NAME…….. INDEX NO……..

232/1
PHYSICS
PAPER 1
(THEORY)
JULY/AUGUST, 2015
TIME: 2 HOURS

CANDIDATE'S SIGN……..……

DATE……..……...

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK - 2015

Kenya Certificate of Secondary Education
PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

INSTRUCTIONS TO THE CANDIDATE:

(a) Write your **name** and **index number** in the spaces provided above.
(b) **Sign** and write the **date** of examination in the spaces provided above.
(c) This paper consists of **two** Sections **A** and **B**.
(d) Answer **all** the questions in sections **A** and **B** in the spaces provided.
(e) All working **must** be clearly shown in the spaces provided.
(f) Mathematical tables and electronic calculators **may be** used.

FOR EXAMINER'S USE ONLY:

Section	Question	Maximum Score	Candidate's Score
A	1 – 13	25	
B	14	11	
	15	9	
	16	7	
	17	9	
Total Score		80	

SECTION A: (25 MARKS)

1. A burette has an initial reading of 22.5cm³. Determine the final reading after liquid of volume of 11.3cm³. To removal from the burette. (2 marks)

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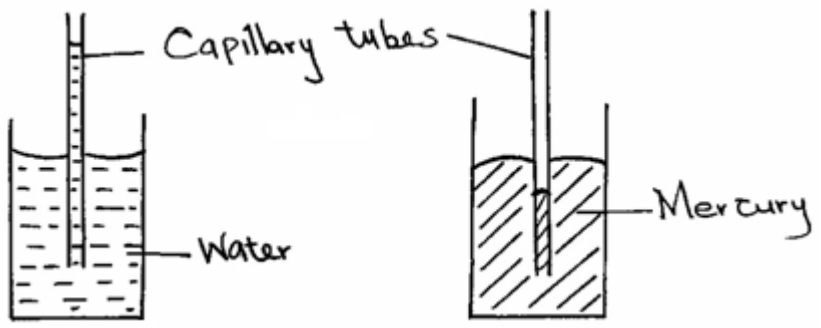
2. The figures below shows capillary tubes inserted in water and mercury respectively.



It is observed that in water the meniscus in the capillary tube is highter than the meniscus in the beaker, while in mercury the meniscus in the capillary tube is lower than the meniscus in the beaker. Explain them observations. (2 marks)

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3. The barometric height in a town is 65cmHg. Given that the standard atmospheric pressure is 76cmHg and the density of mercy is 13600kg/m³, determine the attitude of the town. (Density of air is 1.25kg/m³). (2 marks)

_____

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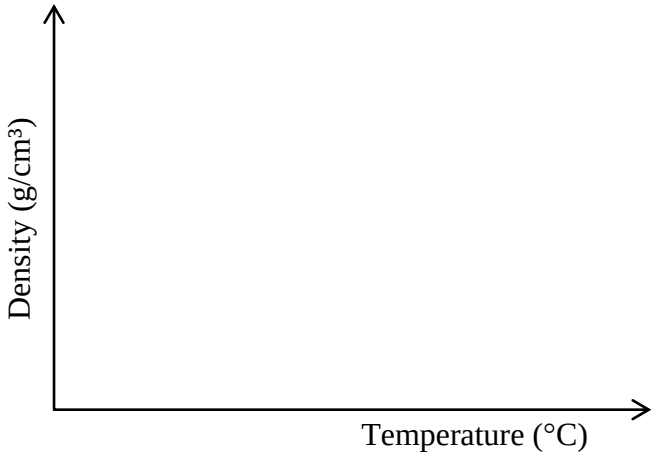
_____

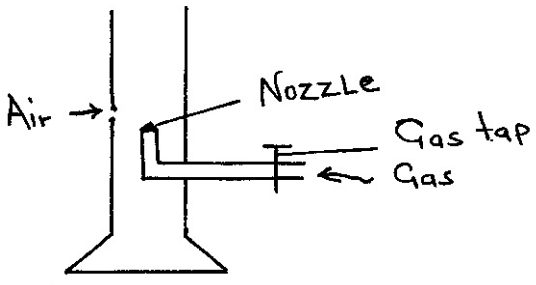
4. (i) State the Brownian motion. (1 mark)

(ii) Chalk is denser than air. Explain why chalk dust floats in air. (1 mark)

5. On the Cartesian plan below sketch a graph to show how the density of water varies from O°C to 10°C. (2 marks)



6. The figure below shows a Bunsen burner.



Explain how air is drawn into the burner when the gas tap is open. (2 marks)

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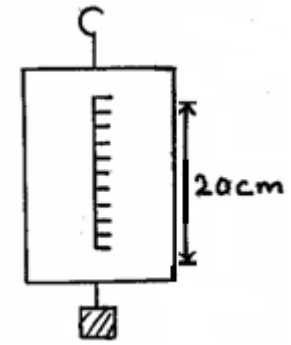
7. The figure below shows a spring balance, its spring constant is 125N/m. The scale spreads a distance of 20cm.



Determine the maximum weight that can be measured using the spring balance. (3mks)

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8. State and explain **one** way in which vacuum flask is adapted to it's functions. (2 marks)

_____

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9. A uniform metre rule pivoted at it's 15.0cm mark is balanced by a 2N weight suspended at the 5.0cm mark. Determine the mass of the metre rule. (3 marks)

_____

_____

_____

10. State the law of inertia. (1 mark)

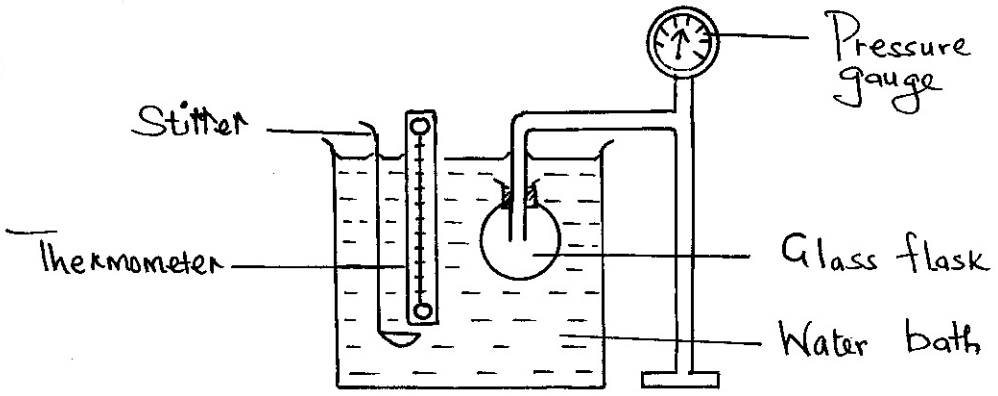
11. When the temperature of a gas in a closed container is raised, the pressure of the gas increases. Explain in terms of kinetic energy how the molecules of the gas cause an increase in pressure. (2 marks)

12. What is meant by the term "banking" of the road? (1 mark)

13. State the law of conservation of energy. (1 mark)

SECTION B: (55 MARKS)

14. (a) The figure below shows a set-up that may be used to verify pressure law.



(i) State the measurements that should be taken in the experiment. (2 marks)

_____

_____

(ii) Explain how the measurements in (i) above may be used to verify pressure law. (3 marks)

_____

_____

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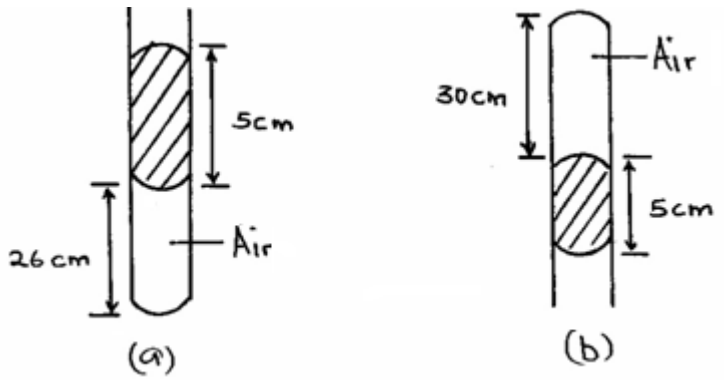
_____

(b) A column of air 26cm long is trapped by mercury thread 5.0cm long as shown in the figure (a) below. When the tube is inverted as in figure (b) the air column becomes 30cm long. What is the value of atmospheric pressure? (3 marks)



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(c) A steel cylinder of capacity $0.5m^3$ contains nitrogen at a pressure of 30,000Pa when the temperature is 27°C. What will be the pressure of nitrogen if it is allowed to flow into another cylinder of capacity $9.5m^3$ with the temperature reduced to -23°C? (3 marks)

(d) State the difference between the temperature measured in Kelvin scale and Celcius scale. (1 mark)

15. (a) Define the term specific heat capacity. (1 mark)

(b) A block of metal of mass 150g at 100°C is dropped into a lagged calorimeter of heat capacity $40Jk^{-1}$ containing 100g of water at 25°C. The temperature of the resulting mixture is 34°C. (Specific heat capacity of water = $4200Jkg^{-1}$). Determine;

(i) Heat gained by calorimeter. (2 marks)

(ii) Heat gained by water. (2 marks)

(iii) Heat lost by the metal block. (1 mark)

(iv) Specific heat capacity of the metal block. (3 marks)

16. (a) The moon goes round the earth at a constant speed. Explain why it is true to say the moon is accelerating. (1 mark)

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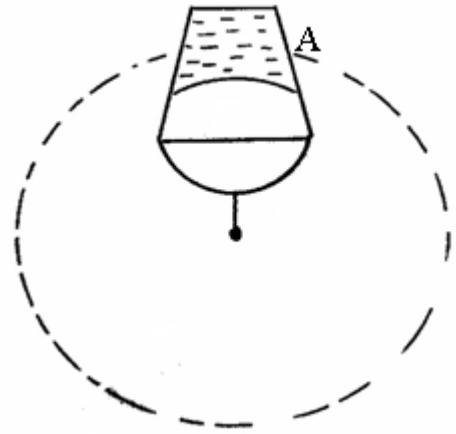
(b) The figure below shows a pail of water being swung in a vertical circle.



Explain why the water does not pour out when the pail is at position **A** as shown.

(1 mark)

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

(i) the angular velocity. (2 marks)

(ii) the angular acceleration. (3 marks)

(iii) the tension on the string. (3 marks)

(iv) the linear velocity. (2 marks)

17. (a) (i) What is meant by perfectly inelastic collision. (1 mark)

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_____

_____

(ii) A minibus of mass 1600kg travelling at a constant velocity of 20mls collides with a stationary car of mass 800kg. The impact takes 2 seconds before the two moves together and come to rest after 15 seconds. Determine.

(a) The common velocity.

_____

_____

_____

_____

(b) The distance moved after the impact. (2 marks)

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(iii) The impulse force. (3 marks)

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(c) A man uses the inclined plane to lift a 50kg load through a vertical line height

of 4.0m. The inclined plane makes an angle of 30° with the horizontal. If the efficiency of the inclined plane is 80%, determine.

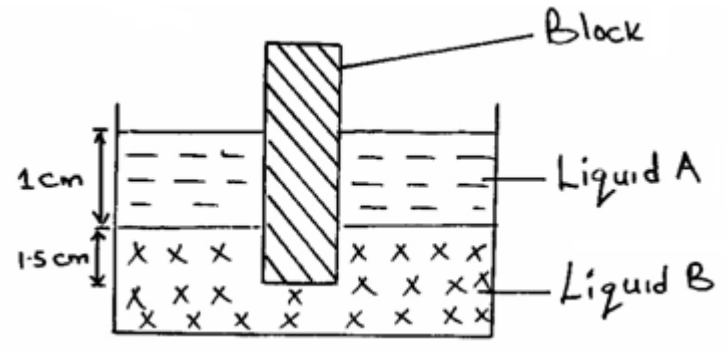
(a) The effort needed to move the load up the inclined plane at a constant velocity. (3 marks)

(b) The work done against friction in raising the load through the height of 4.0m. (Take g = 10N/kg). (3 marks)

18. (a) State the Archimedes Principle. (1 mark)

(b) The figure below shows rectangular block of height 4cm floating vertically

in a beaker containing two immiscible liquid A and B. The densities of the liquid are 8000 kg/m³ and 12,000kg/m³ respectively.



The cross sectional area is 2cm².
Determine.

(i) the weight of the liquid A displaced by the black. (2 marks)

(ii) the weight of the liquid B displaced by the block. (2 marks)

(iii) the mass of the block. (1 mark)

(iv) the density of the block. 2 marks)

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NAME…….. INDEX NO……..

232/2 **CANDIDATE'S SIGN……..……**
PHYSICS
PAPER 2 **DATE……..……...**
(THEORY)
JULY/AUGUST, 2015
TIME: 2 HOURS

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK - 2015

Kenya Certificate of Secondary Education
PHYSICS
PAPER 2
(THEORY)
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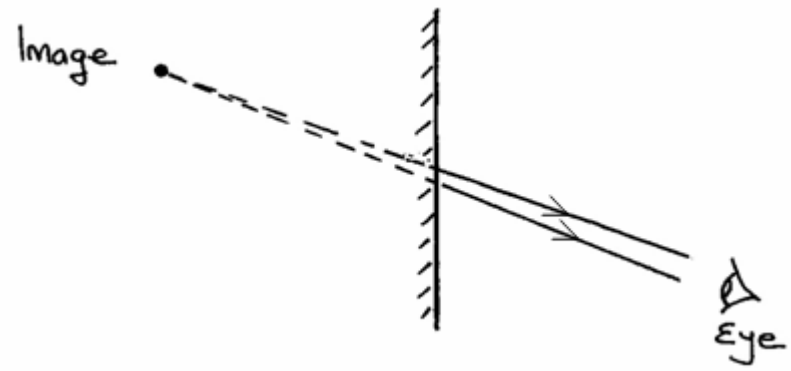
B		11	
		9	
		7	
		9	
Total Score		80	

SECTION A: (25 MARKS)

1. (a) Figure 1 shows an image formed in a plane mirror.



By drawing incident rays for the rays shown, locate the position of the object.(2 marks)

(b) Explain how an enlarged hole in a pin hole camera produces a blurred image. (1 mark)

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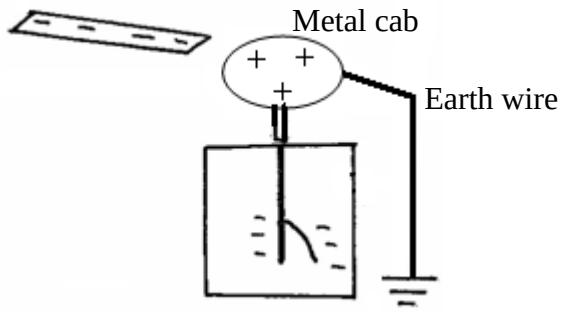
2. The figure 2 below shows an electroscope being charged by induction.



(i) State the reason why the cap of the electroscope is made circular. (1 mark)

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_____

(ii) On the same diagram, show the direction of the flow of electrons on the earth wire.

3. The table below shows the type of radiation detection method and uses of electro-magnetic radiations. Complete the table. (2 marks)

Type of radiation	Detection method	Use

	Blackened thermometer	Warming
Microwave		

4. (a) Figure 3 below shows a current carrying conductor placed perpendicularly between the poles of a magnet.

(i) Show on the diagram the magnetic field pattern. (1 mark)

(ii) The direction of net force on the conductor. (1 mark)

5. Using dormain theory, describe how a nail can be magnetised through hammering. (2 marks)

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6. (i) Define focal plane. (1 mark)

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(ii) State **two** properties of an image formed by a concave mirror that makes it suitable for use by barbers. (2 marks)

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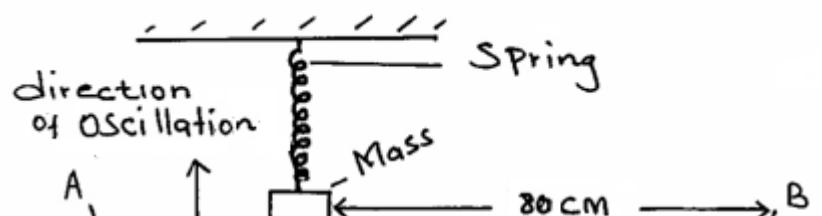
7. A student set up a mass attached to a spring such that when it oscillates, it taps on water surface in a wide shallow tank.



The student measured time for 20 oscillations and found that the mass takes 36 seconds. Given that the student counted four rippies between the mass and end B of the tank. Determine the speed of the waves. (3 marks)

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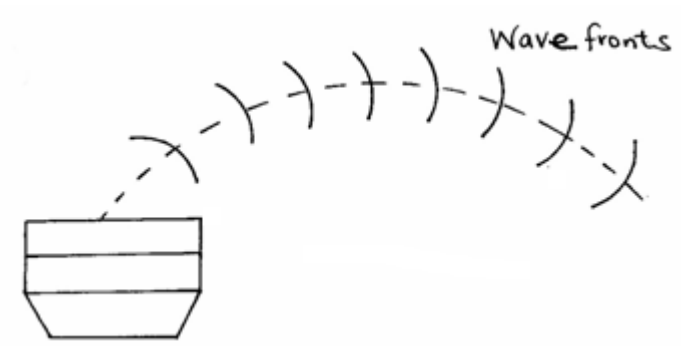
8. Figure 4 below shows sound waves emitted by a drum struck.



Explain why the wave fronts are directed towards the ground. (2 marks)

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9. In a compound microscope, the focal length of the objective lens is 3.0cm and that of the eye piece is 3.2cm and they are placed 10.0cm apart. An object is placed 5cm from the objective lens. Use the lens formular. In turn for each lens to find the position of the final image. (3 marks)

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10. (a) Apart from Snell's law, state another law of refraction of light. (1 mark)

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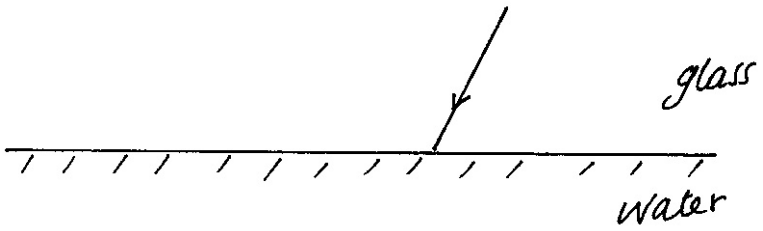
(b) A ray of light is incident on a glass-water interface making an angle of 35° with the boundary as shown below.



Calculate the angle of refraction (take refractive of glass and water as $\frac{3}{2}$ and $\frac{4}{3}$ respectively). (2 marks)

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SECTION B: (55 MARKS)

11. (a) Two 12V lead-acid accumulator A and B are rated 60Ah and 70Ah respectively. State **two** physical differences between the two. (2 marks)

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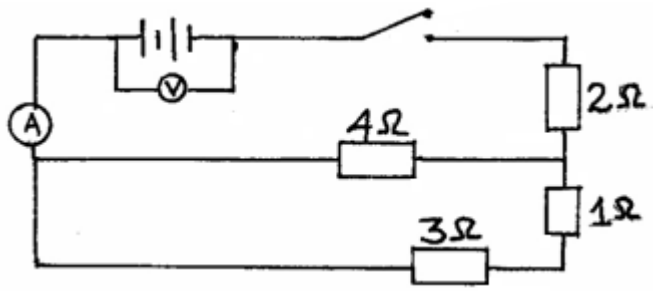
(b) The figure below shows a net work of resistors connected together in a circuit.
The voltmeter reads 3.0V when the switch is open and 2.4V when switch is closed.



Given that the ammeter reads 0.6A.
Determine:

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

_____

(ii) the internal resistance of each cell. (1 mark)

_____

_____

_____

(iii) the potential drop across the 3Ω resistor. (3 marks)

_____

_____

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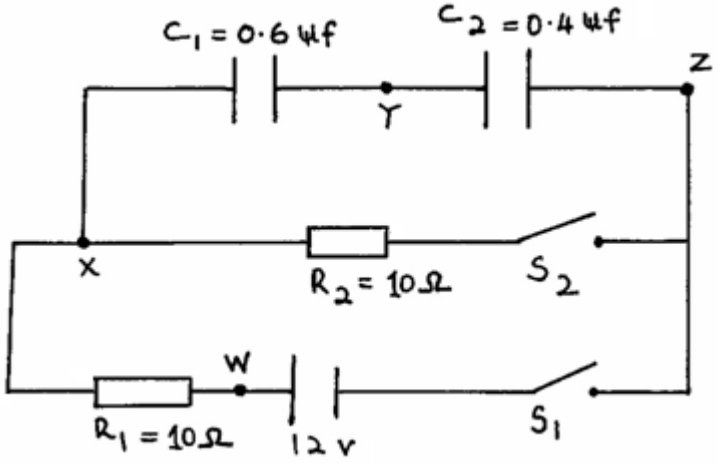
(c) The diagram below represents an electrical circuit with switches S_1 and S_2 open.



Switch S_1 is closed and the circuit, left undisturbed for a few minutes.

Determine:

(i) the potential difference between **W** and **X**. (1 mark)

_____

(ii) the magnitude of charge on each plate of capacitor C_1 in SI units. (3 marks)

_____

_____

_____

_____

(iii) the potential difference between **Z** and **Y**. (2 marks)

_____

_____

_____

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12. (a) State the Faraday's law of electricity. (1 mark)

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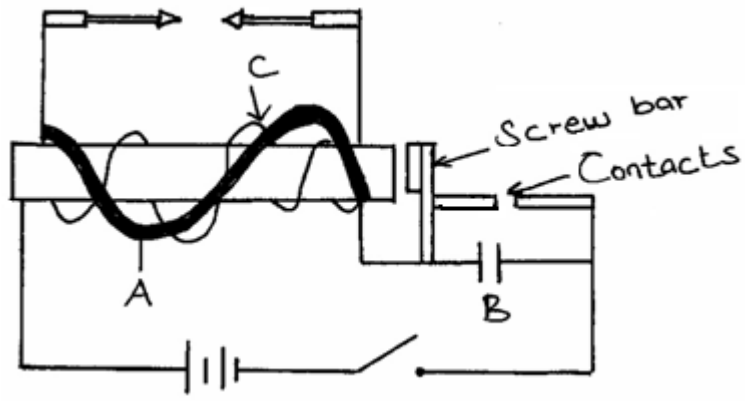
(b) The diagram below shows an induction coil used to produce sparks.



(i) Name the part labelled **C**. (1 mark)

_____

(ii) Explain why the part labelled **A** is thicker than **C**. (1 mark)

_____

_____

_____

(iii) State the purpose of part labelled **B**. (1 mark)

_____

_____

_____

(c) (i) A transformer is used on a 240V a.c supply to deliver 12A at 120V to a heating coil. If 20% energy is lost at the transformer, calculate the current in the primary coil. (3 marks)

_____

_____

_____

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(ii) State the adjustments that can be made on a d.c generator to produce alternating current. (1 mark)

_____

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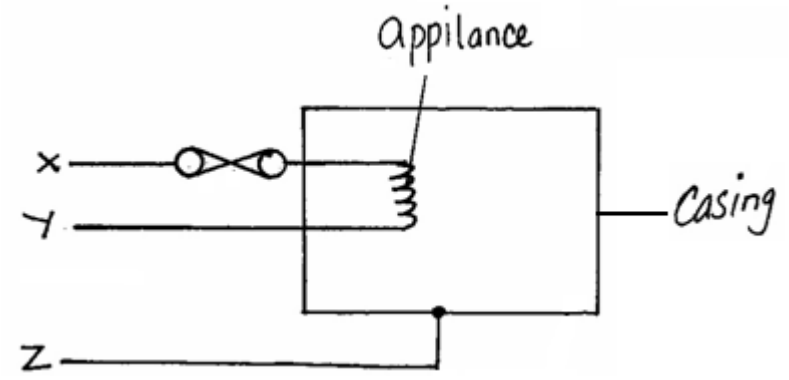
(d) (i) The figure below shows the wiring in a modern main appliance. (1 mark)



Identify the colour of wires **Y** and **Z**. (2 marks)

Y _____

Z _____

(ii) A cooker rated 2.0KW was operated for 35 minutes each day for 30 days. If the cost of each unit is Sh.12.5 Calculate the cost of electricity used. (3 marks)

_____

_____

_____

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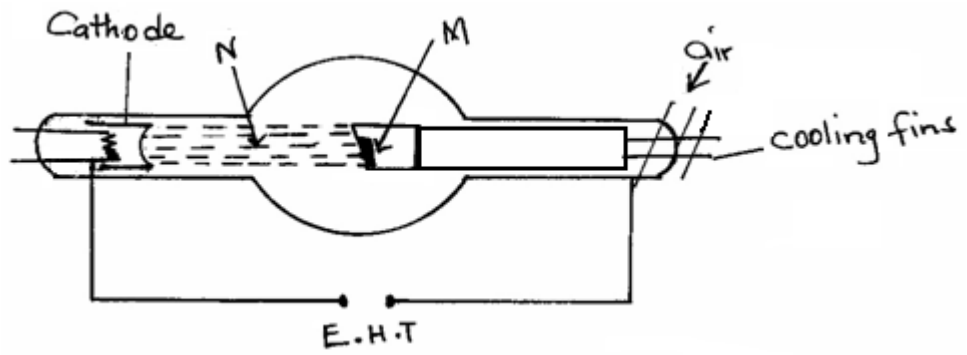
13. (a) The figure below shows an X-ray tube.



(i) Why is **M** set at an angle of 45° relative to the electron beam? (1 mark)

_____

_____

_____

(ii) State one property for parts labelled **M** and **N**. (2 marks)

M _____

N _____

(b) The tube above is operated at an anode potential of 12KV and a current of 10.0mA, determine.

(i) number of elections hitting the target per second. (2 marks)

_____

_____

_____

_____

(ii) Velocity with which the electrons strike the target
(electron charge = 1.6×10^{-19}C mass of an electron = 9.11×10^{-31}kg). (3 marks)

_____

_____

_____

_____

(c) When the time-base is off, the length of the line on a CRO screen is 4cm peak to peak for an AC voltage 400V. Determine the sensitivity setting. (2 marks)

_____

_____

_____

_____

14. Uranium – 235 isotope has the symbol $^{236}_{92}U$. When bombarded by a neutron, it splits to give substance X and Y and 2 neutrons as shown in the equation below.

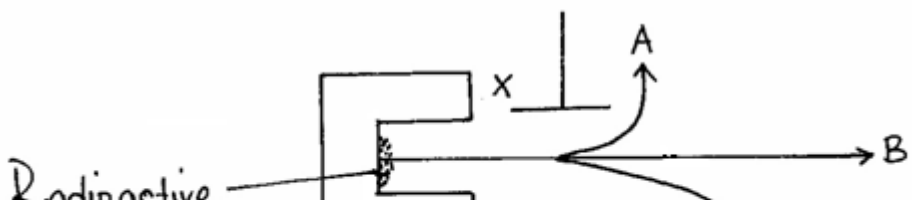
$$^{236}_{92}U + {}^{1}_{0}n \rightarrow {}^{95}_{56}X + {}^{a}_{b}Y + 2\,{}^{1}_{0}n$$

Find the value of **a** and **b**. (2 marks)

a _____

b _____

(b) The diagram in figure below shows paths followed by three radiations **A**, **B** and **C** from a radioactive isotope through an electric field.



(i) Identify radiation **A**. (1 mark)

_____

(ii) Give a reason why **C** deviates more than **A**. (1 mark)

_____

_____

_____

(iii) Give **one** property of radiation **B**. (1 mark)

_____

_____

(c) For a certain radioactive material, the average count-rate is found to be 82 counts per second. After 210 seconds, the count rate had dropped by 63 counts per second. The average background count-rate remained constant at 10 counts per second. What is the half-life of the material? (3 marks)

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_____

_____

_____

_____

15. (a) A clean zinc plate is placed on top of the cap of a negatively charged gold leaf electroscope as shown.

When U.V light is shone on the zinc plate, the leaf is found to fall. Explain. (2 marks)

_____

_____

_____

_____

(b) An certain metal surface has a work function of 2.04 x 10^{-19}J. Calculate the maximum kinetic energy in electron volt of the liberated elections when the metal is illuminated by light of wavelength 4.5 x 10^{-7}m. (3 marks)

$\begin{pmatrix} h = 6.63 \times 10^{-34}\, JS \quad C = 3.0 \times 10^{8}\, m/s \\ e = 1.6 \times 10^{-19}\, J \end{pmatrix}$

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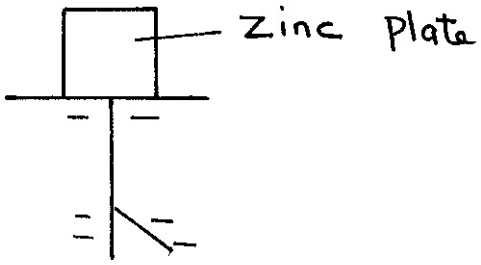
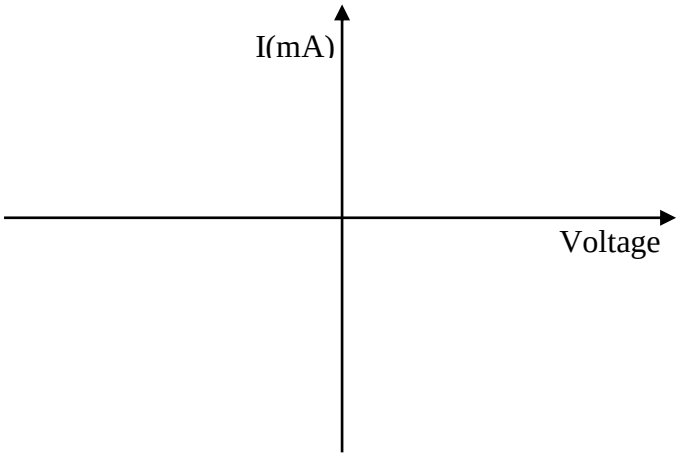
(c) (i) The figure below shows a P-N function diode connected to a dry cell.



On the axis provided plot the I.V characteristic of diode. (1 mark)



(ii) A piece of phosphorous crystal is added in the structure of silicon, state the minority charge carrier of the semiconductor formed. (1 mark)

_____

(iii) In the space below, draw a circuit of showing full-wave rectification using a bridge rectifier. (2 marks)

NAME…….. INDEX NO…….....

232/3
PHYSICS
PAPER 3
(PRACTICAL)
JULY/AUGUST, 2015
TIME: 2½ HOURS

CANDIDATE'S SIGN…….…….

DATE…….……

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK - 2015

Kenya Certificate of Secondary Education
PHYSICS
PAPER 3
(PRACTICAL)
TIME: 2½ HOURS

INSTRUCTIONS TO CANDIDATES:

1. *Write your **name** and **index number** in spaces provided **above**.*
2. ***Sign** and write the date of examination in spaces provided **above**.*
3. *Answer **all** the questions in spaces provided in the question paper.*
4. *You are supposed to spend the first 15 minutes of 2½ hours allowed for this paper reading the whole paper carefully before commencing the work.*
5. *Marks are given for clear record of the observations actually made, their suitability, accuracy and the use made of them.*
6. *Candidates are advised to record their observations as soon as they are made.*
7. *Mathematical table and electronic calculators may be used.*

FOR EXAMINER'S USE ONLY

Question 1									
Maximum Score									
Candidate's Score									

Question 2							
Maximum Score							
Candidate's Score							

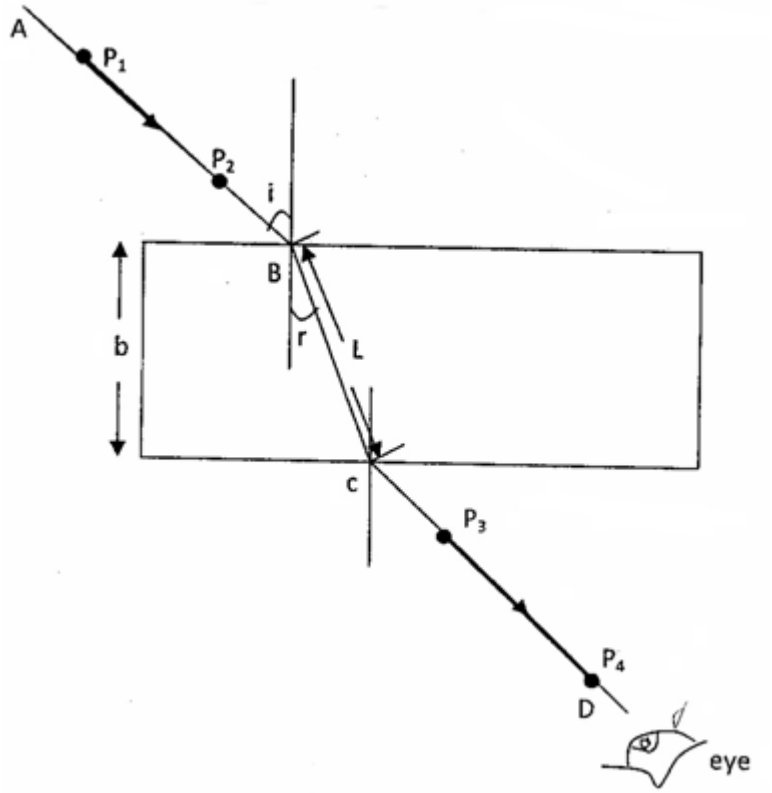
GRAND TOTAL

Physics Paper 3 *Turnover*

1. You are provided with the following:
   - A rectangular glass block.
   - 4 optical pins.
   - A softboard.
   - A plain paper.

   Proceed as follows:

   (a) Place the glass block on the plain paper with one of the largest face upper most. Trace round the glass block using a pencil as shown below.



   (b) Remove the glass block and draw a normal at B. Draw an incident ray AB of angle of incidence, i = 20°.

   (c) Replace the glass block and trace the ray ABCD using the optical pins.

   (d) Remove the glass block and draw the path of the ray ABCD using a pencil. Measure length L and record it in the table below.

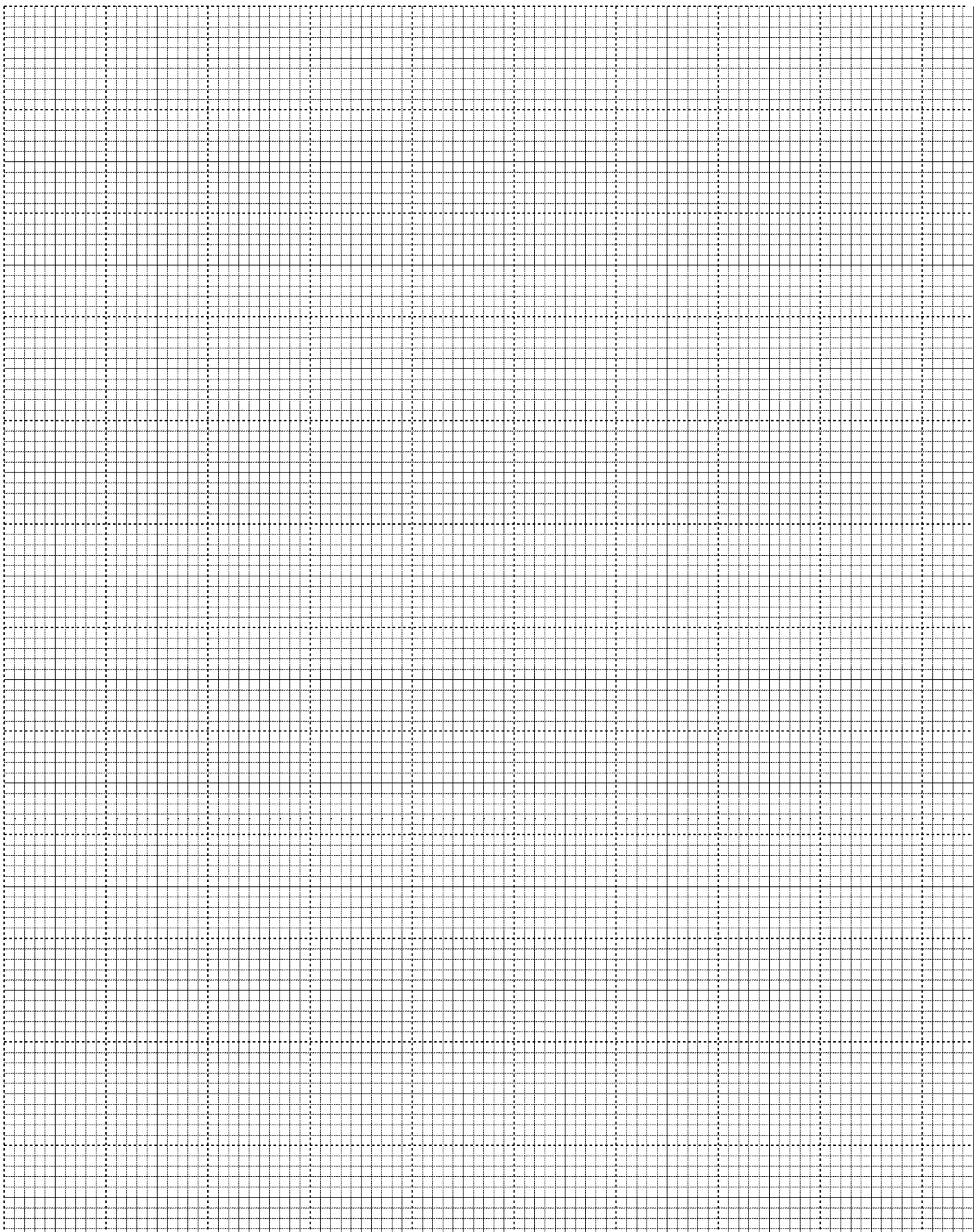
Angle i°	L(cm)	$L^2(cm^2)$	$\frac{1}{L^2}(cm^{-2})$	$Sin^2 i$
20				0.1170
30				0.2500
40				0.4132
50				0.5868
60				0.8830
70				

(6 marks)

(e) Repeat the procedure above for the angles of incidence given.

(f) Calculate the value of L^2 and $\frac{1}{L^2}$; Record in the table.

(g) Plot a graph of $\frac{1}{L^2}$ (y-axis) against $Sin^2 i$ (χ-axis). (5 marks)



(h) Calculate the gradient, S. (3 marks)

(i) Given that the equation of that graph: $\frac{1}{L^2} = -\left(\frac{1}{n^2 b^2}\right) Sin^2 i + \frac{1}{b_2}$

Determine the $\left(\frac{1}{L^2}\right)$ intercept C and the (Sin^2 i) intercept B.

C = _____ (1 mark)

B = _____ (1 mark)

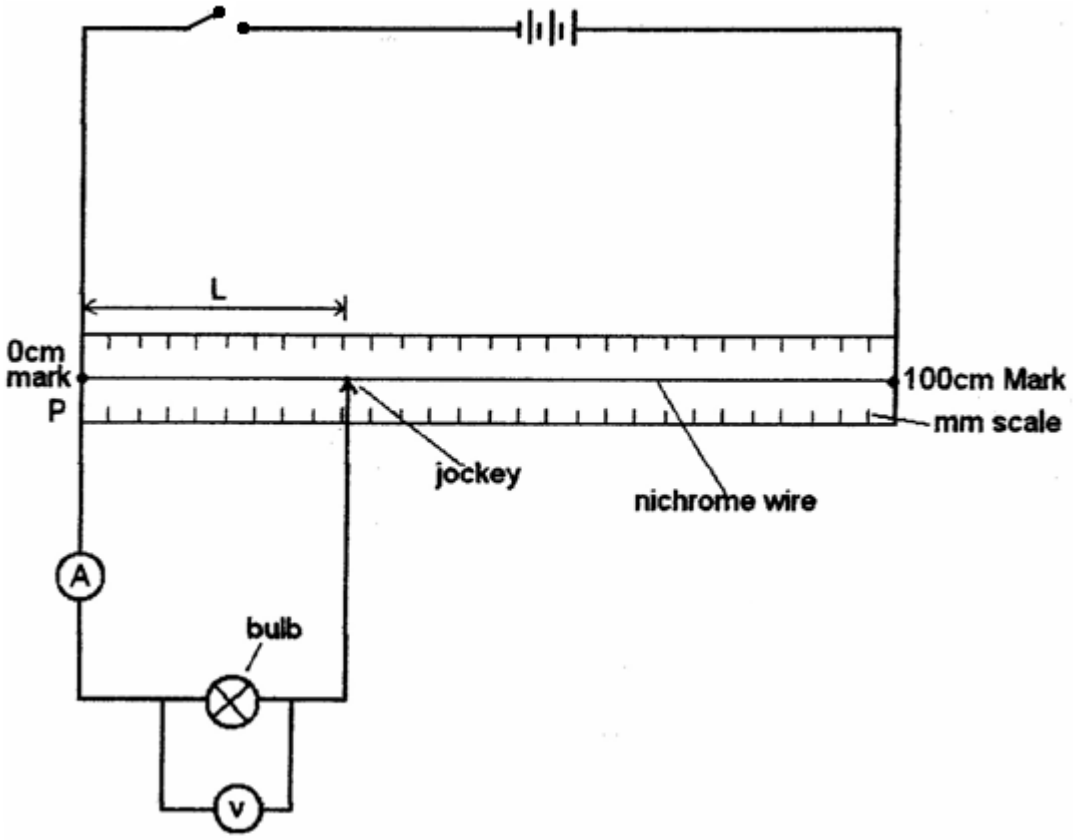
(j) Calculate the value of Q given by: (2 marks)

$Q = -\left(\frac{C}{S}\right) \div B$

(k) Hand in your constructions on the plain paper together with the answer script. (2 marks)

2. You are provided with the following apparatus:
   - 2 size D dry cells.
   - 100cm nichrome wire on a mm scale.
   - A bulb (2.5v) and a bulb holder.
   - 8 conductivity wires (at least 4 with crocodile clips).
   - Cell holder.
   - A switch.
   - A voltimeter (0 – 5v).
   - An ammeter (0 – 1A).
   - A jockey.

   (a) Connect the apparatus provided as show in the diagram below.



Procedure

(b) Place the jockey at χ = 20cm from P, then close the switch.
Record the ammeter reading and the voltmeter reading in the table below.

(c) Repeat the experiment by placing the jockey at χ = 40, 60, 70 and 80cm from P.
Record your readings and complete the table below.

Length L(cm)	1(A)	Pd V(v)	1(mA)	Pd V(mv)	Log 1	Log V

20						
30						
40						
50						
60						
80						

(d) Plot a graph of log I (y-axis) against log V. (5 marks)

(e) Determine the slope of the graph. (3 marks)

(f) Given that Log I = n log v + log k where k and n are constants of the lamp.

(i) Determine using your graph the value of

K _____ (2 marks)

N _____ (1 mark)