Name: …… Index No: ……..……

School: ……..……. Candidate's Signature: ……...……

Date: ……..……..……..……

232/1
PHYSICS
Paper 1
(THEORY)
Time: 2 Hours

MACHAKOS COUNTY KCSE TRIAL AND PRACTICE EXAMINATION 2015

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

PHYSICS
Paper 1
Time: 2 Hours

INSTRUCTIONS TO CANDIDATES:-

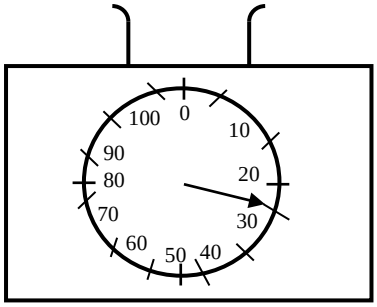
- *Write your **name**, **index number** and **school** in the spaces provided above.*
- *This paper consists of **two** sections; **A** and **B***
- *Answer **all** the questions in section **A** and **B** in the spaces provided*
- *All working **must** be clearly shown.*
- *Mathematical tables and electronic calculators may be used*
- *Take the earth's gravitational field strength $g = 10\ m/s^2$.*
- *This paper consists of 10 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

For Examiner's Use Only:

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

SECTION A: 25 MARKS

1. The figure below shows an empty beaker placed on the top of a pan calibrated in grammes. 50ml of alcohol of density 0.8g/cm3 was added to the beaker.



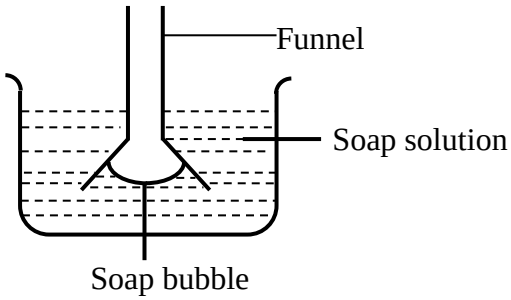
Show on the diagram the new pointer position. (2 Marks)

2. (a) What is surface tension?

_____

_____

(b) The figure below shows a funnel dipped into a liquid soap solution.



Explain what happens to the soap bubble when the soap is removed. (2 Marks)

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3. A boy on a bicycle accelerated uniformly at $1m/s^2$ for 10 seconds from an initial velocity of 4m/s. Calculate the distance travelled in this time. (3 Marks)

_____

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_____

4. An object is attached to a spring balance and its weight determined in air. It is then gently lowered into a beaker containing water.
(i) State what happens to the reading. (1 Mark)

_____

_____

(ii) Explain the force that causes observation in (i) above. (1 Mark)

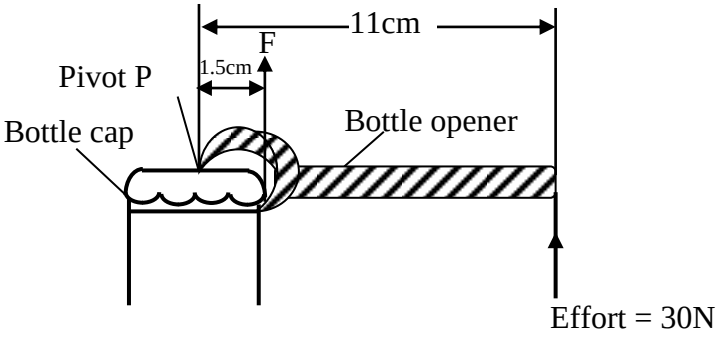
5. A metal cube weighs 1.0N in air and 0.8N when totally immersed in water.
Calculate

(i) Volume of water it displaces. (2 Marks)

(ii) the density of the cube (2 Marks)

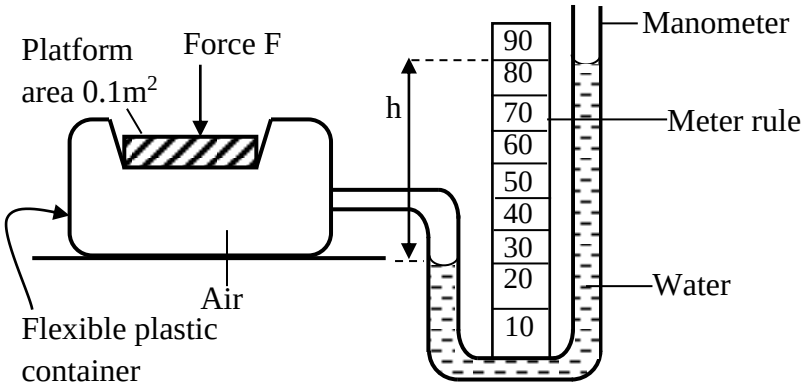
6. State how the velocity of a moving fluid varies with pressure. (1 Mark)

7. The figure below shows a bottle opener.



A force of 30N is applied at a distance of 11cm from the pivot P. The force F on the bottle cap of 1.5cm from the pivot P. Calculate the force F on the edge of the cap. (2 Marks)

8. The figure shows a manometer used to measure the pressure difference between the air inside a plastic container and the atmosphere outside.



Calculate the force F exerted on the container. (3 Marks)

_____

_____

_____

_____

9. A student observes that in the morning an overhead electrical cable is straight and taut. At midday the student observes that the same cable has sagged. Explain these observations. (2Marks)

_____

_____

10. A rubber tube is inflated to pressure of 2.7×10^5 pa and volume $3800cm^3$ at temperature of 25^0C. It is then taken to another place where the temperature is 15^0C and the pressure is 2.5 x 105 pa. Determine the new volume (3 Marks)

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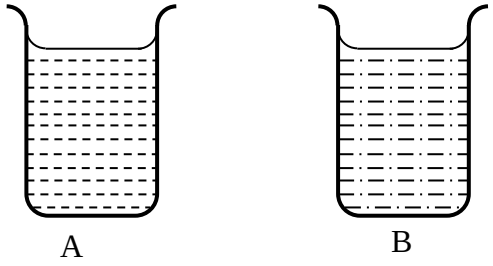
SECTION B: 55 MARKS

11. (a) The figure below shows two containers filled with two different liquids to the same height.



It was found that the pressure at the bottom of A is greater than that at B. Explain (1 Mark)

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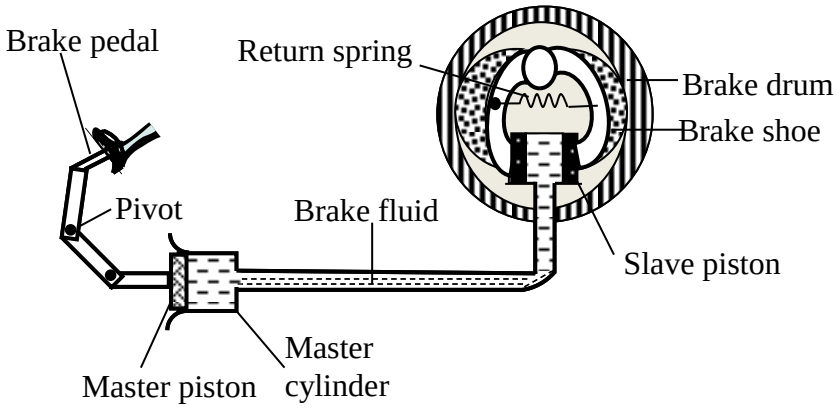
_____

(b) The figure below shows a car braking system. The brake fluid is an oily liquid.



The brake drum rotates with the wheel of the car.

(i) Explain how pushing the brake pedal makes the brake rub against the drum. (4 Marks)

_____

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(ii) The cross-sectional area of the master piston is $2.0cm^2$. A force of 140N is applied to the master piston.

(I) Calculate the pressure created in the brake fluid by the master piston. (2 Marks)

_____

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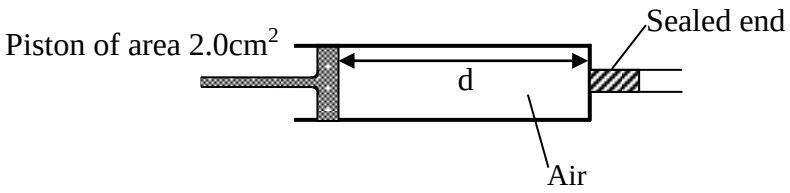
(II) The cross-sectional area of each slave piston is $2.8cm^2$. Calculate the force exerted on each slave piston by the brake fluid.

(III) The force exerted on the master piston is greater than the force applied by the foot on the brake pedal. Using the principle of moments, explain this (2 Marks)

(c) The figure below shows a master cylinder sealed at one end. Instead of brake fluid, the cylinder contains air.



When a force is applied to the piston, the length d changes from 6.0cm to 4.0cm. The pressure of the air increases but the temperature stays constant.

(i) Describe how the molecules of air exert a pressure. (1 Mark)

(ii) Explain why the pressure increases even though the temperature stays constant. (1 Mark)

(iii) The initial pressure of the air inside the cylinder is 1.0×10^5 pa. Calculate the final pressure of the air. (2 Marks)

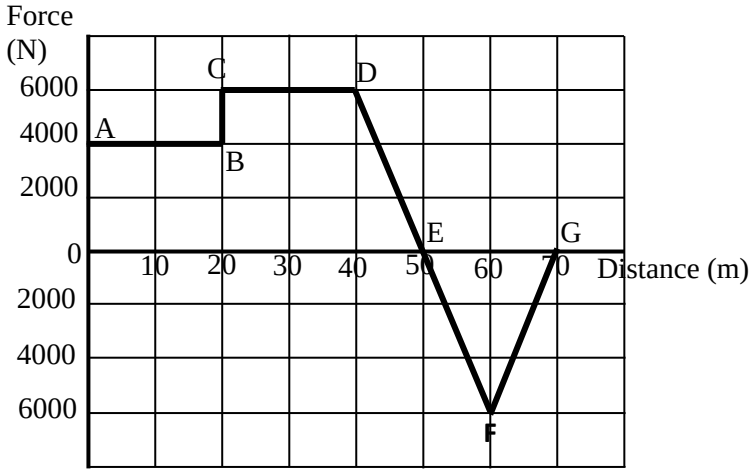
12. (a) What is a machine? (1 Mark)

(b) Two gear wheel have a 80 teeth (driven) and 20 teeth (driving) and lock with each other. They are fastened on axles of equal diameters such that a weight of 150N attached to a string round one axle will just raise 450N on the other axle.
Calculate
(i) M.A (2 Marks)

(ii) V.R (2 Marks)

(iii) Efficiency of the machine. (2 Marks)

(c) The graph below shows the variation of force with distance for a body being towed.



Calculate the total work done on the body. (3 Marks)

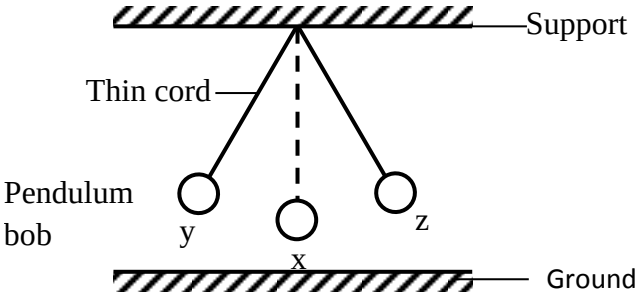
13. (a) Distinguish between distance and displacement. (2 Marks)

(b) A jet fighter moving horizontally at a speed of 200m/s at a height of 2km above the ground is to drop a bomb to hit a target on the ground. How long does the bomb stay in air after release before it hit the target? (3 marks)

(c) Two equal masses travel towards each other on a frictionless air track at speeds of 60cm/s and 40cm /s. They stick together on impact.

What is the velocity of the masses after impact?

(d) The figure shows a simple pendulum oscillating between Y and Z.



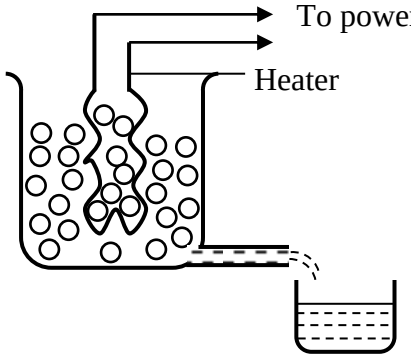
State the type of energy the body passes at

(i) Position y (1 Mark)

(ii) Position x (1 Mark)

14. (a) (i) Define the term latent heat of fusion. (1 Mark)

(b) In an experiment to determine the power of an electric heater, melting ice was placed in a container with an outlet and the heater placed in the ice as shown below. The melted ice was collected.

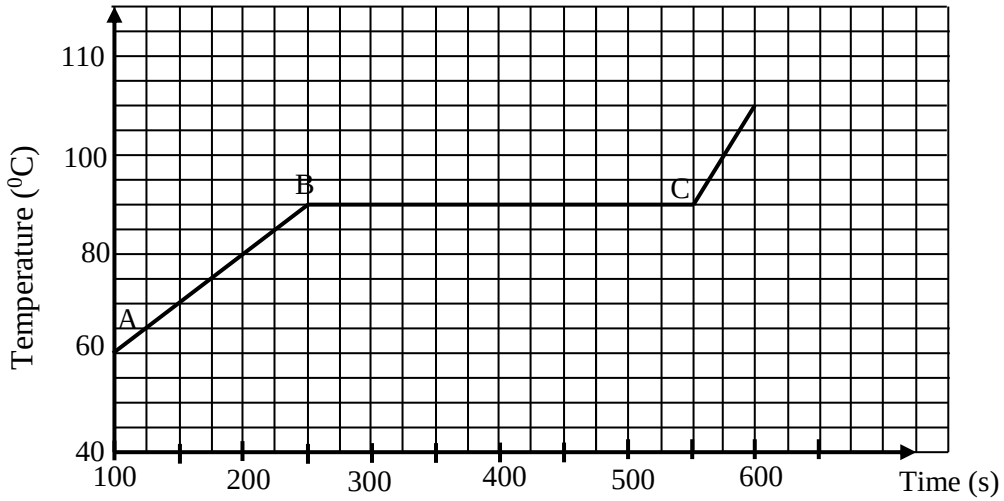


(i) Other than the current and voltage, state the measurement that would be taken to determine the quantity of heat absorbed by the melted ice in unit time. (1 Mark)

(ii) If the latent heat of fusion of ice is L, show how measurement in (i) above would be used in determining the power P of the heater. (2 Marks)

(iii) It is found that the power determined in this experiment is lower than the manufacturer's value indicated on the heater. Explain. (1 Mark)

(c) A mass of wax of 1kg was heated uniformly by a 100W heating element until it melted. The graph below shows how the temperature of the wax varies with time.



(i) Explain what is happening in the region.

AB

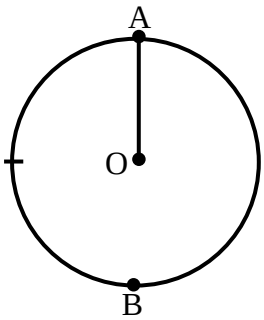
BC

(ii) Calculate the specific heat capacity of the wax. (2 Marks)

(iii) Calculate the specific latent heat of fusion of wax. (2 Marks)

15. (a) A stone of mass 450g is rotated in a vertical circle at 3 revolutions per second. If the string has a length of 1.5m, determine:
(i) the linear velocity (3 Marks)

(ii) The tension of the string at positions A and B. (4 Marks)



(b) State two factors affecting centripetal force. (2 Marks)

Name: ……Index No. ……..……..……

School: ……. Candidate's Sign. …….....

Date: ……..…….

232/2

PHYSICS

PAPER 2

TIME: 2 HOURS

MACHAKOS COUNTY KCSE TRIAL AND PRACTICE EXAM

2015

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

232/2

Physics

Paper 2

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

- *Write your **name** and **index number** in the spaces provided above*
- *This paper consists of **two** sections **A** and **B.***
- *Answer **all** questions in section **A** and **B** in the spaces provided.*
- *All working **must** be clearly shown in the spaces provided.*
- *Scientific calculators and KNEC Mathematical tables may be used.*
- *This paper consists of 12 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

FOR EXAMINER'S USE ONLY:

Section	Question	Maximum Score	Candidate's Score
A	1 – 12	25	
B	13	7	
	14	13	
	15	10	
	16	13	
	17	12	
Total Score		80	

SECTION A (25 MARKS)

1. A circuit consists of a battery, metal wire, ammeter and a switch connected in series. The switch is closed and the ammeter reading noted. The metal wire is now heated.
   a) State the observations made on the ammeter reading. (1mark)

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   b) Give one reason for the above observation made (1mark)

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2. 5 images are formed when two mirrors are inclined at an angle between them. Determine the angle of inclination. (2marks)

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3. A battery is rated 100AH. How long will it work if it steadily supplies a current of 2.5A (2marks)

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4. A current carrying conductor AB is in a magnetic field as shown in figure 1 below.

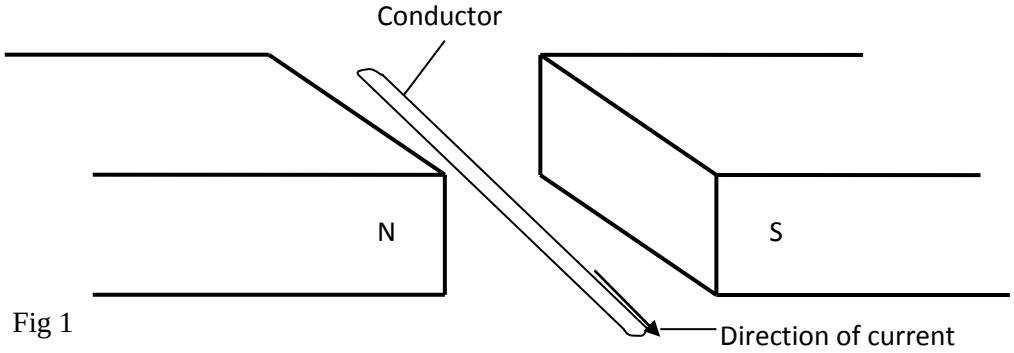

Fig 1

a) Indicate the direction of the force F acting on the conductor. (1mark)

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b) State two factors that determine the direction of the force F. (2marks)

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5. Figure 2 shows an incident ray normal to the surface BC of a right-angled glass prism ABC. The critical angle of the glass is 42^0

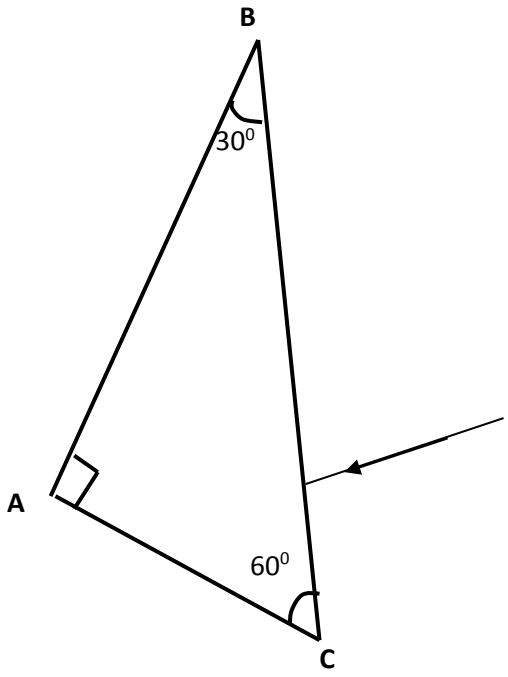

Fig 2

Complete the diagram to show the path of the ray. (2marks)

6. Figure 3 show an object placed in front of a convex mirror.

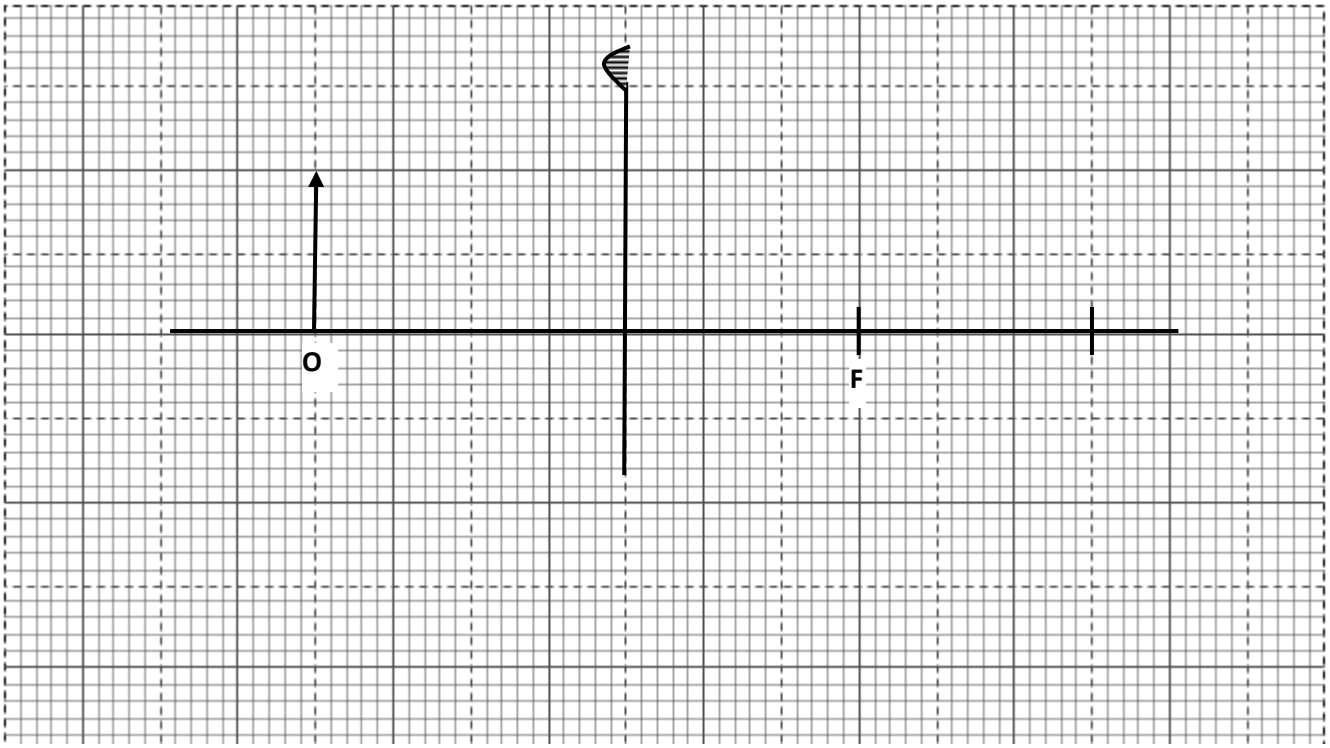

Fig 3

On the same diagram draw the appropriate rays and locate the image formed. (3marks)

7. A house has two 100w bulbs, two 60w bulbs and one 75w bulb. Determine the cost of having all the bulbs switched on for 60 hours, given that the cost of electricity is 50cents per kilowatt hour. (3marks)

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8. Figure 4 shows circular waves approaching a plane barrier in uniform medium.

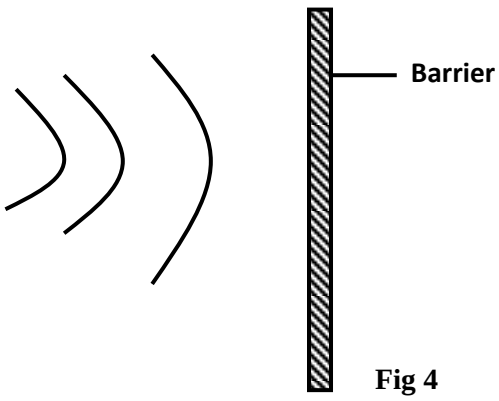

Fig 4

On the diagram sketch the reflected waves. (2marks)

9. Arrange the following in order of decreasing wavelength: x-rays, infrared, microwaves, gamma rays. visible light, radio waves, ultra violet. (2marks)

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10. Explain why most of the x-ray tube is surrounded by lead metal. (1mark)

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11. The expression below is an equation for a radioactive element P. Element Q and R are the daughter nuclides. P, Q and R are not the actual symbols of any of the elements.

$$\frac{235}{92}P \rightarrow \frac{231}{90}Q + \frac{x}{y}R$$

Identify the element R and state two of its characteristics.

R…….. (1mark)

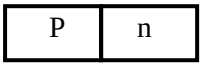
Characteristics i……

ii…… (2marks)

12. The figure 5 below shows a block diagram of a p-n junction diode.

On the same diagram, show how a cell may be connected so that it is reverse biased. (1mark)

Fig 5



SECTION B (55 MARKS)

13. Figure 6 shows an object placed 5cm in front of a convex lens whose focus length is 10cm.

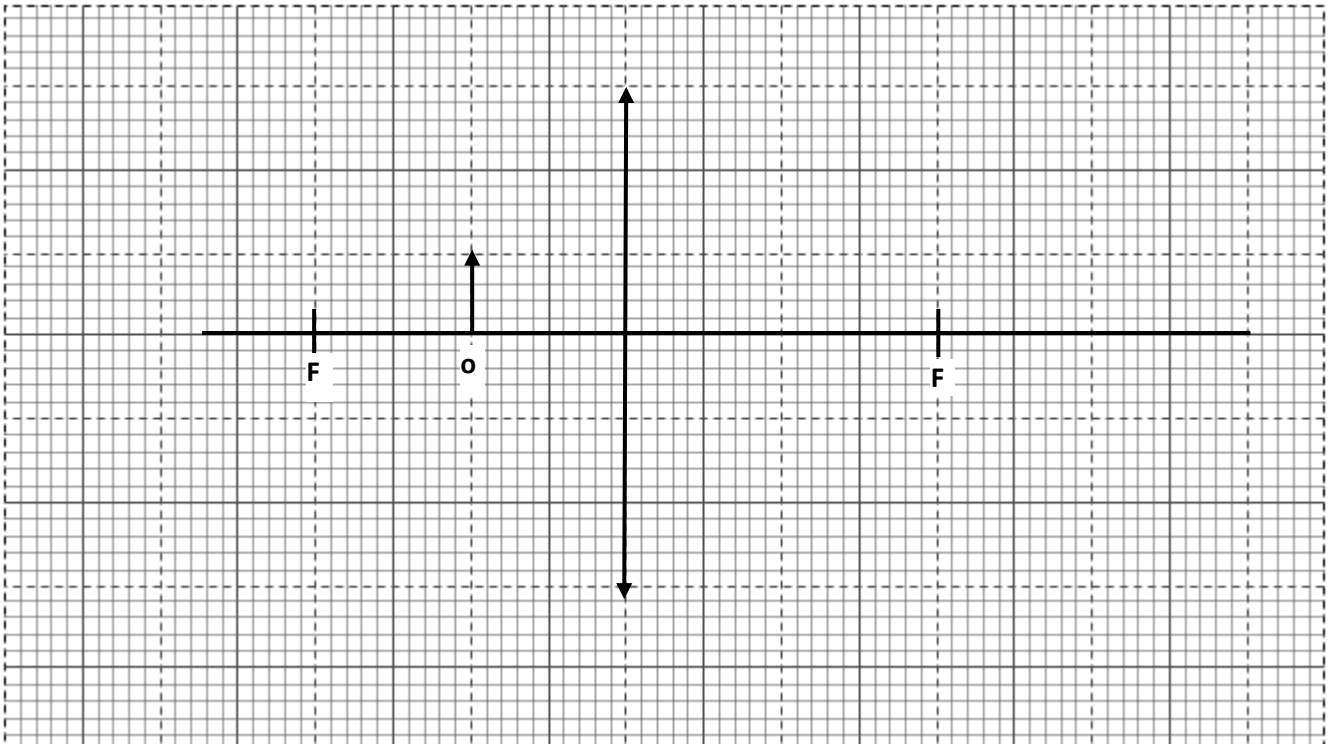


Fig 6

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

b) Use the ray diagram to determine

i) The image distance (1mark)

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ii) The image size (1mark)

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iii) The magnification (2marks)

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14. a) Explain how a negatively charged electroscope gets discharged when the cap is touched with a finger. (2marks)

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b) Figure 7 shows capacitors A, B and C connected as shown with a battery if e.m.f 6v and zero internal resistance

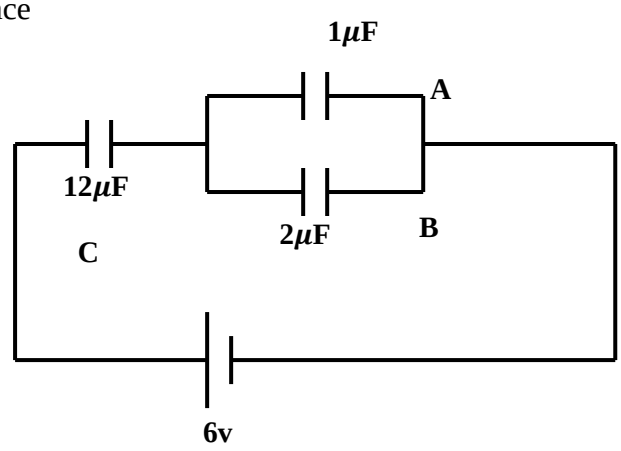

Fig 7

Determine

i) The effective capacitance of the circuit. (3marks)

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ii) The potential difference across 12μF capacitor (3marks)

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iii) Change stored in 1μF capacitor. (3marks)

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c) Figure 8 shows an isolated positive point charge P

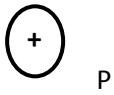

Fig 8

On the figure, sketch the electric field pattern around the charge. (2marks)

15. a) State one difference between electromagnetic waves and mechanical waves. (1mark)

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b) The wave shown in figure 9 below has a velocity of 200m/s

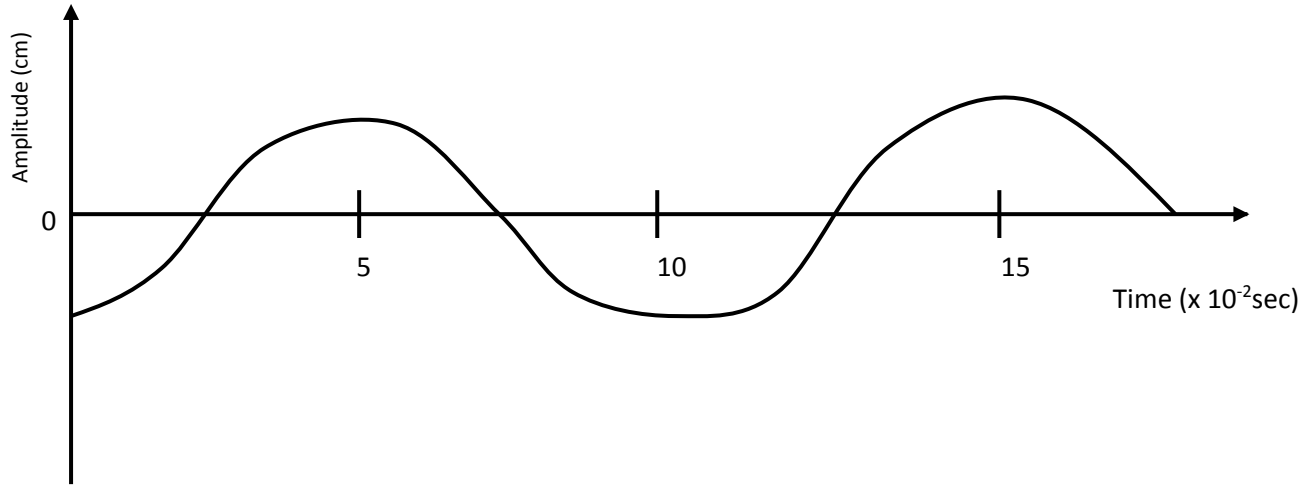

Fig 9

Determine

i) The period T of the wave (1mark)

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ii) The frequency of the wave. (2marks)

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iii) The wavelength of the wave. (3marks)

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c) Figure 10 below shows two rays of monochromatic light incident on two adjacent slits S1 and S2

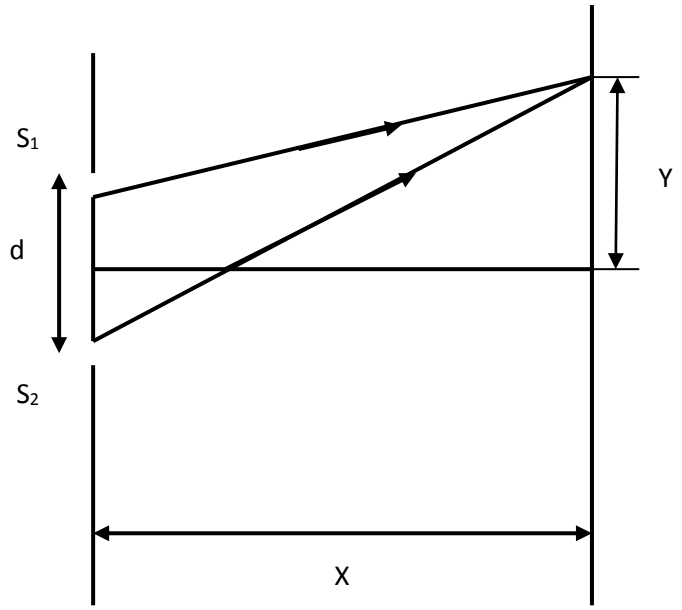

Fig 10

State what is observed on the screen when the:

i) Distance X is increased. (1mark)

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ii) Slit separation, d is reduced. (1mark)

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iii) White light is used. (1mark)

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16. a) A bar magnet is moved into a coil of insulated copper wire connected to a centre-zero galvanometer as shown in figure 11 below.

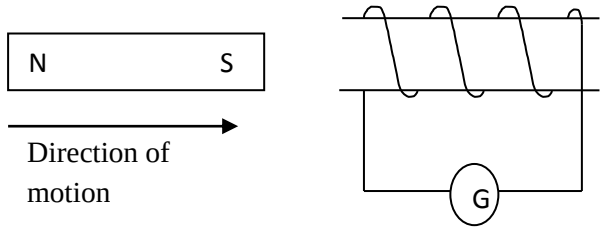

Fig 11

i) Show on the diagram the direction of induced current in the coil. (1mark)

ii) State and explain clearly what is observed on the galvanometer when the magnet is moved into and then withdrawn from the coil. (4marks)

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b) A transformer has 800 turn in the primary and 40 turns in the secondary winding. The alternating e.m.f connected to the primary is 240v and the current is 0.5A.
Determine

i) The secondary e.m.f (3marks)

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ii) The power in the secondary if the transformer is 95% efficient. (2marks)

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c) Explain how energy losses in a transformer are reduced by having

i) A soft-iron core (1mark)

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ii) A laminated core. (1mark)

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17. a. i) Distinguish between thermionic emission and photoelectric emission. (2marks)

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ii). State one factor which affects the rate of each of the above types of emission. (2marks)

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b) Sodium has a work function of 2.3 ev. given that planck's constant, h=$6.63x10^{-34}Js$,velocity of light in vacuum $c = 3.0x10^8\ {}^{m}/_{s,}$ $1ev = 1.6x10^{-19}c$ and mass of an electron $m_c = 9.1x10^{-31}kg$,calculate

i) Its threshold frequency (2marks)

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ii) The maximum velocity of the photoelectrons produced when the sodium is illuminated by light of wavelength $5.0x10^{-7}m$ (4marks)

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iii) The stopping potential V, with the light of this wavelength. (2marks)

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Name: ……Index No. ……..…….……

Candidate's Sign. ……..…….....

Date: …….……

232/3

PHYSICS PRACTICAL

Paper 3

TIME: 2 ½ HOURS

MACHAKOS COUNTY KCSE TRIAL AND PRATICE EXAM 2015

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

Physics

Paper 3

Time: 2 ½ Hours

INSTRUCTIONS TO THE CANDIDATES:

- *Write your **name** and **index number** in the spaces provided above.*
- *Answer **all** questions in the spaces provided in the question paper.*
- *You are supposed to spend the first 15 minutes of the 2 ¼ hours allowed for this paper reading the whole paper carefully.*
- *Marks are given for a clear record of the observation actually made, their suitability, accuracy and the use made of them.*
- *Candidates are advised to record their observations as soon as they are made.*
- *Mathematical tables, slide rules and calculators may be used.*
- *Take $\pi = 3.14$ and gravitational acceleration $g = 10m/s^2$*
- *Record your observations as soon as you make them.*
- *This paper consists of 6 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

For Examiners' Use Only

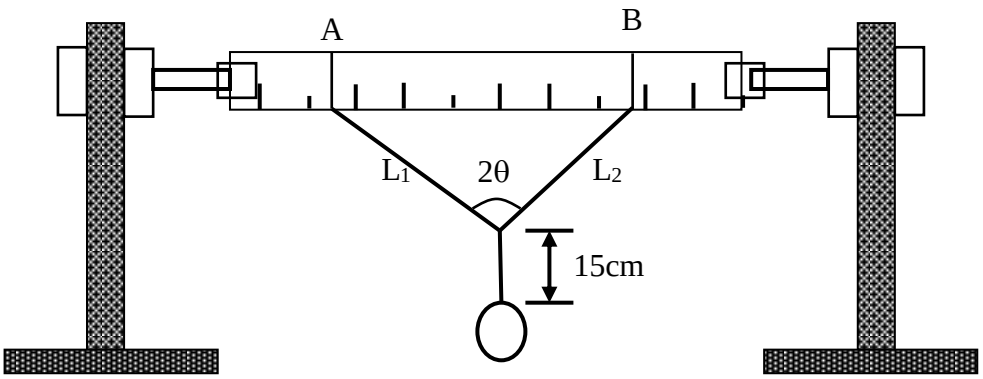
Question 1	e (i)	e (ii)	f	g	h
Maximum Score	**6**	**5**	**2**	**2**	**3**
Candidate's Score					

Question 2	a (i)	a(ii)	b	c	d	25 (i)	(iv)	(v)
Maximum Score	**8**	**5**	**2**	**2**	**3**			
Candidate's Score								

1. You are provided with the following apparatus
   - A metre rule
   - Two stands
   - A pendulum bob
   - Some plasticine
   - Stop watch
   - Two pieces of strings (long and short one)

   Proceed as follows:

   (a) Attach one end of the length of string to the metre rule at 10cm mark. Mark by use of a sliding loop of string round the meter rule.
   (b) Fix the string at this point with the small bob of plasticine.
   (c) Tie the string in a second loop at 90cm mark so that the string is stretched tight between the two marks.
   (d) Fix this loop with a small plasticine. Attach the pendulum bob to the centre of the string so that the centre of gravity is 15cm below the point of suspension.
   (e) If the attachments of the pendulum bob to the pieces does not produce a V-shape. Squeeze the string at the knot between the thumb and the fore finger.



i) Measure the angle 2θ (1mk)

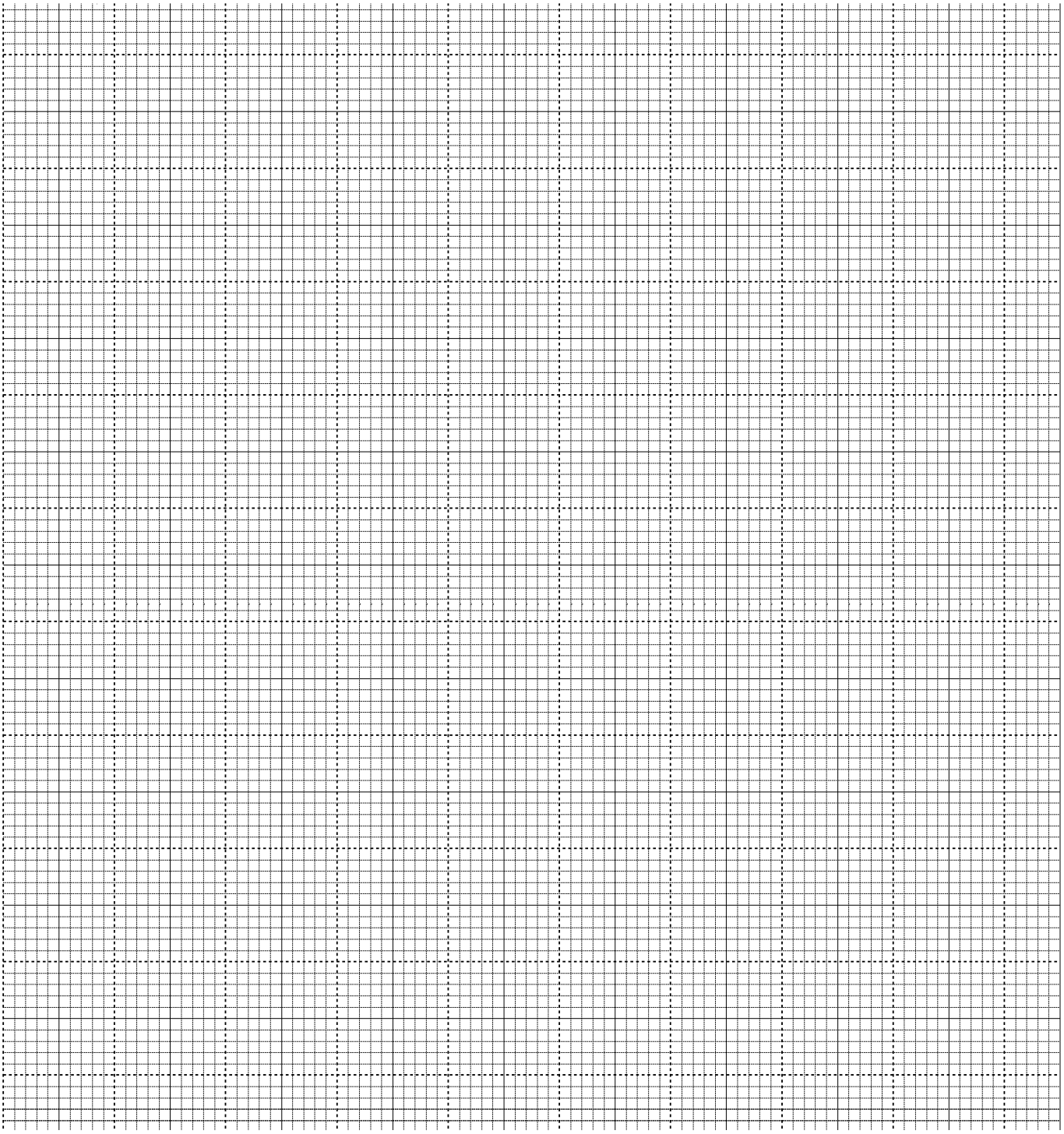
ii) Pull the pendulum bob towards you through a small distance, release it; measure the time (t) of the motion by timing 10 oscillations.

iii) Remove the plasticine at B and slide the loop towards A by 4cm and repeat (ii) above for other distances AB as shown in the table below.

Table (a) (8marks)

Length from A to B (cm)	80	76	72	68	64	60
Time for 10 oscillations (s)						
Period time T (s)						
$T^2(s^2)$						
2θ						
θ						
Cosθ						

(f) Plot a graph of T^2 against Cosθ (5 marks)



(g) Find the slope "s" of the graph. (3 marks)

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(h) Given that $k = \frac{1.6\pi^2}{s}$ find k. (2 marks)

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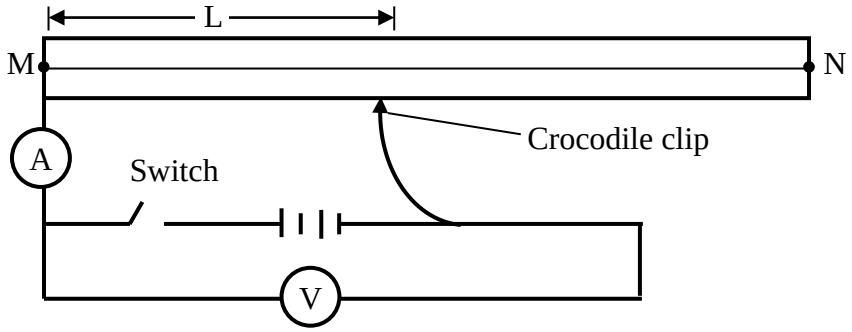
2. (a) You are provided with the following apparatus:
   - Resistance wire fitted on a scale labelled MN
   - Switch
   - Voltmeter
   - Ammeter
   - Two dry cells
   - Six connecting wires

(i) Set up the apparatus as shown in the figure below;



(ii) Remove the crocodile clip to the resistance wire such that MN and close the switch. Record the voltmeter reading.
Y=……..V (1mk)

(iii) Attach the crocodile clip to the resistance wire such that L=10cm

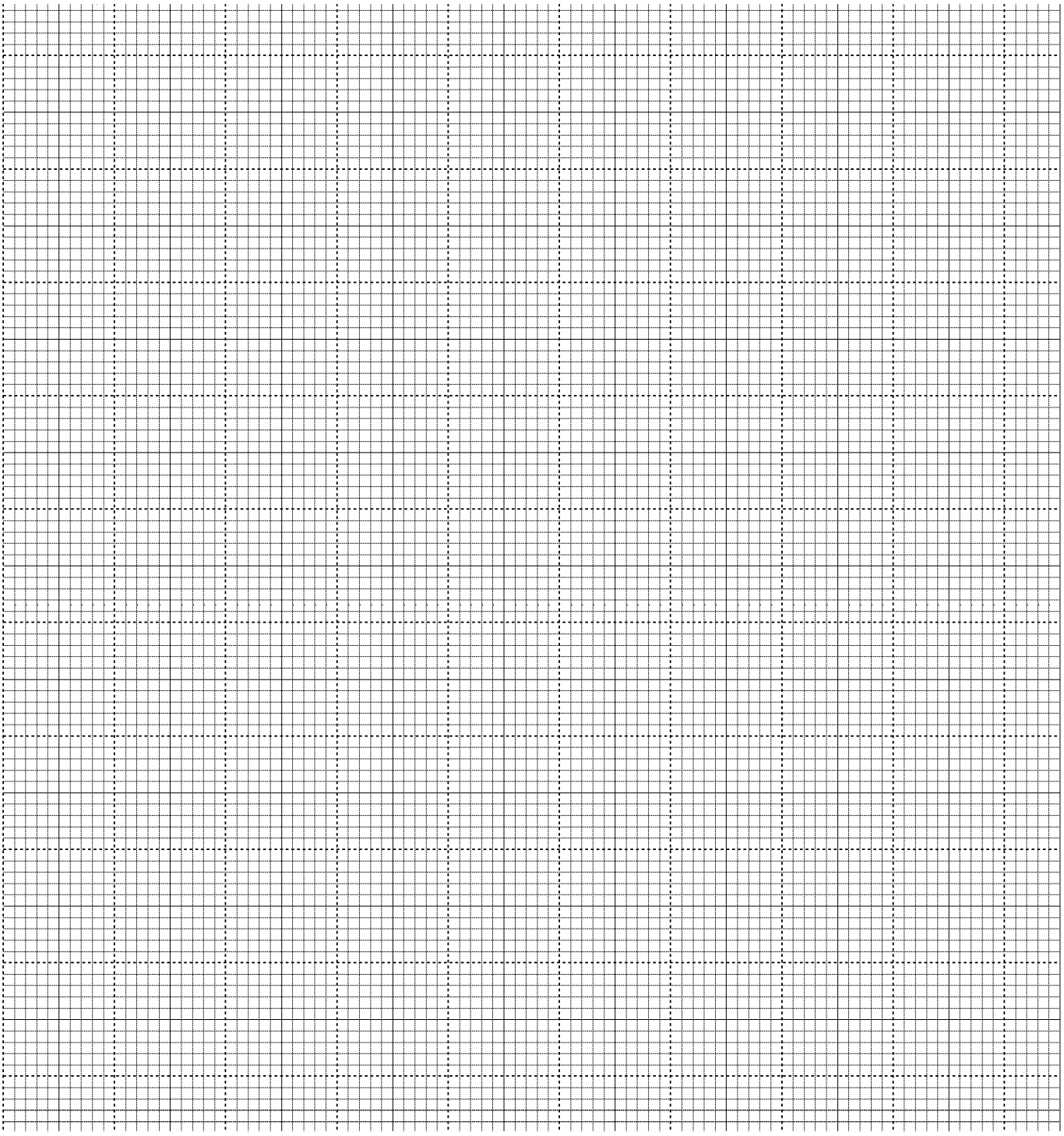
(iv) Record the voltmeter and ammeter readings in the table below.

(v) Repeat the procedure in (iii) and (iv) for L=20cm, 30cm, 50cm, and 80cm

(vi) Complete the table below; (5 marks)

Length L=cm	10	20	30	50	80
Current I (A)					
p.d $V_{(v)}$					
Y-V					
$\frac{V}{y-v}$					
R = $\frac{V}{I}$					

b) Plot a graph of R (vertical axis) against $\frac{v}{y-v}$ (5 marks)



c) Determine the slope m of the graph (2marks)

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d) The graph is given by the equation $R = \frac{5mv}{y-v} + d$ determine the value of m and d (2 marks)

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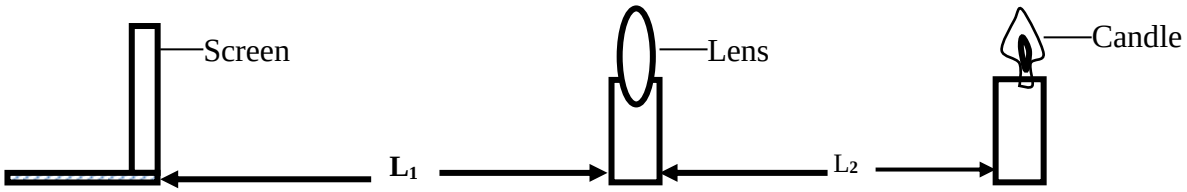
Question 2 (b)

You are provided with the following set of apparatus

- A metre rule
- A white screen
- A candle
- Lens and lens holder

Procedure

i) Set up the apparatus as shown



ii) Starting with L_1=30cm, adjust the position of the candle in order to obtain a sharp image on the screen. Record the value of L_2……. (1mk)

iii) Repeat the procedure for L_1=60cm

iv) Fill and complete for values of L_1/L_2 below. (3 marks)

L_1cm	L_2(cm)	$\frac{L_1}{L_2}$
30		
60		

v) Given the equation

$$F_1 = \frac{L_1}{m+1}$$

When m=magnification determine the value of focal length f, (2 marks)

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_____

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