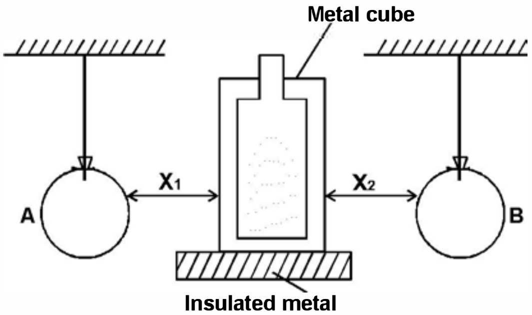
KISII CENTRAL FORM FOUR JOINT EVALUATION
Kenya Certificate of Secondary Education
PHYSICS
Paper - 232/1
July/August 2016
Time: 2 hours

SECTION A (25 marks)

Answer ALL the questions in the spaces provided.

1. The water level in a burette is $30.6cm^3$, 50 drops of water each of volume $0.2cm^3$ are added to the water in the burette. What is the final reading of the burette. (2 marks)
2. Explain why it may be difficult to suck a liquid using a drinking straw on the surface of the moon. (1 marks)
3. The **Fig 1** below shows two identical balloons A and B the balloons were filled with equal amounts of same type of gas. The balloons are suspended at distance $\mathbf{x_1}$ and $\mathbf{x_2}$ from a metal cube filled with boiling water and placed on an insulating material.

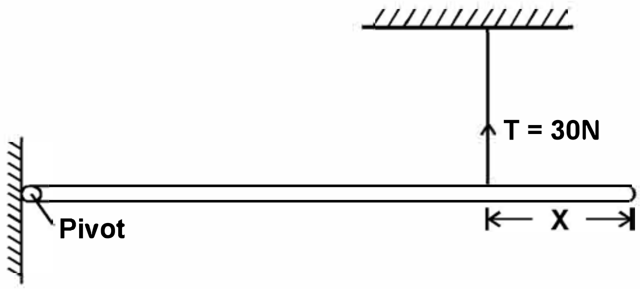
Fig 1



a) State the mode by which heat travels from the cubes to the balloons. (1 mark)
b) The face of the cube towards A is bright and shiny and face towards **B** is dull black. State with reasons the adjustments that should be made on the distances x1 and $\mathbf{x_2}$ so that the rate of change of temperature in both balloons remains the same. (2 marks)

4. Using particulate nature of matter, explain why a solid expands when heated? (2 marks)
5. A metal bench feels colder than a wooden one when one sits on both, in a cold morning even though both are at the same temperature. Explain this observation. (2 marks)
6. The uniform rod of length one metre shown in the figure below is in equilibrium

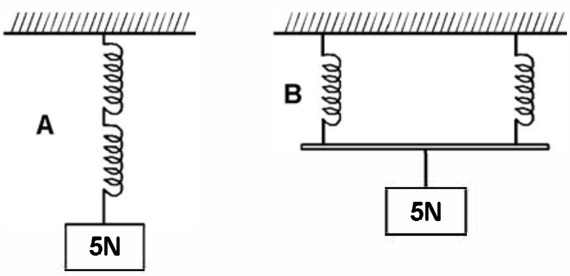
Fig 2



Find the value of X if the weight of the rod is 40N. (3 marks)

7. The springs in the figure below are identical.

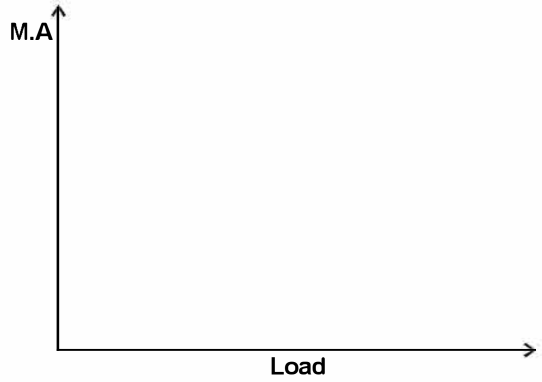
Fig 3



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

8. A lawn sprinkler has 20 holes each of cross-sectional area 1.25×10^{-3} cm^2 and is connected to a horse-pipe of cross-section area $2.4cm^2$. If the speed of the water in the horse pipes is 1.5m/s, calculate the speed at which the water emerges from the holes. (3 marks)

9. On the axes provided, sketch a graph of Mechanical Advantages (M.A) against load for a pulley system (1 mark)



10. The figure below shows a container with small holes at the bottom in which wet clothes have been put. When the container is whirled air at high speed, it is observed that the clothes dry faster. **Fig 4**

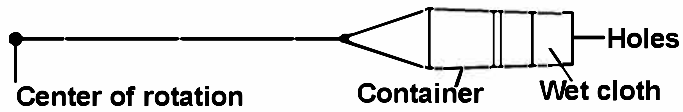


Fig 4

Explain how the rotation of the container cause the clothes to dry so faster. (1 mark)

11. A ball rolls off a platform of height 1.8m at a horizontal speed of 15m/s. How far off the edge of the platform does it land? (Take g = $10ms^{-2}$) (3 marks)

12. State the gas law that relates the volume of a gas to the temperature of the gas. (1 mark)

SECTION B : (55 marks)

13. The figure 5 below shows a section of ticker-tape produced by a ticker-timer operating frequency of 50Hz.

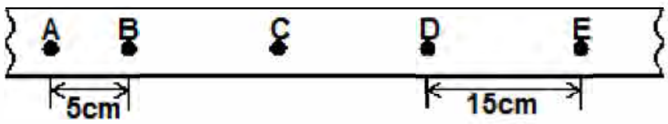


Fig 5

a) i) Find the average velocity between A and B. (2 marks)

ii) Find the average velocity between D and E (2 marks)

iii) Determine the average acceleration. (2 marks)

b) i) Explain why bodies in circular motion undergo acceleration even when their speed is constant. (2 marks)

ii) A stone of mass 40g is tied to the end of a string 50cm long and whirled in a vertical circle in 2 rev/s. Calculate the maximum tension in the string. (3 marks)

15.a) i) State the Archimedes principle. (1 mark)

ii) An object weighs 1.05 N in air and 0.66N when fully immersed in water and 0.73N when fully immersed in a liquid. If the density of water is $1000kgm^{-3}$, find the density of the liquid. (3 marks)

b) i) State the law of floatation. (1 mark)

ii) The figure 6 below shows a buoy, A, volume 45 litres and mass of 9kg. It is held in position in sea water of density 1.03g/cm by a light cable fixed to the bottom so that 7/8 of the volume of the buoy is below the surface of sea water.

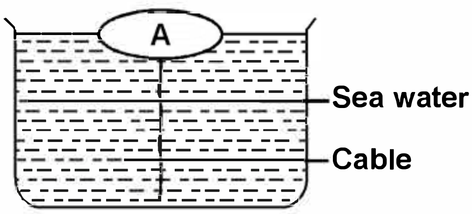


Fig 6

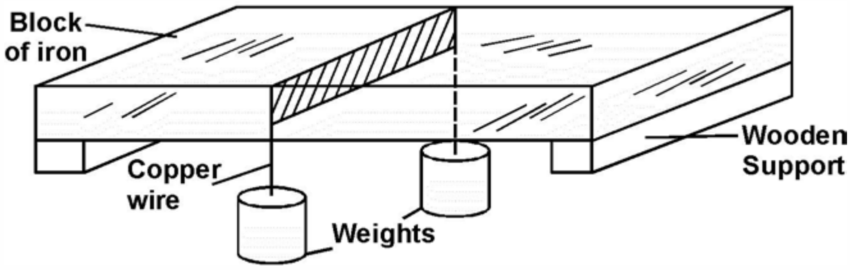
Determine the tension, T in the cable. (4 marks)

c) State any two adjustments that can be made to a hydrometer to make it more efficient. (2 marks)

15. a) Distinguish between latent heat of fusion and specific latent of fusion. (1 mark)

b) Figure 7 shows a block of ice. A thin copper wire with two heavy hanging from its ends, passes over the block. The copper wire is observed to pass through the block of ice without cutting it in a process known as regelation.

Fig 7

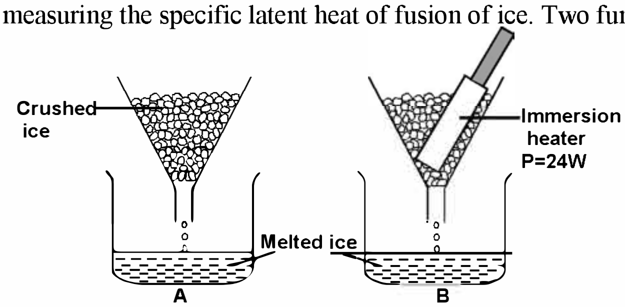


i)Explain this observation. (3 marks)

ii) What would be the effect of replacing the copper wire with a cotton thread? Explain. (2 marks)

c)Figure 8 shows one method of measuring the specific latent heat of fusion of ice. Two funnels A and B contain crushed ice at 0.C

Fig 8



The mass of melted ice from each funnel is measured after 11 minutes. The result are shown below.

Mass of melted ice in A = 24g

Mass of melted ice in B = 63g

i)What is the reason for setting up funnel A? (1 mark)

ii)Determine the:

I. Quality of heat supplied by the heater. (2 marks)

II. Mass of ice melted by the heater. (1 mark)

III. Specific latent heat of fusion of ice. (3 marks)

16.a) i) State Newton's second law of motion. (1 mark)

ii) Explain why a high jumper flexes his knees when landing on the ground. (1 mark)

b) A ball of mass 100g is dropped from a height 1.25m above the ground surface. It rebounds to a height of 1.1.m. Calculate

i)Velocity of the ball before impact. (3 marks)

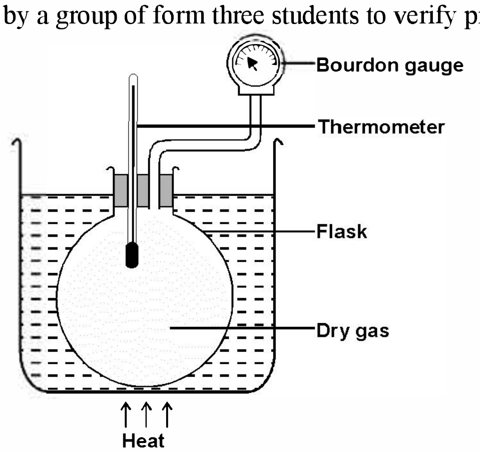
ii)Force of impact (take g = 10N/kg) (3 marks)

c) i) Differentiate between elastic and inelastic collision. (1 mark)

ii) A car of mass 800g collides head on with a truck of mass 5000kg travelling at 40m/s. The car is thrawn on to the bonnet of the truck which continues to move after impact at 10m/s in the original direction. How fast was the car moving? (3 marks)

17. a) What is meant by absolute zero temperature? (1 mark)

b) The set up below was used by a group of form three students to verify pressure law.



Describe briefly how the set-up can be used to verify pressure law. (4 marks)

c)A 4.5cm³ bubble released at the bottom of a dam measured 18cm³ at the surface of the dam. Work out the depth of the dam taking atmospheric pressure to be 10^5 Pa and the density of water as 1g/cm³. (3 marks)

KISII CENTRAL FORM FOUR JOINT EVALUATION

Kenya Certificate of Secondary Education
232/2
PHYSICS
Paper 2
(THEORY)
July/August 2016

Time 2 hours

SECTION A : 25 marks)

1. State any two differences between light and cathode rays. (2 marks)
2. Figure 1 below shows two rays from a mirror forming an image of some object placed in front of the plane mirror. Complete the ray diagram to show the position of the object. (2 marks)

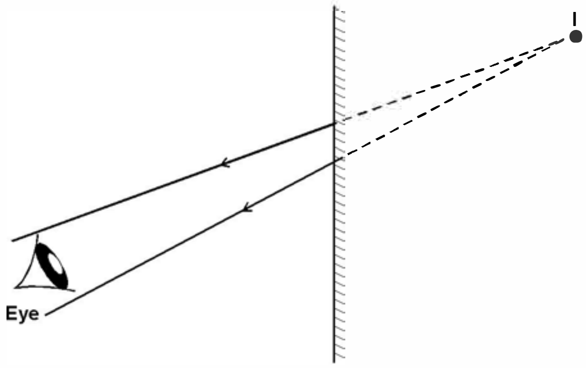
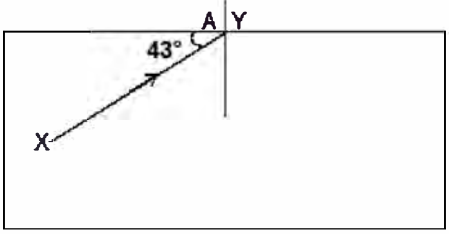


Fig 1

3. An electric iron box has a resistance of 60. For how long should it be switched on in order to dissipate 288,000 joules of energy if it operates at 240V. (3 marks)
4. Use domain theory to differentiate between magnetic and non-magnetic materials. (1 mark)
5. State how polarization is reduced in wet Leclanche cell (1 mark)
6. Light of frequency 5.5×10^{14}Hz is made to strike a surface whose work function is 2.5eV. show that photoelectric effect, will not take place. (3 marks)
7. State two conditions necessary for electromagnetic induction to occur. (2 marks)
8. An object is placed 30cm from a concave mirror of focal length 20cm. Calculate the magnification. (3 marks)
9. You are given three bars. One is magnetized with opposite poles at its ends. Another is magnetized with consequent poles. The third is not magnetized. Describe an experiment which you would perform to identify each. (3 marks)
10. The diagram below shows a ray of light **xy** travelling through a glass block of critical angle 42° to point A.

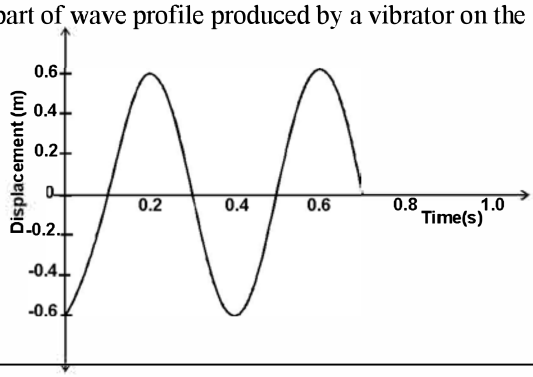


On the same diagram, draw the path of the ray as it travels past point **A**. (2 marks)

11. Distinguish between soft and hard x-rays in terms of their production. (1 mark)
12. i) Arrange the following waves in order of increasing frequencies. (1 mark)
    Gramma rays, radio waves, infrared, UV and X-rays
    ii) Name the electromagnetic radiation used in heating. (1 mark)

SECTION B : (55 marks)

13.a) Distinguish between transverse and longitudinal waves. (2 marks)
b) Figure below shows part of wave profile produced by a vibrator on the surface of water.



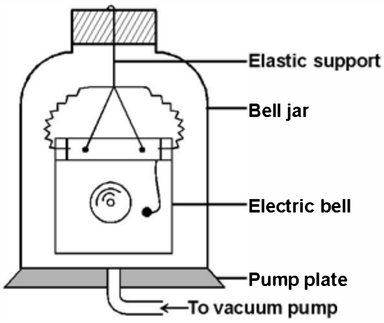
Calculate the

i) Period (1 mark)

ii) Frequency (1 mark)

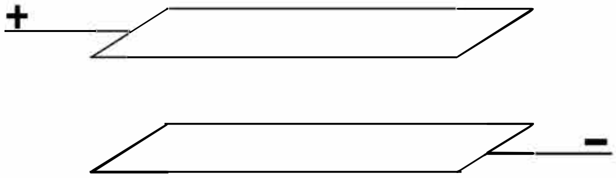
iii) Wavelength if velocity of the wave is 330m/s (3 marks)

c) The diagram below shows a set up that was used to demonstrate that sound requires a material medium for transmission.



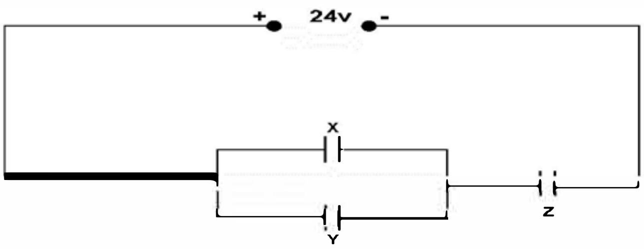
Give two possible reasons why it is not possible to reduce the sound completely when air is pumped out. (2 marks)

14.i)The figure below shows a pair a parallel plates of a capacitor connected to a battery, the upper plate is displaced slightly to the left.



State with reason the effect of this movement on the capacitance. (2 marks)

ii) The figure below shows an electrical circuit with three capacitor **X**, **Y** and **Z** of capacitance 8.0 μF, 10.0μF and 6.0μF respectively connected to a 24V battery

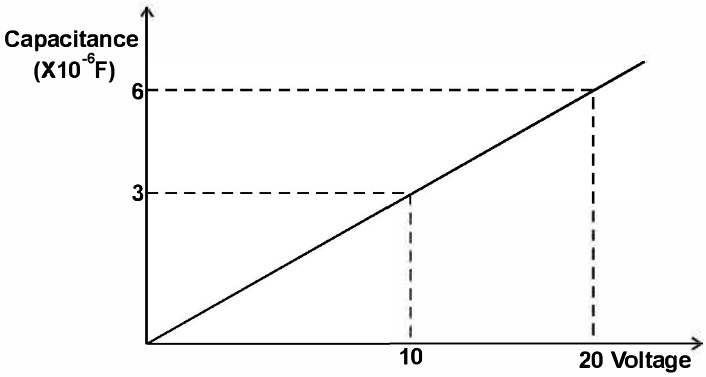


Determine

I. the combined capacitance of the three capacitors. (3 marks)

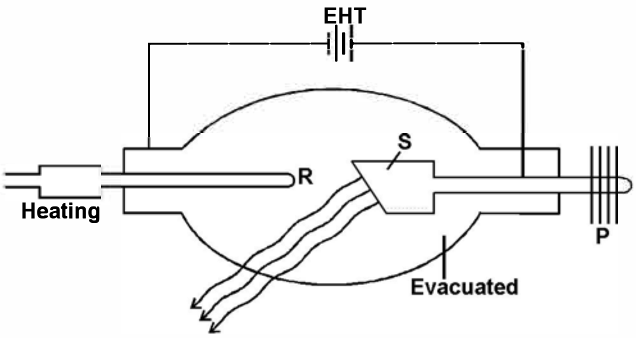
II. The charge on the capacitor **Z** (2 marks)

iii) The graph below shows the variation of capacitance of a capacitor with voltage supplied across it.



Use the graph to determine the quantity of charge stored in the capacitor. (3 marks)

15.a)The diagram below shows an X-ray tube drawn by a student. Use it to answer the questions which follow.

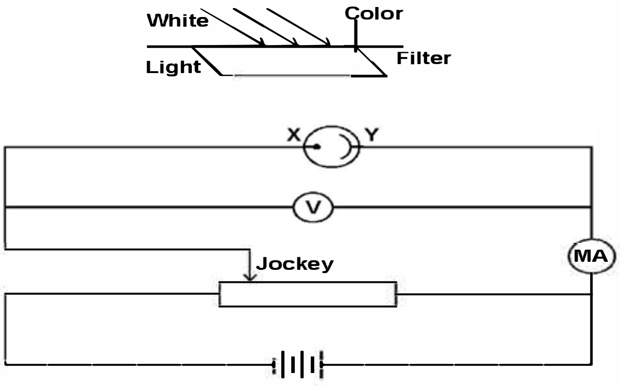


State with reason the material used for the part labelled R. (2 marks)
ii) Why is the tube evacuated. (1 mark)
iii) How can the wavelength of the X-rays emitted from this tube be reduced. (1 mark)

b) X-rays are emitted when a tube operates at 3×10^2 V and a current of 0.01 A is passing through it (take e = 1.6×10^{-19}C, Me = 9×10^{-31}). Calculate;
i) the velocity of the electron on hitting the target (3 marks)
ii) the minimum wavelength of the x-rays emitted. (3 marks)

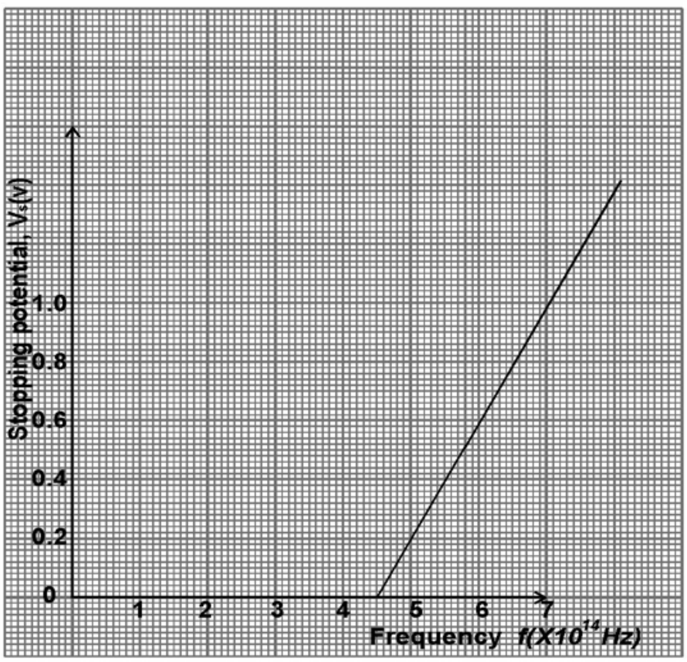
c) i) State **two** properties of x-rays. (2 marks)
ii) State **two** uses of X-rays. (2 marks)

16.a) What is meant by the term photoelectric effect. (1 mark)
b) The figure below shows an arrangement used to investigate photoelectric effect.



i) Name the parts X and Y (2 marks)
ii) State how the intensity of light affects the photo current. (1 mark)

c) The result obtained from experiment with different colours are shown graphically below.

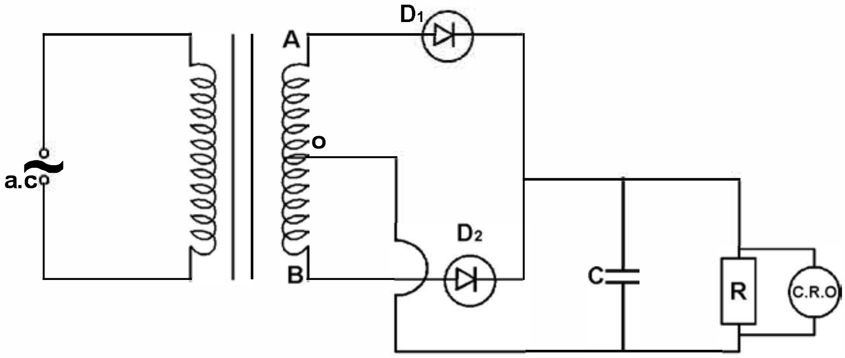


From the graph determine;

i) Threshold frequency. (2 marks)

ii) The work function of the metal (3 marks)

17. a) A student connected a circuit as shown below in order to produce a rectified output.

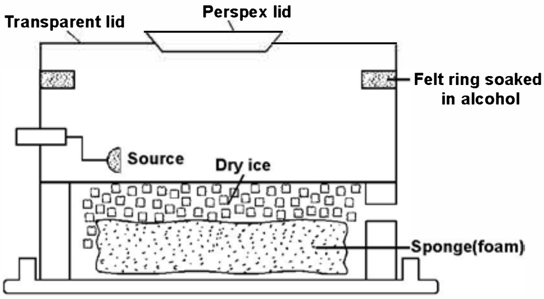


i) Name the type of rectification shown above (1 mark)

ii) Explain how the rectified output is produced. (3 marks)

iii) What is the purpose of capacitor, C in the circuit. (1 mark)

b) Figure 11 below shows a diffusion cloud chamber for detecting radiation emitted by a radioactive material.



Explain how the radiation emitted from the source is detected by the cloud chamber. (3 marks)

c)A radioactive isotope has a half life of 2.5 hours. How long will it take its activity to fall to $^1/_8$ of its initial level.(3 marks)

KISII CENTRAL FORM FOUR JOINT EVALUATION

Kenya Certificate of Secondary Education
PHYSICS
Paper 3
(PRACTICAL)
July/August 2016
Time 2 ¾ hours

Each candidate should be provided with the following:
Question 1
- A metre rule
- Two identical 100g masses.
- About 200ml of paraffin in 250ml beaker labelled as liquid L.
- Three pieces of thread, each about half metre long. The three pieces should be cut from sewing thread.
- A stand with clamps
- Piece of tissue paper.
- A concave mirror of focal length 15 cm with a holder
- A screen
- A candle
- A match box (to be shared)

Question 2
- 100cm long wire mounted on the mm scale and marked X, (gauge 32) or diameter 0.25mm
- 80cm long wire marked W of diameter 0.35mm
- 10Ω carbon resistor marked R
- Centre zero galvanometer
- Two Jockeys / Crocodile clips
- 9 connecting wires 3 of which are atleast 60cm and with crocodile clips at one end.
- Micrometer screw gauze (to be shared)(1 for 10 students)

KISII CENTRAL FORM FOUR JOINT EVALUATION
Kenya Certificate of Secondary Education
PHYSICS
Paper - 232/3
July/August 2016
Time: 2½ hours

1. **This paper has two parts A and B, answer both parts.**

PART A

You are provided with the following:
- A meter rule
- Two identical 100g masses
- About 200ml of liquid L in 250ml beaker.
- three pieces of thread, each about half metre long.
- Stand with clamps
- Tissue paper.

Proceed as follows:

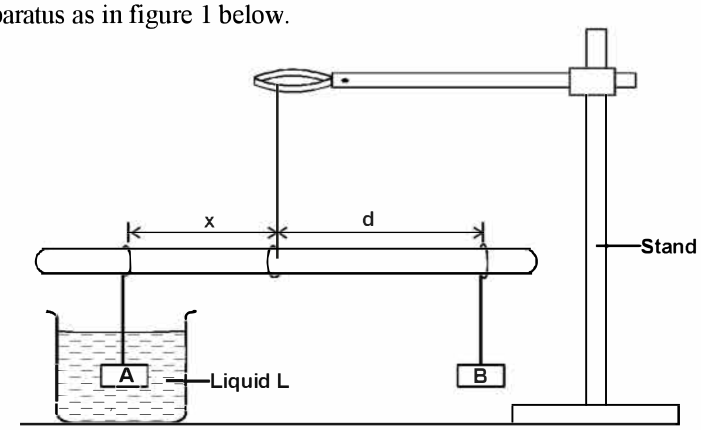
a) Using a stand and one piece of thread, suspend the metre rule in air such that it balances horizontally. Record the position of the centre of gravity. G.

G = ... mm

Note: The metre rule should remain suspended at this point throughout the experiment.

b) Set up the apparatus as in figure 1 below.

Fig 1



Suspend the mass A at a distance x = 50mm. Adjust the position of mass B until it balances mass. A immersed in liquid L.

Record the distance d, of the mass B from the pivot.

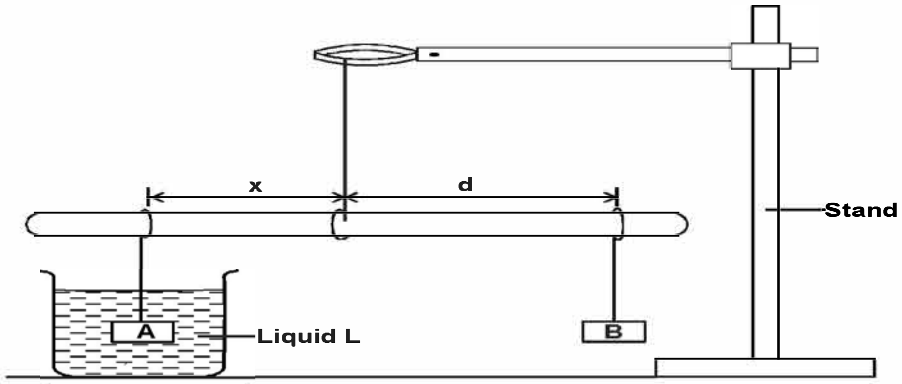
Repeat the same process for other values of x in table 1 below and complete the table.

Table 1

x (mm)	50	100	150	200	250	300
d (mm)						

(3 marks)

c) Plot a graph of d(y-axis) against x (5 marks)



d) Determine the slope, S of the graph. (2 marks)

e) Given $S = \frac{F}{W}$ where F is the apparent weight of object A in the liquid L and W is the actual weight of A. Find :-

i) The value of F. (2 marks)

ii) The upthrust, U (3 marks)

PART B

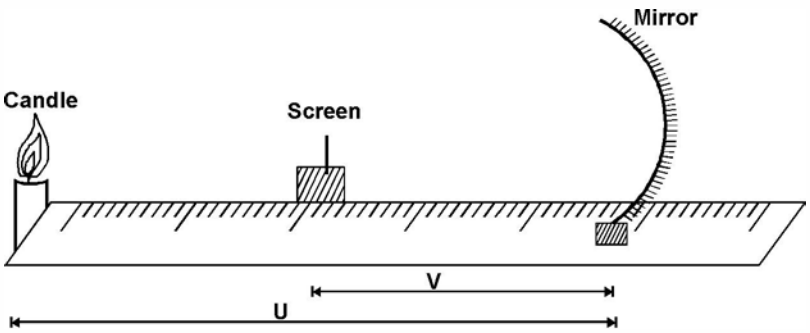
You are provided with the following.

- A concave mirror with holder.
- A screen
- A meter rule
- A candle
- A match box (to be shared)

Proceed as follows:

f) Set up the apparatus as in figure 2 below.

Fig 2



g) Put the object at a distance u = 30cm and from the mirror. Adjust the position of the screen until a sharp image is formed on the screen. Record the distance V

h) Repeat procedure (b) above for the distance u = 40cm and record the new distance V, complete the table 2 below.

Table 2

U(cm)	V (cm)	m =	(m + 1)
30			
40			

i) Give $f = \frac{v}{(m+1)}$, calculate the values of f hence determine the average value f_{av} ; (3 marks)

QUESTION 2

You have been provided with the following apparatus

- Resistor
- Cell size D new
- Cell holder
- Two resistor wires mounted on mm scales, marked W and X.

a) Proceed as follows.

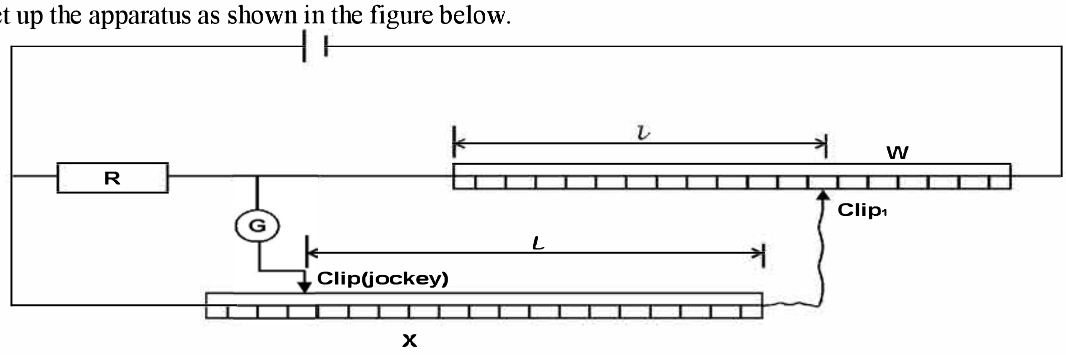
i) Measure and record the diameter of wire W

D = ... mm

ii) Use the information to calculate the cross-sectional area of the wire. (A)

A = ... mm

iii) Set up the apparatus as shown in the figure below.



iv) Move the crocodile clip along W such that the length l= 10cm, then move the jockey to obtain a balance point along the wire X. Record the length L the value of the balance point along wire X.

b) Repeat steps (iii) for values of l = 20cm, 30, 40, 50, 70 and 80cm and complete the table. (6 marks)

c) Plot a graph of $l$cm against (5 marks)

d) From the graph find the slope S of your graph. (3 marks)

e) From the graph state the value of $\frac{1}{L}$ (cm^{-1}) when l= 0 (1 mark)

f) Given that $l = \frac{100R}{JL} - \frac{R}{j}$ find the value of J when R = 10Ω. (2 marks)