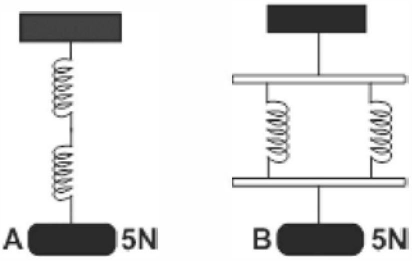
BURETI SUB-COUNTY JOINT EVALUATION TEST
Kenya Certificate of Secondary Education
232/1
PHYSICS
Paper 1
July/August 2016
Time: 2 Hours

SECTION A : (25 MARKS)

1. The water level in a burette is $20.3cm^3$. 50 drops of water each of volume $0.1cm^3$ are added to the water in the burette. What is the final reading of the burette? (2 marks)
2. The springs in figure 1 are identical.

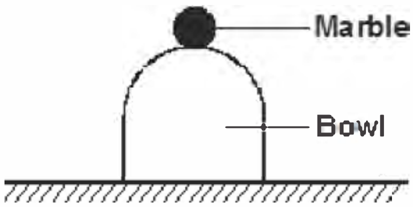
Fig. 1



The extension produced in A is 4cm. What is the extension in B? (3 marks)

3. Water flows through a narrow pipe of radius 6cm connected to another pipe of radius 9cm. If the speed of water in the narrow pipe is 3m/s, determine the speed of water in the wider section. (3 marks)
4. Figure 2 shows a marble placed on an inverted bowl.

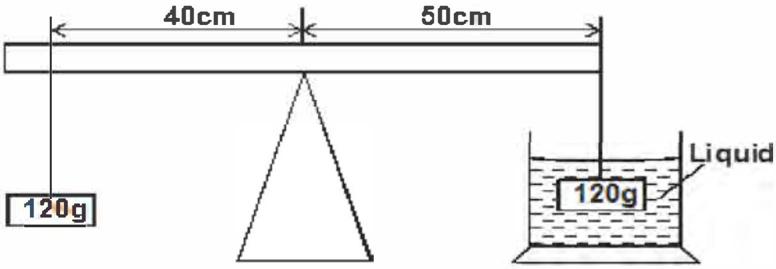
Fig. 2



State and explain the type of equilibrium the marble is. (3 marks)

5. A uniform meter rule is balanced as shown in the figure 3 below.

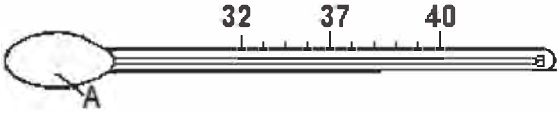
Fig. 3



By displacement method, the immersed object is found to occupy $13.5cm^3$. Determine the density of the liquid in SI units.(3 marks)

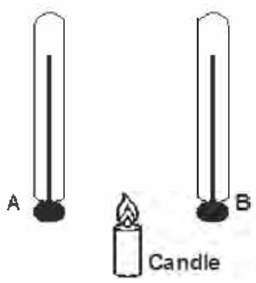
6. Figure 4 below shows a thermometer used by a doctor to determine the temperature of a patient. Why is it difficult to work with this thermometer? (2 marks)

Fig. 4



7. Figure 5 shows two identical thermometers. Thermometer A has a blackened bulb while thermometer B has a silvery bulb. A candle is placed equidistant between the two thermometers.

Fig. 5



State with a reason the observations made after sometime. (2 marks)

8. When a liquid is heated in a glass flask its level at first falls then falls then rises. Explain this observation. (2 marks)

9. Sketch a graph showing how volume of pure water varies with temperature from0° to 10°C. (2 marks)

10. A tall building has two barometers, one at the ground floor reading 750nunHg and the other at the top reading 748nunHg. Determine the height of the building. (2 marks)

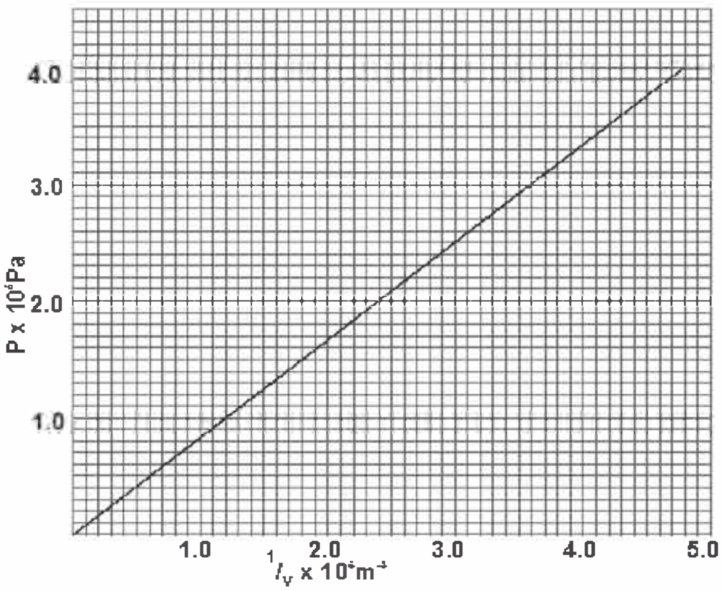
11. What does study of thermodynamics entails? (1 mark)

SECTION B: (55 MARKS)

12. **a)** State what is meant by an ideal gas. (1 mark)

b) The pressure acting in a gas in a container was changed steadily while the temperature of the gas as maintained constant. The value of volume V of the gas measured for various values of pressure. The graph in the figure 6 shows the relation between the pressure, P1 and the reciprocal of volume 1/V

Fig. 6



i) Suggest how the temperature of the gas could be kept constant. (1 mark)

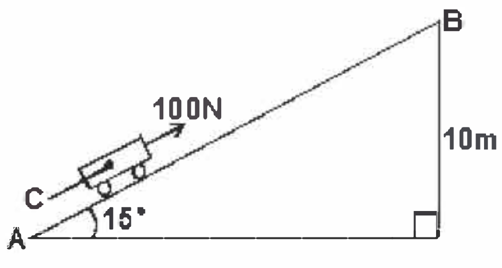
ii) Given that the relation between the pressure P1 and the volume V1 of the gas is given by PV = k. Where k is a constant, use the graph to determine the value of k. (3 marks)

iii) What physical quantity does k represent? (1 mark)

iv) State one precaution you would take when performing such an experiment. (1 mark)

c) A gas occupies a volume of 4000 litres temperature of 37°C and normal atmosphere pressure. Determine the new volume of the gas if it is heated at constant pressure to a temperature of 67°C (normal atmosphere pressure P = 1.01 x 10^5Pa) (4marks)

13. Figure 7 below shows an inclined plane, a trolley of mass 30kg is pulled up a slope by a force of 100N parallel to the slope. The trolley moves so that the centre of mass C travels from points A to B.



i) What is the work done on the trolley against the gravitational force in moving from A to B?

ii) Determine the work done by the force in moving the trolley from A to B (2 marks)

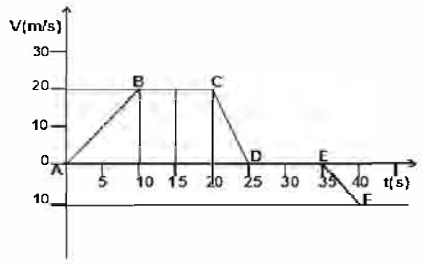
iii) Determine the efficiency of the system. (3 marks)

iv) Determine the work done in overcoming the frictional force. (1 mark)

v) Determine the mechanical advantage of the system. (3 marks)

14. **a)** Figure 8 below is a graph showing the velocity of a body plotted against time.

Fig. 8



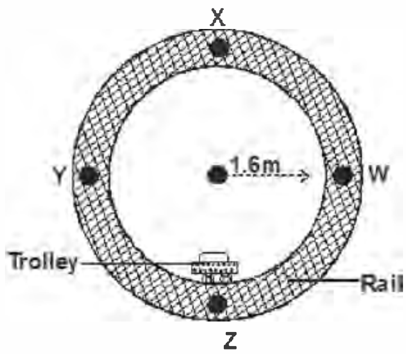
i) Describe the motion of the boy over : (3 marks)
CD, DE,EF

ii) What is the acceleration of the body over the region AB? (1 mark)

iii) What is the average velocity over the total journey? (2 marks)

b) Figure 9 below shows a trolley moving on a circular rail with a vertical plane, given that the mass of the trolley is 250g and the radius of the rail is 1.6m.

Fig. 9



i) Determine the minimum velocity at which trolley passes point X. (3 marks)

ii) Find the angular velocity at point Z (3 marks)

iii) The force exerted on the rail at this point. (2 marks)

15. **a)** A boy throws a tennis ball vertically upwards from a truck moving at a constant velocity. Give the reason why the ball lands back exactly the same point where it was projected. (1 mark)

b) Define impulse in terms of momentum. (1 mark)

c) A trailer of mass 30 tonnes travelling at a velocity of 72km/h runs onto a stationary bus of mass 10 tonnes.The impact takes 0.5 seconds before the two vehicles move off together at a constant velocity for 15 seconds. Determine:

i) The common velocity (3 marks)

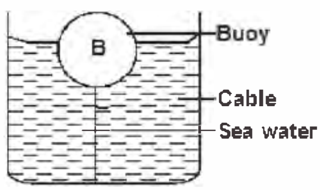
ii) The distance moved after the impact. (2 marks)

iii) The impulsive force on the trailer on impact. (3 marks)

d) Give a reason why when a passenger jumps from a floating boat, the boat moves backwards.

16. Figure 10 below shows a buoy B of volume 40 litres and mass 10kg. It is held in position in sea water of density $1.04gcm^{-3}$ by a light cable fixed to the bottom so that $^{3}/_{4}$ of the volume is below the surface of the sea water.

Fig. 10

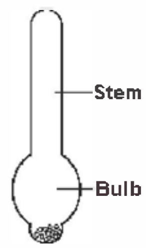


i) Show all the forces acting on the buoy at equilibrium. (3 marks)

ii) Determine the tension in the cable. (3 marks)

c)Figure 11 shows a bulb hydrometer.

Fig. 13



i) State the principle in the hydrometer. (1 mark)

ii) Explain why the hydrometer has a weighted bulb and narrow stem. (1 mark)

BURETI SUB-COUNTY JOINT EVALUATION TEST
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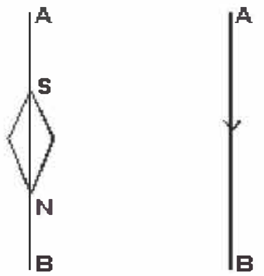
232/2
PHYSICS
Paper 2
July/August 2016
Time: 2 Hours

SECTION A : (25 MARKS)

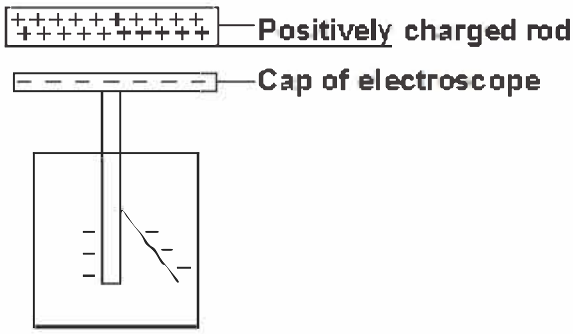
Answer all the questions in this section in the spaces provided.

1. A current carrying wire is placed above a compass needle as shown in the figure below.



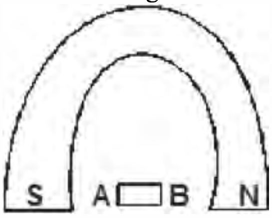
If the current flows in the direction A to B, show in the diagram the deflection of the compass needle. (1mark)

2. State two differences between sound waves and microwaves. (2 marks)
3. The figure below shows a highly positively charged rod being moved slowly downwards towards the cap of a negatively charged leaf electroscope. It is observed that the leaf initially falls then rises.



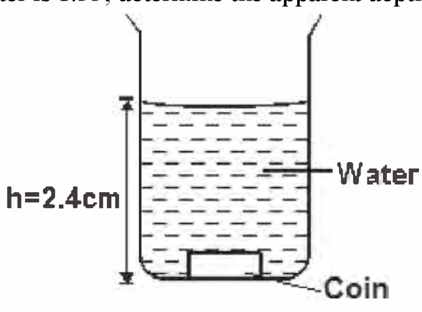
Explain this observation. (2 marks)

4. A soft iron bar AB is placed in a magnetic field of a horse shoe magnet as shown below.

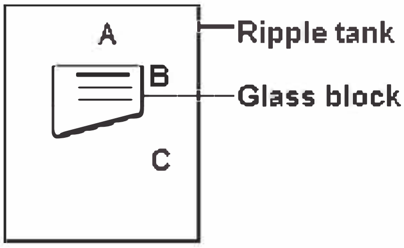


What are the polarities of A and B. (1 mark)

5. A certain car battery is rated 30Ah. Determine the amount of current it can supply in 10 minutes.
6. A coin is placed at the bottom of a beaker filled with water to a height of 2.4cm as shown in the figure below. Given that the refractive index of water is 1.33, determine the apparent depth of the coin. (3 marks)

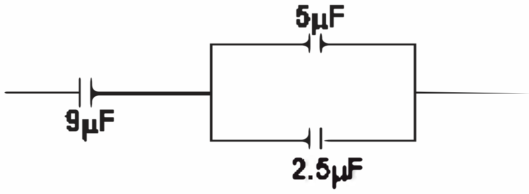


7. The figure below shows water waves travelling from region A through B to C in a ripple tank.



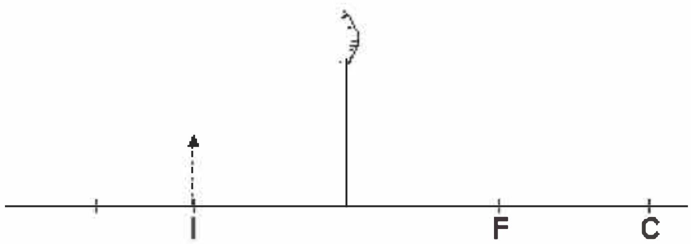
On the same diagram, complete the figure to show incident waves at region A and after crossing the boundary to C. (2 marks)

8. The figure below shows part of an electric circuit. The charge stored in the 9 μF capacitor is 1.4 micro coulombs (μC)



Determine the p.d across the 5 μF capacitor. (3 marks)

9. The figure below shows an image I formed by an object placed infront of a convex mirror. C and F are the centre of curvature and principal focus of the mirror respectively. Using appropriate rays locate the object position. (3 marks)



10. Given that the wavelength of a certain electromagnetic wave is 7500cm, determine its frequency. (Take the speed of light in a vacuum as 3.0×10^8 m/s) (2 marks)

11. Uranium -234 undergoes a radioactive decay represented by the equation shown below.

$$^{234}_{92}U \longrightarrow {}^{a}_{b}X + 2\alpha$$

Find the value of a and b (2 marks)

12. State two modifications that can be done to a pinhole camera in order to be used to fake still photographs. (2 marks)

SECTION B : (55 MARKS)

Answer all the questions in the spaces provided.

13. **a)** State the Faraday's law of electromagnetic induction. (1 mark)

b)i) A transformer is connected to an a.c source of 240V to deliver 12A at 120V to a heating coil. If 20% of energy taken from the supply is dissipated in the transformer, calculate the current in the primary coil. (4 marks)

ii) If the wire in the primary coil is charged to have a 2Ω determine the power dissipated as heat in the coil. (2 marks)

c) A house has three rooms each with two 240V, 60W bulbs. If the bulbs are switched on from 7.00p.m to 10.00pm daily.

i) Calculate the power consumed per day in kilowatt-hours. (3 marks)

ii) Find the cost per week for lighting these rooms at sh.6.30 per kilowatt hour. (2 marks)

d) What is the purpose of earthing in domestic wiring circuit? (1 mark)

14. **a)** The distance of separation between the plates of a certain capacitor is reduced. State how this affects the capacitance of a capacitor. (1 mark)

b) You are provided with the following apparatus used for studying charging of a capacitor.

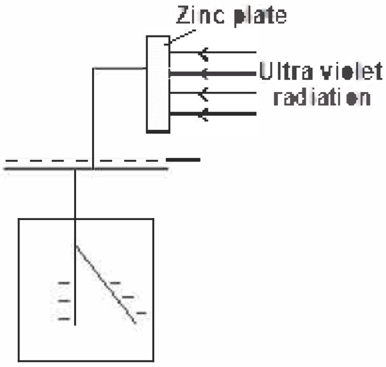
An uncharged capacitor, voltmeter, milliameter, 6V battery, connecting wires, a switch and a load resistor R.

i) Draw a circuit diagram that can be used to charge the capacitor. (2 marks)

ii) Use the circuit diagram drawn above to explain how the capacitor gets charged. (3 marks)

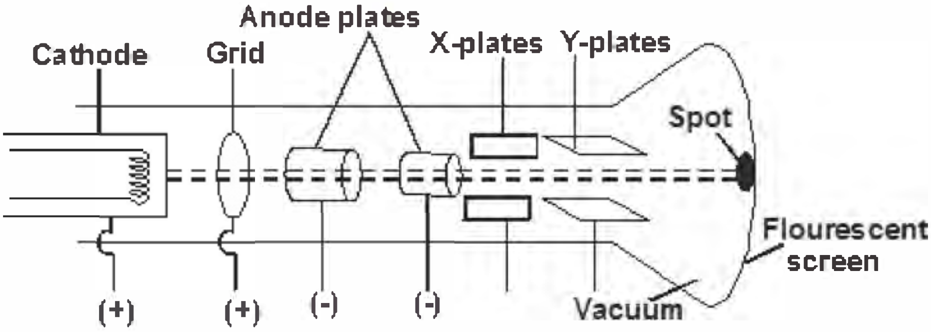
iii) State the purpose of resistor R. (1 mark)

c) The zinc plate shown below is connected to a negatively charged electroscope and is exposed to ultraviolet radiation.



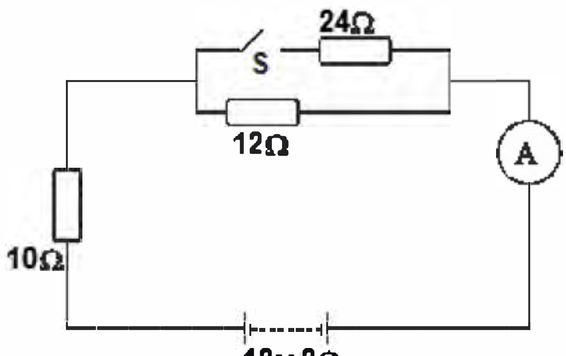
i) Explain what happens to the leaf of the charged electroscope. (3 marks)
ii) If the same experiment is repeated using a positively charged electroscope, explain the observation. (3 marks)

15. a) Differentiate between X-rays and cathode rays in their mode of production. (2 marks)
b) The figure below shows a cathode ray oscilloscope (CRO) drawn by a student.



i) Identify two mistakes in the diagram. (2 marks)
ii) In a correctly drawn C.R.O, what adjustment can be made to obtain a very bright spot. (1 mark)
ii) State the reason why the fluorescent screen should be earthed. (1 mark)
iv) State two differences between a C.R.O and T.V tube. (2 marks)
c) In an X-ray tube, the accelerating voltage is 100KV
i) Calculate the kinetic energy of the electrons arriving at the target (take $e = 1.6 \times 10^{-19}C$) (3 marks)
ii) If 0.5% of the kinetic energy is converted to X-rays, determine the minimum wavelength of the emitted X-rays (take h = 6.63×10^{-34}Js and C = 3.0×10^{8}m/s) (4 marks)

16. a) State one condition necessary for Ohm's law to be obeyed. (1 mark)
b) The figure below shows a battery of e.m.f 12V and internal resistance of 2Ω connected to resistors and an ammeter.



i) Determine the ammeter reading when the switch S, is open. (3marks)
ii) Find the ammeter reading when the switch is closed. (4 marks)
c) A lens forms an image on a screen when the distance between the object and the lens is 100cm.
i) What kind of lens was used? Explain. (2 marks)
ii) If the size of the image is twice the size of the object, determine the distance of the image from the lens. (2 marks)
iii) Determine the power of the lens. (2 marks)

BURETI SUB-COUNTY JOINT EVALUATION TEST
232/3
PHYSICS
Paper 3
July/August 2016
Time: 2½ Hours

1. You are provided with the following apparatus :
- one resistor labelled R = 40Ω
- a wire labelled W mounted on milliameter scale
- a wire labelled S mounted on a milliameter scale
- one dry cell and a cell holder
- one jockey
- one centre zero galvanometer
- eight connecting wires, four with crocodile clips at both ends
- a micrometer screw gauge
- a switch

Proceed as follows

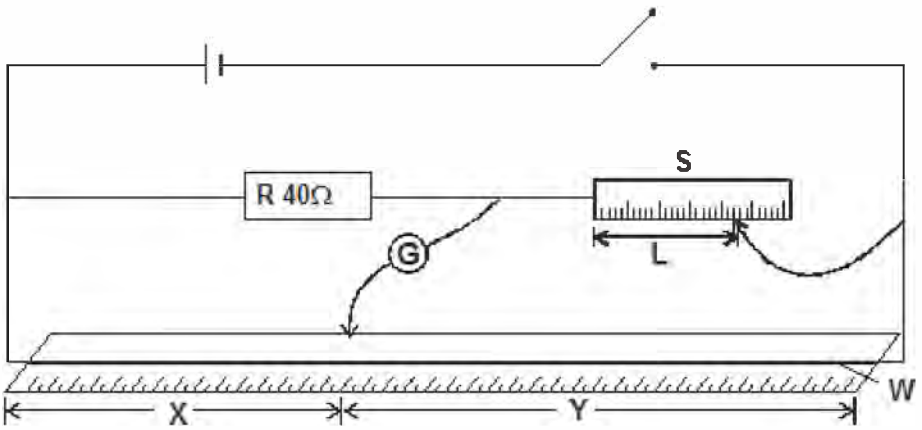
a) Determine the average diameter D, of the wire labelled W using the micrometer screws gauge provided.

D_1 = ... mm (½ mark)

D_2 = ... mm (½ mark)

$D = \frac{D_1 + D_2}{2}$ (½ mark)

b) Set up the apparatus as shown in the circuit diagram in figure 1 below.
Use the crocodile clips to fix length L, of wire labelled S at 50cm from the end connected to the galvanometer G.



c) Close the switch and use the jockey to touch one end of the wire W, and then the other end. The deflections on the galvanometer should be in opposite directions, if not check the circuit. Adjust the positions of the jockey along the wire W until there is no deflection in the galvanometer. Record the value of x and y.

x = ... cm (½ mark)
y = ... cm (½ mark)

d) Record for other values of L in the table.

L (cm)	45	40	35	30	25	20
X (cm)						
Y (cm)						
$\frac{y}{x}$ (adp)						

(3 marks)

e) i)Plot a graph of $^{y}/_{x}$ (y-axis) against L. (4 marks)
Fig. 2

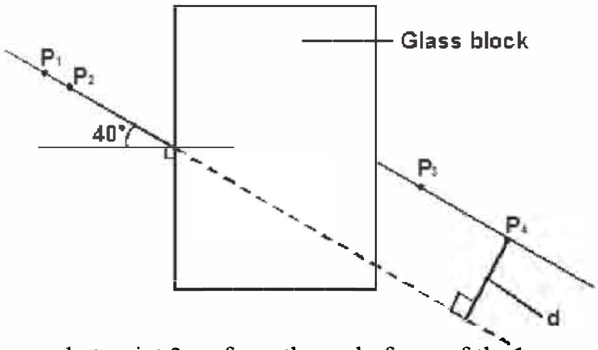
ii) Determine the slope, m of the graph. (2 marks)
iii) Given that K = <u>100D,</u> determine the value of K. (2 marks)

PART B

You are provided with the following apparatus :
- a rectangular glass block
- four optical pins
- a piece of soft board
- a plain sheet of paper
- 4 thumb tacks

<u>Proceed as follows</u>

Place the plain sheet of paper on the soft board and fix it using the thumb tacks provided.
Place the glass block at the centre of the sheet, draw its outline. Remove the glass block.

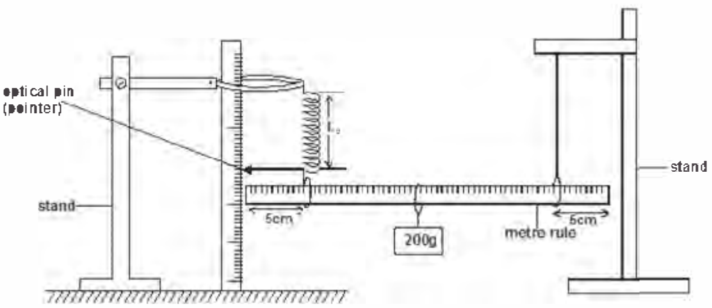


ii) Draw normal at point 2cm from the end of one of the longer side of the block outline. Draw a line at an angle of □ = 40° from the normal. Stick two pins p_1 and p_2 vertically on this line.
By viewing through the glass from the opposite side stick two other pins P_3 and P_4 vertically such that they are in line with the images of the first two pins. Draw a line through the marks made by P_3 and P_4 to touch the outline. Extend the line P_1P_2 through the outline (dotted line)
Measure and record the perpendicular distance d_1, between the extended line and the line P_3P_4
d_1 = ... cm (1 mark)
Repeat the procedure in above □ = 60° d_2 = ...cm (1 mark)
Hence find $d = \frac{d_1 + d_2}{2}$ (1 mark)

NB: The sheet of paper with the drawing MUST be handed in together with the question paper.

2. You are provided with the following apparatus :
- Two metre rule (not half metre rules)
- Two stands ad two clamps
- Two bosses
- Three pieces of threads
- One optical pin
- A piece of cellotape (and or plasticine)
- A spring
- One mass of 200g
- A stop watch

Proceed as follow
i) Set up apparatus as shown in the figure 1 below. Attach the pin (to act as the pointer) at one end of the metre rule using a cellotape.



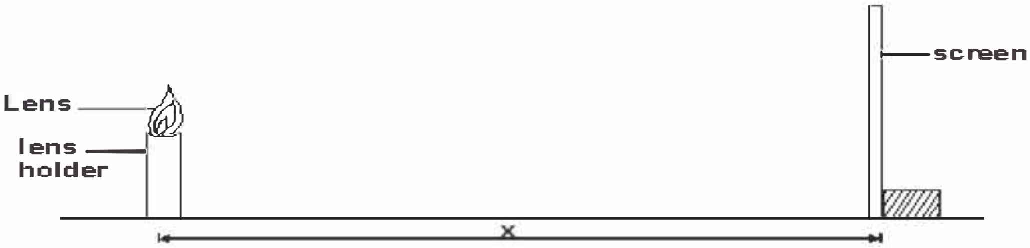
ii) Suspend one end of the metre rule with a thread at 5cm mark from the end
iii) Suspend the other end with spring also 5cm from the end so that the metre rule is horizontal.
iv) Hold the other rule vertically on the bench so that it is near the end with a pointer as shown in the diagram above.
v) Read the pointer position,
L_0 .... cm (1 mark)
a) Hang on the horizontal metre rule the 200g mass at a length l = 10cm from the spring record the extension, e, of the spring in the table below.
b) Displace the mass slightly downward and release it to oscillate vertically. Take time for 20 oscillation and record in the table below.
c) Repeat for other position of L, of the mass.
NB: Before taking the reading, ensure the oscillation is steady. (4 marks)
vi) Plot a graph of extension, e (m) (y-axis) against $T^2(S)^2$ (5 marks)
vii) Calculate the gradient of the graph. (2 marks)
viii) Given that determine the value of R. (3 marks)

PART B

b) You are provided with a lens P a lens holder a white screen and a 30cm rule.

Procedure

i)Set the apparatus as shown in figure 4 below. Focus a sharp image of a distant object on the screen. The object should be 10cm away.The object should be at least 10cm away.



a) Measure the distance x in cm between the lens and the screen at which a sharp image is obtained repeat this two times, using different objects and record your readings in table 3 below.

Table 3

Object	Distance X, (cm)
1	
2	

(2 marks)

ii) Calculate the average value of x. (2 marks)
iii) What is the physical significance of the result obtained in (iii) above? (1 mark)