. **(3marks)**



.....
.....
.....

d).A capacitor was full charged to a potential of 40v. The capacitor is connected as shown in the figure below to discharge at load resistor R. Sketch a graph to show how the capacitor discharges with time

(2 marks)



.....

17.(a)Water waves from a given source move from a deeper a shallow to end. What effect would this have on the;

(i) Frequency (1mark)

.....

(ii)Wavelength (1mark)

.....

(iii) Velocity of the wave(1mark)

.....

(b).The **figure 10** shows wave fronts approaching a wide opening

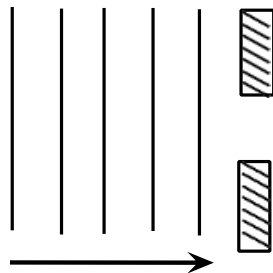


figure 10

i)Complete the diagram to show the appearance of the wave fronts after crossing the opening (2mark)

(ii)State what would be observed on the pattern if the gap was made smaller (1mark)

.....

c.) **Figure 11** below shows light rays from two coherent sources S_1 and S_2 falling on screen. Dark and bright fringes are observed between A and B

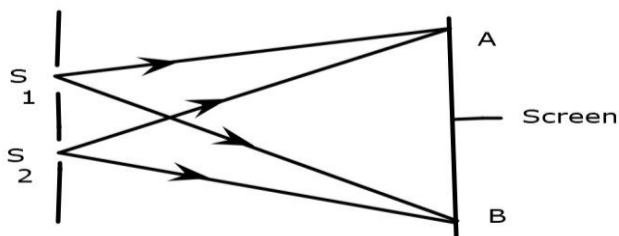


figure 11

i) State the function of S_1 and S_2

(1mark)

ii) State how

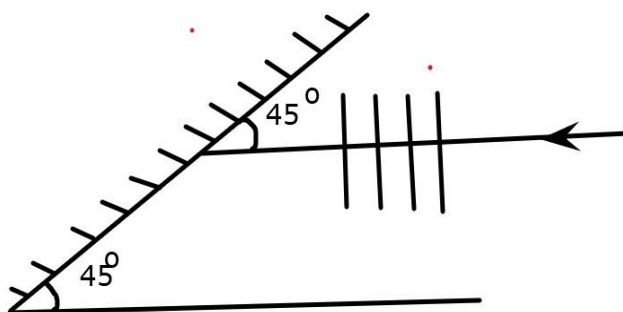
I. Bright fringes are formed

(1mk)

II. Dark fringes are formed

(1mark)

c.) **Figure 12** below shows plane water waves incident on a plane reflector placed at an angle to the path of the waves.



Complete the diagram to show the reflected waves

(2marks)

18. (a) Define the term principal focus for in converging lens(1mark)

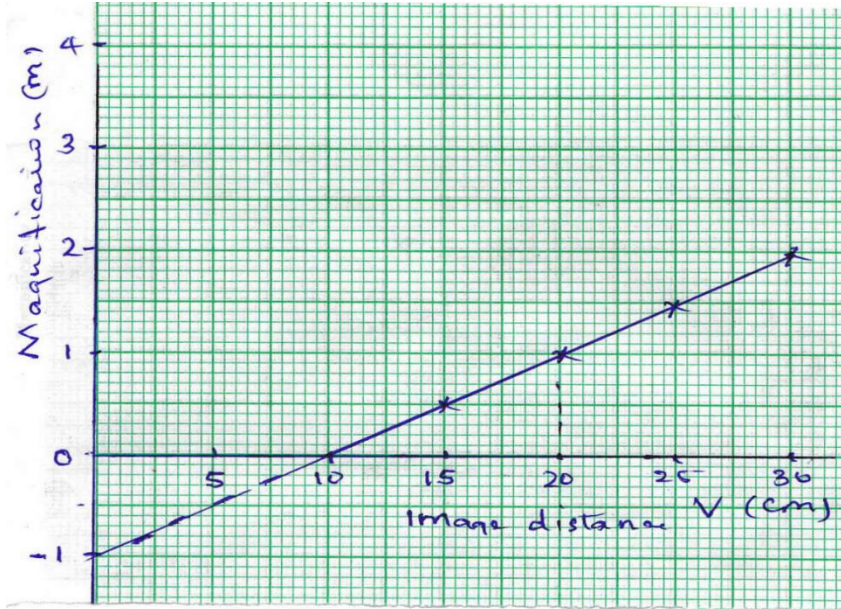
.....

b) Sketch on a diagram to illustrate how a convex lens is used as a magnifying glass.

(3 marks)

.....

(c) In an experiment to determine the focal length of a converging lens using 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 13**



The equation of the graph can be represented by the

equation $m = \frac{v}{f} - 1$

- (i) State the significance of the gradient of the graph **(1mark)**

- (ii) From the graph, determine the focal length of the lens. **(3marks)**

- (iii) Determine the value of object distance for which the image is not magnified. **(1mark)**

- (iv) An object of height 10.5cm stands before a diverging lens of focal length 20cm and a distance of 10cm from the lens. Determine the image distance. **(3 marks)**

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NAME:.....INDEX NO.ADM NO.....

SIGNATURE: DATE:CLASS

SCHOOL

232/2

PHYSICS

PAPER 2

TIME: 2 HRS.

KCSE TOP PREDICTION MASTER CYCLE 4

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 Section **A** and **B** in the spaces provided.
- All workings must be clearly shown.
- Non-programmable silent electronic calculators and KNEC Mathematical tables may be used.

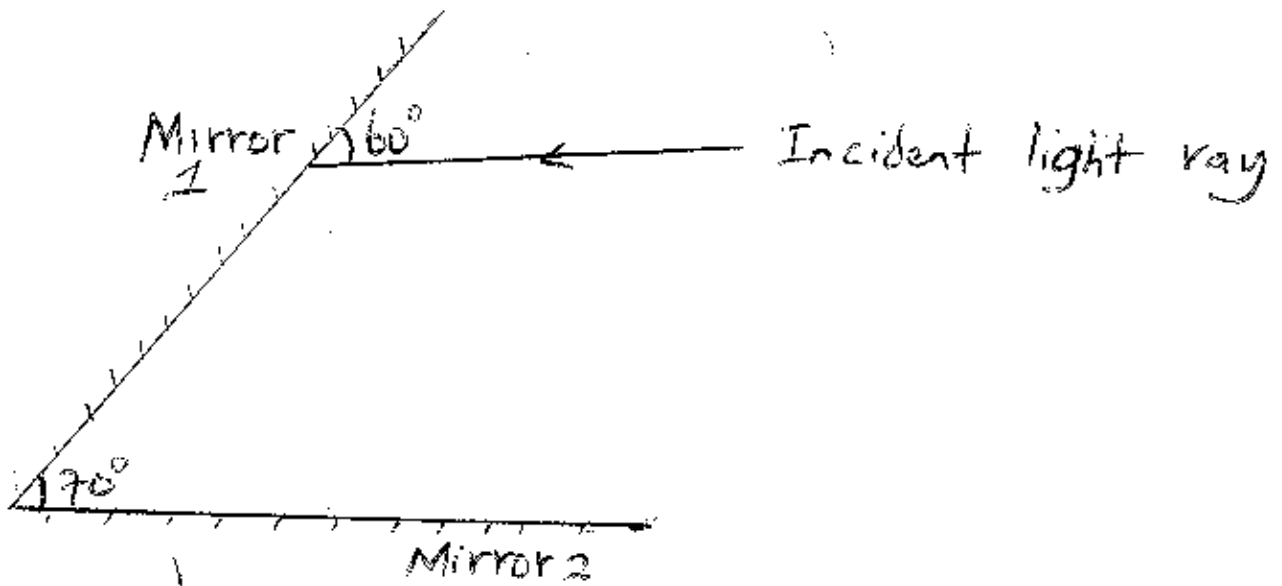
FOR EXAMINER'S USE ONLY:

SECTION	QUESTION	MAXIMUM SCORE	STUDENT'S SCORE
A	1 - 12	25	
	13	13	
B	14	10	
	15	12	
	16	9	
	17	11	
TOTAL SCORE		80	

SECTION A (25 MARKS)

Answer all the questions in this section in the spaces provided.

1. The figure 1 below shows a ray of Light incident on the surface of one plane mirror.



Sketch the path of the ray on the diagram after striking mirror 2 indicating all the angles. (2 marks)

2. An observer watching a fireworks displays sees the light from an explosion and hears the sound 4 seconds later. How far was the explosion from the observer (speed of sound in air = 330m/s. (2 marks)

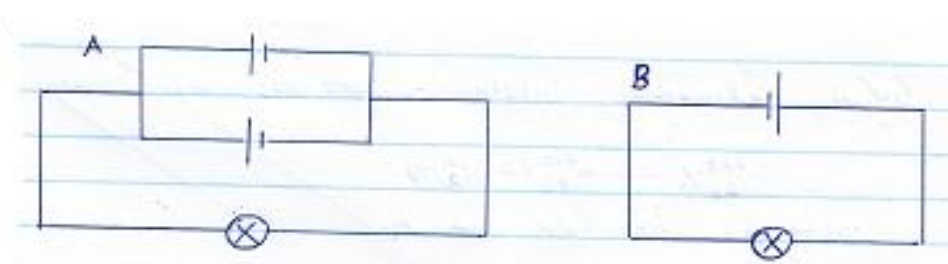
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3. In the circuit diagram shown in figure 2 below the lamps are identical and the cells are also identical.



State with a reason in which circuit the lamp will be lit for a longer period. (2 marks)

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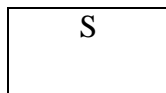
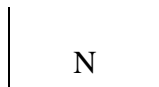
4. A bulb is rated 100W, 240V. Determine the amount current through the filament of the bulb. (2 marks)

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5. A negatively charged rod is brought near the cap of a leaf electroscope. The cap is then earthed momentarily by touching with the finger. Finally the rod is withdrawn. State the final charge on the electroscope. Explain your answer. (3 marks)

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.....
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6. Figure below show a wire carrying current whose direction is out of the paper. The wire is placed in a magnetic field.



(a). Indicate on the figure the direction of the force F , acting on the wire. (1 mark)

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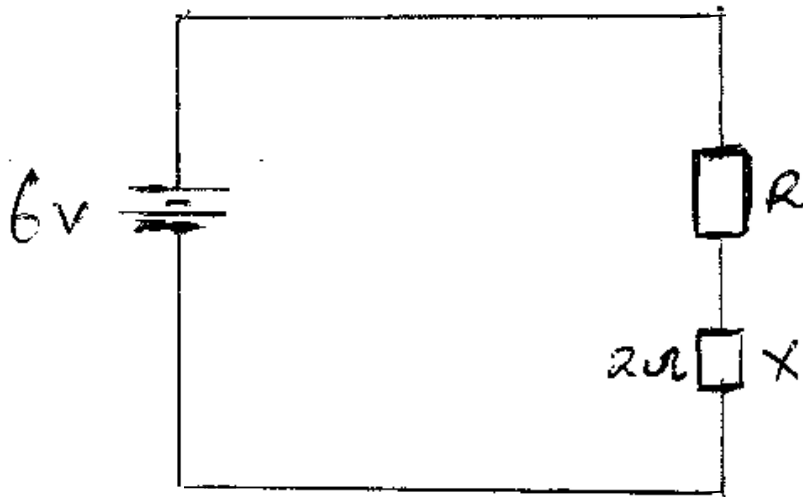
(b). State what would be observed on the wire if the direction of the current is reversed (i.e. into the paper). (1 mark)

.....

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7. The figure 4 below shows a device x connected in series with a resistor of resistance R, the voltage across x is 0.14v. .



Calculate the value of resistance R.

(3 marks)

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8. The Table below shows the type of radiation detection method and uses of electromagnetic radiations. Complete the table.

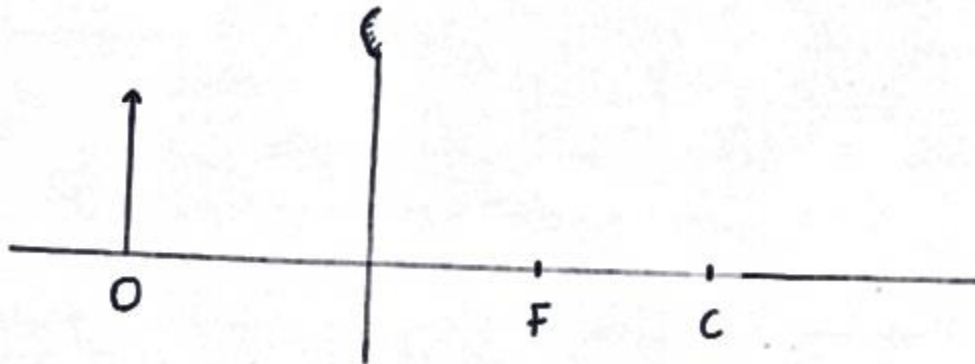
(1 mark)

Type of radiation	Detection	Use
	Blackened thermometer	warming

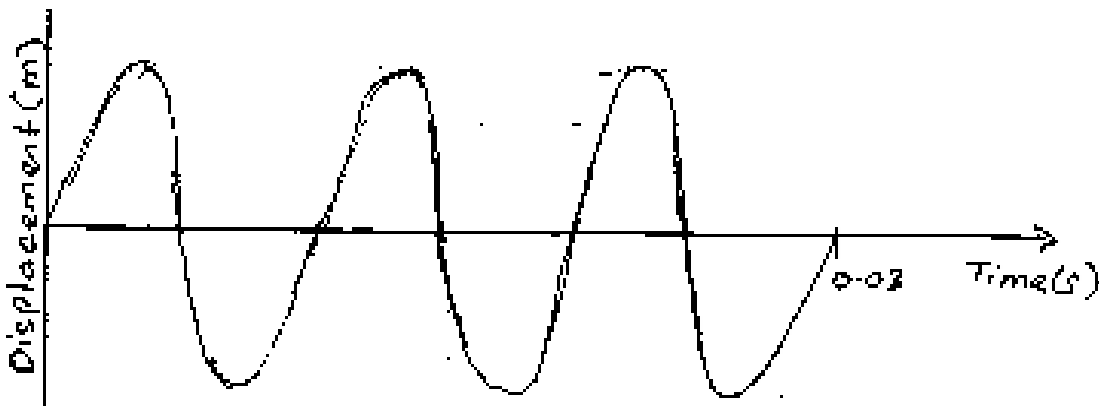
9. An object O is placed in front of a convex mirror as shown in the diagram below.

Complete the diagram to show the position of the image I.

(3 marks)



10. The sketch shown below is a displacement-time graph of a wave travelling at 320m/s.



Determine the wavelength of the wave.

(3 marks)

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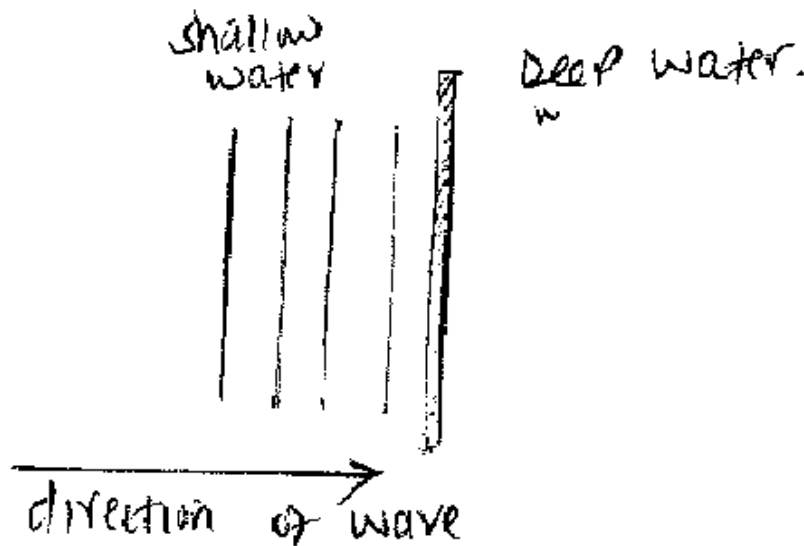
11. Give a reason why repulsion in magnetism is the surest way of testing polarity.

(1 mark)

.....

.....

12. The diagram below shows plane waves moving from shallow to deep end of a pond.



Complete the diagram to show the waves on the deep end.

(1 mark)

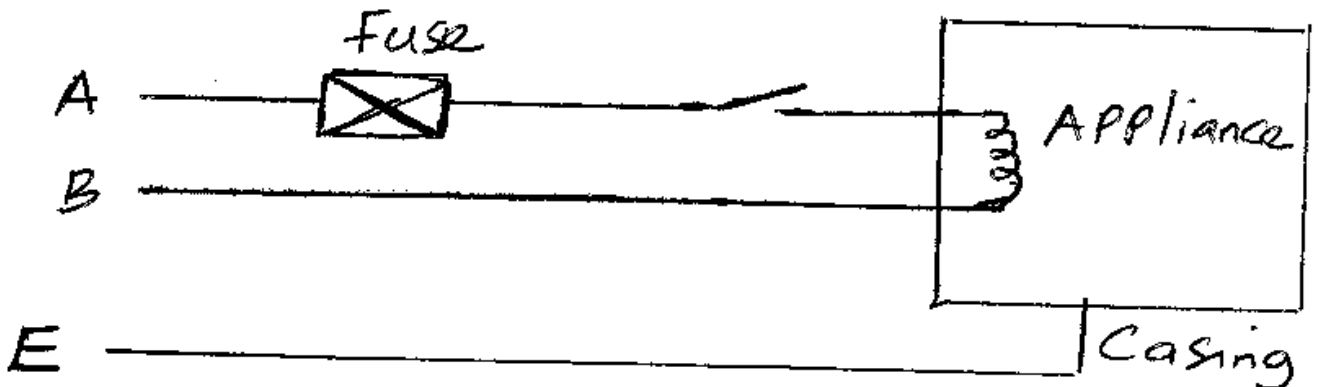
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SECTION B (55 MARKS)

Answer all questions in this section

13. (a). Figure 4 below shows a modern mains appliances



(i). Name wire A and B (2 marks)

A

B

(ii). State the purpose of Lead E (1 mark)

.....
.....

(iii). State the function of the fuse in the circuit. (1 mark)

.....
.....

(b). A heater is marked 3kW, 240V. The fuses available are marked 10A, 13A and 20A. Which fuse is most suitable? (2 marks)

.....
.....
.....

(c). Give a reason why power is transmitted at high voltage. (1 mark)

.....
.....

(d). A 2kW electric heater is used for 10 hrs. Calculate the cost of electricity if it costs sh.30 per unit. (3 marks).

.....
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.....

(e). A step down transformer has 600 turns in the primary coil. The input voltage is 120V while the output voltage is 24V. Determine the number of turns in the secondary coil. (2 marks)

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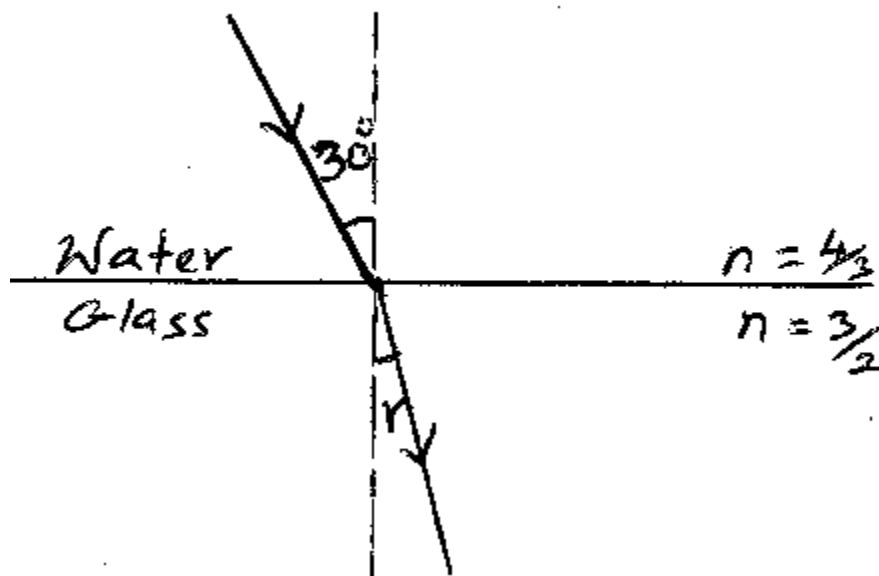
(f). State how energy lost through eddy currents is minimized in a transformer. (1 mark)

.....
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14. (a). State Snell's law. (1 mark)

.....
.....

(b). A ray of light travelling from water to glass makes an angle of incident of 30° as shown below.



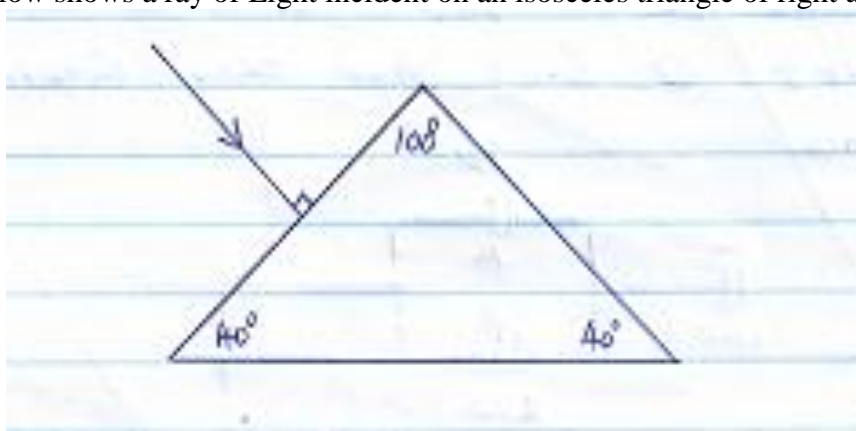
Determine the angle of refraction in the glass. (3 marks)
(Refractive index of water = $\frac{4}{3}$ and Refractive index of glass = $\frac{3}{2}$)

.....
.....
.....

(c). State the necessary and sufficient conditions for total internal reflection to occur. (2 marks)

.....
.....
.....

(d). The figure below shows a ray of Light incident on an isosceles triangle of right angle.



Complete the diagram to show how the ray travels through the Prism. Take the critical angle of the glass prism to be 39° . (2 marks)

(e). State two advantages of optical fibre when used in communication over ordinary copper wires. (2 marks)

.....

15. (a). Define work function (1 mark)

.....

(b). Name two factors that affect photoelectric effect. (2 marks)

.....

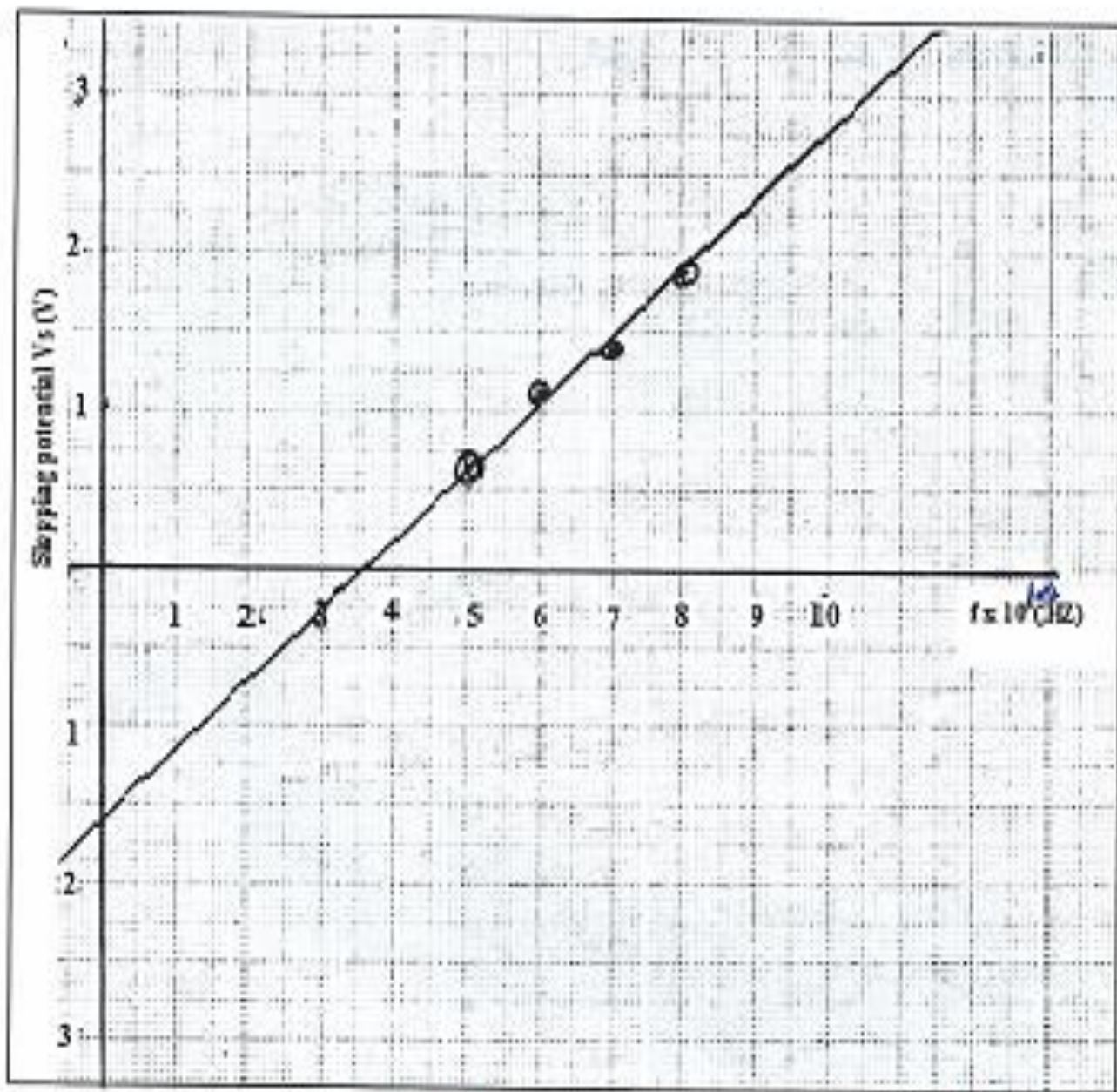
(c). The threshold frequency of sodium is 5.6×10^{14} Hz. Planck's constant 6.63×10^{-34} Js. **Find**

(i). Work function of sodium. (2 marks)

.....

(d). A certain metal is illuminated with radiation of different frequencies and corresponding stopping potential determined. The graph below shows how the stopping potential vary with frequency.

(Electronic charge, $e = 1.6 \times 10^{-19} \text{c}$)



Using the graph determining

(i). Threshold frequency.

(1 mark)

.....
.....
.....

(ii). Planks constant. (3 marks)

.....
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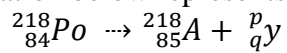
(iii). Work function of the metal. (3 marks)

.....
.....

16. (a). Distinguish between nuclear fusion and nuclear fission. (1 mark)

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.....

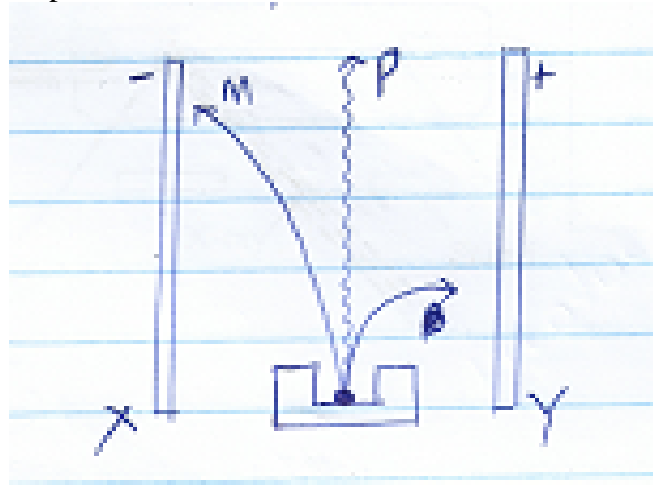
(b). The equation below represents a nuclear reaction



(i). Determine the values of P and q. (2 marks)

.....
.....
.....
.....

(c). The figure below represents diffusion of various radiations from a radioactive source S placed in an electric field between two plates X and Y (1 mark)



Identify the radiations marked with letters M and P. (2 marks)

M

P

(d). Given that 5g of cobalt-60 is kept in a laboratory and it has a half-life of 5 years. Determine the mass that will have decayed after 15 years. (3 marks)

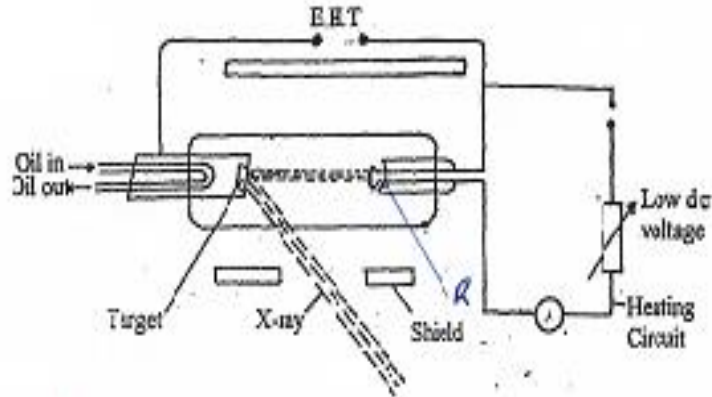
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17. The figure below represent the important parts of an x-ray tube used in an industry



(a). Name the part labelled R. (1 mark)

.....

(b). Name a suitable material used for the target, give reason for your answer. (2 marks)

.....

(c). State the reason why R is concaved in shape. (1 mark)

.....

(d). Explain how x-rays are produced in the x-ray tube. (3 marks)

.....

(e). Explain why the x-ray tube should be evacuated. (1 mark)

.....

(f). The shields are usually made from lead metal.

Explain why lead is the preferred material for shield.

(1 mark)

.....
.....
.....

(g). Explain the effect on the x-rays produced when:

(i). The magnitude of the extra-high tension. Voltage is increased.

(1 mark)

.....
.....

(ii). The ammeter reading is increased.

(1 mark)

.....
.....

Name: Adm No:
School: Class:
Signature: Date:

PHYSICS (232/2)
FORM FOUR (4)
Time: 2 Hours

KCSE TOP PREDICTION MASTER CYCLE 5

Instruction to Candidates

- (a) Write your name, 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) Silent non-programmable electronic calculators may be used.
- (g) Candidates should answer the questions in English.

For Examiners Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 – 11	25	
B	12	12	
	13	12	
	14	12	
	15	9	
	16	10	
Total Score		80	

This paper consists of 12 printed pages, candidate should check the questions to ascertain that all pages are printed as indicated and that no questions are missing

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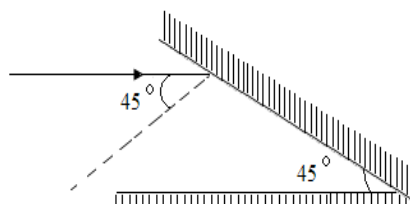
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SECTION A 25 MARKS

Answer all the questions in the spaces provided.

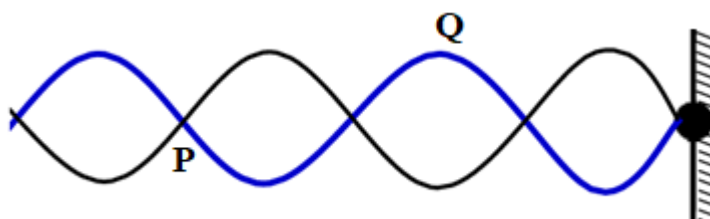
1. The figure below shows a ray of light incident on a mirror at an angle of 45° . Another mirror is placed at an angle of 45° to the first one as shown. Sketch the path of the ray until it emerges. **(2 marks)**



2. State any two ways of reducing the magnetic force of attraction of a magnet **(2 marks)**

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3. The figure below shows a transverse stationary wave along a string.

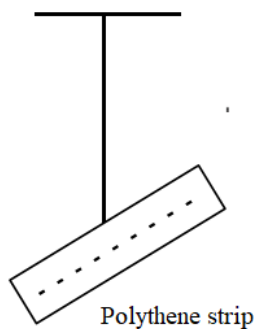
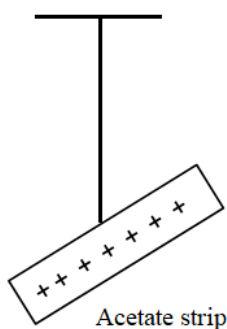


Name P and Q and explain how each is formed.

(3 marks)

.....
.....
.....

4. The diagrams below show a positively charged acetate strip and a negatively charged polythene strip freely suspended and isolated.

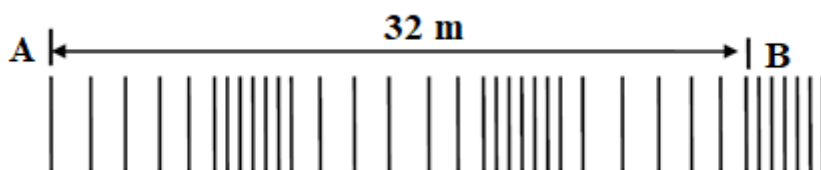


Two rods X and Y are brought up in turn to these strips. X attracts the acetate strip but repels the polythene strip. Rod Y does not repel either the acetate or the polythene. State the type of charge on each rod.

X (1 mark)

Y (1 mark)

5. The diagram below shows waves generated from a tuning fork. If the wave takes 0.1 second to move from point A to B, determine the frequency of the wave. (4 marks)



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6. Name two detectors of microwave (2 marks)

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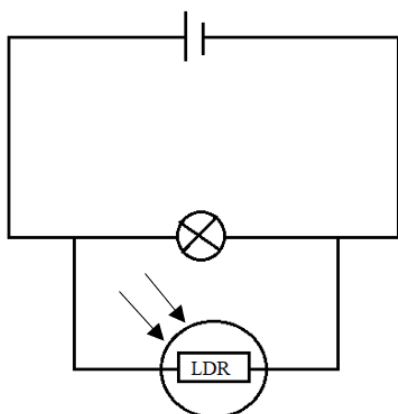
7. Other than current state two other factors that affect the magnitude of force on a current carrying conductor placed in a magnetic field. **(2 marks)**

.....
.....

8. Give a reason why a concave mirror is not preferred as a driving mirror. **(1 mark)**

.....
.....

9. A student connected the set up below in the laboratory. Explain the observation made on the bulb when the set-up below is taken to a dark room **(2 marks)**

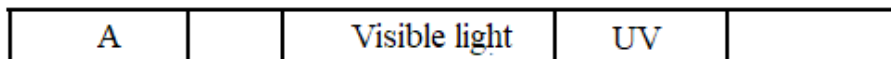


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10. A person standing 110 m from the foot of a cliff claps his hands and hears a sound 0.75 seconds later. Find the speed of sound in air. **(3 marks)**

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11. The figure below is part of electromagnetic spectrum.



Identify radiation A and state its source.

(2 marks)

.....

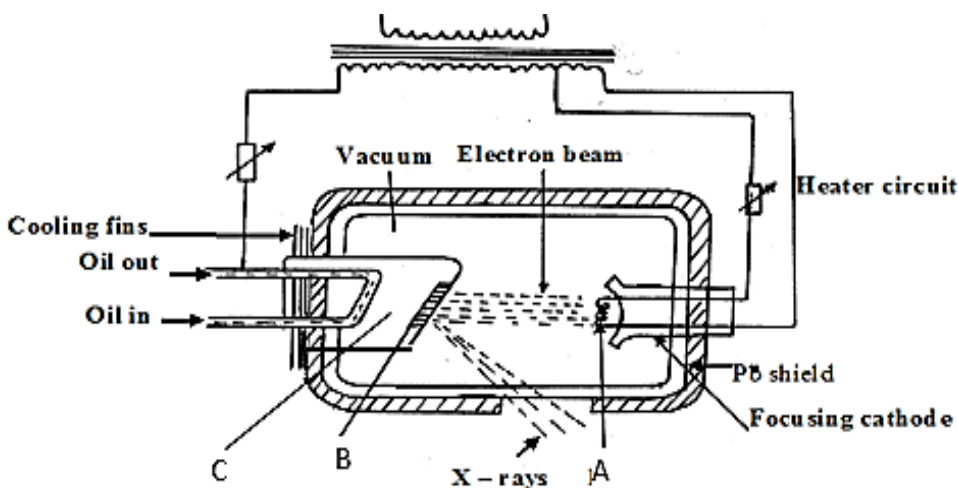
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SECTION B 55 MARKS

Answer all the questions in this section in the spaces provided.

12. (a) The figure below shows a X-ray tube.



(i) Name the part labelled C

(1 mark)

.....

(ii) State the property of the material labelled B on the diagram which makes it suitable for use in the X-ray tube.

(1 marks)

.....

.....

(iii) Why is C inclined at an angle of 45°?

(1 mark)

.....

.....

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(iv) State the adjustment that can be made to vary

I. The quality of X-rays

(1 mark)

.....
.....

II. The quantity of the X-rays.

(1 mark)

.....
.....

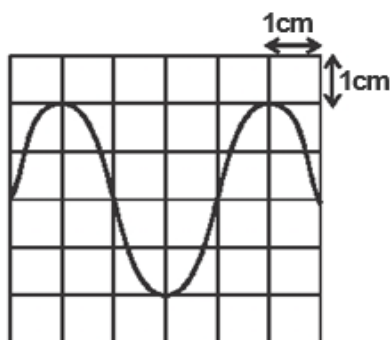
(v) An x-ray tube has an accelerating potential of 100KV. Determine the maximum frequency of the x-rays produced.

(Plank's constant = $6.63 \times 10^{-34} \text{ Js}$, $e = 1.6 \times 10^{-19} \text{ C}$)

(3 marks)

.....
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.....

(b) In a CRO, waveform given below was displayed on the screen when the sensitivity at the Y plate was 10V/cm and time base set at 20 milliseconds/cm.



Determine:

(i) peak voltage

(2 marks)

.....
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(ii) frequency of the signal

(2 marks)

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13. a) ${}^{88}_{226}\text{Ra}$ decays into ${}^{86}_{222}\text{Rn}$ by emission of an alpha particle. Write a nuclear equation for the decay (1 marks)

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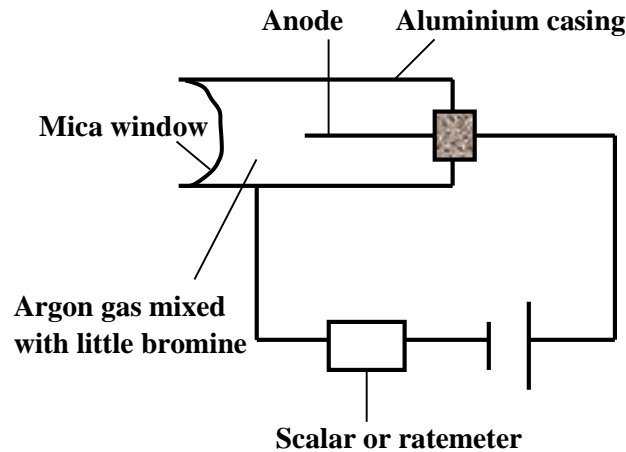
b) i) What do you understand by the term half-life of a radioactive substance? (1 mark)

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ii) A G.M tube registers 20 counts. When a radioactive source is brought close to it, it registers 3220 counts and 120 counts 30 hours later. What is the half-life of this substance? (3 marks)

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c) The figure below shows a G.M tube.



i) What is the purpose of the mica window? (1 mark)

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ii) Explain the purpose of the bromine (2 mark)

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iii) Why should argon gas be kept at low pressure (1 mark)

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iv) What is meant by the term “dead time” as used in GM tube (1 mark)

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v) Briefly explain how GM tube works.

(2 marks)

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14. (a) State the Ohm's Law

(1 mark)

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(b) You are provided a rheostat, 2 cells, a voltmeter, an ammeter, a switch and a fixed resistor.

i) Draw a circuit diagram that can be used to verify Ohm's law.

(2 marks)

ii) Describe how the above set up can be used to determine Ohms law.

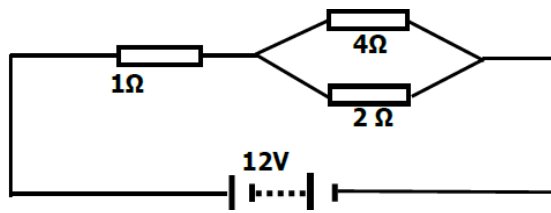
(4 marks)

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(b) Study the circuit diagram below and answer the questions that follow.



Calculate

- (i) Determine the total resistance in the circuit. *(2 marks)*

.....
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- (ii) The current through the 4Ω resistor *(3 marks)*

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15. a) State Snell's law *(1 mark)*

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b) A ray of light travelling from water to glass makes an angle of incident of 30° . Find the angle of refraction in the glass. Refractive index of water = $\frac{4}{3}$. Refractive index of glass = $\frac{3}{2}$ **(3 marks)**

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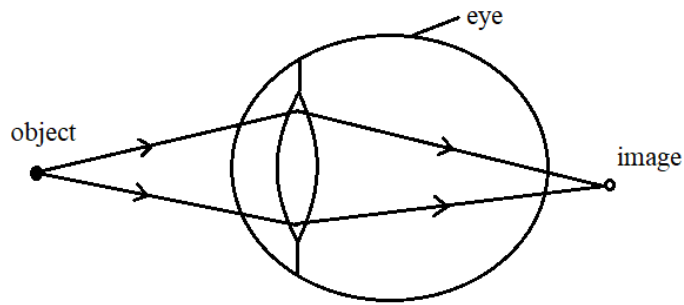
c) State the necessary and sufficient conditions for total internal reflection to occur. **(2 marks)**

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d) The figure below shows a human eye defect.



(i) State one possible cause of this defect. **(1 mark)**

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(ii) On the diagram, show how the defect is corrected. (2 mark)

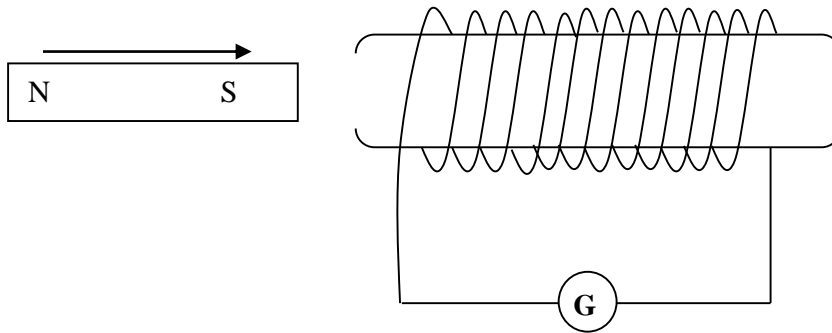
16. (a) State the Lenz's law of electromagnetic induction. (1 mark)

.....

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.....

(b) A bar magnet is moved into a coil of an insulated copper wire connected to a zero centre galvanometer as shown below



(i) Show on the figure above the direction of the induced current in the coil (1 mark)

(ii) State and explain what is observed on the galvanometer when the south pole of the magnet is moved into and then withdrawn from the coil. (2 marks)

.....

.....

.....

(c) A transformer has 800 turns in the primary and 40 turns in the secondary winding. The alternating voltage connected to the primary is 240V and current of 0.5.A. If 10% of the power is dissipated as heat within the transformer, determine the current in the secondary coil.

(3 marks)

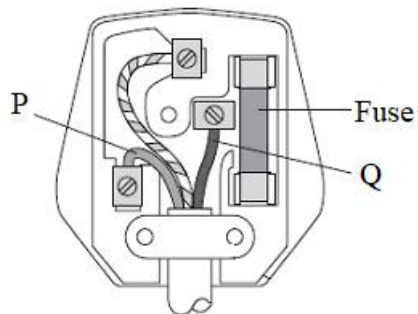
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(d) The diagram below shows a three-pin plug.



(i) Name the colour of conductors P and Q (2 marks)

P.....

Q.....

(ii) Why is the earth pin longer than the rest in the three-pin plug shown above? (1 mark)

.....
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Name: Adm No:
School: Class:
Signature: Date:

PHYSICS (232/2)
FORM FOUR (4)
PAPER 2
Time: 2 Hours

KCSE TOP PREDICTION MASTER CYCLE 6

Instructions to candidates

- (a) Write your name, index number in the spaces provided above.
- (b) Sign and write the date of the examination in the spaces provided
- (c) This paper consists of **TWO** Sections: **A** and **B**.
- (d) Answer **ALL** the questions in section **A** and **B** in the spaces provided.
- (e) All working **MUST** be clearly shown.
- (f) KNEC mathematical tables and silent non-programmable electronic calculators may be used.
- (g) **This paper consists of 13 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**
- (i) **Candidates should answer the questions in English**

For examiners use only

Section	Question	Maximum score	Candidates score
A	1-15	25	
B	16	11	
	17	11	
	18	10	
	19	11	
	20	12	
TOTAL SCORE		80	

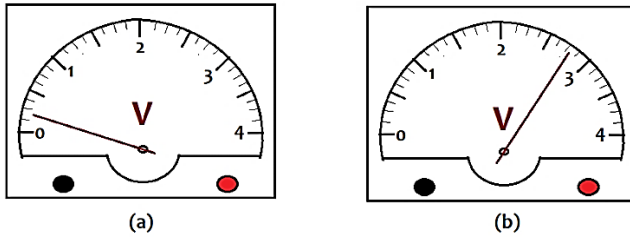
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Section A (25 marks)

1. The fig. 1 below shows a voltmeter before and after use to take the emf of a cell.



Record the value of emf of the cell.

(2 marks)

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2. The chart below shows an arrangement of different parts of the electromagnetic spectrum.

Radio wave	A	B	Visible light	C	D	Gamma Rays
------------	---	---	---------------	---	---	------------

(i) Name the radiation represented by C.

(1 mark)

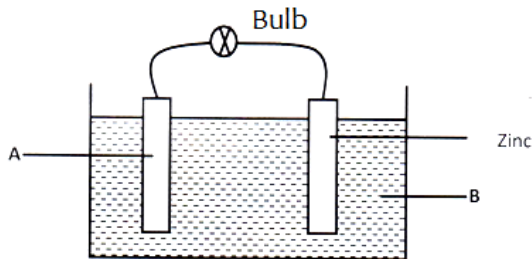
.....

(ii) Name a device that can be used to detect radiation A.

(1 mark)

.....

3. Figure 2 below shows a set-up of a simple cell.



(a) Name the material used in part A

(1 marks)

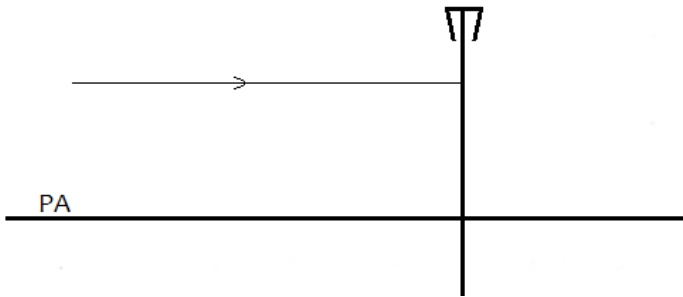
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(b) Name the electrolyte B.

(1 mark)

.....

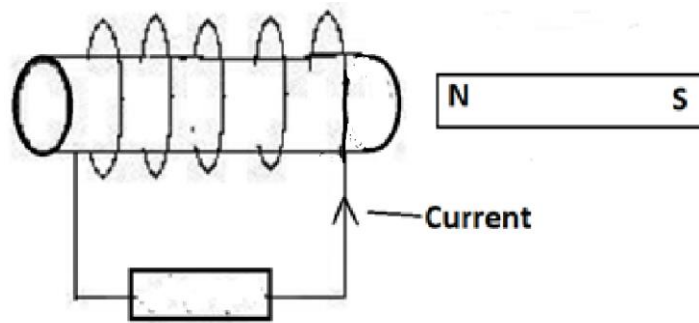
4. The fig. 3 below shows a ray incident to a concave lens.



Draw on the diagram to show the resulting ray.

(1mark)

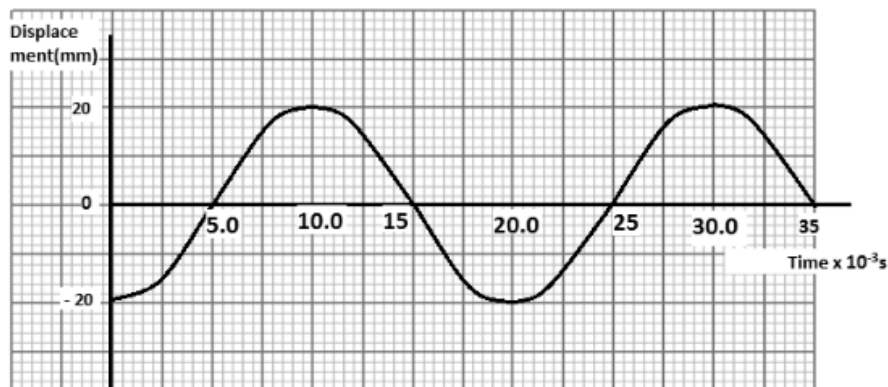
5. The figure 4 below shows a magnet and a solenoid in relative motion.



If the current shown was induced current indicate the motion of the magnet.

(1mark)

6. Figure 5 represents a displacement – time graph for a wave.



Determine the frequency of the wave.

(2 marks)

.....
.....

7. State the reasons for the following in the filament bulb:

a) Inside is filled with inert gas at low pressure.

(1 mark)

.....

b) The filament is coiled.

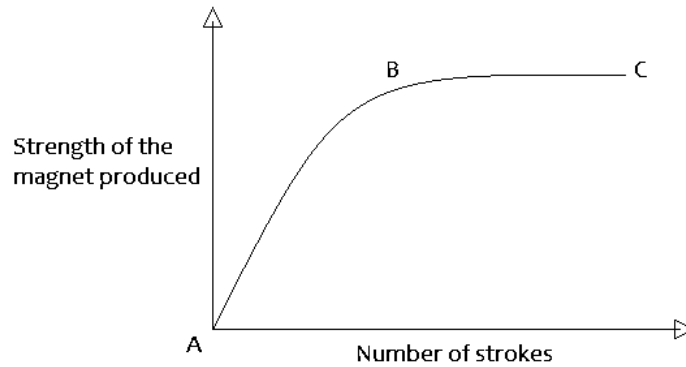
(1 mark)

.....

8. A girl standing at a distance claps her hands and hears an echo from a tall building 2 seconds later. If the speed of sound in air is 340m/s, determine how far the building is. *(3 marks)*

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9. In an experiment to magnetize an iron bar by single stroke method, the graph below was plotted.



Explain what is happening between points AB and BC. (2marks)

AB

.....

BC

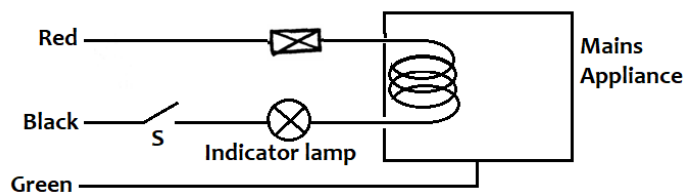
.....

10. State two ways of confirming that an accumulator is fully charged. (2marks)

.....

.....

11. The fig. 6 below shows an electrical appliance with leads labelled Red, Black and Green.

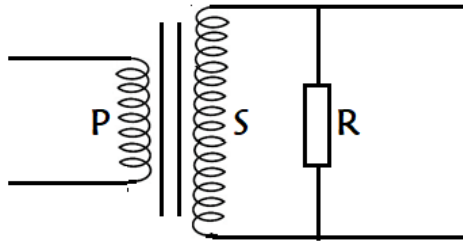


Identify one mistake in the connection.

(1 mark)

.....
.....

12. Figure 7 below shows a perfectly efficient transformer. The number of turns in the secondary coil S is six times that of the primary coil P.



If a supply voltage of 4V d.c is connected across P, state with reason what happens to the voltage across R (2 marks).

.....
.....

13. Explain what is meant by radioactive decay.

(1 mark)

.....
.....
.....

14. A part from the field, state two ways of increasing the magnitude of current generated.

(2 marks)

.....
.....

15. State one structural difference between a.c and d.c generators. (1 mark)

.....
.....

Section B (55 marks)

16. a. State one application of each of the following. (2marks)

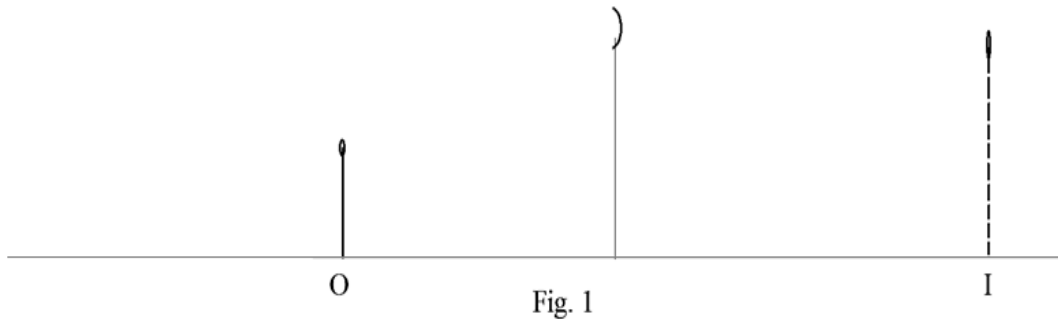
i. Convex mirror

.....

ii. Parabolic mirror

.....

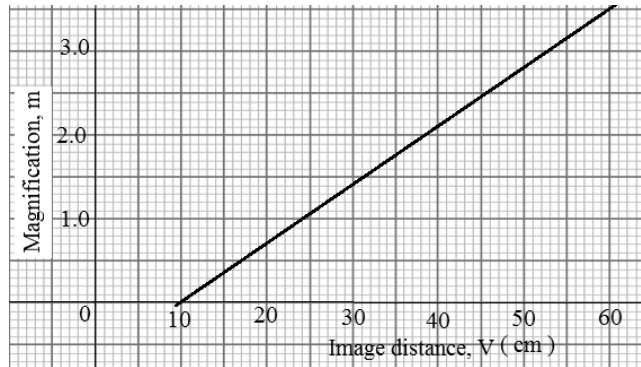
b. Fig. 9, which is drawn to a scale of 1:5, represents an object O and its image 'I' formed by a concave mirror.



By drawing suitable rays, locate and mark on the figure the position of the principal focus 'F' of the mirror. Determine the focal length f . (3 marks)

.....
.....

c. The graph in Fig. 10 shows the variation of magnification, M with image distance, V for a concave mirror.



Determine:

I. The object position when the image position is 45cm. **(3marks)**

.....

.....

.....

II. The focal length of the mirror. **(1mark)**

.....

.....

d) state two reasons why a concave mirror is used as a doctor's dental mirror. **(2 marks)**

.....

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17. (a) State **two** factors that determine the capacitance of a parallel plate capacitor. *(2marks)*

.....
.....
.....

(c) A $5\mu\text{F}$ capacitor is charged to a potential difference of 200V and isolated. It is then connected to a $10\mu\text{F}$ capacitor.

Find ;

(i) The resultant potential difference across the combination *(3marks)*

.....
.....
.....

(ii) Energy stored before connection *(3marks)*

.....
.....
.....

(iii) Total energy in the capacitors after connection. *(2marks)*

.....
.....
.....

(c) Give two applications of capacitors

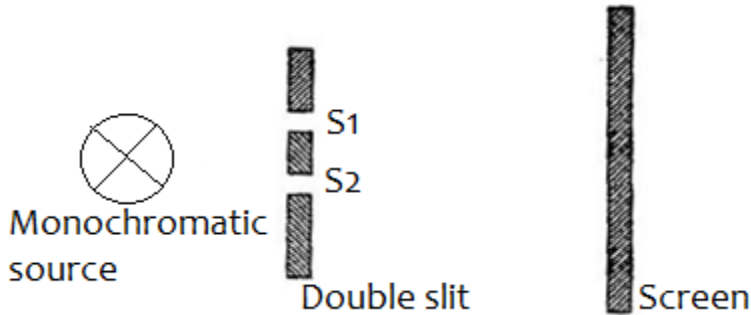
(2 marks)

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18. a) In an experiment to observe interference of light waves a double slit is placed close to the source. See figure 12



(i) What is a monochromatic source of light.

(1 mark)

.....

.....

(ii) State the function of the double slit

(1 mark)

.....

.....

(iii) Describe what is observed on the screen (1marks)

.....
.....
.....

(iii) State what is observed on the screen when
I. The slit separation S_1S_2 is reduced (1 mark)

.....
.....

II. White light source is used in place of monochromatic source (1 mark)

.....
.....

b) During physics lesson, the teacher noticed that Joe had to sit behind in order to see the writings on the board clearly.

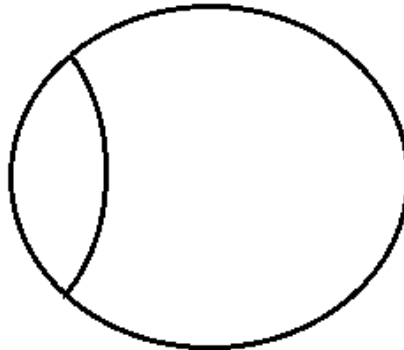
I. Name the eye defect experienced by Joe. (1 mark)

.....

II. State one possible cause of the defect. (1 mark)

.....
.....

- III. On the diagram in fig 11 below, draw to show how the defect can be corrected by use of a lens. (3 marks)



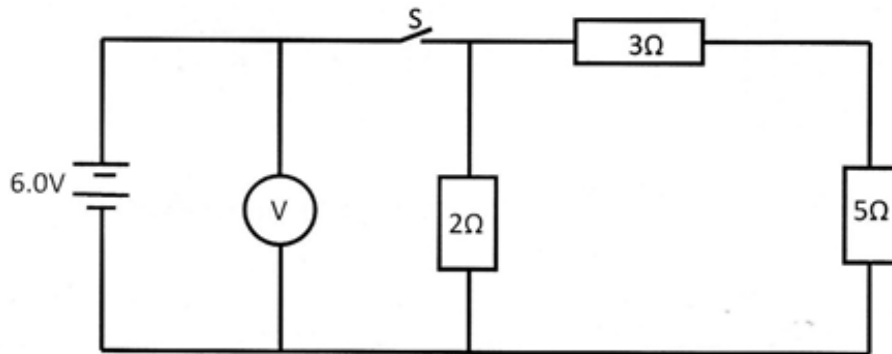
19. (a) Distinguish between an ohmic and non-ohmic conductors. (1 mark)

.....

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- (b) Figure 16 shows a circuit with resistors and voltmeter connected to a battery



i). If each cell has an internal resistance of 0.7Ω , determine the total resistance in the circuit. *(3 marks)*

.....
.....
.....

ii). Calculate the value of current flowing through the 3Ω resistor when the switch is closed? *(2 marks)*

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.....

iii). What is the reading of the voltmeter when the switch S is
I. Open *(1 mark)*

.....

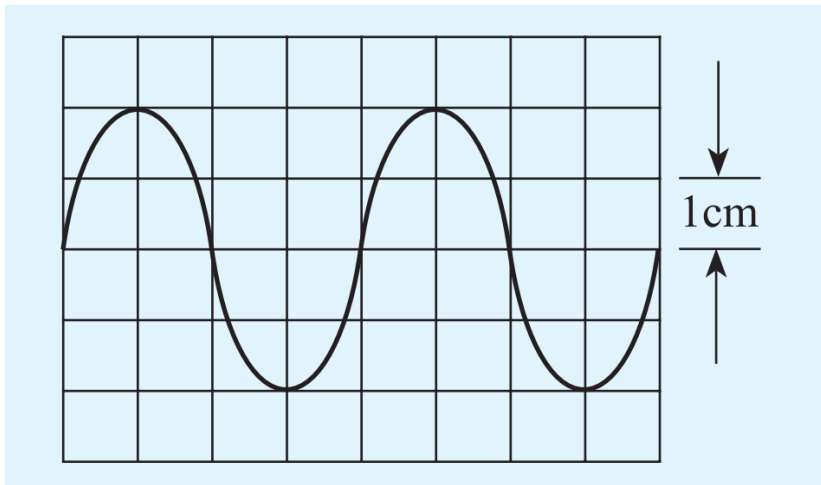
II. Closed *(3 mark)*

.....
.....
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iv). Account for the difference between the answers in (I) and (II) above *(1 mark)*

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20. (a) The figure below shows a waveform on a CRO screen: Given that the Y-gain control is set at 20 V/cm and the time-base set to 10 ms/ cm,



Calculate the:

(i) Periodic time of the wave. (2 marks)

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.....

.....

(ii) Frequency of the wave. (2 marks)

.....

.....

.....

(iii) Peak voltage (2 marks)

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.....

.....

(b) Calculate the frequency of X-rays produced by an X-ray tube operating at 20 kV, assuming that no energy is dissipated as heat. (Planck's constant $h = 6.63 \times 10^{-34}$ Js, and the electronic charge is 1.6×10^{-19} C) (3 marks)

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(c) Calculate the energy of photons associated with radiation of frequency 4.8×10^{14} Hz, stating your answer in eV (3 marks)

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THE LAST PRINTED PAGE

NAME..... ADM NO

SCHOOL.....CLASS.....SIGN.....

DATE.....

231/2

PHYSICS

PAPER 2

TIME: 2 hours

KCSE 2023 TOP PREDICTION MASTER CYCLE 7

Kenya Certificate of Secondary Education (K.C.S.E)

232/2

PHYSICS

PAPER 2

TIME: 2½ Hours

Instruction to The Candidates

- Write your **name** and **ADM 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**.
- There are 14 printed pages, with 18 questions check to confirm that your paper is complete.
- Answer **all** the questions in sections **A** and **B** in the spaces provided.
- All working must be clearly shown in the spaces provided.
- Mathematical tables and electronic calculators **may be** used.

For Examiners Use Only

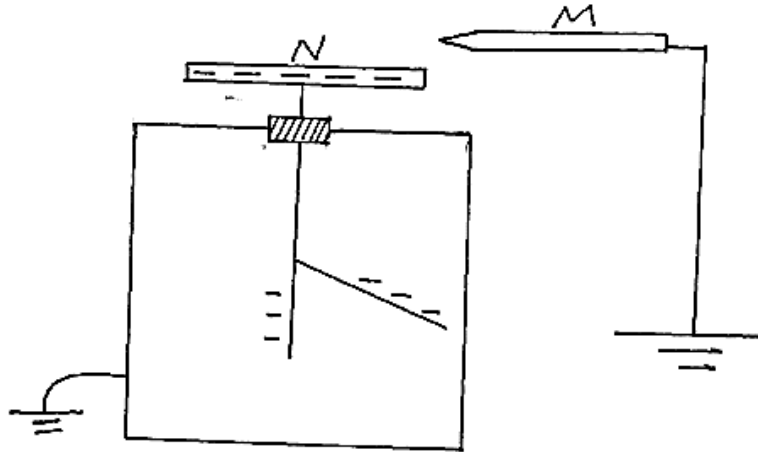
Section	Question	Total Score	Candidates Score
A	1-13	25	
B	14	8	
	15	9	
	16	11	
	17	14	
	18	13	
Total		80	

SECTION I (25 MARKS)

1. State the number of images formed when three objects are placed between two plane mirrors which parallel to each other. (1mk)

.....

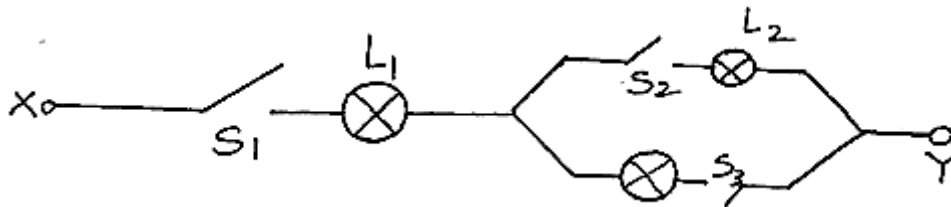
2. The figure shows a highly negatively charged electroscope. A pointed pin M which is earthed is brought closer to the metal cap N as shown.



State and explain the observations that will be made. (3mks)

.....

3. The figure below shows an electric circuit. S_1 , S_2 and S_3 are switches and L_1, L_2 and L_3 are lamps. A constant potential difference is applied across X and Y.



- i) Other than L_1 state the lamp that will light when S_1 and S_2 are closed. (1mk)

.....

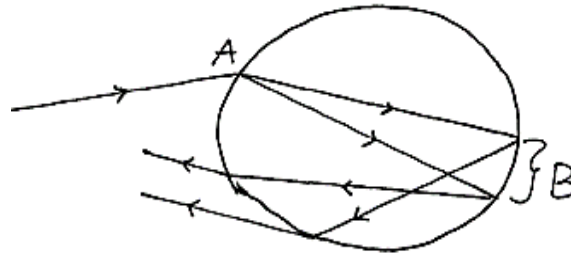
- ii) How does the brightness in L_1 in (i) above compared with its brightness when all the switches are closed. (1mk)

4. One method of magnetization is by single stroking. State the disadvantage of this method. (1mk)

.....

 5) A pendulum bob takes 0.5seconds to move from its mean position to maximum displacement.
 Calculate its frequency. (2mks)

6. The figure below shows part of a rainbow.



State what happens at part

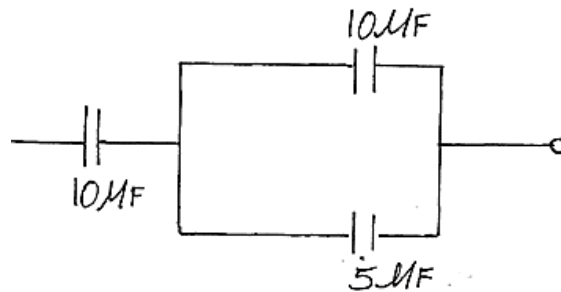
A (1mk)

B (1mk)

7. State one factor that affects resistance of metal conductor other than temperature. (1mk)

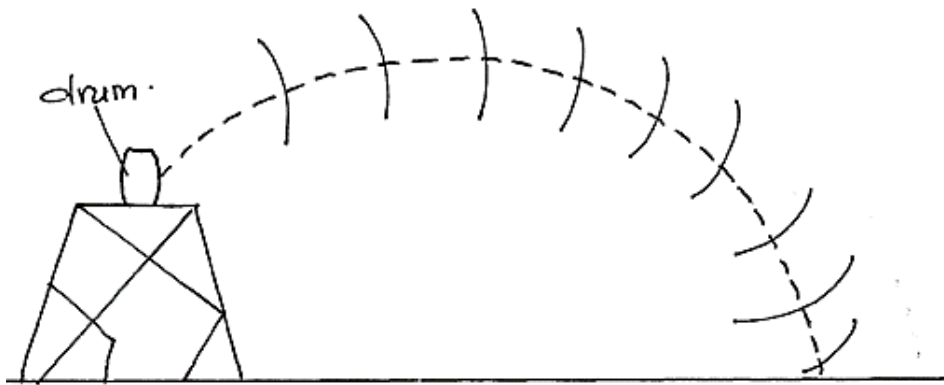
.....

8. The figure shown a network of three capacitors



Determine the effective capacitance. (2mks)

9. The figure shows sound waves emitted by a drum stick.



Explain way the wave fronts are directed to the ground

(2mks)

.....

.....

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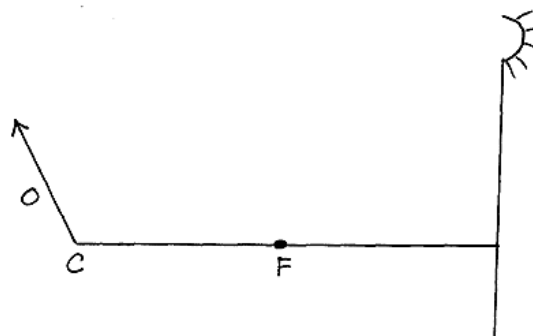
10. Write a nuclear equation of a radioactive cobalt ${}_{26}^{60}\text{Co}$ which undergoes a β decay to form element W. (2mks)

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.....

11. The figure below show an object O placed in front of concave mirror.



On the same figure construct a ray diagram to locate the image of the object.

(3mks)

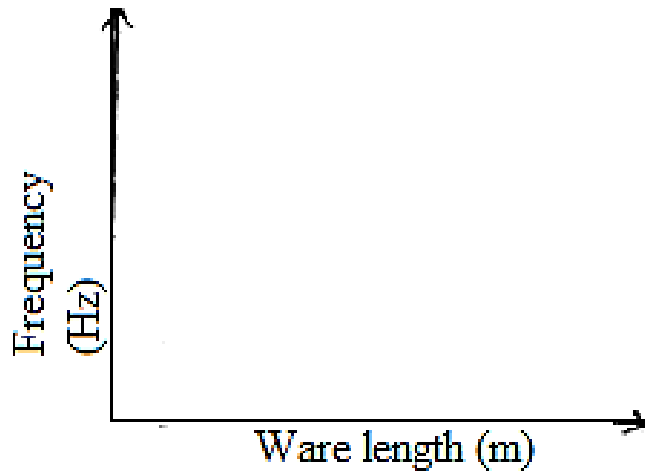
- 12.a) State one property common to all electromagnetic waves.

(1mk)

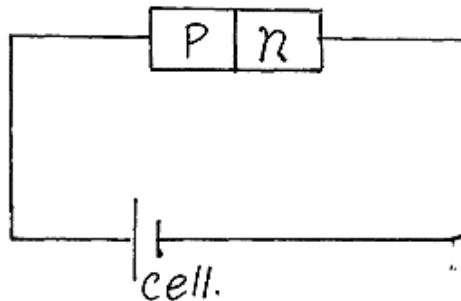
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- b) On the axis provided, sketch a frequency wavelength graph for electromagnetic waves. (1mk)



13.a) The figure below shows a p-n junction connected to a cell.

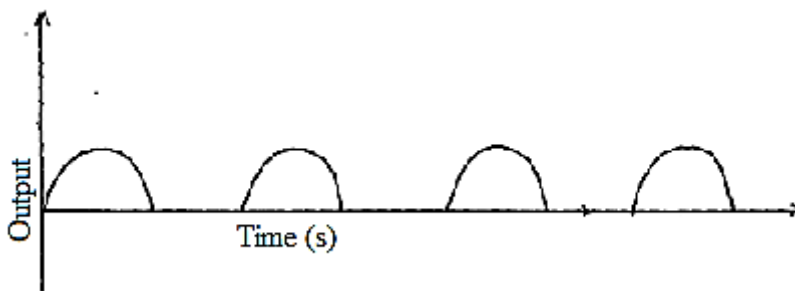


What type of biasing will occur if the terminals of the cell are interchanged (1mk)

.....

.....

b) The graph below shows the output obtained with time during rectification process



State the number of diode used in this process. (1mk)

.....

.....

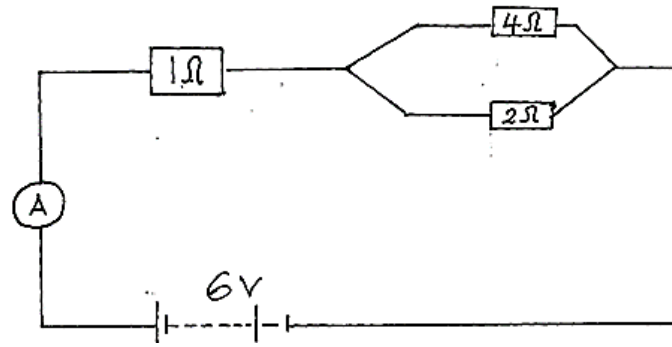
SECTION II (55 MARKS)

Answer all the question in the space provided

14.a) State Ohm's law (1mk)

.....
.....

b) Study the circuit diagram below and answer the question that follows.



Calculate

i) The effective resistance (2mks)

ii) Current flowing through the ammeter (2mks)

iii) Current flowing through the 4Ω resistor. (3mks)

15.a) State one use of echoes (1mk)

.....

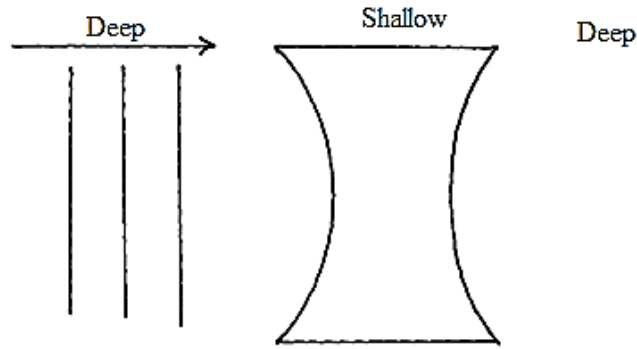
b) Explain why there is gradual decrease in amplitude of a progressive wave (1mrk)

.....

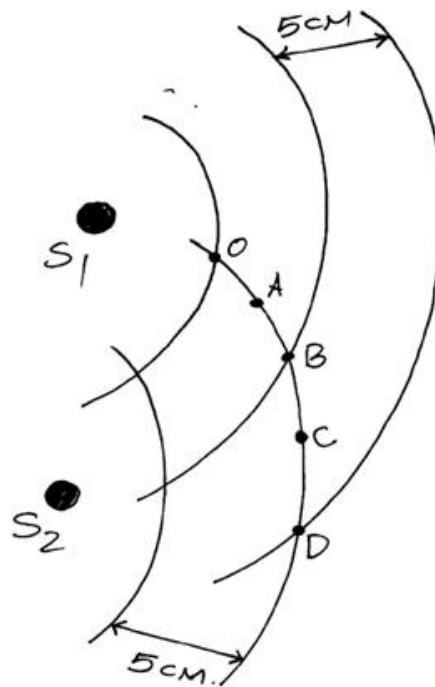
c)i) Distinguish between Refraction and reflection of waves (1mk)

.....
.....
.....

- ii) In the figure below complete the diagram to show how plane wave move in the shallow and deep region there after (2mks)



- iii) The figure below shows how water wave interferes in a ripple tank. The amplitude and wavelength of each wave is 8cm and 5cm respectively.



Determine the amplitude of the water wave at point

- A (1mk)
 B (1mk)

- iv) If the Vibrator at S_1 and S_2 in part (iii) above produce coherent waves of frequency 40Hz, determine the speed of the water wave. (2mks)

16.a) Determine the term principal focus for a convex lens. (1mk)

.....
.....

b) A certain student accommodates objects situated at a distance greater than 80.0cm from the eye.

i) Define the term accommodation in reference to eye vision. (1mk)

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.....

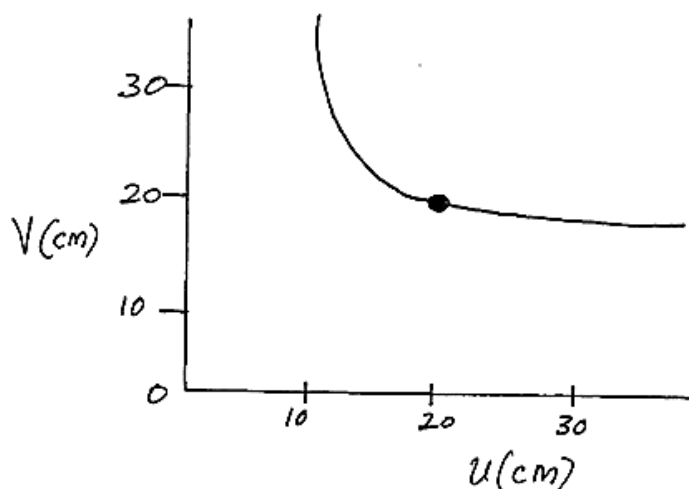
ii) State with a reason this type of eye defect (2mks)

.....
.....

iii) Identify the type of lens that would enable the student to see. (1mk)

.....
.....

c) The graph below is a plot of image distance (v) against object distance (u) for a convex lens.



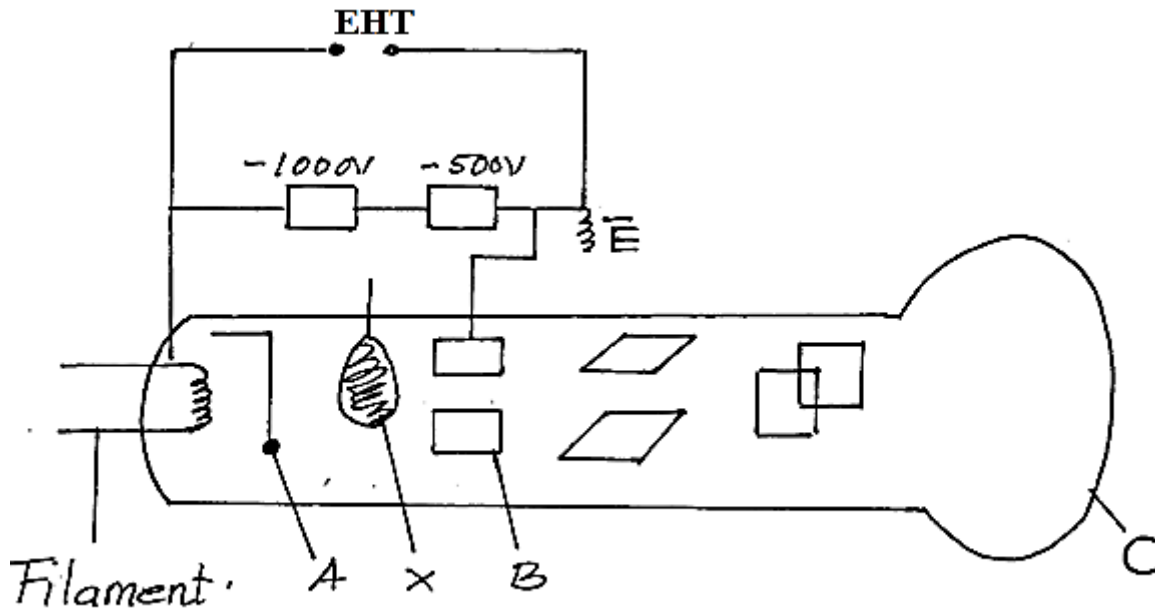
From the graph determine the focal length of the convex lens. (2mks)

d) An object of height 4cm is placed 2cm from a diverging lens of focal length 3cm calculate:

i) The image distance. (2mks)

ii) The height of the image (2mks)

17.a) The figure below shows a cathode ray oscilloscope (CRO)



i) State the function of the component labeled: (3mks)

- A
- B
- C

ii) What would be the effect on the CRO if the temperature of the filament of the electron gun was raised. (1mk)

.....

iii) Name and state the function of the part labeled X. (2mks)

.....

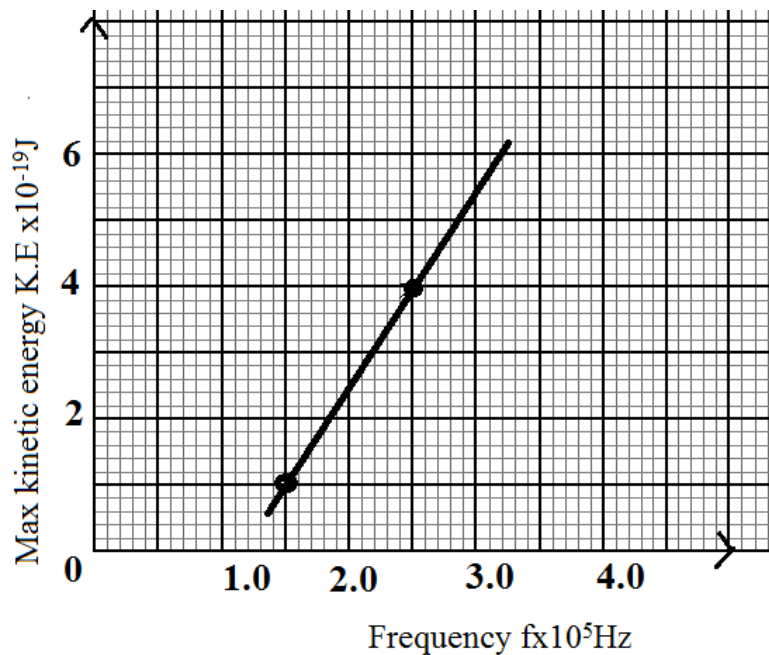
b) Apart from thermionic emission name the other method of emitting electrons from a metal surface. (1mk)

.....

c) State two factors that affect photoelectric effect on a metal surface. (2mks)

.....

d) The graph below shows how kinetic energy varies with frequency f in an experiment using a photocell.



Given the $k.e \text{ max} = hf - \phi$ determine from the graph :

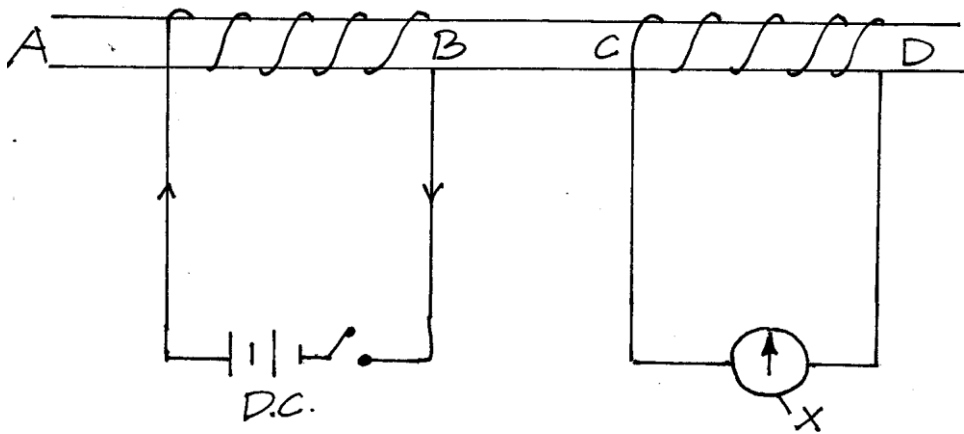
i) Plank constant h (3mks)

ii) The Constant \emptyset (2mks)

18.a) State the Lenz's law of electromagnetic induction. (1mk)

.....
.....

b) The figure below shows two coil connected using a soft iron core



i) Name the part labeled X (1mk)

.....

ii) State and explain what happens when the switch is closed (3mks)

.....
.....
.....

ii) State the observation made on X when the D.C supply is replaced with A.C (1mk)

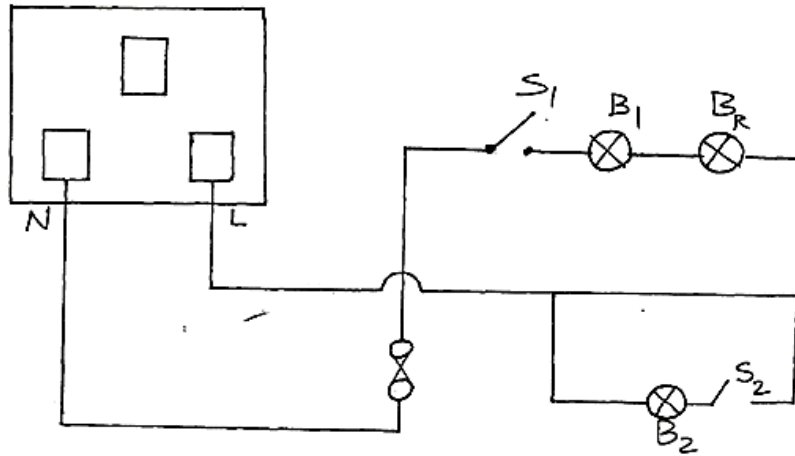
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c) A generator produces 250kW is connected to a factory by a cable which has a total resistance of 10Ω . Determine the voltage at which the generator produces power if the maximum current in the cable is 8.0A (2mks)

d)i) State two ways through which power loss is minimized in a transmission cables. (2mks)

.....
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ii) The figure below shows part of a wiring circuit for a house.



Identify three faults made in the wiring. (3mks)

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THIS IS THE LAST PRINTED PAGE!

232/2
PHYSICS
PAPER 2
Time: 2 HRS

KCSE 2023 TOP PREDICTION MASTER CYCLE
8

NAME _____ ADMNO _____

SIGNATURE _____ DATE _____ CLASS _____

Instructions

- ✓ Write your name, index number and name of your school in the spaces provided above.
- ✓ This paper consists of two sections, section I and II. Answer all the questions in both sections.
- ✓ Mathematical tables and silent non – programmable calculators may be used.
- ✓ This paper consist of 12 printed pages. Ensure all the pages are printed.

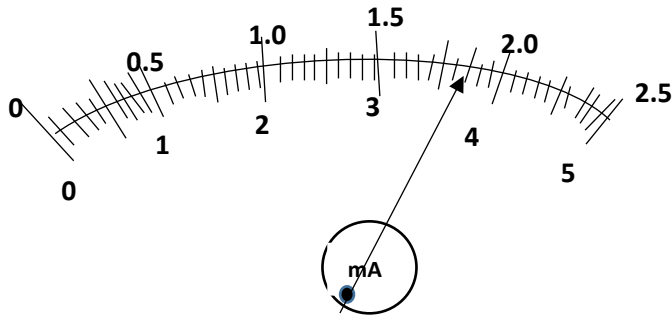
For examiners' use only

section	Question	Maximum score	Candidate's score
I	1 – 11	25	
II	12	11	
	13	11	
	14	11	
	15	12	
	16	10	
Total		80	

Section I (25 marks)

Answer all the questions in this section

1. What is the reading shown by the pointer in the figure below, if the full scale range is;



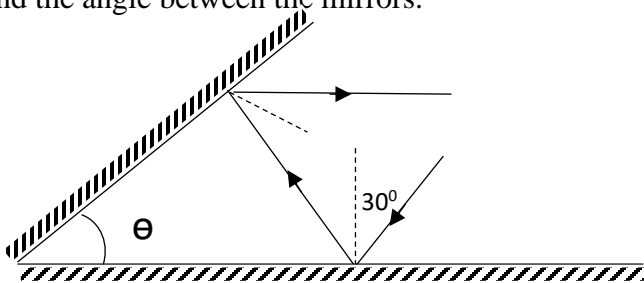
- a) 0 - 2.5 (1 mark)

.....

- b) 0 - 5 (1 mark)

.....

2. The following diagram shows two mirrors inclined at an angle θ to each other. A ray of light is incident on one of the mirrors and finally reflected from the second mirror parallel to the first mirror. Find the angle between the mirrors. (2 marks)



3. It is not possible to charge an electroscope by contact method using a metal rod. Explain (2 marks)

.....
.....
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4. A car battery is rated 40 Ah and it is expected to supply a constant current for 120 minutes.

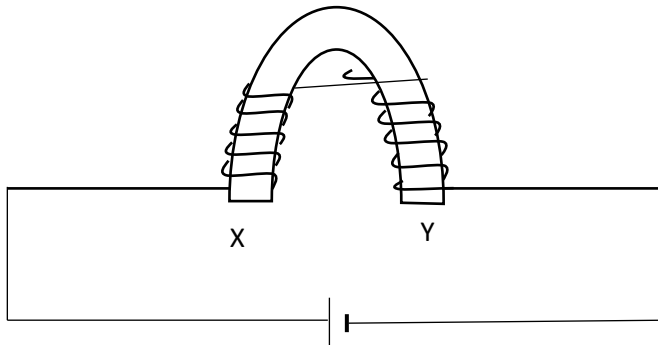
a) What is the strength of the current delivered? (2 marks)

.....
.....
.....

b) Explain why eight dry cells in series cannot be used to start a car engine even though they have the same e.m.f. (1 mark)

.....
.....

5. A coil of insulated wire is wound around a u – shaped soft iron core X Y and connected to a battery as shown below.

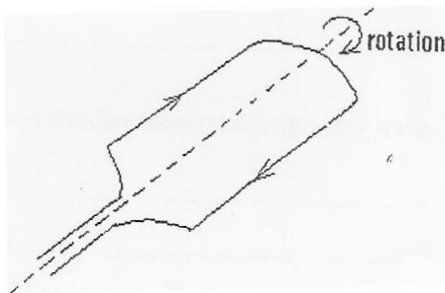


State the polarities of the ends X and Y. (2 marks)

X

Y

6. The figure below shows a coil carrying a current flowing in the direction shown in a magnetic field.



On the same diagram draw the magnetic field lines across the coil. (1 mark)

7. An object of height 5 cm is placed 25 cm from a convex mirror of focal length 15 cm. determine the image distance and hence state the nature of the image formed. (3 marks)

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8. Loudspeaker placed between two wall A and B is sending out constant wave pulses. Determine how far the loudspeaker is from wall B if it is 100m from wall A, and the time between the two echoes received is 0.2 seconds (speed of sound is 340m/s) (3 marks)

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9. The following table shows part of the electromagnetic wave spectrum.

Ultraviolet rays	
Microwaves	
X-rays	
Visible light	

(a) On the right column of the table, arrange the waves in the order of decreasing energy. (1 marks)

(b) Give an application of each of the following electromagnetic waves. (2 marks)

i) Ultraviolet rays:

.....

ii) Microwaves:

.....

10. A $4\ \Omega$ resistor is connected in series to a battery of e.m.f 6V and negligible internal resistance. Determine the power dissipated by the resistor. (2 marks)

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11. State any two laboratory safety rules that deal with electrical safety in the lab. (2 marks)

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Section II (55 marks)

Answer all the questions in this section.

12. a) Define term focal length as used in thin lenses (1 mark)

.....

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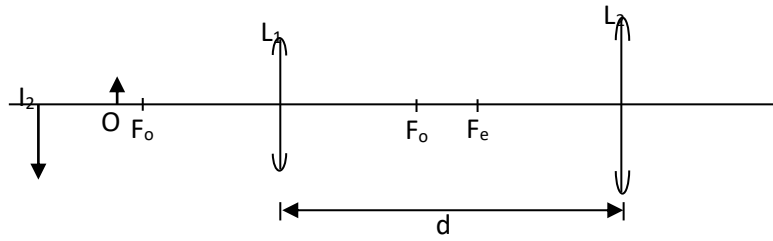
- b) Give the functions of the following parts of a lens camera. (3 marks)

i. Shutter:

ii. Film:

iii. Diaphragm:

- c) A compound microscope with objective lens L_1 of focal length 0.8cm and an eyepiece lens L_2 of focal length 2.5cm is shown in figure below. An object O is placed in front of the objective lens at a distance u_1 of 1.2cm. The system forms a final image I_2 at a distance of 10cm from L_2 . Determine the distance of separation of lenses L_1 and L_2 . (4 marks)



.....

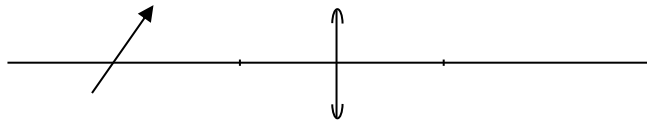
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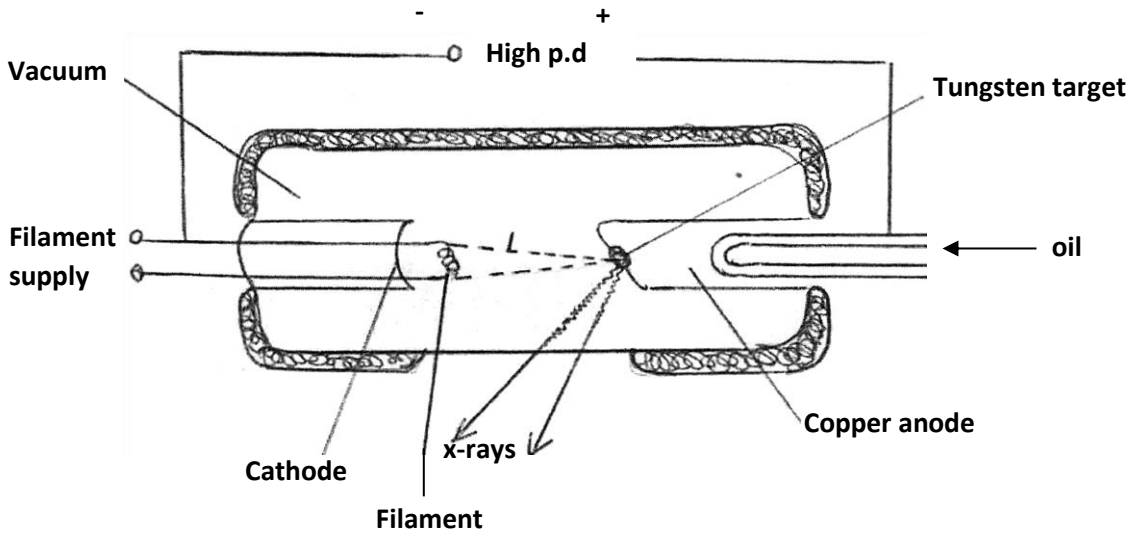
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d) The figure below (figure 9) shows an object placed in front of a convex lens. Complete the ray diagram to show the position of the image. (3 marks)



13. The figure below shows the features of an X-ray tube



(a) (i) What is the purpose of the oil going in and out of the anode (1mk)

.....
.....
(ii) State the property of tungsten that makes it suitable as a target (1mk)

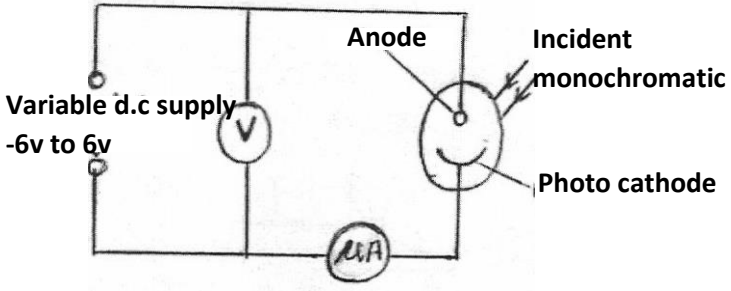
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(b) An X-ray tube operates with a potential difference of 100kV and filament current is 20mA.
Calculate;

I. The power transferred to the target of X-ray tube (2mks)

.....
.....
.....
II. The number of electrons hitting the target per second (2mks)

.....
.....
.....
III. The maximum kinetic energy of emitted electrons (Take charge of an electron = $1.6 \times 10^{-19} \text{C}$, mass of an electron = $9.1 \times 10^{-31} \text{kg}$) (2mks)

.....
.....
(c) The diagram shows monochromatic radiation falling on a photocell connected to a circuit



The incident radiation has a wavelength of $2.15 \times 10^{-7} \text{m}$. The metal surface of the photocell has a work function of 2.26 eV.

- (i) Calculate the energy in eV of a photon of the incident radiation (Take $c=3.0 \times 10^8 \text{ m/s}$, $h=6.63 \times 10^{-34} \text{ Js}$ and $e=1.6 \times 10^{-19} \text{ C}$) (3mks)

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- (ii) What is the maximum kinetic energy of the emitted electrons (2mks)

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- (iii) Write down the value of the stopping potential (1mk)

.....

14. a) State Snell's law (1 mark)

.....

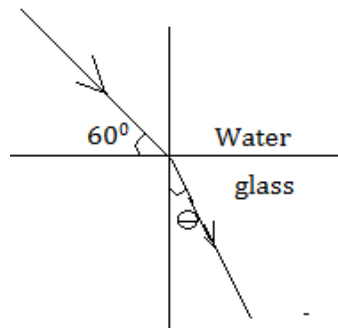
.....

- b) A student prepares to swim to the bottom of a pool to pick a coin on the bed. It is only while under the water that she realizes the presence of a sharp object beside the coin that she had not seen. Explain a possible reason why it was not visible in clear swimming pool water. (1 mark)

.....

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- c) The figure below shows a ray of light travelling



- i) Calculate the refractive index of water with respect to glass given the refractive index of glass and water are $\frac{3}{2}$ and $\frac{4}{3}$ respectively. (2 marks)

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- ii) Calculate the angle Θ (2 marks)

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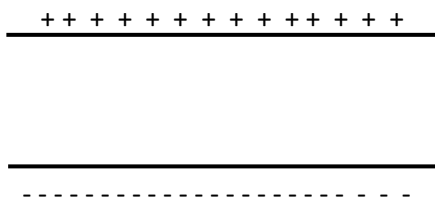
- d) Using a well-labeled diagram, describe how optic fibers are used for communication. (3 marks)

15. a) Define the term capacitance. (1 mark)

.....

.....

- b) The figure below shows two charged plates close to each other



- (i) Complete the diagram to show the electric field patterns between the plates (1 mark)
- (ii) Without changing the area of overlap, suggest any two ways of increasing the capacitance of a parallel plate capacitor. (2 marks)

.....

c) You have been provided with **THREE** identical capacitors each of capacitance $12 \mu\text{F}$. State and show how you would combine them to get the following effective capacitance

- (i) $36\mu\text{F}$ (2marks)

.....

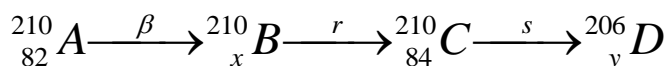
- (ii) $4\mu\text{F}$ (2marks)

.....

- (iii) $8\mu\text{F}$ (2marks)

.....

16. (a) (i) The following nuclear reaction is part of a radioactive series



I. Name the radiation represented by **r** and **s** (1mk)

r

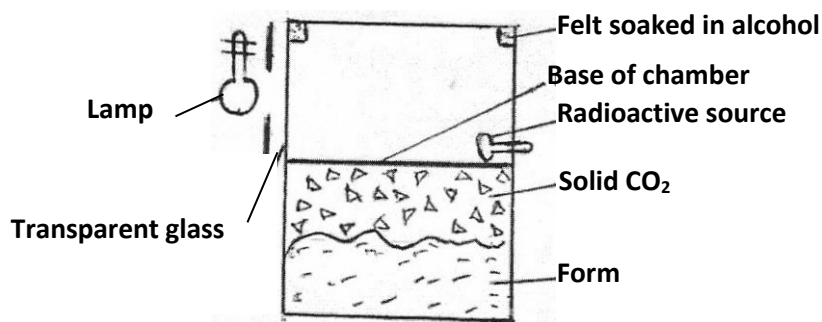
s

II. Determine the number represented by **x** and **y** (1mk)

x

y

(ii) The figure below shows the features of diffusion cloud chamber used for detecting radiations from radioactive sources



I. State the property of alcohol that makes it suitable for use in the chamber (1mk)

.....

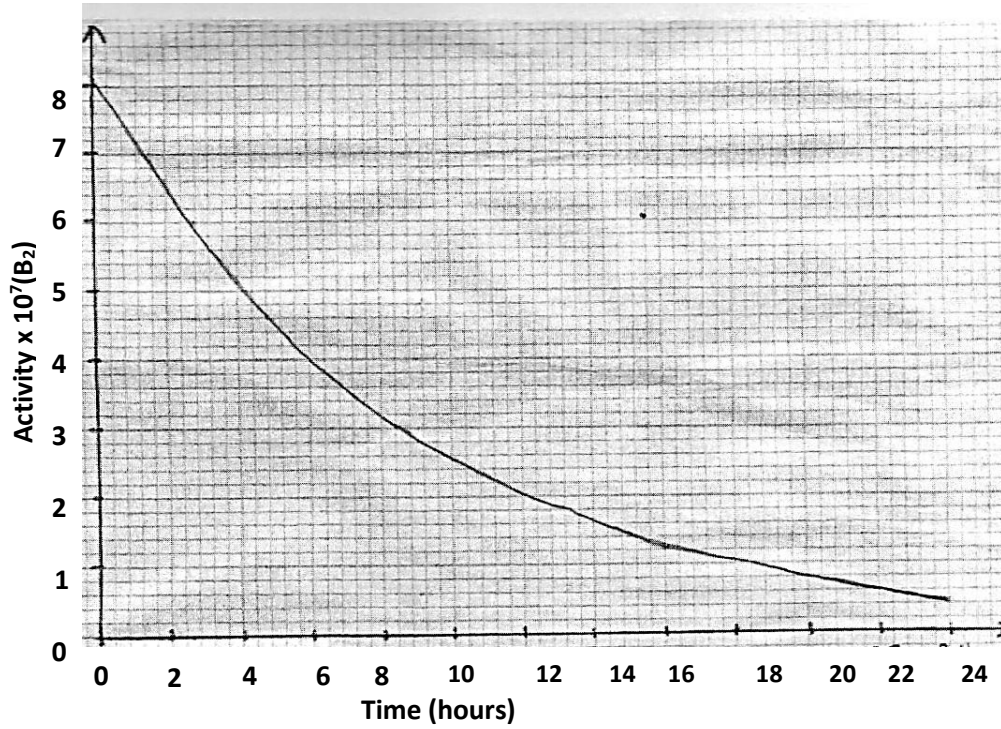
II. What is the purpose of the solid CO₂? (1mk)

.....

III. Explain how the radiation from the radioactive source is detected in the chamber. (2mks)

IV. State one advantage of the cold chamber over a charged gold leaf electroscope when used as detectors of radiation (1mk)

(b) The graph below shows how the activity of a sample of the radioisotope technetium which is used extensively in medicine, varies with time



I. Use the graph to determine the half-life, $T_{1/2}$ of technetium (1mk)

II. Hence calculate the decay constant for technetium given that $T_{1/2} = \frac{0.6931}{\lambda}$ where λ is the decay constant. (1mk)

III. Determine the number of technetium atoms remaining in the sample after 24 hours (1mk)

NAME..... CLASS.....ADM NO.....

SIGNATURE..... INDEX NO..... DATE.....

232/2

PHYSICS

PAPER 2

TIME: 2 Hours

KCSE TOP PREDICTION MASTER CYCLE 9

INSTRUCTION TO CANDIDATES.

- . Write your **name** and **admission number** in the spaces provided above
- . This paper contain **two sections**; Section I and Section II.
- . Answer all the questions in section I and II. In the spaces provided
- . All workings and answers **must** be written on the question paper in the spaces provided below each question.
- . Marks may be given for correct working even if the answer is wrong.
- . Calculators and KNEC Mathematical tables may be used EXCEPT where stated otherwise.
- . Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A	1-13	25	
B	14	10	
	15	10	
	16	08	
	17	09	
	18	10	
	19	08	
	TOTAL	80	

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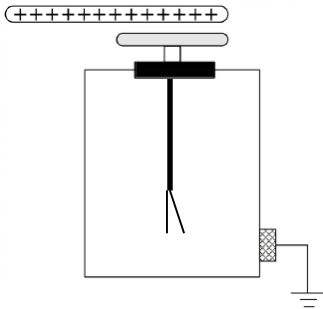
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SECTION A 25 MKS

1. Give a reason when light strikes a mirror at 90° , it is reflected along the same path
(1 mark)

.....
.....

2. The figure below shows an electroscope that is being charged.



If the final charge on an electroscope is positive

- a) State the method of charging that produces the above electroscope to be positively charged
(1 mark)

.....
.....

- b) Explain how the final charge was acquired
(2 marks)

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3. Give the formula relating to the Emf of a cell, the internal resistance, r , and the terminal voltage, V and the current, I in a closed circuit
(1 mark)

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4. Give a reason why parabolic reflectors are used as car headlight lamps. **(1 mark)**

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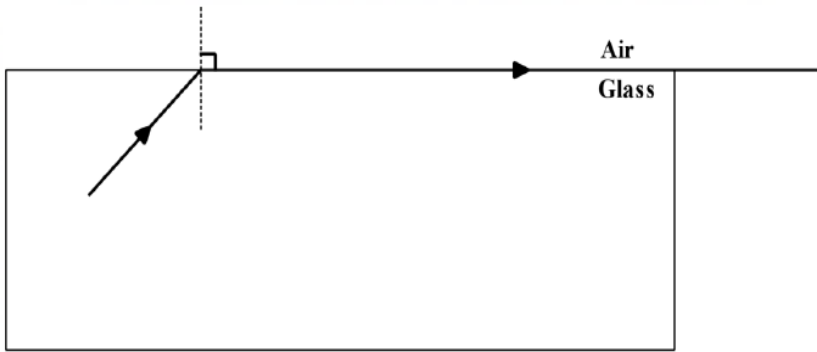
5. A current of 2A flows through a conductor for 2.5minutes. If the electronic charge is 1.6×10^{-19} C, calculate the number of electrons involved. **(3marks)**

.....
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6. Give one reason why Ultra sound is used in pulse echo techniques in determining the depth of the sea. **(1 mark)**

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7. The figure below is drawn to scale. Use this information on the figure to answer the questions that follow;



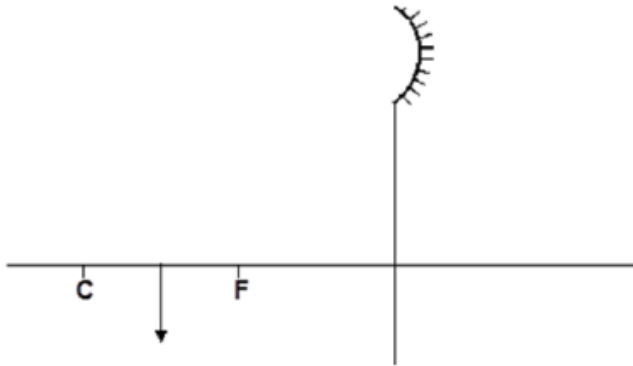
Determine the refractive index of the glass material. **(2 marks)**

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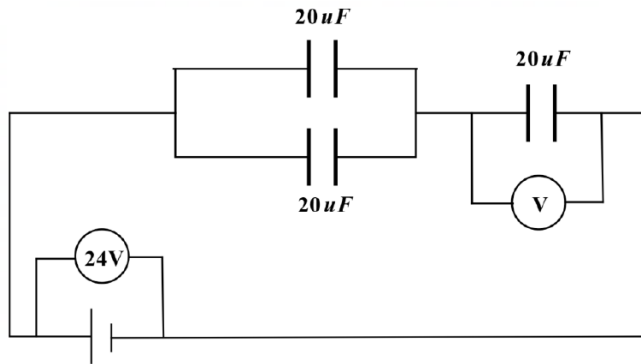
8. a) i) What is a virtual image? **(1 mark)**

.....
.....
.....

ii) Complete the ray diagram in figure 3 below so as to form an image. **(3 marks)**



9. Three capacitors of capacitance $20\mu\text{F}$ are arranged as shown below. Find the Reading on the voltmeter across the $20\mu\text{F}$ shown in the following diagram. **(3 marks)**



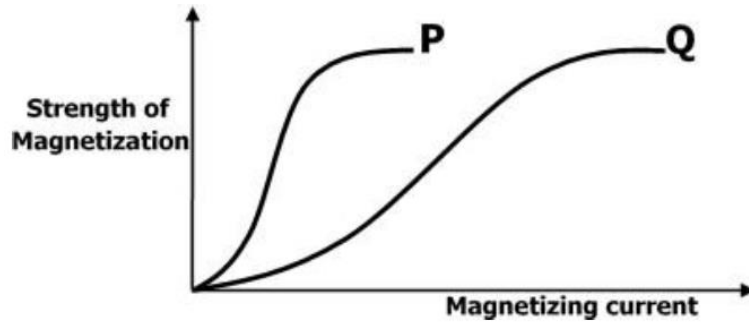
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10. In an experiment to magnetize two substances P and Q using electric current, two curves were obtained as shown below. State with a reason which substance will be used as an armature in an electric bell. (2 marks)



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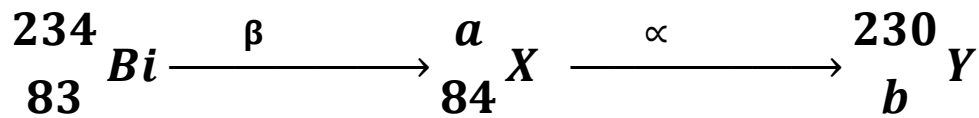
11. State the function Argon and Nitrogen in a fluorescent lamp. (1 mark)

.....

12. Distinguish between thermionic emission and photoelectric effect. (1mark)

.....

13. The following is part of a radioactive decay series.



Determine the values of a and b (2mark)

.....

SECTION B

14. a) Explain in terms of flow of electric charges why a thin wire feels warmer than copper leads in the same current **(1 mark)**

.....
.....
.....

b) i) State the main energy changes that take place in a filament lamp **(1 mark)**

.....
.....

ii) Name any two factors affecting the heating effect of an electric current **(2 marks)**

.....
.....

iii) Give a reason why tungsten wire is used in a filament bulb. **(1 mark)**

.....
.....

c) A light bulb is found to have a resistance of 950Ω . When operating normally on a 240V mains.

Calculate

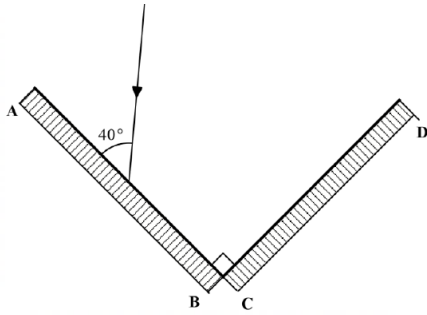
i) Power rating of the Bulb **(2 marks)**

.....
.....
.....

ii) Electric energy converted to heat and light when the bulb operates for 2 hours **(3 marks)**

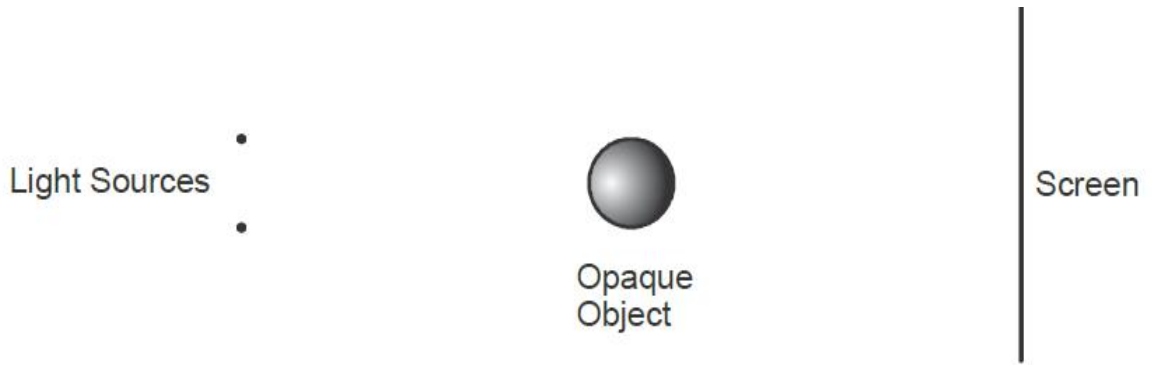
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15. (a) The mirror AB and CD are at right angles to each other.



Complete the diagram to show the path taken by the ray PQ after reflection at both mirrors. **(2 marks)**

(b) The figure below shows two point sources of light with an opaque object placed between them and the screen.



Complete the diagram to show the nature of the shadows formed. Label the shadows. **(2 marks)**

c) State the changes that would occur in the size and brightness of the image formed if:

i. The object distance is made large **(1 mark)**

.....

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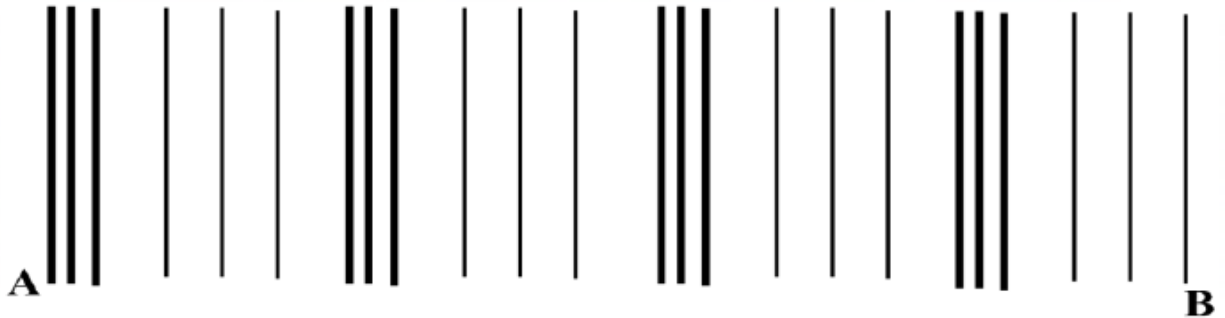
ii. The length of the camera is made longer **(1 mark)**

.....
.....

iii. The single hole is replaced by four pinholes close together **(1 mark)**

.....
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.....

d) The diagram below shows sound waves passing through air. Study it and answer the questions that follow.



Label the following **(3 marks)**

- i. Compression
- ii. Rarefaction
- iii. Wavelength

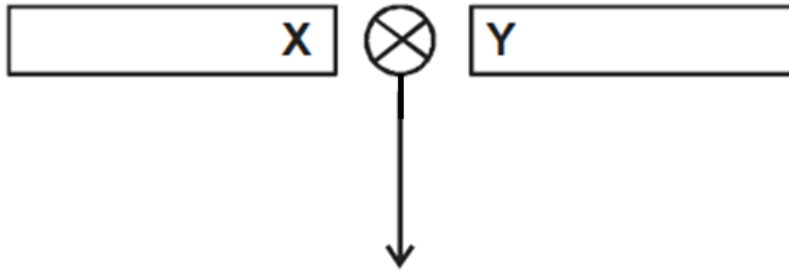
16. a) State the functions of carbon brushes in an electric motor. **(1 mark)**

.....
.....

b). Why are carbon brushes and commutators made of graphite in an electric motor?
(1 mark)

.....
.....

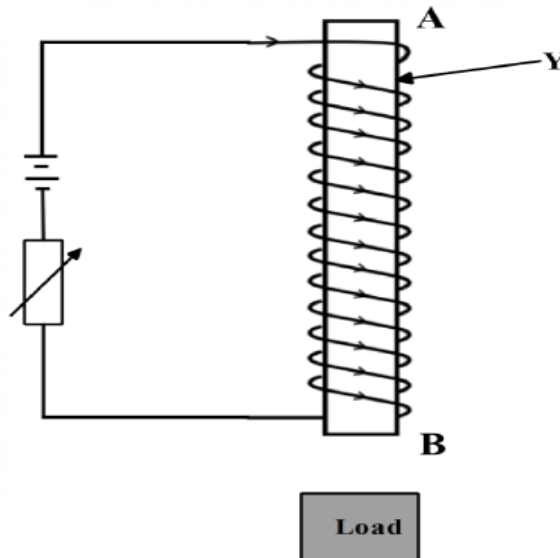
c) The figure below shows a conductor carrying current placed in the magnetic field and moves in the direction shown



Identify the polarity of end X. **(1 mark)**

X –

d) The figure below shows a simple electro magnet for lifting heavier container loads in the kilindini port in Mombasa city in Kenya.



i) Which material is Y made from? Explain why it is a preferred choice for its use in the above diagram? **(2 marks)**

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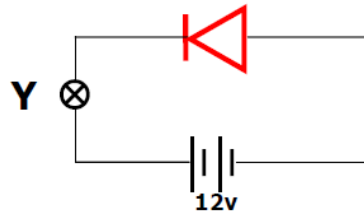
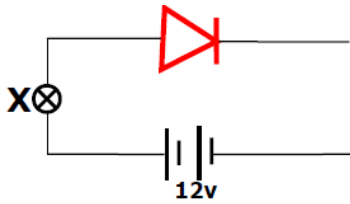
ii) State the polarity of B **(1 mark)**

.....

iii) Explain one way in which the electromagnet can be made more powerful **(1 mark)**

.....
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.....

(e) In an experiment on use of semiconductor diodes, it was noted that bulb X in figure below lights while bulb Y does not. Explain. **(1mark)**

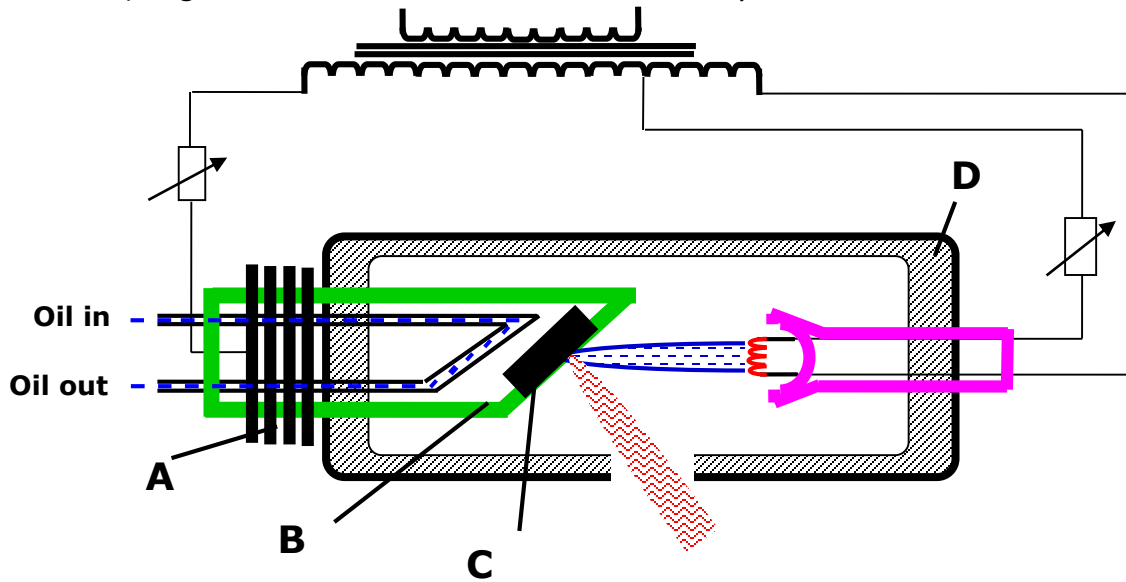


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17. a) State the properties of X-rays, which makes it possible to detect cracks in bones. **(1mark)**

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.....

b) Figure below shows the features of an X-ray tube.



i) Name the parts marked with letters A and B **(1mark)**

.....

ii) State and explain which material is suitable for part C. **(1mark)**

.....

iii) State the reason why the machine should be surrounded by D. **(1mark)**

.....

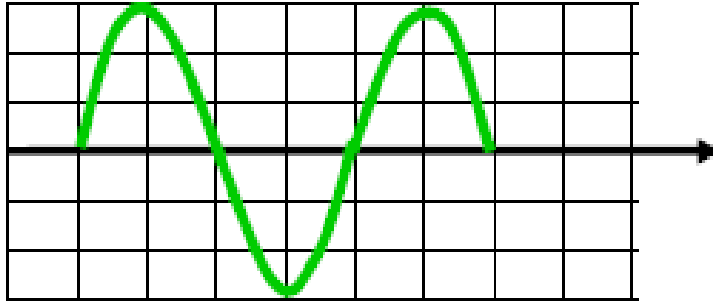
iv) State one way in which cooling is achieved in this X-ray machine. **(1mark)**

.....

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.....

c) The figure below shows the trace on the screen of an a.c signal connected to the y-plates of C.R.O with time base on.



Given that the time control is 5ms/div, and the y-gain is at 100V/div, determine:

i) The frequency of the a.c signal. **(2marks)**

.....

ii) The peak voltage of the input signal **(2marks)**

.....

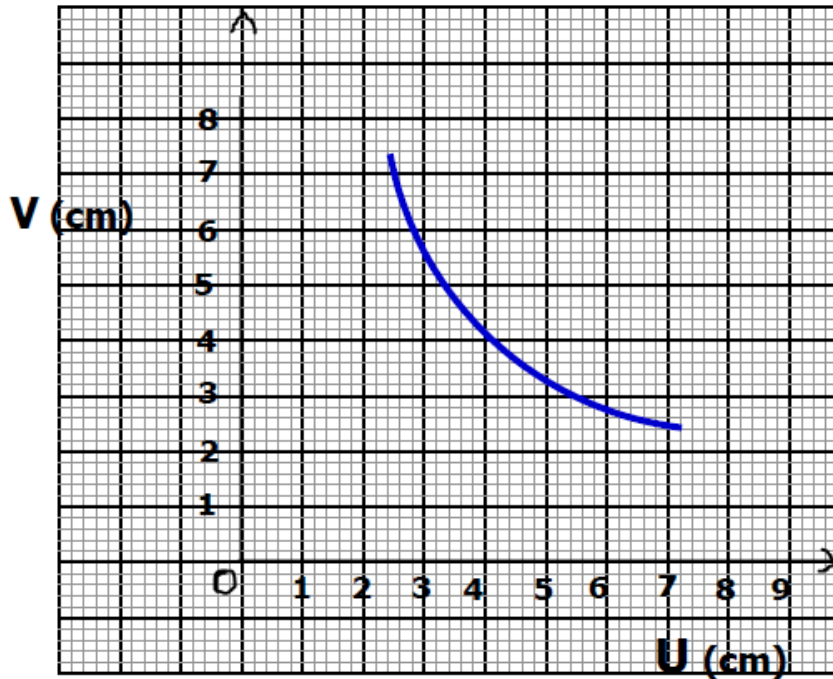
18. a) (i) Name one type of electromagnetic radiation whose frequency is greater than that of visible light but less than that of gamma rays. **(1mark)**

.....

(ii) Arrange the following in order of increasing frequencies: Red, Green, Yellow, Blue. **(1mark)**

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b) The figure below shows an object placed in front of a convex lens.



i) On the same figure indicate a point X where the object distance is equal to the image distance of the lens. (1 mark)

Use the point X in (a) above to determine;

ii) The radius of curvature (2 marks)

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iii) Focal length of the lens (1 mark)

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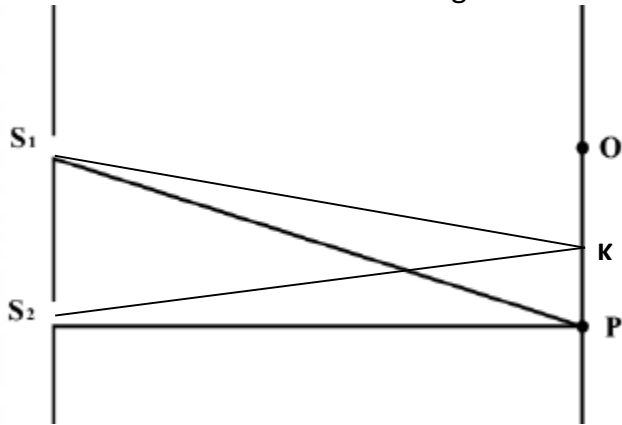
iv) Calculate the magnification of the mirror at point X from the graph (1 mark)

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c) The figure below shows the waves starting from two coherent sources S_1 and S_2



What would be observed at K if the waves are;

(i) light waves.

(1 mark)

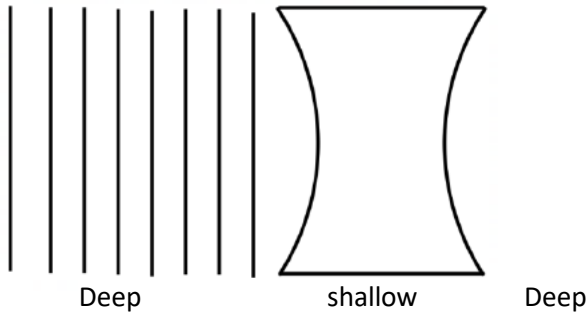
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(ii) Sound waves.

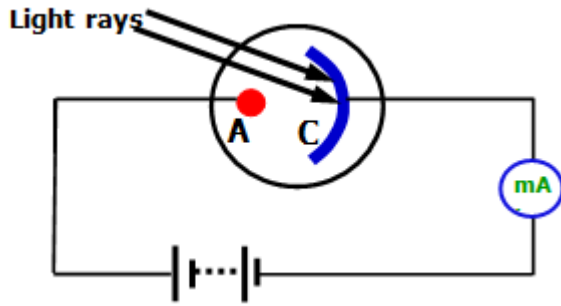
(1 mark)

.....

c) Complete how the wave fronts emerge from the concave lens below. **(1 mark)**



19. a) The figure below shows a circuit diagram for a photocell.



i) Name the part labeled A **(1mark)**

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ii) Why is the milliammeter showing a deflection when ultraviolet light is shown on the photocell? **(1mark)**

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iii) State how the milliammeter reading is affected when the intensity of light is increased. **(1mark)**

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(b) The graph below shows the relationship between the emf (E) and the current I flowing through a cell of internal resistance, r .



From the graph determine; Current (I)

i) Emf of the cell **(1 mark)**

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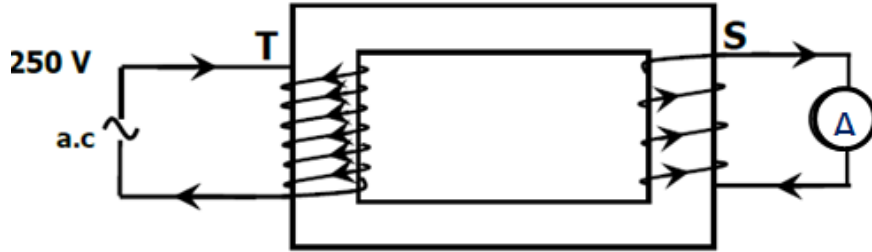
ii) the internal resistance r of the cell **(2 marks)**

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(c) Two coils T and S are wound on a soft iron core as shown. T has 1000 turns while S has 600 turns and resistance of 100Ω



Calculate the maximum current measured by the ammeter.

(2marks)

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THIS IS THE LAST PRINTED PAGE

NAME..... INDEX NO.:.....

STREAM: ADM NO:

DATE:

PHYSICS

Form Four

Paper 232/2

(THEORY)

Time: 2 Hours

KCSE TOP PREDICTION MASTER CYCLE 10

INSTRUCTIONS TO CANDIDATES:-

- Write your **Name, Index number, Admission number** and **school** in the spaces provided above.
- This paper consists of **two** sections; **A** and **B**
- Answer **all** the questions in section **A** and **B** in the spaces provided
- All working **must** be clearly shown.
- Mathematical tables and electronic calculators may be used.
- This paper consist of 19 printed pages. You are advised to ascertain that all pages are printed as indicated.
- Take the earth's gravitational field strength $g = 10 \text{ m/s}^2$.

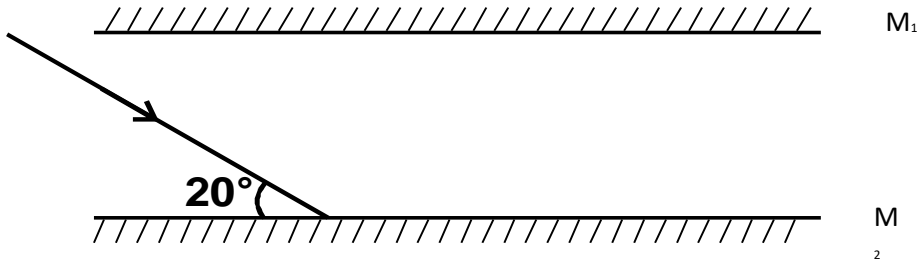
For Examiner's Use Only:

SECTION	QUESTION	TOTAL SCORE	CANDIDATES SCORE
A	1 - 12	25	
B	13	10	
	14	9	
	15	8	
	16	9	
	17	9	
	18	10	
TOTAL		80	

SECTION A (25 MARKS)

Answer all questions in this section in the spaces provided.

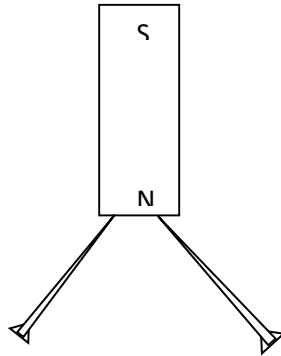
1. The diagram below shows two parallel mirrors M_1 and M_2 and a ray of light being incident on one of the mirrors as shown.



Trace the ray of light through the mirrors and indicate the angle of incidence on M_1

(2 mks)

2. Two pins are hanging from a magnet as shown in the diagram below.



Explain why the pins spread as shown in the diagram.

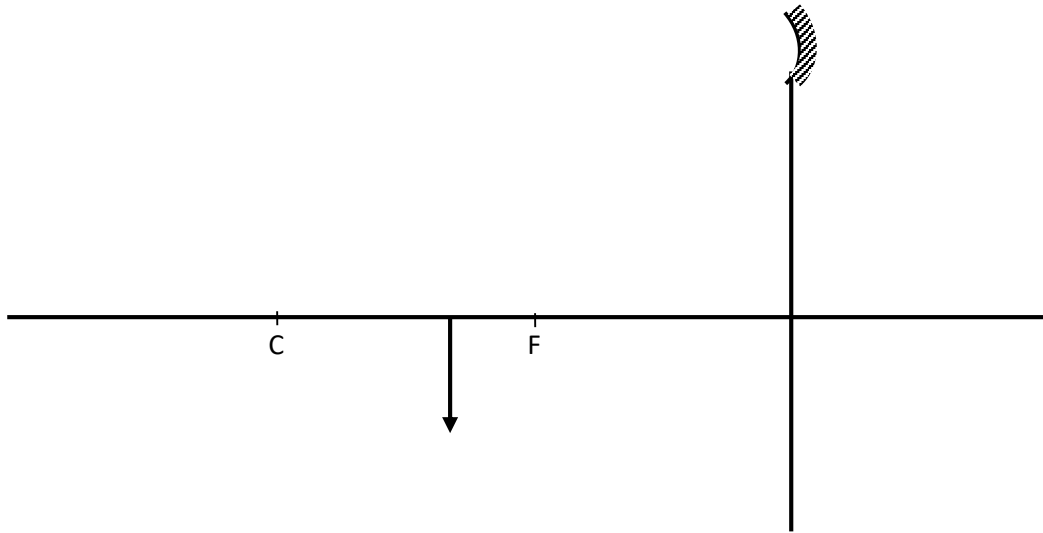
(2mks)

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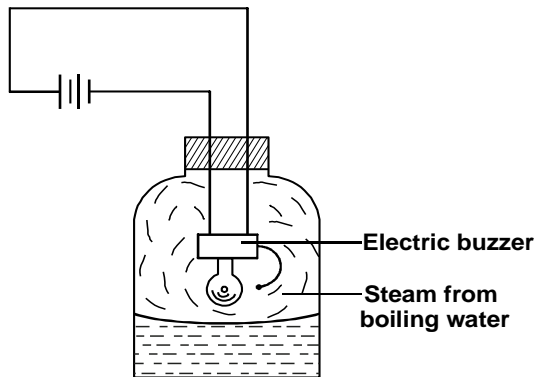
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3. An image I is formed in front of a concave mirror and on the principal axis as shown in the figure below. **(2mks)**



4. The figure below shows a set up by a student.



State and explain what happens to the sound from the buzzer as the bottle and its contents are cooled to 0°C . **(2 mks)**

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5. Arrange the following waves in order of decreasing wavelength.

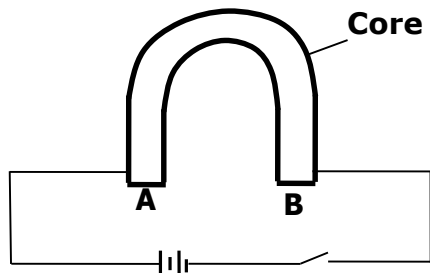
(1mk)

Infrared, X-rays, Microwaves, Radio waves, Red light.

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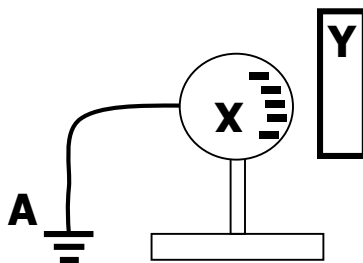
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6. Figure below shows an incomplete circuit of an electromagnet.



Complete the circuit by drawing the windings on the two arms of the core such that A and B are both North poles when the switch is closed. **(1mk)**

7. Figure represents a step in charging a material B negatively by induction.



(i) What is the charge on Y?

(1mk)

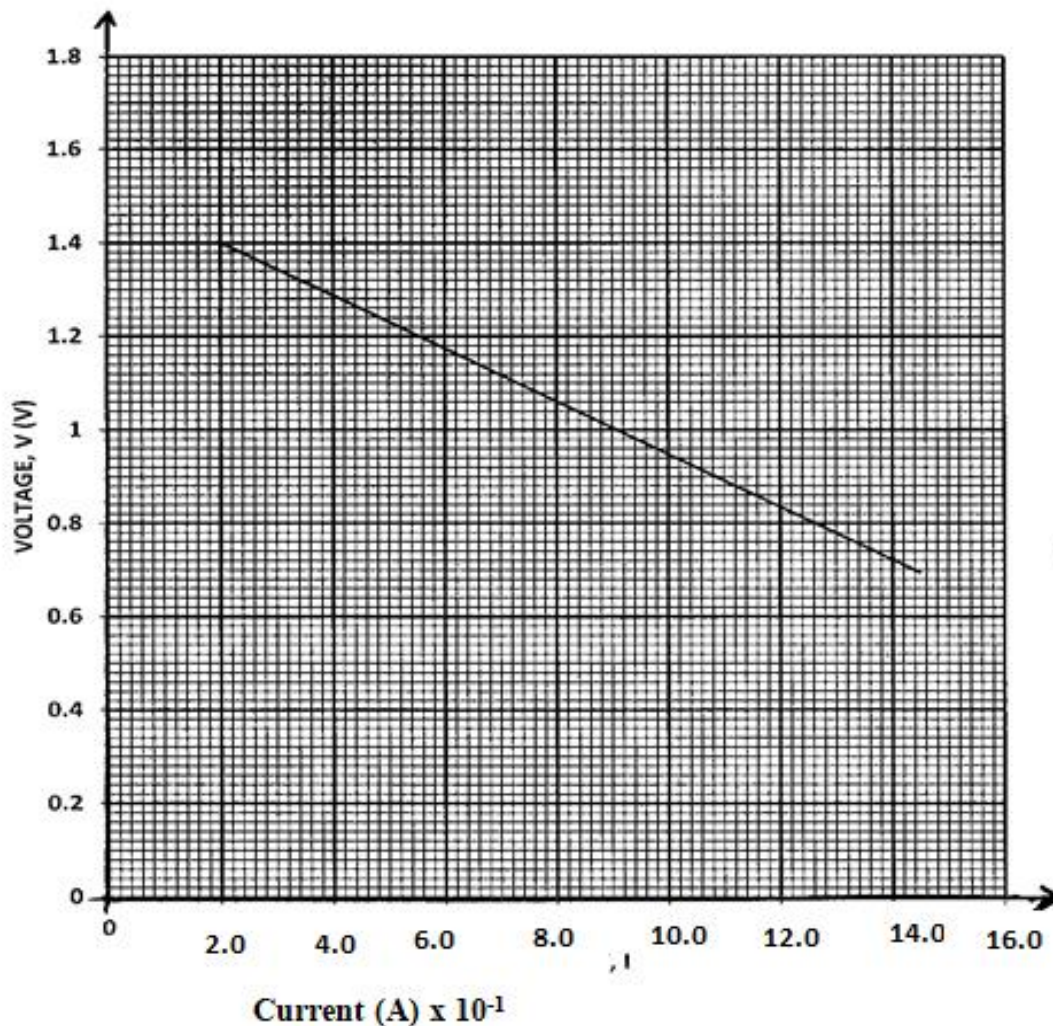
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(ii) Explain what happens at A.

(1mk)

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8. The graph below shows the variation of p.d. (V) across the terminals of a cell and current drawn from the cell.



- a) Use the graph to determine the electromotive force (emf) of the cell. **(1mk)**
- b) Draw a circuit diagram that may be used to obtain the values plotted in the graph. **(2mk)**

9. A vibrator is sending out eight ripples per second across a water tank. The ripples are observed to be 4cm apart. Calculate the velocity of the ripples. **(3mks)**

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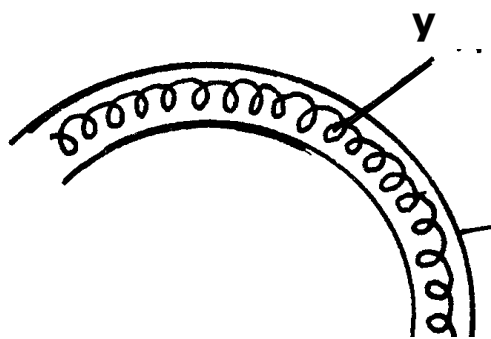
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10. The figure below shows part of electric cooker coil.



i. Why is the material labeled Y coiled? **(1mk)**

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ii. State the property of material Y that makes it suitable for its use. **(1mk)**

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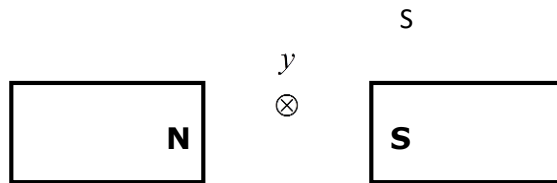
11. An immersion heater rated 1500W is used continuously for 30 minutes per hour per day. Calculate the cost of electricity per week if the rate is Ksh. 6.70 per unit. **(2mks)**

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12. Fig below shows a conductor y placed in a magnetic field. The conductor carries a current flowing into the paper.



(i) Sketch the resultant magnetic field between the poles of the bar-magnet.

(1mk)

(ii) Show on the diagram the direction of the force, F acting on the conductor

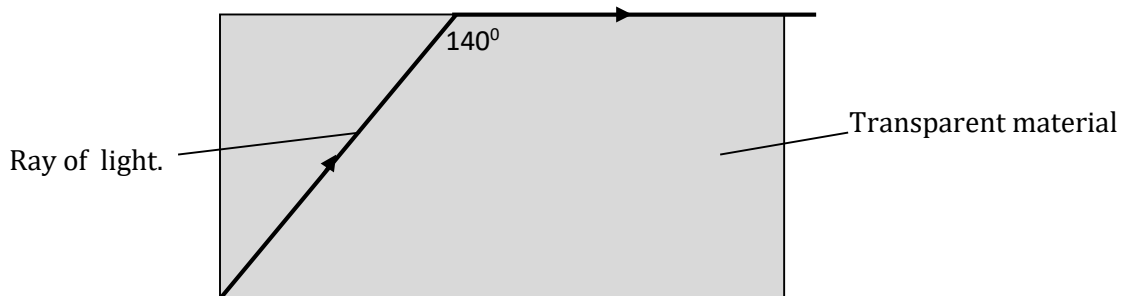
(1mk)

SECTION B (55 MARKS)

Answer all questions in this section in the spaces provided.

13.

a) Figure below shows the path of light through a transparent material placed in air.



i. Give a reason why the above ray is not refracted at the interface of air and the transparent material as shown in the diagram. (1mk)

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ii. Calculate the refractive index of the transparent material. (3mks)

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b) An image is formed 10cm in front of a concave lens of focal length 15cm. calculate the position of the object in respect to the lens. **(3mks)**

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c) You are provided with the following apparatus to determine the focal length of a lens.

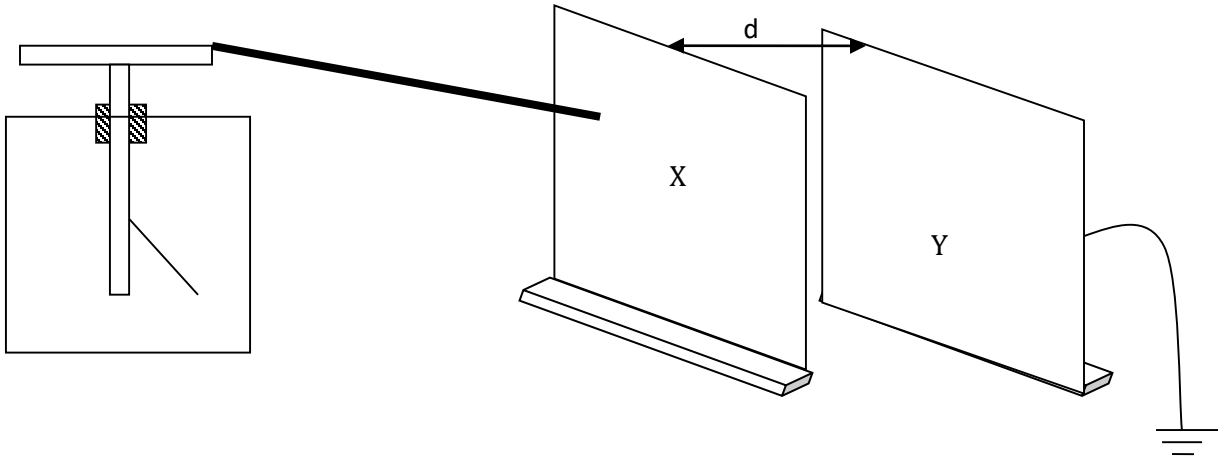
- A lit candle.
- A white screen.
- A metre rule.

With a aid of a labelled diagram, describe the procedure you would follow to determine the focal length of the lens. **(3mks)**

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14.

- a) The figure below shows metal plates X and Y each fixed to an insulated stand. X is charged and Y is earthed. X is connected to an uncharged electroscope with a conductor.



If plate Y is moved away from plate X,

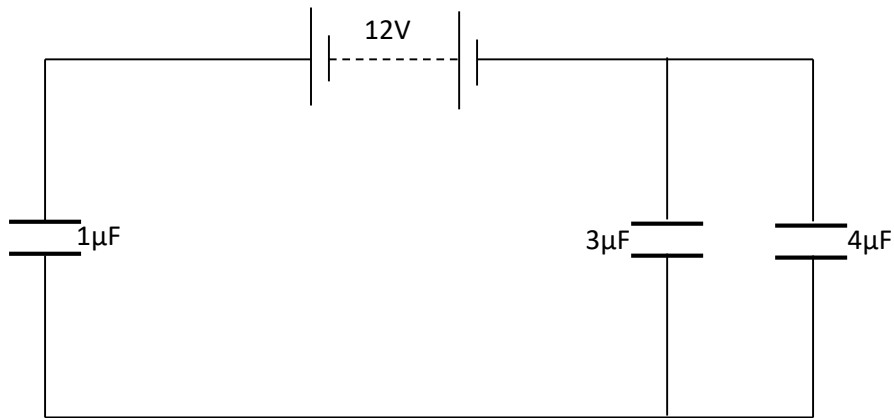
- i. State what happens to the amount of charge on the plates. **(1mk)**

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- ii. State and explain the observation made. **(3mks)**

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- b) The figure below shows an arrangement of capacitors connected to a 12V dc supply.



Determine:

i. The total capacitance of the arrangement.

(2mks)

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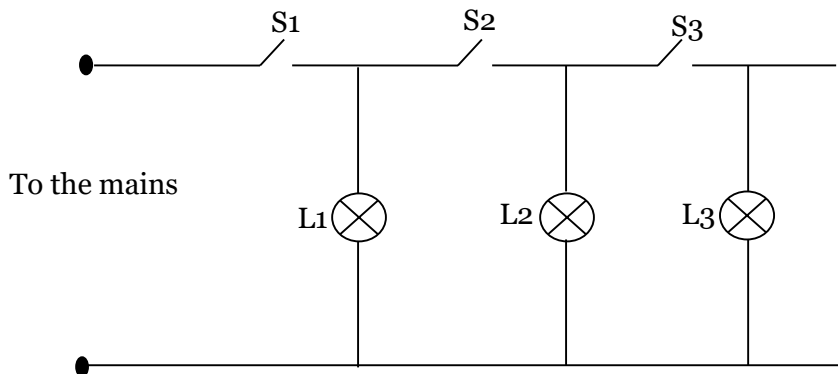
ii. The voltage across the $3\mu\text{F}$ capacitor.

(3mks)

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15.

a) The figure below shows an attempt to supply each of the three lamps L1, L2 and L3 with a switch.



i. Give a reason why this is a poor connection.

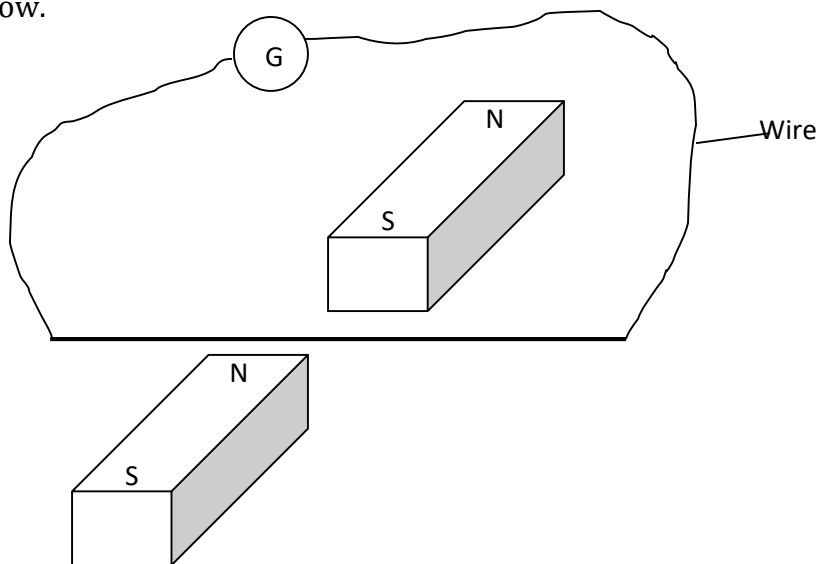
(1mk)

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ii. Redraw the diagram to show the correct positioning of the switches.

(1mk)

b) A wire placed between the pole of two permanent magnets is connected to a galvanometer as shown below.



i. State what is observed when the wire is moved up and down. **(2mks)**

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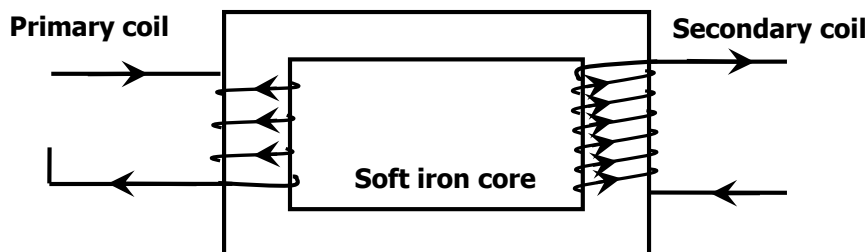
ii. Suggest two ways of increasing the magnitude of the effect you have stated in (i) above. **(2mks)**

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iii. The figure below shows a simple transformer. Study it and answer the questions that follow.



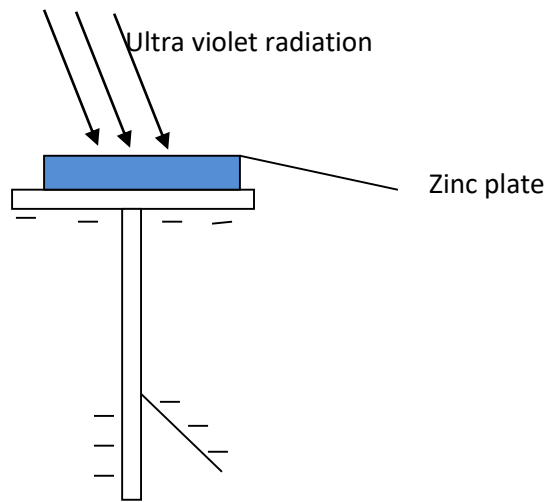
State and explain which coils are thicker.

(2mks)

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16.

a) The figure below shows Zinc plate placed on the cap of a negatively charged electroscope.



Ultraviolet radiation is made to fall on the plate as shown on the diagram.

i. What happens to the leaf of the electroscope?

(1mk)

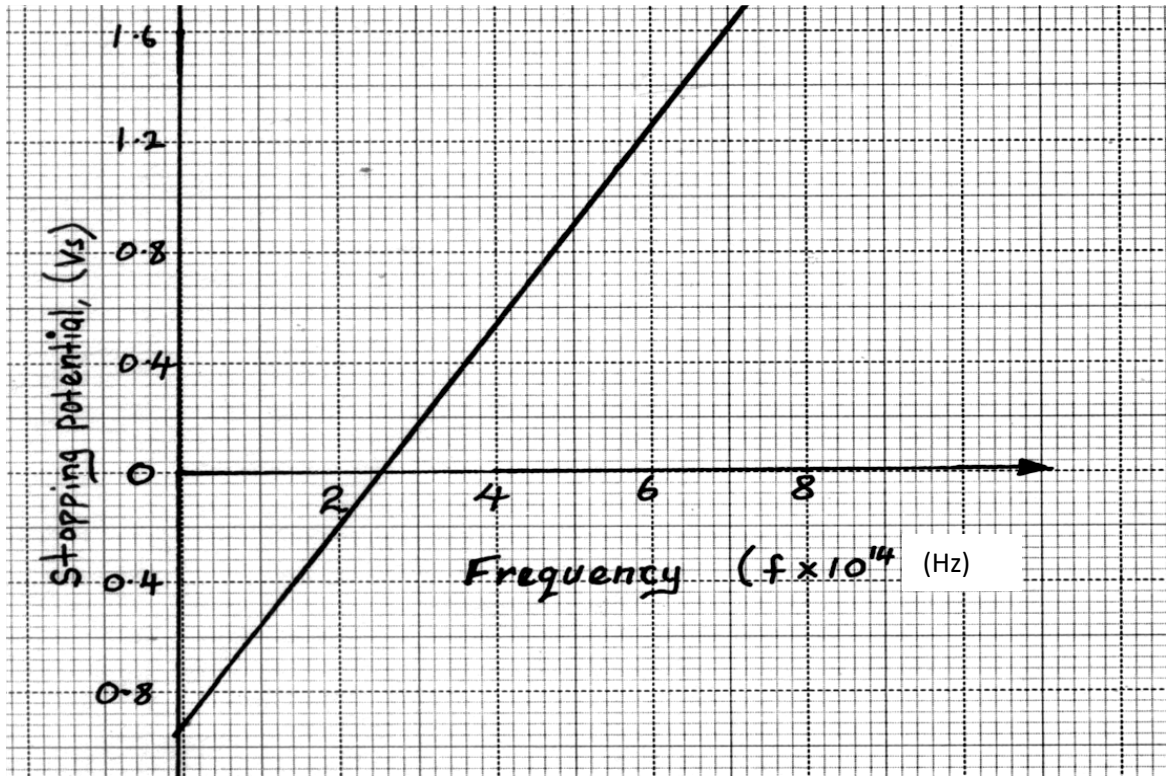
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ii. What would happen if radiation was red light?

(1mk)

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- b) In an experiment to find the relationship between frequency of a radiation and kinetic energy of the photoelectrons in a photoelectric device, the following graph was obtained.



Use the graph to determine the Planck's constant h .

(3mks)

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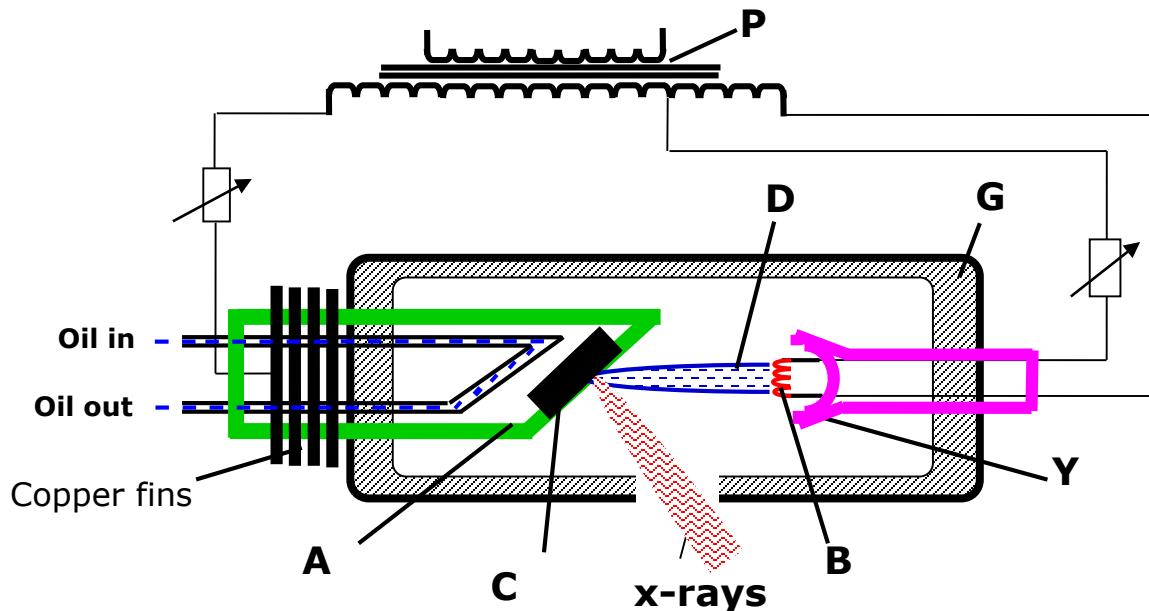
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c) Figure below shows the features of an X-ray tube.



i. Explain the function of part labelled P.

(1mk)

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ii. Explain why the part labelled C gets very hot during production of X-rays.

(2mks)

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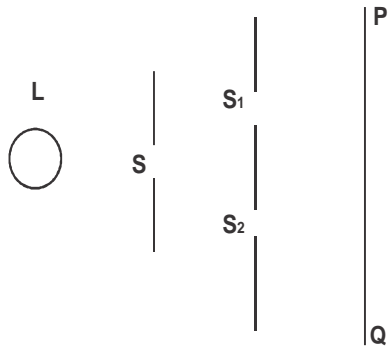
iii. Explain what is done to produce X-rays of shorter wavelength using the above X-ray tube.

(1mk)

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17.

- a) The figure below shows monochromatic source of light L behind a barrier with a single slit S placed behind another barrier with two identical slits S_1 and S_2 . A screen PQ is placed in position as shown.



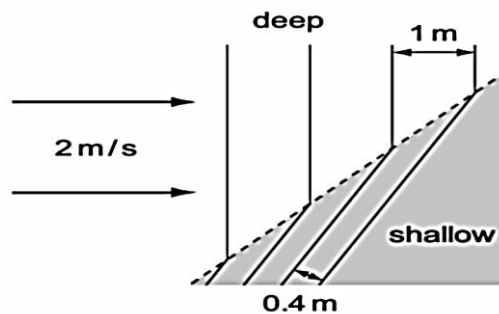
- i) What is the significance of S_1 and S_2 ? **(1 mk)**

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- ii) Explain what is observed on screen PQ. **(2 mks)**

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- b) Waves pass from deep water to shallow water and refraction occurs.



Calculate the speed of the waves in the shallow water.

(2 mks)

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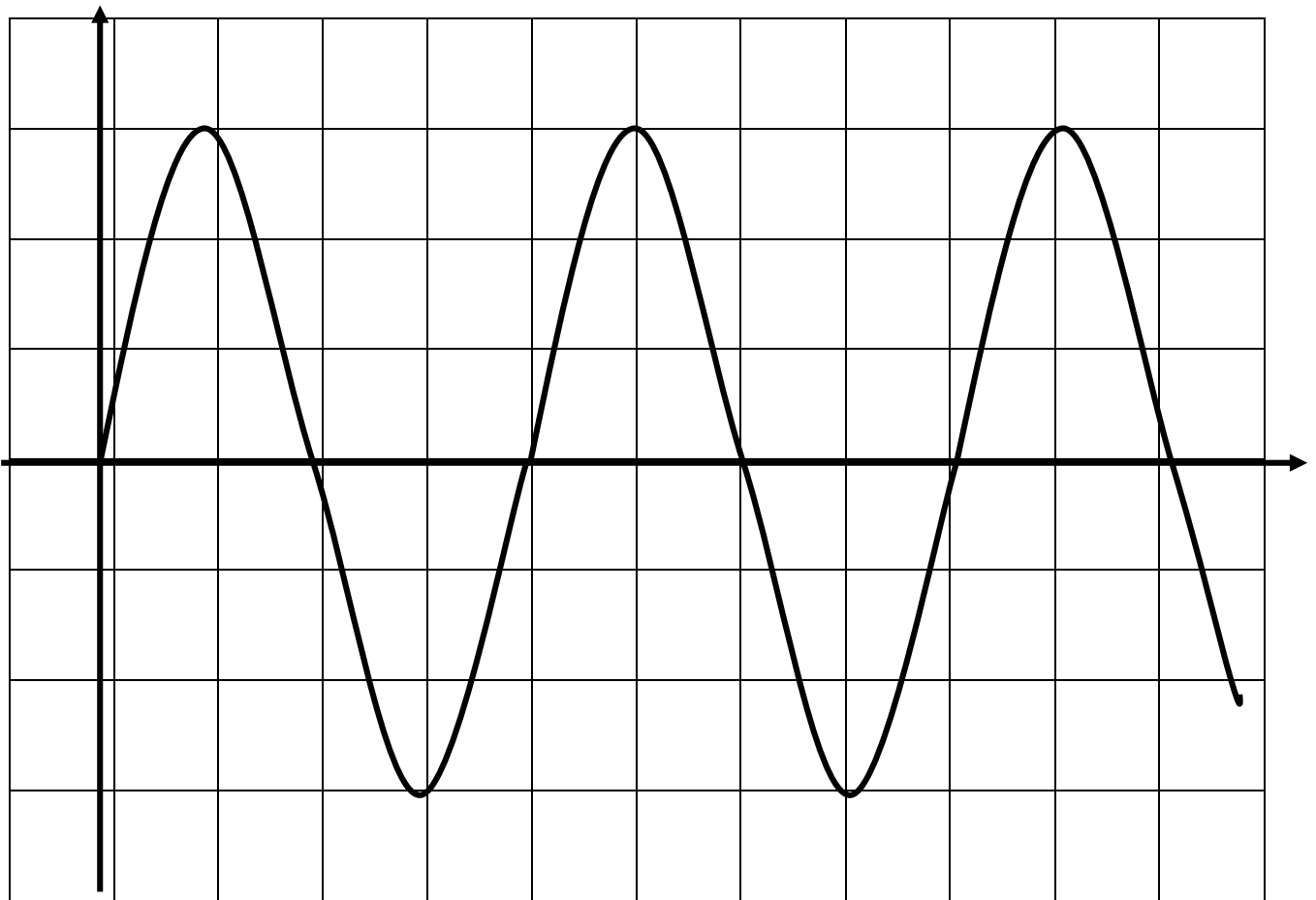
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c) The figure below shows an a.c. signal on the screen of a Cathode Ray Oscilloscope.

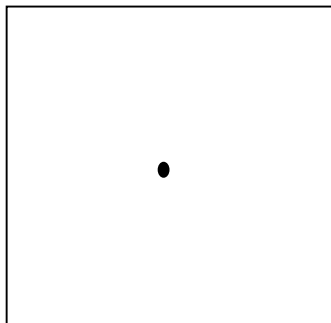


Determine the frequency of the signal given that the time base is set at 10ms/division.

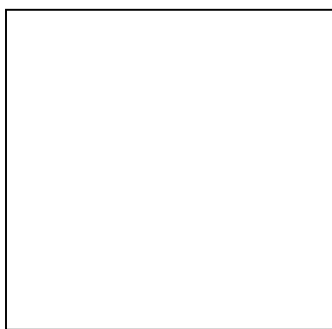
(2mks)

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d) Diagram (a) below shows the position of the bright spot on the screen of a C.R.O. when there is no signal on both Y and X plates.



Indicate on the diagram (b) below what is observed on the display screen when the Y-plate is connected to a.c. signal and for (c) when X-plate is connected to a d.c. signal. **(2mks)**



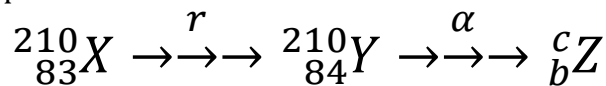
(b)



(c)

18.

a) The following reaction is part of a radioactive series.



i. Identify the radiation r.

(1mk)

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ii. Determine the value of c.

(1mk)

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b) At a certain instant the corrected count-rate registered on a detector placed close to an α -particle emitter is 200 per second and this falls to 50 per second in 12 minutes. Determine the half life of the source. (3mks)

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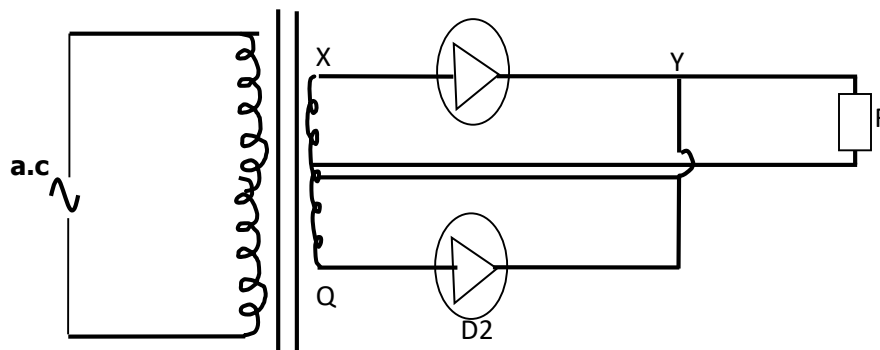
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c) Study the rectification circuit below and use it to answer questions that follow.



i. Briefly explain how the circuit works to rectify the alternating current.

(3mks)

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Show on the diagram how a capacitor should be connected to smooth the output voltage.

(1mk)

ii. In the grid provided, sketch a curve of smoothed output voltage against time. (1mk)

