TOP SCHOOLS PREDICTIONS

PHYSICS

KCSE PREDICTION TESTS (1-10)

2nd Series of Sampled Top Performing Schools Possible Questions in Physics Expected in the Forthcoming Annual Final KCSE Examinations for our Candidates.

SERIES 2

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TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 1 PAPER 1

Time: 2 Hours

NAME…… INDEX NO……..…

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INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

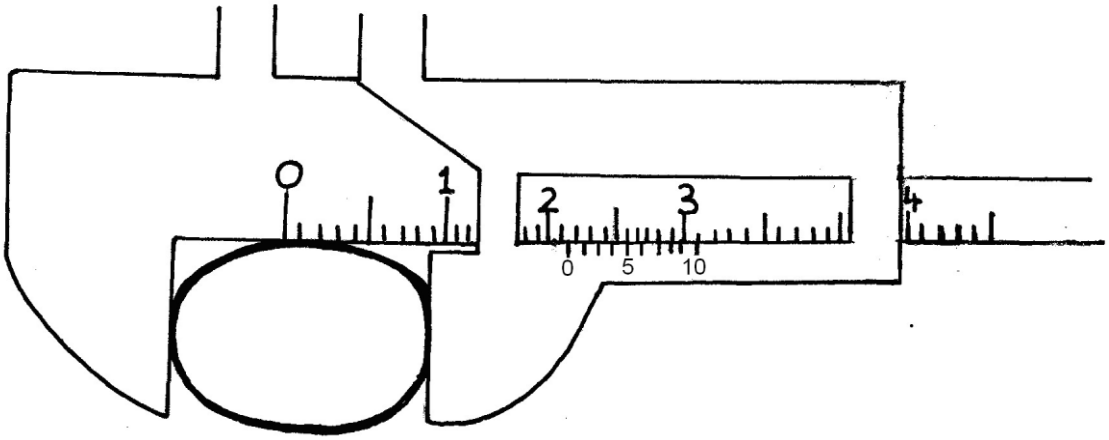
b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

QUESTIONS

SECTION A (25 MARKS)

1. **(i)** What is the name of the instrument shown below **(1mk)**

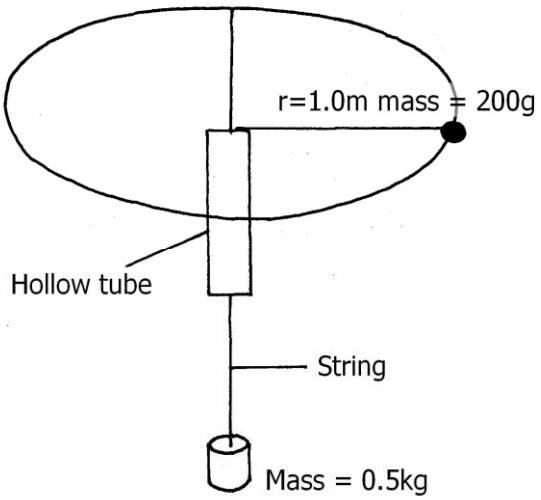


(ii) If the instrument has zero error of 0.04cm, find the diameter of the sphere **(2mks)**

2. A block of copper of mass 2kg and specific heat capacity of 400J/kg/K initially at 121^0C is immersed in water at 20^0C. If the final temperature is 21^0C, determine the mass of water. (specific heat capacity of water is 4200J/kgk) **(3mks)**

3. Sketch a graph of velocity against time of a steel ball which is dropped to fall through glycerine in a measuring cylinder **(3mks)**

4. The figure below shows a mass of 200g connected by a string through a hollow tube to mass of 0.5kg. The 0.5kg mass is kept stationary in the air by whirling the 200g mass round in a horizontal circle of reading 1.0metre



Determine the angular velocity of the 200g mass **(3mks)**

5. A steel ball bearing is allowed to fall freely in a viscous liquid. State the condition necessary for it to attain terminal velocity **(1mk)**

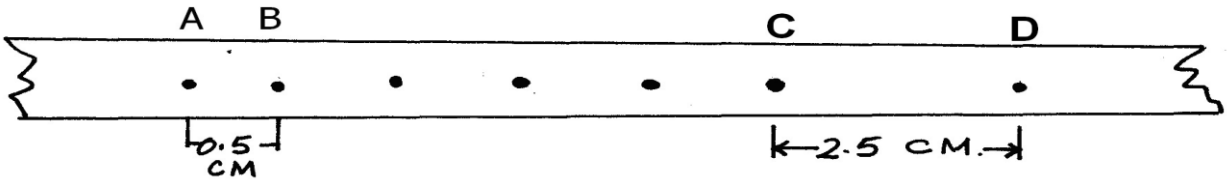
6. State reason why heat transfer by radiation is faster than by conduction **(1mk)**

7. A body is projected vertically upwards from the top of a building. If it lands on the base of the building, sketch the velocity time graph for the motion (2mks)

SECTION B

8. The figure below shows the motion of a trolley on a ticker timer. The ticker has frequency of

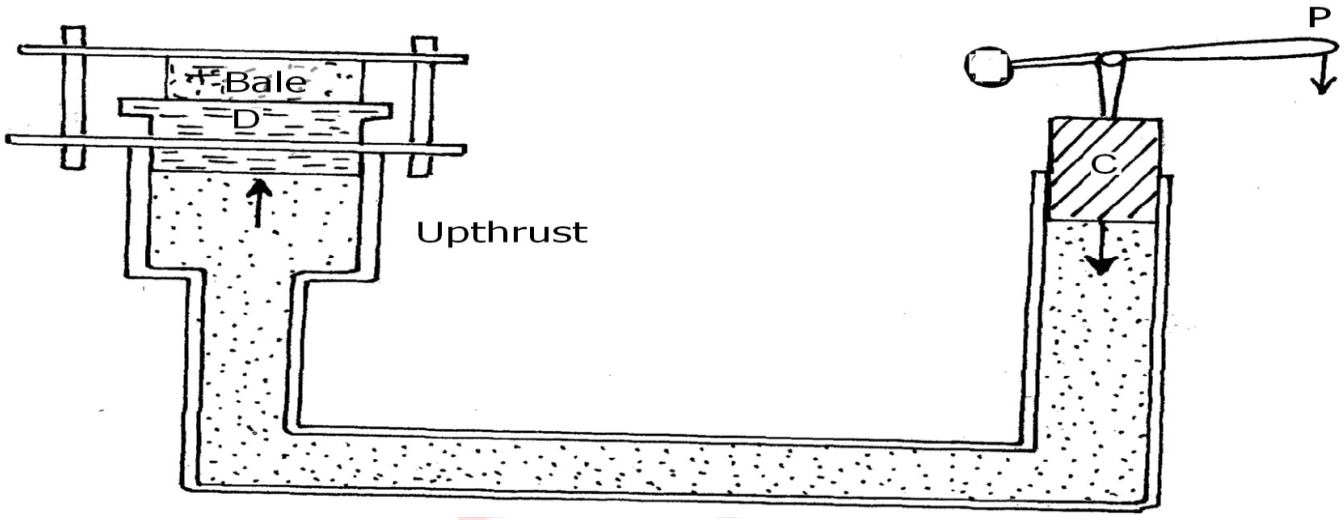
50HZ



(a) **(i)** Calculate the initial velocity between A and B **(2mks)**

(ii) Calculate the final velocity between C and D **(2mks)**

(iii) Calculate the acceleration of the trolley during the motion **(3mks)**



The two pistons C and D are of areas $100cm^2$ and $2m^2$ respectively. A force of 100N is applied on the smaller piston, find the load that can be lifted on the large piston if :-

(a) The piston has negligible weights and no frictional forces **(3mks)**

(b) The small and larger pistons have negligible weights and frictional forces 10N and 40N respectively **(3mks)**

(c) The small piston has a weight of 5N, the larger piston has weight of 10N and the frictional forces are negligible **(3mks)**

(d) In a hydraulic brake the master piston has an area of $4mm^2$ and the wheel piston each has an area $4cm^2$. Find the forces applied to the wheel when a force of 10N is applied on the master piston **(3mks)**

(e) State two properties of the liquid used in the hydraulic system. **(2mks)**

14. In an experiment to determine the density of sand using a density bottle, the following measurements were recorded.

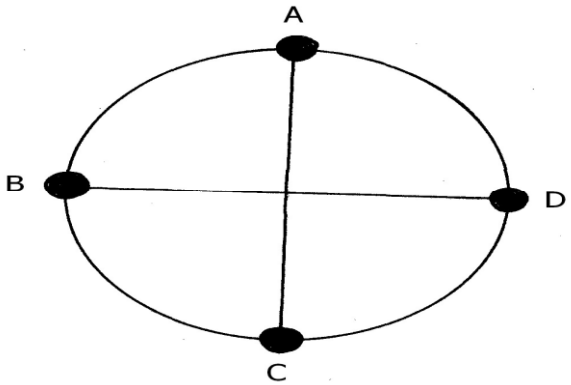
Mass of empty density bottle = 43.2g
Mass of density bottle full of water = 66.4g
Mass of density bottle with some sand = 67.5g
Filled up with water (sand, watered bottle) = 82.3g
Use the above information to determine the;

(a) Mass of the water that completely fill the bottle **(2mks)**
(b) Volume of water that completely filled the bottle **(1mk)**
(c) Volume of the density bottle **(1mk)**
(d) Mass of sand **(1mk)**
(e) Mass of water that filled the space above the sand **(1mk)**
(f) Volume of the sand **(2mks)**
(g) Density of the sand **(2mks)**

15. **(a)** Explain why it is advisable to use the pressure cooker for cooking at high altitudes(2mks)
(b) Water of mass 3kg initially at 20^0C is heated in an electric kettle rated 3.0kw. The water is heated until it boils at 100^0C. Taking specific heat capacity of water to be 4200Jkg^{-1} K^{-1}, heat capacity of kettle = 450J/kg, specific latent heat of vaporization of water = 2.3MJ/kg, calculate

(i) The heat absorbed by the water **(1mk)**
(ii) Heat absorbed by the electric kettle **(2mks)**
(iii) The time taken for the water to boil **(2mks)**
(iv) How much longer it will take to boil away all the water **(2mks)**

16. (a) Define angular velocity **(1mk)**
(b) The figure below shows an object of mass 0.2kg whirled in vertical circle of radius 0.5m at uniform speed of 5m/s



Determine the tension in the string at

(i) Position A **(3mks)**
(ii) Position **B** **(3mks)**
(iii) At what point is the string likely to cut. Explain **(2mks)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 1 PAPER 2

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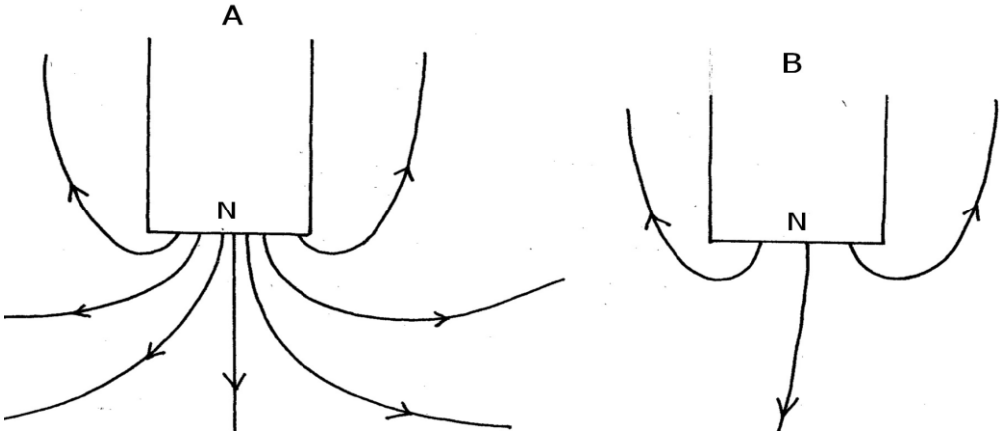
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SECTION A (25 MARKS)

1. Two magnets A and B in figure 1 were brought from a point high above a table towards a steel pin.

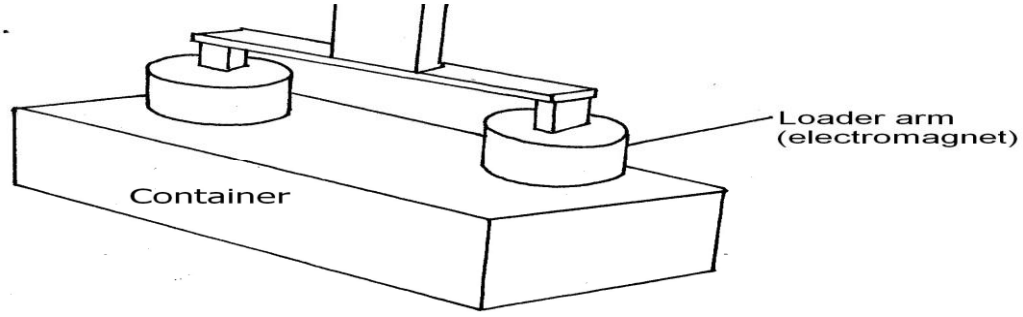
Fig. 1



State with reason which magnet will attract the pin at a bigger height above the table**. (2mks)**

2. The figure 2 below shows container loader which uses electromagnet to offload containers from a ship.

Fig. 2



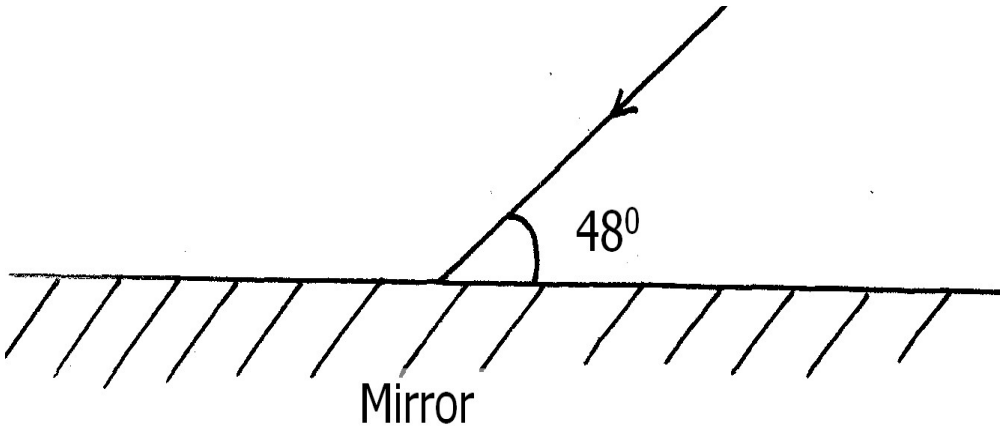
(i) Why should the container be made of iron or steel **(1mk)**

(ii) State two ways in which the loader can be made to lift heavier container **(2mks)**

3. Explain why sound cannot be heard from far when one shouts in a forest **(1mk)**

4. The figure 3 shows a ray of light incident on a mirror.

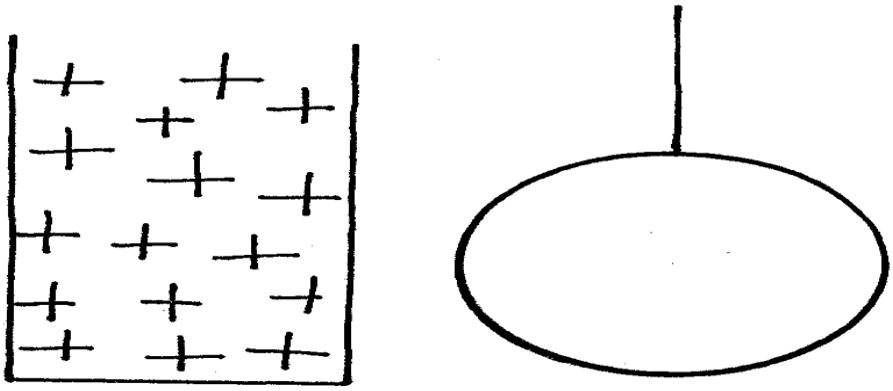
Fig. 3



Determine the angle of reflection when the mirror is rotated 10^0 anticlockwise **(2mks)**

5. A positively charged material was brought close to an insulated metallic ball as shown in Fig 4. State and explain the distribution of charge in the ball **(2mks)**

Fig. 4

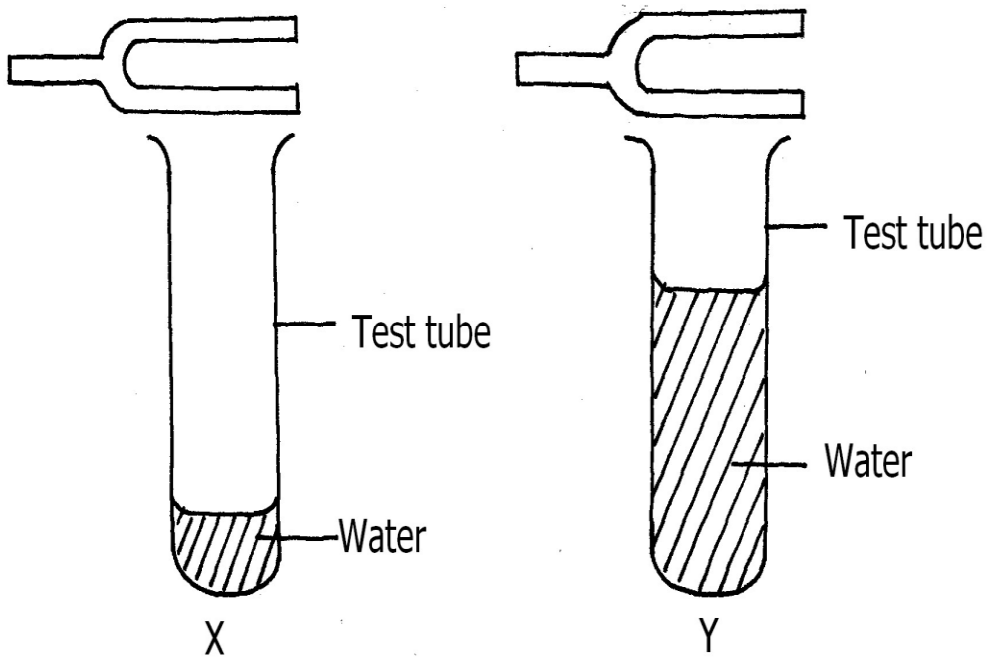


6. Two 12V lead acid accumulators are vated 60Ah and 70Ah. State two physical differences between the accumulators **(2mks)**

7. When a new dry cell is connected in series with a 2.7Ω resistor, a current of 0.5A flows in the circuit. Determine the internal resistance of the cell. **(3mks)**

8. A vibrating tunning fork of frequency 512Hz was brought close to two test tubes X and Y with water levels as shown in fig. 5

Fig. 5



It was observed that loud sound is produced in test tube X but not in Y. Explain this observation. **(2mks)**

9. A form 4 student observed that his grandfather positions a book far from his eyes when reading it. Explain the type of lenses that the student should advice his grandfather to wear **(2mks)**

10. Explain how earth wire provides safety in an electrical installation **(2mks)**

11. In a cathode ray oscilloscope the time base is set at 25cs/mm. Given that crest to crest of a signal covers a length of 6cm, determine the frequency of the signal **(3mks)**

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

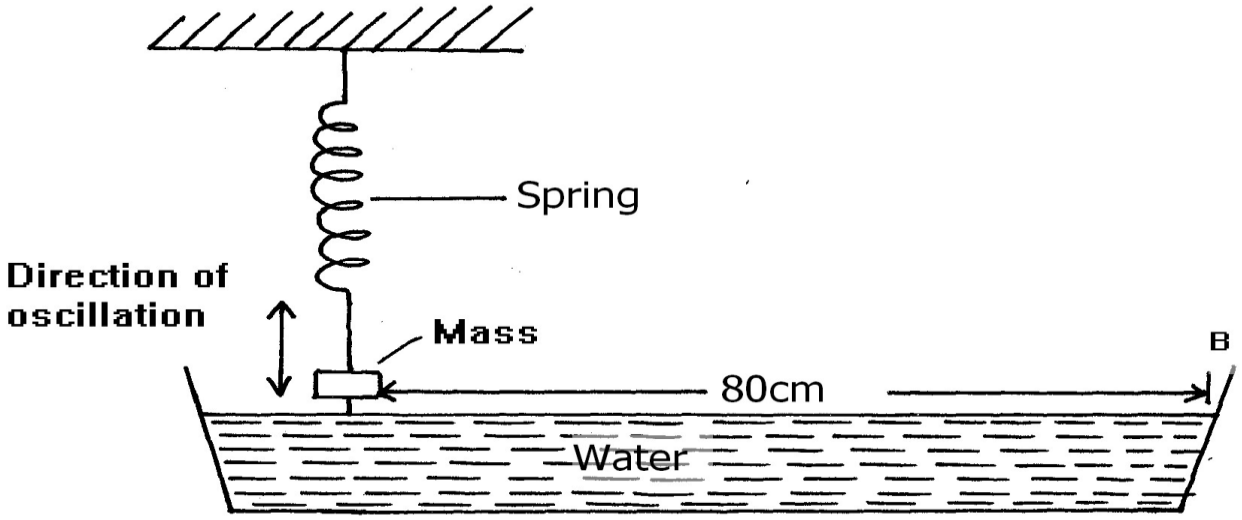
Radio	A	Visible	Ultra-violet	X-rays	Gamma-Rays

Name the radiation represented by A **(1mk)**

SECTION B (55 MARKS)

13. Students set up a mass attatched to spring such that when it oscillates it taps on water surface in a wide shallow tank.

Fig. 6



The students measured time for 20 oscillations and found that the mass takes 36 seconds.

(i) Determine the periodic time of the mass **(2mks)**

(ii) Calculate the frequency of the waves produced on the water surface **(3mks)**

(iii) Given that the student counted four ripples between the mass and end B of the tank,

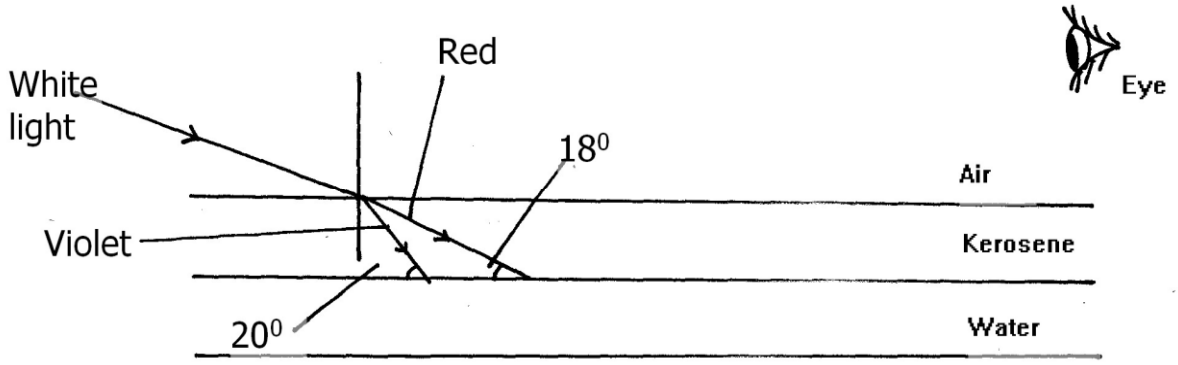
Determine the speed of the waves. **(3mks)**

14. **(a) (i)** State Snell's law of refraction of light **(1mk)**

(ii) Give two advantages of totally internally reflecting prisms over plane mirrors. **(2mks)**

(b) A ray of light is incident on a kerosene water interfaces as shown in figure 7

Fig. 7



Given that the refractive index of water and kerosene are 1.33 and 1.44 respectively,

Determine

(i) the refractive index for the kerosene – water interface **(3mks)**

(ii) determine and show on the figure the path of the rays of light between the

Kerosene-water surface **(3mks)**

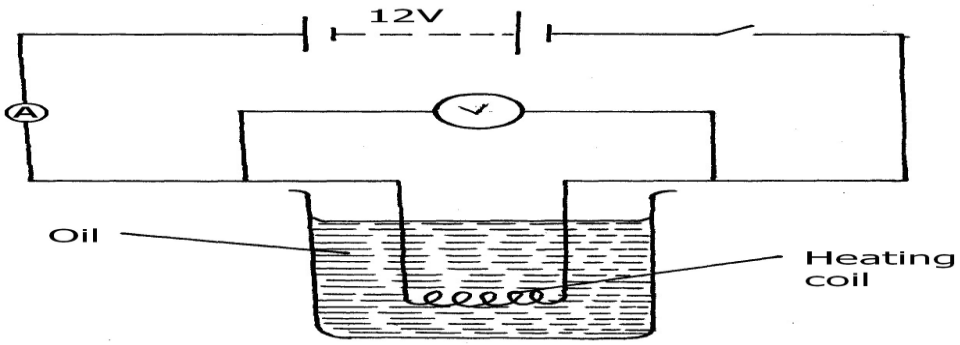
(iii) Why does the colours of the light separate at the kerosene layer. **(1mk)**

(iv) State and explain the observation that the eye above the two surfaces would see **(2mks)**

15. **(a)** State Ohm's law **(1mk)**

(b) The figure 8 below shows a circuit with a coil used to warm oil in a beaker.

Fig. 8



(i) Explain how heat is produced in the coil **(2mks)**

(ii) Given that the reading of the ammeter is 2.4A determine the resistance of the coil. **(3mks)**

(iii) How much heat is produced in the coil in a minute? **(3mks)**

(iv) Give two changes that can be made in the set up in order to produce more heat per minute. **(2mks)**

16. (a) The set up in fig. 9 shows two coils A and B close to each other.

Figure 9



Show on coil B the direction of current when switch is closed. **(1mk)**

(b) A transformer that is 80% efficient has 4000 turns in primary coil and 500 turns in secondary coil is used to supply power to a 15Ω motor, from 240V mains.

(i) Calculate the voltage in the secondary coil **(3mks)**

(ii) Power rating of the motor **(3mks)**

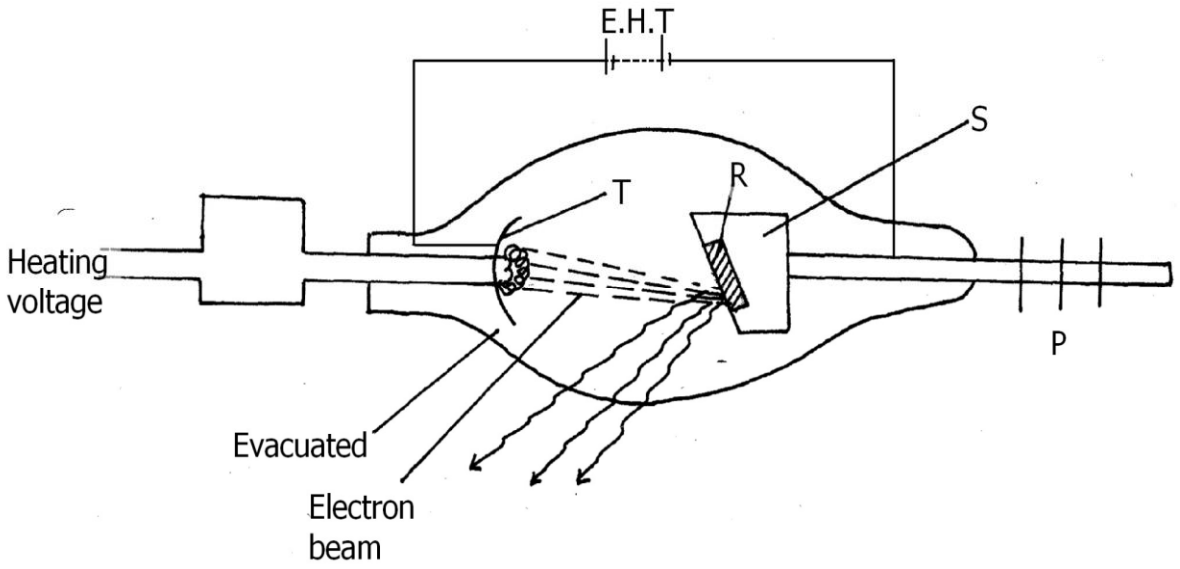
(iii) Current in the primary coil **(3mks)**

(c) In a step-down transformer the secondary coil is made of thick copper coil. Explain **(2mks)**

17. **(a)** State one property of X-rays **(1mk)**

(b) Figure 11 below shows an X-ray tube drawn by a student. Use it to answer questions which follows

Fig. 11



(i) Why is the tube evacuated? **(1mk)**

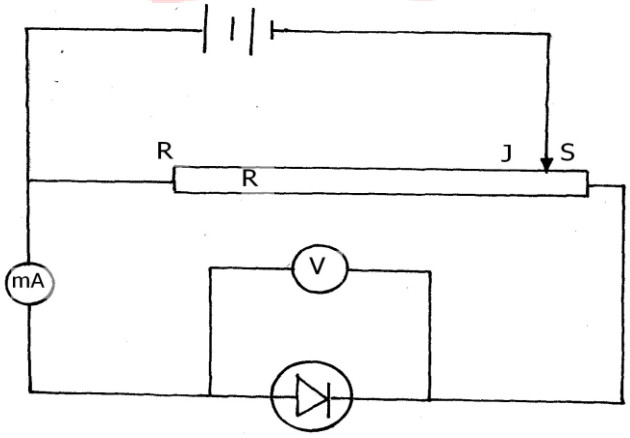
(ii) What adjustment can be made to increase the penetrating power of the X-ray produced **(1mk)**

(iii) Name a suitable material for the target. **(1mk)**

(iv) Name the part labelled T **(1mk)**

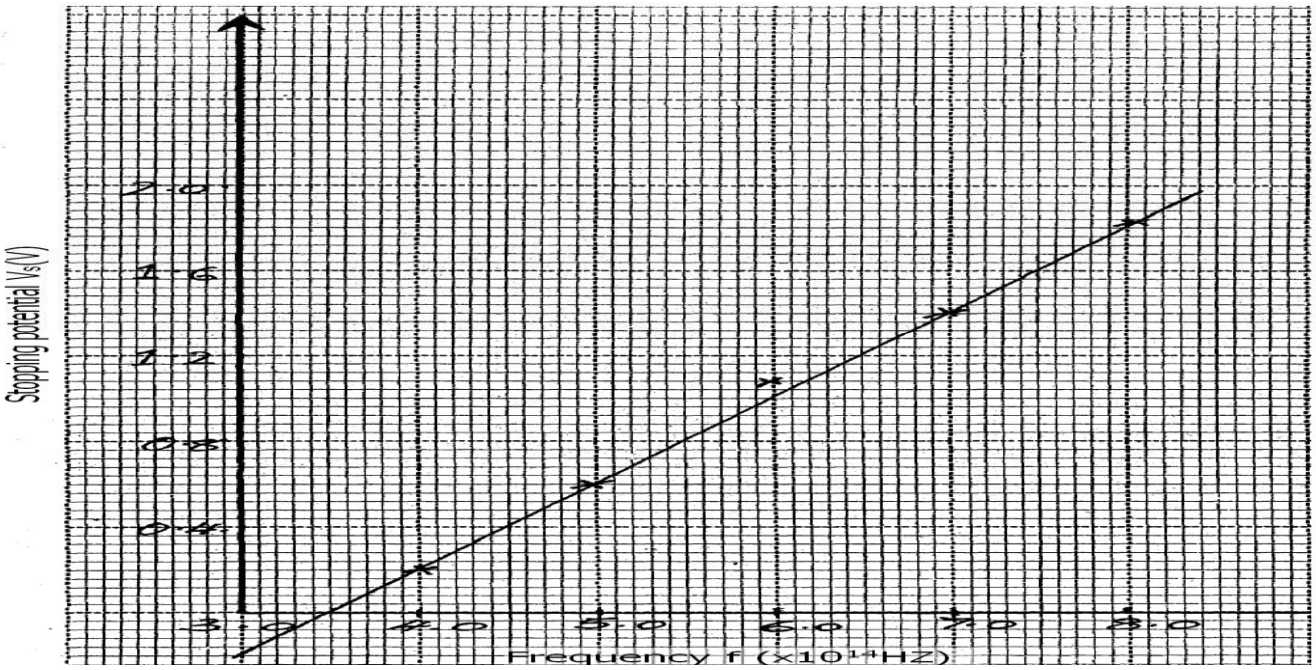
(c) Figure 12 shows a circuit used to study behaviour of diode.

Fig. 12



State the behaviour of voltmeter reading as Jockey J is moved from S to R **(1mk)**

(d) The graph below shows stopping potential V against frequency for a photocell



From the graph determine

(i) the threshold wavelength **(2mks)**

(ii) Planck's constant **(2mks)**

(iii) Work function of the metal **(2mks)**

(Take C = 3.0×10^{8}m/s, e = 1.6×10^{-19}C)

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 2 PAPER 1

Time: 2 Hours

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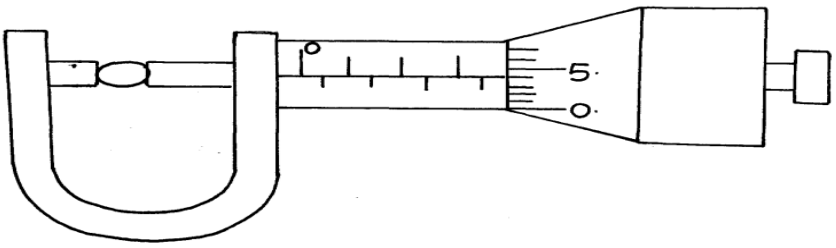
b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

SECTION A (25 MARKS)

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

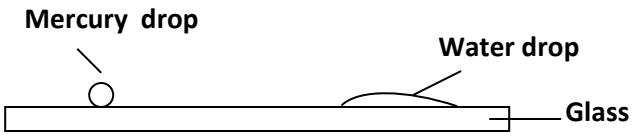
1. Figure 1. shows a micrometer screw gauge being used to measure the diameter of a ball bearing.



If the instrument has a negative zero error of 0.01mm, record the actual diameter of the ball bearing.

(1mk)

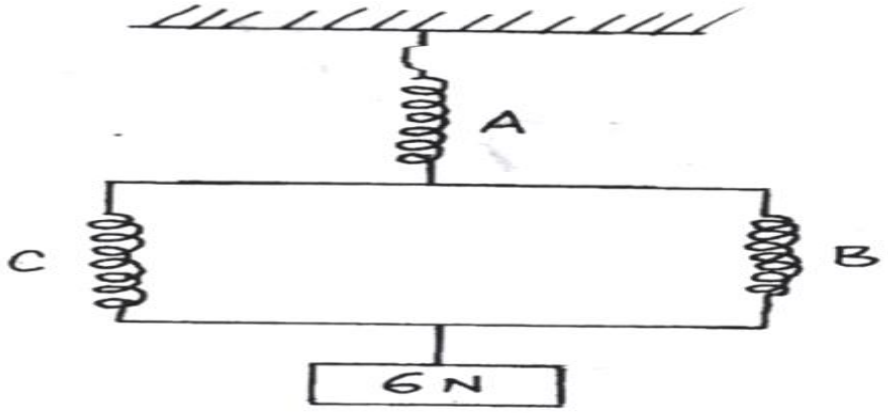
2. Figure 2. shows drops of mercury and water on a glass surface,



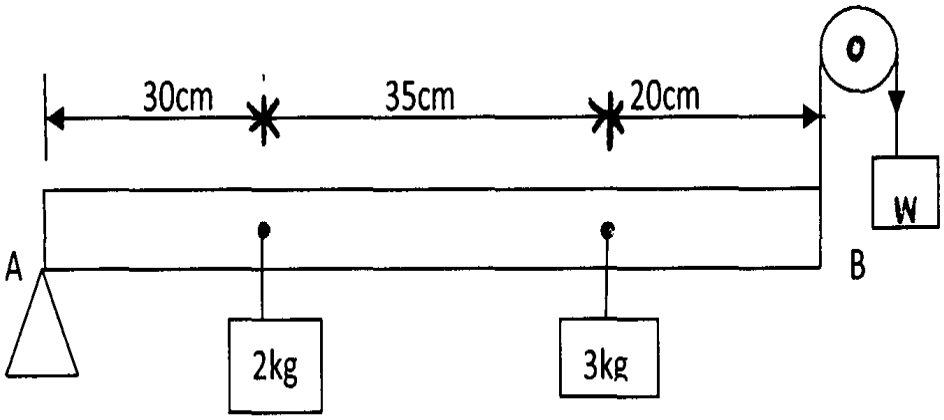
Explain the difference in the shapes of the drops. **(2mks)**

3. Explain why fish can survive under water when the surface is already frozen. **(1 mk)**

4. Figure 3 shows three identical springs each of spring constant 4.5N/m and negligible weight are used to support a load as shown. Determine the total extension of the system**.** **(2mks)**



5. Figure 4 shows a uniform rod **AB** of negligible weight pivoted at **A**.



If the system is in equilibrium, determine the weight **W** shown in the diagram. **(3mks)**

6. A ball is thrown from the top of a cliff 20m high with a horizontal velocity of $10ms^{-1}$. Calculate the distance from the foot of the cliff to where the ball strikes the ground. (3 marks)

7.The height of mercury column in a barometer density 13600kg/ m^{-3}, at a place is 64cm. What would be the height of a column of paraffin in barometer at the same place.
(Density of paraffin = 8.0×10^2 kg /m^3). **(3mks)**

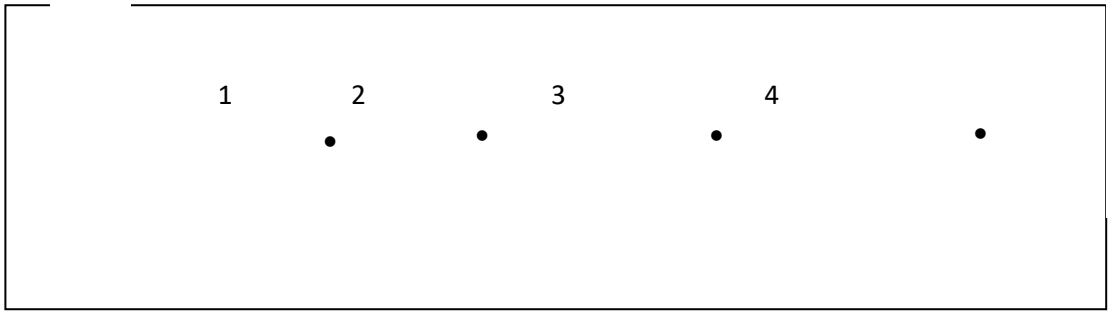
8. Explain o**n**e advantage of mercury over alcohol as a thermometric liquid**.** **(1mk)**

9.A body of mass **M** is allowed to slide down an inclined plane. State **two** factors that affect its final velocity at the bottom of the inclined plane. **(2mks)**

10. A car of mass 1 tone moving at a velocity of 108km/hr is brought to rest in 5 seconds. Calculate the retarding force.(2mks)

11. Explain why a gas cylinder in a house containing cooking fire explodes**.** **(2mks)**

12. Oil is leaking from a car as it travels along a straight road. One drop falls on the ground every fifty seconds. Figure 5 below shows the pattern of the drop on the ground.



(i) Describe the motion of the car. **(1mk)**

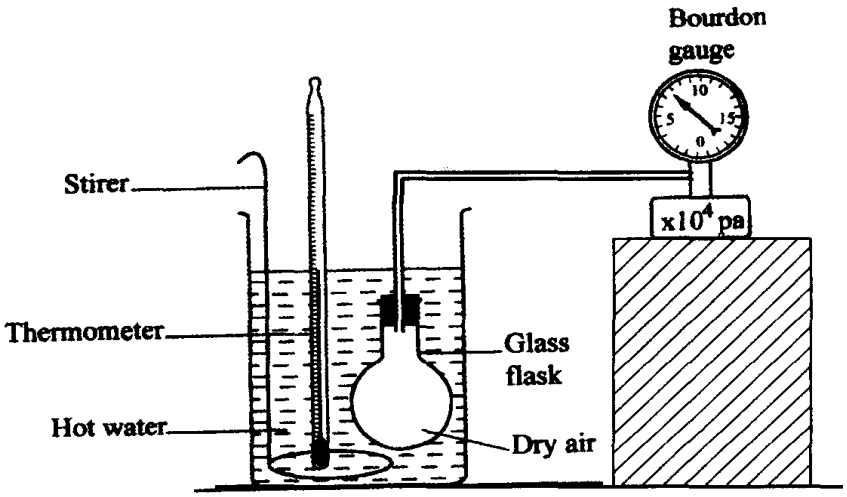
(ii) Determine the acceleration of the car if the distance between drop 1 & 2 is 20 meters and the distance between drop 3 & 4 is 40 meters **(2mks)**

SECTION B - 55 MARKS

Answer all questions in this section in the spaces provided.

13. a) State Pressure Law . **(2mk)**

b) Figure 6 shows a set up that may be used to verify Pressure law.



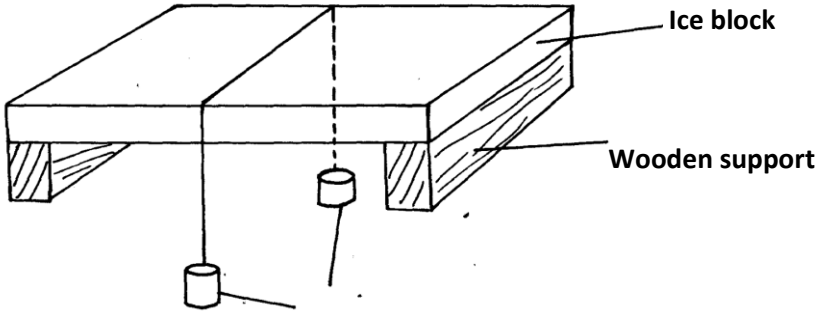
i) State the measurements that may be taken in the experiment. **(2mks)**

ii) Explain how the measurement in (i) above may be used to verify Pressure law . **(4mks)**

iii) A car tyre is at an air pressure of 4.0×10^5 Pa at a temperature of 27 °C. While it is running the temperature rises to 75 °C. What is the new pressure in the tyre?(Assume the tyre does not expand) **(3mks)**

14. (a) Define specific latent heat of fusion of a substance. **(1mk)**

(b) Figure 7 below shows a block of ice with two heavy weights hanging such that the copper wire connecting them passes over the block.



weights

(i) It is observed that the wire gradually cuts through the ice block, but leaves it as one piece. Explain **(3mks)**

(ii) What change would be observed if the copper wire used in the experiment was placed by a cotton thread. **(1mk)**

(c) A block of ice of mass 40g at 0°C is placed in a calorimeter containing 400g of water at 20°C. The heat absorbed by the calorimeter is negligible. The final temperature of the mixture after all the ice has melted is T. (specific latent heat of fusion of ice=340,000 J/kg, specific heat capacity of water=4200$JKg^{-1}k^{-1}$)

(i) Derive an expression for the heat gained by the ice as it melts to water at temperature **T.** **(2mks)**

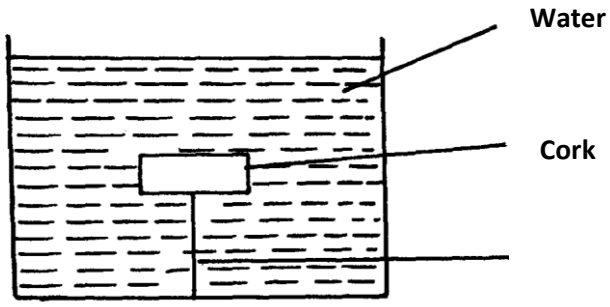
(ii) Derive an expression for the heat lost by the water. **(1mk)**

(iii) Determine the value of **T**. **(2mks)**

(d) State **two** differences between boiling and evaporation. **(2mks)**

15.(a) State the law of floatation. **(1mk)**

(b) Figure 8 shows a piece of cork held with a light thread attached to the bottom of a beaker. The beaker if filled with water.



(i) Indicate and label on the diagram the forces acting on the cork. **(3mks)**

(ii) Write an expression showing the relationship between the forces. **(1mk)**

(c) A solid displaces 8.5cm^3 of liquid when floating on a certain liquid and 11.5 cm^3 when fully submerged in the liquid. The density of the solid if 0.8g/cm3. determine:

(i) Up thrust on the solid when floating. **(3mks)**

(ii) Density of the liquid. **(3mks)**

16. **(a)** Name a device that is used to convert sound energy to electrical energy. **(1mk)**

(b) Define the term efficiency of a machine. **(1mk)**

(c) A pulley system having a velocity ratio of 4 is used to raise a load of 100N through a height of 0.6m at a constant speed using an effort of 60N in a time of 15 seconds.

(i) Calculate the efficiency of the system. **(2mks)**

(ii) How far does the effort end move in order to raise the load by 0.6m. **(2mks)**

(iii) Determine the power developed by the effort. **(2 mks)**

17. (a) Define the following terms:

(i) Instantaneous velocity**.** **(1mk)**

(ii) Uniform acceleration **(1mk)**

(b) A car moves with a constant velocity of 15m/s for 300s and is then accelerated uniformly to a velocity of 25m/s in the next 20s. this velocity is maintained for the next 300s. the car is then brought to rest in 30s with uniform deceleration.

(i) Sketch a velocity-time graph for this journey**.** **(2mks)**

.From the graph determine;

(ii) The acceleration while the velocity is changing from 15m/s to 25m/s**.** **(2mks)**

(iii) The total distance traveled from the time the car reached maximum velocity of the car during this period**.** **(2mks)**

(c) A ball is thrown horizontally at V=8m/s from a tower. It reaches the ground after 4s. Find:

(i) The horizontal distance d it travels before hitting the ground. **(1mk)**

(ii) The height of the tower **(2mks)**

(iii) The velocity on impact with the ground**.** **(2mks)**

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TRIAL 2 PAPER 2

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SECTION A (25mks)

Answer ALL questions in this section in the spaces provided after each question.

1. What is the purpose of a fuse in domestic wiring system? **(1mrk)**

2. Use the domain theory to explain briefly why a ferromagnetic material gets saturated when magnetized. **(2mks)**

3. The **figure 1** below shows an object placed some distance from a biconcave lens.

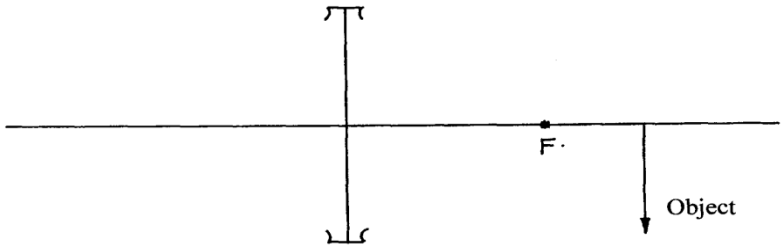


Figure 1

Construct the image on the diagram. **(2mks)**

4. What determines the hardness of X-rays? **(1mk)**

5. Distinguish between the terms 'photoelectric' and 'thermionic' effect. **(2mks)**

6. The **figure 2** below shows a light rod balanced due to the action of the forces shown. Q is a magnet of weight 4N and R is a permanent magnet which is fixed. Determine the force between Q and R and state whether it is attractive or repulsive. **(3mks)**

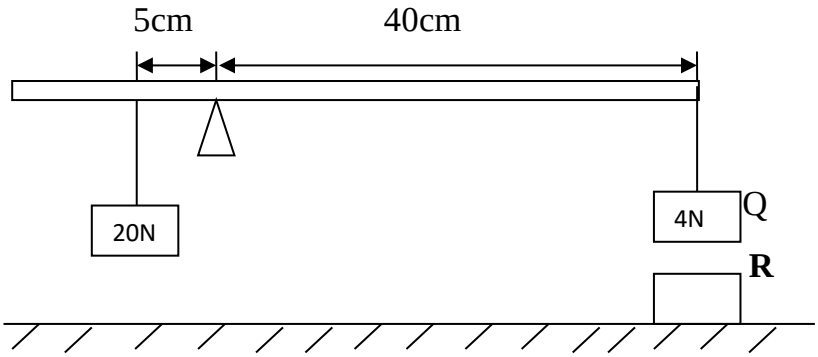


Figure 2

7. Determine the ammeter reading when the potential difference of 3.0 volts is supplied across PQ in figure 3. **(3mks)**

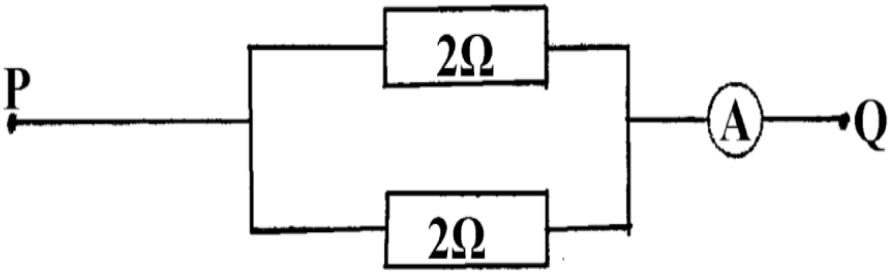


Figure 3

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

Radio	**A**	**Visible**	**B**	**X – Rays**	**Gamma Rays**

Name the possible radiations represented by letter **B**. **(1mk)**

9. A student stands at a distance 400m from a wall and claps two pieces of wood. After the first clap the student claps whenever an echo is heard from the wall. Another student starts a stopwatch at

the first clap and stops it after the twentieth clap. The stopwatch records a time of 50 seconds. Find the speed of sound. **(3maks)**

10. The **figure 4** below shows a plane mirror KL and an object B.

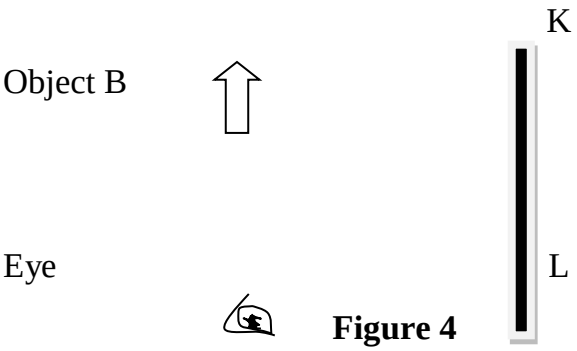


Figure 4

a) Complete the ray diagram to show how the person sees the image. **(2mks)**

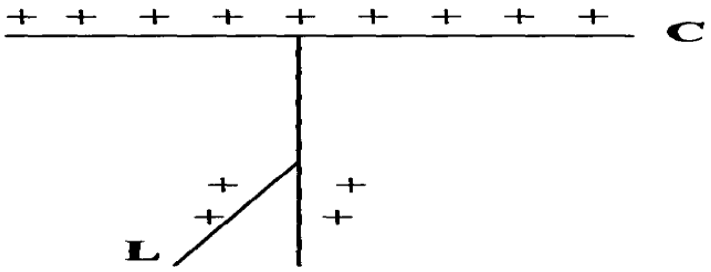
b) State the nature of the image formed. **(2mks)**

11. The following equation represents a decay series.

$$^{210}_{83}\text{x} \longrightarrow {}^{210}_{84}\alpha \longrightarrow {}^{a}_{b}\text{Q}$$

Identify the radiation **x** and determine the values of **a** and **b.** (2mks)

12. A gold leaf electroscope is positively charged as shown in the diagram below where **C** is the cap and **L** is the gold leaf. State and explain what happens to **L** when a positively charged rod is brought near **C** without touching it. (2mks)

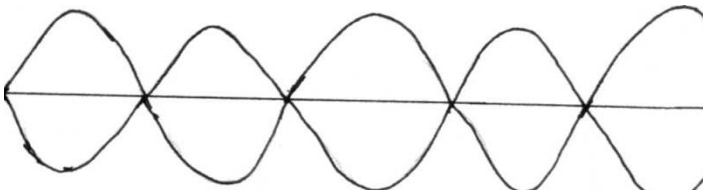


SECTION B (55 MARKS)

Answer ALL questions in this section in the spaces provided after each question.

13. a) Differentiate between transverse and longitudinal waves. **(2mks)**

b) **Figure 5** shows a transverse stationary wave along a string



i). Label the nodes and antinodes on the diagram above. **(2mks)**

ii). If the distance between an anti-node and consecutive node is 1.0×10^{-3}m, determine the wavelength of the stationary wave**.** **(2mks)**

c). Five successive wave frequency in a ripple tank are observed to spread a distance of 6.4cm. If the vibrator has a frequency of 8 Hz, determine the speed of the wave. **(3mks)**

d). The **figure 6** below shows a displacement-time graph for a wave motion

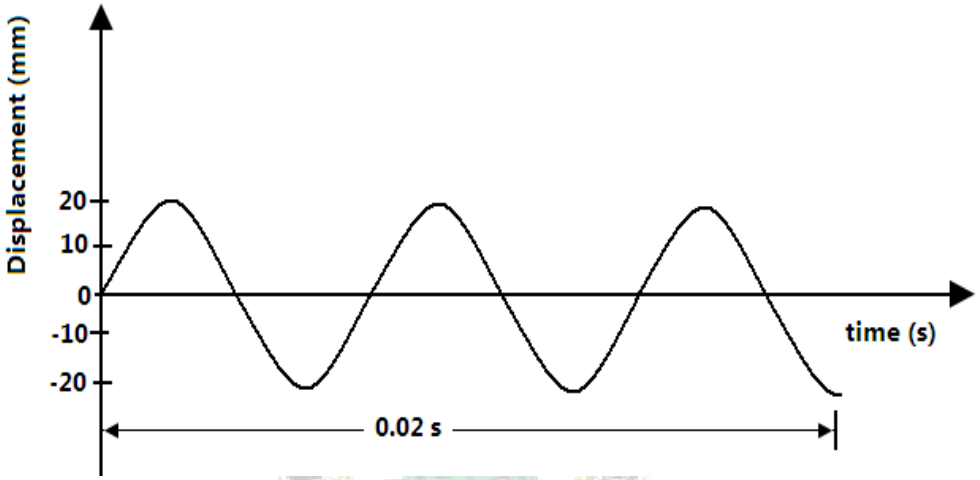


Figure 6

What is the frequency of the wave**?** **(3marks)**

14. **(a)** What do you understand by the term **e.m.f** of a cell?. **(1mk)**

(b) A cell of e.m.f **E** and internal resistance **r** is used to pass a current through various resistors R Ohms and the values of current recorded in the table below.

R(Ohms)	1.6	2.1	2.5	3.6	5.0	8.0
I(A)	1.0	0.8	0.7	0.5	0.37	0.34
1/i(A^{-1})						

i. Complete the table for the values of **1/i** giving your answer to 3d.p. **(3mks)**

ii. Plot a graph of **1/i** versus **R.** **(5mks)**

iii. Given that the equation **E =I(R +r),** use your graph to determine the values of **E** and **r. (5mks)**

15. **a)** State **three** factors that determine the capacitance of a parallel plate capacitor. **(3marks)**

b) Three capacitors of capacitance 200µf, 300µF and 600µf are connected together in a circuit.

i. Draw a circuit diagram to show the arrangement of the capacitors which gives an effective capacitance of 100µf. **(2marks)**

c) The figure 6 below shows a circuit where a battery of e.m.f 6V , switches X and Y, two capacitors of capacitance 2 µF and 4 µFare connected.

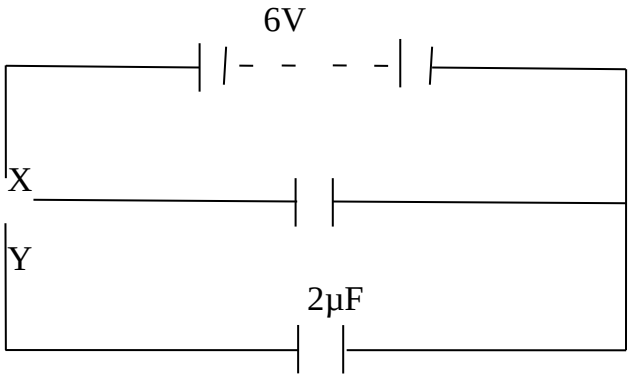


Figure 6

i. Determine the charge stored in the 2 μF capacitor when switch X is closed and switch Y is open. **(3marks)**

ii. When switch Y is finally closed and switch X is open, determine the potential difference across each capacitor. **(3marks)**

d) Briefly explain how the lightening arrester works. **(3mks)**

16. **(a)** Define the term 'work function'. **(1mk)**

(b) List three factors which affect photoelectric effects. **(3mks)**

(c) The table below shows the stopping potential and the corresponding frequencies for a certain photocell.

Stopping potential V_s (V)	0.2	0.6	1.10	1.42	1.83
Frequency f ($\times 10^{14}$Hz)	4.0	5.0	6.0	7.0	8.0

Plot a graph of stopping potential against frequency. **(5mks)**

Use your graph to determine;

i) The threshold frequency**.** **(2mks)**

ii) Plank's constant. (Take **e** to be 1.6×10^{-19}C) **(2mks)**

iii) Work function. (2mk)

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 3 PAPER 1

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

SECTION A: (25 MARKS)

Answer all questions in this section in the spaces provided:

1. The diagram **below** shows a micrometer screw gauge used by a student to measure the thickness of a wire. If it has a zero error of -0.06mm, what is the actual thickness of the wire. **(2 marks)**

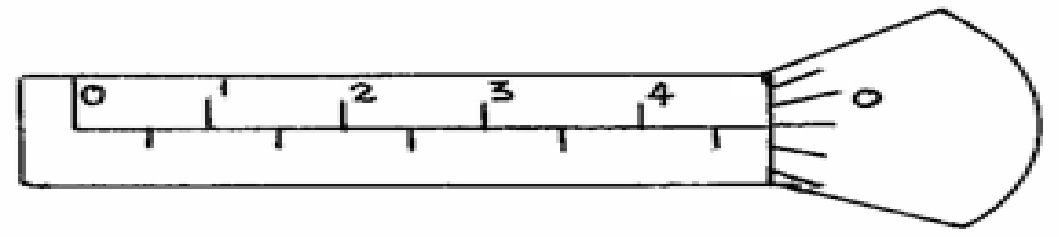


Fig.1

2. A spring extends by 2cm when a mass of 40g is suspended on it. What is the weight required to extend it by 2.5cm. **(2 marks)**

3. Use the diagram **below** to answer the question **below**.

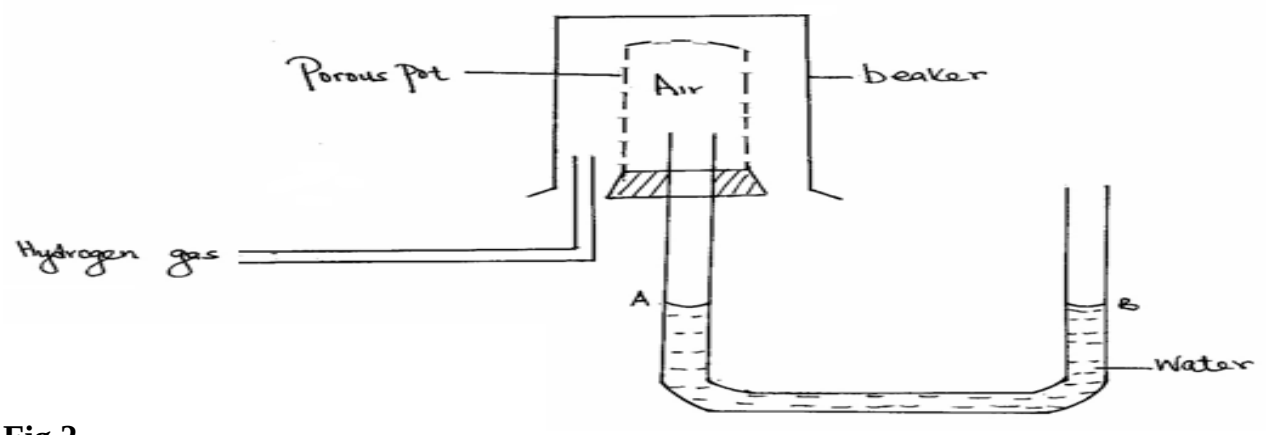


Fig.2

(i) State the aim of this experiment. **(1 mark)**

(ii) At the start of the experiment, the region below the beaker had no hydrogen gas. The hydrogen gas from a gas generator is now introduced for sometime. State the observation made.**(1 mk)**

(iii) Give a reason for your answer. **(1 mark)**

4. Figure **3 below** shows a marble placed on an inverted bowl.

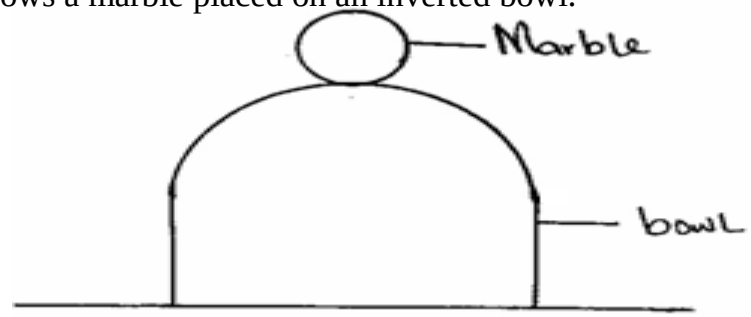


Fig.3

State and explain the type of equilibrium the marble is in. **(2 marks)**

5.(a) Define the moment of a force. **(1 mark)**

(b) A uniform metre rule of mass 100g is balanced by suspending a 10g mass and a 20g mass on its ends as shown **below**.

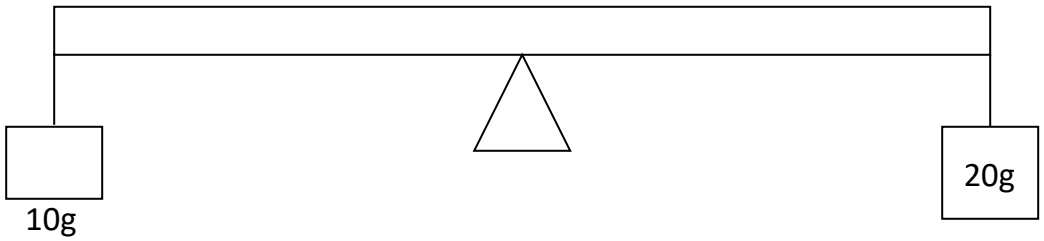


Fig.4

Determine the position of the pivot. **(3 marks)**

6. Figure **5 below** shows a simple bimetallic thermostat used for detecting fire.

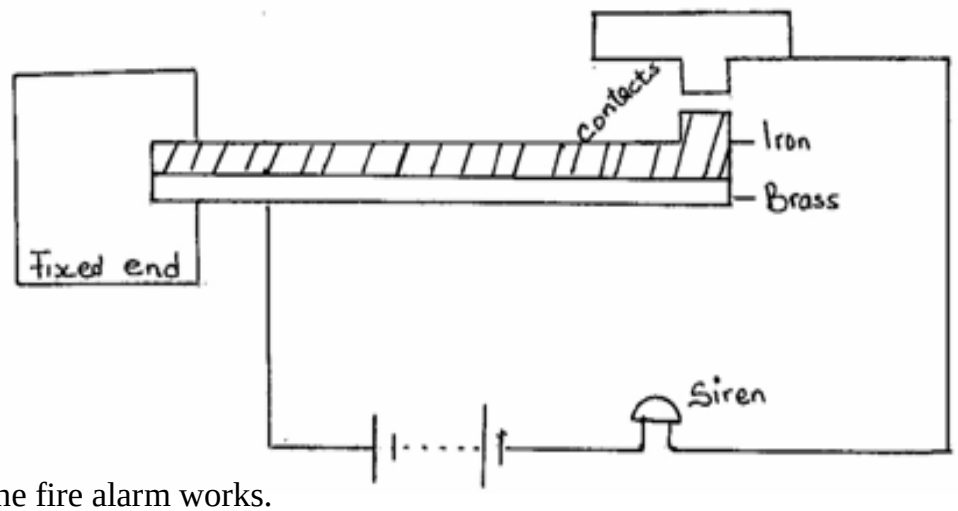


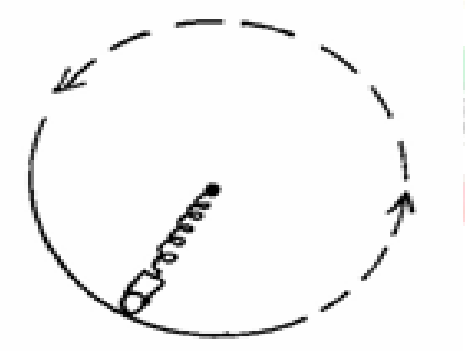
Fig.5

Describe how the fire alarm works. **(1 mark)**

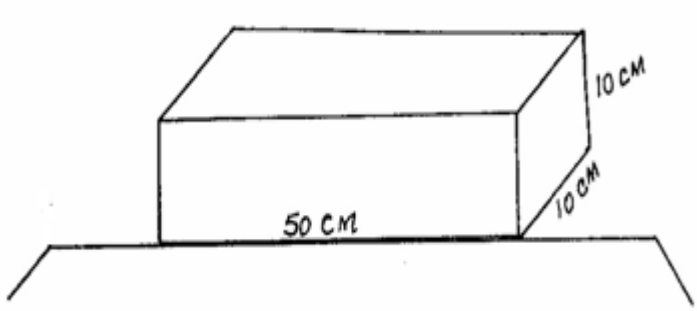
7. **(a)** State **one** assumption made in Bernoulli's fluid flow.

(b) "Air flow over the wings of an aircraft causes a lift. Explain this statement with an aid of a well labelled diagram. **(2 marks)**

8. The following figure represents a spiral spring being rotated in a horizontal circle at uniform speed. The length of the spiral spring including a mass of 50g at its end is 0.2m. The spring constant is 0.5N/cm. Determine the extension produced when the spring rotates at a speed of 4m/s and radius 1m. **(3 marks)**



9. A concrete block of mass 50kg rests on the surface of the table as shown **below**.



What is the maximum pressure that can be exerted on the bench by the block? **(3 marks)**

10. When an inflated balloon is placed in a refrigerator it is noted that its volume reduces.

Use the kinetic theory of gases to explain this observation. **(2 marks)**

SECTION B: (55 MARKS)

Answer question in this section in the spaces provided.

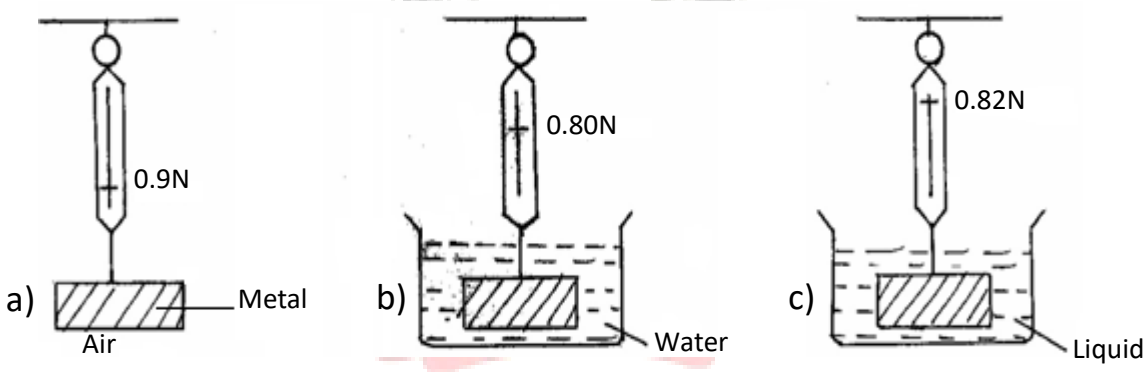
11. (a) State the pressure law of an ideal gas. **(1 mark)**

(b) A 30ºC the pressure of a gas is 100cm of mercury. At what temperature would the pressure of the gas fall by20cm of mercury. Give the temperature in ºC. **(2 marks)**

(c) A hole of area 4.0cm² at the bottom of a tank 5m deep is closed with a cork. Determine the force on the cork when the tank is filled with water. (Take g = 10ms^{-2} and density of water = 1000kgm^{-3}). **(4 marks)**

(d) A measuring cylinder of height 25cm is filled to a height of 15cm with water and the rest is occupied by kerosene. Determine the pressure acting on its base (density of water = 1gcm^{-3} density of kerosene = 0.8gcm^{-3} and atmospheric pressure = 103,000pa). **(3 marks)**

12. The figure **below** shows the same block weighed in air, water and liquid. Given that the reading of the level of water becomes 150cm³ when the metal is fully immersed.



(a) Determine:

(i) Density of the metal. **(3 marks)**

(ii) Water level before the solid was immersed. **(2 marks)**

(iii) Explain why the spring balance gives different reading in figure (b) and (c) with the same metal block. **(2 marks)**

13. (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/hr rams 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)**

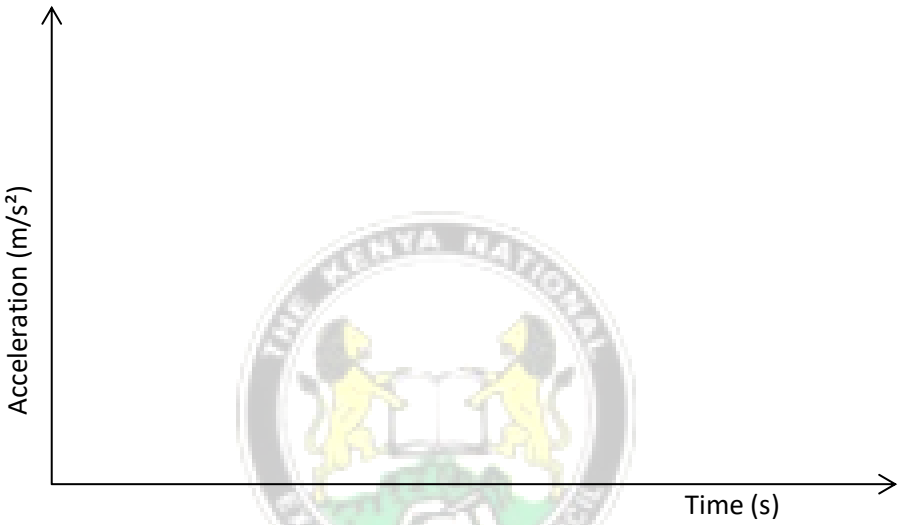
(d) Give the reasons why a safety seat belt used in a vehicle;

(i) should have a wide surface area. **(1 mark)**

(ii) should be slightly extensible. **(1 mark)**

(e) Give a reason why, when a passenger jumps from a floating boat, the boat moves backwards. Give a reason for this. **(1 mark)**

(f) A steel ball is dropped into a cylinder containing oil. Sketch on the axis given **below** a graph showing the variation of acceleration with time. **(1 mark)**



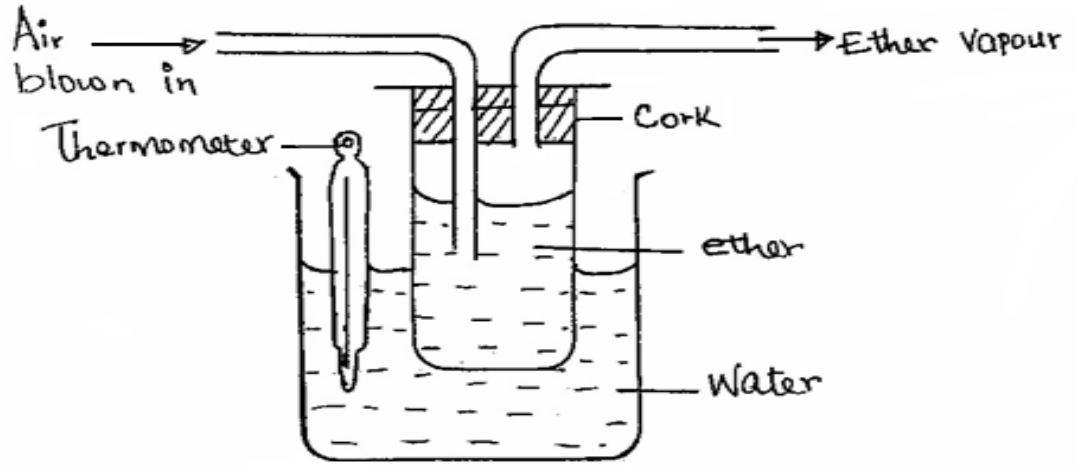
14. **(a)**State **two** ways through which the rate of evaporation of a liquid may be increased.**(2 mks)**

(b) A metal of mass 10kg is heated to 120ºC and then dropped into 2kg of water. The final temperature of the mixture is found to be 50ºC. Calculate the initial temperature of the water. (Specific heat capacity of the metal and water is 450JKg^{-1}K^{-1} and 4200JKg^{-1}K^{-1} respectively). **(3 marks)**

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

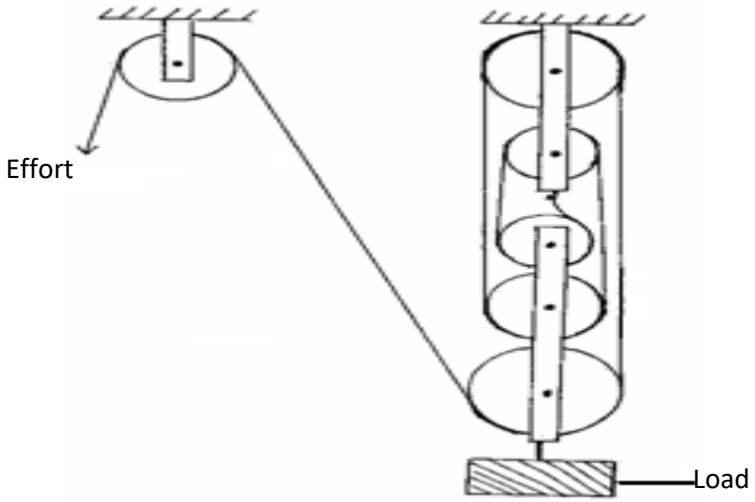
(d) Formation of ice on roads during winter in cold countries is known to hamper vehicles. State **two** ways in which the melting point of ice may be lowered to solve this problem. **(2 marks)**

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



(g) State **two** differences between heat and temperature. **(2 marks)**

15. The figure **below** shows a machine being used to raise a load. Use the information given in the figure to answer questions **below**.



(a) Determine the velocity ratio (V.R) of the machine. **(1 mark)**

(b) If a load of 800N is raised by applying an effort of 272N, determine the efficiency of the machine. **(1 mark)**

(c) A crane lifts a load of 2000kg through a vertical distance of 3.0m in six seconds. Determine

(i) work done. **(2 marks)**

(ii) Power of the crane. **(2 marks)**

(d) Name the transducer that is used to convert the following form of energies.

(i) Electrical to sound. **(1 mark)**

(ii) Electrical to kinetic. **(1 mark)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 3 PAPER 2

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

b) ***Sign** and write **date** of examination in the spaces provided.*

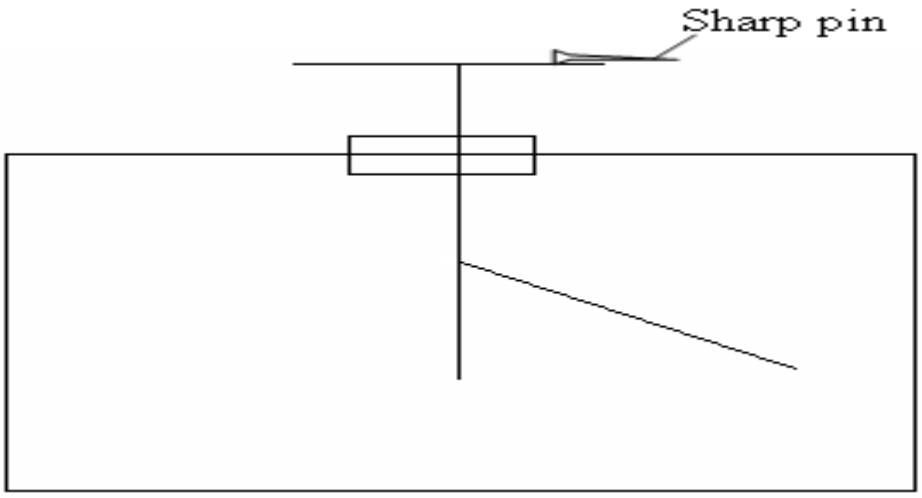
c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

QUESTIONS

SECTION A: (25 MARKS)

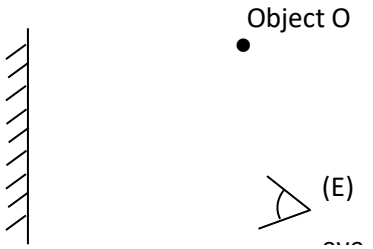
1. State the property of light suggested by the formation of shadows. **(1 mark)**

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



Explain why the leaf collapses. (2 marks)

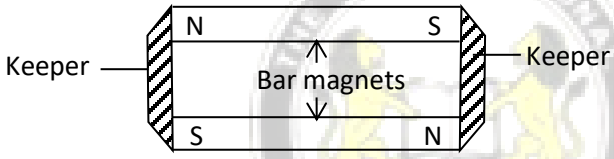
3. The figure **below** shows an object O placed infront of a plane mirror.



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

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

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



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

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

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

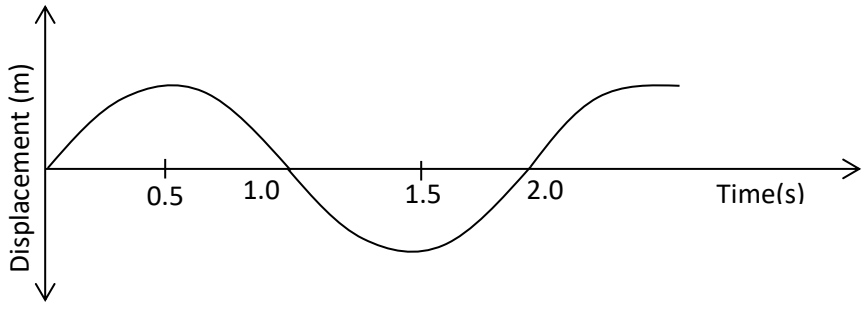
Radio	A	Infrared	Visible	B	X-Rays	Gamma Rays

(i) Name the radiation represented by **B**. **(1 mark)**

(ii) Name a device that can be used to detect radiation **A**. **(1 mark)**

7. **(a)**Distinguish between a transverse and a longitudinal wave. **(1 mark)**

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



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

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

9. (a) What are extrinsic semi-conductors. **(2 marks)**

(b) Explain what happens to the depletion layer when a diode is forward biased. **(2 marks)**

10. (a) State the purpose of cooling fins in the X-ray tube. **(1 mark)**

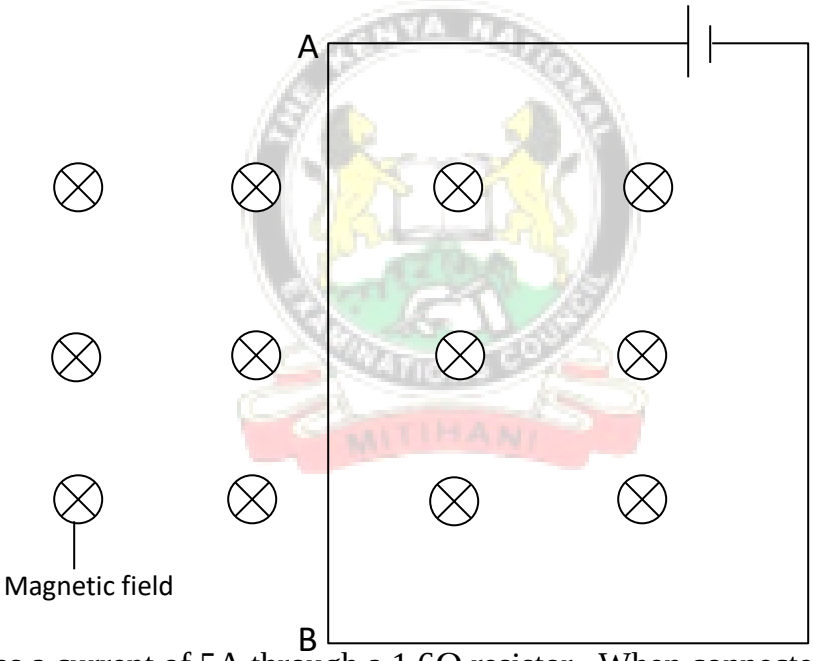
(b) State **two** differences between X-rays and gamma rays. **(2 marks)**

SECTION B: (55 MARKS)

Answer question in this section in the spaces provided.

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

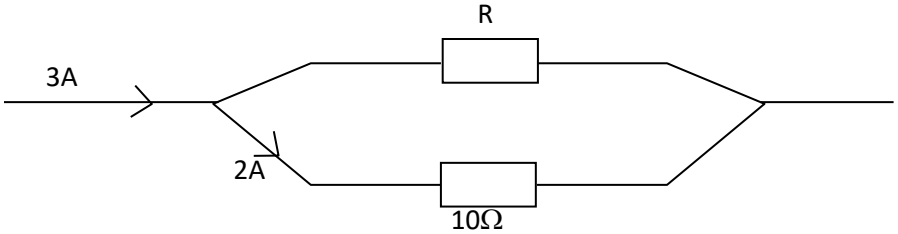
(b) The following figure shows a conductor placed in a magnetic field. Indicate on the diagram the direction of motion of part AB of the conductor. **(1 mark)**



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

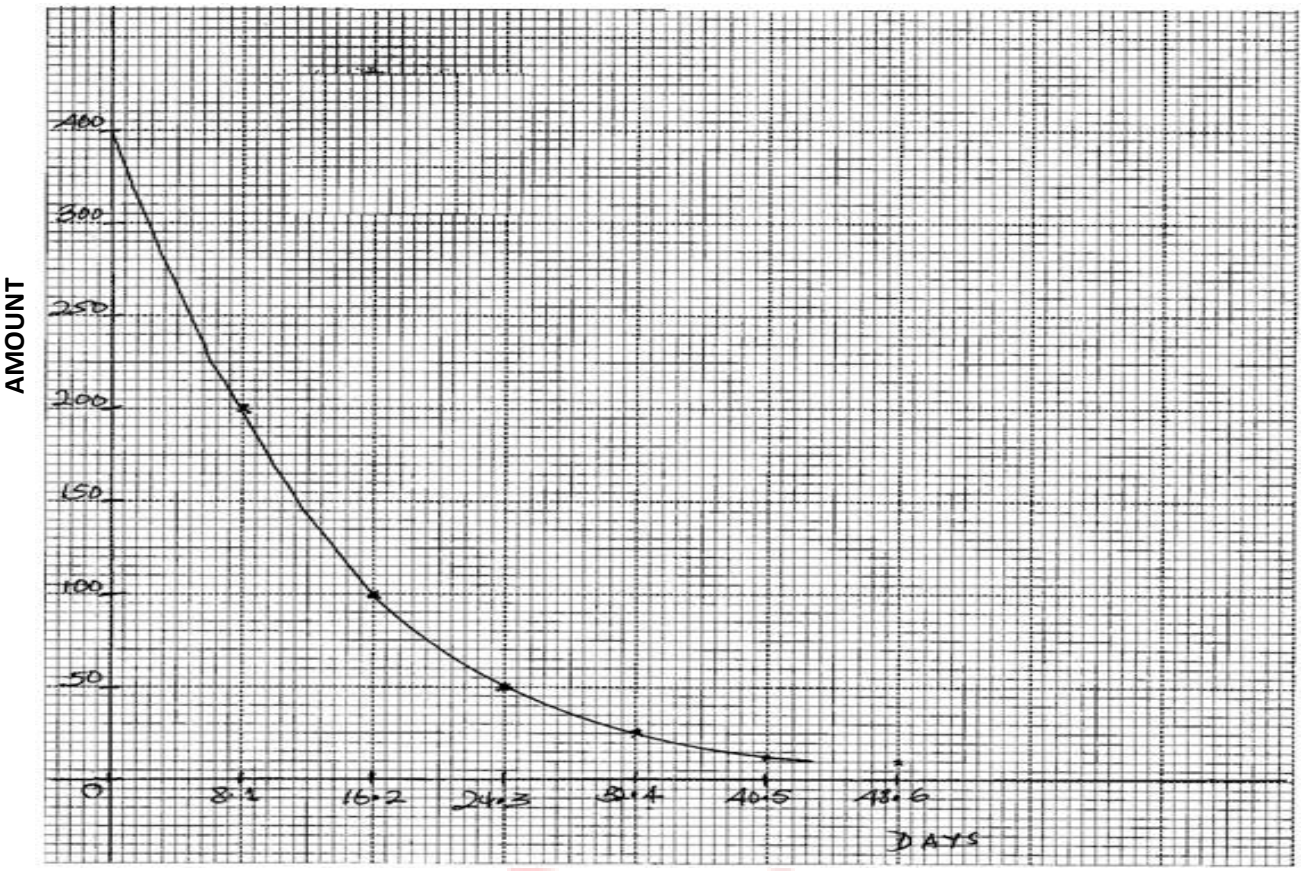
(d) Calculate the length of a nichrome resistance wire of cross-sectional area $7 \times 10^{-8} m^2$ required to make a resistor of 10 ohms. (Take resistivity of nichrome = $1.10 \times 10^{-6} \Omega m$). **(3 marks)**

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



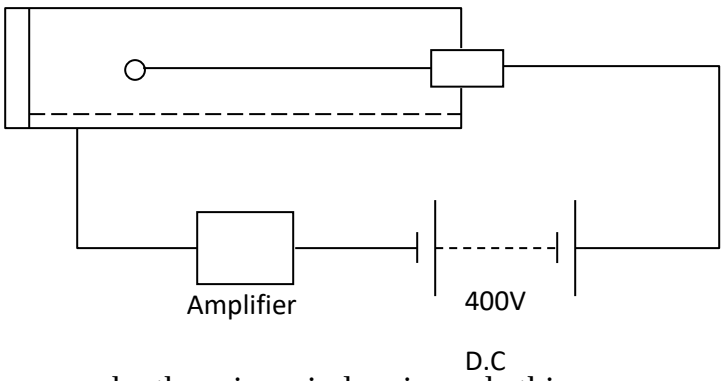
12. I (a) The half life of cobalt 60 is 5 years. How long will a sample take for the activity to decrease to $\frac{1}{16}$ of its value. **(2 marks)**

(b) The graph **below** shows radioactive decay of iodine.



Use the graph to determine the half-life of iodine. (2 marks)

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

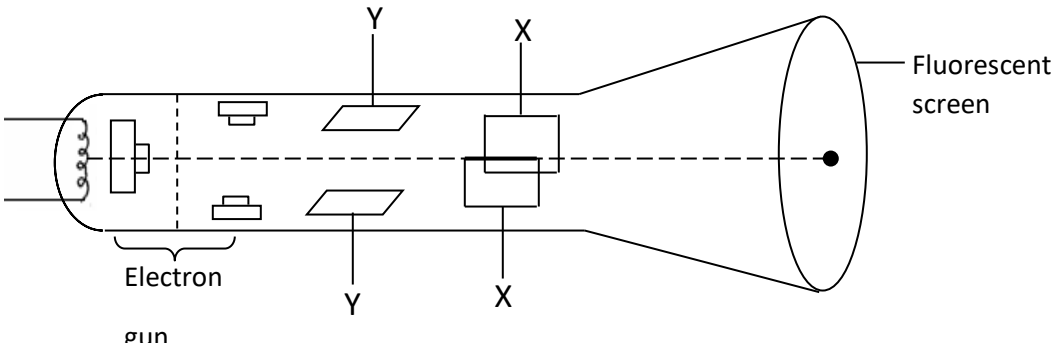


(i) Give the reason why the mica window is made thin. **(1 mark)**

(ii) Explain how the radiation entering the tube through the tube is detected by the tube. **(3 marks)**

(iii) What is the purpose of the halogen vapour. **(1 mark)**

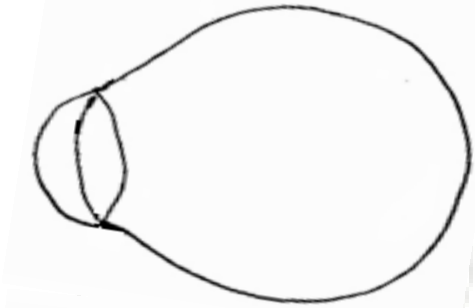
II The figure **below** shows a simple cathode ray tube.



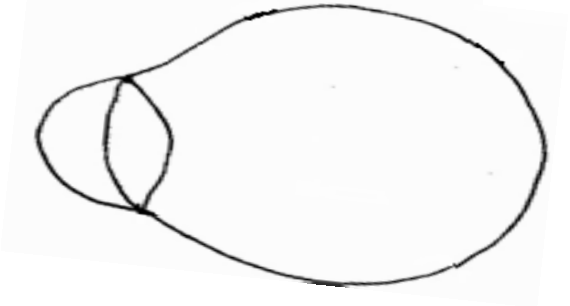
(i) Explain how the electrons are produced in the tube. **(2 marks)**
(ii) State **one** function of the anode. **(1 mark)**
(iii) At what part of the cathode ray tube would the time base be connected. **(1 mark)**
(iv) Why is a vacuum created in the tube? **(1 mark)**

13. (a) The figures **below** shows diagrams of the human eye.

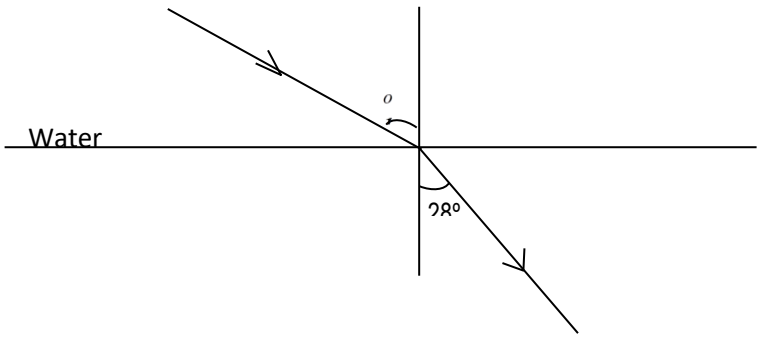
(a)



(b)



(i) Sketch in figure (a) a ray diagram to show long sightedness. **(1 mark)**
(ii) Sketch in figure (b) a ray diagram to show how a lens can be used to correct the long sightedness. **(2 marks)**
(b) Draw a ray diagram to show how a convex lens can be used as a magnifying glass. **(2 marks)**
(c) The diagram **below** shows a ray of light travelling between water-glass interface.



Calculate the value of $\overset{o}{\imath}$ given that $a^n g = 1.52$ *and* $a^n w = \frac{4}{3}$. **(3 marks)**

(d) State **one** conditions for total internal reflection to occur. **(1 mark)**

14. (a) A transformer with 2000 turns in the primary circuit and 150 turns in the secondary circuit has its primary circuit connected to a 800Va.c. source. It is found that when a heater is connected to the secondary circuit it produces heat at the rate of 1000W. Assuming 100% efficiency, determine the:

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

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

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

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

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

(ii) Calculate the cost of using the following appliances in one month (30 days) of the company rate is Ksh.9.50 per unit.

I A 2000W water heater for 2 hours per day.

II A 75W bulb for 10 hours per day.

III An 1500W electric iron for 1 hour per day. **(3 marks)**

(iii) Find the total monthly bill for the above household if in addition to the energy consumed, the power company charges each consumer.

I A standing charge of Ksh.200.

II Fuel cost levy at 70 cents per unit. **(2 marks)**

15. (a) Define the term work function. **(1 mark)**

(b) The minimum frequency of light that can cause photoelectric emission to occur from a surface of metal is 6.94×10^{14}Hz. If the speed of the emitted electrons is 8.0×10^{5}ms^{-1}. Calculate:- (h = 6.63×10^{-34}Js. me = 9.11×10^{-31}kg).

(i) the work function of the metal. **(2 marks)**

(ii) the maximum kinetic energy of the photoelectron. **(2mks)**

(iii) the frequency of the source. **(3 marks)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 4 PAPER 1

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

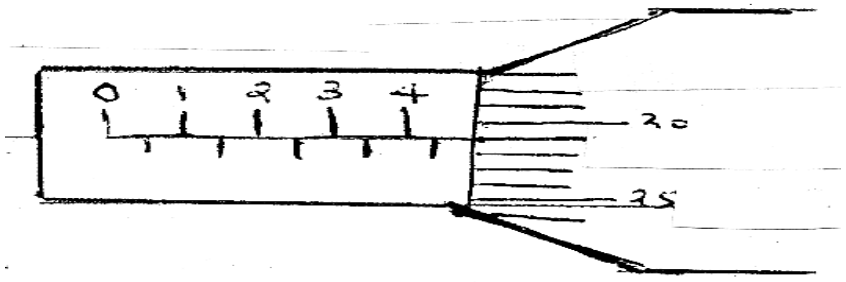
b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

SECTION A (25 MARKS)

Answer ALL questions in this section in the spaces provided

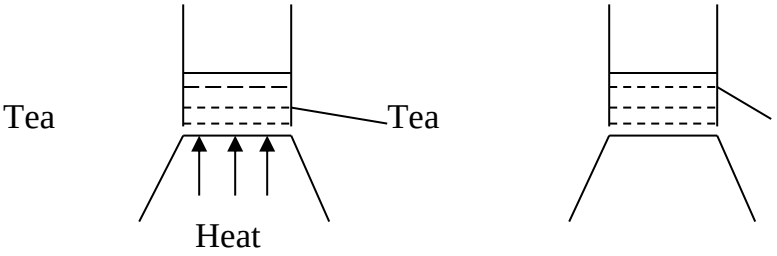
1. The micrometer screw gauge below has a zero error of -0.019cm.



Determine the true reading of the instrument. **(2mks)**

2. A string of negligible mass has a metal ball tied at the end of the string 100cm long and the ball has a mass of 0.4kg. The ball is swinging horizontally, making 5 revolutions per second. Determine the angular velocity in radians per second. **(3mks)**

3. Study the set-ups below and use it to answer the questions that follow:



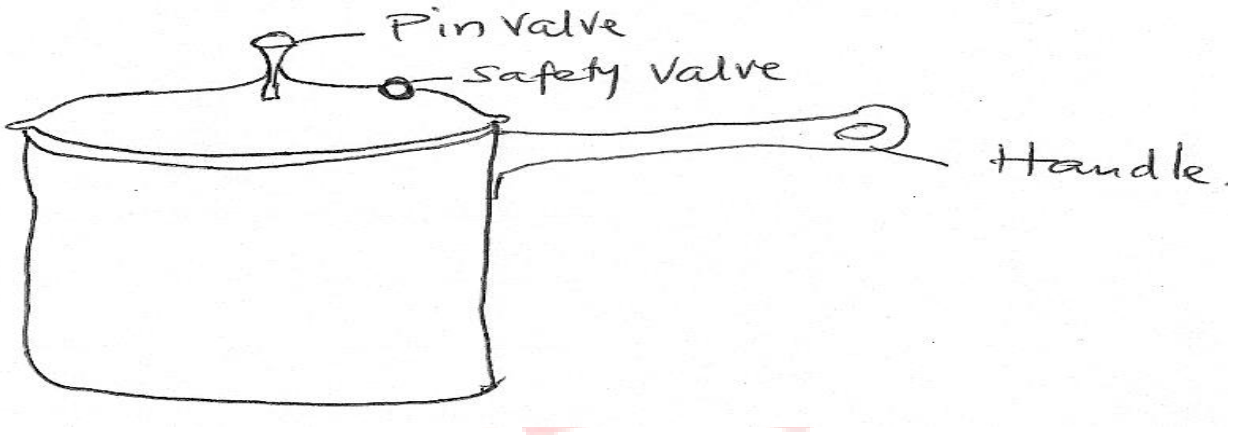
(a) (b)

A student placed one teaspoonful of sugar in each of the identical cups with equal volume of tea as shown above. With a reason which cup of tea will taste sugary after 2 minutes? **(2mks)**

4. Why is a wire gauze often placed above a Bunsen burner flame during an experiment?**(2mks)**

5. A car traveling from Kisumu to Eldoret had its tyre pressure measured in Kisumu and found to be 300kPa. On arrival to Eldoret where the temperature is 18^0C. The pressure of the tyre was found to be 200kPa. What was the temperature of the air in the tyre in Kisumu? (Assume that the volume of the air in the tyre is constant) **(3mks)**

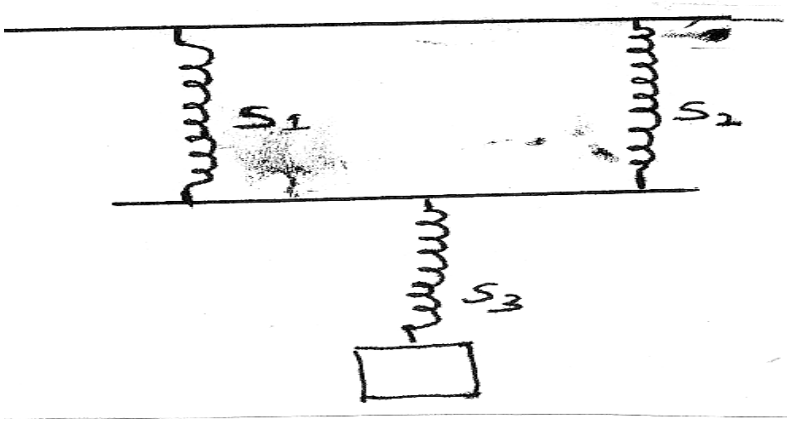
6. The diagram below shows some parts of a pressure cooker.



(a) What is the function of safety valve? **(1mk)**

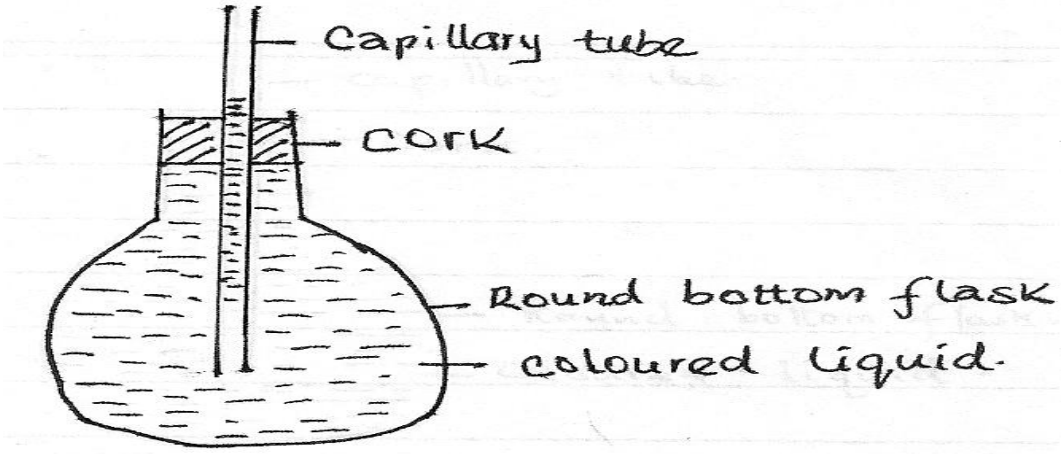
(b) The mass of the material used to make the vessels above is 0.5kg, and its specific heat capacity if 420J/Kgk. Calculate its heat capacity. **(2mks)**

7. A of such identical springs in which the third spring hangs midway between two springs S_1 and S_2.single light spring has a spring constant of 0.2N/cm. The figure below shows an arrangement

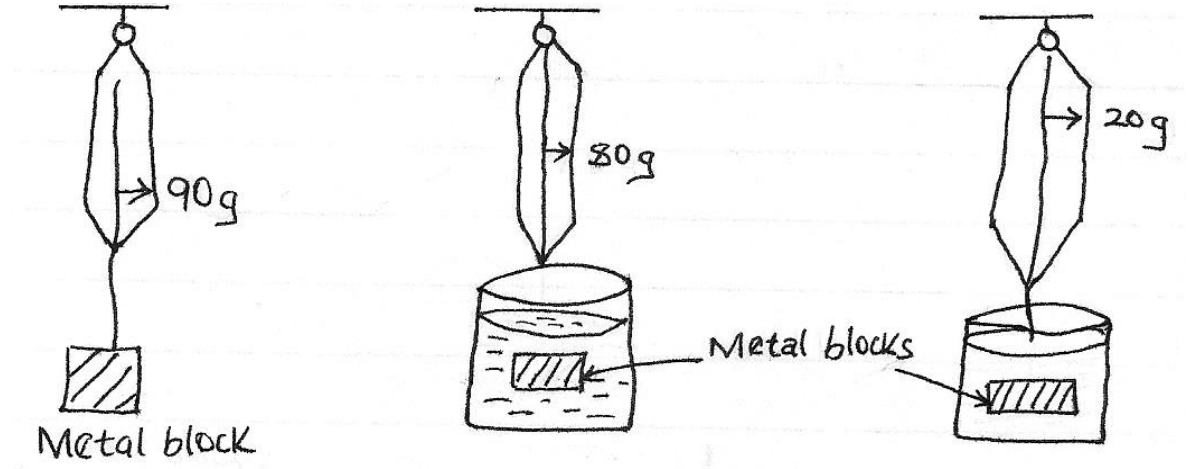


Calculate the total extension of the system. **(2mks)**

8. State what will be observed when the above apparatus is placed in cold water. **(2mks)**

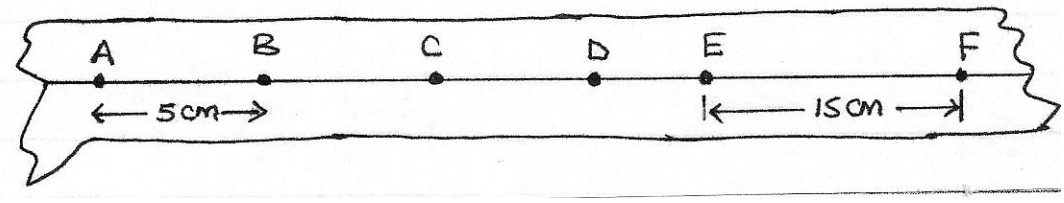


9. The diagram below shows the same metal block weighed in air, water and a liquid X.



Calculate the density of the metal. **(3mks)**

10. The figure below shows a large tape made from a ticker tape timer running at 50Hz.



Calculate the acceleration of the body over the interval AF. **(4mks)**

11. Name **two** forces that determine the shape of an oil drop on a table. (2mks)

SECTION B (55 MARKS)

Answer ALL questions in this section in the spaces provided

12. **(a)** State the principle of conservation of Linear momentum. **(1mk)**

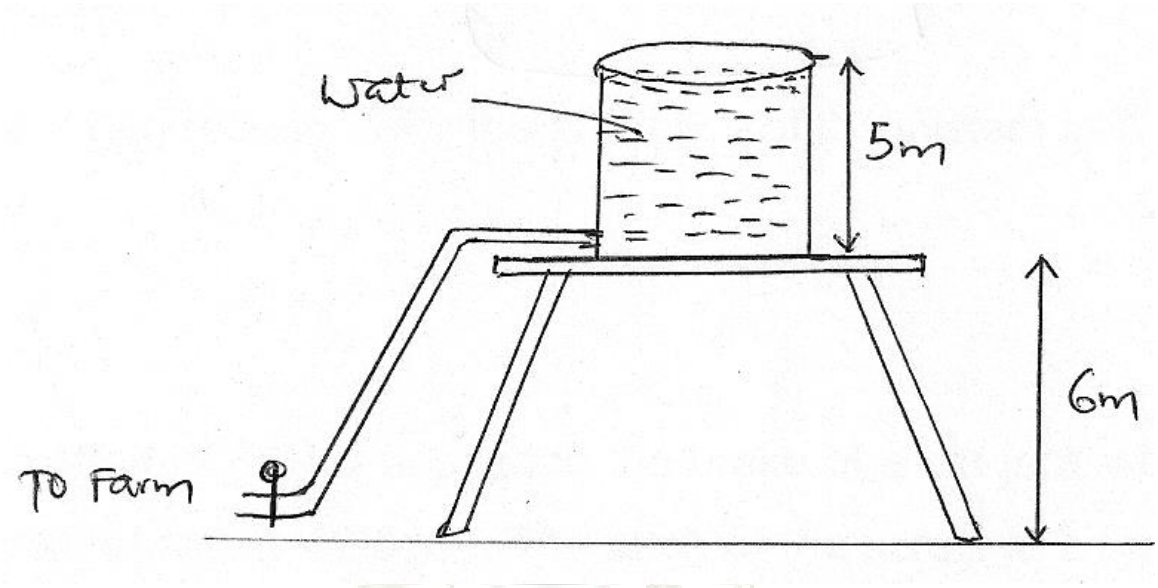
(b) Calculate the recoil velocity of a gun of mass 0.4kg which fires a bullet of mass 0.090kg at a velocity of 600m/s. **(3mks)**

(c) (i) State **two** factors which affect frictional force of a body. **(2ms)**

(ii) Suggest any **two** ways in which friction can be minimized. **(2mks)**

(iii) State **two** advantages of friction. **(2mks)**

13. A farmer in Kapsabet town placed up a tank for use in irrigation as shown.



(i) The farmer discovered that there was not enough pressure to water his crops. Explain to him how the pressure can be increased. **(2mks)**

(ii) Which form of energy is possessed by the water in the tank? **(1mk)**

(iii) Calculate the velocity of the water jetting out of the pipe. **(3mks)**

(iv) Calculate the pressure at which the water jets out. **(2mks)**

(v) State **two** disadvantages of water barometer. **(2mks)**

14. (a) State the law of conservation of energy. **(1mk)**

(b) Draw a block and tackle system with a velocity ration of 5. **(2mks)**

(c) The block tackle system above was used to lift 100kg of load. Given that the efficiency of the system is 75%. Calculate the effort applied to lift the load**.** **(2mks)**

(d) Give **two** reasons why the efficiency of the system is 75%. **(3mks)**

(e) An effort of 60N is applied to the brake of a car jack whose hand moves through a circle of radius 17.5cm. The pitch of the screw is 2.5mm. Determine the velocity ratio of the screw Jack. **(3mks)**

15. **(a)** What is a laminar flow? **(1mk)**

(b) The water from a gardener hose pipe fills a bucket in 30.0s. The volume of the

bucket is $8.00x10^{-3}m^3$. Find the speed of the water that leaves the hose pipe at:

(i) An un-obstruction opening with cross-sectional area of $2.85x10^{-4}m^2$. **(3mks)**

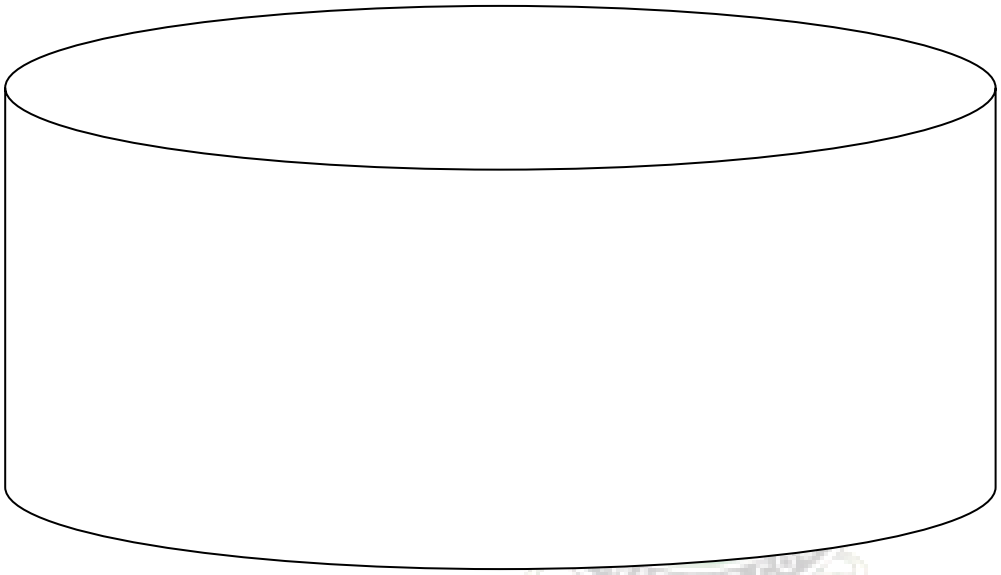
(ii) An un-obstruction opening that has only half as much area. **(3mks)**

(iii) State **two** assumptions needed in derivation of equation of continuity. **(2mks)**

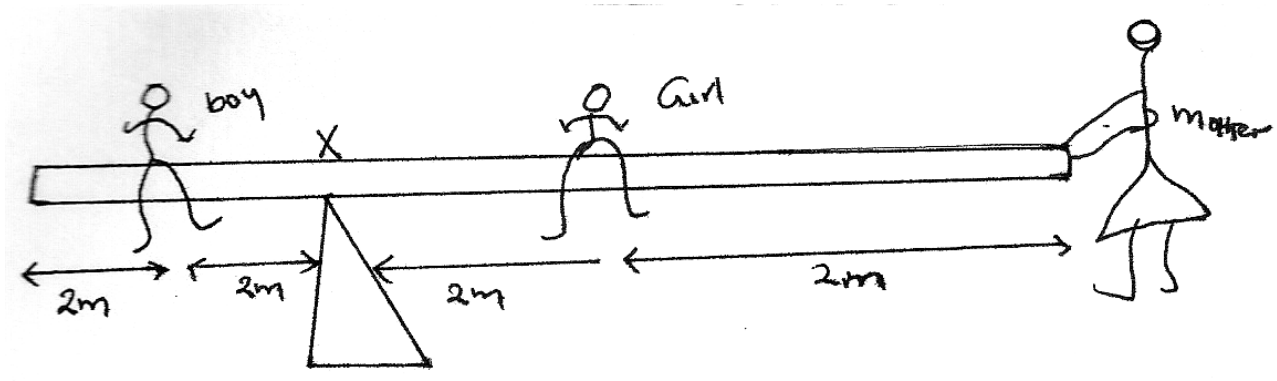
(c) State **one** effect of Bernoulli's principle. **(1mk)**

16. (a) (i) Define the term centre of gravity of a body. **(1mk)**

(ii) Locate the C.o.g. of the cylinder shown below. **(1mk)**



(b) The figure below shows a boy and a girl on playground seesaw. The seesaw has a mass of 30kg and is pivoted at its centre. Their mother has to hold the girl's end in order to keep the seesaw level. The boy's mass is 50kg and the girl's mass is 30kg. All the distances are shown on the diagram.



Calculate:

(i) The turning effect of the boy's weight about point x. **(1mk)**

(ii) The turning effect of the girl's weight about x. **(1mk)**

(iii) The force their mother must apply on the end of the seesaw in order to keep it level. **(2mks)**

(iv) The total downward force in the central support of the seesaw. **(2mks)**

(c) A stone is thrown vertically upward with an initial velocity of 30mls:

(i) Determine the maximum height reached. **(3mks)**

(ii) Time taken to come back to the point of projection. **(3mks)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 4 PAPER 2

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

SECTION A (25 MARKS)

Answer ALL questions in this section in the spaces provided

1. The experiment below is an equation for a radioactive element A. Elements B and C are the daughter nuclides. A, B and C are not the actual symbols of any of the elements.

$$\begin{matrix}235\\92\end{matrix}A \longrightarrow \begin{matrix}231\\90\end{matrix}B + \begin{matrix}X\\Y\end{matrix}C$$

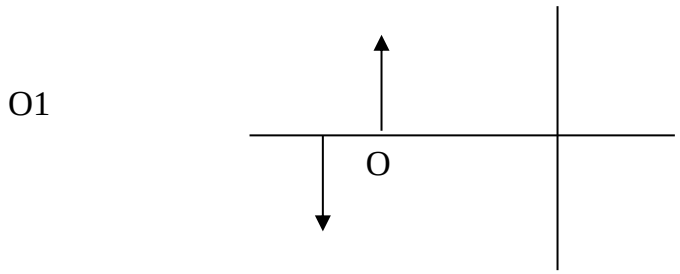
(a) Identify the element C. **(1mk)**

(b) State **two** of its characteristics. **(2mk)**

2. **(i)** State the characteristics of images formed by a pinhole camera. **(2mks)**

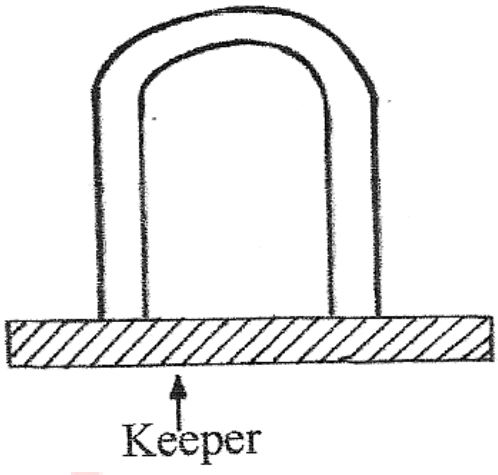
(ii) What is the effects on the image when the camera is elongated? **(1mk)**

3. The figure below shows the object O and its image O1 formed by a concave mirror. Locate the position of the principle focus. **(2mks**



4. An electromagnet is made by winding insulated copper wire on an iron core. State **three** changes that could be made to increase the strength of the electromagnet. **(3mks)**

5. Figure below shows a U-shaped magnet stored with a keeper.



Explain how this method helps to retain magnetism longer. **(2mks)**

6. State the energy transformation when fast moving electrons are suddenly stopped by a target in an x-tray tube. **(1mk)**

7. A current of 13A flows through a heating element of resistance 8.5Ω for 1.5 minutes. Calculate the quantity of heat supplied. **(3mks)**

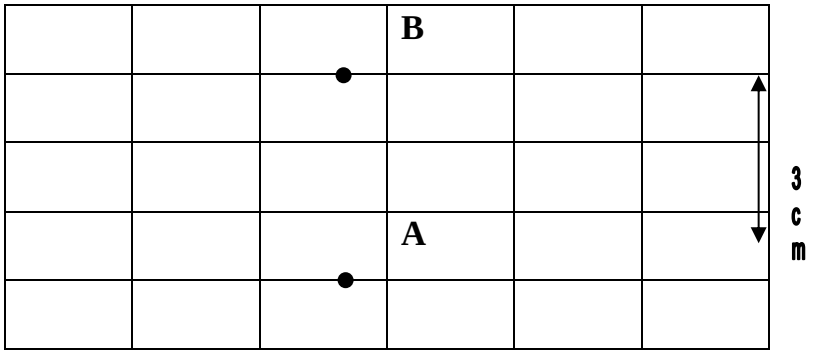
8. Give a reason why it is not advisable to smoke a cigarette near a charging battery. **(1mk)**

9. State the dynamo rule. **(1mk)**

10. Radio X is broadcast on wavelength 150m at a frequency of 200KHz. Calculate the velocity of the radio waves. **(2mks)**

11. Draw a diagram to illustrate the correction of myopia. **(1mk)**

12. The figure below shows the displacement of a spot on a cathode ray oscilloscope screen.



The spot appears on the CRO at position A. When DC voltage is applied to Y-plates the spot is displaced to position B. The Y-gain is set at 20V/cm.

(i) State the type of voltage applied. **(1mk)**

(ii) Find the voltage applied. **(2mks)**

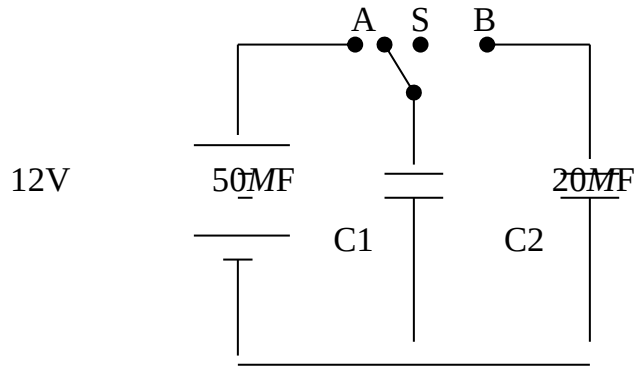
SECTION B (55 MARKS)

Answer ALL questions in this section in the spaces provided

13. **(a)** **(i)** State the basic law of electrostatics. **(1mk)**

(ii) In testing for the sign of charge on a body, explain the behaviour of a positively charged electroscope when charged bodies are brought closer to the electroscope. **(2mks)**

(b) The figure below shows an arrangement which may be used to charge a capacitor of capacitance 50*M*F and then to connect it to a capacitor of capacitance 20*M*F.

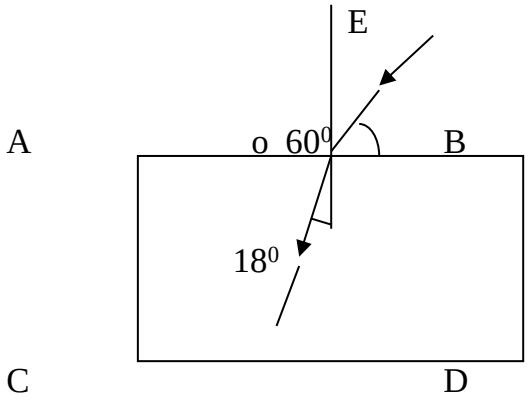


(i) The switch S is first placed at position A, so that the capacitor C, is connected to the 12V dc supply. Calculate the charge stored in the capacitor. **(3mks)**

(ii) The switch S is now changed to position B. Calculate the final potential difference across the capacitors. **(3mks)**

14. **(a)** State the conditions to be satisfied for total internal reflection to occur. **(2mks)**

(b) A ray of light traveling in the direction EO in air enters a rectangular block at an angle of incidence 30^0. The resulting angle of refraction is 18^0.

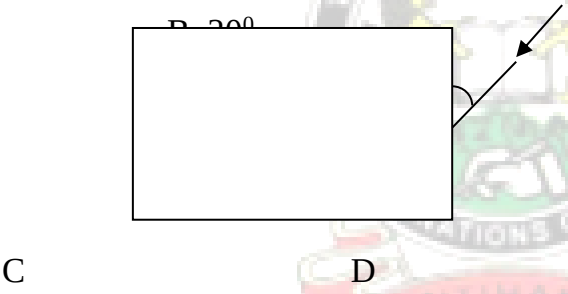


Find:-

(i) The refractive index of the block. **(2mks)**

(ii) The critical angle C of the block. **(3mks)**

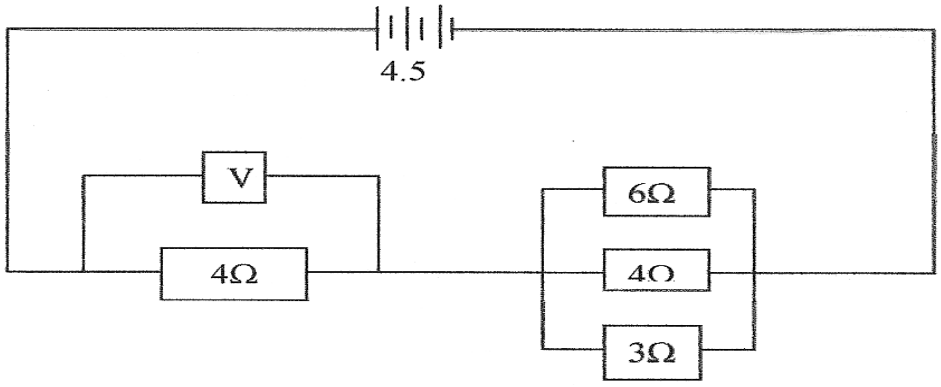
(c) If the ray is incident on surface BD, as shown in the figure.



(i) Complete the diagram to show the path of light through and out of the block. **(2mks)**

(ii) At what angle will the ray leave the block? **(4mks)**

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



Fig

(i) Calculate the effective resistance of the circuit. **(3mks)**

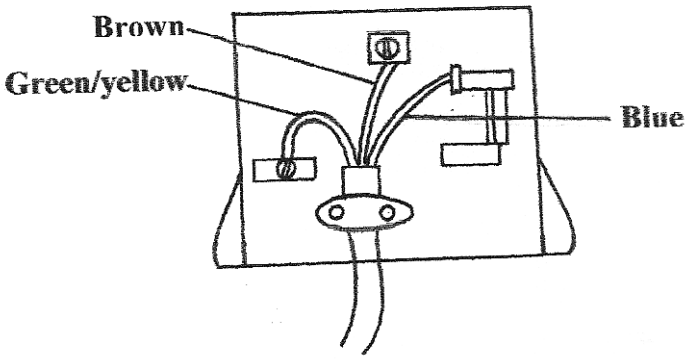
(ii) Find the voltmeter reading. **(3mks)**

(b) A cell drives a current of 3.2A through a 2.8Ω resistor. When it is connected to

1.6Ω resistor, the current that flows is 5A. Find the E.m.f. (E) and internal resistance of the cell.

(4mks)

16. (a) The figure below shows a connection to the three pin plug.



(i) Identify the mistakes in this wiring. **(3mks)**

(ii) What would happen if this plug was connected to the mains of the socket? **(1mk)**

(iii) State **two** reasons why the earth pin is normally longer than the other two pins. **(2mks)**

(b) A house has five rooms with 240V, 60W bulbs. If the bulbs are switched on from 7.00p.m. to 10.30p.m.

(i) Calculate the power consumed per day in Kilowatt-hours. **(3mks)**

(ii) Find the cost per week for lighting these rooms at Kshs. 6.70 per unit. **(3mks)**

17. (a) The diagram below shows part of the electromagnetic spectrum.

a	b	c	d	e	f

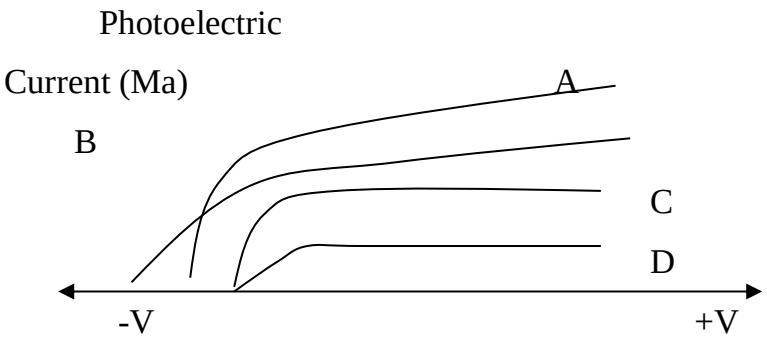
→ Increasing wave length

Radiation of frequency corresponding to each of the above regions is allowed to strike a metal plate and in some case electrons were ejected from the metal.

(i) From which of the above regions is Radiation most likely to eject electrons from a metal plate? **(1mk)**

(ii) Give a reason for your answer in (i) above. **(1mk)**

(b) A photoelectron cell consists of a conducting plate (cathode) coated with photo emissive material and an anode were used in an experiment to study photoelectric current and the potential difference V between the cathode and anode.



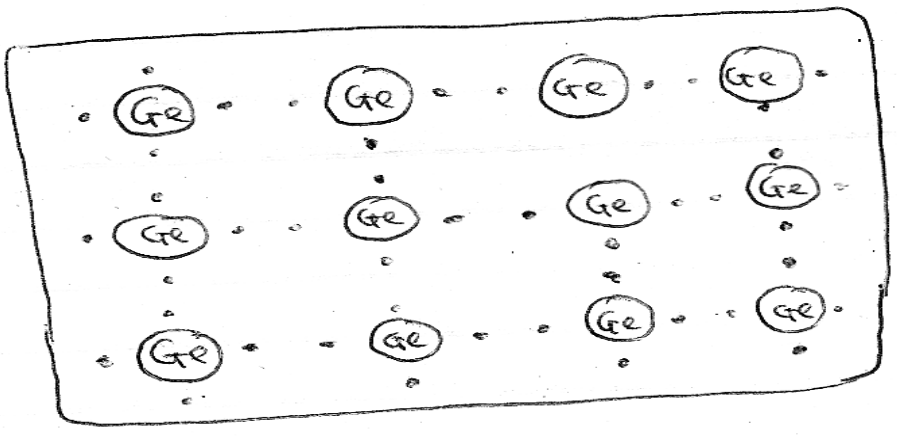
(i) In what ways do curves ACD differ from B? **(1mk)**

(ii) Explain the cause of difference in (i) above. **(1mk)**

(c) Light of frequency 8.05 x 10^{14}HZ; can eject electrons with a kinetic energy of 4.5 x 10^{-18}J from the metal surface. Determine the energy required just to release electrons from the metal (give your answer in ev) **(3mks)**

(Planck's constant = 6.63 x 10^{-34}Js) (IeV = 1.6 X 10^{-19}J)

(d) The structure of germanium crystal may be represented by the diagram in the figure shown below.



(i) How many valence electrons has each germanium atom? **(1mk)**

(ii) State and explain the conditions under which pure germanium behaves as an insulator.

(2mks)

(iii) How can the conductivity of germanium be increased? **(1mk)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 5 PAPER 1

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

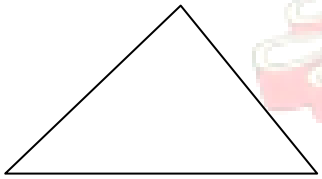
b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

SECTION A: (25 MARKS)

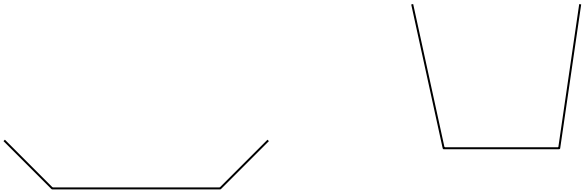
Answer all questions in this section in the spaces provided:

1. The figure **below** shows a uniform triangular lamina.



Locate the centre of gravity of lamina. (2mks)

2. The figure **below** shows two containers of equal volume but of different diameters.



Equal volume of hot water was put in both containers. Explain why it cools faster in the wider container than in the narrower one. **(1mk)**

3. State **one** advantage of hydraulic brakes over mechanical brakes. **(1mk)**

4. A body in a uniform circular motion experiences acceleration despite moving at a constant speed. Explain. **(1mk)**

Use the information below to answer question **5** and **6**:

In an experiment to determine the density of a liquid, the following readings were made.

Mass of empty density bottle = 20g

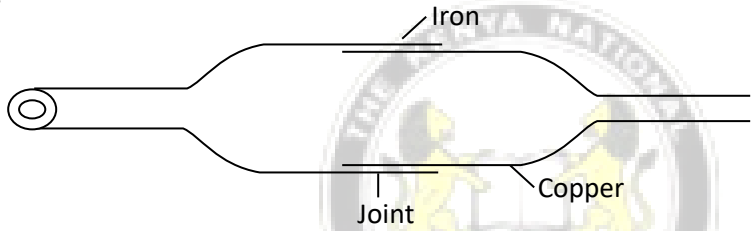
Mass of bottle filled with water = 70g

Mass of bottle filled with a liquid = 695g

5. Find the density of the liquid, given that density of water is $1000kgm^{-3}$. **(3mks)**

6. Find the mass of the liquid. **(3mks)**

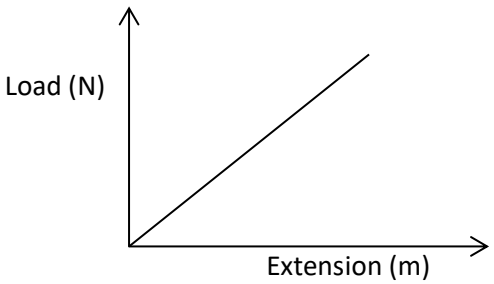
7. The diagram **below** shows a metal tube made of iron and copper. The joint is tight at room temperature.



Explain how you would separate the two by changing the temperature given that copper expands more than iron for some change in temperature. **(2mks)**

8. State **one** assumption made when estimating the size of an oil molecule in the oil drop experiment. **(1mk)**

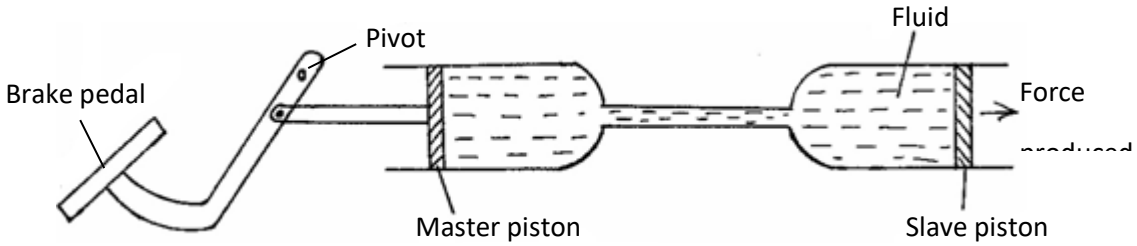
9. The figure **below** shows a load-extension graph for various loads hung from a single spring.



On the same axes sketch a graph for a spring double the diameter and half the length of the first one.

(1mk)

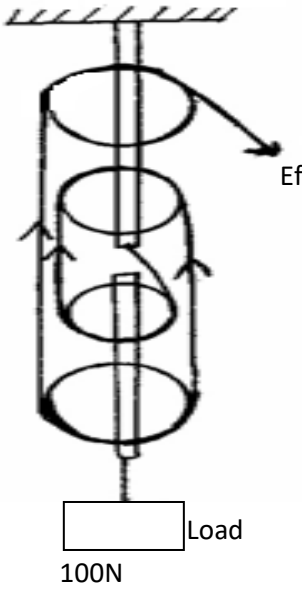
Use the information **below** which represents hydraulic braking system to answer questions **10** and **11**.



10. State **one** property the fluid should have. **(1mk)**

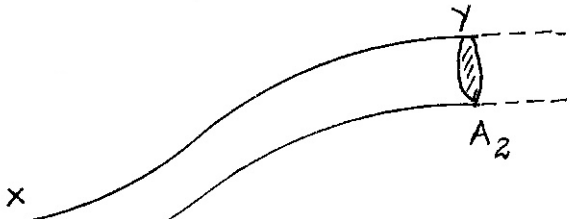
11. Explain briefly how the system operates. **(3mks)**

12. Figure **below** shows a pulley system being used to raise a load.



If the effort applied is 28N and the load lifted is 100N, determine the efficiency of the system. **(3mks)**

13. Figure **below** shows a section of a pipe XY. A constant pressure difference maintains a streamline flow of a liquid in the pipe.



If the cross-sectional area A_1 at X is less than A_2 ay Y, state how the liquid velocity V_2 at Y compares with V_1 at X. (1mk)

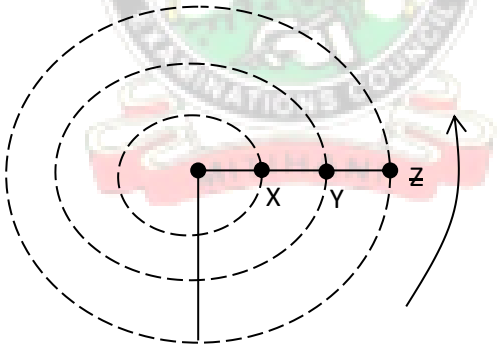
14. Explain the cause of random motion of smoke particles as observed in Brownian motion experiment using a smoke cell. **(2mks)**

SECTION B: (55 MARKS)

Answer question in this section in the spaces provided.

15. (a) State what is meant by centripetal acceleration. **(1mk)**

(b) The figure shows masses **X**, **Y** and **Z** placed at different points on a turn table. The turn table is rotated at different angular velocities.



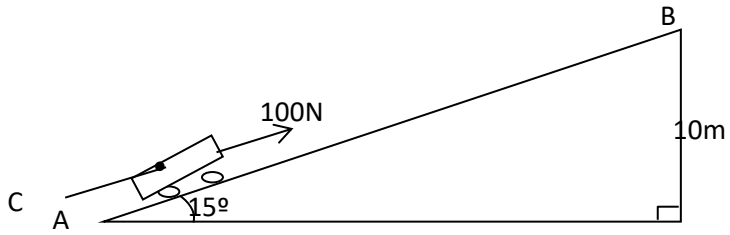
(i) State **two** factors that would cause the masses to slide. **(2mks)**

(ii) At the time that start sliding off, state the mass with the highest angular velocity, give reason for your answer. **(2mks)**

(c) (i) If the centripetal for is 2N and the mass and radius of the path for mass Y are 100g and 0,03m respectively. Calculate the angular velocity of the mass when the system is in equilibrium. **(3mks)**

(ii) Indicate on the same diagram the direction of velocity of mass Z at that position. **(1mk)**

16. The figure **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**.? **(2mks)**

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

(iii) Determine the efficiency of the system. **(3mks)**

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

(v) Determine the mechanical advantage of the system. **(3mks)**

17. The graph represents displacement-time graph for a car moving with uniform acceleration along a straight horizontal road.

From the graph determine:

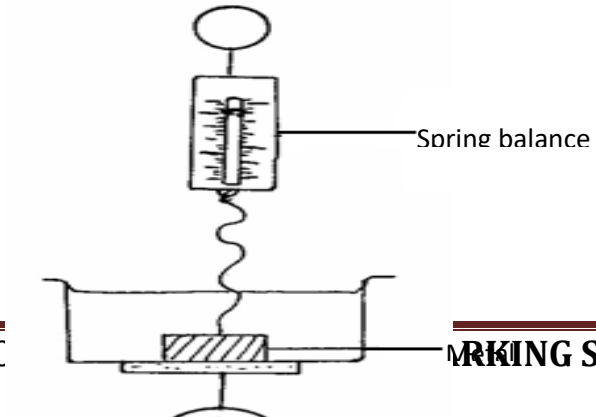
(i) the velocity of the car at the 20^{th} second. **(2mks)**

(ii) the velocity at the 50^{th} second. **(2mks)**

(iii) the acceleration of the car between the 20^{th} second and 50^{th} second. **(3mks)**

(b) A bullet is fired horizontally from a storey building 15m high. If the initial speed is $350ms^{-1}$, determine the maximum horizontal distance covered by the bullet. **(3mks)**

18. (a) A cylindrical block of metal of mass 500g and density $5.0 \times 10^3 kg/m^3$ rests on the bottom of a beaker containing a liquid of density $2.5 \times 10^3 kgm^{-3}$, standing on a compression balance. The metal is attached to a spring balance by a light inextensible string and to begin with the string is slack as shown in the figure **below**.



The metal is slowly raised by raising the spring balance vertically until the metal is well above the surface of the liquid. The mass of the beaker and liquid, without the metal is 1.5kg. Determine the readings, in Newton's, that will be recorded on each of the balances when

(i) the string is slack as shown the diagram. **(3mks)**

(ii) the string is taut with the metal fully immersed in the liquid. **(5mks)**

(b) The weight of a stone in air is 7.5N. When fully immersed in paraffin of density 0.8g/cm^3 its weight is 6.3N. Determine the;

(i) up thrust in the paraffin. **(1mk)**

(ii) volume of the stone. **(2mks)**

19. (a) What is meant by specific latent heat of vaporization of a substance? **(1mk)**

(b) In an experiment to determine the specific latent heat of vaporization of water, steam at 100^{o}C was passed into water contained in a well-lagged copper calorimeter. The following measurements were made:

- Mass of calorimeter = 55g
- Initial mass of water = 75g
- Final mass of calorimeter + water + condensed steam = 133g
- Final temperature of the mixture = 30^{o}C

[Specific heat capacity of water = 4200JKg^{-1}k^{-1} and specific heat capacity of copper = 390JKg^{-1}k^{-1}]

Determine the

(i) mass of condensed steam. **(1mk)**

(ii) heat gained by the calorimeter and water if the initial temperature of the calorimeter + water = 20^{o}C. **(2mks)**

(iii) given that L is the specific latent heat of vaporization of steam,

(I) Write an expression for the heat given out by steam. **(2mks)**

(II) Determine the value of L. **(2mks)**

(c) (i) In verifying the Charles' law of gases, the volume and the temperature of a gas are varied at constant pressure, State the condition necessary for the law to hold**. (1mk)**

(ii) With an aid of a labeled diagram, describe an experiment to verify Charles' law**. (5mks)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 5 PAPER 2

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

b) ***Sign** and write **date** of examination in the spaces provided.*

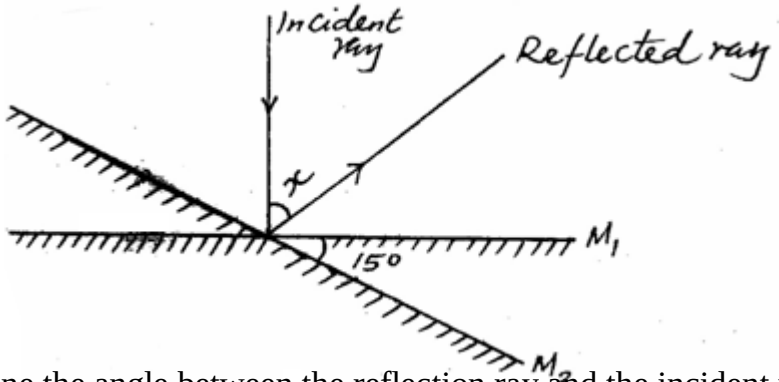
c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B**.*

SECTION A: (25 MARKS)

Answer all questions in this section in the spaces provided:

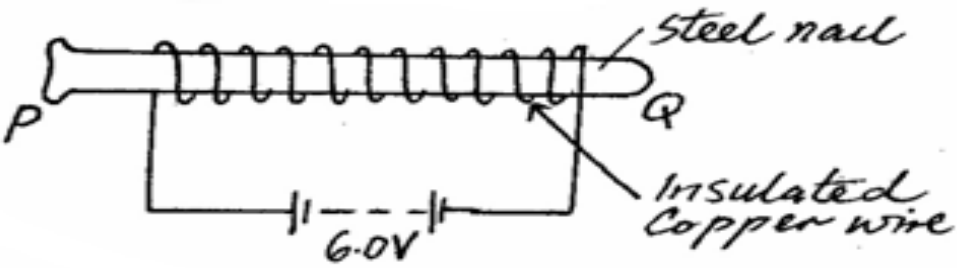
1. State t**wo** conditions under which a pinhole camera may form an image on its screen which has the same size as the object. **(2mks)**

2. The figure shows a ray of light incident along the normal. The mirror is rotated at an angle of 15º in a clockwise direction without changing the position of the incident ray,



Determine the angle between the reflection ray and the incident ray. **(2mks)**

3. A steel is to be magnetized by electrical method as shown below. Identify the pole **P** and **Q** of the resulting magnet. **(1mk)**

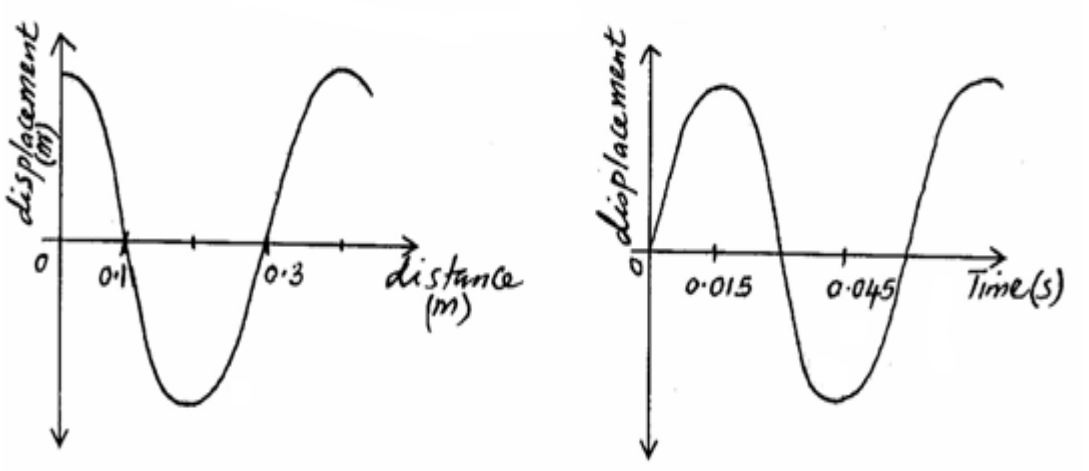


P: _____

Q: _____

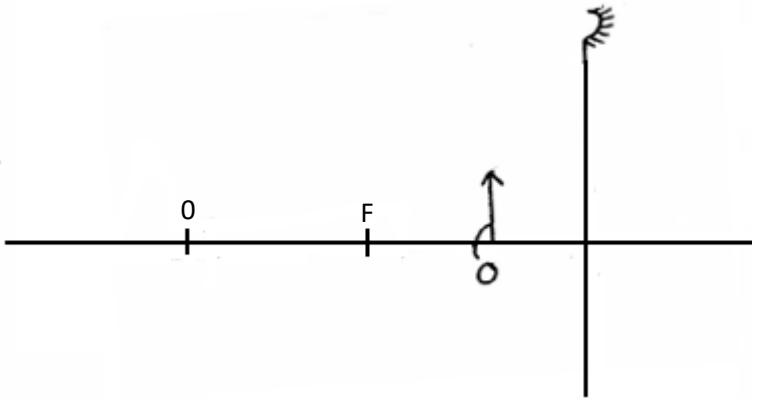
4. A small chain is often seen hanging at the back of a petrol carrying lorry. State and explain its significance. **(2mks)**

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



Determine the velocity of the wave. **(3mks)**

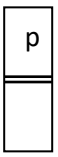
6. An object O is placed in front of a concave mirror and on the principal axis, as shown in the figure **below**. Complete the light ray diagram to locate the position of the image. **(3mks)**



7. Arrange the following radiations in order of increasing wavelengths. **(1mk)**

Infrared, blue light, ultraviolet, radiowaves, χ-rays.

8. The figure **below** shows a block diagram of a p-n junction diode.



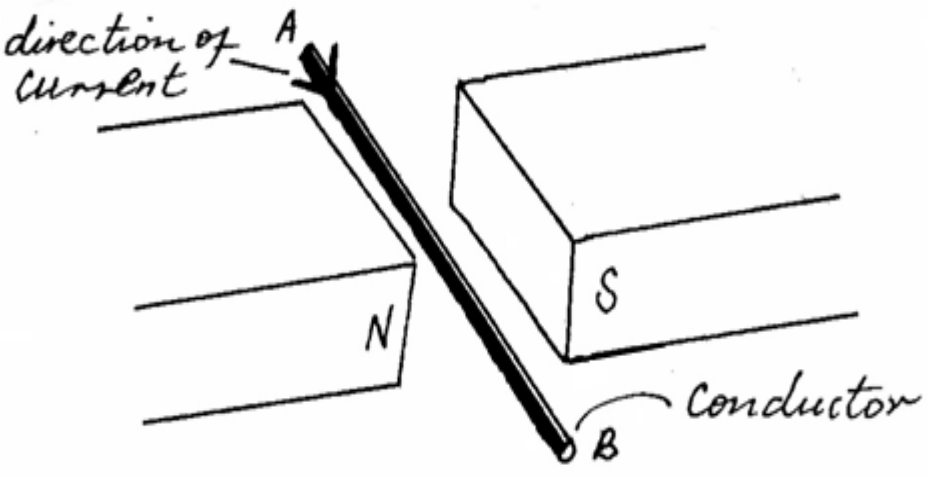
On the same diagram, show how a cell may be connected so that it is reverse biased**. (1mk)**

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

10. What do you understand by polarization as used in a simple cell? **(1mk)**

11. State how the defect mentioned in question 10 above is minimized in a simple cell. **(1mk)**

12. A current-carrying conductor **AB** is in a magnetic field as shown in the figure **below**.



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

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

13. You are given three resistors of values 5Ω, 8Ω and 12Ω. Show in a circuit diagram how you would connect them so as to give:

(a) an effective resistance of 9.8Ω. **(2mks)**

(b) the least effective resistance. **(1mk)**

SECTION B: (55 MARKS)

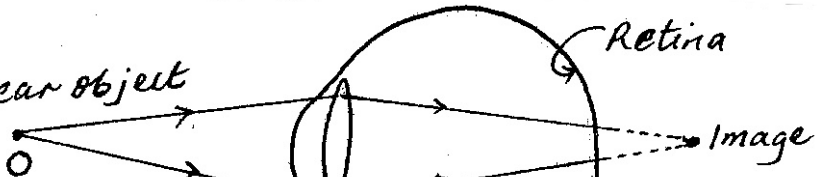
Answer question in this section in the spaces provided.

14. (a) Define refractive index. **(1mk)**

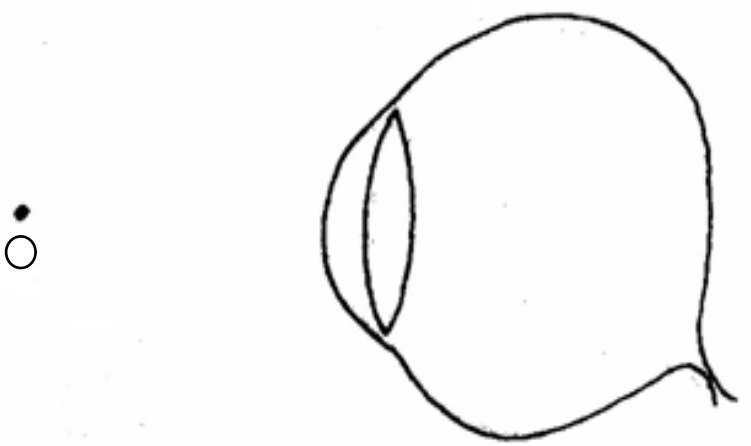
(b) The critical angle of a certain material medium is 43.2º. Determine the refractive index of the material. **(2mks)**

(c) (i) What do you understand by the term accommodation? **(1mk)**

(ii) The diagram **below** shows a certain defect of vision. Name the defect. **(1mk)**



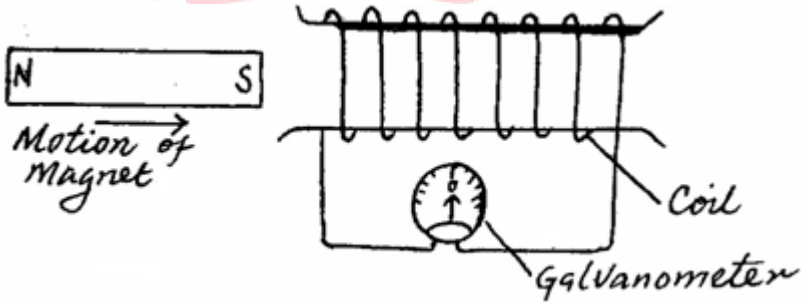
(iii) On the figure **below** show how the defect can be corrected. **(2mks)**



(d) An object is placed 40cm in front of a concave lens of focal length 20cm; determine the position of the image. **(3mks)**

15. (a) (i) State Lenz's a law of electromagnetic induction. **(1mk)**

(ii) A bar magnet is moved into a coil of insulated copper wire connected to a centre-zero galvanometer, as shown in the figure **below**.



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

(ii) State and explain clearly what is observed on the galvanometer when the S-pole of the magnet is moved into and then withdrawn from the coil. **(4mks)**

(b) A transformer has 800 turns 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.

(i) Determine

I the secondary e.m.f **(2mks)**

II the power in the secondary if the transformer is 95% efficient. **(2mks)**

(ii) Explain how energy losses in a transformer are reduced by having:

I a soft-iron core. **(2mks)**

II a laminated core. **(1mk)**

16. (a) (i) Distinguish between thermionic emission and photoelectric emission. **(2mks)**

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

Thermionic emission. **(1mk)**

Photoelectric emission. **(1mk)**

(b) Sodium has a work function of 2.3eV. Given that: Planck's constant $h = 6.63 \times 10^{-34}$JS, velocity of light in vacuum, $C = 3.0 \times 10^{8}$m/s, 1 electron-volt (1eV) = 1.6×10^{-19} C and mass of an electron, $m_e = 9.1 \times 10^{-31}$kg, calculate:

(i) Its threshold frequency. **(2mks)**

(ii) the maximum velocity of the photoelectrons produced when the sodium is illuminated by light of wavelength 5.0×10^{-7}m. **(4mks)**

(iii) the stopping potential V, with the light of this wavelength. **(2mks)**

17. (a) State **two** advantages of using a Cathode Ray Oscilloscope (C.R.O) as a voltmeter over the ordinary voltmeter. **(2mks)**

(b) An X-ray operates at 30000V and the current through it is 2mA. Given that the charge of an electron is 1.6×10^{-19}C, $h = 6.63 \times 10^{-34}$JS, speed of light, $C = 3.0 \times 10^{8}$m/s, calculate:-

(i) the maximum kinetic energy of the electrons when hitting the target**.** **(2mks)**

(ii) the number of electrons hitting the target per second. **(2mks)**

(iii) The minimum wavelength of the X-rays emitted. **(2mks)**

18. (a) A radioactive carbon-14 decays to nitrogen by beta particles as shown **below**.

$$^{14}_{6}C = ^{\chi}_{7}N + ^{0}_{y}e$$

Determine the values of χ and y. **(2mks)**

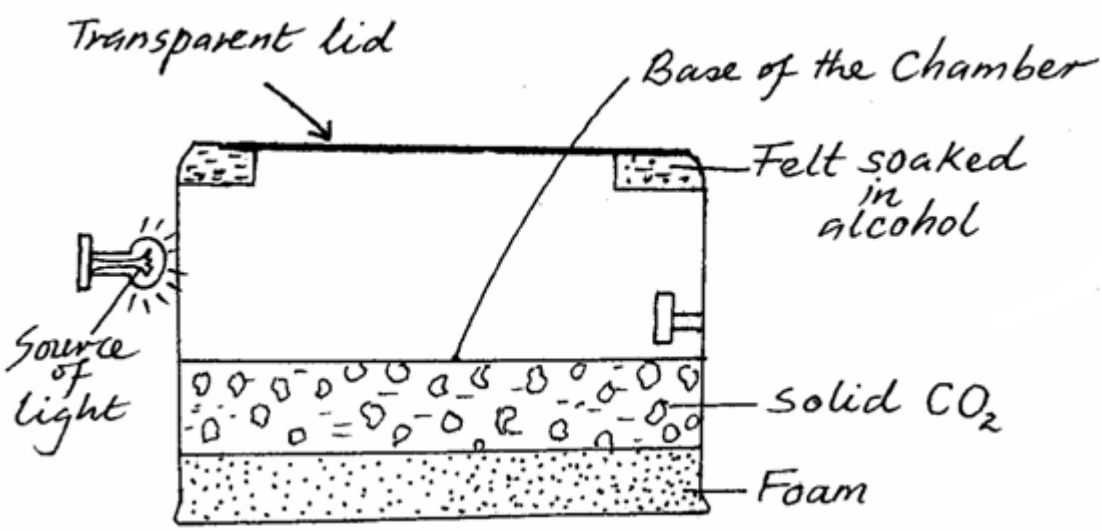
(b) The graph **below** shows the activity (disintegrations per minute) of a sample of carbon-14 against the time in years.

(i) From the graph determine the half-life of carbon-14. **(2mks)**

(ii) A mass of 100g of carbon-14 decays and the mass taken after 15000 years.

Determine the mass that remains. **(3mks)**

(c) The figure **below** shows the cross-section of a diffusion cloud chamber used to detect radiation from radioactive sources.



(i) State the function of the following:

I Alcohol. **(1mk)**

II Solid CO_2. **(1mk)**

(ii) Explain briefly how the diffusion cloud chamber can be used to detect and identify alpha particles. **(3mks)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 6 PAPER 1

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

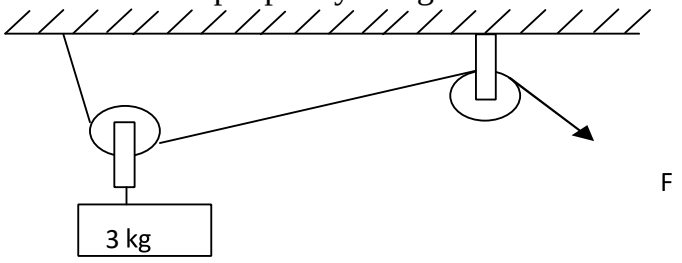
b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***232/1

SECTION A (25MARKS)

1. An air bubble expands as it rises to the surface of water in a deep pond. State the cause of this given that the temperature remains constant. **(1mrk)**

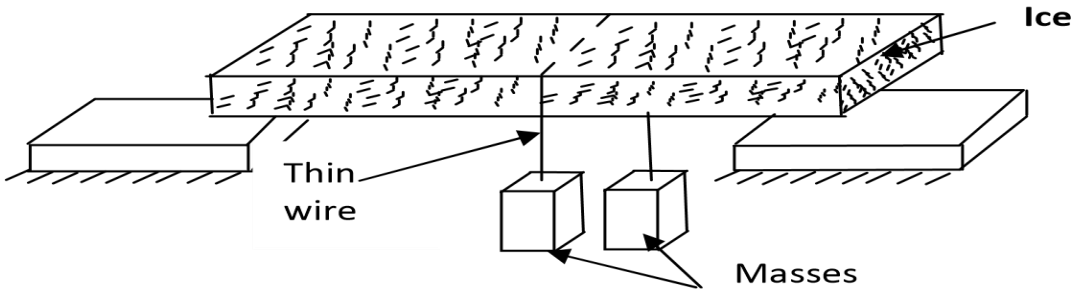
2. The simple pulley in figure 1 is used to lift a 3kg mass.



Through what distance must the string at F be pulled to lift the mass 0.2m high. **(2mrks)**

3. The thermal conductivity of a metal increases with the increase cross-sectional area of the metal. Explain how the cross-section affects conductivity using the electron movement. **(1mrk)**

4. The set up figure 2 is used to investigate the effect of pressure on melting point. It is observed that the thin wire cuts through the ice block but it remains one piece.

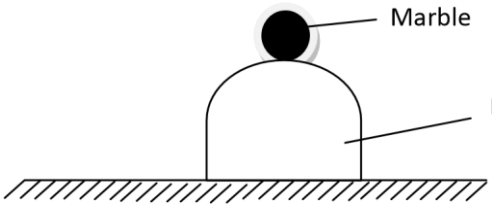


Explain the observation above. **(2mrks)**

5. **(i).** Explain why a liquid and not a gas is used as a hydraulic machine fluid. **(1mrk)**

ii). State the other important property of a liquid that hydraulic machines depend on**.** **(1mrk)**

6. Figure 3 shows a marble placed on an inverted bowl.



State and explain the type of equilibrium the marble is. **(2mrk)**

7. i) Figure 4 shows two forces acting on an object, P is a force of 20N and the object moves with constant velocity. What is the value of the opposing force F? **(1mrk)**

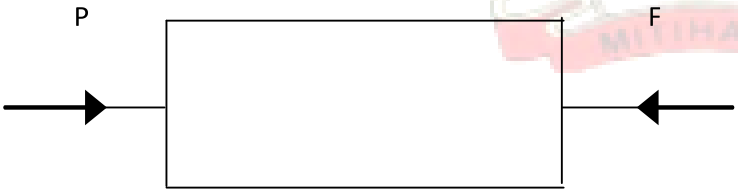
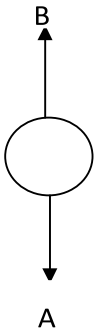


Figure 4

ii).Figure 5 shows the forces acting on a rain drop which is falling to the ground



a).i). Name the force A causing the raindrop to fall. **(1mrk)**

ii).Force B opposes the motion of the drop. State one possible cause of this force. **(1mrk)**

b). State what happens to the drop when force A = force B **(1mrk)**

8. State two molecular differences between a real gas and ideal gas. **(2mrks)**

9. A man lifts a weight of 300N through a vertical height of 2m in 6 seconds. Determine the power developed. **(2mrks)**

10. A drop of Methylated spirit placed on the back of the hand feels colder than a drop of water at the same temperature. **(1mrk)**

11. "Air flow over the wings of an air craft causes a lift". Explain this statement with the aid of a labeled diagram. **(2mrks)**

12. Figure 6 shows a suspended copper solid immersed in a fluid.

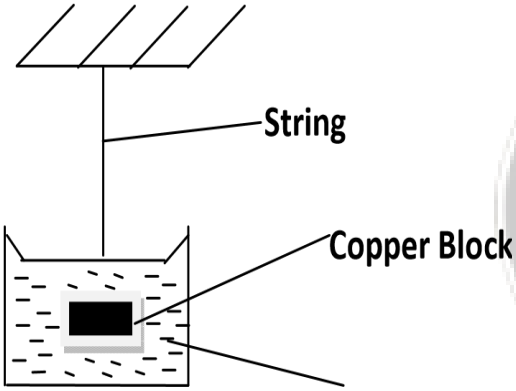


Figure 6

Explain what will happen to the tension in the string if a liquid of higher density is used**.** **(1mrk)**

13. A bucket containing water is rotated in vertical circle of radius 80cm. What should be its velocity so that the water may not spill out. **(2mrks)**

14. A rubber ball of mass 400g strikes a wall horizontally at 6.0m/s and bounces back at 4m/s. In 0.02 second. Determine the total force it exerts on the wall. **(2mrks)**

SECTION B (55MARKS)

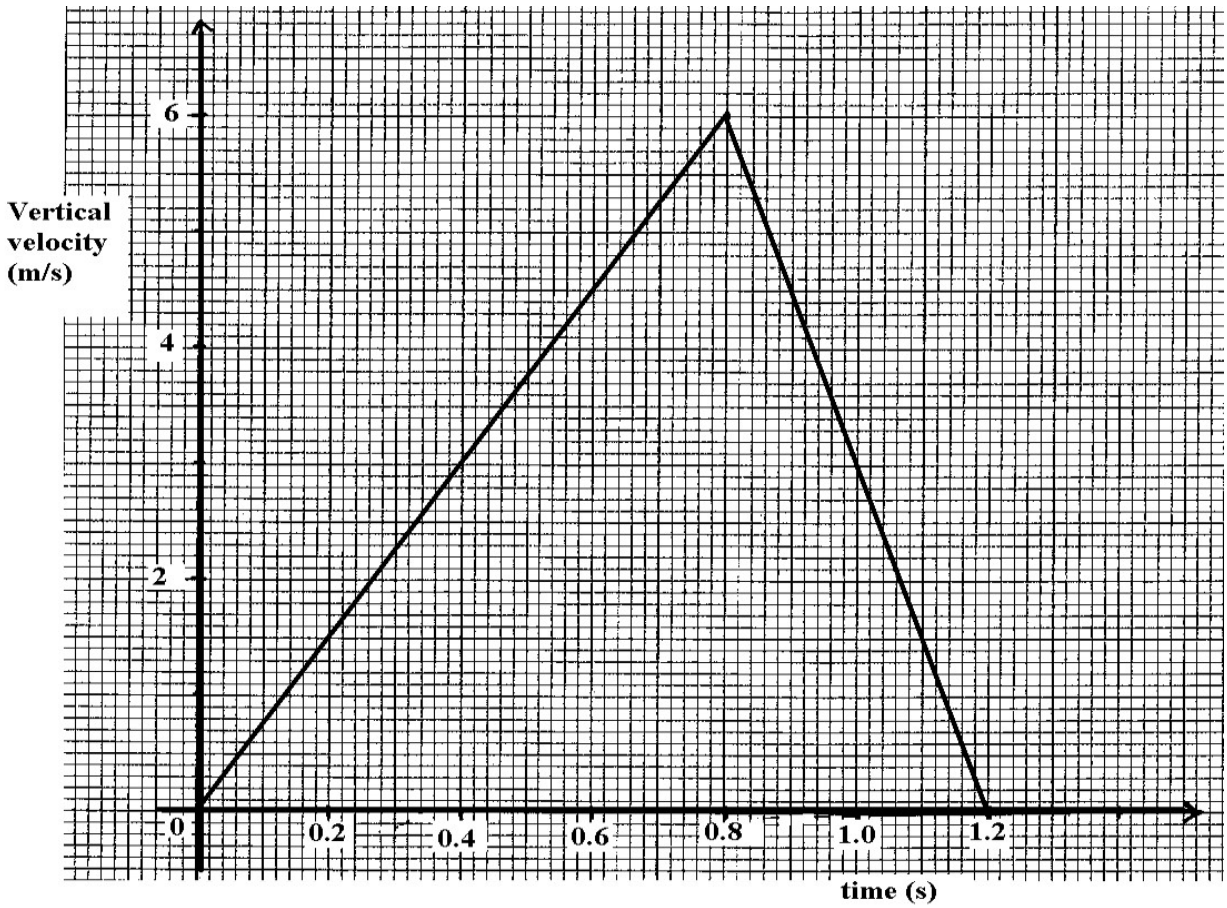
15. a) State the pressure law of an ideal gas. **(1mrk)**

b). At 20^0c the pressure of a gas is 50cm of mercury. At what temperature would the pressure of the gas fall by 30cm of mercury. Give the temperature in degrees Celsius. **(2mrks)**

c). Define the absolute zero of the Kelvin temperature scale. **(1mrk)**

d) A hole of area 2.0 cm^2 at the bottom of a tank 2m deep is closed with a cork. Determine the force on the cork when the tank if filled with water. Take density of water = $1000kgm^{-3}$ and g = $10m/s^2$ **(4mrks)**

16. Ian has a mass of 70kg. He dives from a high diving pond. His vertical velocity at different times is shown in the graph in figure 7.



a). From the graph

i) Determine the height of the diving board **(3mrks)**

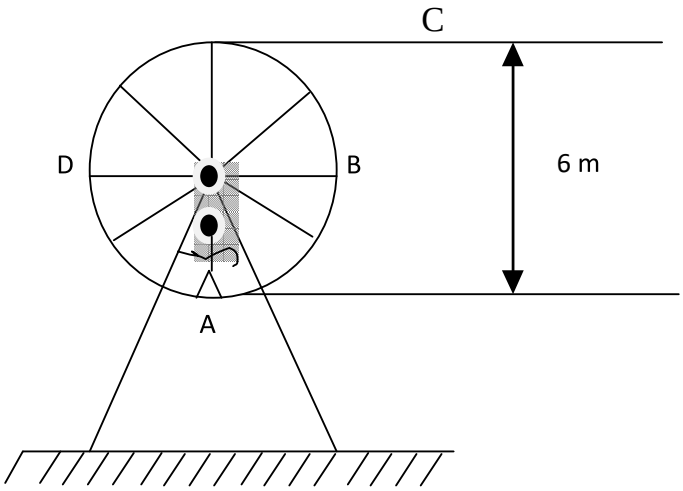
ii) Determine the retarding force on Ian in the water. **(3mrks)**

b) i) Calculate the loss of Ian's Potential energy after 0.5sec diving. **(3mrks)**

ii). Determine Ian's kinetic energy 0.5s after he started the dive. **(3mrks)**

iii) Give an explanation for the differences between the answer to part b) (i) and (ii). **(1mrk)**

17. Figure 8 shows a child of mass 40kg at point A of a fair ground ride. If the velocity of the child at A is 8m/s and the wheel exhibits uniform circular motion,

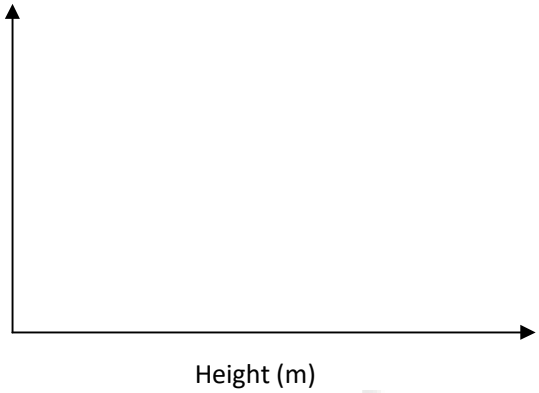


a). Determine the velocity of the child at point B. **(2mrks)**

b) Determine the centripetal force acting on the child. **(3mrks)**

c). At which position will the normal reaction of the seat be maximum? Give a reason for your answer. **(2mrks)**

d). Sketch a graph of gravitational potential energy of the child against height as she moves from point A to Point C. On the graph indicate the values of gravitational potential energy at points A B and C. **(3mrks)**



18. a) Define specific heat capacity. **(1mrk)**

b) In an experiment to determine the specific latent heat of water, steam at 100^0C was passed into water contained in a well lagged copper calorimeter.

The following measurements were made

Mass of colorimeter = 60g

Initial mass of water = 80g

Initial room temperature of water = 15^0c

Final temperature of the mixture 45^0c

Final mass of water + calorimeter + condensed steam =160g

Specific heat capacity of water = 4200Jkg^{-1}k^{-1} and specific heat capacity of copper = 390Jkg^{-1}k^{-1}

i). Calculate:

a) Mass of condensed steam **(1mrk)**

b) Heat gained by the calorimeter and water. **(4mrks)**

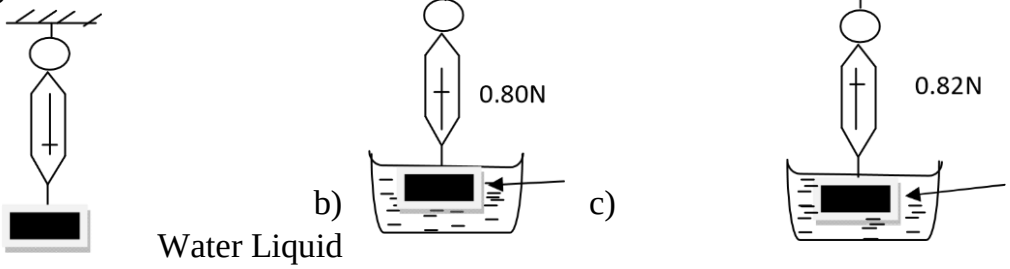
ii) Given that Lv is the specific latent heat of evaporation of steam,

a). Write an expression for the latent heat of vaporization of steam. **(2mrks)**

b) Determine the value of Lv. **(2mrks)**

19. Figure 9 shows the same metal block weighted in the air, water and liquid. Given that the reading of the level of water becomes 75cm^3 when the metal is fully immersed,

Figure 9



Determine **(i)** Density of the metal **(3mrks)**

ii) Water level before the solid was immersed. **(2mrks)**

iii) Explain why the spring balance gives different reading in figure 9 (b) and 9 (c) with the same metal block. **(2mrks)**

b) A piece of wood of mass 16g and volume 20cm^3 floats on water. What additional mass should be placed on it so that it may float with its surface level within the surface of water. **(2mrks)**

c) i). State one conditions of equilibrium for a body acted upon by a number of parallel forces.(1mrk)

ii).Figure 10 below shows a uniform plank of length 6.0cm acted upon by forces shown. If the plank has a weight of 30N, determine the weight of W given that volume of metal block is 5000cm^3, density of water = 1g/cm^3 **(4mrks)**

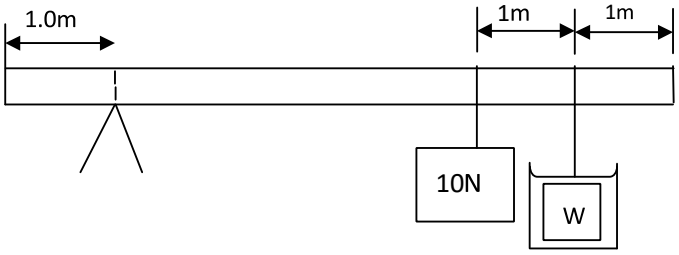


Figure 10.

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 6 PAPER 2

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

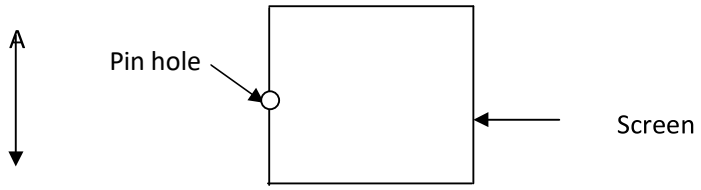
b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

SECTION A (25 marks)

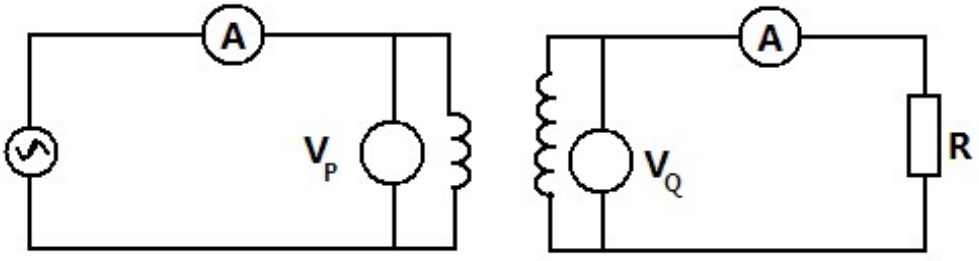
Answer all questions in this section in the spaces provided

1. Figure 1 shows an object AB placed in front of a pin-hole camera. Using a ray diagram, show how the image is formed on the screen.



2. ***State*** the conditions necessary for a wave incident on a slit to be diffracted. B **(2mrks)**

a Figure 2 represents a transformer connected to an Ac source and a resistor R.



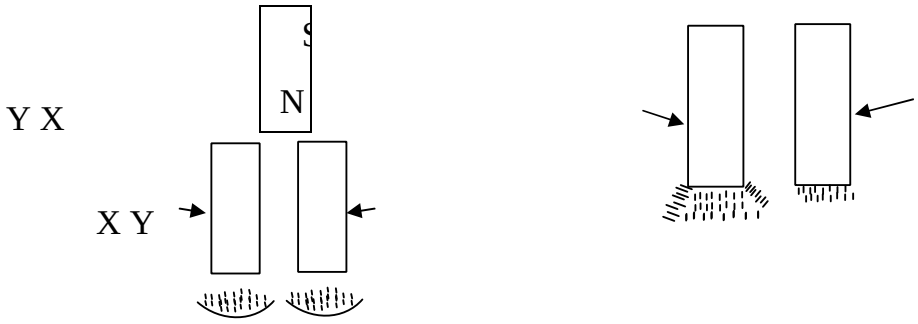
Circuit P Circuit Q

a). Compare the ratios $\frac{I_P}{I_Q}$ and $\frac{V_Q}{V_P}$ where I_P and I_Q are the currents flowing through the circuits P and Q respectively while V_P and V_Q are the potential differences across the circuits P and Q respectively.

(1mrk)

b) ***State*** the assumption made in question 3 (a) above. **(1mrk)**

4. Figure 3 below shows a simple experiment using a permanent magnet and two metal bars X and Y put closer the iron fillings.



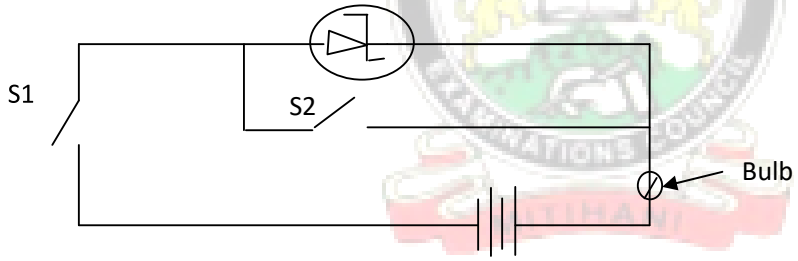
b).After attraction

a).During attraction

State with a reason which bar is made from a soft magnetic material. **(2mrks)**

5. ***State one*** difference between a chemical reaction and radioactivity. **(1mrk)**

6. Figure 4 shows a Zener diode connected in a circuit in series with a bulb.



It is observed that the bulb lights when both switches S_1 and S_2 are closed. ***State*** and ***explain*** the observation made on the bulb when S_1 is closed and S_2 is open. **(2mrks)**

7. ***State*** the advantage of generating an Ac supply rather than DC voltage supply in a power station. **(1mrk)**

8. Figure 5 shows a force on a conductor carrying current when placed in a magnetic field.

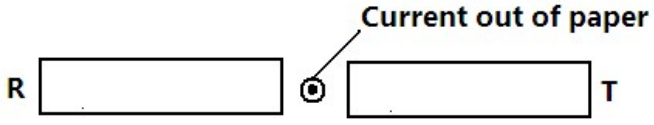


Figure 5

State the polarities R and T. **(1mrk)**

T _____

R _____

9. What is the purpose of a fuse in domestic wiring system? **(1mrk)**

10. The period of a wave is T seconds. Its wavelength is λ metres. Show that v = **f**λ where v is the speed of the wave and f is the frequency. **(2mrks)**

11. In determining the depth of an ocean, an echo sounder producing ultrasonic sound is used. ***Give one*** reason why this sound is preferred. **(1mrk)**

12. What causes electrical resistance in conductors? **(1mrk)**

13. ***State one*** advantage of a CRO as a voltmeter over other voltmeters. **(1mrk)**

14. A ray of light incident on the surface of a glass prism is observed as represented in the

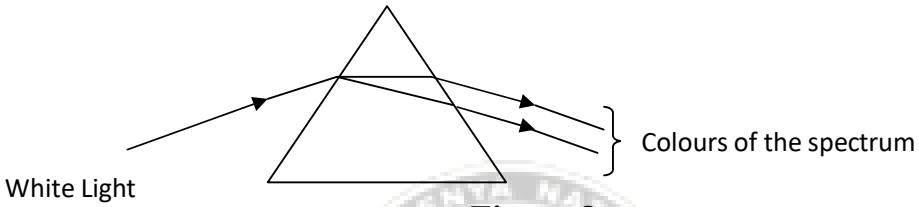


Figure 6.

Explain this observation. **(2mrks)**

15. Figure 7 shows how a distant object is focused in defective eye.

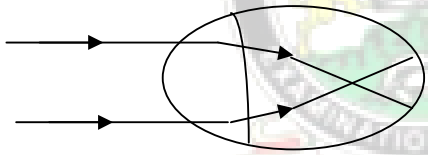


Figure 7

a).*State* the nature of effect. **(1mrk)**

b). Suggest a suitable lens to correct the defect. **(1mrk)**

16. One of the isotopes of Uranium has a half life of 576 hours.

a) Complete the table below to show how the mass varies with time from the initial mass of 4000mg.

Time (minutes)	34560	69120
Mass (mg)	4000	

b) Explain why the mass of the isotope will not eventually reduce to zero. **(1mrk)**

SECTION B (55Marks)

Answer ALL the questions in this section in the spaces provided

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

$$^{210}_{82}A \xrightarrow{\beta} {}^{210}_{x}B \xrightarrow{r} {}^{210}_{84}C \xrightarrow{s} {}^{y}_{82}D$$

i). Name the radiations represented by r and s **(2mrks)**

s_____

r_____

ii). Determine the numbers represented by x and y. **(2mrks)**

b) Figure 8 shows the features of a diffusion cloud chamber used for detecting radiations for radioactive sources.

i) State the property of alcohol that makes it suitable for use in the chamber**.** **(1mrk)**

ii) ***State*** the function of the Perspex lid. **(1mrk)**

iii) ***Explain*** why the base velvet chamber is painted black. **(1mrk)**

iv) Explain how the radiation from the radioactive source is detected in chamber. **(4mrks)**

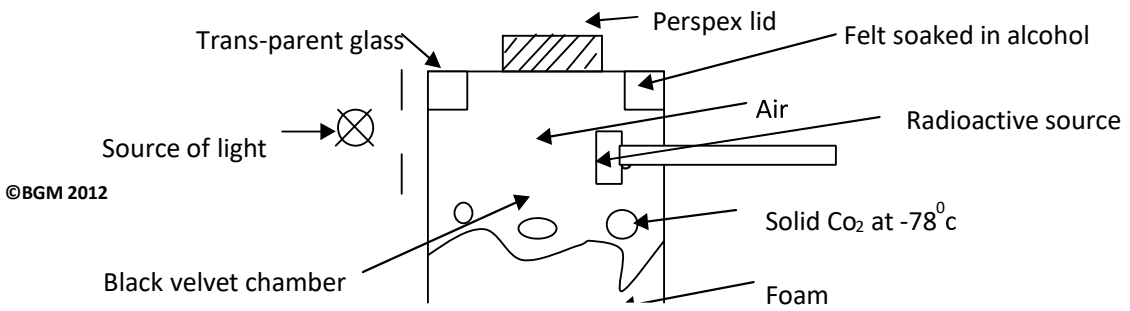
v) ***State two*** advantages of the cloud chamber over a charged gold leaf electroscope when used as detectors of radiations. **(2mrks)**

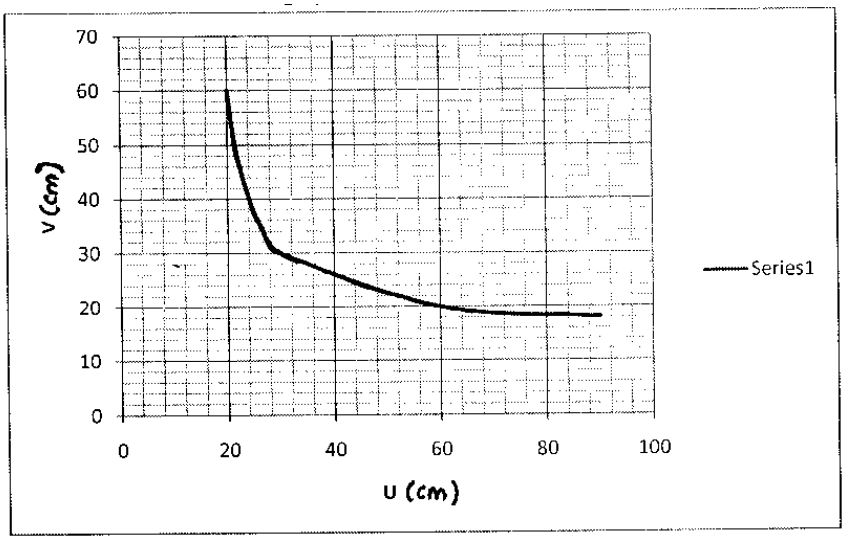
18. a). Figure 8 shows an object AB, placed in front of a converging mirror. C is the center of curvature of the mirror.



Using a ray diagram, determine the size of the image of AB as reflected by the mirror. **(4mrks)**

b). In an experiment to determine the local length of a convex lens, the corresponding values of the object distance u, and the image distance v, both measured from the optical center of the lens were obtained. The graph below shows the relationship between v and u.





i) Using the graph above and without using the lens formula, determine the value of the focal length of the lens. **(3mrks)**

ii) A convex mirror of focal length 10cm forms an image 5cm from the mirror. By calculations, determine the position of the object as measured from the mirror**.** **(3mrks)**

19. a) State Ohm's law. **(1mrk)**

b). A dry cell of emf E and an internal resistance of r is used to drive a current through various resistors of resistance R and the values of $\frac{1}{I}$ and R plotted on a graph in figure 9.

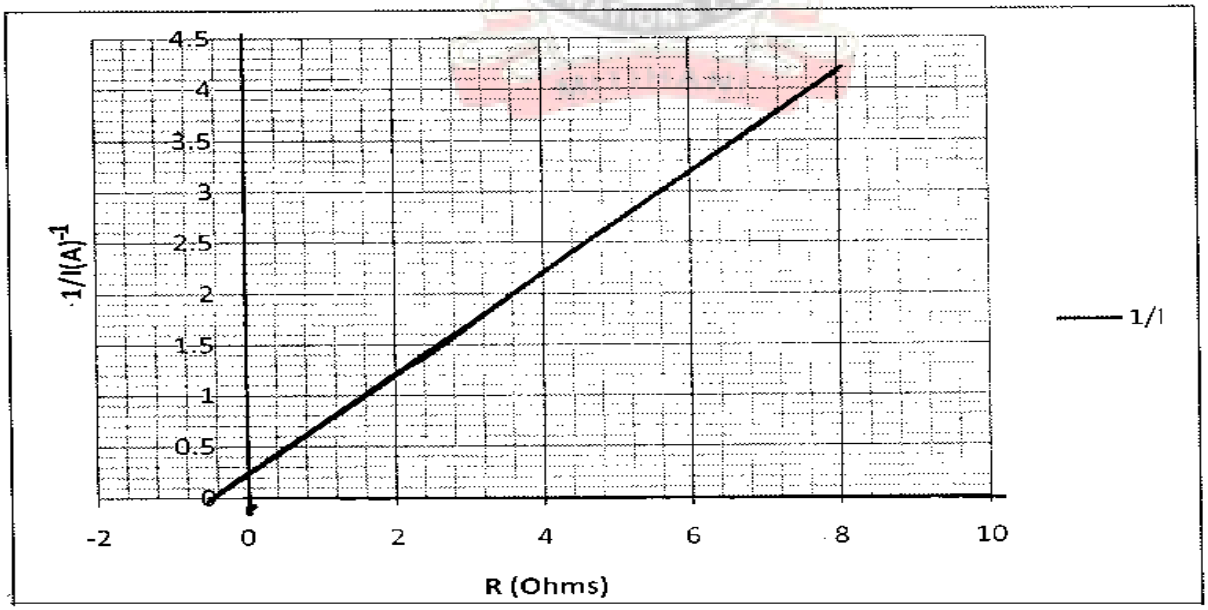


Figure 9.

The variables I and R are related by the equation $\frac{1}{I} = \frac{R}{E} + \frac{r}{E}$

(i) Using the graph in figure 9, determine the emf, E of the cell. **(4mrks)**

iii) Show that the internal resistance r of the cell is given by r = -R intercept and hence determine r. **(3mrks)**

c). Figure 10 shows part of a ring main circuit connected to hair drier salon heater.

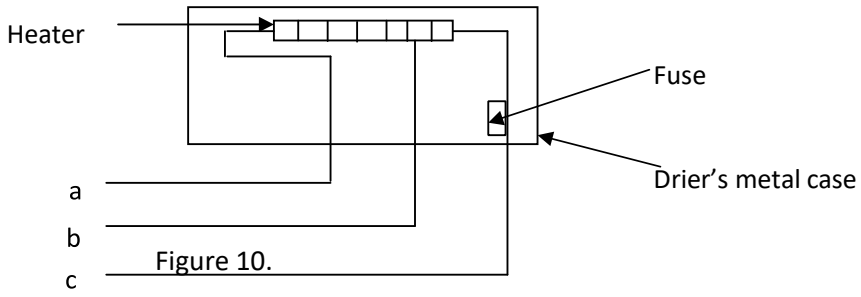


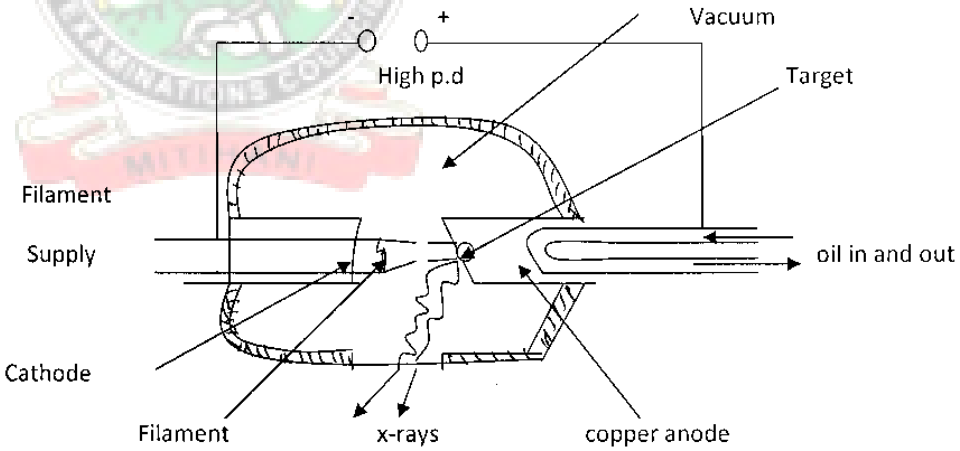
Figure 10.

Identify by giving a reason the wire labeled c. **(2mrks)**

d). Two lamps marked 75W 250V and an electric heater marked 2KW 250V are used for a period of 10 hours. Calculate the total cost of using them for this period if electricity costs Khs.4.5 per kWh unit. **(4mrks)**

20. a) State one property of X – rays that is not exhibited by visible light. **(1mrk)**

b).Figure 11 shows the features of an X- ray tube.



i). State how the electrons are produced. **(1mrk)**

ii). What is the effect on the wavelength of the X- rays produced when

a) P.d across the tube is decreased. **(1mrk)**

b) The number of electrons hitting the metal target is increased. **(1mrk)**

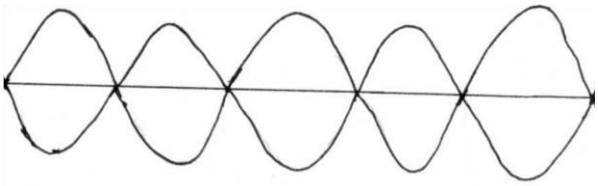
iii). Why is copper metal used at the anode? **(1mrk)**

iv).***State*** with a reason the property of molybdenum that makes it suitable as a target.(2mrks)

v). Explain how soft X – rays are produced in this X – ray tube. **(2mrks)**

c). Calculate the maximum velocity of electrons that would produce X- rays of frequency 8.0×10^{8} Hz if only 20% of the kinetic energy is converted to X rays. **(3mrks)**

21.a) Figure 12 shows a transverse stationary wave along a string

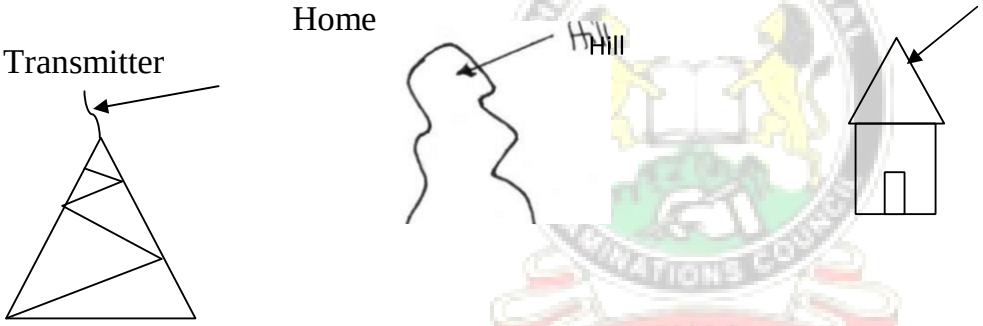


i). Label the nodes and antinodes on the diagram above. **(1mrk)**

ii). If the distance between an anti-node and consecutive node is 1.0×10^{-3}m, determine the wavelength of the stationary wave. **(2mrks)**

b). Five successive wave frequency in a ripple tank are observed to spread a distance of 6.4cm. If the vibrator has a frequency of 8 Hz, determine the speed of the wave. **(2mrks)**

d). Figure 13 shows a transmitter producing both TV and radio waves.



Briefly explain why radio reception will be better than TV beyond the hill. **(2mrks)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 7 PAPER 1

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

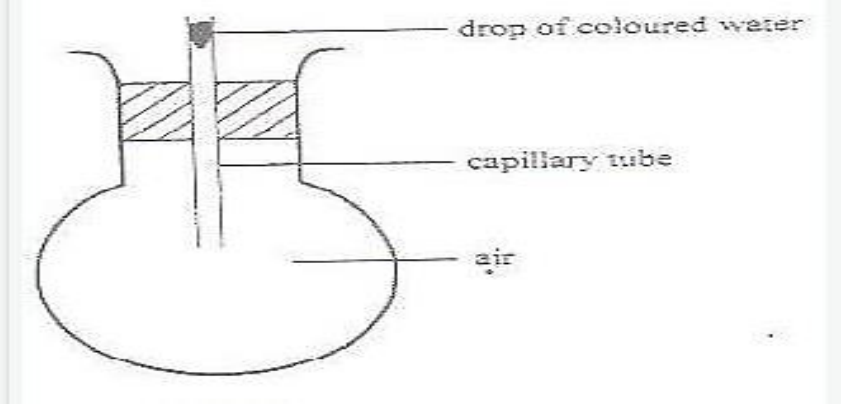
SECTION A (25 MARKS)

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

1. State the meaning of SI unit and give its significance**.** **(2 marks)**

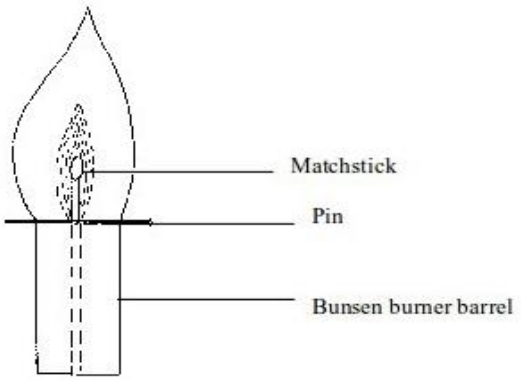
2. The human lung functioning normally can withstand a pressure of up to *5 atmospheres.* How deep in metres can an experienced diver go under water at normal atmospheric pressure? (*1 atm = 10 metres of water*) **(2 marks)**

3. The figure below is a set up used to study the behavior of gases



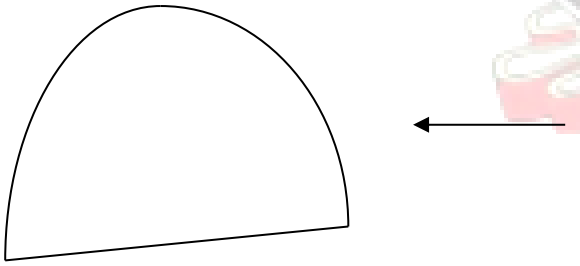
State and explain fully the observations made if the round bottomed flask is immersed in cold water. **(2 marks)**

4. The diagram below shows a matchstick placed under a Bunsen burner flame

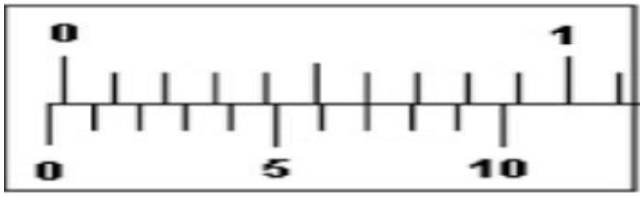


It is observed that the matchstick does not catch flame. Explain this observation. **(2 marks)**

5. When an oil drop is placed on a clean water surface, it spreads to form a thin film. Explain why this happens. **(1 mark)**
6. A ball of mass 600g falls from a height of 16 m and bounces back to a height of 10 m. Calculate the amount of sound energy produced. (Assume no other energy losses) **(3 marks)**
7. A balloon is filled with air to a volume of 100ml at a temperature of 30^0C. Determine the volume when the temperature rises to 70^0C at the same pressure. **(2 marks)**
8. a) Explain why steam causes more serious burn than water at same temperature. **(1 mark)**
   b) Steam at 100^0C was passed into 100g of cold water at 15^0C. When the temperature of the mixture reached 50^0C, its mass was found to be 106.1g. Assuming no heat losses to the surrounding, determine the latent heat of vaporization of water. (Take specific heat capacity of water to be 4200 J/kg/K) **(3 marks)**
9. Complete the diagrams below to show the streamlines for a fluid flowing past the stationary object in the direction shown. **(2 marks)**



10. The diagram below shows the scale of vernier callipers when the jaws are closed



a) State the zero error. **(1 mark)**

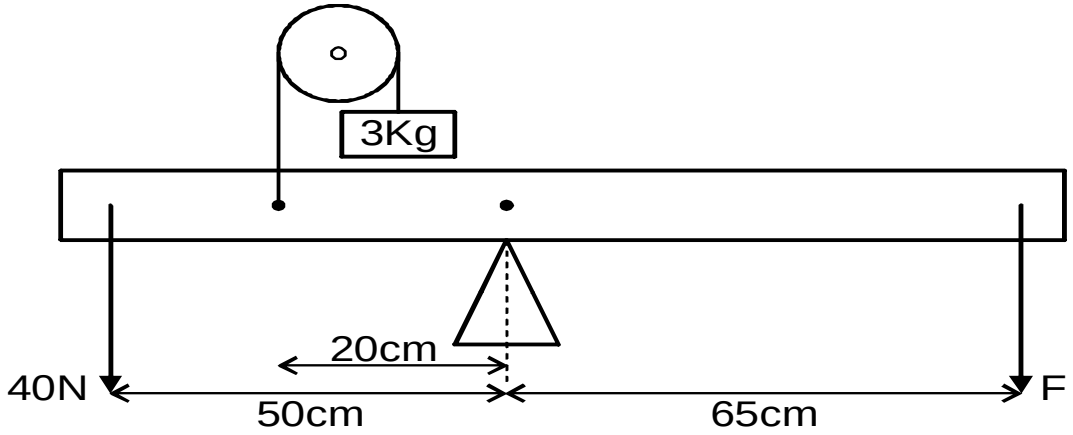
b) A student used the vernier calipers above to measure the length of a cube. If the mass and density of the cube were 6.86g and 2.5g/cm^3, calculate the reading shown by the instrument. **(4 marks)**

SECTION B (55 MARKS)

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

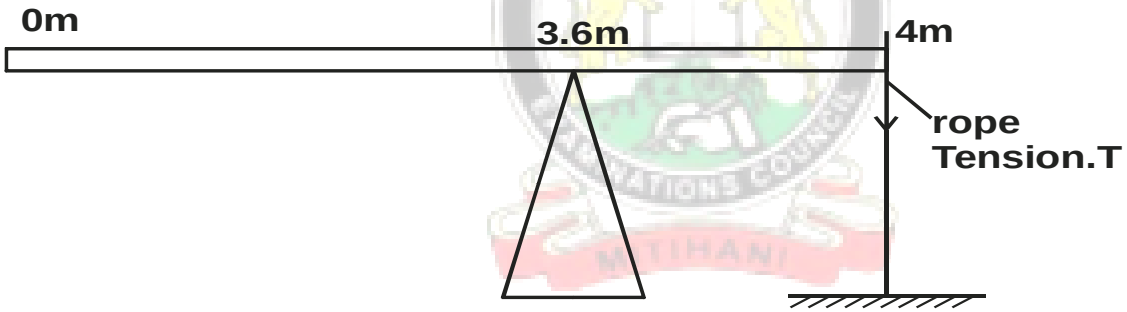
11.

(a) The figure below represents a system in equilibrium



Determine the force F needed to maintain the system at equilibrium. **(3 marks)**

(b) A uniform rod of length 4m and mass of 4kg is pivoted at 3.6m mark. The rod is held horizontal with a vertical rope at the 4m mark, as shown in the figure below.



Calculate the tension, T in the rope (Take g = 10N/kg) **(3 marks)**

(c) State two conditions necessary for a body acted upon by a number of parallel forces to remain at equilibrium. **(2 marks)**

(d) Explain why a bunsen burner has a heavy and wide base . **(2 marks)**

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

(ii) A striker kicks a ball of mass 250g initially at rest with a force of 75N. If the foot was in contact with the ball for 0.10 s. Calculate the take off velocity of the ball. **(2 marks)**

(b) A bullet of mass 20g moving at 400 m/s strikes a block of wood of mass 3.5 kg initially at rest. The bullet sticks into the block and the two move off together on a horizontal rough surface, with a frictional force of 4N acts between them and the surface.

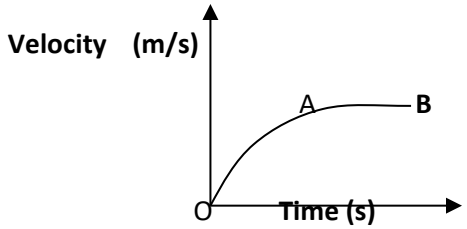
(i) Determine the initial common velocity of bullet and wooden block. **(3 marks)**

(ii) What distance does the block move before coming to rest? **(3 marks)**

(c) A high jumper usually lands on a thick soft mattress. Explain how the mattress helps in reducing the force of impact. **(1 mark)**

(d) The figure below shows a graph of velocity against time for a ball bearing

(e) released at the surface of a viscous liquid.



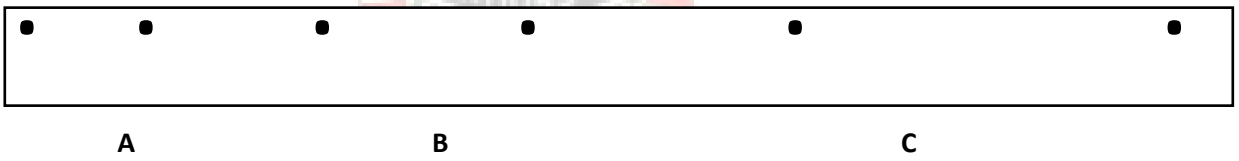
Explain the motion of the ball bearing for parts.

(i) OA **(1 mark)**

(ii) AB **(1 mark)**

(f) Give a reason why it is important that passengers in vehicles put on safety belts. **(1 mark)**

13. (a) The figure below shows a section of a tape (drawn to scale) after passing through a ticker timer of frequency 100 Hz. The tape is attached to a trolley moving in the direction shown.



i. State the

ii. Determine the initial velocity of the trolley, AB. **(2 marks)**

iii. Determine the final velocity of the trolley, CD **(2 marks)**

iv. Determine the acceleration of the trolley. **(2 marks)**

(b) A bullet is fired horizontally at a velocity 200 m/s from the roof top of a storey building. If it strikes the ground after 1.5 seconds;

i) What is the name given to the path followed by the bullet. **(1 mark)**

ii) Calculate the height of the building. **(2 marks)**

iii) Calculate the distance from the foot of the building to where the bullet hits the ground. **(2 marks)**

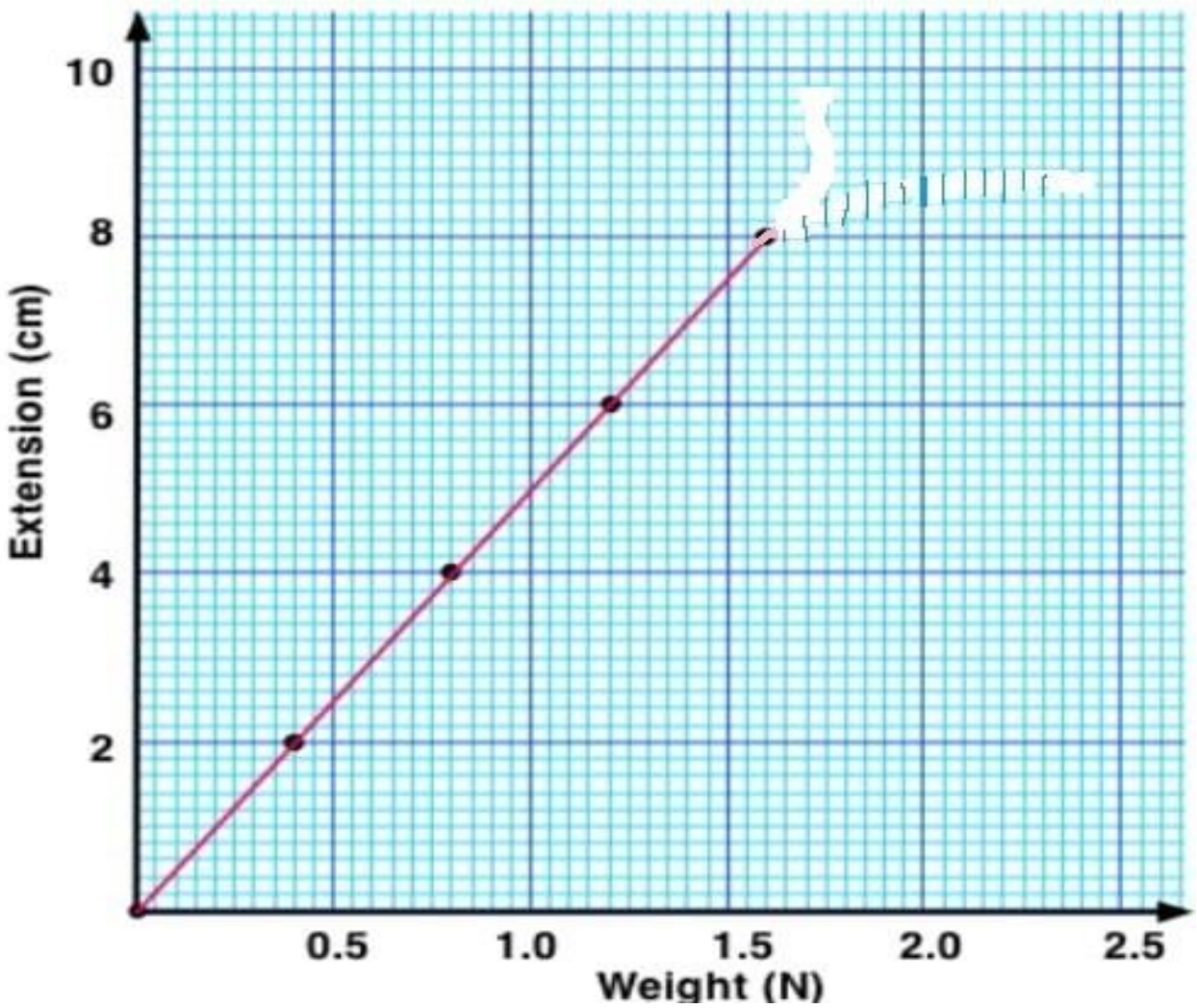
14.

a) i) Define proportionality limit for an elastic material. **(1 mark)**

ii) Name the property of a spring that enables it to regain its original length when a load is removed. **(1 mark)**

b) A pan is attached to the lower end of a hanging spring of natural length 12 cm. When an object of mass 100g is placed in the pan the length of the spring becomes 25 cm. For an object of mass 220g placed in the pan, the length of the spring becomes 30cm. Calculate the mass of the pan. **(4 marks)**

c) A spring and several masses were used in an experiment to determine spring constant. Below is a graph of extension against weight plotted from the experimental results.



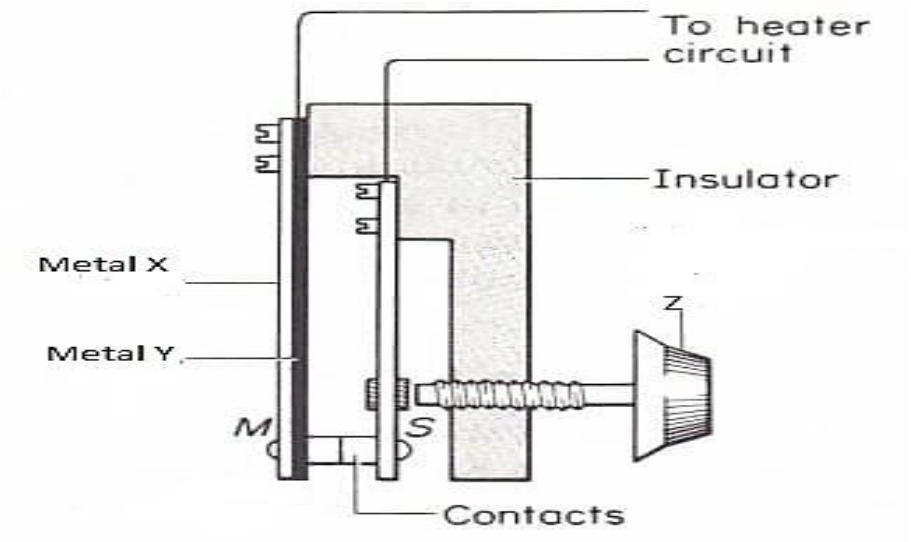
i) Determine the slope of the graph. **(2 marks)**

ii) Determine the spring constant of the spring used in the experiment. (**2 marks)**

iii) Calculate the elastic potential energy stored in the spring. **(2 marks)**

iv) On the same graph page sketch the expected graph if two such identical springs arranged in parallel were used during the experiment. **(1 mark)**

15. (a) The figure below shows a circuit diagram for controlling the temperature of a room.



i) State the name of the device. **(1 mark)**

ii) The bimetallic strip is made of two metals, Copper and Steel. Suggest what metal X is likely to be. **(1 mark)**

iii) What is the function of part labeled Z? **(1 mark)**

iv) Briefly explain how it works. **(3 marks)**

b) State the advantage of alcohol in glass thermometer over mercury in glass thermometer. **(1 mark)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 7 PAPER 2

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

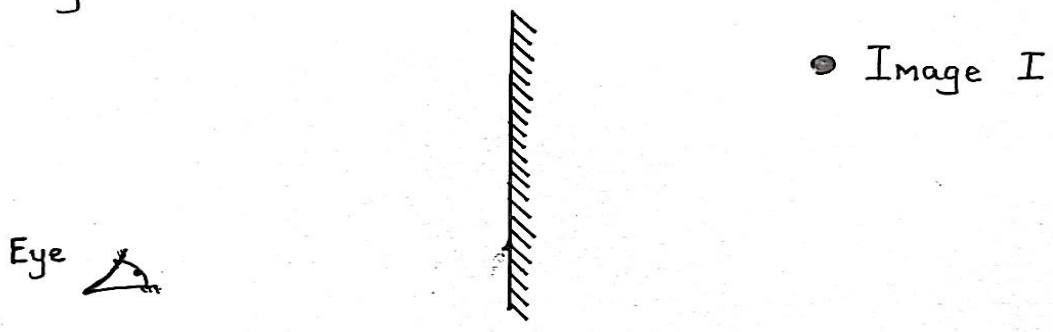
b) ***Sign** and write **date** of examination in the spaces provided.*

C) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

SECTION A

1. a) Fig.1 below shows an image of an object reflected on a plane mirror. Using ray diagram, locate the position of the object. **(3mks)**

Fig. 1

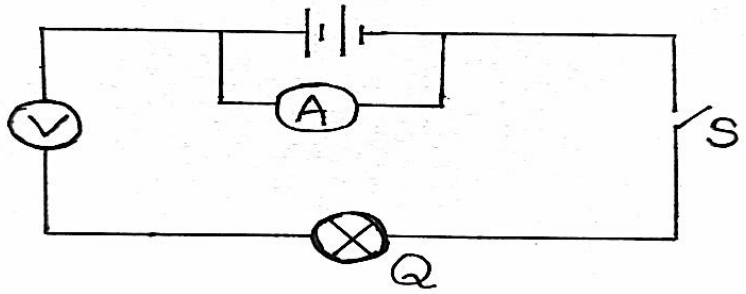


b) A mirror is rotated through an angle of 15^{o}, find the angle through which the reflected ray is rotated. **(1mk)**

2. A strongly charged glass rod is brought close to a neutral electroscope. State and explain the observations made. **(2mks)**

3. **Fig.2** below shows a circuit made by a form 2 student.

Fig. 2

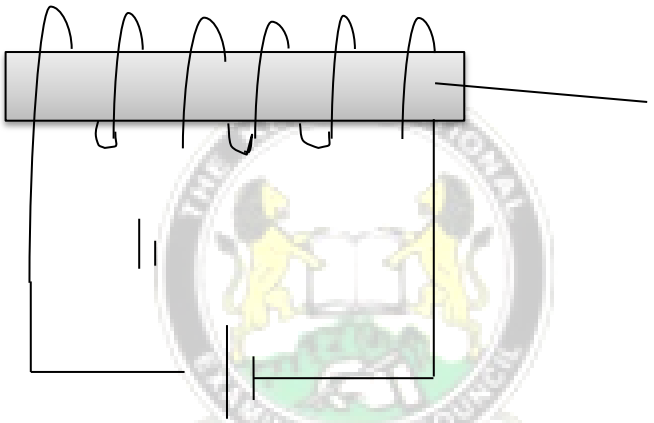


a) State and explain the observation made on component Q when switch S closed. **(2mks)**

b) A current of 1A flows through a circuit for three minutes. Calculate the number of electrons that flows through a point in the circuit. (charge of an electron = 1.6×10^{-19}C) **(3mks)**

4. **Fig. 3** below show a copper rod placed inside a solenoid.

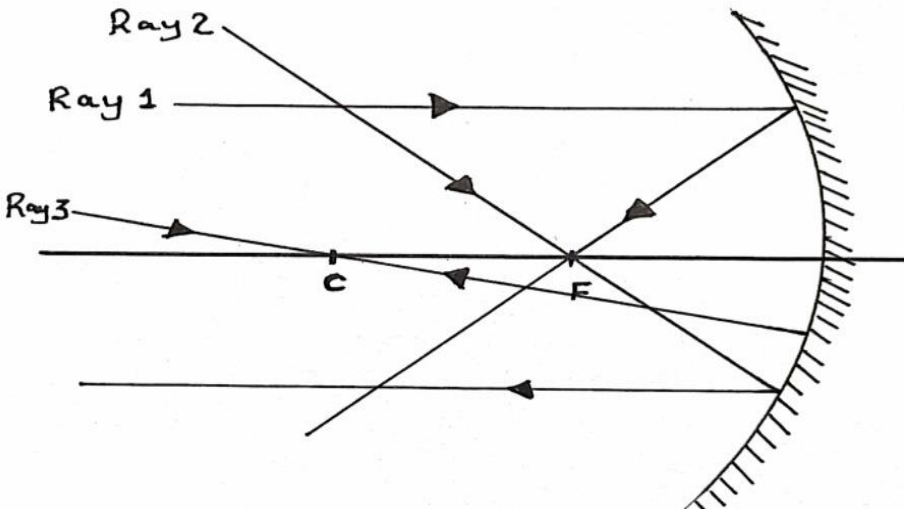
Fig.3



a) State and explain the observation made when the rod is removed after sometime and dipped into a container with iron fillings **(2mks)**

b) Using domain theory, distinguish between magnetic and non-magnetic materials **(1mk)**

5. **Fig.4** below shows rays incident on a curved mirror.



State the rules for drawing the ray 1, ray 2 and ray 3. **(3mks)**

Ray1……

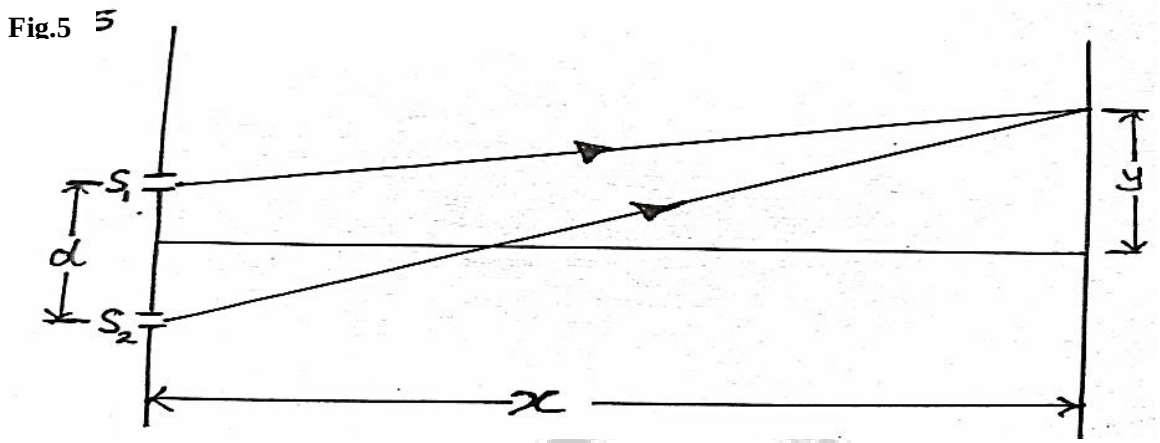
Ray 2……

Ray3……

6. a) Define interference as used the waves **(1mk)**

b) The fig.5 below shows two ways of monochromatic light incident on two adjacent slit S_1, and S_2

Fig.5



State what is observed on the screen when**:**

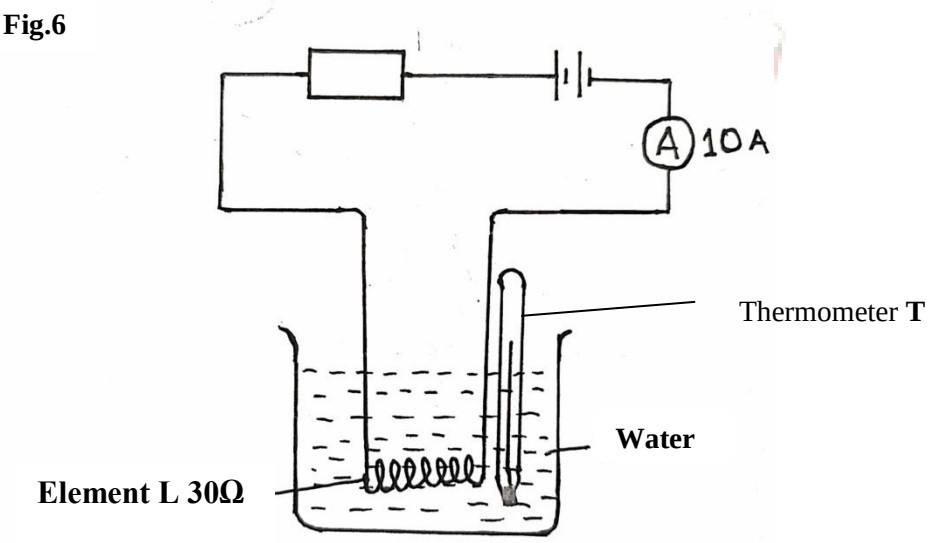
i) The distance **x** is increased. **(1mk)**

ii) The slit separation **d** is reduced. **(1mk)**

iii) **The white light is used.** **(1mk)**

7. The **fig.6** below shows a circuit with a heating element **L** of resistance 30Ω immersed in a container of water.

Fig.6



a) If current in the circuit is 10A and the switch is on for 2minutes. Calculate the heat energy absorbed by the water in kilojoules. (*ignore heat gained by the container*) **(3mks)**

b) State the adjustment made on the element **L** so that high temperature is recorded by the thermometer **T** in the same duration of time. **(1mks)**

SECTION B (55MKS)

8. a) A gun was fired at a point 150m from a vertical wall while listening to an echo. The echo coincides with the sound from the gun at each time the gun is fired. After 20 successive shots, time recorded was 18.5seconds. Determine:

i) Time taken for one echo to be heard **(2mks)**

ii) Speed of sound in air **(3mks)**

iii) What difference would you expect if the gun was short on a colder day **(1mks)**

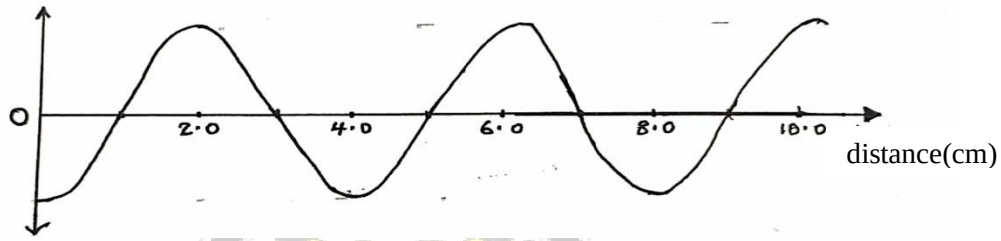
c) Sound is classified as a longitudinal mechanical wave, explain why sound is classified as

i) A longitudinal waves **(1mk)**

ii) A mechanical waves **(1mk)**

d) Fig.7 below shows a progressive waves of frequency 10Hz

Fig.7

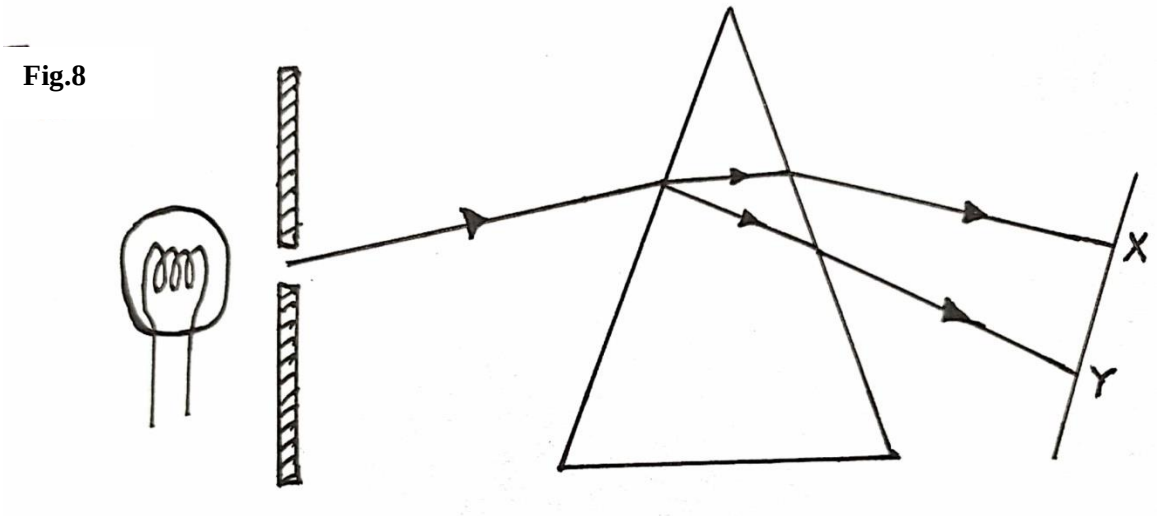


Determine the speed of the wave (3mks)

e) Calculate the wavelength of the KBC FM radio wave transmitted at a frequency of 95.6MHz. *($v = 3.0 \times 10^8 m/s$)* (3mks)

9. a) The figure **8** below shows a narrow beam of white light passed onto a glass Prism.

Fig.8



What is the name of the phenomenon represented in the diagram? **(1mk)**

ii. Name the colour at **X** and **Y**. **(2mk)**

X: .....

Y: .....

iii. Give a reason for your answer in part (ii) above. **(2mks)**

iv. What is the purpose of the slit? **(1mk)**

b. Figure **9** below shows the path of ray of yellow light through a glass prism. The speed of yellow light in the prism is 1.8×10^8 m/s.

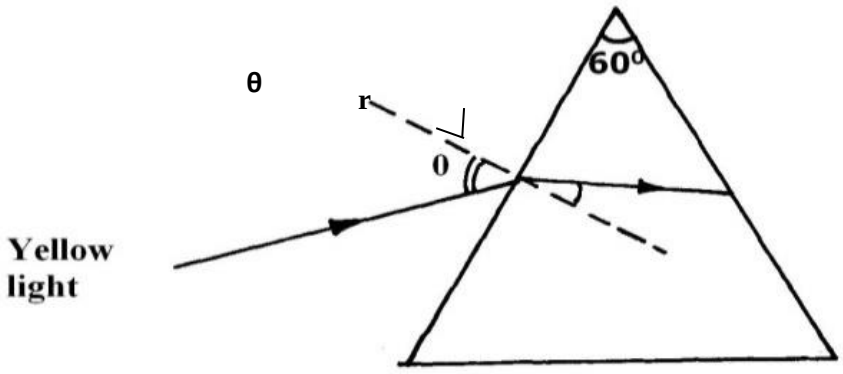


fig.9

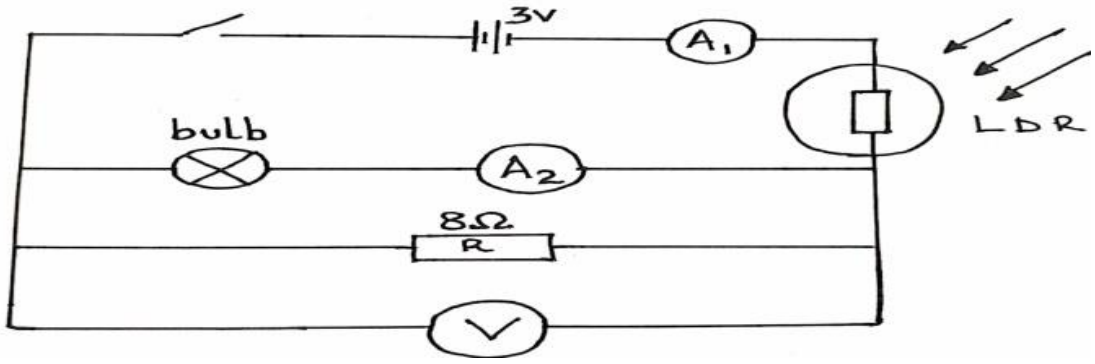
i. Determine the refractive index of the prism material (Speed of light in vacuum, C $= 3.0 \times 10^8$ m/s) **(3mks)**

ii. Given that r = 31.2^0, determine the angle θ. **(3mks)**

iii. Show on the same diagram, the critical angle c and hence determine its value**. (3mks)**

10. Fig.**10** below shows a circuit in which a bulb. A resister R, a voltmeter V, a light dependent resistor(LDR) and ammeters A1 and A2 of negligible resistors are connected

Fig. 10



R has a resistance of 8Ω when the switch is closed with no source of light. Ammeter A2 reads 0.12A while the voltmeter reads 2.4V

a) Determine;

i) The current passing through R **(2mk)**

ii) The resistance of the bulb **(2mks)**

b) Light is now shone onto the Light Dependent resistor (LDR)

i) State how this will affect the reading of ammeter A1 **(1mk)**

ii) Explain your answer in b) (i) above **(2mks)**

c) If the LDR has a resistance of 10Ω at room temperature, determine:

i) The total resistance in the circuit at room temperature **(2mks)**

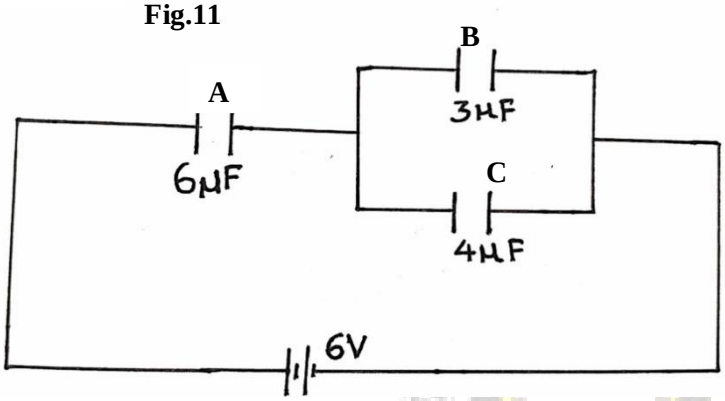
ii) The voltage across the LDR **(3mks)**

iii) Name one application of light dependent resistor(LDR) **(1mk)**

11. a) Explain how negatively charged electroscope gets discharged when the cap is touched with a finger. **(1mks)**

b) Fig.**11** below show a capacitor A,B,C connected as shown with a battery of e.m.f 6V

Fig.11



Determine:

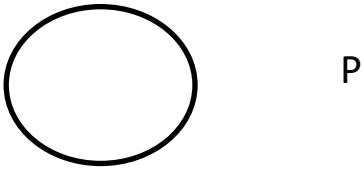
i) Effective capacitance of the circuit **(3mks)**

ii) The potential difference across 6μF capacitor **(3mks)**

iii) Charge stored in 4μF capacitor **(3mks)**

iv) Energy stored in a 4μF capacitor **(2mks)**

c) Fig.12 below shows an isolated positive point charge P



On the figure, sketch the electric field pattern around the charge **(1mks)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 8 PAPER 1

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

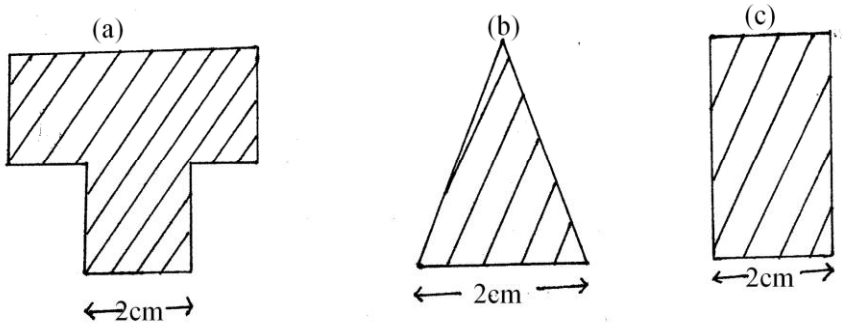
b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

SECTION A(25 MARKS)

1. In the spaces below, draw the scale of a vernier calipers showing a reading of 0.74 cm **(2mks)**

2. The figure below shows three wooden blocks resting on a flat surface. (They are made of the same material).



i) Arrange them starting with the most stable **(1mk)**

ii) State the factor that have considered in 2(i) when arranging them . **(1mk)**

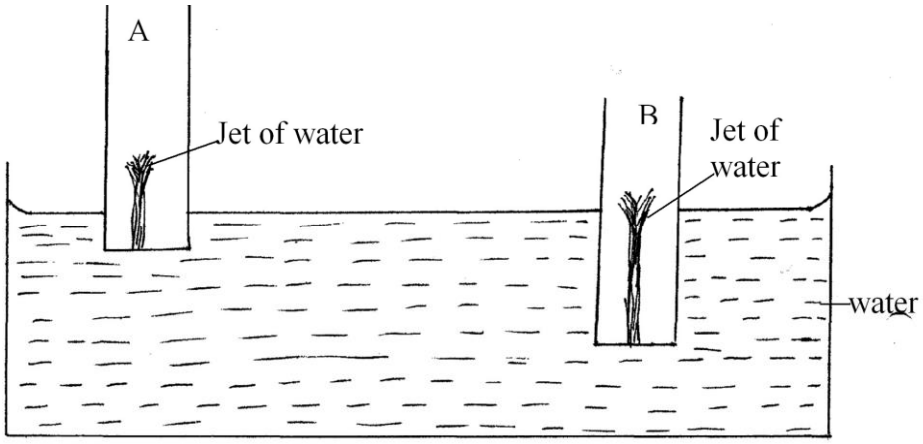
3. The diagram shows a velocity time graph for a vehicle moving at 2mls and begins to accelerate at a time t = O seconds

Graph

What is the vehicle's acceleration at time, t = 5 seconds. **(2mks)**

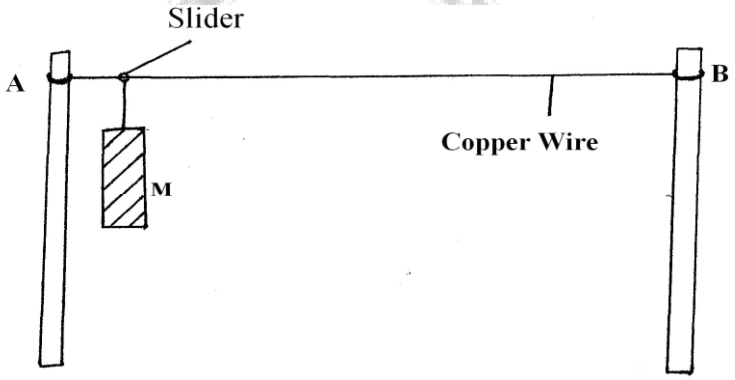
State any two conditions that must be satisfied for a body to float in a fluid. **(2mks)**

4. Two cans A and B with holes at their bottoms are pressed down on water as shown.



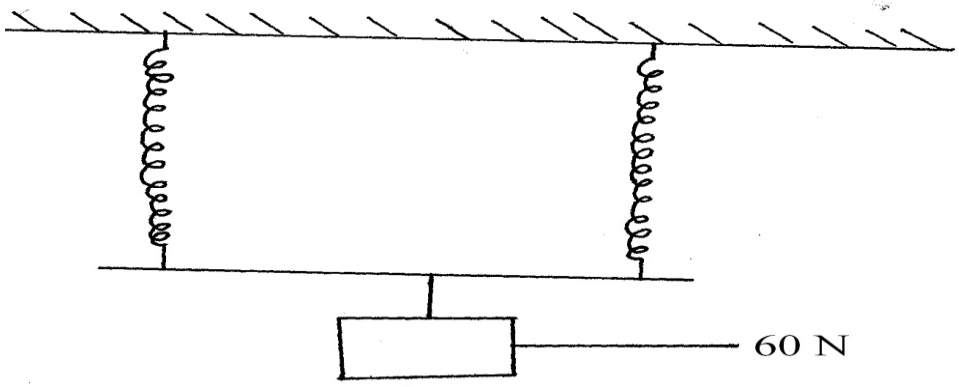
Explain why the jet of water in the tin B is larger than in A **(2mks)**

5. The diagram below shows a horizontal copper wire tightly fixed. A mass M is suspended from the wire using a slider at a point closer to A than B.

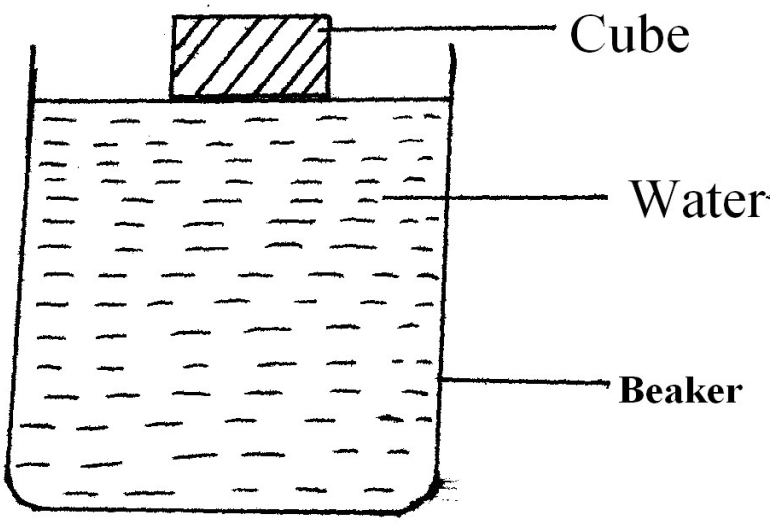


The copper wire is then heated for sometime, State and explain what is likely to be observed on the position of the mass. **(2mks)**

6. Two identical springs, whose spring constant is 6.0N/ cm, are used to support a load of 60N as shown below.



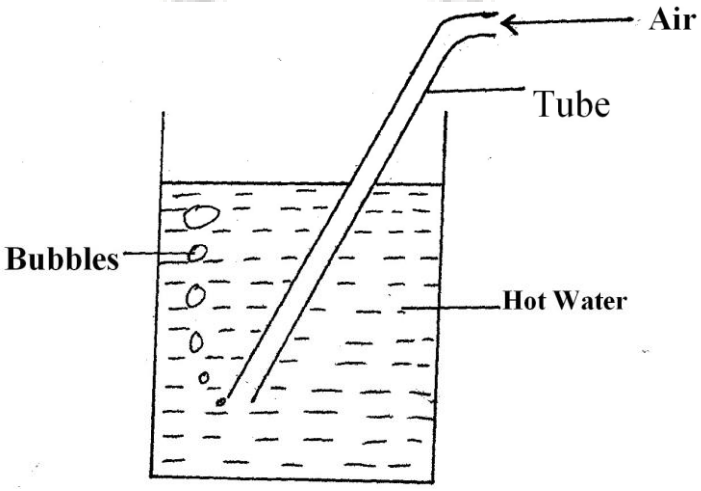
7. The figure below shows a cube of a certain wood whose density is the same as that of water. The cube is held on the surface of water. The cube is held on the surface of water in along beaker.



State and explain what happens to the cube after it is released. **(2mks)**

a) State one factor that determines the value of critical speed of a given body undergoing uniform circular motion **(1mk)**

10. The figure shows a gas being bubbled through hot water.



Explain why the bubbles increased in size as it rises to the water surface. **(2mks)**

11. A stone weight 2N in air and 1.2 N when totally immersed in water. Calculate the volume of the stone. **(2mks)**

12. Explain why in trying to move a rigid wall, a person is said to be doing no work. **(1mk)**

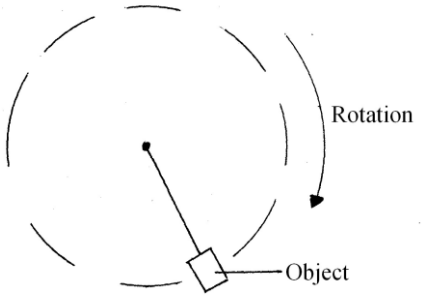
13. The reading of mercury barometer is 70.0 cm. What is the pressure at the place in N/m^2 (Density of mercury is 1.36×10^4 Kg / m^3) **(2mks)**

SECTION B (55MKS)

Answer All questions in this section

14. a) Define centripetal acceleration . (1mk)

b) An object of mass 400g revolves uniformly on a horizontal frictionless surface. It is attached by a cord 20 cm long to a fixed point P.



i) Mark and label on the diagram the direction of centripetal force F and linear velocity V. **(2mk)**

ii) The object makes a revolutions per second. Determine the linear velocity of the object. **(2mks)**

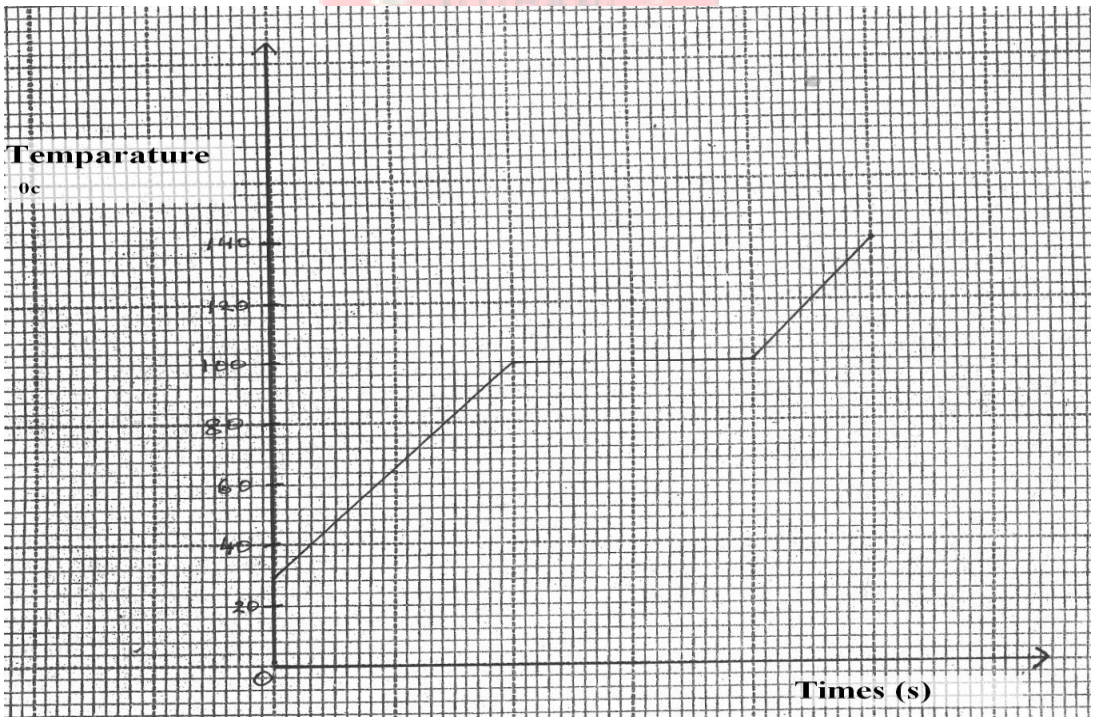
c) A stone is tied to a light string of length 0.5 m. If the stone has a mass with a uniform angular velocity of 6 revolutions per second, determine.

i) The period **(2mks)**

ii) The tension of the string when the stone is at the bottom of the swing. **(3mks)**

15. a) State and difference between evaporation and vapourisation. (1mk)

b) The graph below shows the boiling process of water, Use it to answer the questions that follow.



(i) State the room temperature from the graph. **(1mk)**

ii) State what is happening along BC in the graph **(1mk)**

c) 50g of stream at 100^0C was passed into cold water at 20^0C. The temperature of the mixture was 50^0c. Taking specific heat capacity of water as 4200 J Kg^{-1} K^{-1} and specific latent heat of vapourisation of water as 2260 $KJKg^{-1}$ and ignoring heat losses, determine.

i) Quantity of heat lost by the steam. **(3mks)**

ii) Quantity of heat transferred from the condensed steam to the cold water. **(3mks)**

iii) Mass of the cold water **(3mks)**

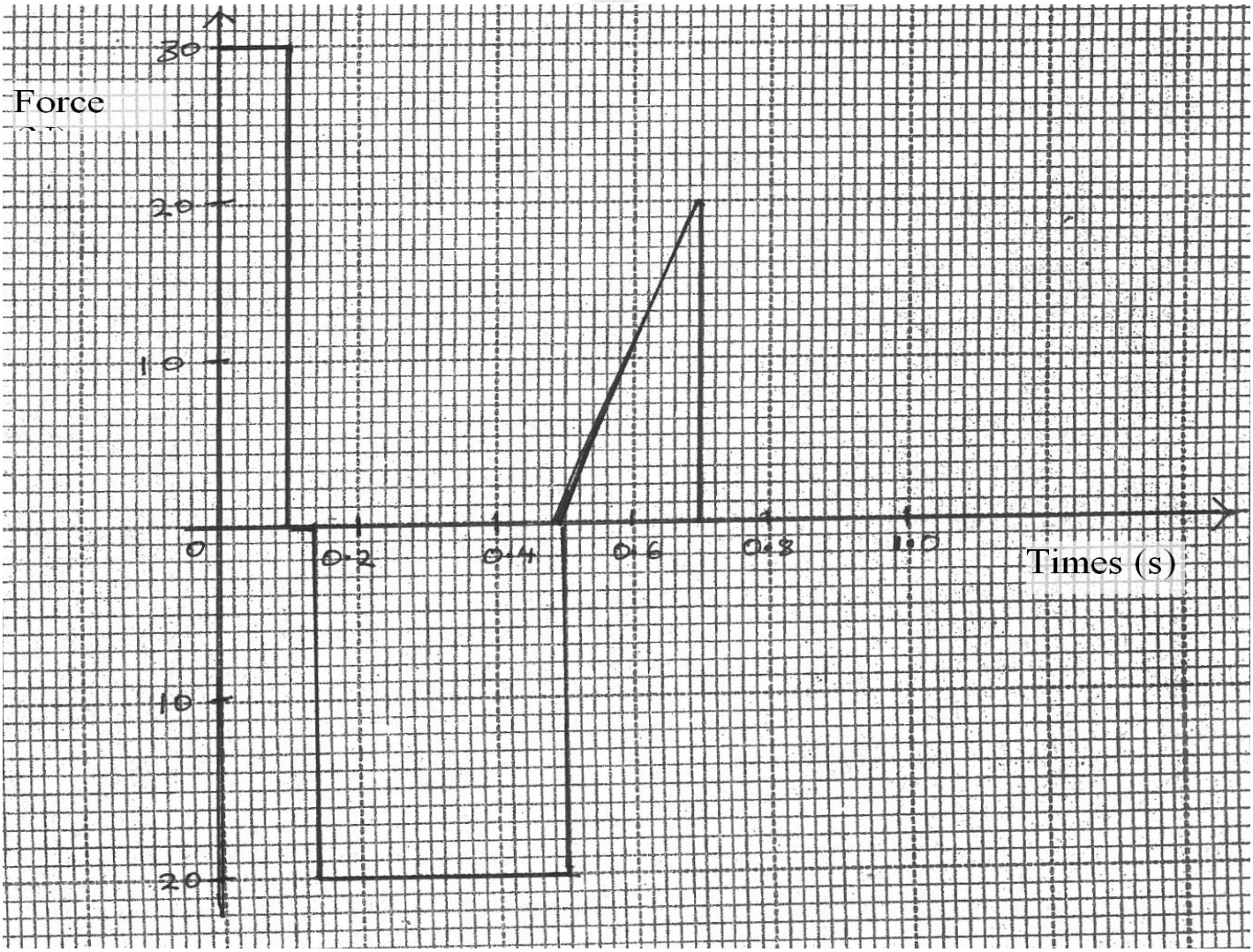
16. a) State any one differences between inelastic collision and elastic collision . **(1mk)**

b) Two trolleys of masses 2.0 kg and 1.5 kg travelling towards each other at 0.20mls and 0.35mls respectively collide head on the trolleys combine on collision:-

i) Calculate their combined velocity. **(3mks)**

ii) State the direction in which the trolleys will move after the collision.

c) The graph below shows how force applied on a 20kg mass varies with time.



Find the total impulse after 0.7 seconds. **(3mks)**

d) State Charle's law **(1mk)**

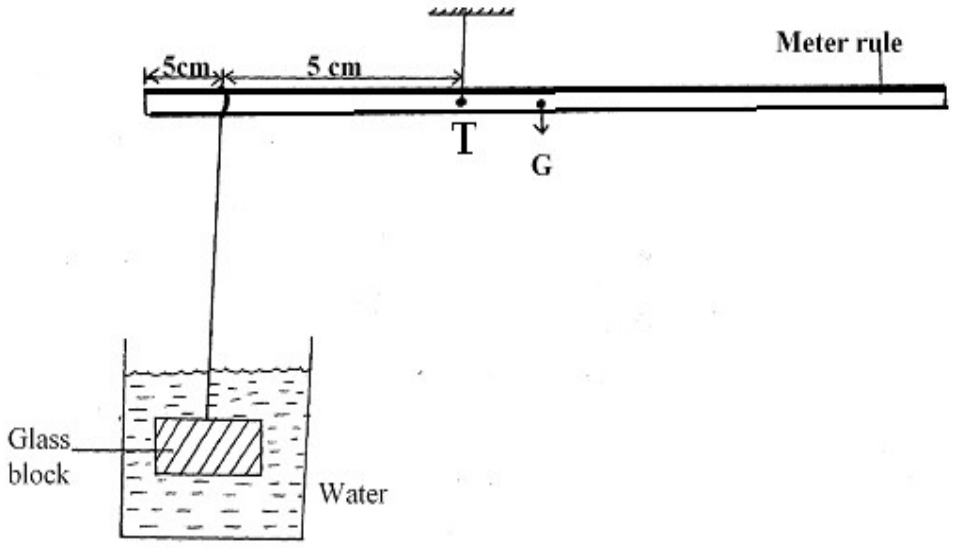
e) A gas has a volume of 20 cm^3 at 27^0c and normal atmospheric pressure. Calculate the new volume of the gas if it is heated to 54^0 c at the same pressure. **(3mks)**

17. a) State the law of floatation **(1mk)**

b) Explain why hydrometer has a wide bulb with air in it. **(2mks)**

c) Alog of wood of mass 300kg floats on water, the density of wood is 750 kg/ms. What is the maximum numbers of pupils of average weight 400N that can sit on the log without making it wholly immersed. **(3mks)**

d) A uniform meter rule of masses 100g is kept in equilibrium by suspending a glass block in water as shown.

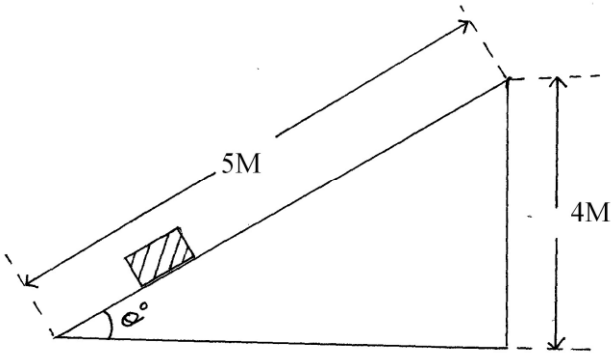


The volume of the glass block is 0.0005m^3 point G is the centre of gravity of the meter rule and T is the turning point.

i) What is the distance from G to the turning point T. **(1mk)**

ii) Determine the weight of the glass block **(3mks)**

18. a) The figure below shows an inclined plane of length 5m.



Find the velocity ratio of the inclined plane. **(2mks)**

b) Sketch the possible arrangement of the pulleys with a velocity ratio of S**.** **(2mks)**

c) The table below shows the readings for various masses hung from a spring balance.

Mass (kg)	0	0.02	0.04	0.06	0.08	0.10
Reading (mm)	120	131	139`149	161	171	
Force (N)						
Extension (mm)						

i) Complete the table **(2mks)**

ii) Plot the graph of the force against extension on the grid provided below. **(4mks)**

From the graph, determine the extension when a mass of 0.045 kg is hung from the spring **(1mk)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 8 PAPER 2

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

b) ***Sign** and write **date** of examination in the spaces provided.*

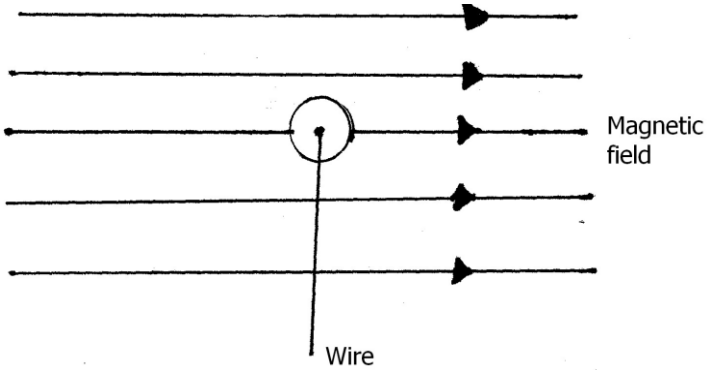
c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B**.*

SECTION A (25 marks)

1. Figure 1 below shows two bar magnets north and south poles placed together as shown. In the figure sketch the magnetic field pattern between the two magnets. **(1mk)**



2. Figure 2 below shows a wire in a magnetic field. A current is switched on to flow through the wire in the direction shown. State the direction of motion of the wire. **(1mk)**

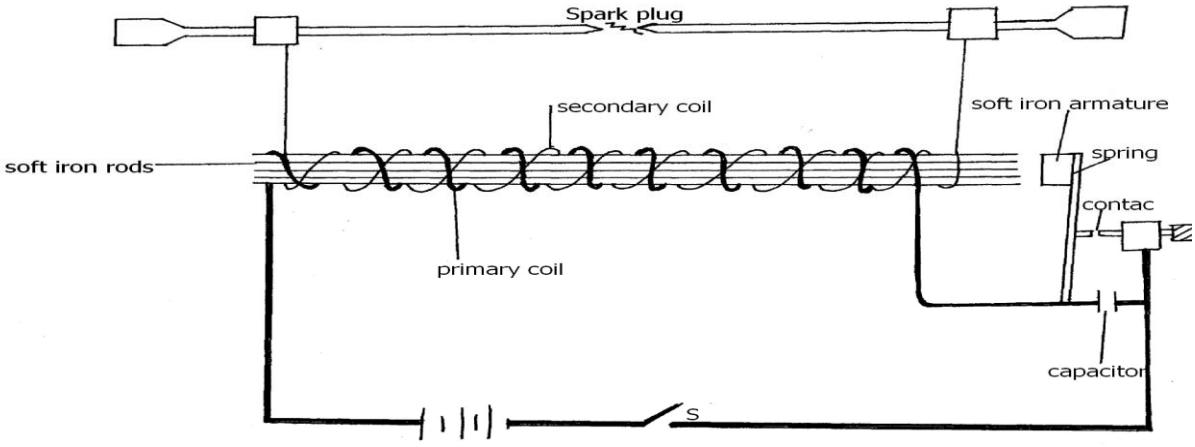


3. Explain the meaning of the following terms as used in waves: **(2mks)**

i) Amplitude
ii) Waveform

4. State the factor that determines the quality of the x-rays produced in the x-ray tube. **(1mk)**

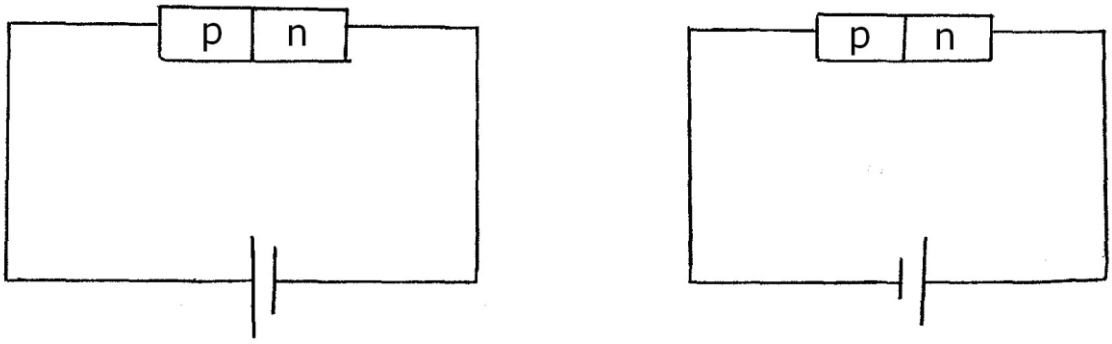
5. In order to step up 12 V to 15 kV in an induction coil, the circuit below was used.



Explain how voltage is stepped up by the arrangement. **(3mks)**

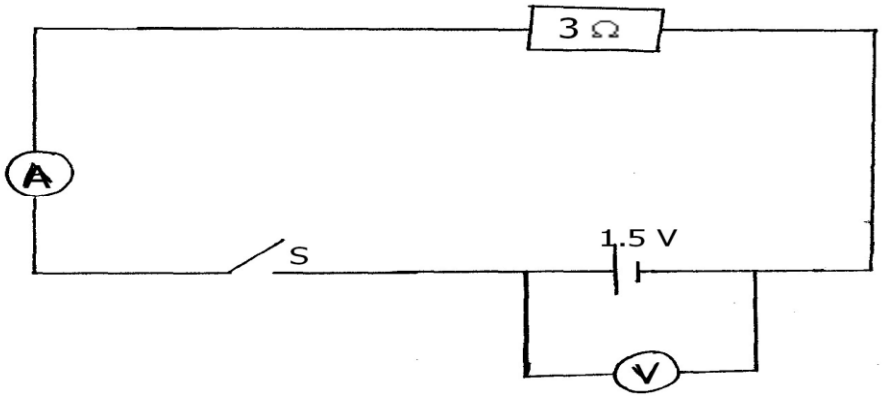
6. The y-gain control of a C.R.O is set at 2V/div. Calculate the number of vertical divisions when it is showing a peak voltage of 50V. **(2mks)**

7. Figure 4(a) and fig 4(b) shows a p-n junction connected to a battery. It is observed that the current in 4(a) is greater than the current in 4(b).



State the reason for this observation **(2mks)**

8. In figure 5, the internal resistance of the cell is 0.5Ω. Determine the ammeter reading when the switch S is closed. **(3mks)**



9. A Bunsen burner flame brought near to the cap of a charged electroscope causes the divergence of the leaf to decrease. Explain this observation. **(1mk)**

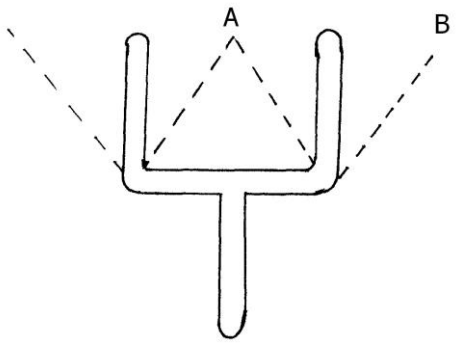
10. A sound wave in air is made up of compressions and rarefactions. Explain what is meant by compressions and rarefactions.

i) Compressions

ii) Rarefactions

11. State Snell's law **(1mk)**

12. Figure 6 below shows a vibrating tuning fork. The prong takes 2ms to go from A to B. What is the frequency of the vibration? **(2mks)**



13. A bright object 50mm high stands on the axis of a concave mirror of focal length 100mm and at a distance of 300mm from the concave mirror. Determine the height of the image. **(2mks)**

14. A household electric lamp is rated as 240V, 60W. The filament of the lamp is made from tungsten and is a wire of radius 6.0×10^{-6} m. Calculate the length of the filament of the lamp when operating at constant temperature. **(3mks)**

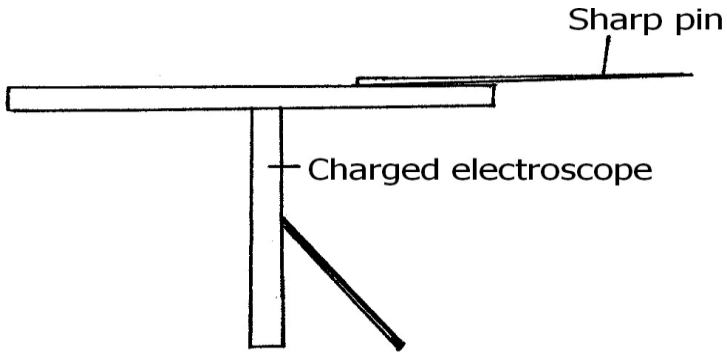
(Resistivity of tungsten is 7.9×10^{-7} Ωm.)

SECTION B (55 marks)

Answer ALL the questions in the spaces provided below each question

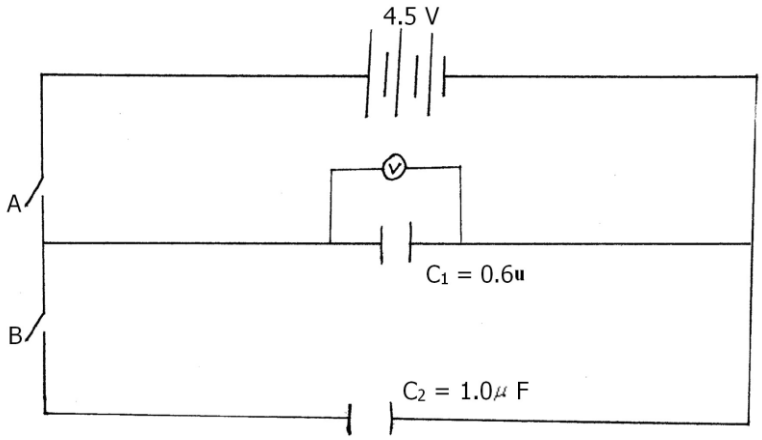
15. a) Define capacitance **(1mk)**

b) In fig below, a sharp pin is fixed on a cap of a leaf of the electroscope. The electroscope is highly charged and then left for sometime.



State and explain the observation made after sometime.

c) Figure below shows a circuit where a battery of e.m.f. 4.5 V, switches A and B, two capacitors $C_1 = 0.6\mu F$ and $C_2 = 1.0\ \mu F$ and a voltmeter are connected.



i) Determine the charge on C_1 when both switch A is closed and switch B is open. **(2mks)**

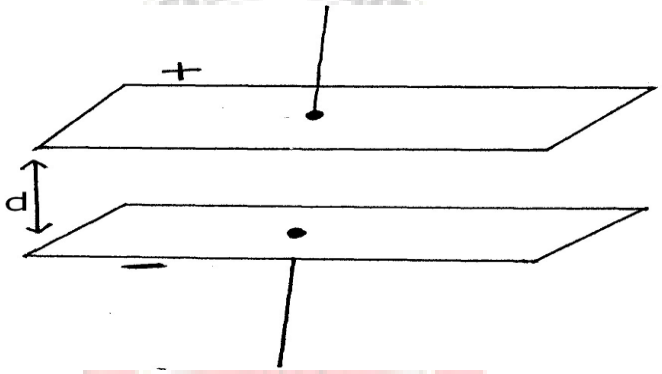
ii) What is the effective capacitance C_1 When both switches A and B are closed.?(2mks)

iii) State and explain what is observed on the voltmeter when

I. Switch A is closed and switch B is open **(2mks)**

II. Switch A is closed and opened and then B is closed **(2mks)**

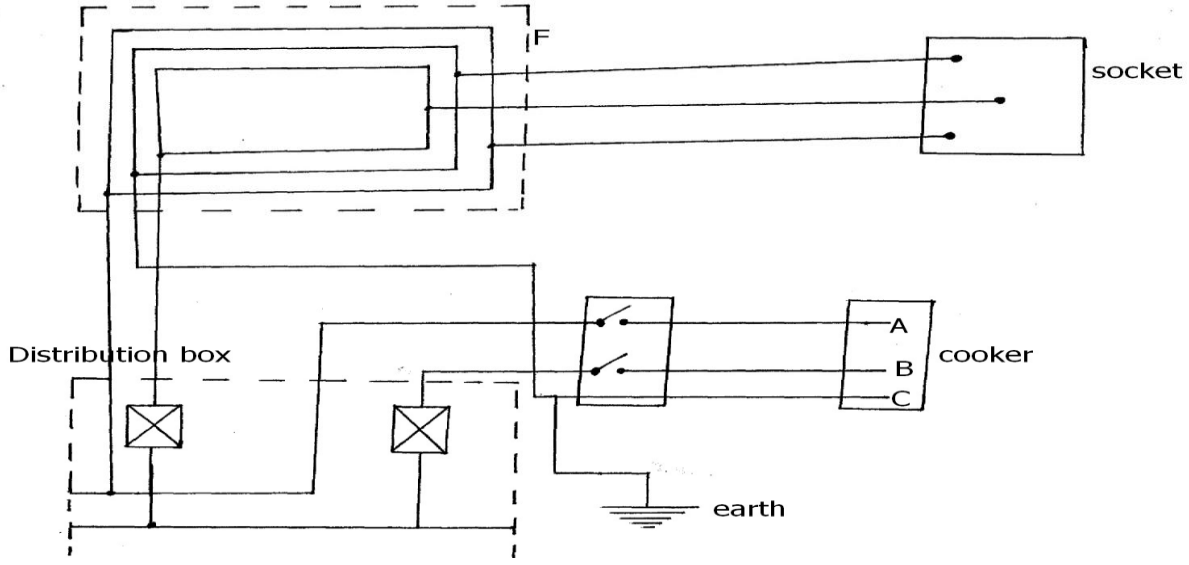
d) Fig shows a pair of parallel plates of capacitors connected to a battery. The upper plate is displaced slightly to the left.



Suggest two adjustments that can be made to so as to reduce the effective capacitance. **(2mks)**

16. a) Long distance transmission of power is done at a very high voltage. Explain. **(1mk)**

b) Fig below shows a section of a house wiring system



i) Name:

I. The circuit labeled F **(1mk)**

II. The terminals A and B **(2mks)**

A ……..

B ……..

ii) Give a reason why R is connected to B and not A

iii) What is R **(1mk)**

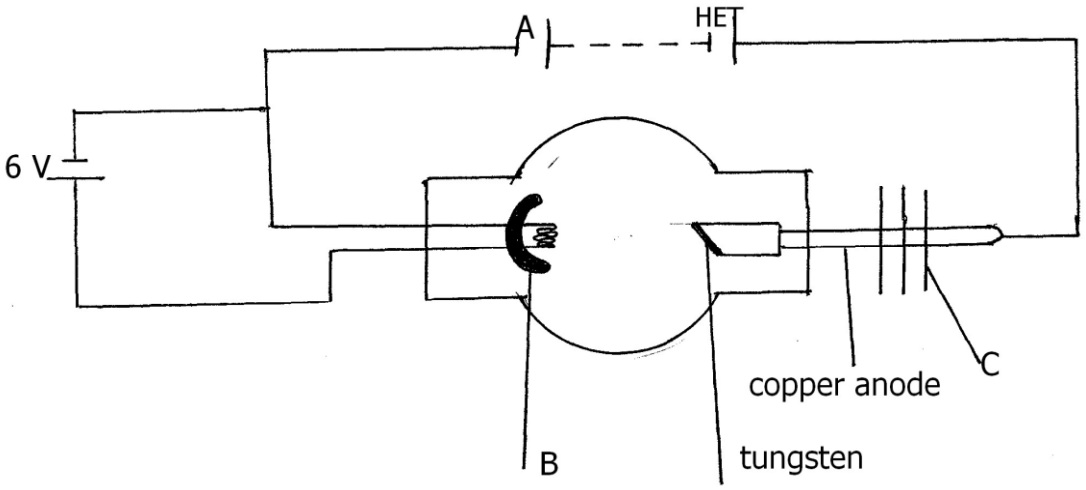
iv) Why is earthing necessary in such a circuit?

c) 54kg of water in a metallic cylinder of heat capacity 9000 JK^{-1} is heated from 10^0 C to 80^0 C using an immersion heater rated 1800 W, 240V. Assuming that no heat is lost to the surrounding and the immersion heater works at its correct voltage. Find;

i) The current flowing through the water **(2mks)**

ii) The cost of heating the same mass of water from 10^0 C to 80^0 C, every day for 30 days. If electricity cost Sh. 6.70 per unit. **(4mks)**

17. a) Fig below shows an x-ray tube.



i) State the function of part B and C

B …….. (1mk)

C …….. (1mk)

ii) Explain briefly how x-rays are produced in the tube **(2mks)**

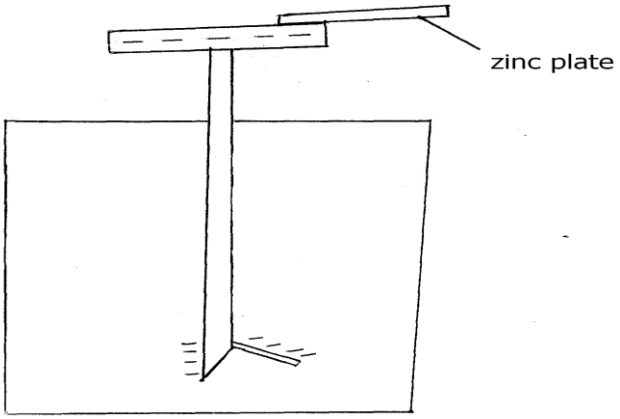
iii) Why is the target (tungsten) made to rotate in modern x-ray tube **(1mk)**

iv) An x-ray operator wanted to produce harder x-rays that could penetrate flesh. State and explain the adjustments he would perform on the x-ray tube achieve this. **(2mks)**

b) An x-ray tube has an accelerating potential difference of 50 kV. What is the shortest wavelength in the x-ray beam. **(3mks)**

(h = 6.64 x 10^{-34} Js, charge on electron, e = 1.6 x 10^{-19} C and velocity of light c= 3.0 x 10^8 m/s)

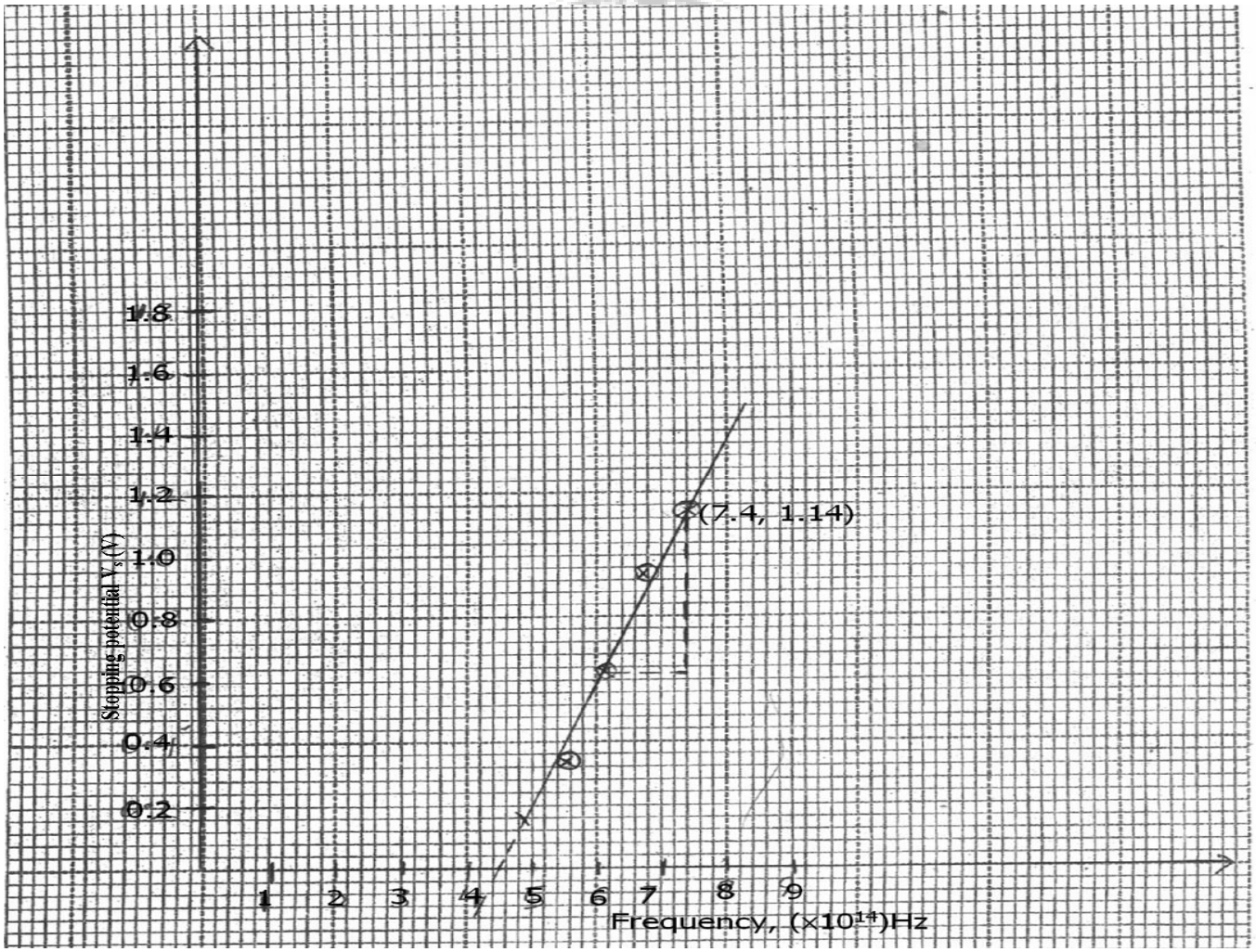
18.a) The figure below shows a zinc plate placed on the cap of a negatively charged electroscope as shown.



State and explain the observation made when zinc plate is irradiated by u.v. light as shown above. **(1mk)**

b) What is photoelectric effect **(1mk)**

c) In a photoelectric effect experiment, a certain surface was illuminated with radiation of different frequencies and the stopping potential determined for each frequency. When stopping potentials were plotted against frequencies the graph below was obtained.



i) From the graph determine the plank's constant and the work function of the surface given that $eV_s = hf - hf_o$. Where $e = 1.6 \times 10^{-19}$, $W_o = hf_o$, f_o = lowest frequency. **(5mks)**

ii) A surface whose work function $W_o = 6.4 \times 10^{-19}$J is illuminated with light of frequency of 3.0×10^{15} Hz. Find the maximum photoelectric energy of the emitted photoelectrons (Use value f h obtained in (i) above) **(2mks)**

19. a) Define radioactivity **(1mk)**

b) What do you understand by the term background radiation **(1mk)**

c) Explain why bromine gas is added to the Geiger Muller tube **(1mk)**

d) In an experiment to determine the half life of a certain radioactive substance, the activity in disintegrations per minute was measured for sometimes and results recorded as below. Taking background radiation as 20 disintegrations per minute, complete the table below.

Time in min	0	10	20	30	40	50	60	70	80
Activity disintegration/min	172	135	107	86	70	58	40	32	26
Actual activity dis/min									

i) On the grid provided plot a suitable graph and use it to determine the half life t½ of the substance **(5mks)**

ii) How long would the activity of a sample iodine 128 take to drop from 1200 to 75 disintegration per second. **(2mks)**

END

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 9 PAPER 1

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

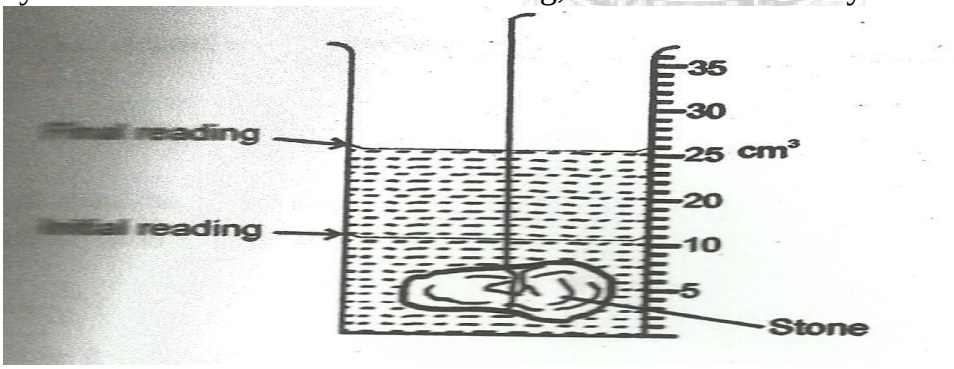
a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

b) ***Sign** and write **date** of examination in the spaces provided.*

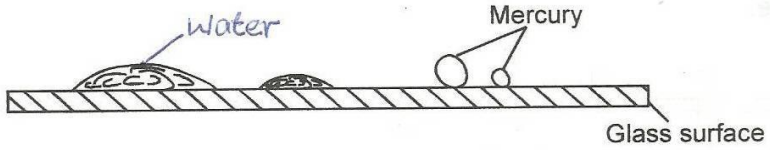
c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

QUESTIONS

1.The figures below shows the level of water before and after a stone was immersed into the measuring cylinder If the mass of the stone is 200g, determine its density. **(3mks)**



2. The figure below shows the shapes formed when drops of water and mercury are placed on the surface of a clean glass plate



Explain the difference in the shapes.

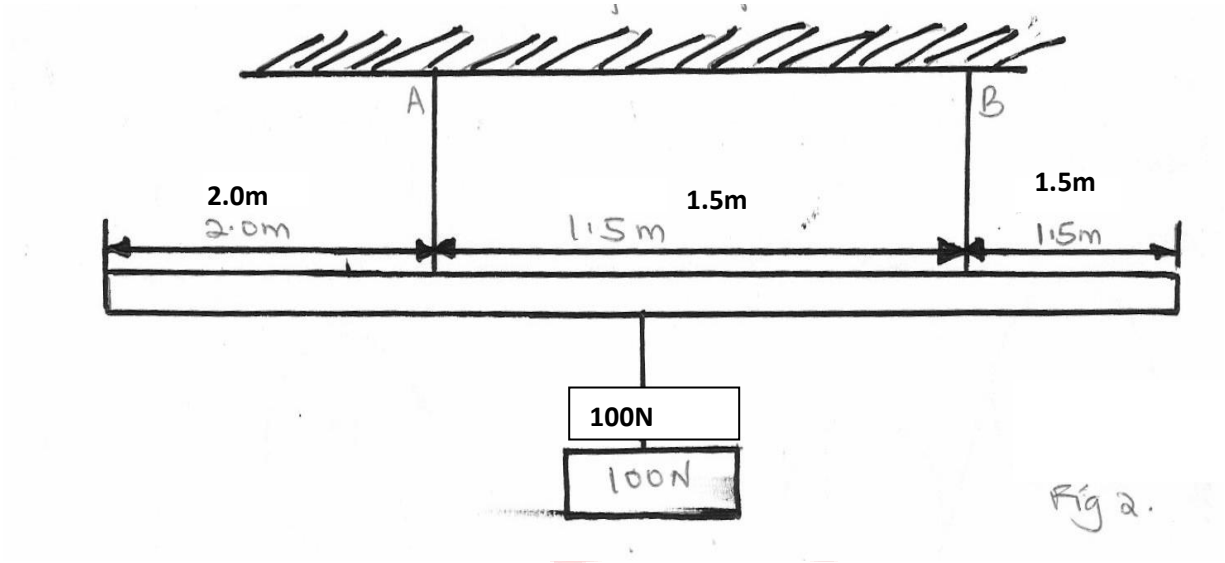
Explain the difference in the shapes. **(1mk)**

3. Explain why air is not used as a brake fluid. **(1mk)**

4.) Use kinetic theory to explain pressure law. **(1mk)**

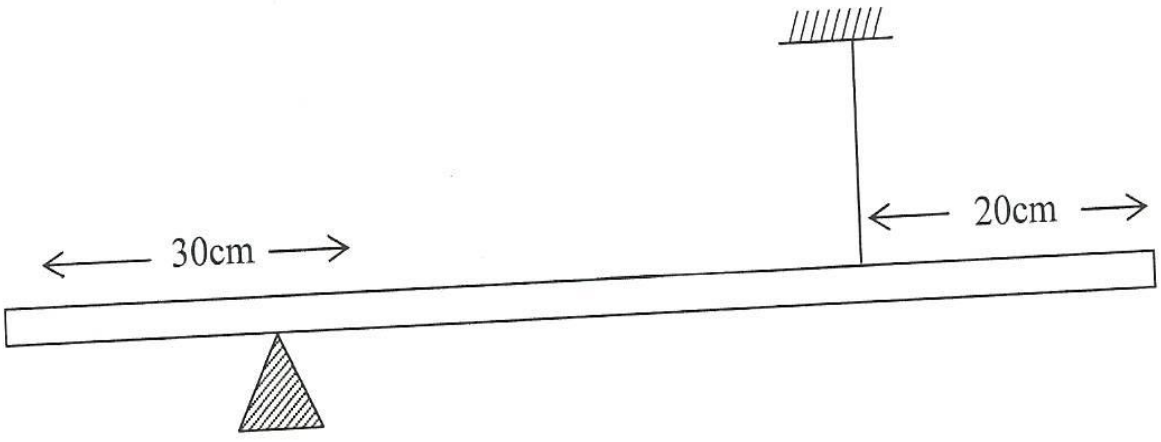
5.) In an oil drop experiment, it was found that one oil drop spread on water to form a patch of diameter 0.8cm and thickness 2.0×10^{-6}mm. Calculate the radius of the drop. **(2mks)**

6.)A uniform wooden plank weighing 50N and 5m long is suspended by two ropes A and B, 1.5m apart. A is 2m from one end and B is 1.5m from the other end as shown in figure below. A concrete block of weight 100N is suspended from the centre of the plank



Calculate the tension T_A in string A **(2mks)**

7. The figure below shows a uniform bar of length 1.4m pivoted near one end. The bar is kept in equilibrium by a string as shown.



Given that the weight of the bar is 1.5N, determine the tension in the string. **(3mks)**

8. The table below shows results of an experiment carried out to study properties of a spring.

Force (N) adde	0	5	10	15	20
Length of sprin (cm)	10	11	12	13	14

State with a reason whether the experiment was done within elastic limit of a spring. **(1mk)**

9. A beaker is filled completely with water. A spoon full of common salt is added slowly. The salt dissolves and the water does not overflow. State the reason why water does not overflow. **(1mk)**

10.In a vacuum flask, the walls enclosing the vacuum are silvered on the inside. State the reason for this. **(1mk)**

11.A bullet is fired horizontally from a platform 15m high. If the initial speed is 300m/s, determine the maximum horizontal distance covered by the bullet. **(3mks)**

12.A high jumper usually lands on a thick soft mattress. Explain why. **(1mk)**

13. If the rate of flow of water in the tube is 0.0001 m^3/s. Determine the length of tube it will take its flow in 3 seconds through a cross-section area of $5cm^2$. **(3mks)**

14. The ice and steam points of a certain graduated thermometer are found to be 15cm apart. What is recorded in ^0c when the length of the mercury thread is 3cm above the ice point? **(2mks)**

15.a) Define heat capacity and state its SI units. **(2mks)**

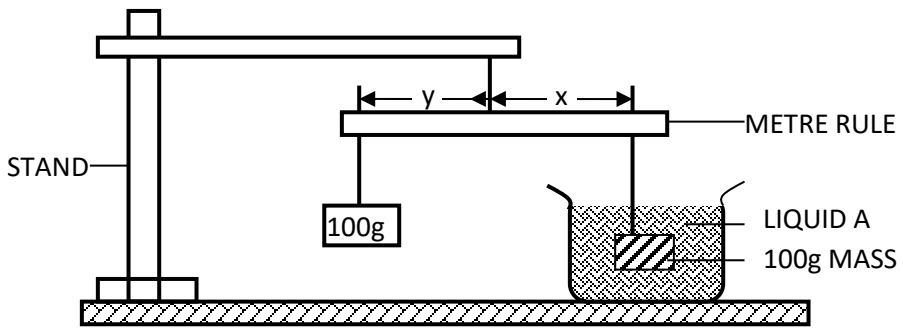
b) i) 200g of ice at -10^oc was slowly heated by an immersion heater rated 200w. The graph below shows how temperature varied with time.

ii) Given that the specific heat capacity for ice is 2100J/kg/k, specific latent heat of fusion for ice 340000J/kg and the specific heat capacity for water is 4200J/kg/k. Calculate the corresponding times for pints B and C. **(4mks)**

iii) What factors affect the melting point of a solid. **(2mks)**

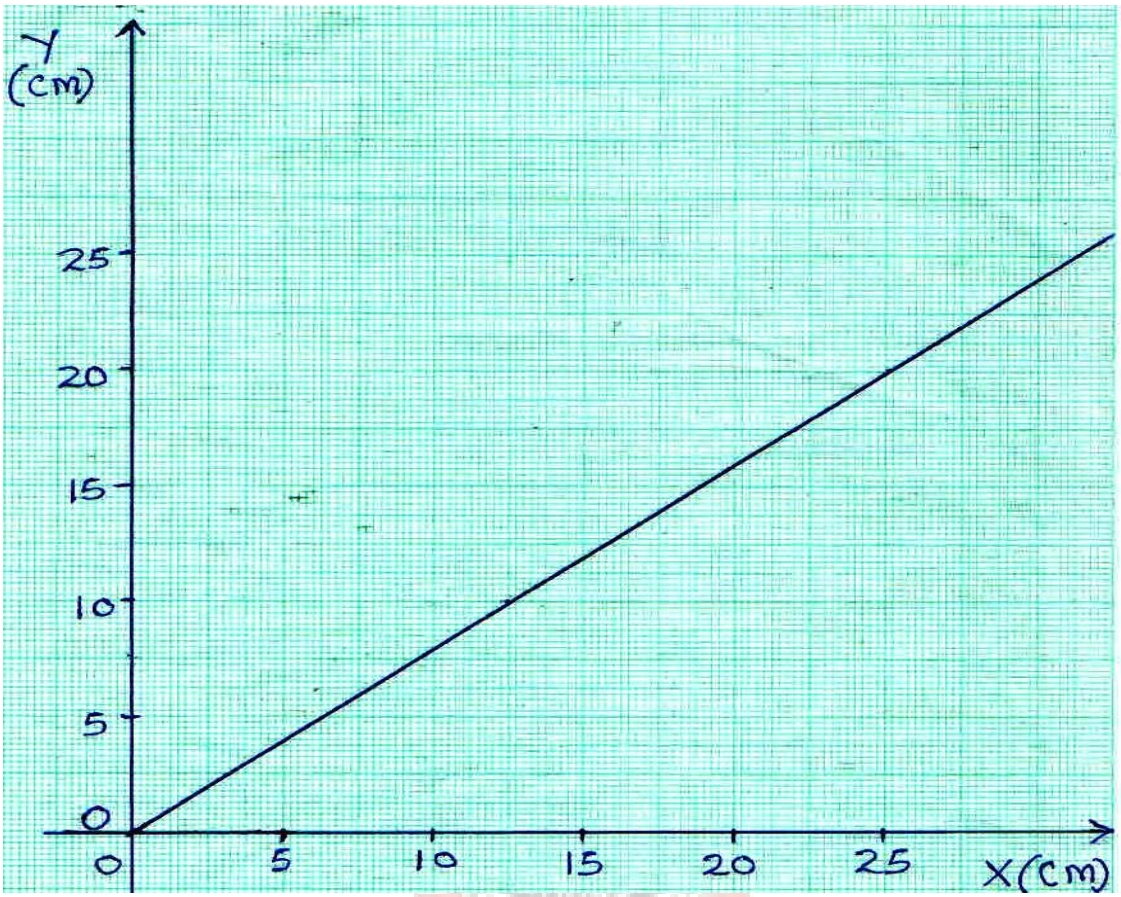
c) i) A sauce pan of mass 0.7kg containing 0.5kg of water +is 20oc it takes 5 minutes before the water starts to boil. Find the rate at which heat is supplied to the water by the burner. Take specific heat capacity of the sauce pan as $600Jkg^{-1}k^{-1}$. **(3mks)**

16. (a) In an experiment to determine the relative density of liquid A, the following set up was used.



The distance x of the mass in liquid A was measured for various length, y of an identical mass of equilibrium and a graph of y against x was drawn as shown in the grid below.

GRAPH OF Y AGAINST X



(i) Determine the gradient, S, of the graph. **(2 Marks)**

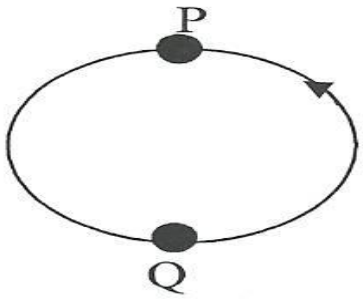
(ii) If S = $\frac{F}{W}$, where F is the apparent weight of mass in liquid A and W is the actual weight of the mass. Calculate the value of F and the upthrust u. **(3mks)**

(iii) Determine the relative density of the liquid a, Given that the weight of the 100g mass in water was 0.9N. **(3mks)**

b) A balloon's fabric weighs 10N and has a gas capacity of $2M^3$. If the gas in the balloon weighs 2N and air has density 1.29kg/m3, Find the resultant force on the balloon when it is floating in air.**(3marks)**

17. a) A body having uniform motion in a circular path always accelerates. Explain. **(1mk)**

b)the figure below shows the path of an object of mass 200g tied to a string 0.2m and being whirled in a vertical circle at a linear speed of 10m/s.



If the string gets cut when the object reaches point Q,

i) indicate with an arrow on the diagram, the path direction it is likely to move. **(1mk)**

ii) Determine the force that cuts the string at point Q **(3mks)**

iii) Calculate the minimum tension **(3mks)**

c) A body is whirled in a horizontal circle at a frequency of 5Hz. Determine its angular velocity. **(3mks)**

SECTION B

18.a) State the law of conservation of energy. **(1mk)**

b)What energy transformation takes place when a car battery is used to light a bulb? **(2mks)**

c) A pulley system has two pulleys on the lower block and one pulley on the upper block. In order to raise the load of 6N, an effort of 2N is applied.

i)Draw a sketch to show the pulley system. **(2mks)**

ii)Calculate the efficiency of the pulley system. **(3mks)**

iii) If the lower block weighs 0.4N. What friction force oppose the motion. **(3mks)**

19. a) Define **(1mk)**

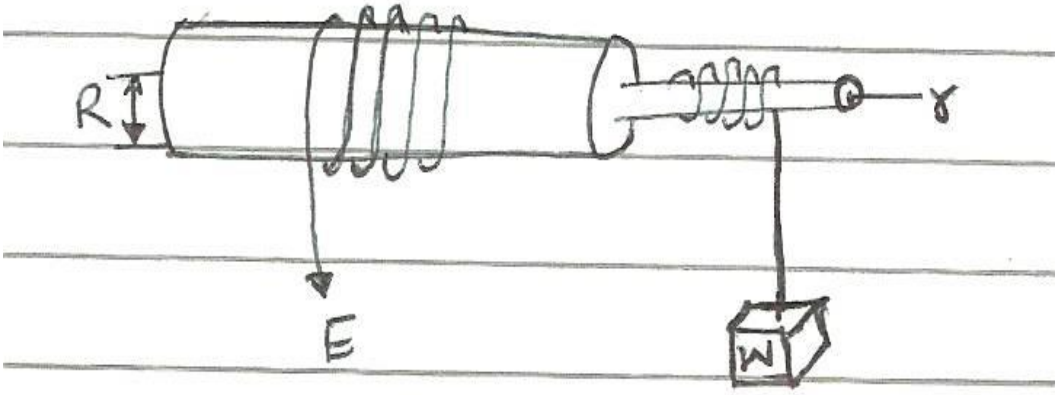
i) Velocity ratio **(1mk)**

ii)Mechanical advantage **(1mk)**

iii)Efficiency **(1mk)**

b)A small pump develops an average power of 80W. It raises water from a borehole to a point 15m above the water level. Calculate the mass of water delivered in one hour. **(3mks)**

c)The figure shows a wheel and axle being used o raise a load W by applying an effort 'E'. The radius of a large wheel is 'R' and that of a small wheel is 'r'.



i)Show that the velocity ratio (V.R) of this machine is given by R/r. **(2mks)**

ii)If r = 5cm and R = 8cm, determine the effort 'E' required to raise a load of 40N, given the efficiency of the ma chine is 85%. **(3mks)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 9 PAPER 2

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

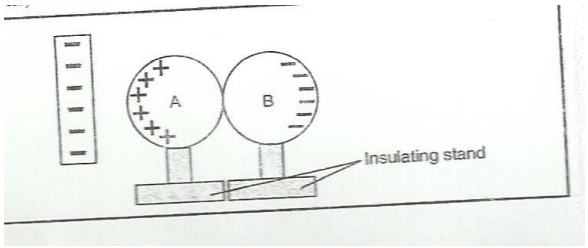
b) ***Sign** and write **date** of examination in the spaces provided.*

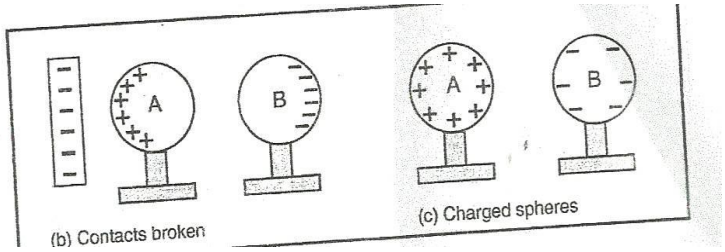
c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

QUESTIONS

1.State the laws of reflection of light. **(2mks)**

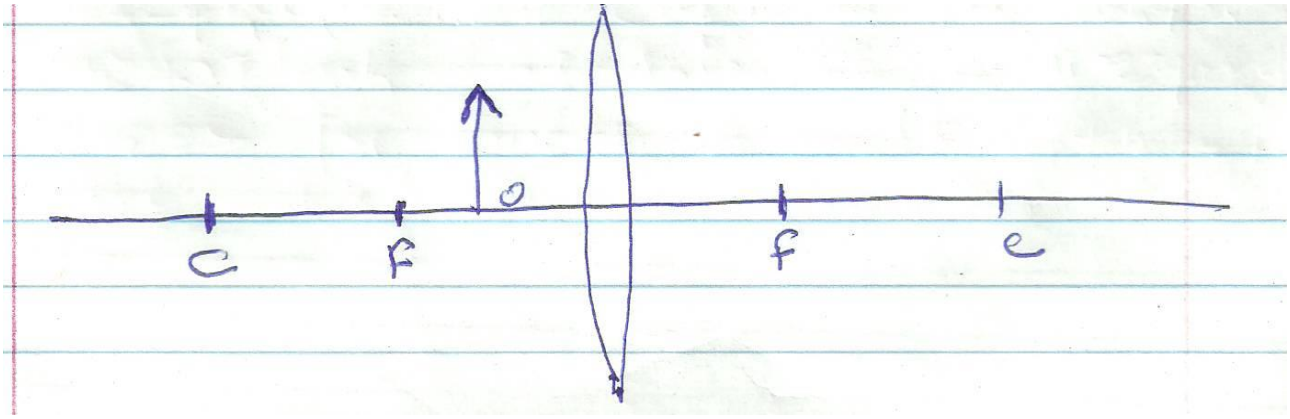
2.The diagram below shows how to charge two spheres simultaneously.





On the diagram indicate the charge acquired by spheres A and B in step two. **(2mks)**

3.Complete the diagram below to show how the lens forms the image. **(1mk)**

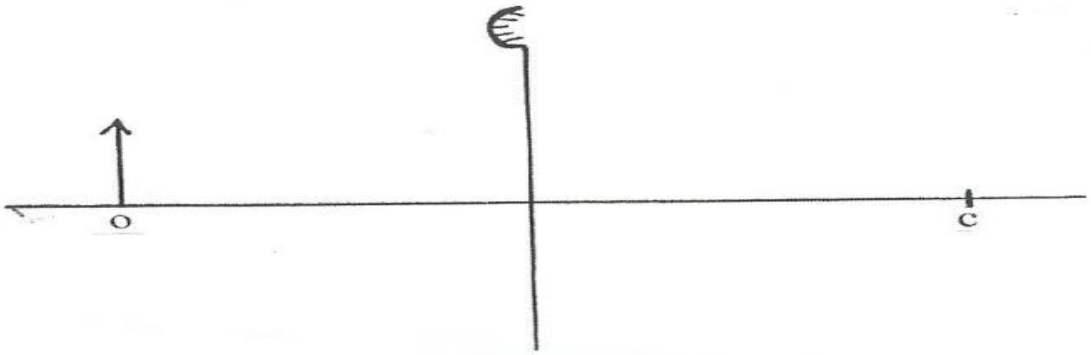


4.) Name one detector of infra-red radiations **(1mk)**

5) Using a diagram explain how soft iron keepers are used to retain magnetism in stored magnets **(2mks)**

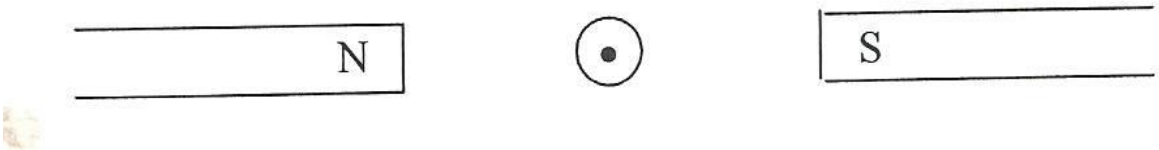
6) A battery is rated 30Ah,determine the amount of current it can supply in 20 minutes **(2mks)**

7) Sketch rays to show the image formed by the object in the following. **(2mks)**



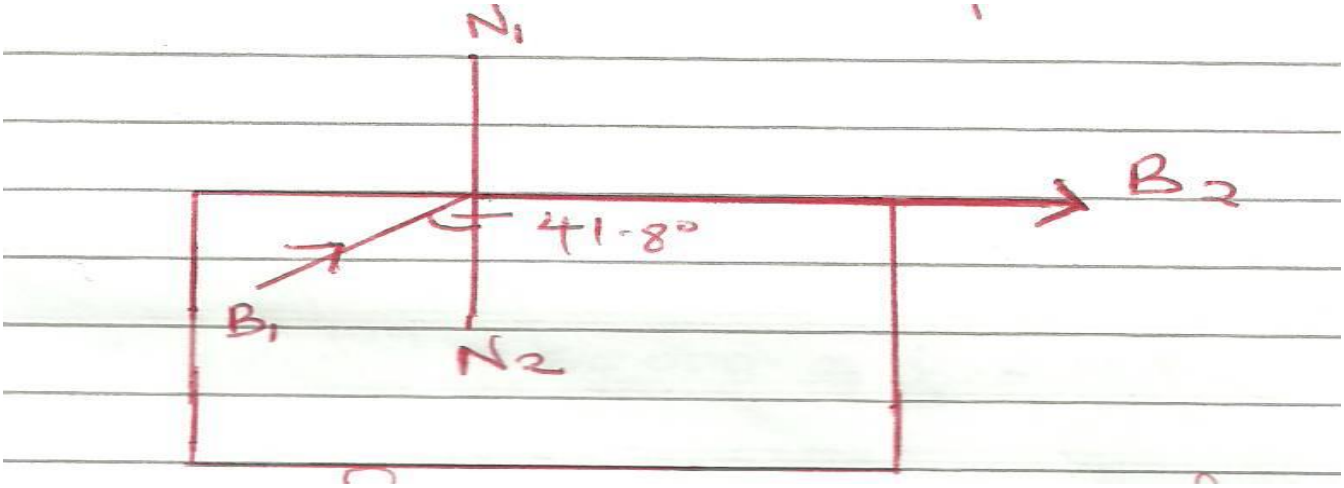
8.Name any one common property of electromagnetic waves. **(1mk)**

9.The figure below shows a conductor carrying current placed within the magnetic field of two magnets. Complete the diagram by showing the field pattern and the direction of force F that acts on the conductor. **(2mk)**



10. What is meant by donor impurity in semiconductor. **(1mk)**

11.The figure below shows ray B, incident through a glass block to air interface.



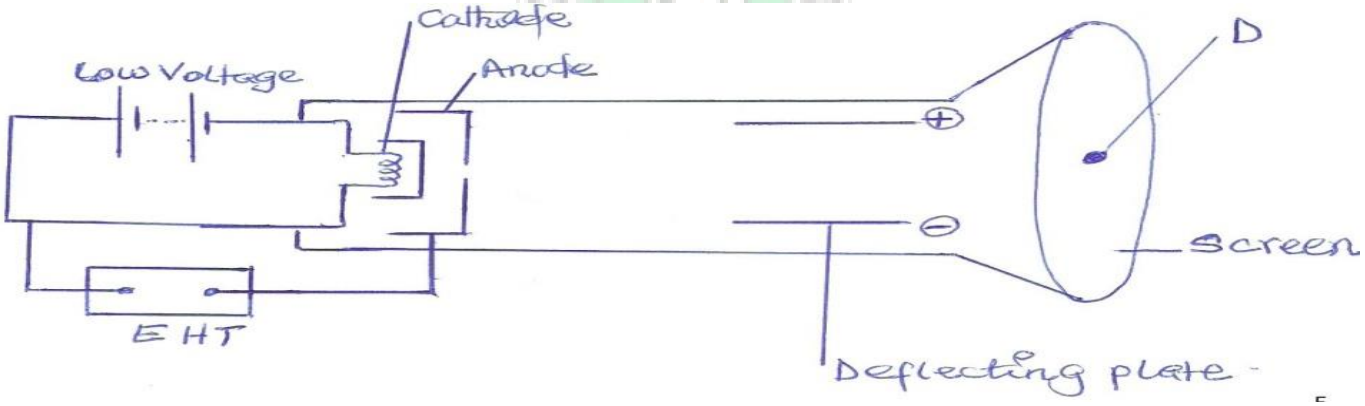
B2 is the emergent ray of B1. Determine the refractive index of the glass block.

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

13.A potential difference of 50kv is applied across an x-ray tube. Given that the charge of an electron e = 1.6×10^{-19} c and the mass of an electron $m_e = 9.1 \times 10^{-31}$ kg, calculate the velocity of the electron. **(3mks)**

14. An electric heater is rated 3kw and 240v when in operation. Calculate the cost of running the heater for 5 hours if the cost per kwh is ksh.6.70. **(2mks)**

15. The diagram below shows part of a cathode ray tube.



i)Explain how the cathode rays are produced. **(2mks)**

ii) On the same diagram draw the path of the cathode rays to the spot produced on the screen at D. **(2mks)**

iii) Explain the observation made on the spot when the connection to the high voltage supply are interchanged so that the anode is made negative. **(2mks)**

iv) What behavior of cathode rays shows that they move on a straight line. **(2mks)**

v)Name the components of an electron gun of a cathode ray oscilloscope. **(3mks)**

16.a) In a photoelectric effect experiment, a certain surface was illuminated with radiation of different wavelengths and stopping potential determined for each wavelength. The following results were obtained:

Wavelength ($\times 10^{-7}$ m)	3.77	4.05	4.36	4.92	5.46
Stopping potential, (V_s), (V)	1.35	1.15	0.93	0.62	0.36
Frequency ($\times 10^{14}$Hz)					

i)complete the table above given that c = 3.0 x 10^8 m/s **(1mk)**

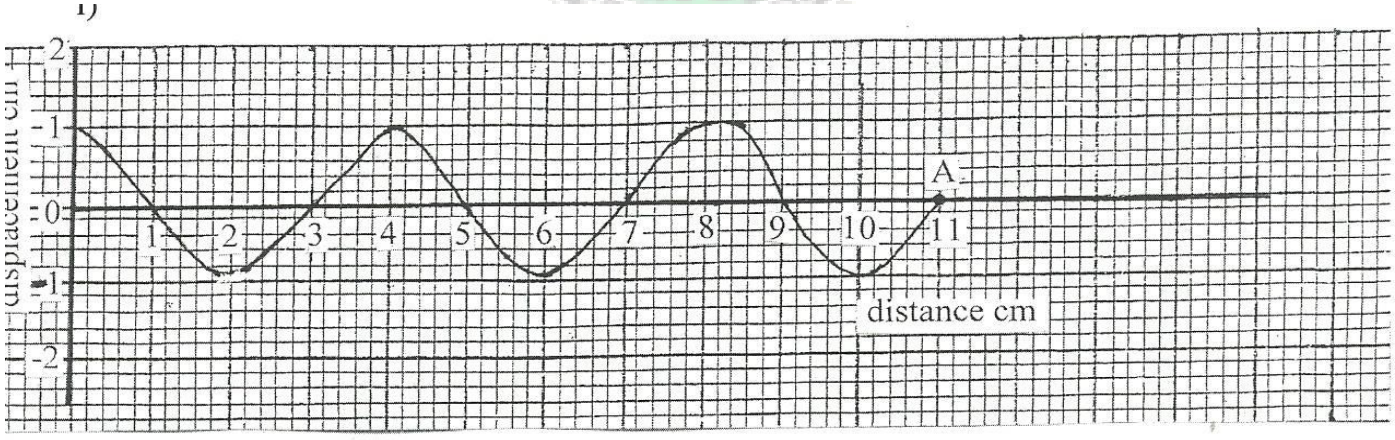
ii) Plot a graph of stopping potential (Y-axis) against frequency **(4mks)**

iii) Determine plank's constant, h and the work function of the surface given that $eV_s = hf - hf_o$, where e = 1.6 x10^{-19} C **(3mks)**

b) A surface whose work function Q = 6.4 x 10^{-19} J is illuminated with light of frequency 3.0 x10^{15} H_z. Find the maximum velocity of the emitted photo electrons (use value of h obtained in **a(ii)** above) **(3mks)**

17. a) State the difference between longitudinal and transverse waves. **(1mk)**

b)The figure below shows a transverse wave travelling along X-axis. T he frequency of the vibrations producing the waves is 20Hz.



i)Determine the amplitude in SI unit. **(1mk)**

ii) If it takes 0.1375 seconds for the wave to move from O to A, determine the speed of the wave. **(2mks)**

ii) Calculate the periodic time of the wave. **(2mks)**

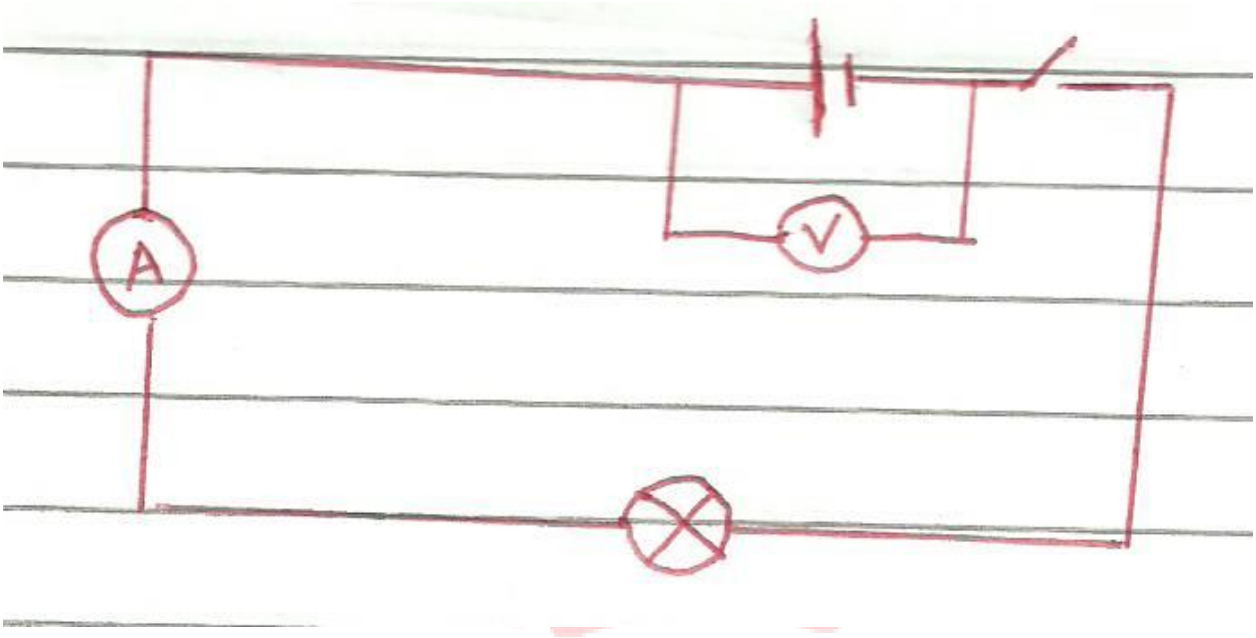
c i)State two factors affecting the speed of sound in air. **(2mks)**

ii)A man makes a loud sound and hears the echo of the sound after 1.25 seconds. If the speed of sound in air is 330ms-1, calculate the distance between the man and the wall causing the echo. **(3mks)**

18. Three resistors of resistance 2Ω, 4Ω and 6Ω are connected together in a circuit. Draw a circuit diagram to show the arrangement of the resistor which gives

a) Effective resistance of 3Ω **(2mks)**

b) In the figure below, the voltmeter reads 2.1v when the switch is open. When the switch is closed, the voltmeter reads 1.8v and the ammeter reads 0.1A.



Determine :-

i) The e.m.f of the cell **(1mk)**

ii) The internal resistance of the cell. **(3mks)**

iii) The resistance of the lamp. **(2mks)**

c. Calculate the length of a wire required to make a resistor of 0.5Ω , if the resistivity of the material is 4.9×10^{-7} Ω m and the cross sectional area is 2.0×10^{-6} m2. **(3mks)**

19.ai) Define half-life of a radioactive substance. **(1mk)**

ii) The following radioactive equation, find the value of N and Z.

b) The half-life of radioactive substance is 4 years. How long will the sample take for the activity to decrease to 1/32 of its original value. **(3mks)**

c)The diagram below shows the cross section of a diffusion cloud chamber used to detect radiation from radioactive source.

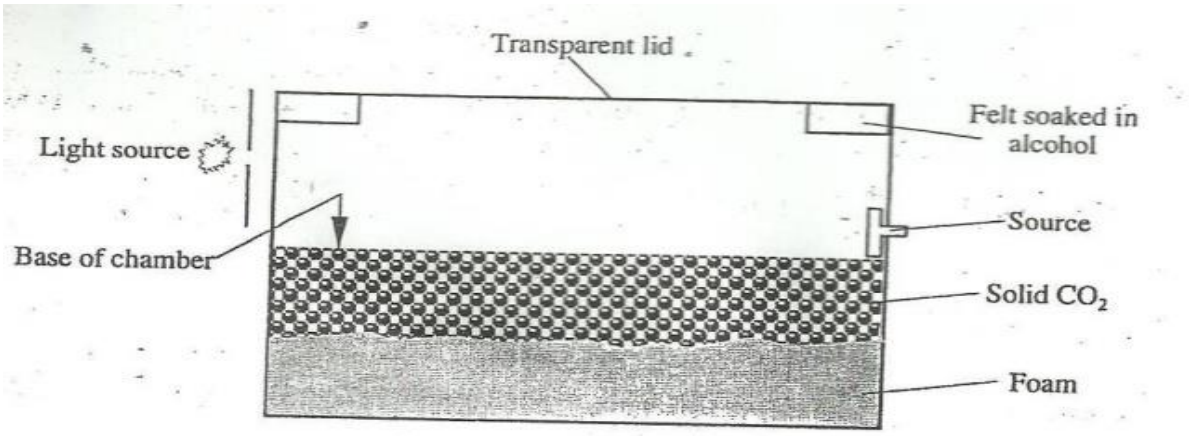


Figure 4

i)State one function of each of the following Alcohol. **(1mk)**

Solid carbon dioxide **(1mk)**

ii) When radio actions from the source enter the chamber some white traces are observed.

Explain how these traces are formed and state how the radio action is identified. **(4mks)**

ii)A leaf electroscope can also be used as a detector of radio actions. State two advantages of the diffusion cloud chamber over the leaf electroscope as a detector. **(2mks)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 10 PAPER 1

Time: 2 Hours

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……....

INSTRUCTIONS TO CANDIDATES.

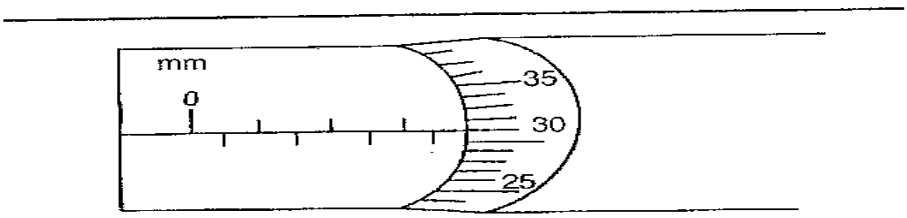
a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

b) ***Sign** and write **date** of examination in the spaces provided.*

c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B**.***232/1**

SECTION A (25 MARKS)

1) State the reading on the micrometer screw gauge shown below.



(1mark)

2) An oil drop forms a circular patch of area $5x10^{-3}$ m^2.If the oil drop has a volume $9x10^{-12}$ m^3, calculate the thickness of the oil molecule **(2marks)**

3) Name one non contact force **(1mark)**

4) A crane just lifts 9940N when an effort of 116N is applied and its efficiency is 75%. Find it's velocity ratio. **(3marks)**

5) The mass of a vessel is 90g and its specific heat capacity is 420J/Kgk. Calculate its heat capacity **(3marks)**

6) Explain the term absolute zero temperature **(1mark)**

7) Two table tennis balls are suspended from a support by thin string and air is blown between them. Explain the consequent motion of the balls. **(2marks)**

8) State the Hooke's law. **(1mark)**

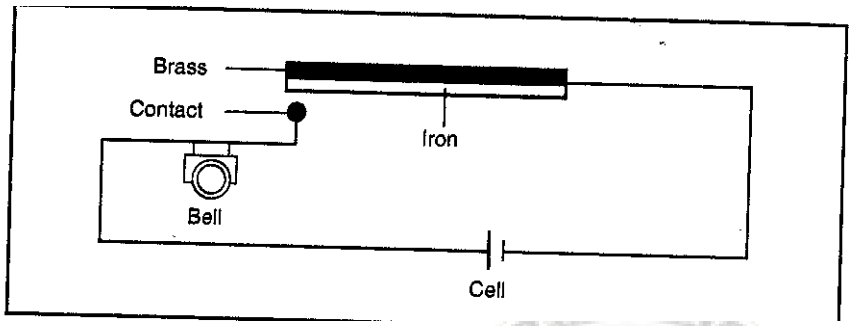
9) Give **a reason** why heat transfer by radiation is faster than heat transfer by conduction. **(1mark)**

10) The moment of the weight of vertical door does not significantly affect the moment of the force to the door .Give a reason for this **(1mark)**

11) In the Brownian motion experiment, smoke particles are observed to move randomly. Explain how this motion is caused **(2marks)**

12) Give **reason** why weight of a body varies from place to place **(1mark)**

13) The figure below shows a fire alarm circuit. Explain how the alarm functions. **(2marks)**



14) State the **reason** why water spilled on a glass surface wets the surface. **(1mark)**

15) Two liquids of density 1100kg/m^3 and 850kg/m^3 are mixed in equal volumes .The mixture fills a tank of 300cmx40cmx50cm to the brim. Calculate the mass of each liquid. **(3marks)**

SECTION B (55 MARKS)

Answer All The Questions In This Section

16) The figure below shows a hydraulic press system using a lever of negligible mass, on the side of the small piston, pivoted at point P. A force of 50N is applied.

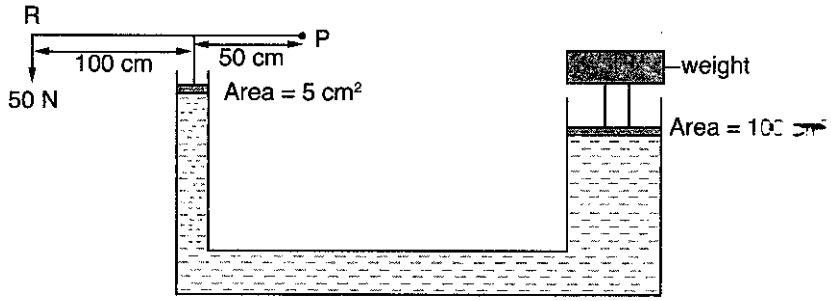


Fig. 4.73

a) Calculate the:

i) Force exerted by the small piston on the liquid **(3 marks)**

ii) Pressure of the liquid below the small piston. **(3 marks)**

iii) Weight of the object supported on the larger piston **(3 marks)**

b) State two properties of the fluid used in the hydraulic press. **(2marks)**

17) a) State Newton's second law of motion **(1mark)**

c) A car of mass 800kg moving with a speed of 15m/s crashes into a wall and comes to rest in 0.4 s. Find the :

i) Impulse **(3 marks)**

ii) Average force by the wall **(3 marks)**

d) A steel ball is released at the top of a tall glass cylinder containing a viscous liquid. Sketch the velocity –time graph for this motion **(2 marks)**

18) a) State the law of flotation **(1mark)**

b) A uniform glass test tube of diameter 1.62cm containing lead shots floats in water with 14.9 cm in water.

i) State the function of the lead shots **(1mark)**

ii) Calculate the total mass of tube and its contents **(4 marks)**

iii) Find the length immersed in a liquid of relative density of 1.6 **(3marks)**

C) A solid displaces $5cm^3$ of paraffin when floating and $25cm^3$ when fully immersed. Determine the density of the solid (Density of paraffin $=800kg/m^3$) **(4marks)**

19) a) A ball of mass 200g tied to a spring is being whirled in a vertical circle of radius 0.4m with uniform speed. At the lowest position, the tension in the string is 2.8N.Calculate the:

i) Uniform speed of the ball **(3marks)**

ii) Tension in the string when the ball is at the upper most position of the circular path **(3marks)**

b) A metal ball of mass 10kg is rotated horizontally by means of a rope 4m long .If its linear speed is 30m/s, find the force that will break the rope. **(3marks)**

c) A body moving with uniform speed in a circular path is accelerates. Explain **(1mark)**

20) a) State the principle of moments **(1mark)**

b) A uniform wooden lath measuring 200cm by 25cm by 15cm is suspended at the 150cm mark and balanced horizontally by hanging a mass of 14 kg at the 200cm mark. Calculate the:

i) Mass of the wooden lath **(3marks)**

ii) Density of the material of the wooden lath **(3marks)**

iii) Tension in the rope supporting the system **(3marks)**

TOP SCHOOLS PREDICTION

PHYSICS

TRIAL 10 PAPER 2

Time: 2 Hours

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INSTRUCTIONS TO CANDIDATES.

a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*

b) ***Sign** and write **date** of examination in the spaces provided.*

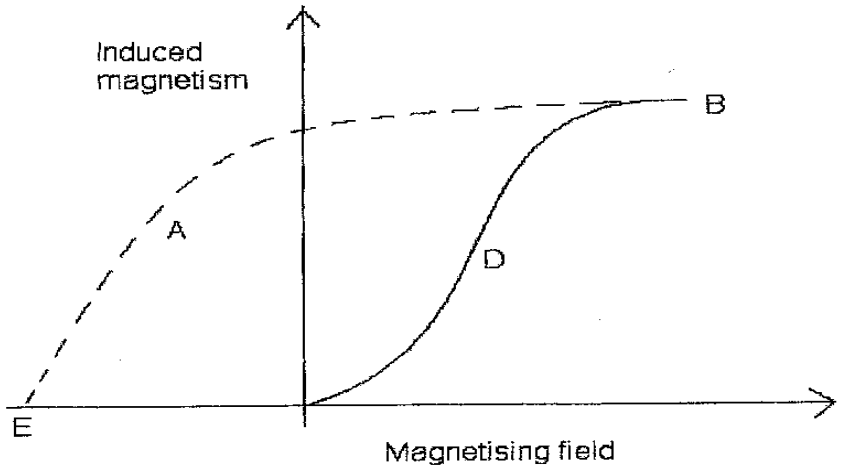
c) *This paper consists of **two** Sections **A** and **B**. Answer **all** the questions in sections **A** and **B.***

QUESTIONS

SECTION A (25 MARKS)

1. Name one source and use of infrared radiation **(2mks)**

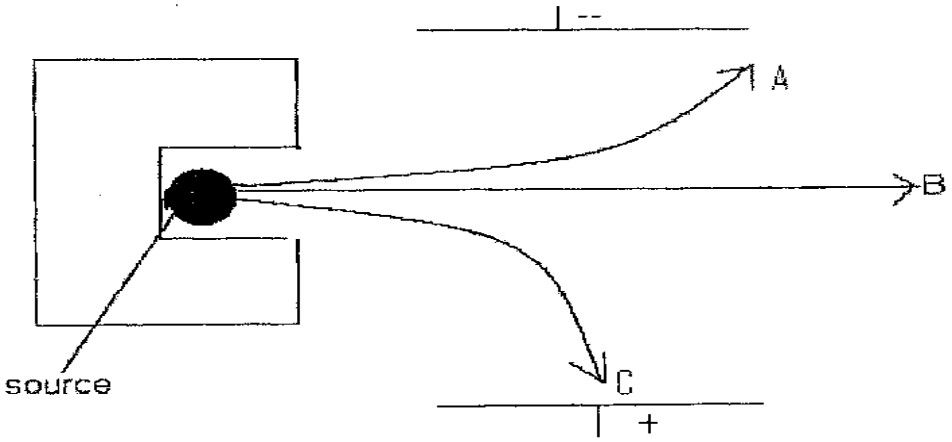
2. The figure below shows curves obtained with a magnetic material



State what curves A and B represent **(2mks)**

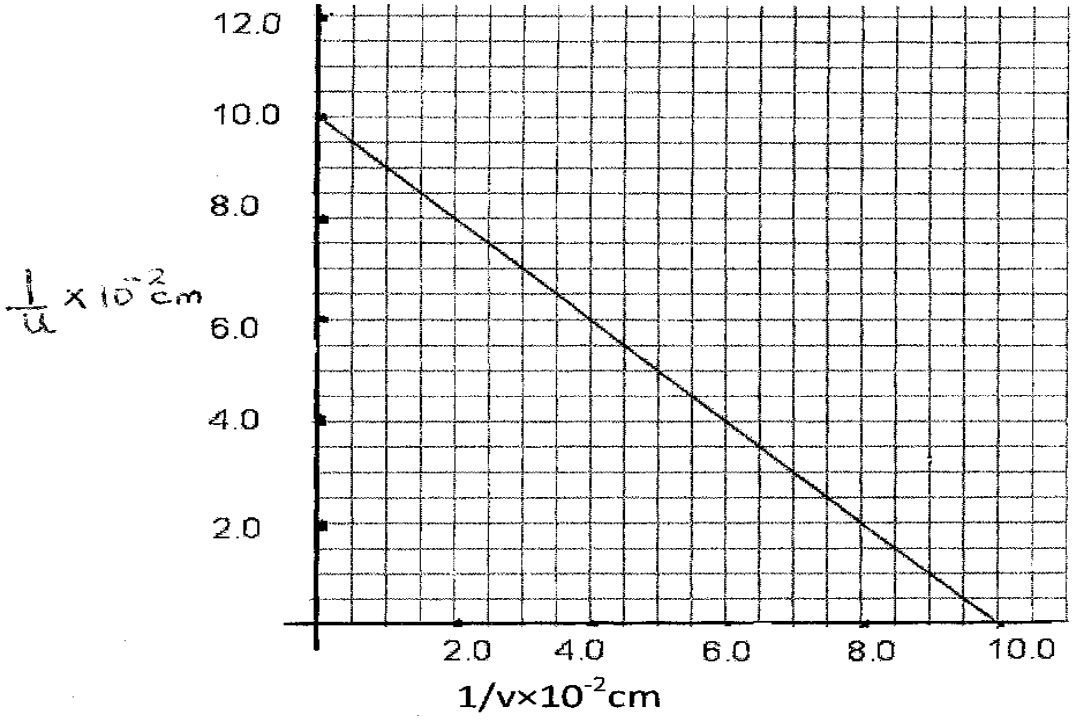
3. State the importance of ear thing in domestic wiring **(1mk)**

4. The figure below shows the three nuclear radiation labeled A, B, and C under the influence of an electric field.



Identify the radiation A, B and C (3mks)

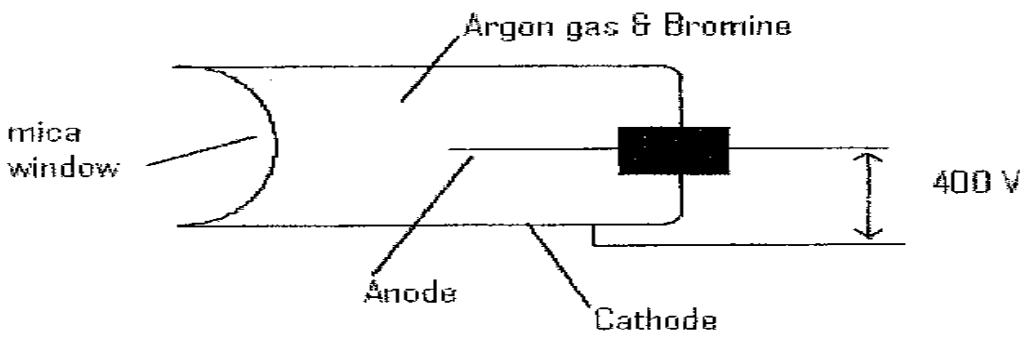
5. In an experiment with a convex lens, image distances were measured when an object was placed at various distances away from the lens. The figure below shows a graph of 1/v against 1/u for the experiment where u is the object and v is the image distance.



Use the graph to find the focal length f of the lens **(3mks)**

6. A student synchronizes his watch with a church bell 2km away. The following morning, there is a wind. He notes that the church bell sounded 0.15s later. Assuming his watch is correct and bell was sounded at the usual time. Determine the direction of the wind and its speed. (Assuming the speed of sound in still air is 340ms $^{-1}$) **(3mks)**

7. The figure below shows a GM tube

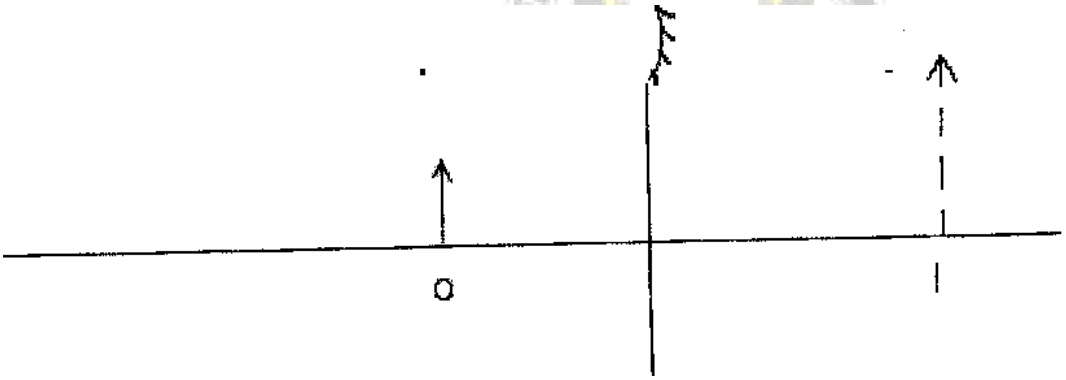


i) Give a reason why the mica window is made thin **(1mk)**

ii) The tube has got a small amount of bromine. State the purpose of the bromine in the tube **(1mk)**

Study the ray diagram below and use it to answer question 8 & 9

8. Complete the diagram by drawing the correct rays on it **(1mk)**



9. Use your drawing to determine the focal length f of the mirror **(2mks)**

10. A 5V ac signal with a frequency of 50Hz is applied across the y-plates. The y-gain and time base setting is 2.5V/cm and 10Ms/cm respectively. Use the information above to sketch a wave form as seen on CRO screen **(3mks)**

11. State Faraday's law of electromagnetic induction (1mk)

12. State three points to observe in maintaining a lead-acid battery (3mks)

SECTION B(55 MARKS)

13. a) State three factors affecting the capacitance or a parallel plate capacitor (3mks)

b) You are provided with the following apparatus

-uncharged capacitor
-Voltmeter
-Milliammeter
-12v battery

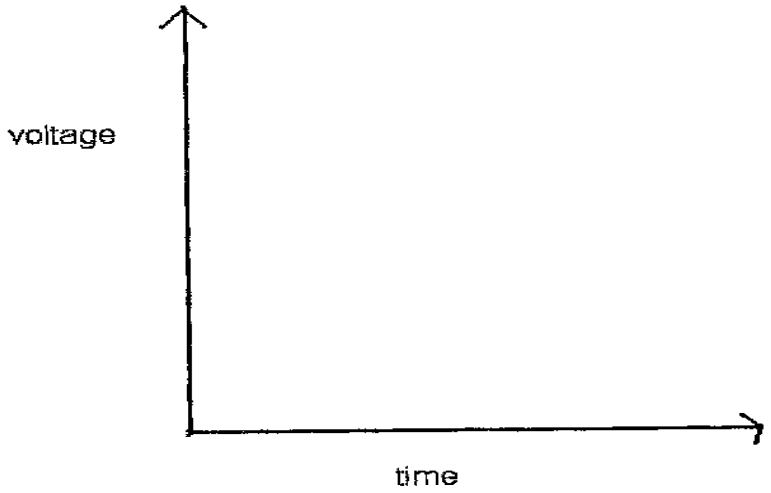
-A load resistor

-Two way switch

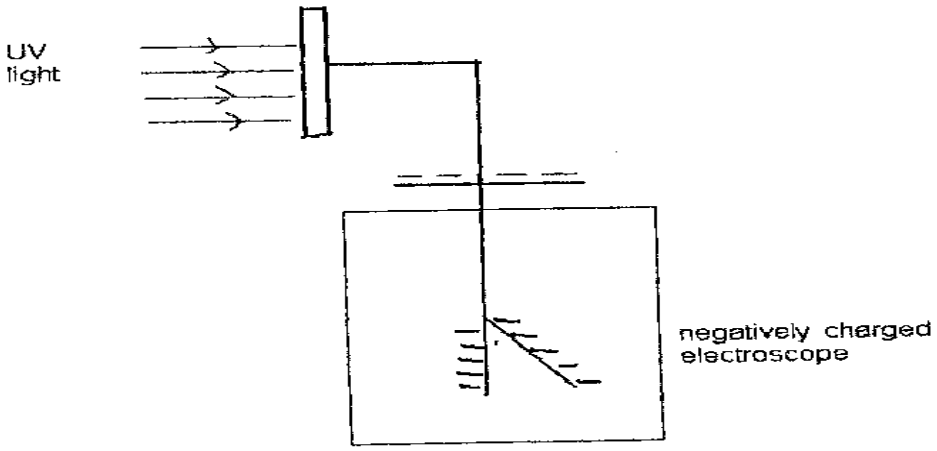
i) Using the above apparatus draw a circuit diagram that can be used to study the charging and discharging the capacitor. **(3mks)**

ii) Use the diagram in b(i) to describe how a fully charged capacitor is discharged **(2mks)**

iii) On the axis provided sketch a voltage –time graph of discharging of capacitor **(1mk)**



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



Explain what happens to the charged electroscope **(2mks)**

14. a) With the aid of a well labeled diagram, explain how lunar eclipse occurs. **(4mk)**

b) Explain why large convex mirrors are placed at certain points in supermarket **(2mks)**

c) An object 2.5 m tall is at a point 8m from a pinhole camera. If the distance of the screen is 8.16m from the object, calculate the size of the image **(3mks)**

d) i) Draw a diagram to show how prisms are used in a periscope **(2mks)**

ii) Calculate the critical angle of a ray of light passing from glass to water, if their refractive indices are $^{2}/_{3}$ and $^{4}/_{3}$ respectively. **(3mks)**

15. a) State the Ohms' law **(1mk)**

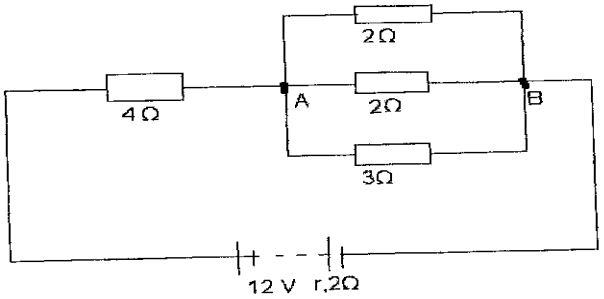
b) Three resistors x,y and z where x = 200 Ω, y = 100 Ω and z is unknown resistance are connected in parallel. This arrangement is then placed in a circuit and current passing through, and potential difference across its measured the table below shows the result.

p.d(v)	2.0	4.0	6.0	8.0	10.0	12.0
Current(l) (A)	0.10	0.20	0.30	0.40	0.50	0.60

i) Plot a graph of p.d against current **(4mks)**

ii) Use your graph to calculate the value of unknown resistance. **(4mks)**

c) Four resistors are connected in a circuit as shown in the diagram below



Calculate the p.d across AB. **(3mks)**

16. a) Distinguish between diffraction and refraction of waves **(1mk)**

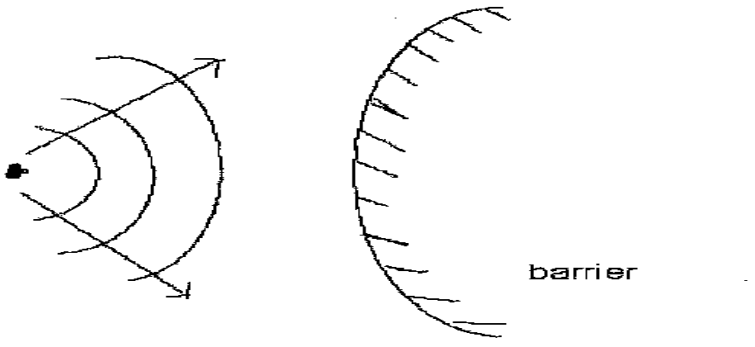
b) Explain clearly how the following affect light intensity in the young's double slit experiment

i) Separation of the slits **(2mks)**

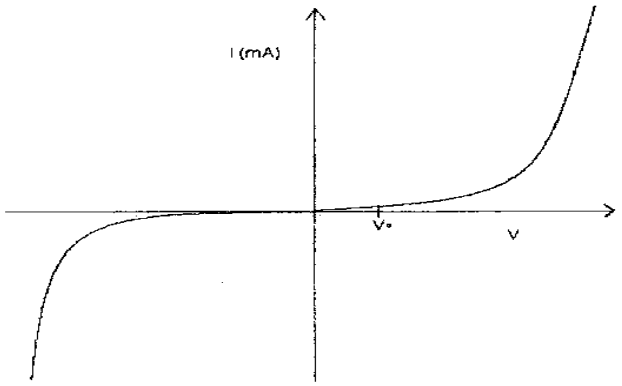
ii) Width of the slits **(2mks)**

iii) Frequency of incident light **(2mks)**

c) The figure below shows circular wave fronts approaching a convex barrier. Complete the figure to show what happens to the wave fronts after reflection on the barrier. **(2mks)**



17. The figure below shows current-voltage characteristics of a junction diode.

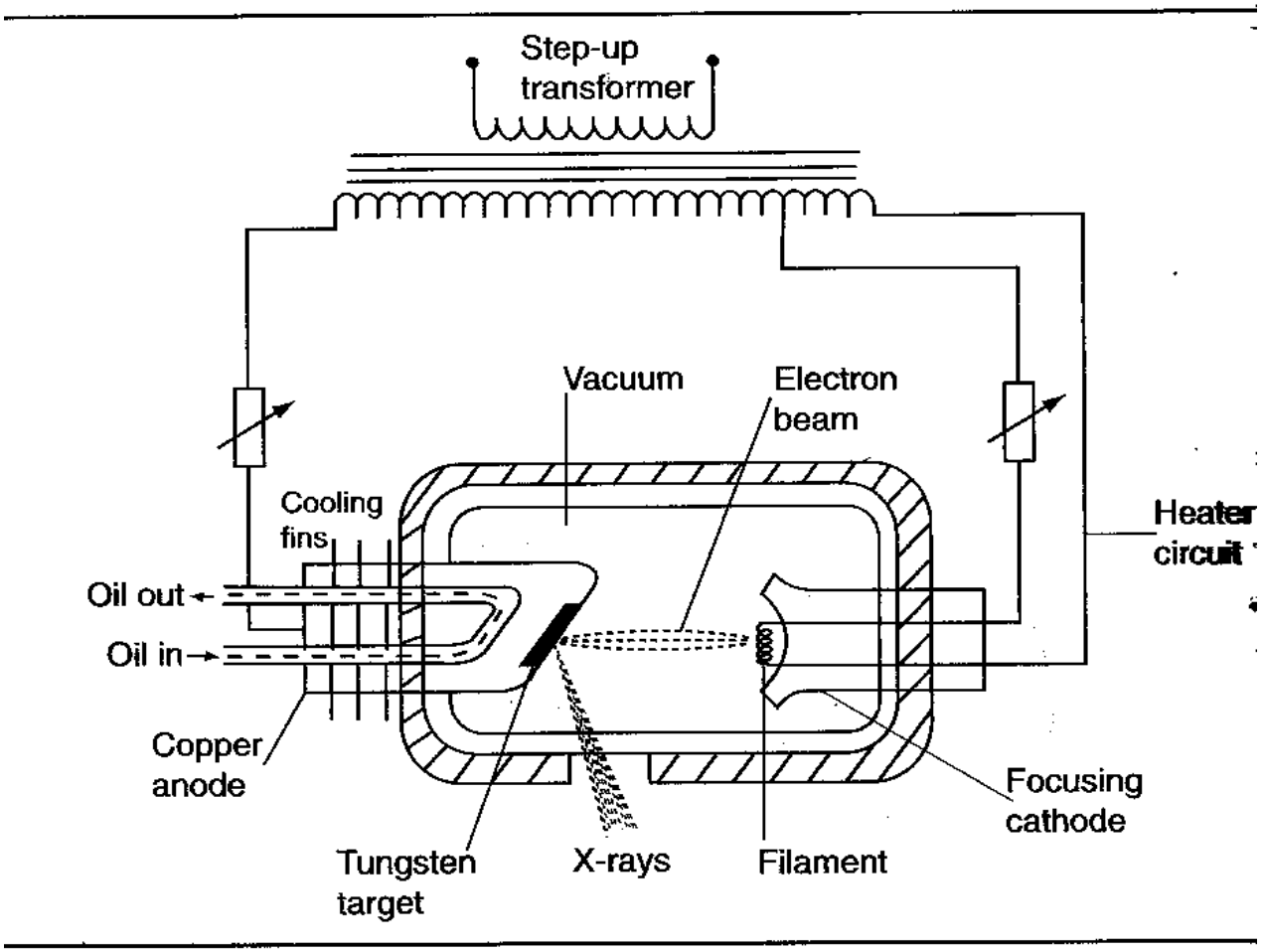


a) In the forward bios, the diode does not conduct until a certain minimal voltage is reached. Explain the effect **(2mks)**

b) Where the voltage is increased in reverse bias, the diode conducts when a certain voltage is reached. What is the name given to this voltage **(1mk)**

c) i) List two properties of x-rays **(2mks)**

ii) The figure shows a simplified illustration of an x-ray tube



Explain the following features in an x-ray tube

Low pressure **(1 mk)**

Lead shield **(1 mk)**

iii) Explain the adjustment that can be made to obtain hard x-rays **(2mks)**

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