KCSE FINAL PREDICTION

PHYSICS

(KCSE PREDICTIONS 1-10)

An Exclusive Top-Notch KCSE Model Prediction Questions.

A special preview of Possible Expected sample KCSE Questions Most likely to be Tested in the Forthcoming KNEC examinations.

SERIES 1

Proudly prepared by an Exceptional team of Experienced Veteran KNEC examiners within the National Group of Mwalimu Agency.

For Marking Schemes/Answers

0746 222 000

MWALIMU AGENCY

KCSE FINAL PREDICTION

PHYSICS

TRIAL 1 PAPER 1

TIME: 2 HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

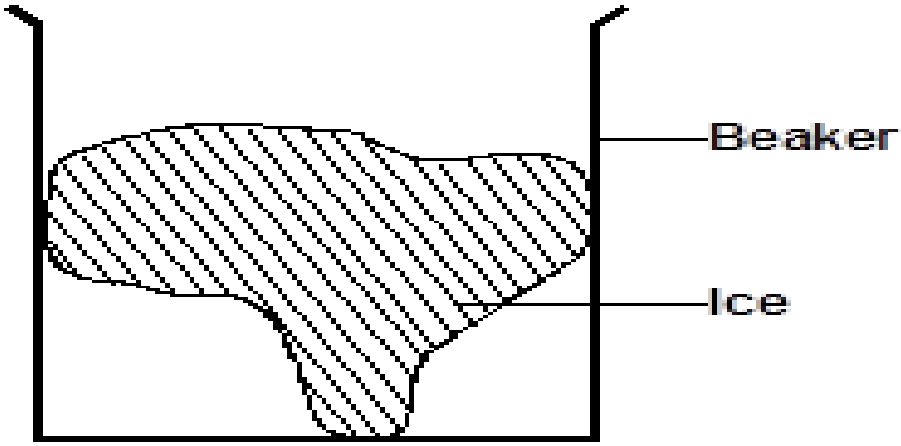
DATE……

SECTION A: 25 MARKS

1.The figure below shows part of micrometer screw gauge with 50 divisions on the thimble scale. Complete the diagram to show a reading of 5.73mm. **(2 marks)**

2. A bottle containing a smelling gas is opened at the front bench of a classroom. State the reason why the gas is detected throughout the room. **(1 mark)**

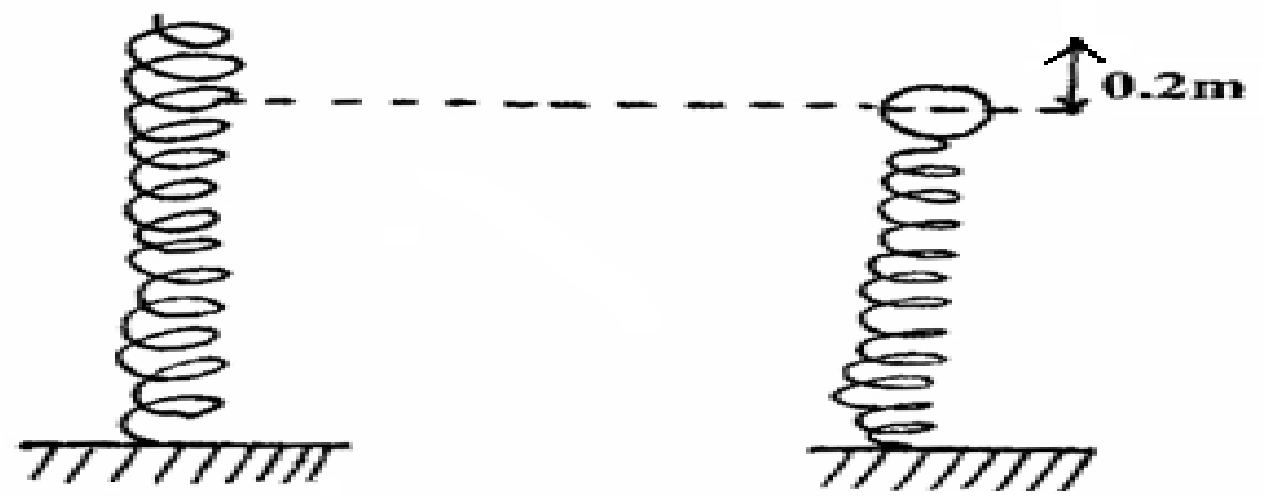
3.The figure below shows beaker containing a block of ice.



State and explain the change in stability when the ice melts. **(2marks)**

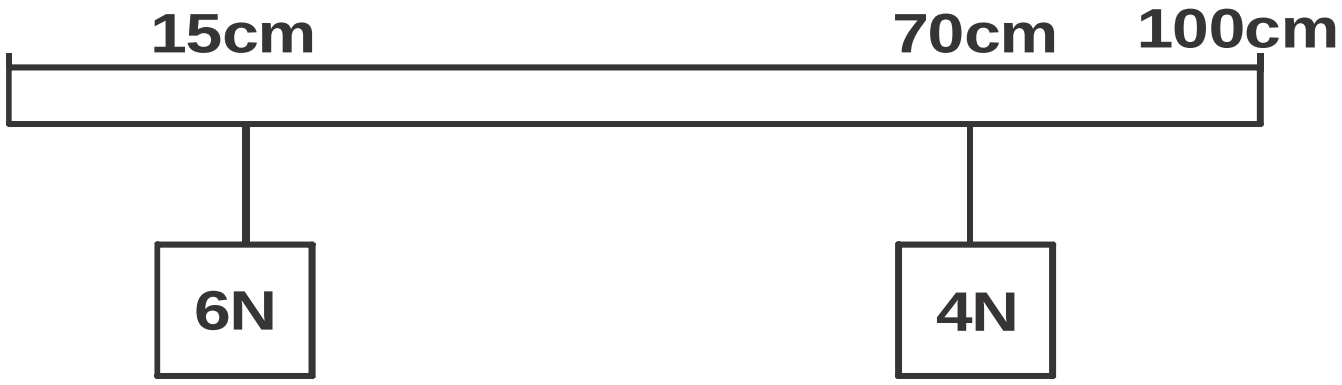
4. An aero plane is moving horizontally through still air at a uniform speed. It is observed that when the speed of the plane is increased, its height above the ground increases. State the reason for this observation. **(2 marks)**

5. A steel ball of mass 0.05kg was placed on top of a spring on a level ground. The spring was then compressed through a distance of 0.2m.



If the spring constant is 15N/m. Calculate the maximum height reached when the spring is released. **(3marks)**

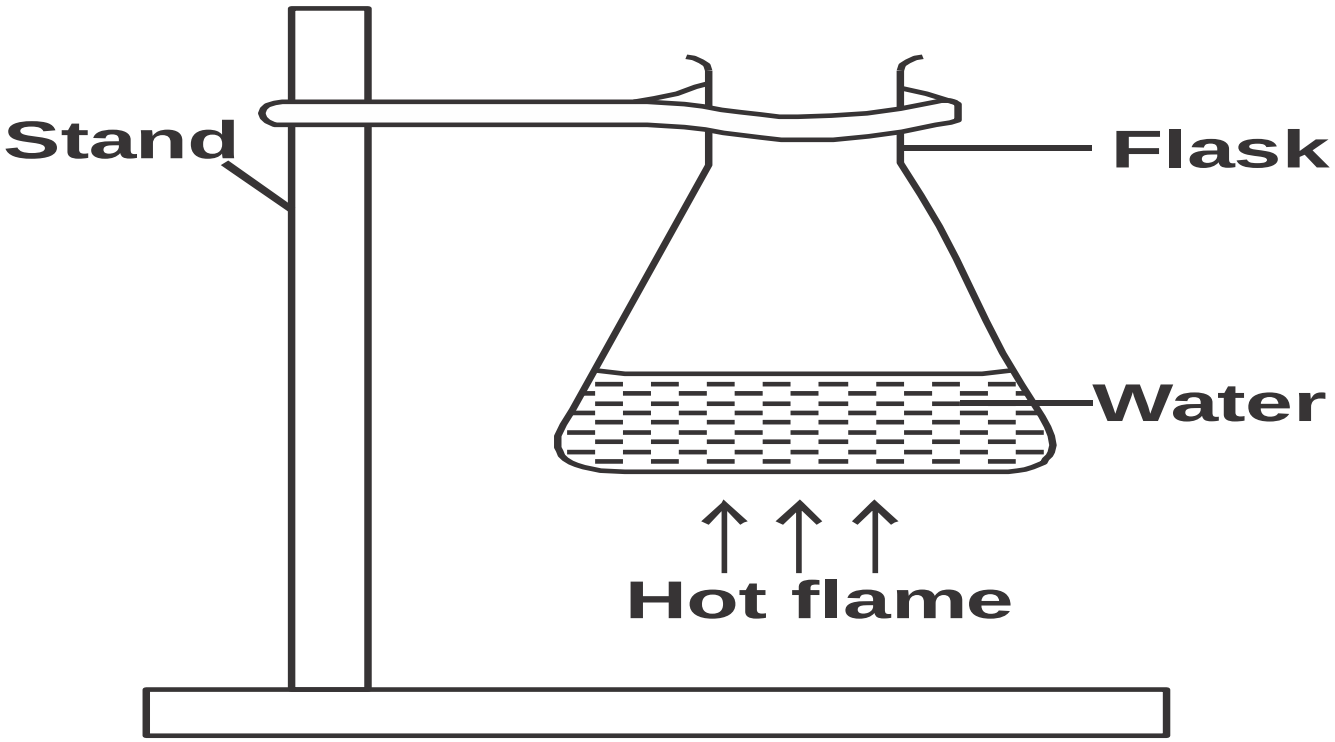
6. The figure below shows a uniform metre rule of weight 3N supporting two weights. The metre rule is pivoted somewhere such that it is horizontally balanced. (Pivot not shown)



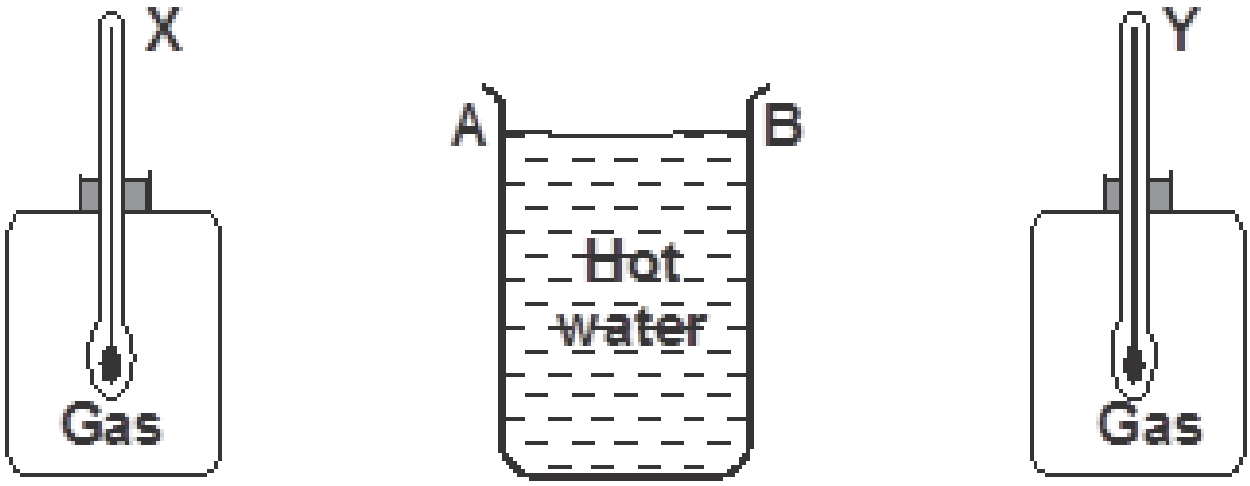
The 6N weight is at 15cm mark while the 4N weight is at 70cm mark. Determine the position of the pivot from zero cm mark. **(3 marks)**

7. State one environmental hazard that may occur when oil spills over a large surface area of the sea. **(1mk)**

8. The figure shows a flat bottomed flask containing some water. It is heated directly with a very hot flame. Explain why the flask is likely to crack. **(2marks)**



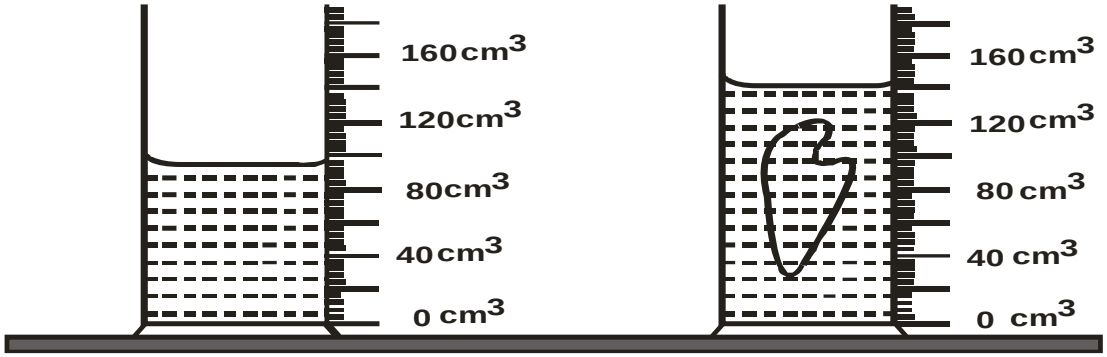
9. The figure below shows a cylindrical container having hot water at 95°C. End A is shiny while end B is dull black. At equal distances from the container is placed two identical gas jars fitted with thermometers X and Y.



Compare the readings of the two thermometers after two minutes **(1 mark)**

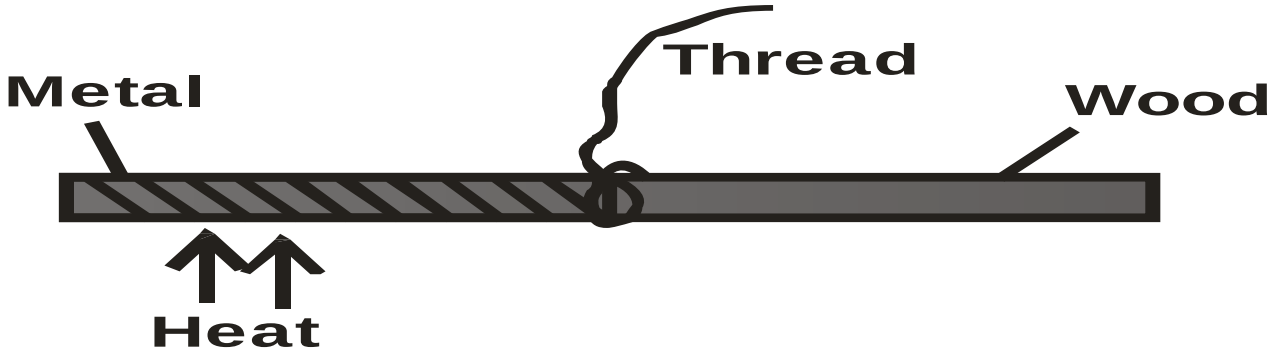
Give a reason for your answer in **question 9** above **(1 mark)**

11. The figure below shows the change in volume of water in a measuring cylinder when an irregular solid is immersed in it.



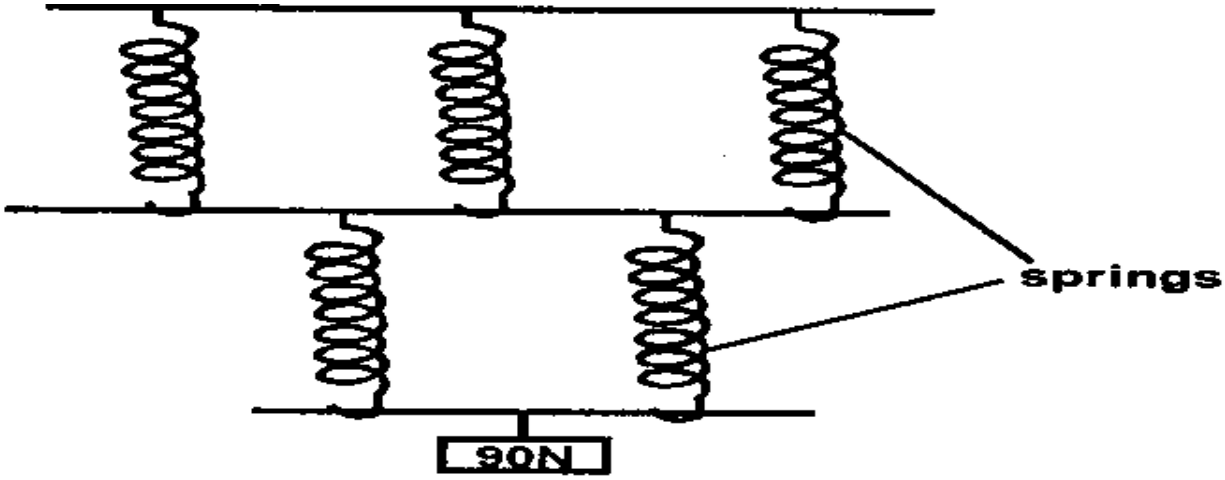
Given that the mass of the solid is 268g, determine the density of the solid in SI units.**3 mk**

12. The following figure shows a rod made of wood on one end and metal on the other end suspended freely with a piece of thread so that it is in equilibrium.



The side made of metal is now heated with a Bunsen flame. State with a reason, the side to which the rod is likely to tilt **(2 marks)**

13. The spiral springs shown in the figure below are identical. Each spring has a spring constant, *k = 300N/m*

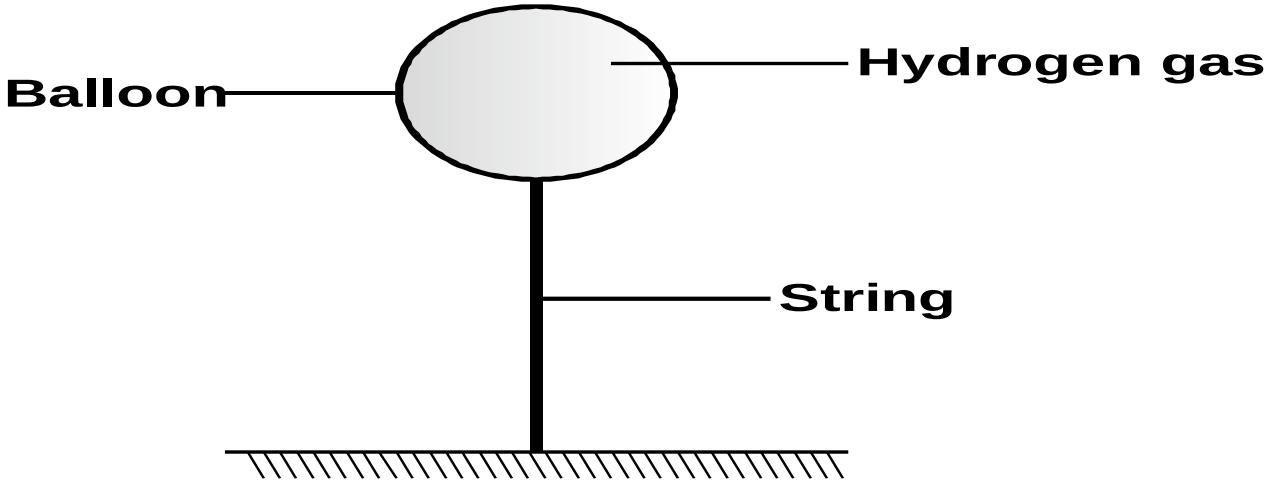


Determine the total extension of the system. (Take the weight of the cross bars to be negligible) **(2 marks)**

SECTION B: 55MARKS

14. (a) State the Archimedes principle. **(1 mark)**

b) A rubber envelope of a hydrogen filled balloon having volume of $2m^3$ is held in position by a vertical string as shown below.



The mass of the balloon is 1.3kg. Given that density of hydrogen is $0.1kg/m^3$ density of air is $1.3kg/m^3$. **Calculate;**

(i) the total weight of the balloon including the hydrogen gas. **(2 marks)**

(ii) the up thrust. **(2 marks)**

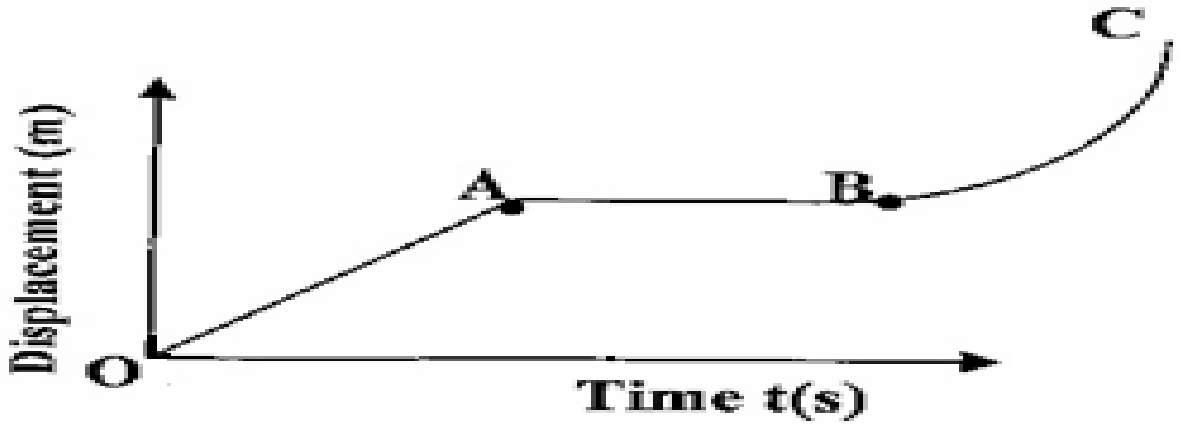
(iii) the tension in the string. **(2 marks)**

(c) A solid weighs 50N in air and 44N when complete immersed in water. Calculate

i) Relative density of the solid. **(2 marks)**

(ii) Density of the solid. **(2 marks)**

15.a) The figure below shows a displacement-time graph of the motion of a particle.



Describe the motion of the particle in the region. **(3marks)**

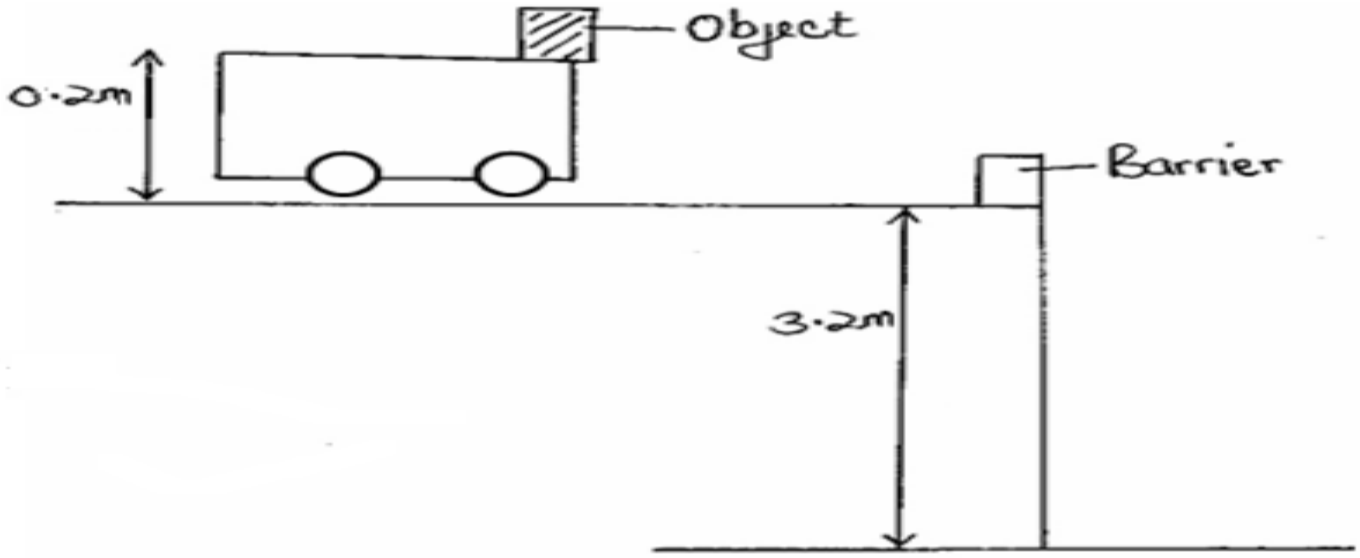
OA……

AB……

BC……

(b) State the Newton's first law of motion. **(1 mark)**

c) The figure below shows a trolley moving towards a barrier at a constant velocity of 20m/s. Use this information to answer the questions that follows.



i) Sketch the path followed by the object after the impact **(1mark)**

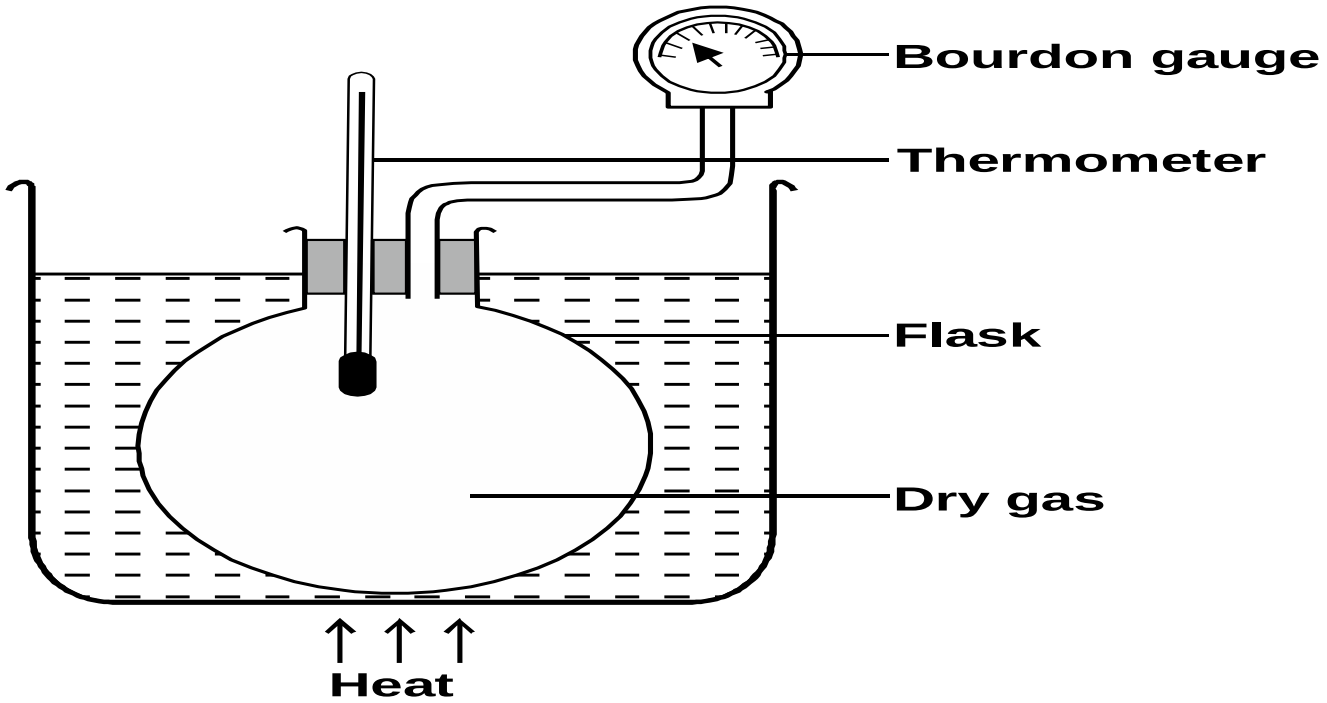
ii) Give a reason why the object on the trolley flies off on impact. **(1 mark)**

iii) Determine the time taken by the object to reach the ground. **(2 marks)**

iv) Determine the horizontal distance covered by the object from the point of impact to the point where it reached the ground. **(2 marks)**

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

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

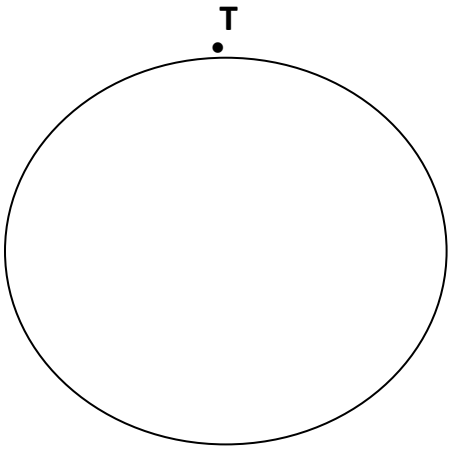


Describe briefly how the set-up can be used to verify pressure law. **(4 marks)**

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

17(a) One of the factors that affect the centripetal force is the mass of the body.State another factor. **(1mark)**

(b) A mass of 400g is rotated by a string at a constant speed V in a vertical circle of radius 100cm. The tension in the string is 9.2N which is experienced at point T.

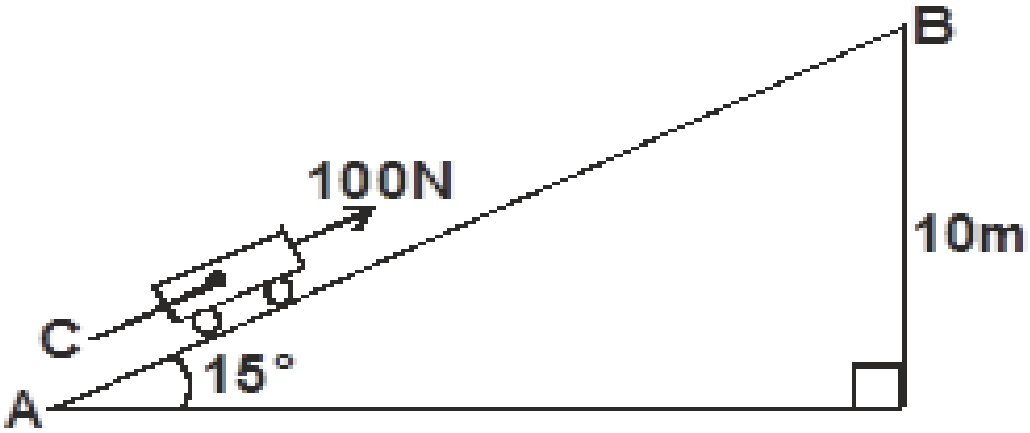


i) Determine the velocity V of the mass at point T. **(3marks)**

ii) Determine the tension in the string at the bottom of the circle. **(2marks)**

c) State two applications of circular motion **(2marks)**

18. 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.



a) What is the work done on the trolley against the gravitational force in moving from A to B? **(2marks)**

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

c) Determine the efficiency of the system. **(3 marks)**

d) Determine the mechanical advantage of the system. **(3 marks)**

19. a) Explain why it is advisable to use a pressure cooker for cooking at high altitudes. **(1 mark)**

b) A block of metal of mass 150g at 100°C is dropped into a lagged calorimeter of heat capacity 40J/K containing 100g of water at 25°C. The temperature of the mixture is 34°C. (specific heat capacity of water = 4200J/kg/K).

Determine:

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

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

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

KCSE FINAL PREDICTION

PHYSICS

TRIAL 1 PAPER 2

TIME: 2 HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

SECTION A: 25 MARKS

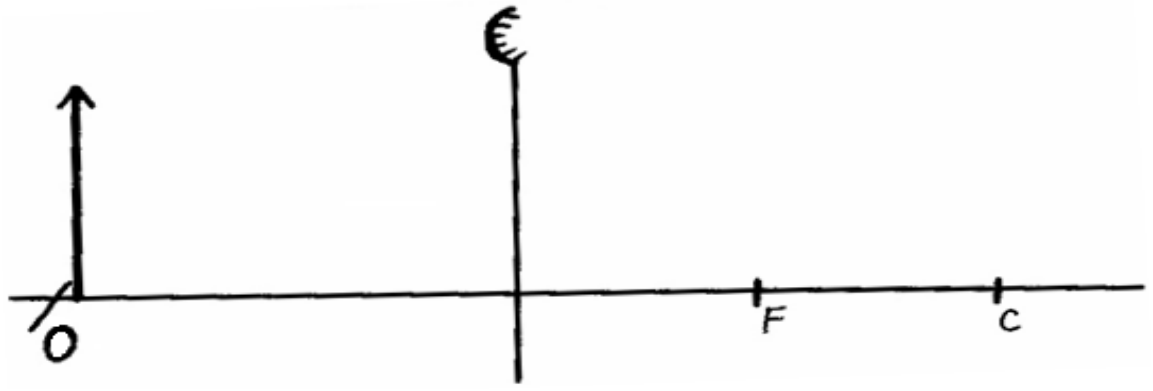
1. The chart below shows an arrangement of different parts of the electromagnetic spectrum.

Radio wave	A	Infrared rays	B	Ultra-violet	χ-Rays

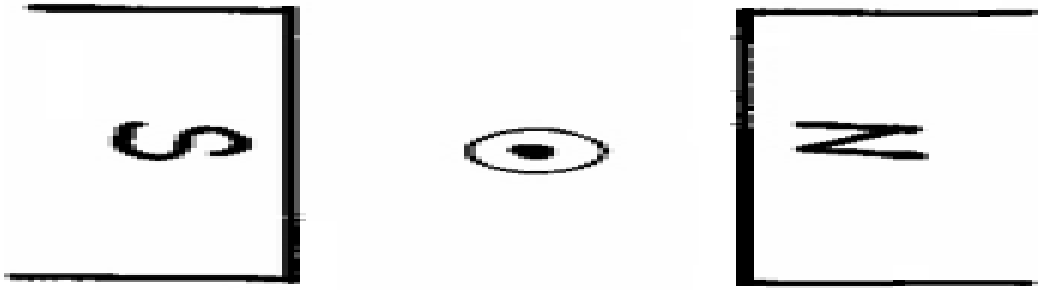
Name the radiation represented by **A** **(1mark)**

State one use of radiation represented by **B** **(1mark)**

2. An object O is placed in front of convex mirror as shown in the diagram below. Complete the diagram to locate the position of the image, 1. **(3 marks)**



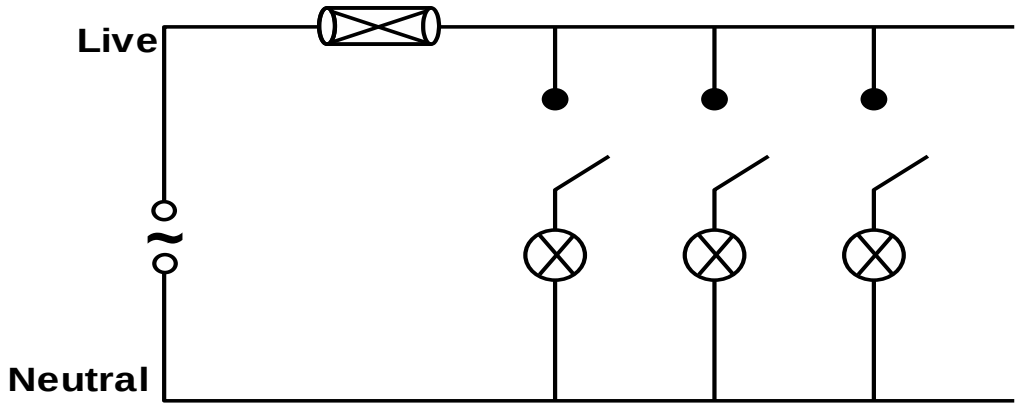
3. The figure below shows a wire carrying current whose direction is out of the paper. The wire is placed in a magnetic field.



(a) Indicate on the figure the direction of the force F, acting on the wire. **(1 mark)**

(b) State what would be observed on the wire if the direction of the current is reversed. **(1 mark)**

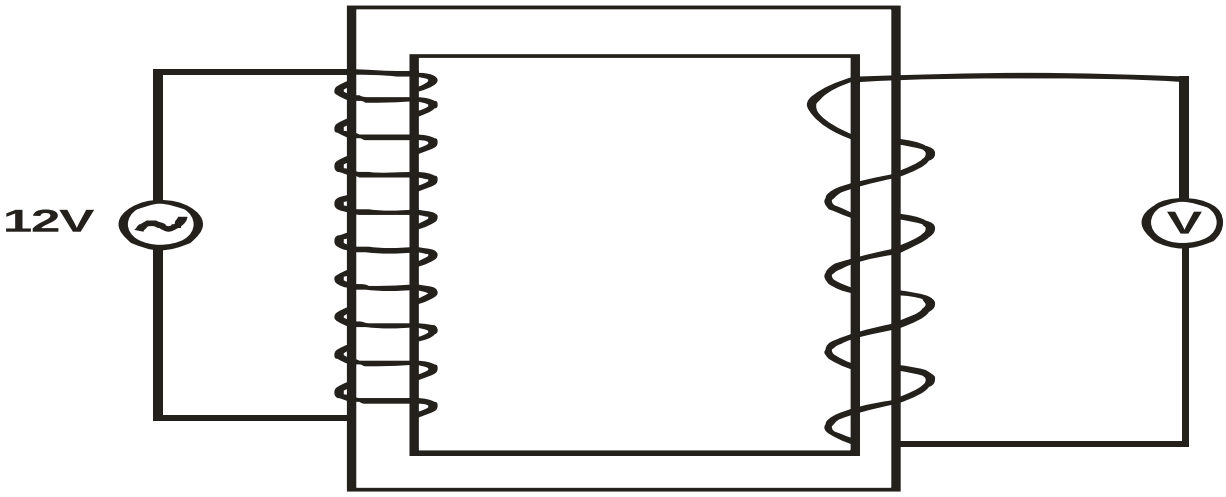
4. The figure below shows part of the lighting circuit of a house.



i) Give a reason why a fuse is included in the circuit. **(1 mark)**

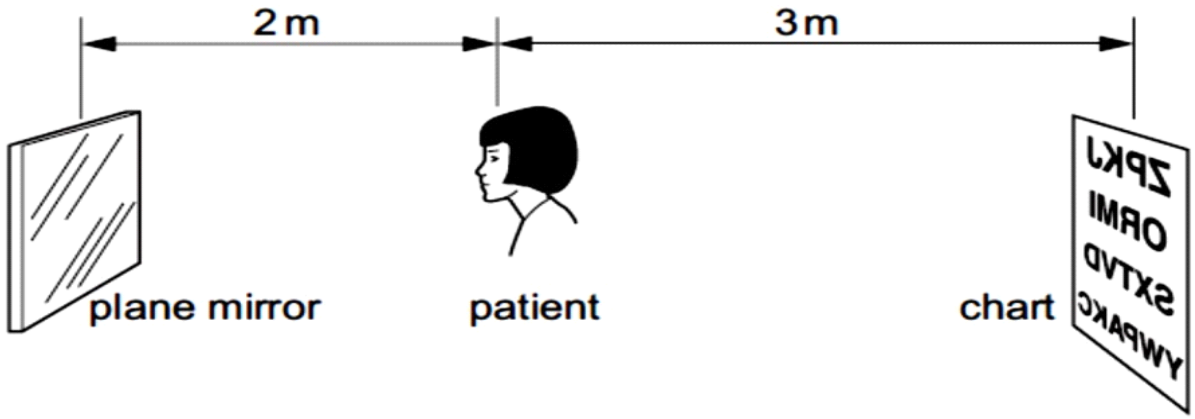
ii) If each lamp has a power of 60W at voltage of 240V. Calculate the current through one lamp when it is switched on. **(2 marks)**

5. Figure 5 below shows a simple transformer connected to a 12v a.c source and an a.c voltmeter.



Determine the reading on the voltmeter. **(2 marks)**

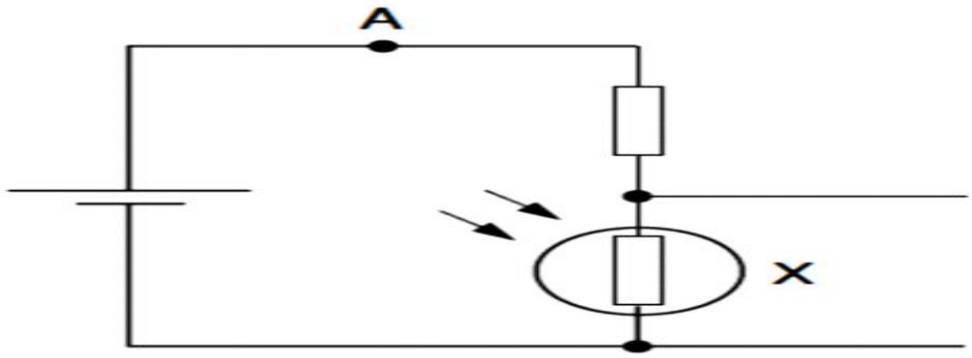
6. The diagram shows a patient having her eyes tested. A chart with letters on it is placed behind her and she sees the chart reflected in a plane mirror.



Determine how far away from the patient, the image of the chart is seen. **(2 marks)**

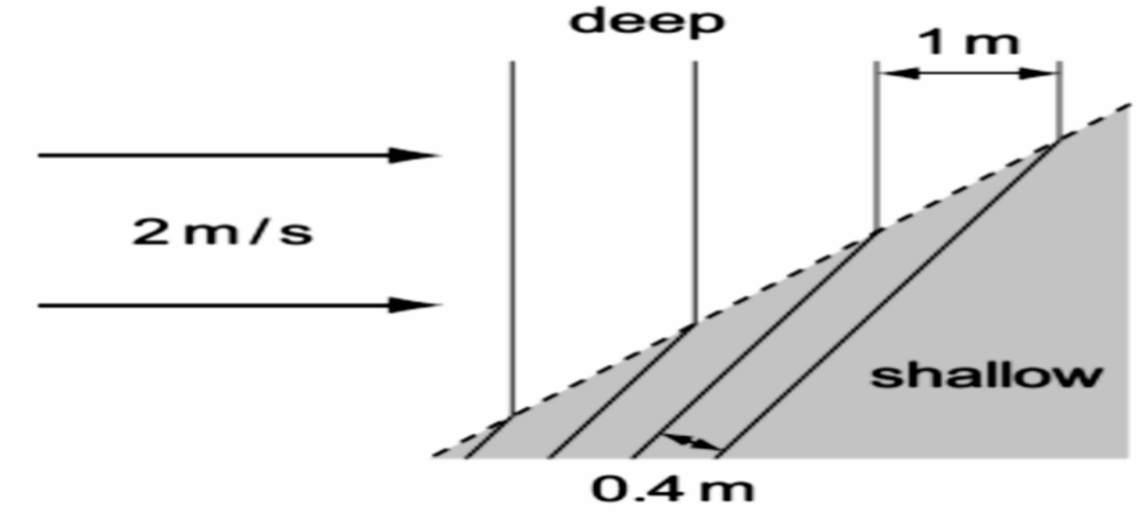
7. State Snell's law. **(1 mark)**

8. The figure below shows an electric circuit.



State and explain how the potential difference across X varies as the light shining on it becomes brighter. **(2marks)**

9. Waves pass from deep water to shallow water and refraction occurs.



Calculate the speed of the waves in the shallow water **(2 marks)**

10. The diagram below shows a ray of light striking the plane at 35° as shown below. State the angle of reflection. **(1 mark)**

11. The figure below shows an iron bar being magnetized by stroking it with a magnet.

Indicate on the iron bar the polarity of resulting magnet. **(1 mark)**

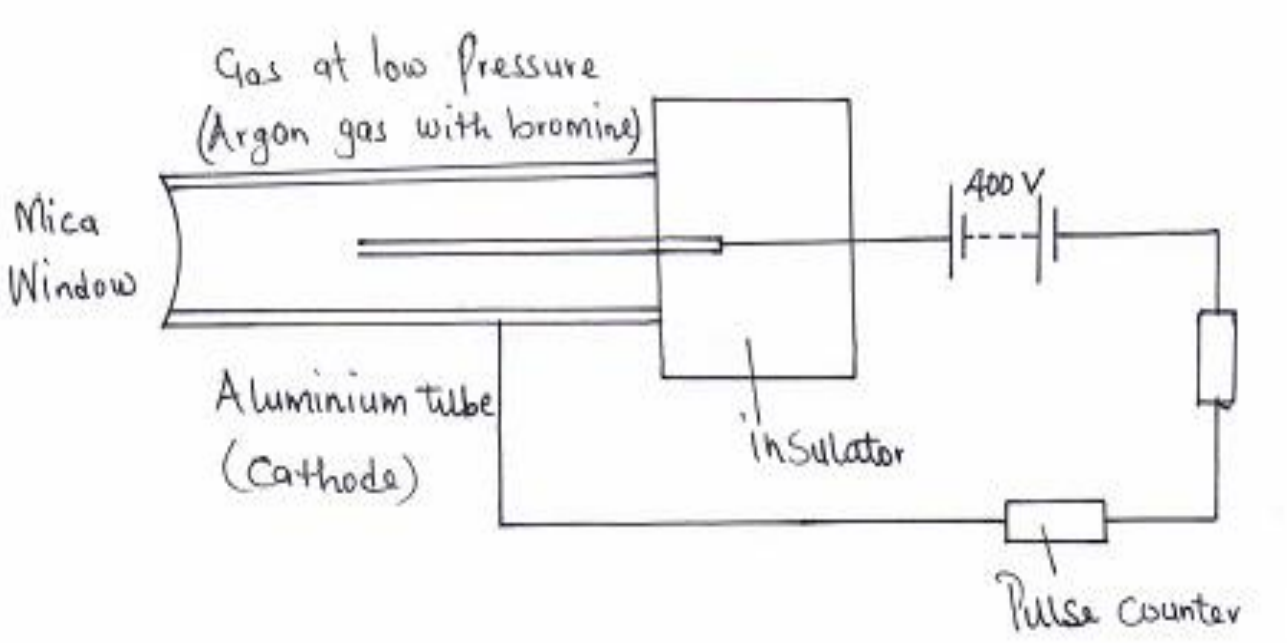
12. An echo sounder of a ship transmits sound waves to the depth of the sea and receives the echo after 2.4 seconds. If the speed of sound in water is $1600ms^{-1}$, determine the depth of the sea. **(3 marks)**

13. It is observed that when a charged body is brought near the cup of a positively charged electroscope, the divergence of the leaf increases. State the type of charge on the body.

(1mark

SECTION B (55 marks)

14. (a) The figure below shows a diagram of a Geiger Muller tube connected to a power supply and a pulse counter.



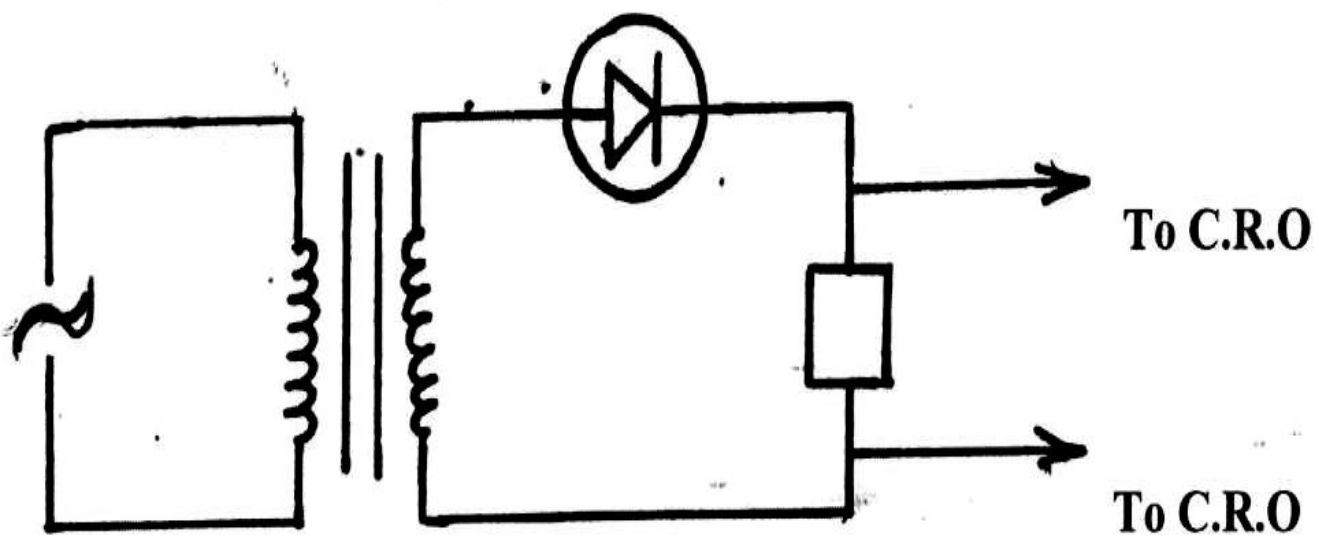
(i) Why should the argon gas be at low pressure? **(1mark)**

(ii) State the purpose of the bromine gas in the tube. **(1mark)**

(iii) Suggest one way of increasing the sensitivity of the tube **(1mark)**

(iv) Find the value of a and b in the following equation. **(2marks)**

b) The figure below shows a PN junction diode used in a rectifier.

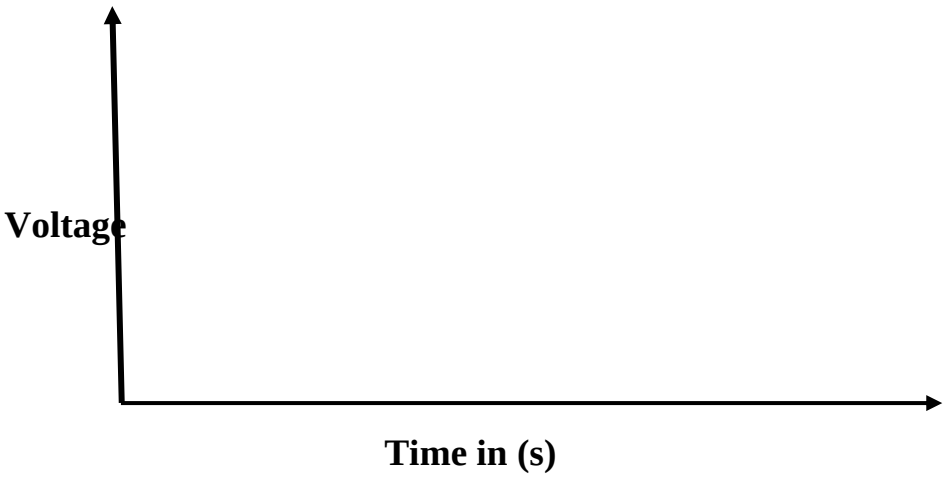


i)) What is an extrinsic semi conductor? **(1mark)**

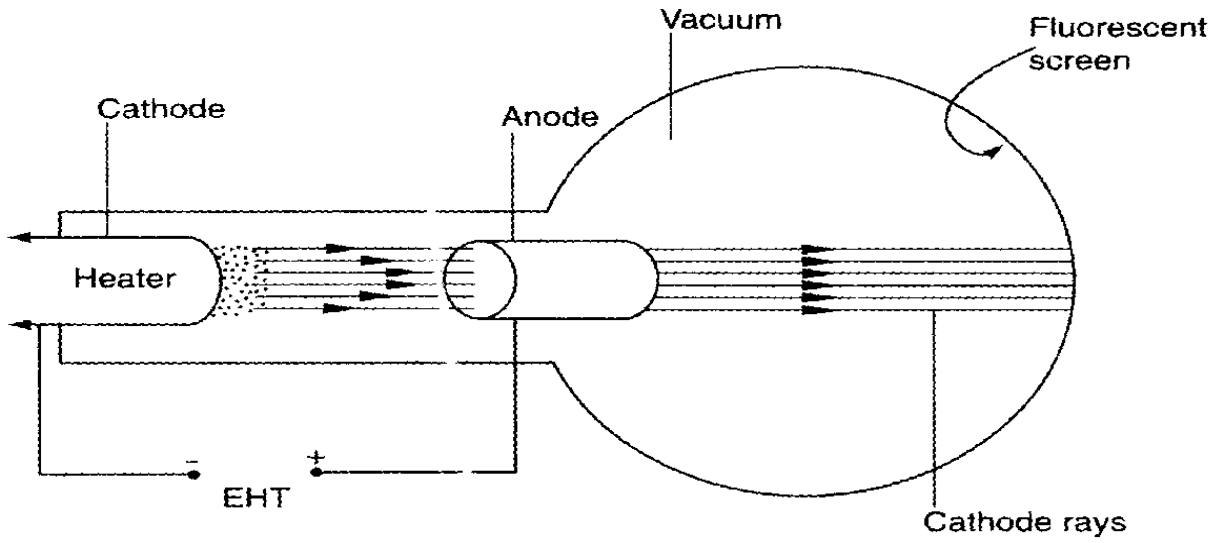
0ii) What type of rectification is shown? **(1mark)**

iii) Describe how the rectification is achieved **(2marks)**

iv) In the space provided below, sketch the output signal displayed on the CRO during the rectification process. **(2marks)**



15. The figure below shows a cathode ray tube



a) State the function of the

i) Heater **(1mark)**

ii) Extra High Tension (E.H.T.) **(1 mark)**

b) State how the intensity of the fluorescence on the screen can be increased. **(1 mark)**

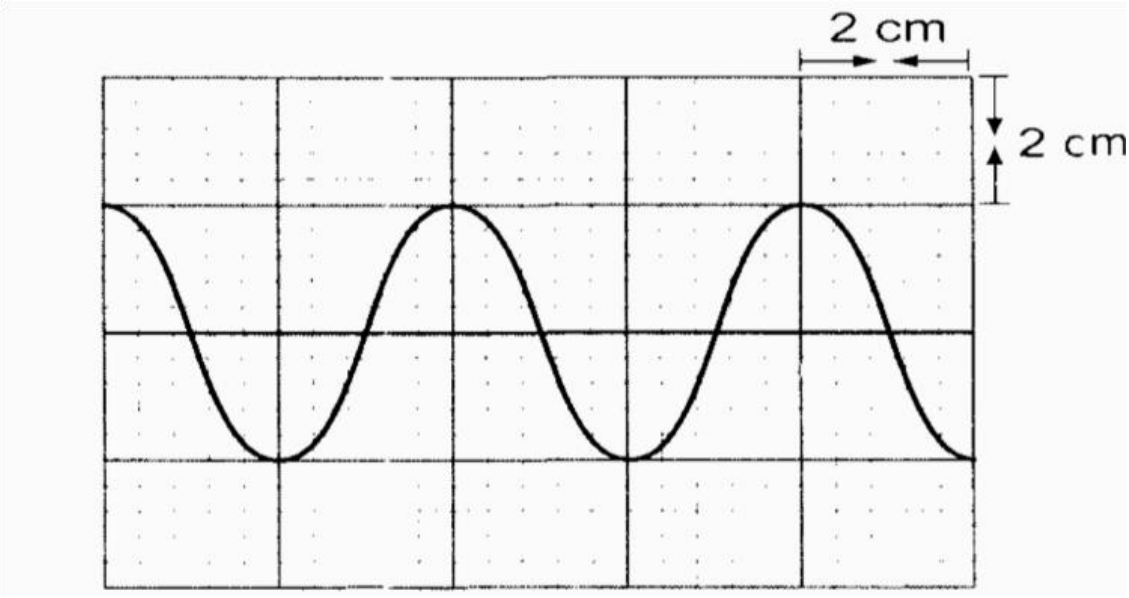
c) State the effect of having air in the tube instead of a vacuum **(1 mark)**

d) State one properties of cathode rays **(1 mark)**

e) Distinguish cathode rays and X-rays **(1 mark)**

f) Give one advantages of using a C.R.O instead of a voltmeter in measuring voltages **(1 mk)**

g) The figure below shows an a.c. voltage. If the Y-gain control reads 10V/cm and the time base reads 5 milliseconds/cm



Calculate:

i) The frequency of the alternating voltage **(2 marks)**

ii) Peak to peak voltage of the alternating voltage **(2 marks)**

16 (a)(i) It is observed that when ultra- violet radiation is directed onto a clean zinc plate connected to the cap of a negatively charged leaf electroscope, the leaf falls .Explain this observation **(2 marks)**

(ii) State why this observation does not occur if the electroscope is positively charged **(1 mark)**

(iii) ,Explain why the leaf of the electroscope does not fall when infra- red radiation is directed onto the zinc plate **(1 mark)**

b)State the effect on the electrons emitted by the photoelectric effect when:

(i) The intensity of incident radiation is increased **(1 mark)**

(ii) The frequency of the incident radiation is increased **(1 mark)**

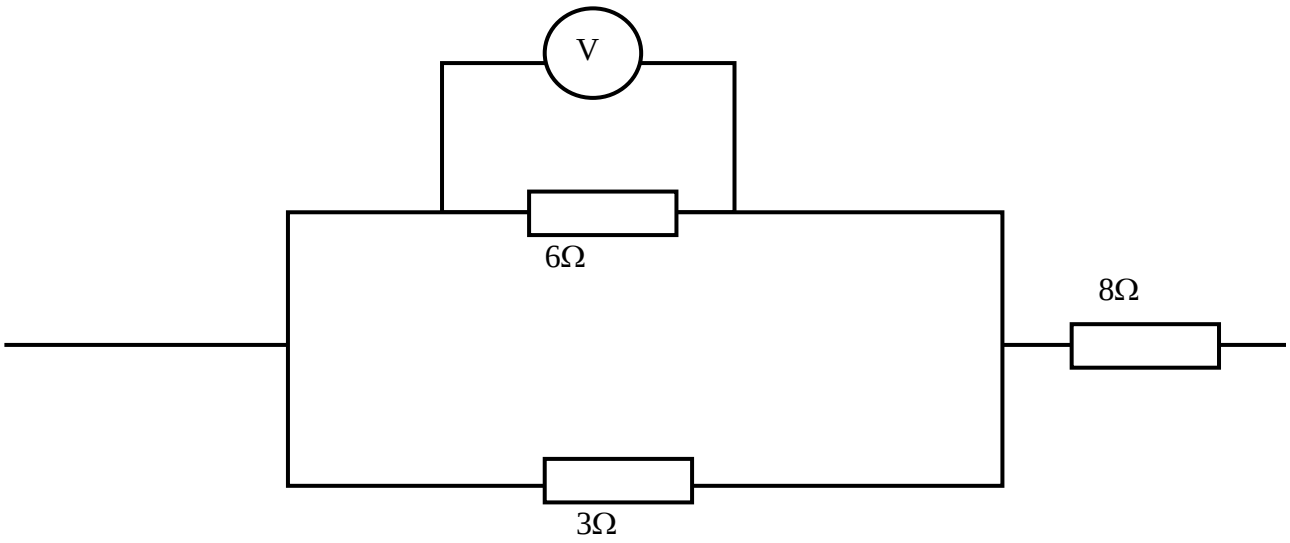
c) Light of wavelength 4.3×10^{-7}m is incident on two different metal surfaces, nickel and potassium. (Take speed of light as 3.0×10^{8} ms^{-1} and planks constant h as $6.63 \times l0^{-34}$Js).

(i) Determine the energy of the incident radiation. **(3 marks)**

(ii) If the work function of nickel is 8.0×10^{-19}J and that of potassium is 3.68×10^{-19}J, state with a reason from which of the two metals the given light will eject electrons. **(2 marks)**

(iii) Determine the velocity of the emitted electrons from the metal surface in **b(ii).** (Take the mass of an electron as 9.1×10^{-31} kg). **(2 marks)**

17(a) The figure below shows three resistors as shown.



If the voltmeter reads 4V, find the

(i) Effective resistance **(3marks)**

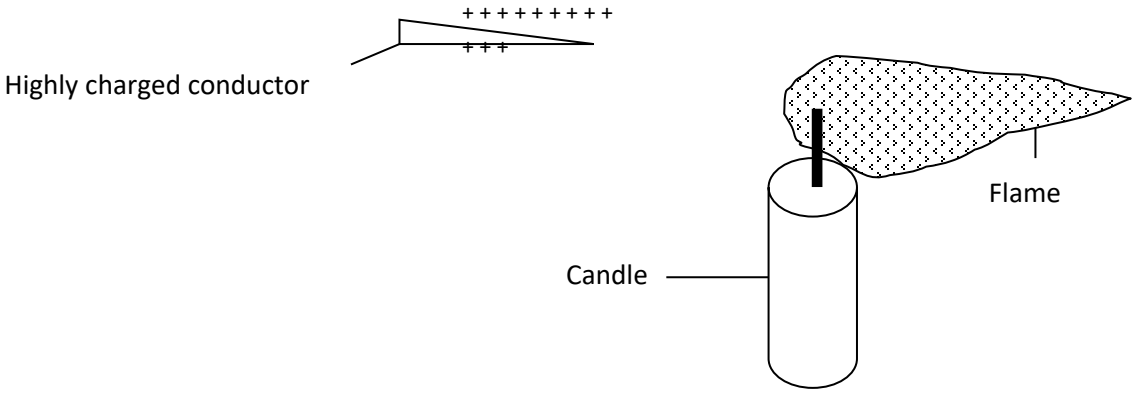
(ii) Current through the 3Ω resistor **(2marks)**

(iii) Potential difference across the 8Ω resistor if the voltage total voltage in the circuit is 10V **(1 mk)**

(c) (i) What is meant by the term "terminal voltage" as used in current elecricity?**(1mark)**

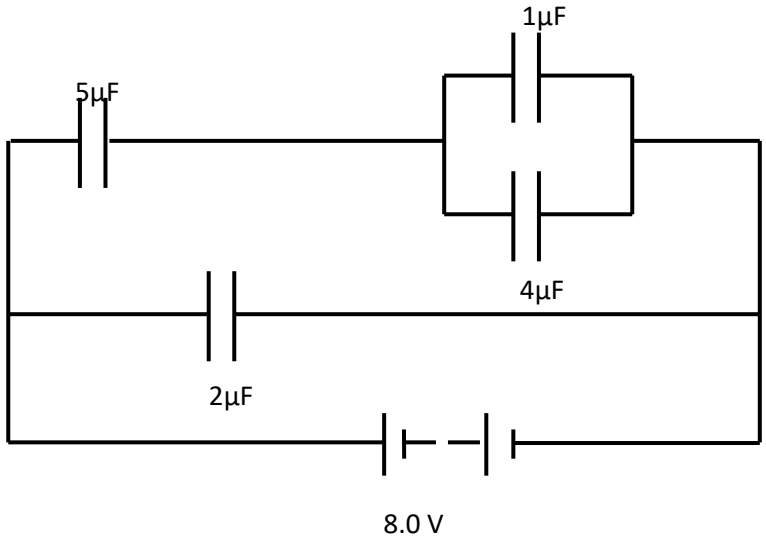
(ii) A cell supplies a current of 2.0A when connected to a 0.6Ω resistor and 1.5A when the same cell is connected to a 0.9Ω resistor.Find the e.m.f and the internal resistance of the cell. **(3marks)**

18((a) Give a reason why a candle flame is blown when a highly charged conductor is brought close to it as shown below. **(1mark)**



b) State two factors that affect capacitance of a capacitor **(2marks)**

c)The figure below shows 1μF, 2μF, 4μF and 5μF capacitors connected to a battery.



Determine:

i) The total capacitance. **(3marks)**

ii) The total energy stored by the capacitors. **(2marks)**

iii) Voltage across the 4μF capacitor. **(2marks)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 2 PAPER 1

TIME: 2 HRS

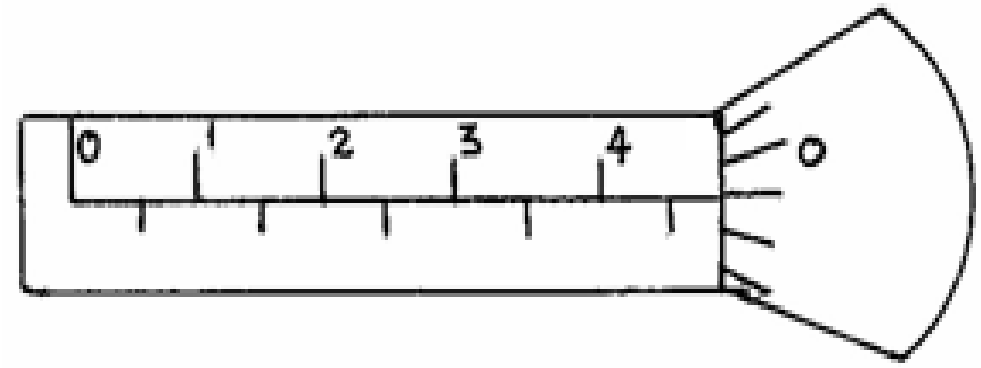
NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

SECTION A: 25 MARKS

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? **(2mks)**

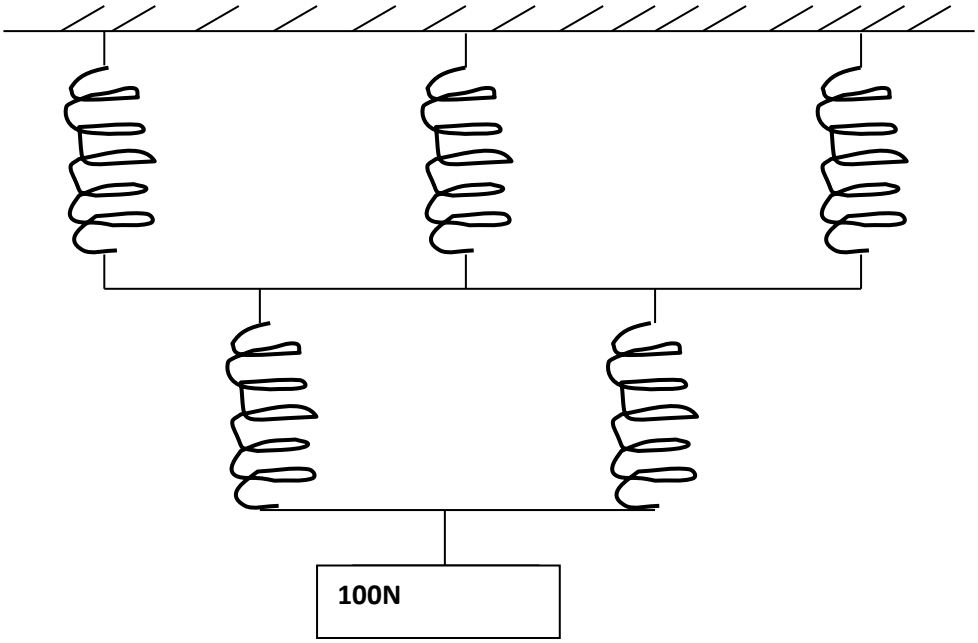


2) (a). State two differences between heat transfer by convection and radiation **(2mks)**

(b). Give a reason why a thick glass bottle cracks when boiling hot water is suddenly poured inside it **(1mk)**

3) An aircraft 300m from the ground, travelling horizontally at 400 m/s releases a parcel. Calculate the horizontal distance covered by the parcel from the point of release. (Ignore air resistance) **(2mks)**

4) A single spring stretches by 2.0 cm when supporting a load of 50N. If in the system below the springs are identical and have negligible weight;



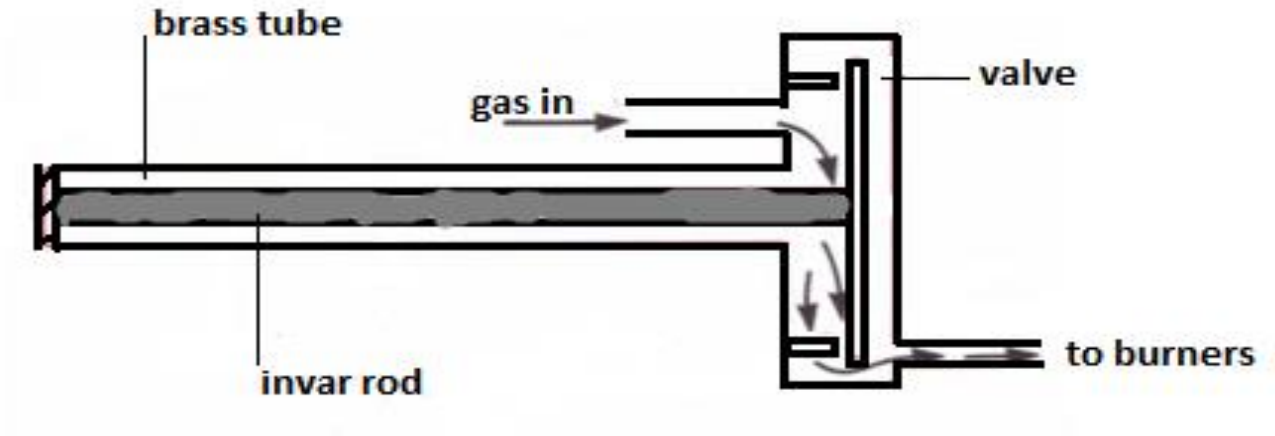
Find:

a) The total extension of the system. **(2mks)**

b)The total spring constant. **(2mks)**

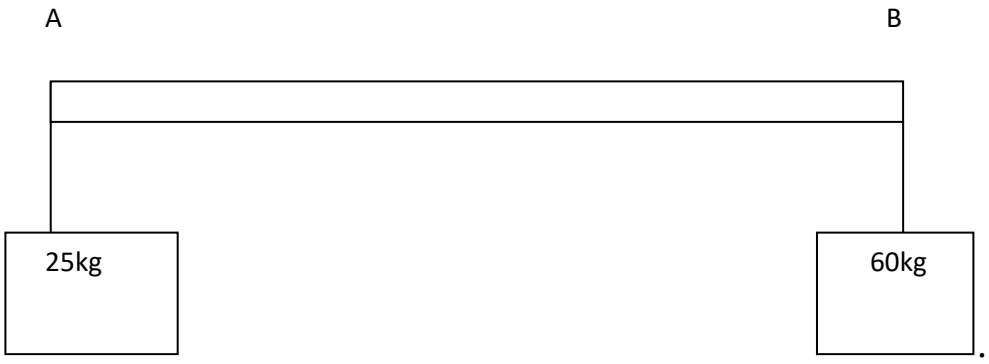
5) (a) The distance between the ice point and steam point on a liquid in glass thermometer is 30cm. what temperature is recorded when the mercury thread is 12cm above the ice point? **(2mks)**

b) The diagram below shows a gas cooker thermostat



Briefly explain how the thermostat works **(3mks)**

6) The figure below shows a uniform plank AB of length 10m weighing 500N. Two masses measuring 25kg and 60kg are loaded on its ends



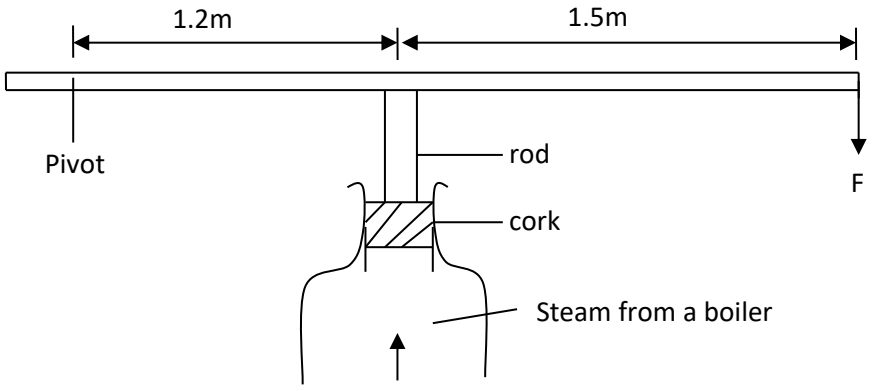
Determine the distance from point A where a support should be placed for the plank to balance horizontally. **(3mks)**

7) In an experiment to determine the thickness of an oil molecule, an oil drop of volume 3.60×10^{-6} m^3 was observed to form a circular patch of diameter 0.016m on the surface of water covered with lycopodium powder

i). Explain why the oil drop forms a circular patch. **(1mks)**

ii) Determine the thickness of the oil molecule **(2mks)**

8) A cork enclosing steam in a boiler is held down by the system shown.



If the area of the cork is 15 cm^2 and a force (F) of 500N is needed to keep the cork in place, determine the pressure of the steam in the boiler. **(3mks)**

SECTION B

9) (a) An electric crane lifts a load of 2000kg through a vertical distance of 3.0m in 6s.

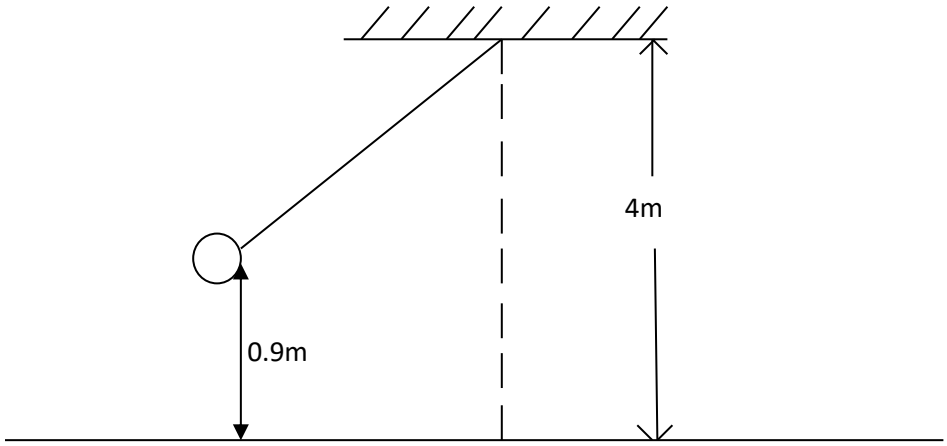
Determine:

Work done **(1mk)**

Power developed by the crane **(2mks)**

Efficiency of the crane if it is operated by an electric motor rated 12.5 Kw **(2mks)**

b) A bob of mass 20kg is suspended using a string of 4m from a support and swings through a vertical height of 0.9m as shown below:

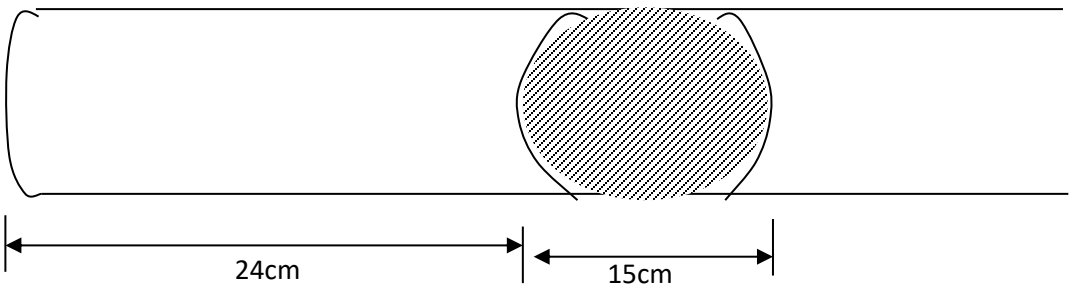


Determine:

The potential energy of the body at its position. **(2mks)**

Speed of the body when passing through the lowest point. **(2mks)**

10) (a) A glass capillary contains enclosed air by a thread of mercury 15cm long when the tube is horizontal, the length of the enclosed air column 24cm as shown.



b) What is the length of the enclosed air column when the tube is vertical with the open end uppermost if the atmosphere pressure is 750mmHg? **(2mks)**

c) Explain why the mercury does not run out when the tube is vertical with the closed end uppermost. **(1mk)**

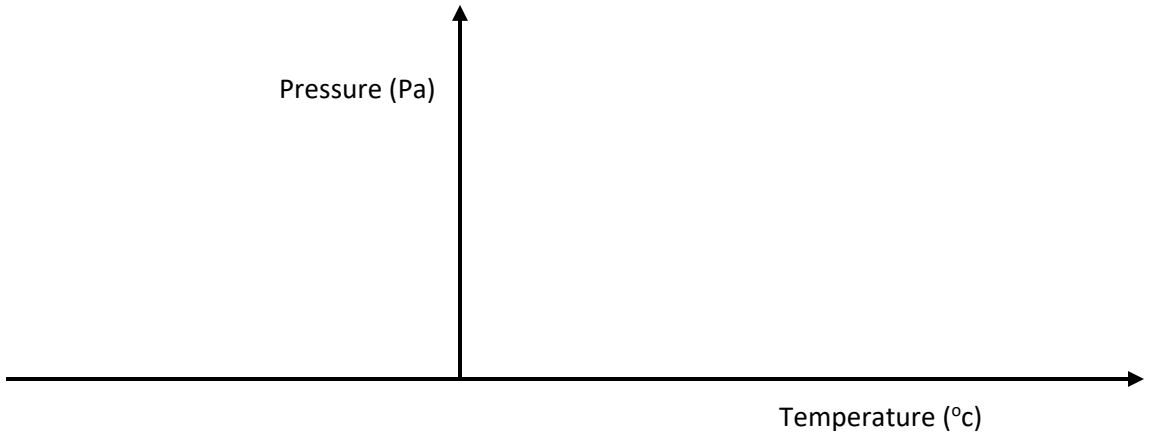
d) Explain why an air bubble increase in volume as it rises from the bottom of a lake to the surface. **(1mk)**

e) 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. **(2mks)**

f) A certain mass of hydrogen gas occupies a volume of $1.6m^3$ at a pressure of 1.5×10^5 Pa and a temperature of 22^0c. Determine the volume when the temperature is 0^0c at a pressure of 0.8×10^5 Pa. **(3mks)**

i)State the pressure law **(1mk)**

ii) On the axis provided, sketch a graph of pressure against temperature on the celcius scale. On the same axis sketch another graph for a gas of a larger volume. **(2mks)**



11) (a) in a hydraulic press, a force of 200N is applied to a master piston of area $25cm^2$. If the press is designed to produce a force of 5000N, determine the area of the slave piston. **(2mks)**

(b) The barometric height in a town is 70cmHg. Given that the standard atmospheric pressure is 76cmHg and the density of mercury is $13600kg/m^3$, determine the altitude of the town. (density of air is $1.25kg/m^3$) **(3mks)**

In an experiment to determine atmospheric pressure, a plastic bottle is partially filled with hot water and the bottle is then tightly corked. After some time the bottle starts to get deformed.

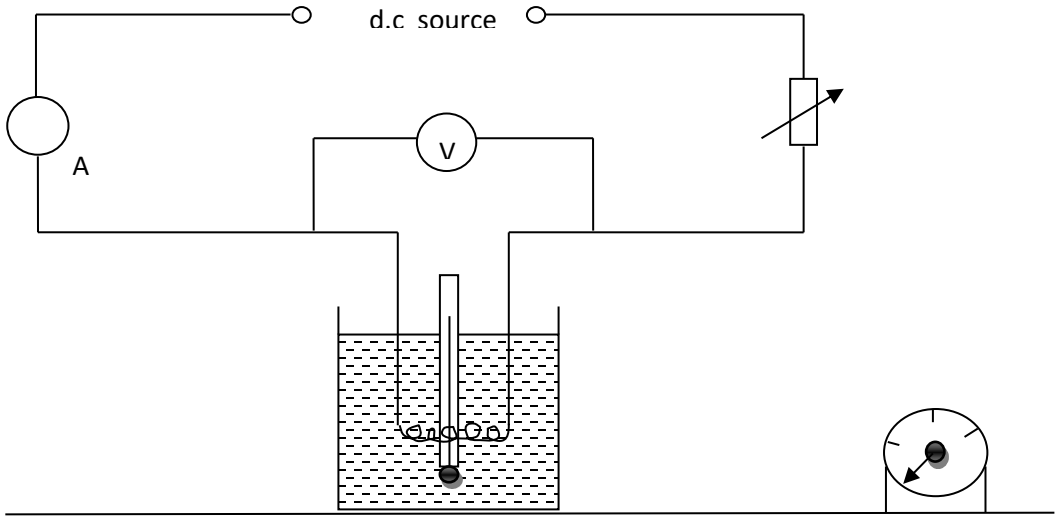
State the purpose of the hot water. **(1mk)**

State the reason why the bottle gets deformed. **(2mks)**

A hole of area $2.0cm^2$ 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 sea water of density $1.2g/cm^3$. **(2mks)**

12) (a) Define specific latent heat of vaporization **(1mk)**

b) The illustration below is used to produce a measured rise in temperature of a liquid using electrical energy.



Explain why;

(i) The liquid will tend to be warmer at the top of the container than at the bottom. **(1mk)**

(ii) The temperature will eventually stop rising even though the current is still passing through the heating coil. **(1mk)**

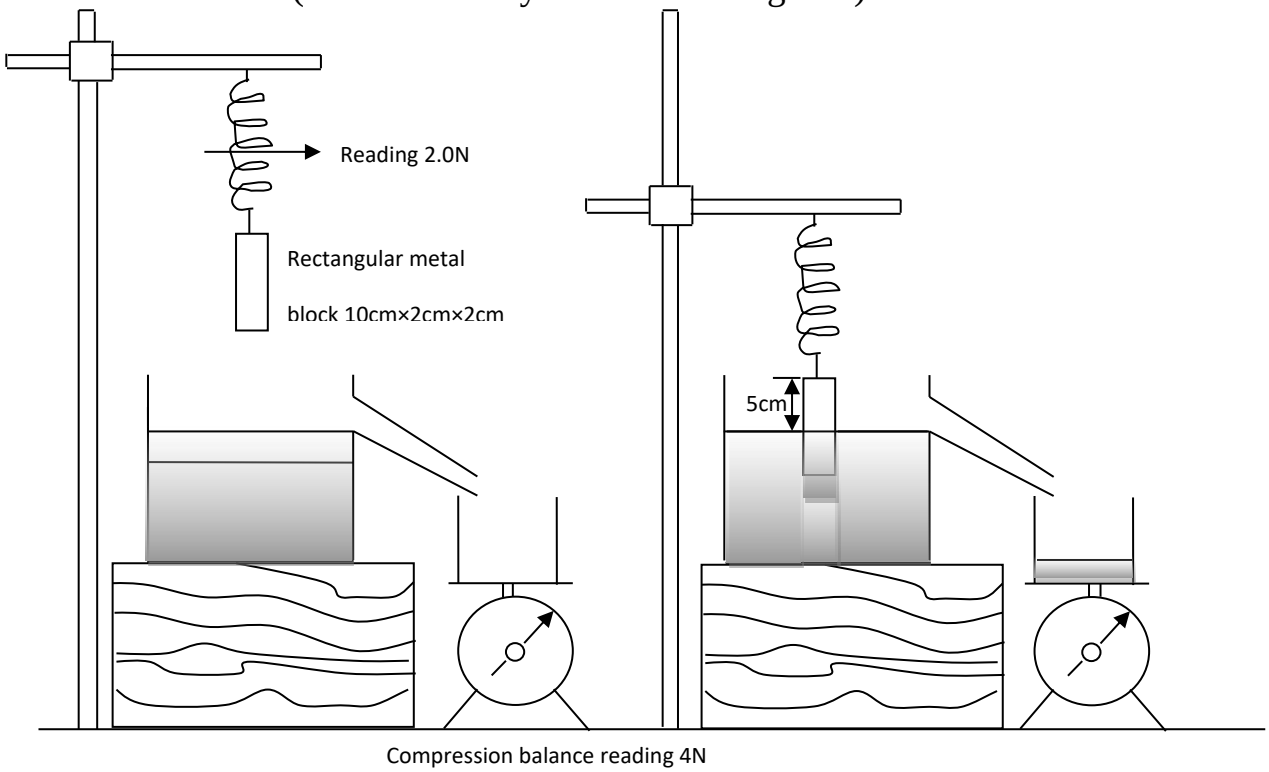
(b) if the apparatus is used to determine the specific heat capacity of the liquid, the accuracy of the experiment will be increased if the liquid is first cooled to about 5^{o}c below room temperature and the current passed until the temperature is about 5^{o}c above room temperature. **(2mk)**

(c). A 50W heating coil is totally immersed in100g of water contained in an insulated flask of negligible heat capacity. The initial temperature of water in the flask is 20^{o}c.

(i) Determine how long it takes for the water to boil at 100^{o}C when the heater is switched on **(2mks)**

(ii) After the water has been boiling for 15 minutes, it is found that the mass of water in the flask has decreased to 80g. Assuming no external heat losses, calculate a value for the specific latent heat of vaporization of water **(3mks)**

13) (a) The figure below shows details of an experiment performed by a student and the results taken. (take the density of water as $1.0g/cm^3$)



(a) Calculate the volume of the metal block below the water **(1mk)**

(b) Calculate the new reading on the compression balance after the block is halfway immersed **(2mks)**

(c) Calculate the reading you would expect to obtain on the spring balance **(2mks)**

(d) Give a statement of the principle you have used in part (iii) above **(1mk)**

b). Explain why the narrow stem of a hydrometer provides greater sensitivity than a wide one **(1mk)**

14) (**a) (i)** A car goes round a flat circular bend whose radius is 100m at a constant speed of 30m/s. Calculate its acceleration **(2mks)**

(ii) if the mass of the car is 1500kg, calculate the frictional force required to provide this acceleration. **(2mks)**

(b) (i) Calculate the maximum speed at which the car can go round the bend without skidding if the coefficient of friction between the tyres and the ground is 0.5**.** **(2mks)**

(ii) Give a reason why the driver of the car has to move through the same bend at a lower speed during a rainy day. **(1mk)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 2 PAPER 2

TIME: 2 HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

SECTION A: 25 MARKS

1. Describe the changes that can be observed during discharging process of a lead –acid accumulator **(2mks)**

2. a) Define power of a lens and give its units **(2mks)**

b) An object whose height is 24cm is placed 20cm in front of a diverging lens of focal length 20cm.

Determine the image distance **(3mks)**

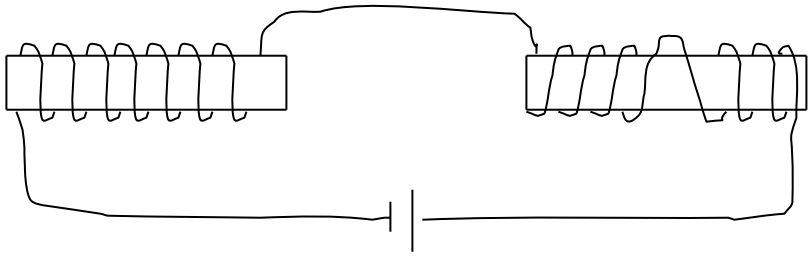
3. a) Give one property of sound waves **(1mk)**

b) a person claps his hands at approximately 0.5s intervals in front of a wall 90m away. He notices that each echo produced by the wall coincides with the next clap.

i) Calculate the approximate speed of sound **(3mks)**

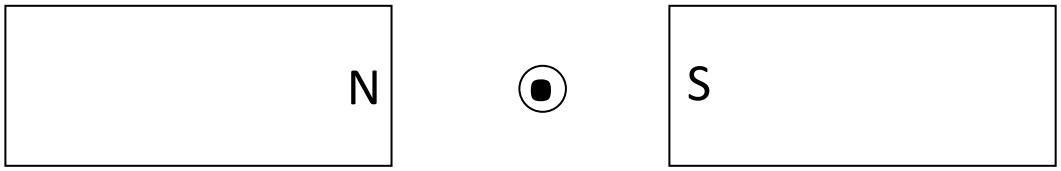
ii) if the results obtained above were used as a basis for an experimental method to determine the speed of sound, what procedure should be adopted to obtain high accuracy in the timing part of the experiment? **(1mk)**

4. Identify the magnetic poles A, B, C and D in the diagram below. **(2mks)**



A B C D

5. The diagram below shows a current carrying conductor placed in a magnetic field.



i)show on the diagram the direction of force on the conductor **(1mk)**

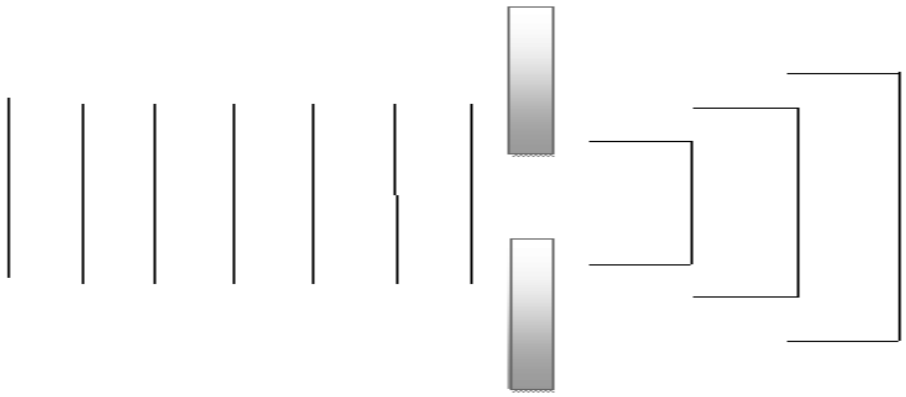
ii) if the current through the conductor is reduced, state and explain what happens to the force in (i) above. **(2mks)**

6. Gamma, radio, infrared, x-rays are part of the electromagnetic spectrum.

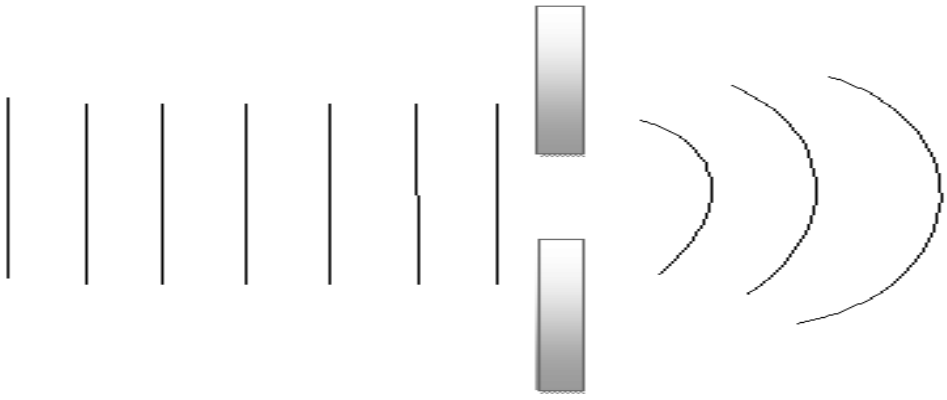
i) Arrange these radiations in order of increasing energy **(1mk)**

ii) State how radio waves are detected **(1mk)**

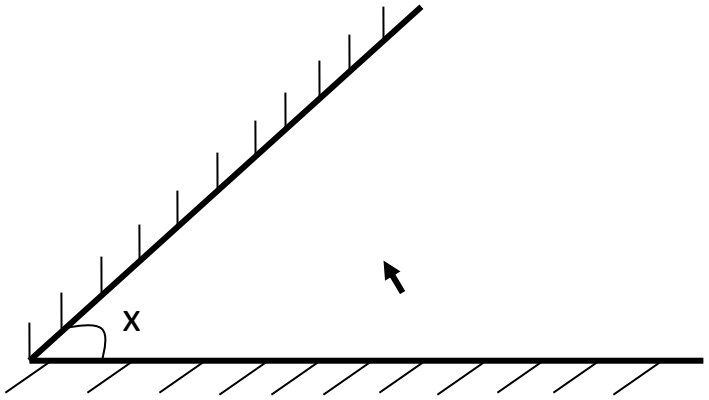
7. The diagram below shows waves being diffracted.



What adjustments should be done to obtain the wave form below? **(2mks)**



8. The diagram below shows an object placed in front of two mirrors inclined to each other at an angle x

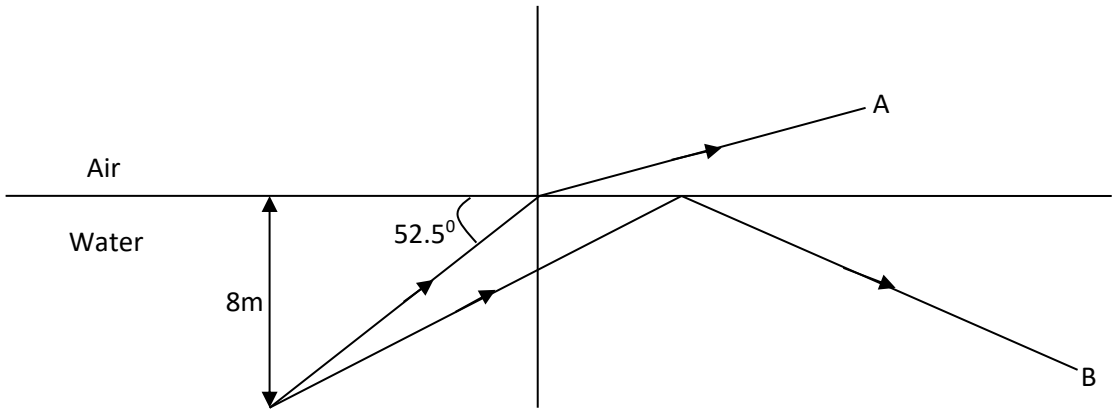


An observer sees five images, determine the value of angle x? **(2mks)**

SECTION B (55 marks)

9. a) State Snell's law **(1mk)**

b) The figure below shows a ray of light incident on a water-air interface from a source 8m deep.



i) Ray A is observed to bend as it enters the air. Give a reason why this occurs **(1mks)**

ii) If the refractive index of water is 1.35, calculate the angle of refraction of ray A **(3mks)**

iii) Find the critical angle of water **(3mks)**

iv) Give a reason why ray B is not travelling out of water **(1mk)**

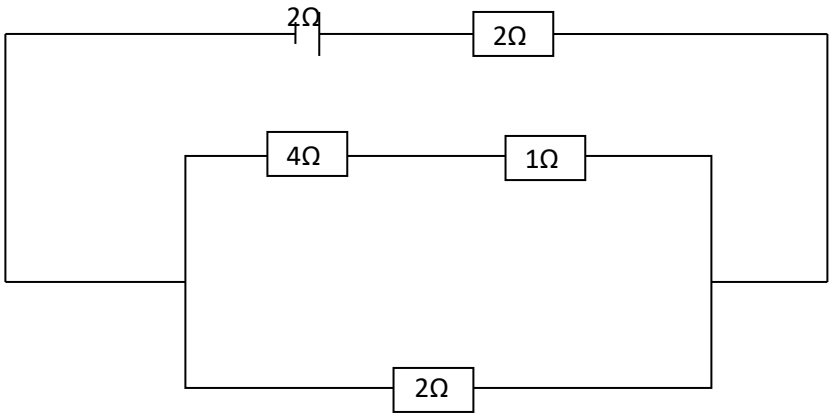
v) a fish is placed at the source of light ray. Calculate the maximum area of view on the surface of water **(3mks)**

10.a) define local action **(1mk)**

b) a charge of 4.8C flows through a lamp every second. Calculate the number of electrons involved per second. **(3mks)**

c) Give two differences between a primary and a secondary cell **(2mks)**

d) The circuit set up shown below makes a current of 1A to flow through the 4Ω resistor

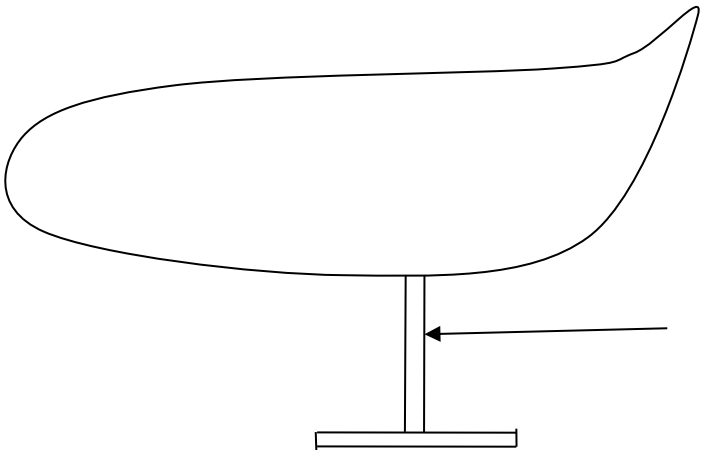


Calculate;

i) The current through the resistor **(3mks)**

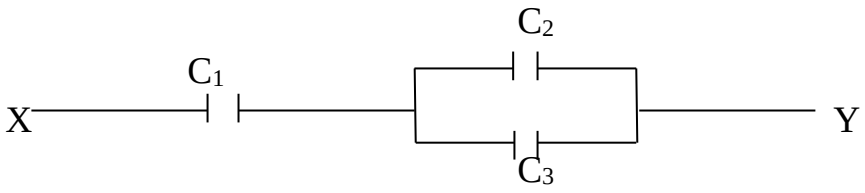
ii) the E.M.F of the cell given that the internal resistance is negligible **(3mks)**

11. Show the charge distribution on the hollow conductor shown below if it is positively charged. **(1mk)**



b. State three factors affecting capacitance of a parallel plate capacitor. **(3mks)**

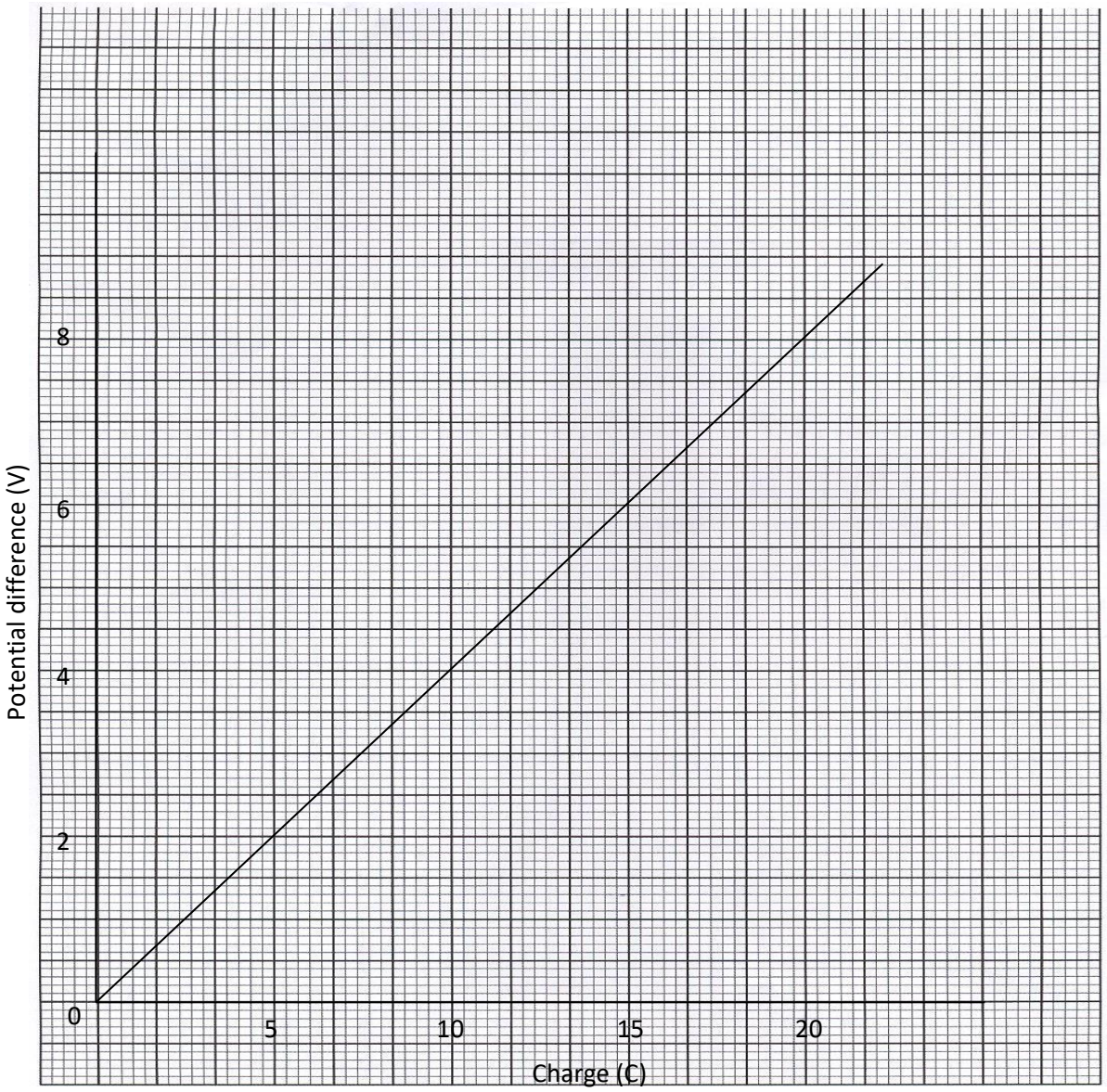
c) The diagram below shows a circuit containing three capacitors.



Write an expression for effective capacitance between X and Y. **(2mks)**

i) If c_1=6μF, c_2=4.5μF and c_3=5 μF, calculate the charge stored when point XY is connected in series with a battery of 6V **(3mks)**

d) The graph below shows the relationship between the voltage drop across a certain capacitor and the charge stored in the capacitor.



From the graph calculate the capacitance of the capacitor. **(3mks)**

12.a) State two factors that determine the magnitude of an induced e.m.f in a conductor **(2mks)**

(b) A Power station has an input of 30kw at a potential difference of 5kv.A transformer with a secondary coil of 1000 turns is used to step down the voltage to 1000v for transmission along a grid .Assuming there are no power loses in the transformer .calculate.

(i) current in the primary coil **(3mks)**

(ii) the number of turns in the primary coil **(3mks)**

(iii) The current in the secondary coil **(2mks)**

(iv) State which of the coils is thick and why **(2mks)**

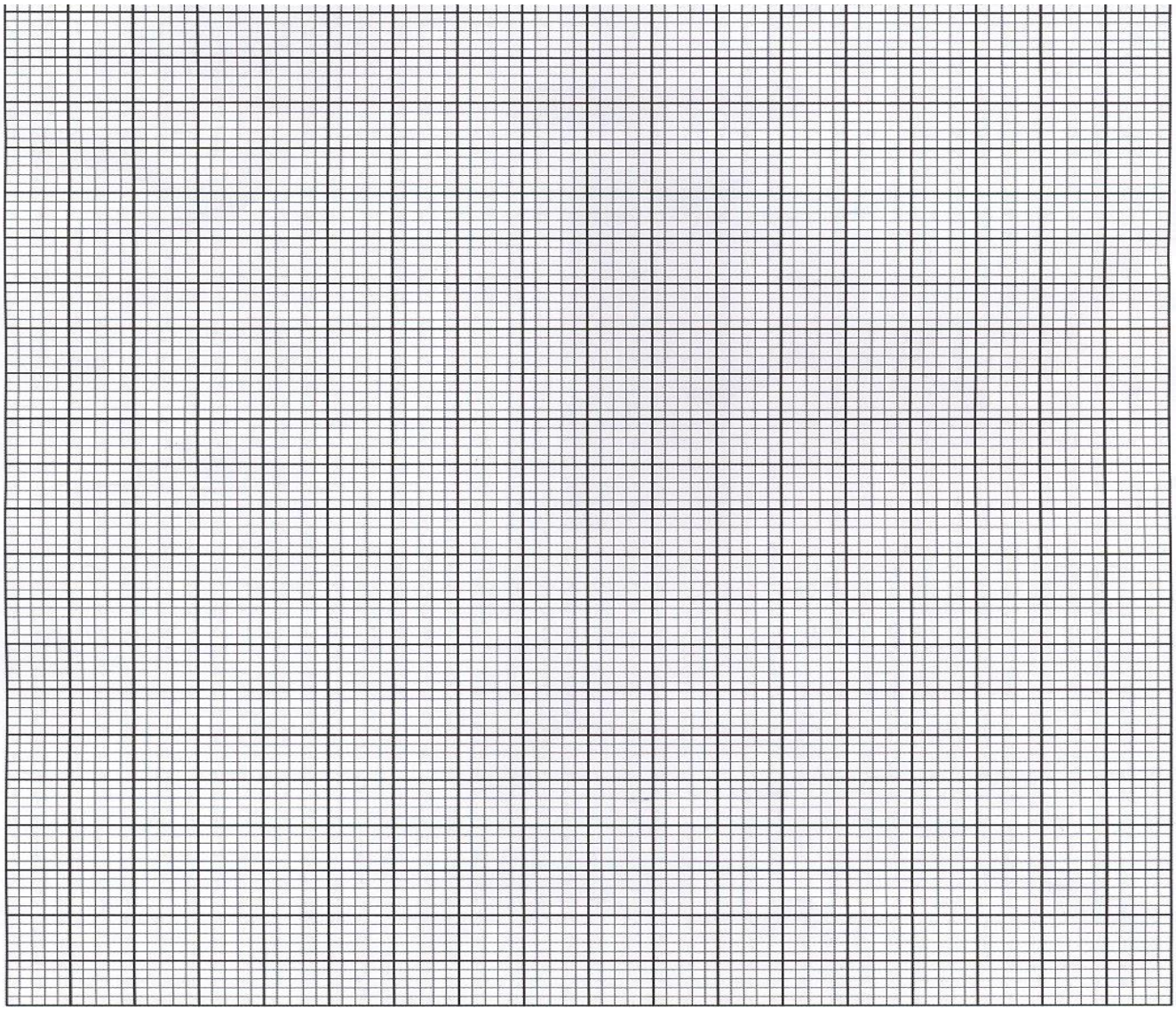
13.a) Define magnification **(1mk)**

b) State two differences between a concave and a convex reflectors **(2mks)**

c) a concave mirror of focal length 20 cm forms a real image three times the size of the object. If the object height is 4cm; determine, using graphical method, the:

(i)object distance **(3mks)**

(ii) The image distance **(1mk)**



KCSE FINAL PREDICTION

PHYSICS

TRIAL 3 PAPER 1

TIME: 2 HRS

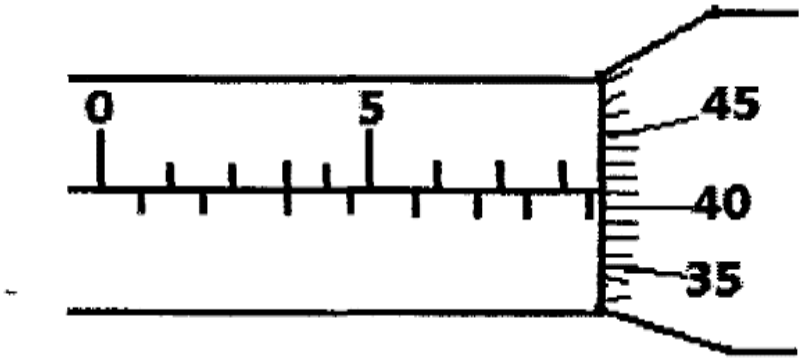
NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

SECTION A: 25 MARKS.

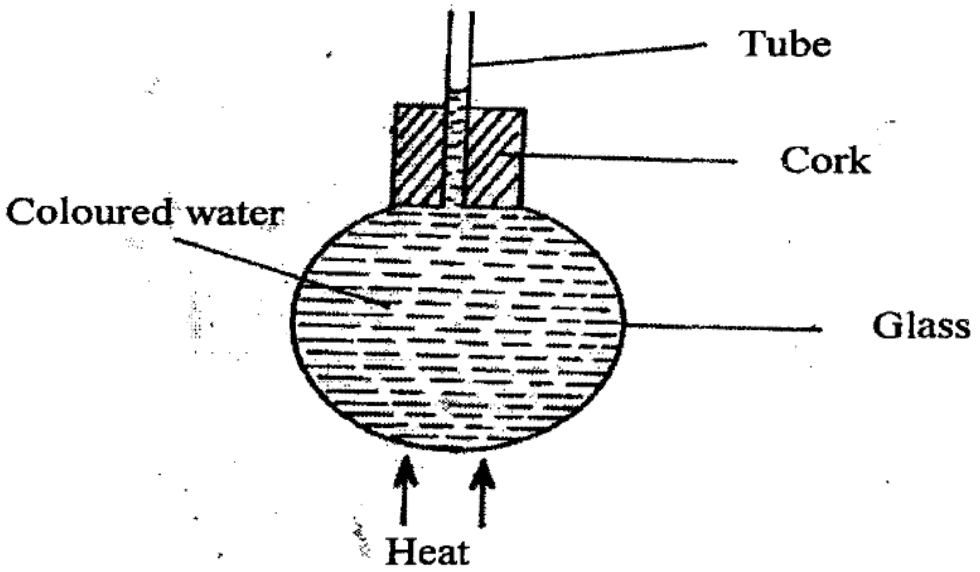
1) What is the actual reading of the micrometer screw gauge shown below if it has an error of+ 0.5mm? **(2marks)**



2) In a ball and ring experiment, the ball goes through the rings at room temperature. When it is heated it does not go through the ring, but when left on the ring for some time, it goes through. Explain this observation. **(2marks)**

3) In the study of free fall, it is assumed that the force F acting on a given body of mass, m, is gravitational, given by F = mg. State two other forces that act on the same body. **(2marks)**

4) In the set up shown below, it is observed that the level of the water initially drops before starting
to rise. Explain this observation. **(2marks)**



5) Distinguish between speed and velocity. **(1mark)**

6) State how the pressure in a moving fluid varies with speed of the fluid. **(1mark)**

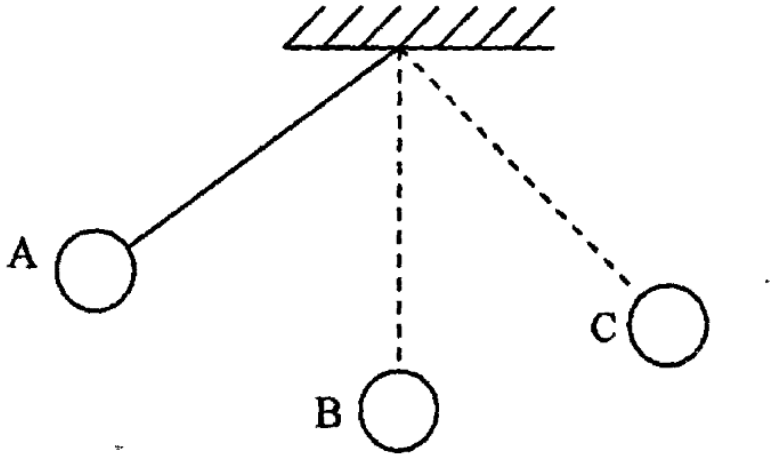
7) A piece of metal weighs 3N in air and 2N when totally immersed in water. Calculate the volume of the metal. (Density of water = 1000Kg/m^3) **(3marks)**

8) Why is banking of roads necessary? **(1mark)**

9) Give a reason why air is not commonly used as the fluid in a hydraulic lift. **(1mark)**

10) Tall buildings are built with lighter materials at the upper part. Explain **(2marks)**

11) The figure below shows a swinging pendulum.

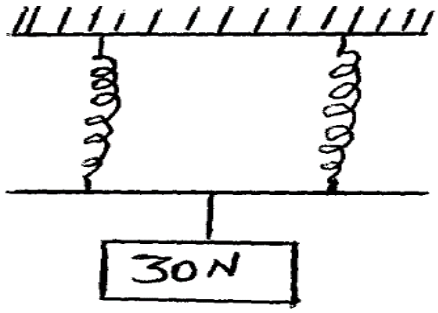


State the energy conservation taking place as the pendulum moves from A to B and B to C

A to B……

B to C……

12) The identical springs each of spring constant 3N/cm are used to support a load of 30N as shown.



Determine the extension on of each spring. **(3marks)**

13) In a vacuum flask, the walls enclosing the vacuum are silvered on the inside. State the reason for this. **(1mark)**

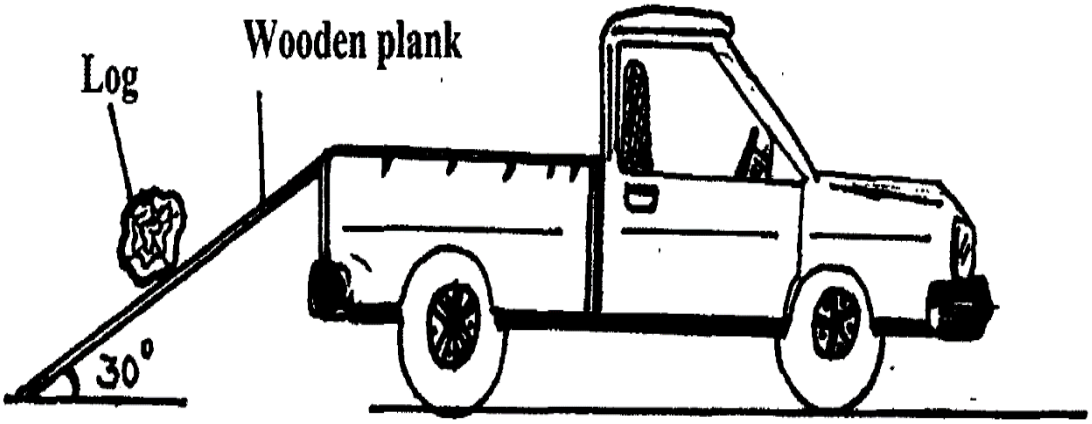
14) Sketch velocity — time graph of a body moving down a viscous fluid. **(2marks)**

SECTION B: (55 MARKS)

Answer ALL the questions in the spaces provided.

15) a) Define the term efficiency as applied in simple machine. **(2marks)**

b) A man used a wooden plank to lift a log of wood from the ground to a stationary lorry on a flat ground as shown in figure below. The wooden plank was inclined at an angle of 30^0 to the ground.



i) Indicate with an arrow on the diagram, the direction of the effort and the load. **(2marks)**

ii) Calculate the velocity ratio of the set up. **(2marks)**

iii) Calculate the mechanical advantage of the set up if its efficiency is 65%. **(2marks)**

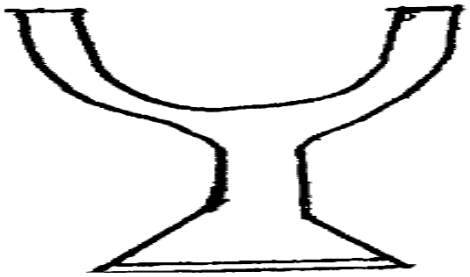
c) A pump is used to spray water from a pool to form fountain.

(i) Determine the minimum power of the pump if it ejects 50 litres of water per minute and spray reached a height of 5metres.(Density of water = 1000Kg/m^3) **(3marks)**

Give a reason why water from the pump has a different temperature from that which left the pool. **(1mark)**

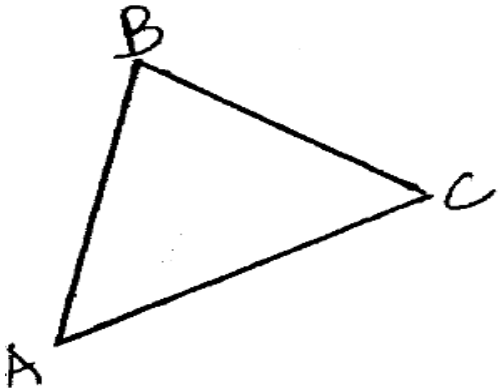
16) a) Define centre of gravity **(lmark)**

b) The figure below shows a wine glass

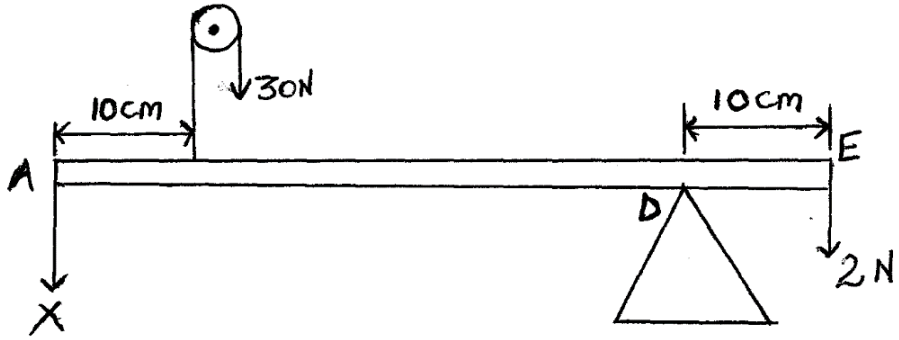


Explain how the stability of the glass is affected if it is filled with wine. **(2marks)**

c) In the triangular ABC shown in the figure below, determine geometrically the position of centre of gravity. **(1mark)**



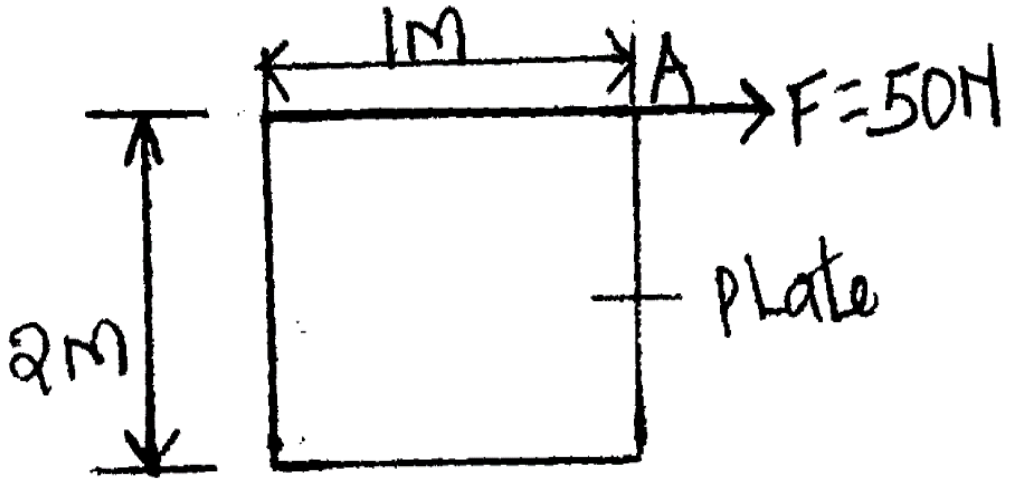
d) The figure below shows a uniform rod AE which is 40cm long. It has a mass of 2kg pivoted at D. If 2N is acting at point E, and 30N force is passed through a frictionless pulley.



Find the force (x) acting at end A. **(3marks)**

e)i) State the principle of moments. **(1mark)**

ii) The figure below shows a metal plate 2M long, 1M wide and negligible thickness A horizontal force of 50N applied at point 'A' just makes the plate tilt.

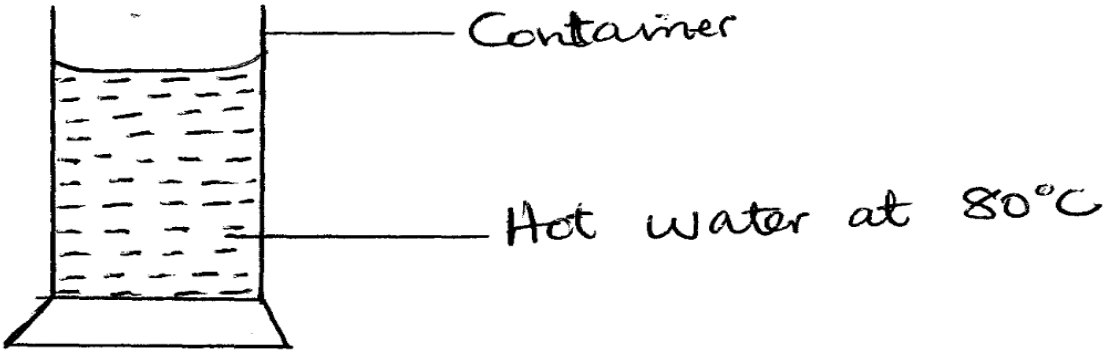


Determine the weight of the plate. **(3marks)**

17) a) State one factor that affects melting point of water. **(1mark)**

b) Define the term *specific heat capacity* of a substance **(1mark)**

c) The figure below shows a container carrying *0.5* Kg of water at 80°C



A metal block of mass 1Kg and specific heat capacity 4000Jkg^{-1}k^{-1} at a temperature of 25°C is lowered into the hot water. The container losses 600J of heat during mixing and a steady final temperature of the mixture obtained is **T**. Assume no further heat is lost to the surrounding and specific heat capacity of water is 4200Jkg^{-1}k^{-1}

I. Derive the expression for:

i) The heat lost by the hot water. **(2mks)**

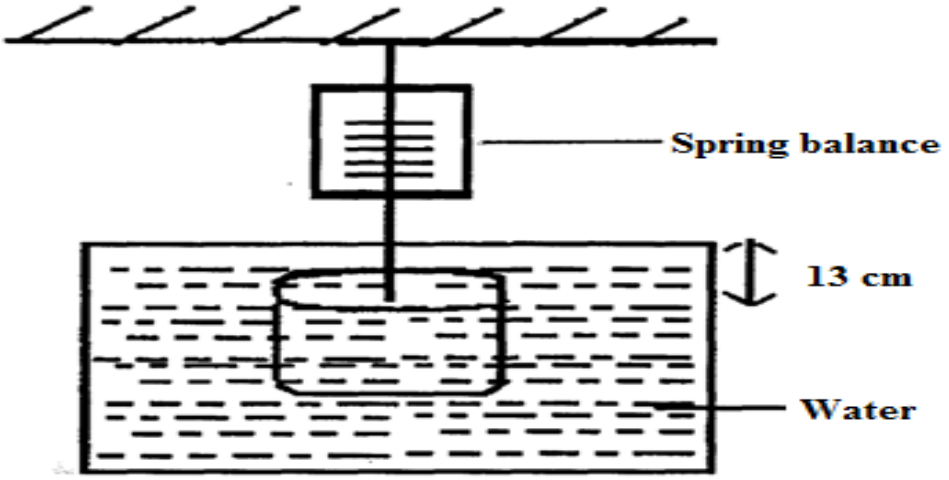
ii) The total heat lost by hot water and the container **(2mks)**

Determine the steady temperature **T** of the mixture **(3mks)**

d) Water drops from a water fall 120m High. The temperature of the water at the bottom is found to be 24°C. Calculate its temperature at the top (Take specific heat capacity of water = 4200Jkg^{-1}k^{-1}) **(3marks)**

18) a) State the law of floatation **(1mark)**

b) A solid metal block cross-section area 4cm^2 and of density 2.5g/cm^3 is fully immersed in water, supported by a spring balance.



i) A part from the weight, state and indicate the direction of any two forces acting on the metal block **(2marks)**

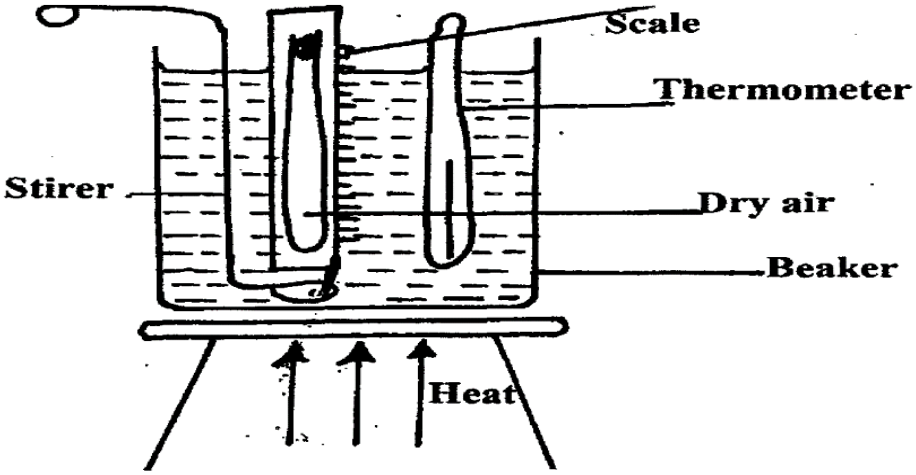
If the upward force acting on the bottom face is 1.5N, calculate the volume of the block (Density of water = 1000kg/cm^3) **(3marks)**

Determine the apparent weight of block in water. **(3marks)**

Explain why the hydrometer is not graduated uniformly. **(1mark**

19) (a) Using Kinetic theory of Gases, explain how the rise in temperature of a gas causes rise in the pressure of a gas if the volume is kept constant. **(3marks)**

(b) The figure below is a set up that can be used to verify Charles' law of gases.



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

ii) Explain how the measurements taken above can be used to verify Charles law. **(3mks)**

c) A certain mass of hydrogen gas occupies a volume of 2.6m^3 at a pressure of 1.5 x 10^5 pa and temperature of 12°C. Determine its volume at a temperature of 0°C, if its pressure is 1.0 x 10^5 pa. **(3 marks)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 3 PAPER 2

TIME: 2 HRS

NAME…… INDEX NO……..…

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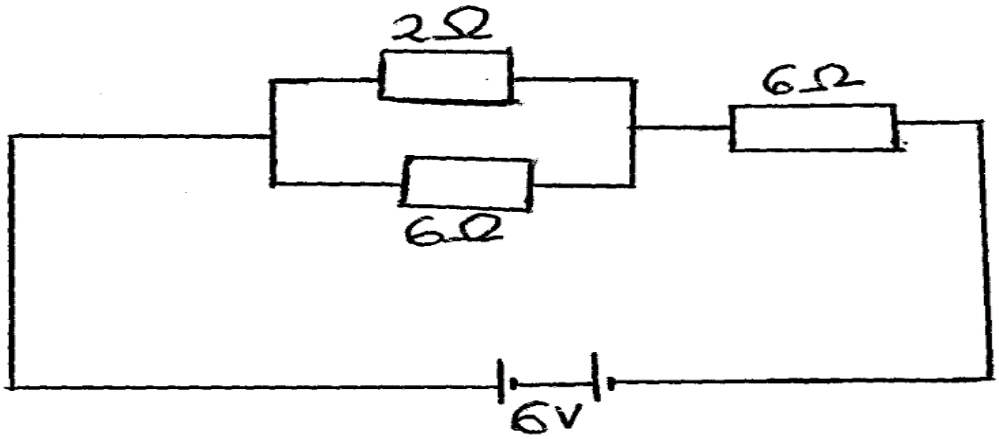
SECTION A: 25 MARKS

1) State any two ways of increasing the size of an image formed by a fixed pinhole camera. **(2marks)**

2) State one advantages of an alkaline battery over a lead acid battery. **(lmark)**

3) The figure above shows a 6V battery connected to an arrangement of resistors.



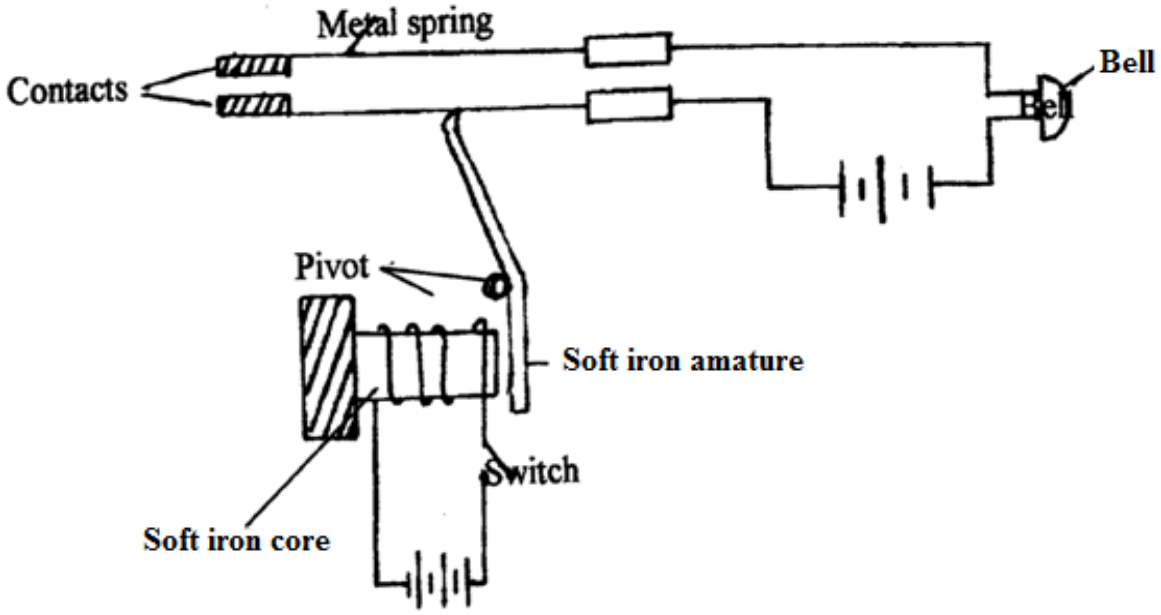
Determine the current flowing through the 2Ω resistor. **(3marks)**

4) A negatively charged rod is brought near the cap of a lightly charged electroscope. The leaf divergence first reduces but as the rod comes nearer, it diverges more.

i) State the charge of the electroscope **(1 mark)**

ii) Explain the behaviour of the leaf above. **(1 mark)**

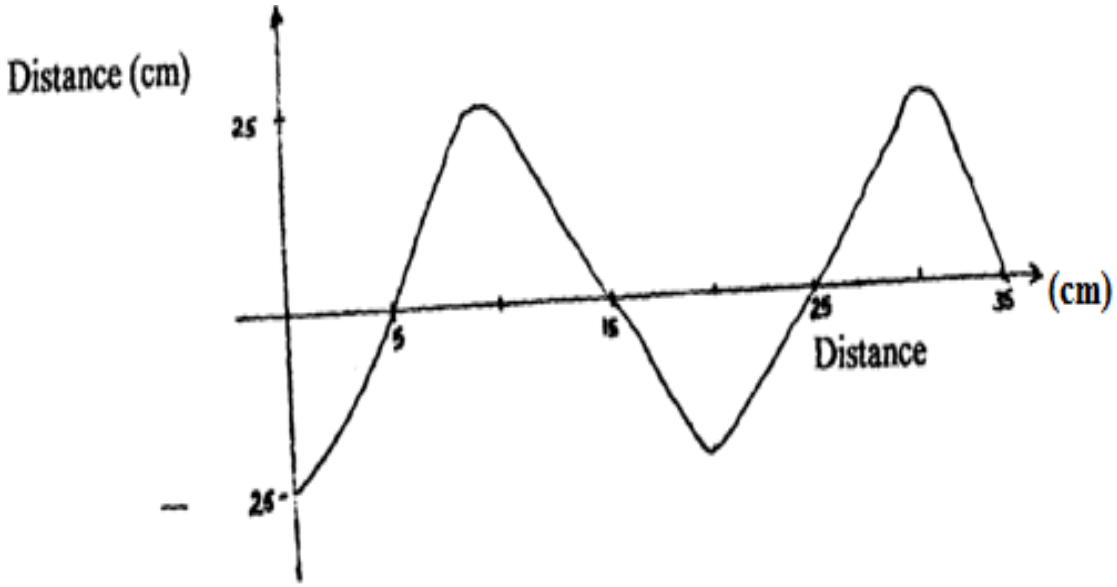
5) The figure below shows an electromagnetic relay.



Explain what happened when the switch is closed. **(3marks)**

6) A current 12 A flows through a circuit for 2.5 minutes. How much charge passes through the circuit? **(2marks)**

7) The diagram below shows part of a wave form. The numbers on the diagram show scales in centimeters. The speed of the wave is $16ms^{-1}$

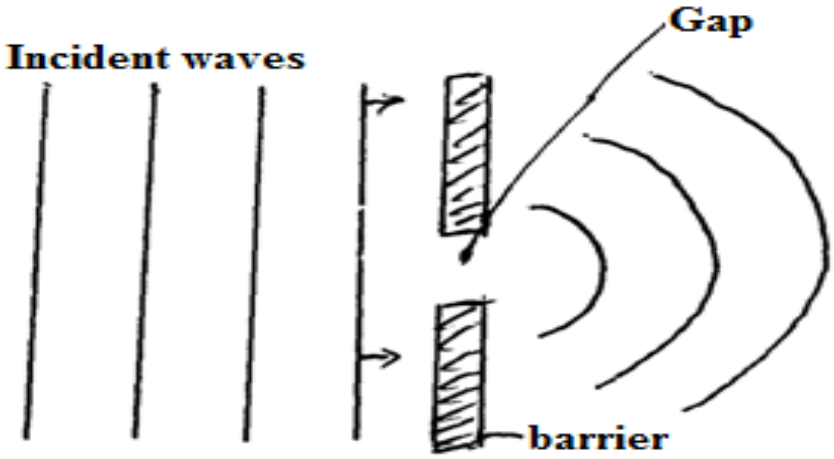


From the graph of the wave shown, determine;

a) The wavelength **(1mark)**

b) The frequency

8) Figure below shows wavefront before and after passing through an opening as shown in fig.5.



State what would be observed on the pattern after passing the opening if:

i) Wave length is increased. **(1mark)**

ii) Gap is increased. **(1mark)**

9) State two ways by which the frequency of a note produced by a sonometer wire may be increased. **(2marks)**

10) An electric kettle rated at 2.0kW, 240V is filled with water. If the water requires 7.0 x 10^5 Joules of heat to boil from the initial temperature, determine the resistance of the element**.** **(3marks)**

11) A certain glass material has a refractive index of *2.5*. What is its critical angle? **(2marks)**

SECTION B: (55 MARKS)

12) A student carried out an experiment to investigate how current varies with potential difference applied across a filament lamp. The following readings were obtained.

Rd(V)	0	0.20	0.40	0.60	0.80	1.20	1.60	2.40
I(A)	0.0	0.11	0.20	0.28	0.34	0.43	0.50	0.58

Draw a diagram for the circuit used to obtain the values. **(2marks)**

Plot a graph of V against I for the values presented in the table. **(5marks)**

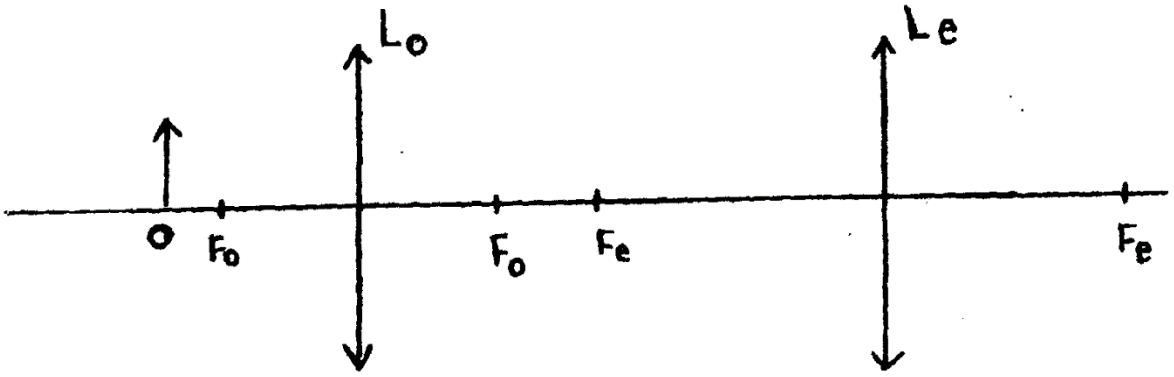
Determine the resistance of the lamp when a current of O.4A flows through it. **(3marks)**

13) a) Define the term *principal focus* in relation to a thin convex lens **(1 mark)**

b) Distinguish between a real and virtual image. **(1 mark)**

c) The diagram shows an arrangement of lenses; L_0 and L_e used in a compound microscope F_0 and F_e are principal foci of L_0 and L_e respectively.

Draw the rays to show how the final image is formed in the microscope. **(3marks)**



The table below shows the object distance, U and the corresponding image distance, V for an object placed.

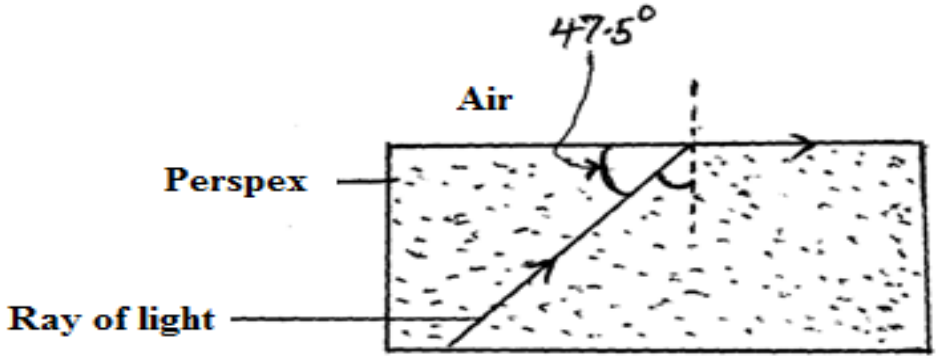
U (cm)	20	25	30	35	40	45
V(cm)						
$\frac{1}{u}\left(cm^{-1}\right)$						
$\frac{1}{v}\left(cm^{-1}\right)$						

(i) Complete the table and plot a graph of $\frac{1}{v}$ against $\frac{1}{u}$ **(7marks)**

(ii) Determine the focal length of the lens. **(2marks)**

14) a) Give two conditions necessary for total internal reflection to occur. **(2marks)**

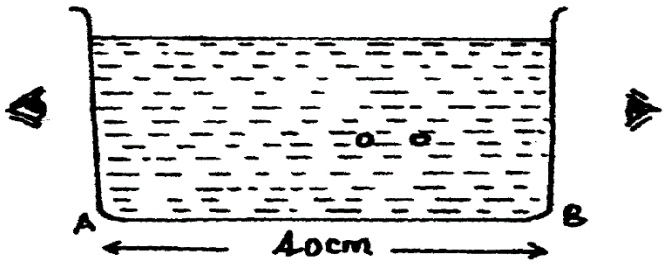
b) Figure below shows the path of a ray of light passing through a rectangular block of Perspex to air.



Calculate the refractive index of Perspex. **(3marks)**

c) Give one use of an optical fibre **(1 mark)**

d) In a transparent liquid container, an air bubbles appears to be 18cm when viewed from end A and 12cm when viewed from end B as shown in figure below. Where exactly is the air bubble. If the length of the tank is 40cm? **(4marks)**



15) a) i) Distinguish between longitudinal and transverse waves. **(1mark)**

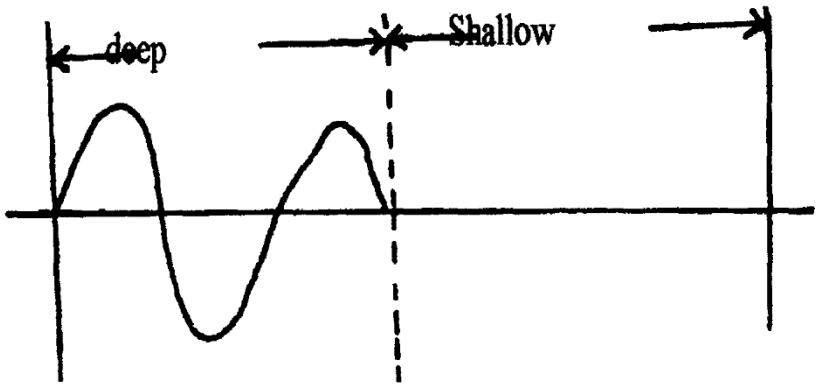
State one distinction between the way sound waves and electromagnetic waves are transmitted. **(1 mark)**

b) A mine worker stands between two vertical cliffs 400m from the nearest cliff. The cliffs are X m apart, every time he strikes the rock once, he hears two echoes, the first one in *2.5s* while the second follows 2s later. From this information calculate:

i) The speed of sound in air. **(2marks)**

ii) The value of X. **(3marks)**

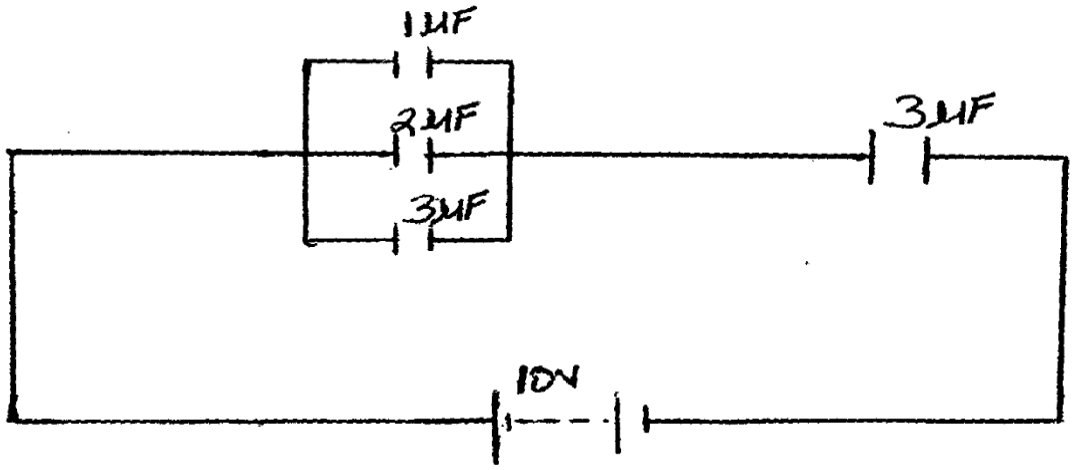
c) Figure 12 below shows the displacement of a particle in progressive wave incident on a boundary between deep and shallow regions.



Complete the diagram to show what is observed beyond the boundary. (Assume no loss of energy) **(2marks)**

Explain the observation in C (i) above. **(2marks)**

16) (a)State two factors that affect the capacitance of a parallel plate capacitor.**(2marks)**



(b) The diagram below shows an arrangement of capacitors in a circuit.
Determine;

i) The total capacitance **(3marks)**

ii) The total charge **(2marks)**

iii) The energy stored by the $2\mu F$ capacitor. **(3marks)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 4 PAPER 1

TIME: 2 HRS

NAME…… INDEX NO……..…

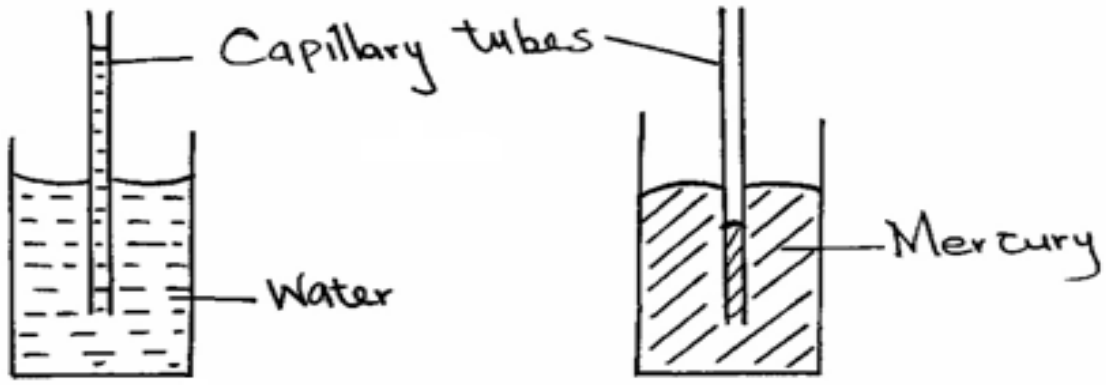
SCHOOL…….. SIGN……

DATE……

SECTION A: 25 MARKS

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

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



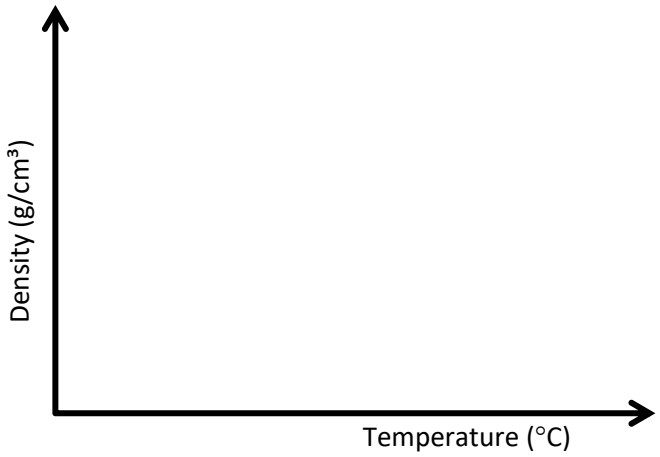
It is observed that in water the meniscus in the capillary tube is highter than the meniscus in the beaker, while in mercury the meniscus in the capillary tube is lower than the meniscus in the beaker. Explain them observations. **(2 marks)**

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

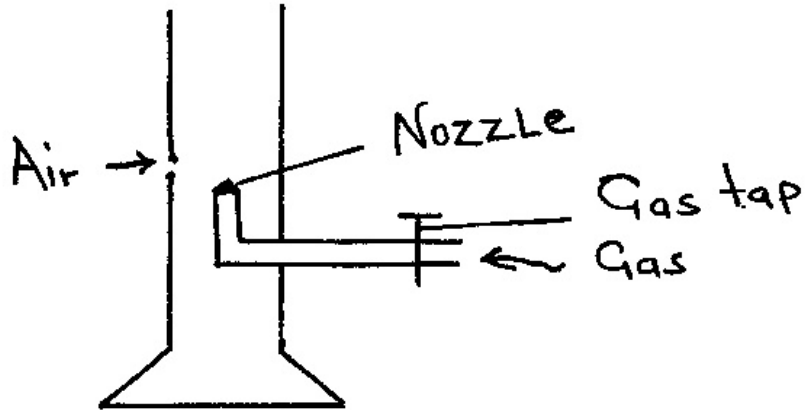
4) **(i)** State the Brownian motion. **(1 mark)**

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

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

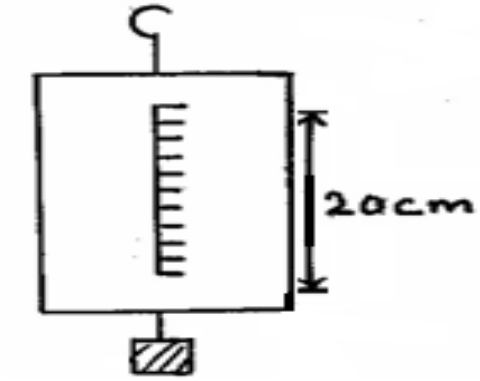


6) The figure below shows a Bunsen burner.



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

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



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

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

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

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

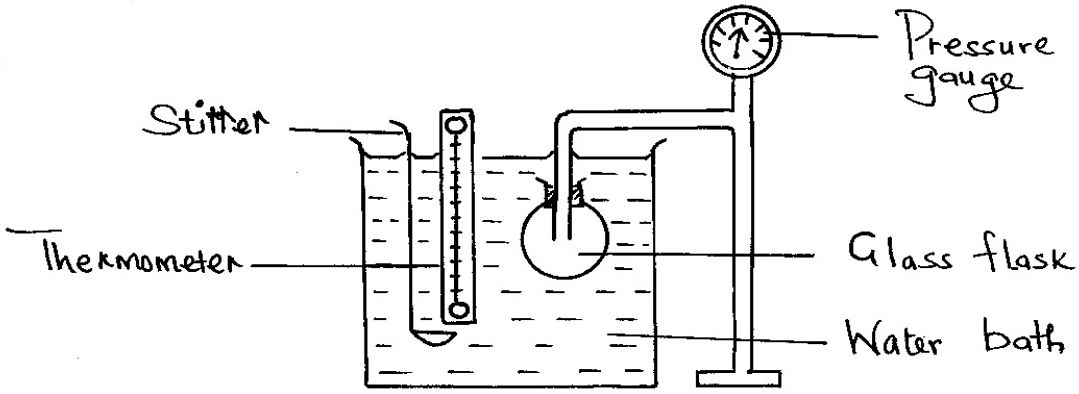
11) When the temperature of a gas in a closed container is raised, the pressure of the gas increases. Explain in terms of kinetic energy how the molecules of the gas cause an increase in pressure. **(2 marks)**

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

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

SECTION B: (55 MARKS)

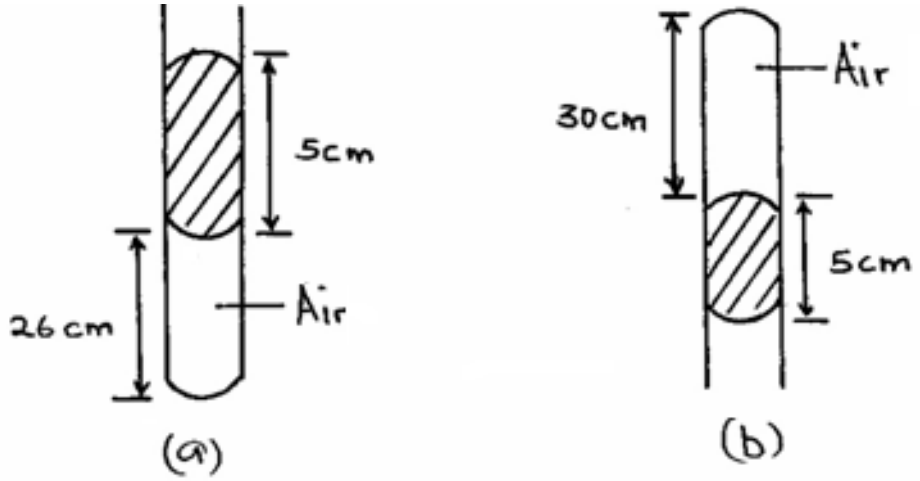
14) (a)The figure below shows a set-up that may be used to verify pressure law.



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

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

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



A steel cylinder of capacity 0.5m³ contains nitrogen at a pressure of 30,000Pa when the temperature is 27°C. What will be the pressure of nitrogen if it is allowed to flow into another cylinder of capacity 9.5m³ with the temperature reduced to -23°C? **(3 marks)**

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

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

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

Determine;

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

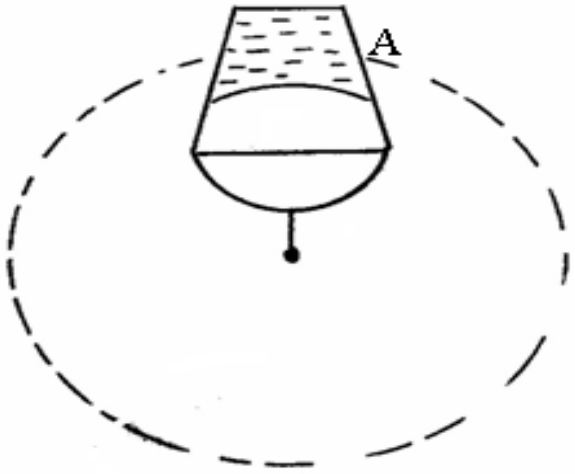
ii. Heat gained by water. **(2 marks)**

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

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

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

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



Explain why the water does not pour out when the pail is at position **A** as shown. **(1 mark)**

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

i. the angular velocity. **(2 marks)**

ii. the angular acceleration. **(3 marks)**

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

iv. the linear velocity. **(2 marks)**

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

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

(a) The common velocity

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

(c) The impulse force. **(3 marks)**

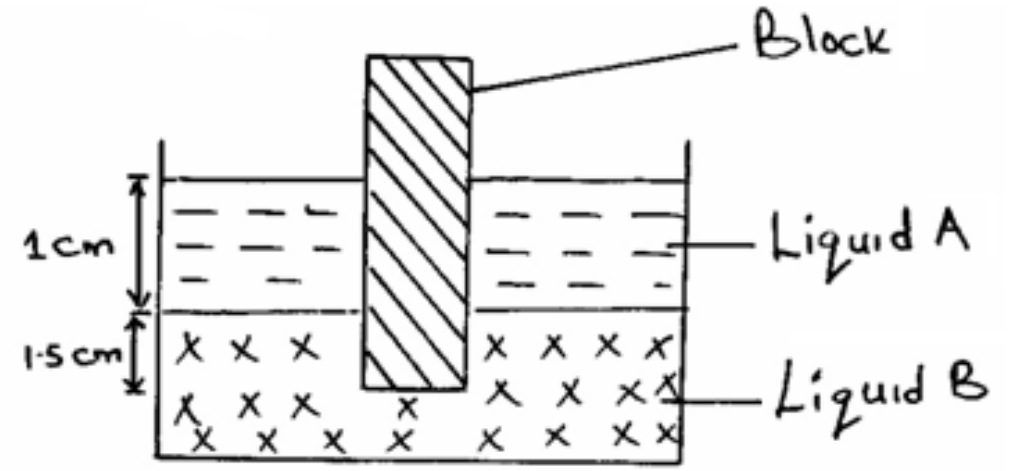
A man uses the inclined plane to lift a 50kg load through a vertical line height of 4.0m. The inclined plane makes an angle of 30° with the horizontal. If the efficiency of the inclined plane is 80%, determine.

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

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

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

(b) The figure below shows rectangular block of height 4cm floating vertically in a beaker containing two immiscible liquid A and B. The densities of the liquid are 8000 kg/m³ and 12,000kg/m³ respectively.



The cross sectional area is 2cm².

Determine.

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

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

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

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

KCSE FINAL PREDICTION

PHYSICS

TRIAL 4 PAPER 2

TIME: 2 HRS

NAME…… INDEX NO……..…

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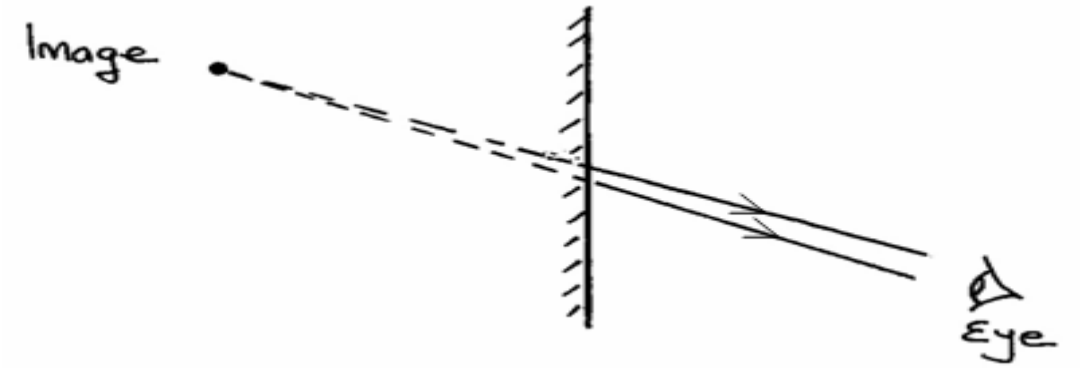
SECTION A: 25 MARKS

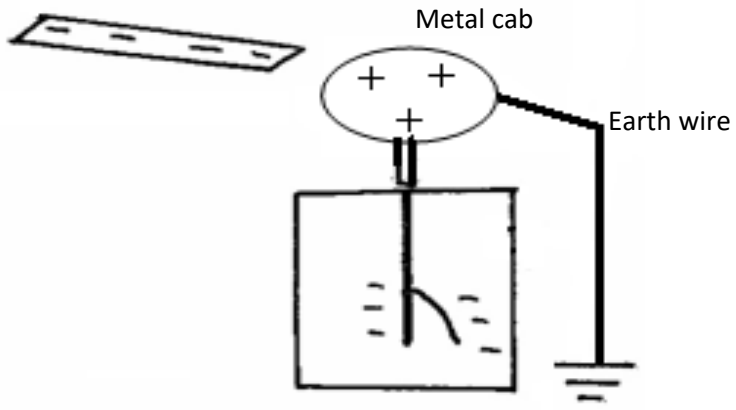
1) (a) Figure 1 shows an image formed in a plane mirror.



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

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

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

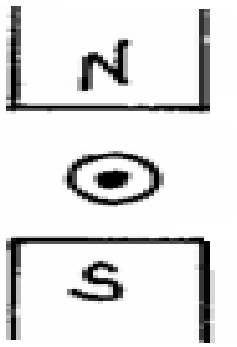


State the reason why the cap of the electroscope is made circular. **(1 mark)**
On the same diagram, show the direction of the flow of electrons on the earth wire.

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

Type of radiation	Detection method	Use
	Blackened thermometer	Warming
Microwave		

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

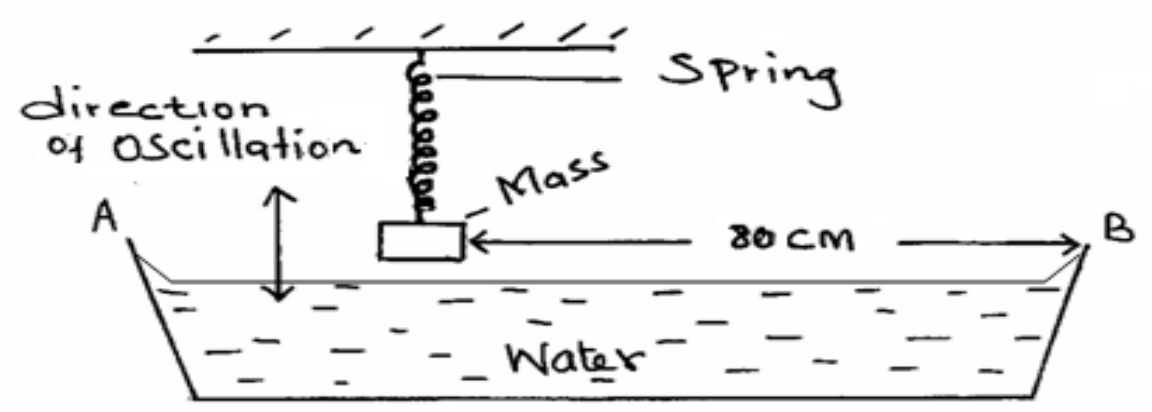


(i) Show on the diagram the magnetic field pattern. **(1 mark)**
(ii) The direction of net force on the conductor. **(1 mark)**

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

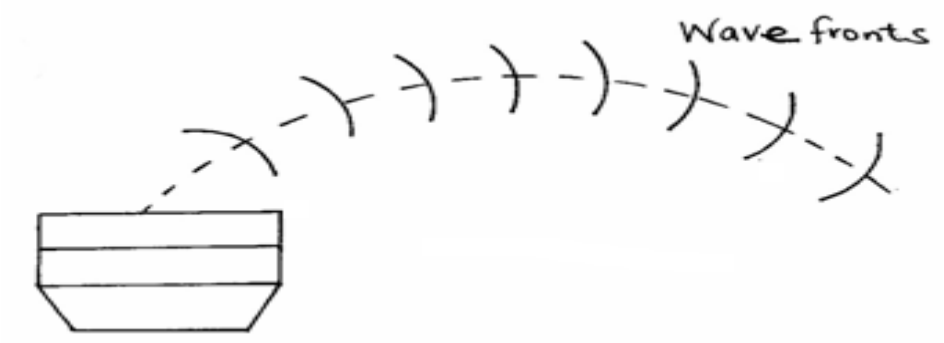
6) (i) Define focal plane. **(1 mark)**
State **two** properties of an image formed by a concave mirror that makes it suitable for use by barbers. **(2 marks)**

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



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

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

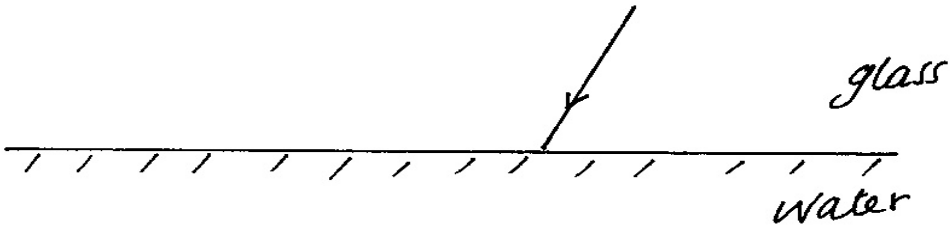


Explain why the wave fronts are directed towards the ground. **(2 marks)**

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

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

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

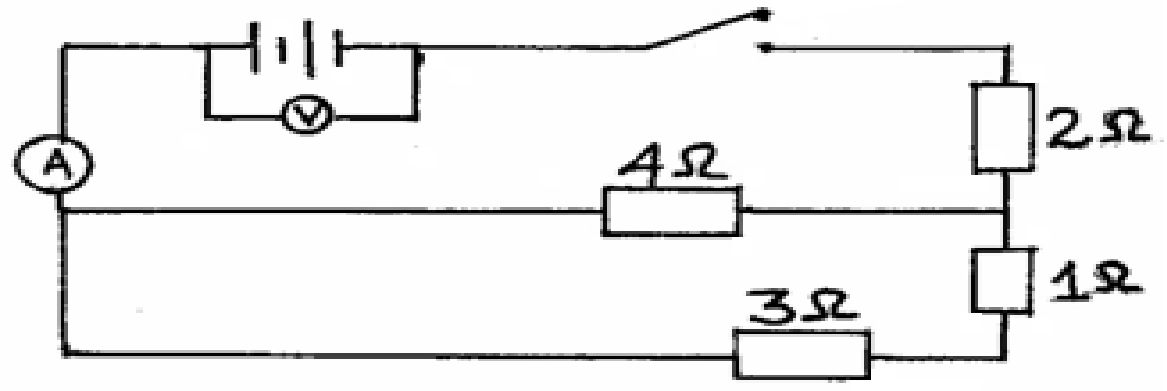


Calculate the angle of refraction (take refractive of glass and water as $\frac{3}{2}$ and $\frac{4}{3}$ respectively). **(2 marks)**

SECTION B: (55 MARKS)

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

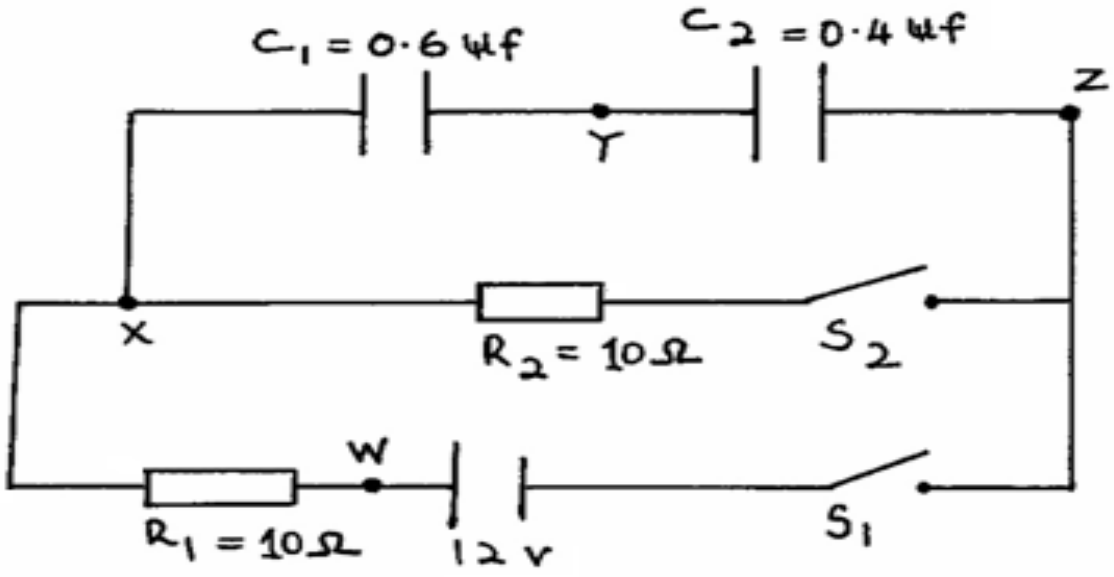
The figure below shows a net work of resistors connected together in a circuit.
The voltmeter reads 3.0V when the switch is open and 2.4V when switch is closed.



Given that the ammeter reads 0.6A.
Determine:

i. the net e.m.f of the battery. **(1 mark)**
ii. the internal resistance of each cell. **(1 mark)**
iii. the potential drop across the 3Ω resistor. **(3 marks)**

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



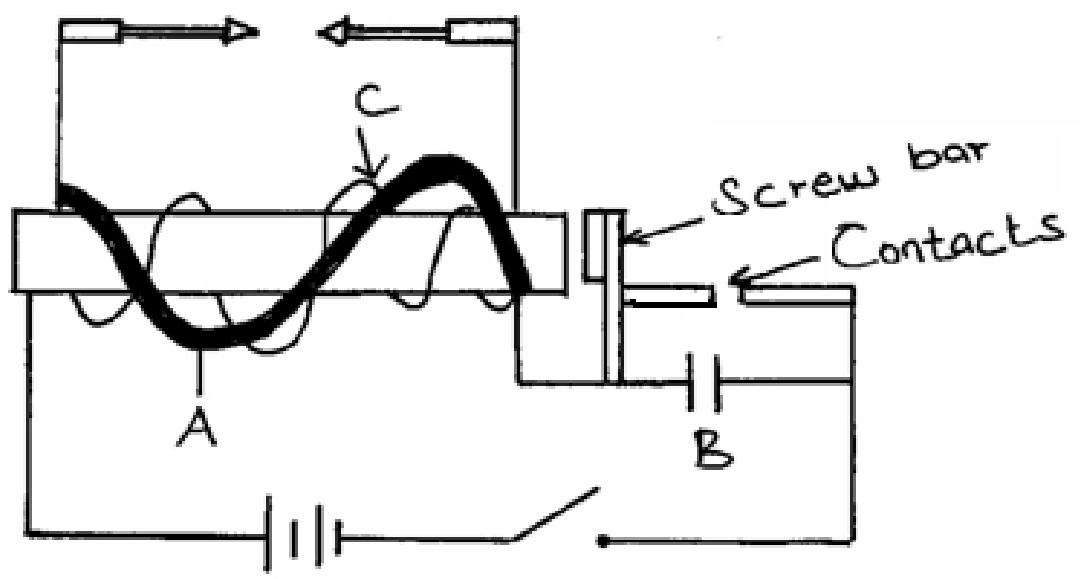
Switch S_1 is closed and the circuit, left undisturbed for a few minutes.

Determine:

i. the potential difference between **W** and **X**. **(1 mark)**
ii. the magnitude of charge on each plate of capacitor C_1 in SI units. **(3 marks)**
iii. the potential difference between **Z** and **Y**. **(2 marks)**

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

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



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

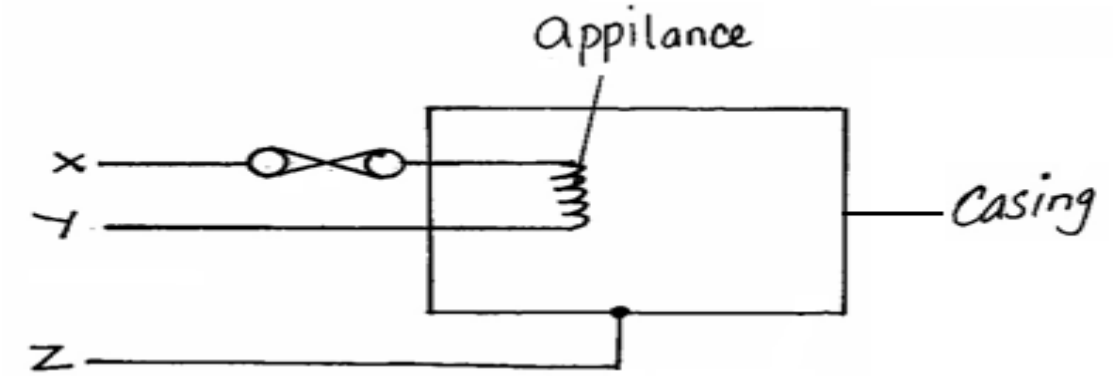
ii. Explain why the part labelled **A** is thicker than **C**. **(1 mark)**

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

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

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

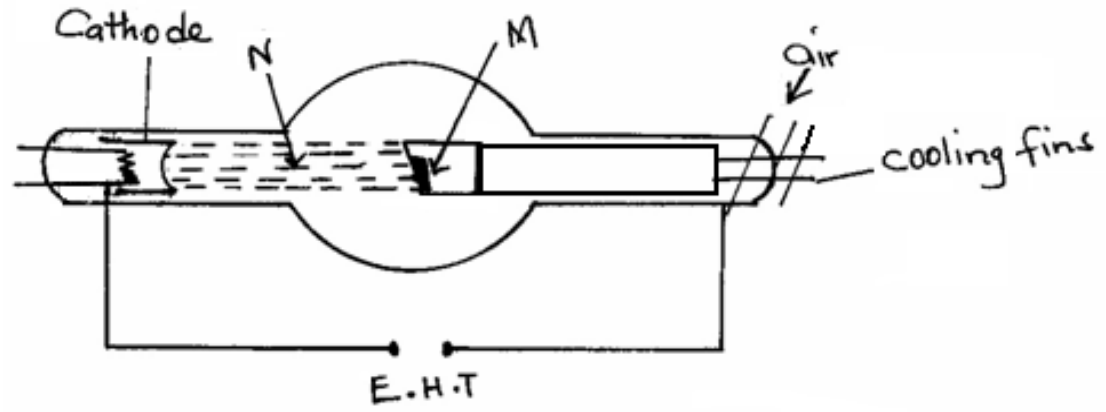
(d)(i) The figure below shows the wiring in a modern main appliance. **(1 mark)**



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

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

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



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

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

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

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

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

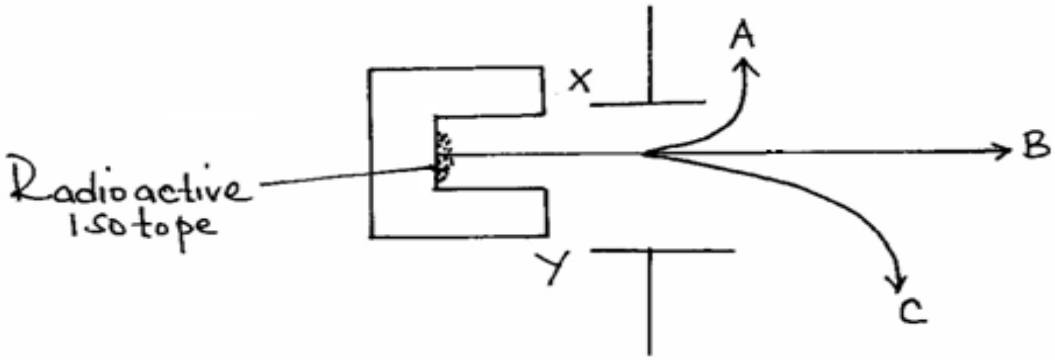
When the time-base is off, the length of the line on a CRO screen is 4cm peak to peak for an AC voltage 400V. Determine the sensitivity setting. **(2 marks)**

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

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

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

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



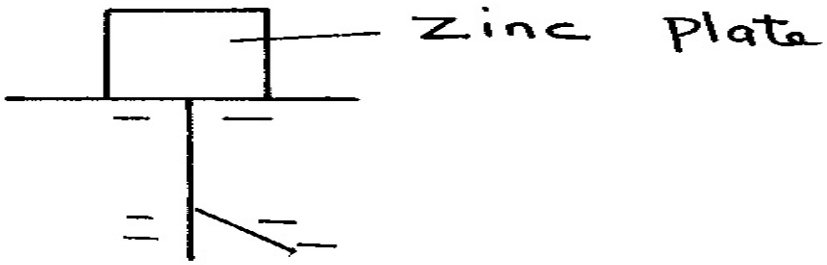
(i) Identify radiation **A**. **(1 mark)**

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

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

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

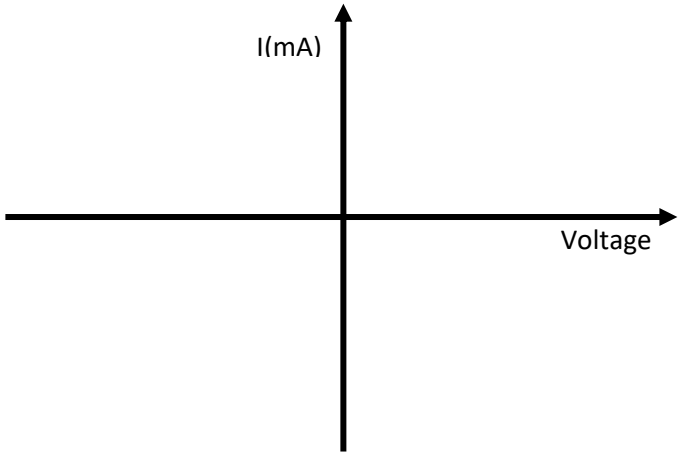
15) (a) A clean zinc plate is placed on top of the cap of a negatively charged gold leaf electroscope as shown.



When U.V light is shone on the zinc plate, the leaf is found to fall. Explain. (2 marks)
An certain metal surface has a work function of 2.04 x 10^{-19}J. Calculate the maximum kinetic energy in electron volt of the liberated elections when the metal is illuminated by light of wavelength 4.5 x 10^{-7}m. **(3 marks)**

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

(c)(i) The figure below shows a P-N function diode connected to a dry cell.
On the axis provided plot the I.V characteristic of diode. **(1 mark)**



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

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

KCSE FINAL PREDICTION

PHYSICS

TRIAL 5 PAPER 1

TIME: 2 HRS

NAME…… INDEX NO……..…

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SECTION A: 25 MARKS

1. A micrometer screw gauge was used to measure the diameter of a wire and the following readingsWere recorded 2.32mm, 2.31mm, 2.34mm, 2.34mm, and 2.31mm? Determine the length the student Should record **(2mks)**
2. The figure below shows a vernier calliper scale.

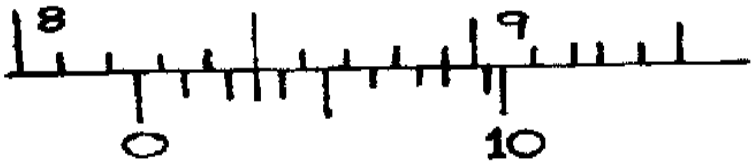
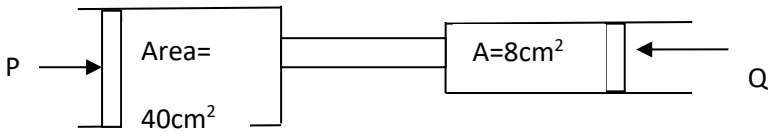


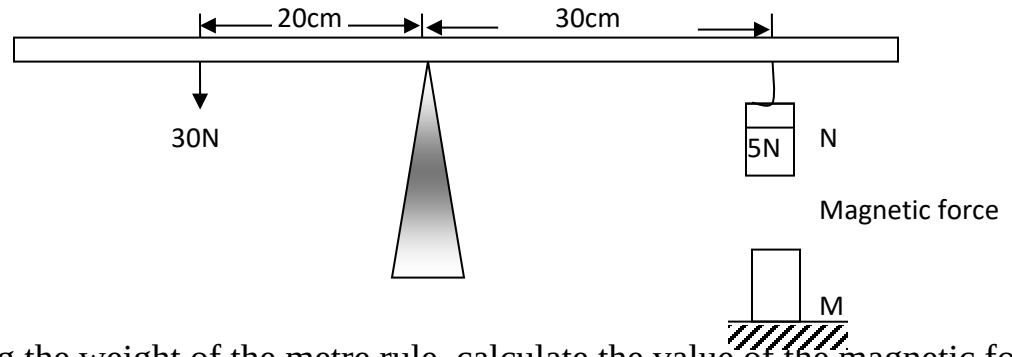
Fig. 1

If the vernier callipers used had a zero error of -0.02 what is the actual reading of the scale**.** **(2mks)**

3. The figure below shows two cylinders of different cross-sectional areas connected with a tube.Opposing forces P and Q are applied to the pistons such that the pistons do not move. If the Pressure on the larger piston is 20 N/cm^2. Determine force Q. **(3 mks)**



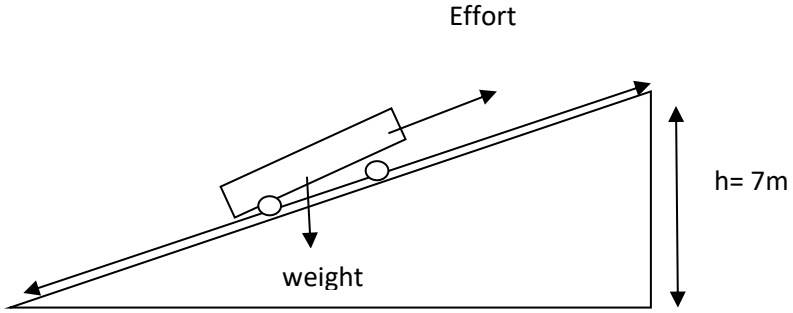
4. A uniform metre rule is balanced at its centre. It is balanced by the 30N, 5N and the magnetic force between **M** and **N**. **M** is fixed and **N** has a weight of 5N



a) Ignoring the weight of the metre rule, calculate the value of the magnetic force between M and N **(3 mks)**

b) Given that the lower end of M is North Pole, state polarity of the end of N facing M. **(1 mk)**

5. The figure below shows a trolley of weight 25N pulled by a force of 10N from the bottom to the top of an inclined plane at a **uniform speed**. The slant height is 40 m.



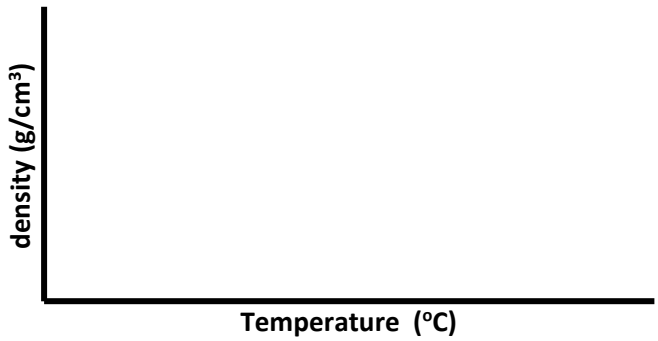
State the value of the force acting downwards along the inclined plane. **(1mk)**

6. Explain how the value in (5) is obtained. **(2mks)**

7. The pressure of the air inside a car tyre increases if the car stands out in sun for some time on a hot day. Explain the pressure increase in terms of the kinetic theory of gases. **(3 mks)**

8. Why it is possible to compress gases but not solids or liquids **(1mk)**

9. One the axis provided, sketch a graph of density against temperature of water from 0^{o} to $20^{o}C$. **(2mks)**

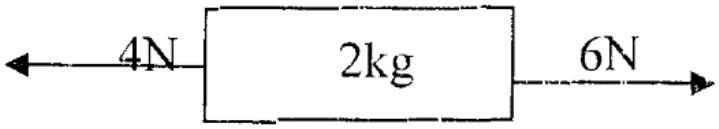


10. During anomalous expansion of water, heat transfer is limited to conduction and radiation only explain **(1mk)**

11. A girl heats 5kg of water to a temperature of 80°C. When she adds m kg of water at 15°C the mixture attains a temperature of 40°C. Determine the value of m **(2mks)**

12. 100 drops of oil, of density 800kg/m^3 are found to have a total mass of 2 x 10-^{4} kg. One of the drops is placed on a large clean water surface and it spreads to form a uniform film of diameter 50 cm^2. Determine; the diameter of the oil molecule. **(2 mk)**

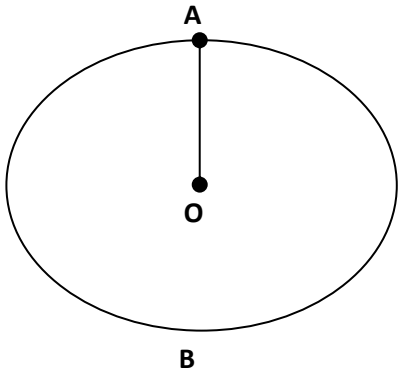
13. The forces act on a trolley as shown below.



Find the acceleration of the trolley. **(2mks)**

SECTION B (55MKS)

14. (a) The figure below shows a stone of mass 450g rotated in a vertical circle at 3 revolutions per second. If the string has a length of 1.5m, determine:



(i) The linear velocity **(3mks)**

(ii) The tension of the string at position **A** **(3mks)**

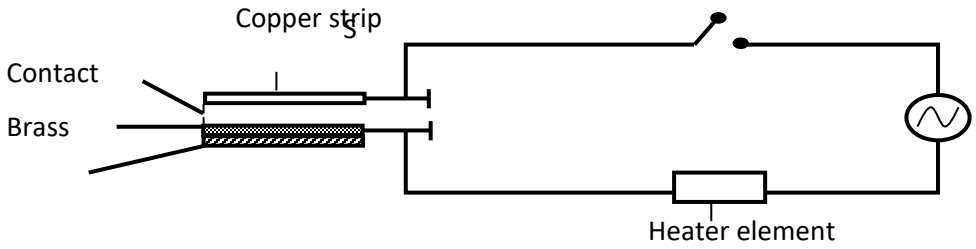
b) On the same diagram indicate the path that the stone will follow if the string snaps at point **B** **(1 Mk)**

(c) A stone is whirled with uniform speed in horizontal circle having radius of 10cm. It takes the stone 10 seconds to describe an arc of length 4cm. Determine:

(i) The angular velocity **ω** **(3mks)**

(ii) The period **T** **(3mks)**

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



(i) State the purpose of the bimetallic strip. **(2mks)**

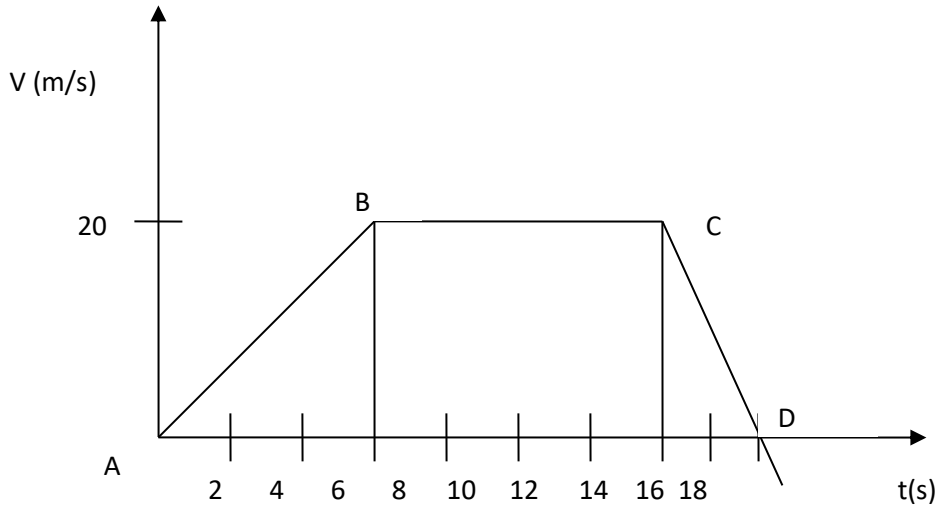
(ii) Describe how the circuit controls the temperature when the switch S is closed.
(3 Marks)

(b) (i) Differentiate between the term heat capacity and specific heat capacity of a substance **(2Mks)**

(ii) An electric kettle rated 2.5kW is used to raise the temperature of 3.0kg of water through 50^0C.

Calculate the time required to effect this (Specific heat capacity of water is 4200j/kgK)
(3 Marks)

16. The figure below shows a velocity time graph for the motion of a body of mass



5Kg

a) Use the graph to determine the:

i) Displacement of the body after 12 seconds. **(3mks)**

ii) Acceleration after point C; **(3mks)**

iii) Force acting on the body in part (a) (ii) **(3mks)**

b) Sketch a displacement-time graph for the motion from point B to D. **(2mks)**

17. (a) (i) State 2nd Newton's law of motion. **(1 Mark)**

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

(b) A ball of mass 100g is dropped from a height of 1.25m above the ground surface. It rebounds to a height of 1.1m. If the time of impact was 0.5 s. Calculate

(i) Velocity of ball before impact **(2 Marks)**

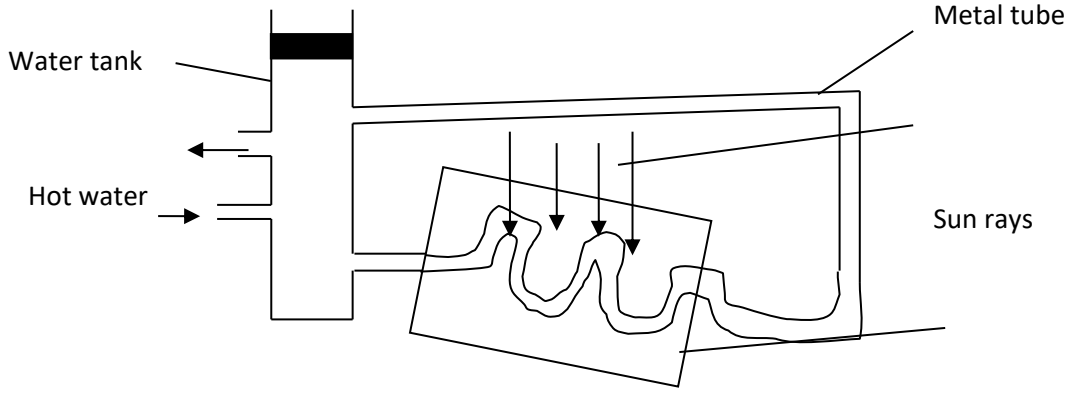
(ii) Force of impact (Take g = 10N/kg) **(3 Marks)**

(d) (i) Distinguish between elastic and inelastic collision **(2Mks)**

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

18. a) State two forms of energy received directly from the sun **(2 marks**

b) The diagram below shows a simple solar heater for domestic use. The inside of the box and the metal tube are both painted black. The bent portion of the metal tube is placed on saw dust in a wooden box. The box is covered with a glass plate and arranged such that the rays from the sun fall on the plate.



i) The metal tube is made of copper. Why is copper preferr

ii) Why is the metal tube in the box coiled **(1mk)**

iii) Explain why the inside of the box is painted black. **(2mks)**

iv) What is the purpose of the saw dust in the set up? **(1mk)**

c) Explain briefly how the solar water heater works. **(3mks)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 5 PAPER 2

TIME: 2 HRS

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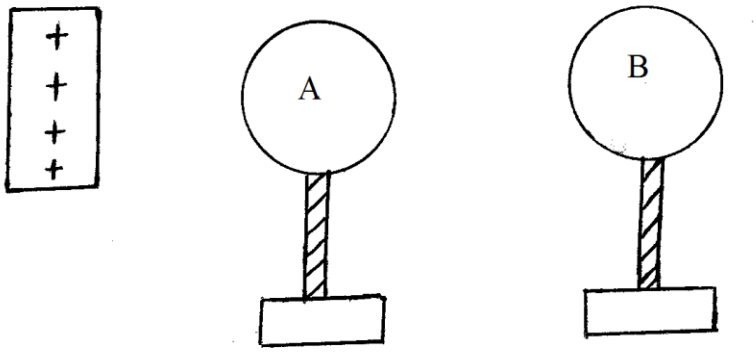
SECTION A: 25 MARKS

1. A positively charged rod is brought close to two spheres A and B, held by insulating handles as shown below.



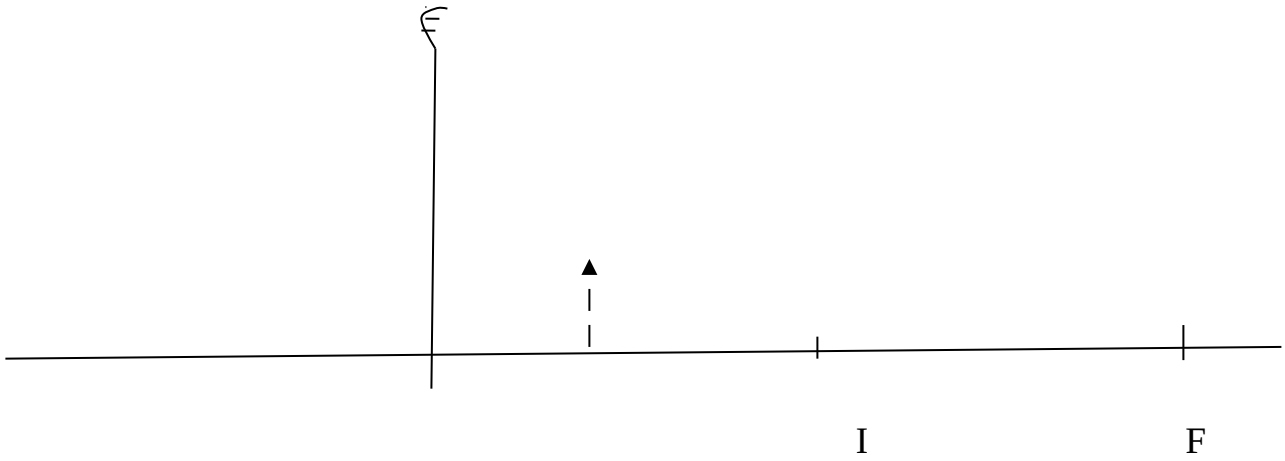
Sphere B is earthed and the positively charged rod withdrawn. The earth connection is then disconnected. In the space below draw a diagram to show the final charge distribution on A and B. **(2 marks)**

2. Define the term frequency . **(1mark)**

3. A boy scout standing a distance ,X,from a tall building blows a whistle and hears its echo, 1.7seconds later. Determine the distance ,X,between the boy and the wall given that the speed of sound in air is 340m/s. **(3marks**

4. State one defect of a simple cell . **(1mark)**

5. The diagram below shows the image formed by a convex mirror. Complete the diagram to show the position of the object **(3marks)**

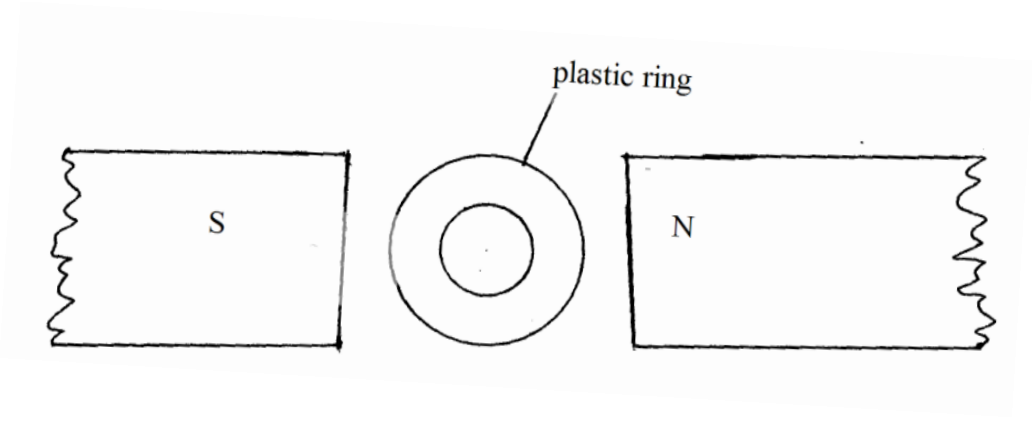


c

6. State one advantage and one disadvantage of using a convex mirror as a driving mirror. **(2 marks)**

ADVANTAGE	DISADVANTAGE

7. The figure below shows two poles of a magnet and ring of plastic placed between them. Show the magnetic lines of force between the two poles **(1 mark)**



8. The figure below shows a plane mirror suspended using a string and makes an angle of 50^0 to the ceiling.

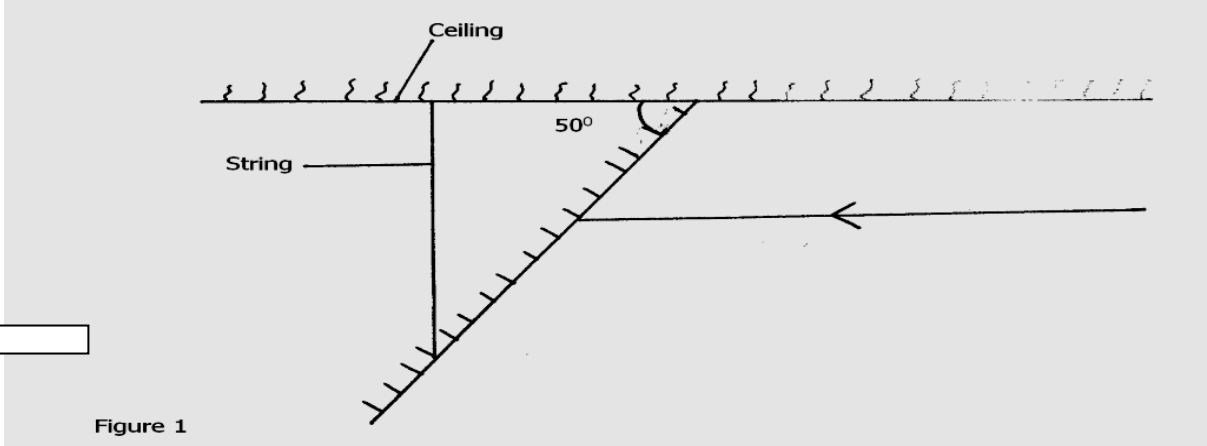
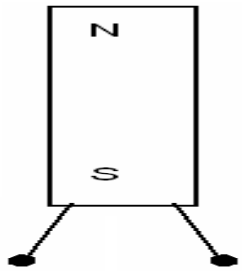


Figure 1

A ray of light strikes the mirror horizontally as shown above. Trace the path of reflected ray. Show all the angles. **(2 marks)**

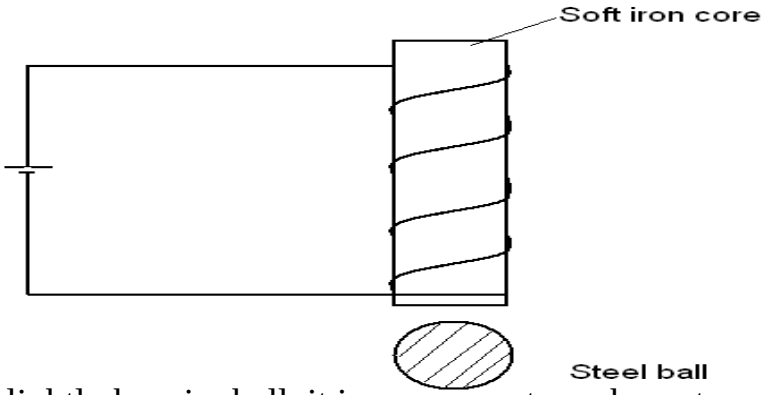
9. In the diagram below, two pins are attached to the end of a magnet as shown.



Explain the behaviour of the pins. **(2 marks)**

10. State the effect of increasing the separation distance between the plates of a capacitor on the capacitance . **(1 mark)**

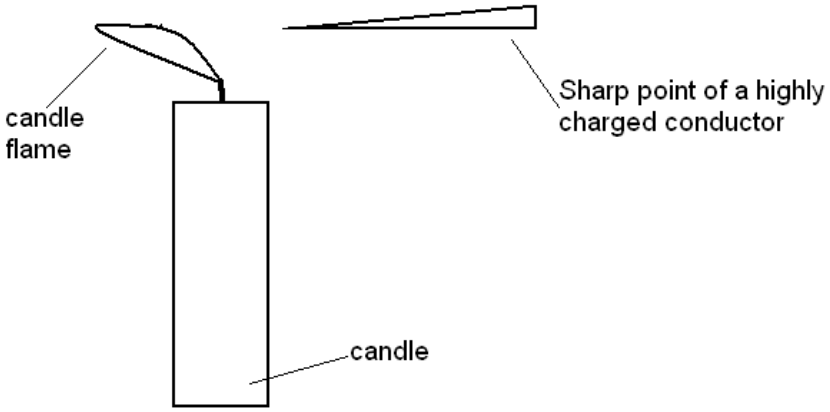
11. The figure below shows an electromagnet that may be used in a laboratory to lift and then release a small steel ball.



In order to lift a slightly heavier ball, it is necessary to make a stronger electromagnet. State two ways in which the electromagnet could be made to lift a heavier steel ball. **2 mks**

12. An electric iron rated 250V, 3000w is connected to a 250V mains supply through a 5A fuse. Determine whether the fuse is suitable or not. **(3 marks)**

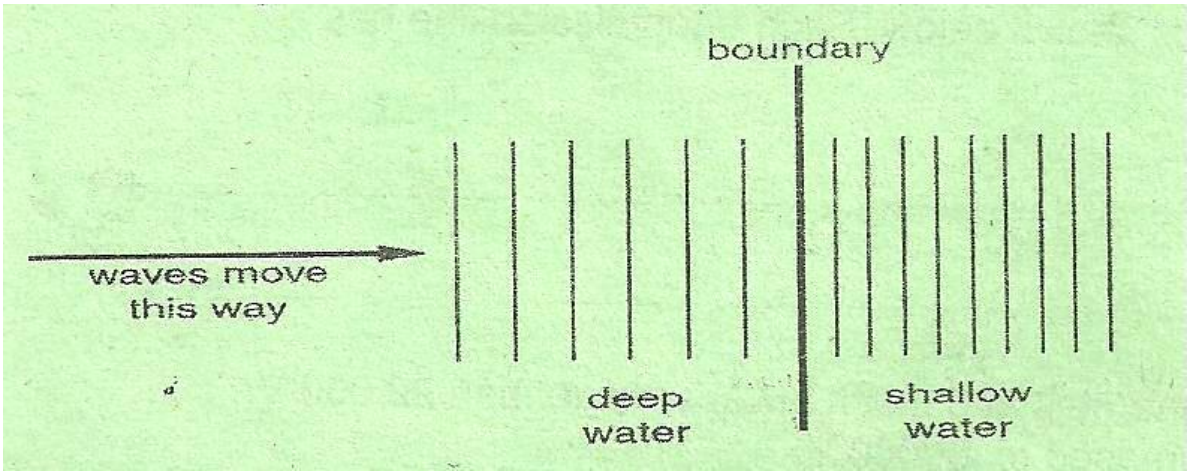
13. The diagram below shows a sharp pointed highly charged conductor. When brought very close to a candle, the flame bends as shown below.



State with reason the charge on the conductor**.** **(2 marks)**

SECTION B (55 MARKS)

14. Plane water waves produced in a ripple tank are passed from a region of deep water into a region of shallow water. The figure shows what the waves look like from the top of the tank..



(a) State what happens at the boundary to:

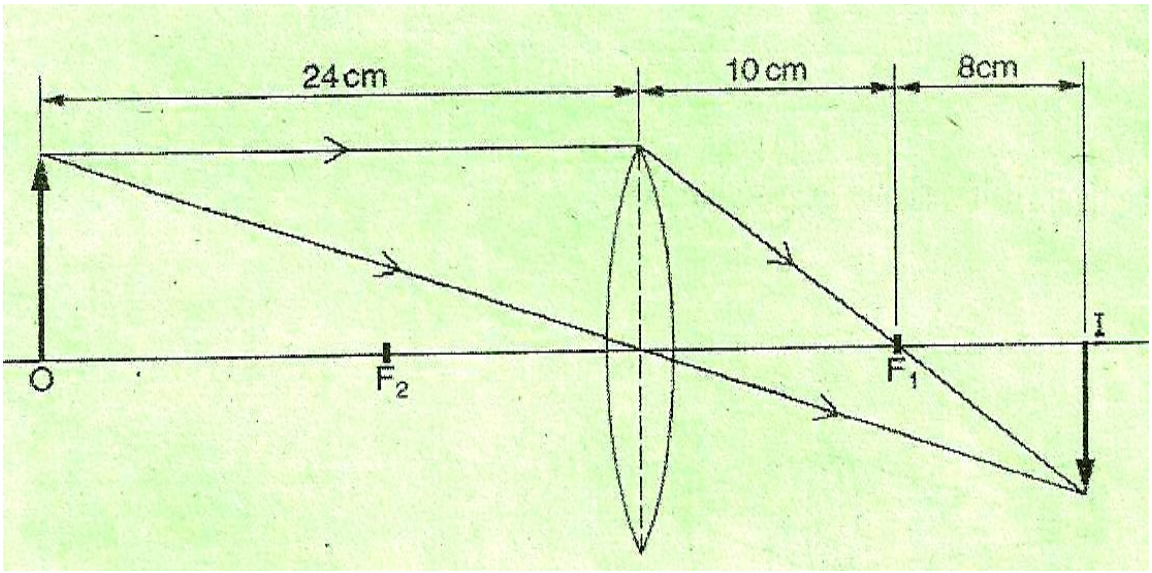
(i) The frequency of the waves. **(1 mark)**

(ii) The speed of the waves **(1 mark)**

(iii) The wavelength of the waves **(1 mark)**

(b) The waves have a speed of 24cm/s in the deep water. Consecutive wave crests are 0.08m apart in the deep water. Calculate the frequency of the source producing the waves. **(2 marks)**

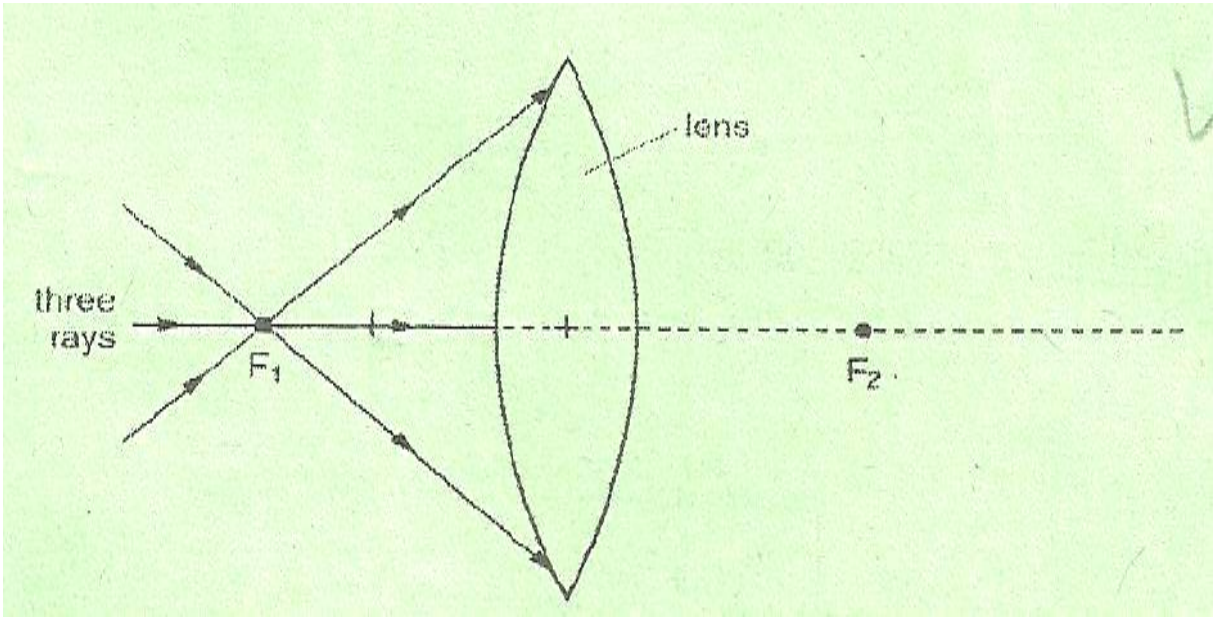
c) The figure below shows how an image is formed by a converging lens.



(i) State the value of the focal length of the lens. **(1 mark)**

(ii) Determine the magnification of the image produced. **(2 marks)**

(b) The figure shows a glass lens in air and its two focal points F_1 and F_2.



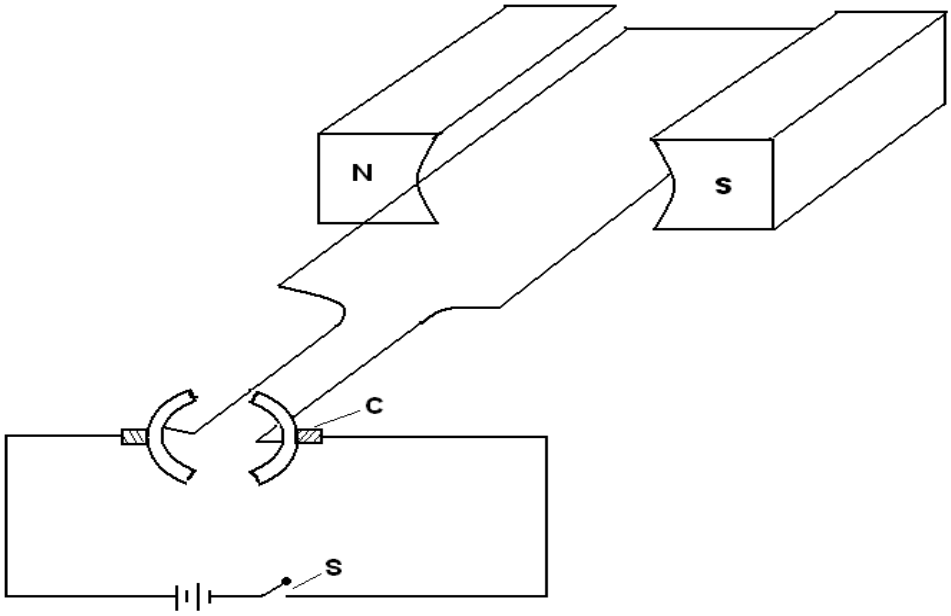
Three rays of light pass through F_1 to the lens.

On the figure above show the path followed by the three rays through the lens and into the air. **(1mark)**

State one possible causes of myopia . **(1 mark**

State the type of lens that is used to correct myopia**.** **(1 mark)**

15. The diagram below shows a simple electric motor.



(a) Name the part labeled C. **(1 mark)**

(b) (i) State one factor that will affect the speed of rotation of the motor. **(1mark)**

(ii) By use of an arrow, show the direction in which the coil will rotate when the switch s, is closed. **(1 mark)**

(c) With the aid of a diagram, illustrate how a telephone receiver operates. **(3 marks)**

(d) (i) State the Lenz's law. **(1 mark)**

(ii) A transformer is designed to operate a 100w, 20V lamp when connected to a 250Vmains supply . Calculate the current that would be drawn from the mains if it is 90% efficient. **3 marks)**

16. The table below is that of electromagnet spectrum with radiations arranged in order of decreasing wavelength.

RADIO WAVES	A	INFRA RED	B	ULTRA VIOLET	C	GAMMA RAYS

a) Identify radiations A,B and C. **(3 marks)**

b) State two properties of electromagnetic waves **(2 marks)**

c) Distinguish between X-rays and Gamma rays in terms of their production. **(2 marks)**

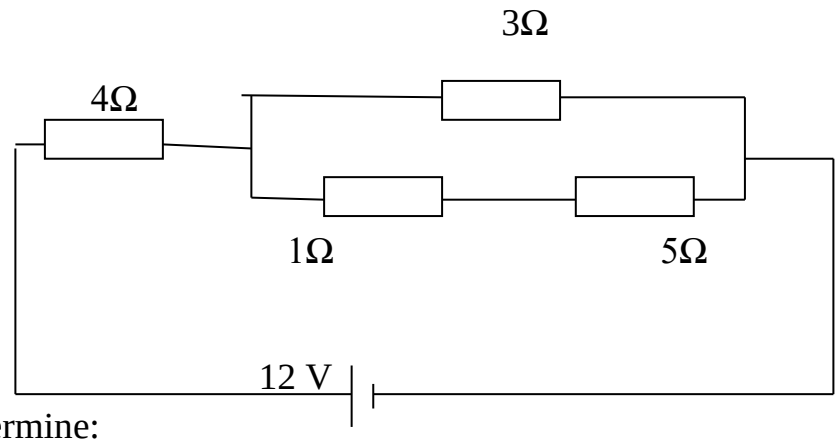
d) State one method of detecting radiowaves. **(1 mark)**

e) An electromagnetic wave has a frequency of 4.5×10^{14}Hz. Given that the speed of light is 3×10^{8}m/s, determine its wavelength. **(3 marks)**

17. a) State Ohm,s **law** **(1 mark)**

b) Differetiate between electromotive force and potential difference**.** **(2marks)**

c) Four resistors are connected as shown in figure below .



Determine:

(i) The total resistance in the **circuit** **(2 marks)**

(ii) The total current flowing through the circuit**.** **(3 marks)**

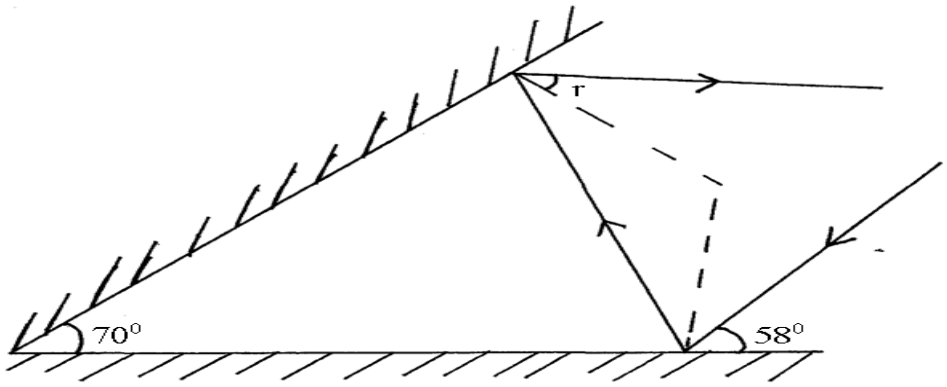
(iii) The potential difference across the 4Ω resistor. **(3 marks)**

(iv) The current through the 3Ω resistor . **(3 marks)**

18. a) State one law of reflection . **(1 mark)**

b) A pupil stands 3m in front of a plane mirror. She then moves 1.8m away from the mirror.Determine the distance between the pupil and her image. **(2 marks)**

c) The figure below shows the path followed by a ray of light on striking two mirrors inclined at an angle of 70^0 to each other.



Determine the angle labeled r. **(2 marks)**

d) State the effects of the following on the size of image formed by a pinhole camera:

i) Decreasing object distance **(1 mark)**

ii) Increasing image **distance** **(1 mark)**

e) Determine the angle at which two plane mirrors should be inclined to form 39 images **(2marks)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 6 PAPER 1

TIME: 2 HRS

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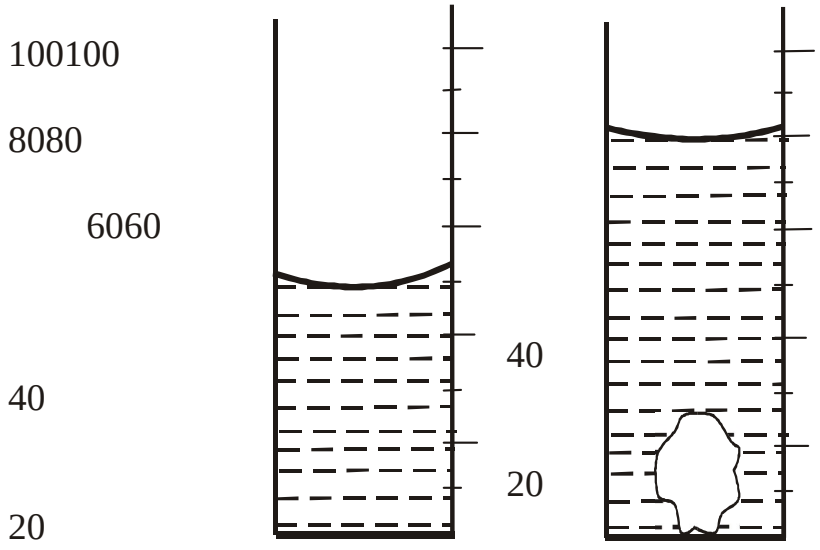
SECTION A: 25 MARKS

1. The figure below shows the change in volume of a liquid in a measuring cylinder when an irregular solid is immersed in it.

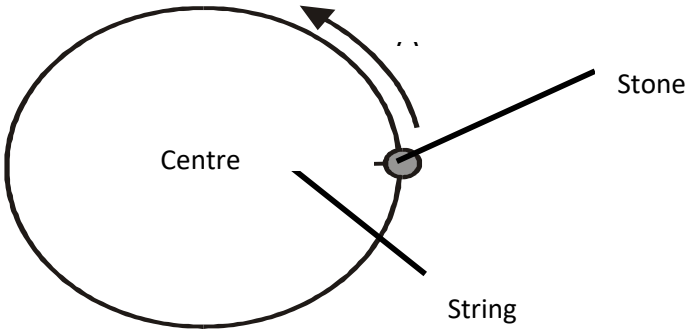


Given that the mass of the solid is 540g, determine the density of the solid in g/cm^3.

(2 marks)

2. Explain how a metal gauge placed between Bunsen flame and a glass vessel prevents the glass vessel from breaking during heating. **(2 marks)**

3. The figure below shows the path of a stone attached to a string whirled in a space in a horizontal circle.

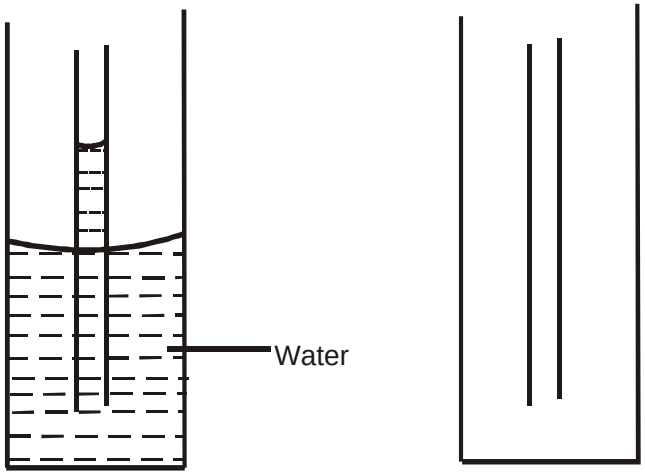


Sketch on the diagram the path the body follows if the string breaks when the body at the position shown. **(1 mark)**

4. State the function of the constriction in a clinical thermometer. **(1 mark)**

5. An oil drop has a diameter of 0.05cm.It forms a circular oil film of diameter 20cm when dropped on the surface of matter. Determine the thickness of the film. **(3 marks)**

6. The diagram below shows a capillary tube immersed in water.



(a) (b)

Using figure (b) sketch to show the appearance of the capillary tube if it was inserted in mercury. **(1 mark)**

7. An unloaded spring has a length of 15cm and when under a load of 24N it has a length of 12cm.What will be the load on the spring when the length is 10cm. **(1 mark)**

8. The total weight of a car with passengers is 25 000N.The area of contact of each of the four tyres with the ground is $0.025m^2$. Determine the minimum car tyre pressure. **(2 marks)**

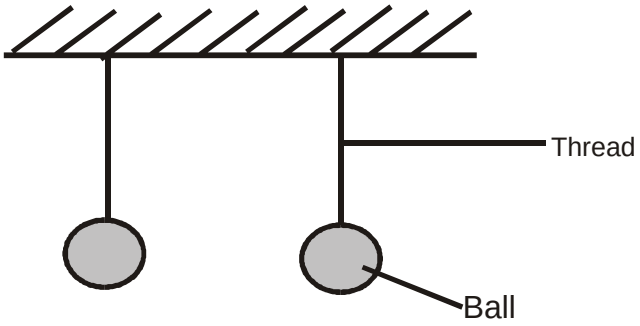
9. A conical flask is filled with water. The flask is fitted with a cork through which a tube is inserted. When the flask is cooled, the water level rises slightly, the falls steadily Explain this observation. **(2 marks)**

10. A dry manufacturer gives the mass of the active ingredient in a tablet as 5mg.Express this quantity in Kg and in standard form. **(1 mark)**

11. When a body of mass 0.25kg is acted on a force, its velocity changes from 5.0m/s to 7.5m/s. determine the work done by the force. **(3 marks)**

12. A car traveling at 72km/h undergoes a uniform acceleration of $0.5m/s^2$.Find the time taken for its velocity to decrease to one quarter of the initial value. **(3 marks)**

13. The figure below shows two balls suspended from threads a short distance apart.

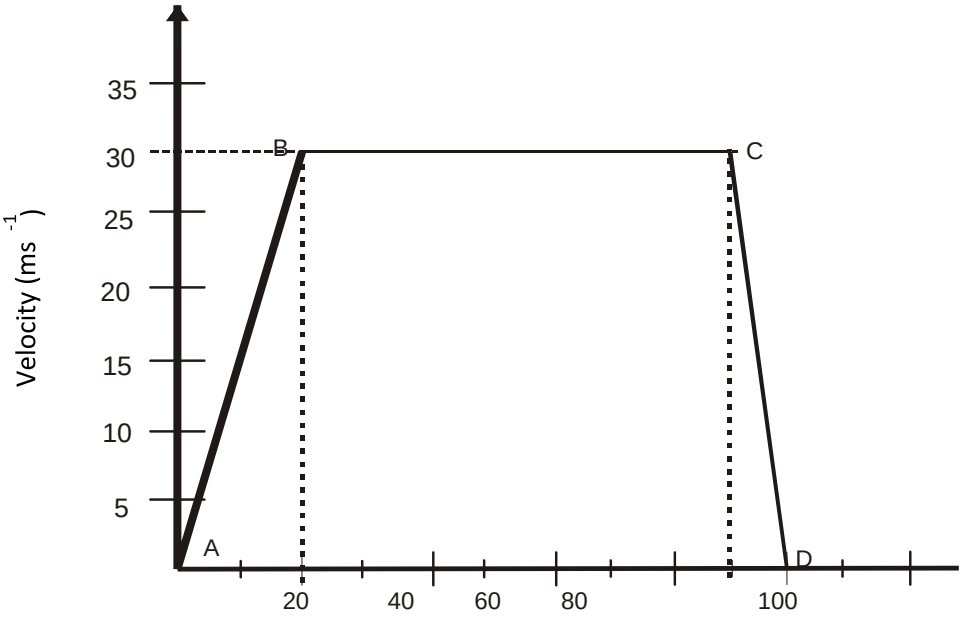


A stream of air is blown between the balls in a horizontal direction. Explain what is observed. **(2 marks)**

SECTION B (55 MARKS)

15. a) Define the term velocity. **(1 mark)**

b) The following figure shows the velocity-time graph for the journey of a car in 100 minutes.



i) Determine the acceleration of the car between A and B and between C and D. **(2 marks)**

ii) Determine the distance covered by the car during the journey. **(2 marks)**

iii) Determine the average velocity of the car. **(2 marks)**

c) A ball rolls off o platform of height 1.8m at a horizontal speed of $15ms^{-1}$.How far off the edge of the platform does it land. **(4 marks)**

16. a) State what is meant by the term specific latent heat of vaporization. **(1 mark)**

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

Mass of calorimeter =50g

Initial mass of water =70g

Final mass of calorimeter + water + condensed steam = 123g

Initial temperature of water + calorimeter = 5^0 C

Final temperature of mixture = 30^0C

(specific heat capacity of water=$4200JKg^{-1}K^{-1}$ and specific heat capacity of copper=$390\ JKg^{-1}K^{-1}$.} Determine:

i) Mass of the condensed steam. **(1 mark)**

ii) Heat gained by calorimeter alone **(2 marks)**

iii) Heat gained by water only. **(2 marks)**

iv) Given that L is the specific latent heat of evaporation of steam

I. Write an expression for the heat given out by steam. **(1 mark)**

II. Determine the value of L **(3 marks)**

17. a) Define a radian **(1mk)**

b) Three masses are placed in a rotating table at distances 6cm, 9cm and 12cm respectively from the centre of rotation. When the frequency of rotation is varied it is noted that each mass slides off at a different frequency of rotation of the table. Table 1 shows the frequency at which each mass slides off.

Radius, r (cm)	12	9	6
Sliding off frequency rev/s	0.68	0.78	1.0

i) State two factors that determine the frequency at which each mass slides off. **(2 marks)**

ii) Oil is now poured on the table before placing the masses. Explain the effect of this on the frequency at which the mass slides off. **(2 marks)**

c) A marked point on a rim of a wheel has a linear velocity of 11.2m/s. if the rim has a radius of 0.8.

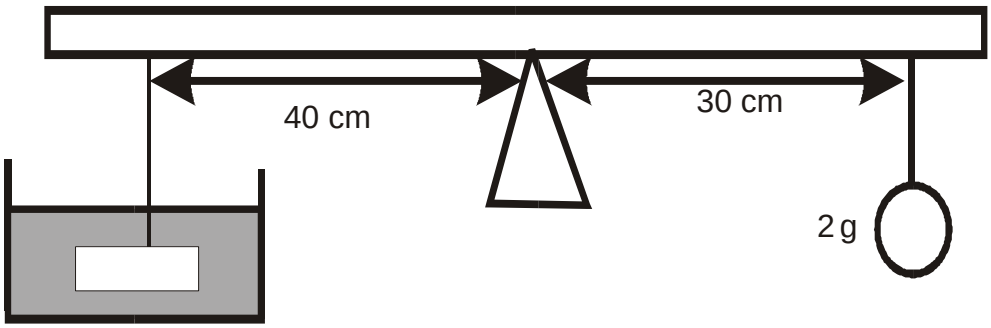
Calculate;

i)The angular velocity of the point **(3 marks)**

ii)The centripetal acceleration . **(2 marks)**

18. a) State Archimede's principle. **(2 marks)**

b) The figure below shows a black of mass 25g and density 2000kg/m^3 submerged in a certain liquid and suspended from a uniform horizontal beam by means of a thread. A mass of 2g is suspended from the beam as shown.



i) Determine the thrust force acting on the liquid. **(3 marks)**

Calculate the density of the liquid**.** **(3 marks)**

c) The rubber used to make a balloon weighs 0.1kg.The balloon is inflated to a volume of $0.5m^3$with hydrogen whose density is $9.0 \times 10^{-2} Kg/m^3$.What is the maximum load the balloon can lift.

(Density of air=$1.3Kg/m^3$) **(4 marks)**

19.a) State the Boyle's law. **(1 mark)**

b) The table below shows the result obtained in the experiment to study the variation of the volume of a fixed mass of a gas at constant temperature.

Pressure (cmHg)	90	60		27
Volume (cm^3)	24	40		

Fill in the missing results. **(3 marks)**

c) Use the table in (b) above to plot a graph of pressure against 1/v. **(6 marks)**

d) What quantity does the slope of eth graph in (c) above represent? **(1 mark)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 6 PAPER 2

TIME: 2 HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

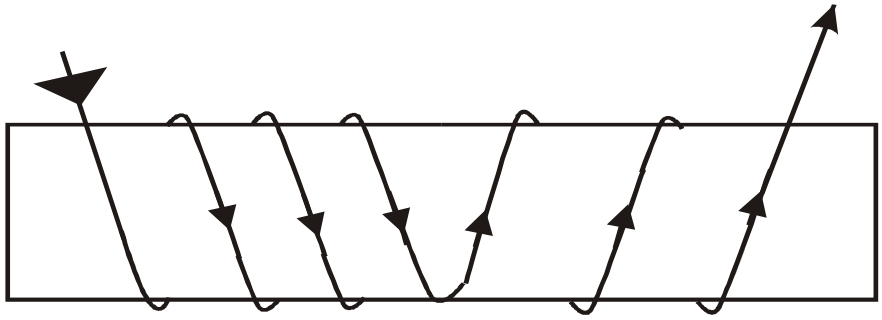
DATE……

SECTION A: 25 MARKS

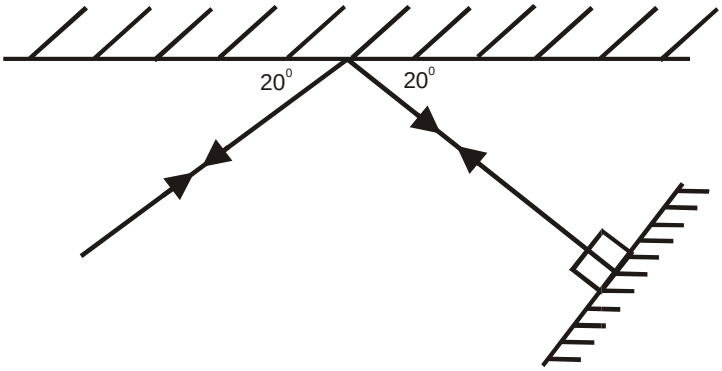
1. State what is meant by polarization in a simple cell. **(1 mark)**

2. Determine the total capacitance of the arrangement below. **(1 mark)**

3. Indicate the poles of the electromagnet shown in the figure below. **(1 mark)**



4. The following diagram shows the path of light after striking two mirrors at an angle.

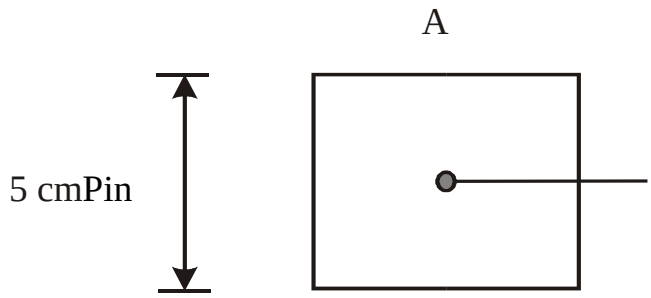


Determine the angle between the two mirrors.

5. A cell of e.m.f E volts and internal resistance r ohms is connected to an external resistor R.A current I amperes flows through the circuit. Write an expression relating E,r,R and I. **(1 mark)**

6. A radio station broadcasts at a frequency of 96.4MHz.What is the wavelength of its radio waves. **($C=3.0x10^{8}ms^{-1}$).** **(1 mark)**

7. A vertical pin is fixed at the centre of a rectangular container with thin transparent walls as shown below.



A transparent liquid is then poured into the container.When viewed from side A, the distance of the pin is1.9cm from the edge,determine the refractive index of the liquid.**2 mk**

8. When a candle flame is brought near the cap of a charged electroscope, the electroscope discharges.

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

9. State the function of a fuse in a circuit. **(1 mark)**

10. Sketch a ray diagram to show the image formed when a convex lens is used as a simple microscope. **(2 marks)**

11. What is meant by threshold frequency as used in photoelectricity. **(1 mark)**

12. Give the difference between real and virtual image. **(2 marks)**

13. A charge of 360 coulombs flows through a lamp every minute. Calculate the number of electrons involved (electron charge is 1.6×10^{-19}C). **(3 marks)**

14. X-Rays are produced by a tube operating at 1.0×10^{4}V.Calculate their wavelength (Take h=6.6×10^{-34}JS,e=1.6×10^{-19} C, c=3.0×10^{8}ms^{-1}.). **(3 marks)**

15. The following is part of a radioactive decay series.

$$^{234}_{83}Bi \xrightarrow{\beta} {}^{a}_{84}X \longrightarrow {}^{230}_{b}Y$$

Determine the values of a and b. **(2 marks)**

SECTION B (55 marks)

16. a) Define the term principal focus as applied in thin lenses. **(2 marks)**

b) A lens forms a clear image on a screen. When the distance between the screen and the object is 80cm,

the image is 3 times the size of the object.

i) Explain the type of lens used. **(2 marks)**

ii) Determine the distance of the image from the lens. **(3 marks)**

iii) Determine the focal length of the lens. **(2 marks)**

c) i) Define the term 'refractive index' of a material. **(1 mark)**

ii) A microscope is used to focus a mark on a surface .When a rectangular glass block 30mm thick is placed on the mark,

17.a) Define work function as used in photoelectric effect. **(1 mark)**

b)Give one application of photoelectric effect **(1mark)**

b) In an experiment to observe photoelectric emission from a clean caesium surface, the following readings were obtained.

Stopping potential (V)	0.6	1.0	1.4	1.8	2.2
Frequency ($x10^4$Hz)	6.0	7.0	8.0	9.0	10.0

i) Plot a graph of stopping potential V_S (y-axis) against frequency **(5 marks)**

ii) From the graph, determine the threshold frequency of the surface**.** **(1 marks)**

iii) Use the graph to determine plank's constant.(Charge of electron=$1.6x10^{-19}$C).**(3 mark)**

iv) Calculate the work function of the metal**.** **(3 marks)**

v) Calculate the threshold wavelength of the radiation.($c=3.0x10^8$). **(2 marks)**

18.a)An x-ray tube produces x-rays whose wavelengths vary from $6.0x10^{-13}$ to $6.0x10^{-13}$m. Determine.

i)The range of the frequency of the x-rays. **(3 marks)**

ii)The highest energy of the x-rays.($c=3.0x10^8$ and $h= 6.6x10^{-34}$ JS**).** **(3 marks)**

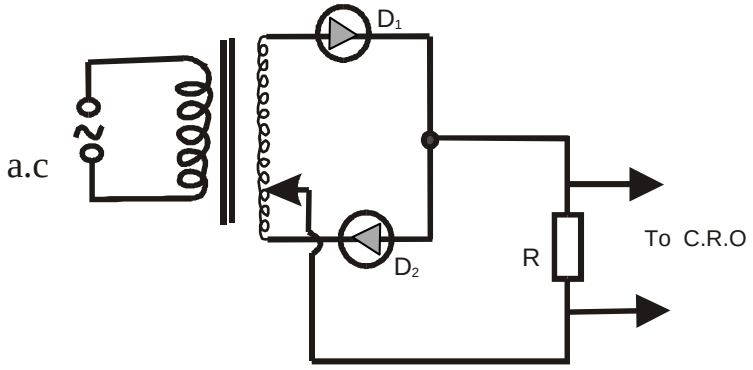
b)The primary coil of a transformer has 1200 turns and the secondary coil has 60 turns. The transformer is connected to a 240V a.c source.

Determine:

i) The output voltage. **(2 marks)**

ii) The output current when the primary coil has a current of 0.5A. (Assume there are no energy losses.) **(3 marks)**

c) A student connected a circuit as shown below, hoping to produce a rectified output.

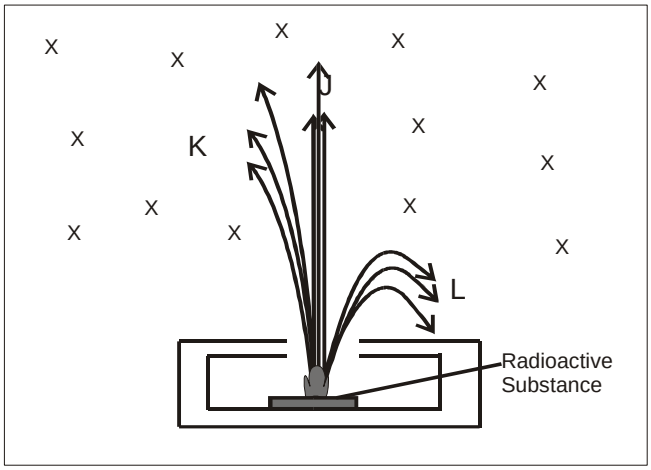


i) Sketch the graph of the output as seen on the C.R.O screen. **(2 marks)**

ii) Explain how this output is produced. **(2 marks)**

19. a) Define the term radioactivity. **(1 mark)**

b) Radiations from a radioactive isotope were subjected to a strong magnetic field .The results are represented in the figure below.



Identify the radiations J and K giving a reason for your choice. **(4 marks)**

(1 marks)

a)J……

Reason **(1 mark)**

b)K…….. **(1 mark)**

Reason

(1 mark)

KCSE FINAL PREDICTION

PHYSICS

TRIAL 7 PAPER 1

TIME: 2 HRS

NAME…… INDEX NO……..…

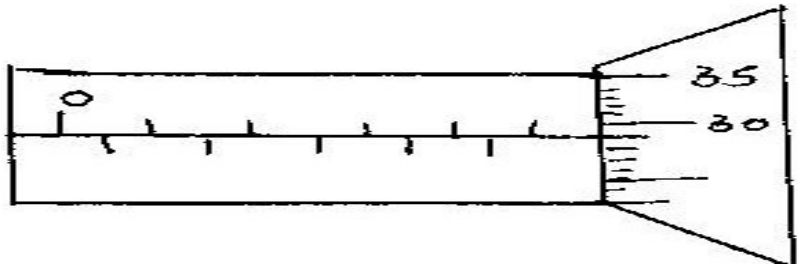
SCHOOL…….. SIGN……

DATE……

SECTION A: 25 MARKS

1) The micro-meter screw gauge below has a zero error of -0.19mm.

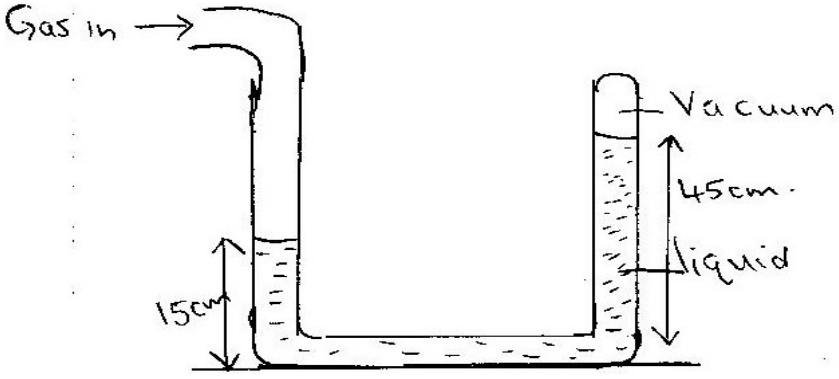
Figure 1



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

2) An object weighs 8.0 N on Earth. What would its weight be on another planet of gravitational acceleration 6.25 N/kg given that acceleration due to gravity on earth is 9.8N/kg **(2mks)**

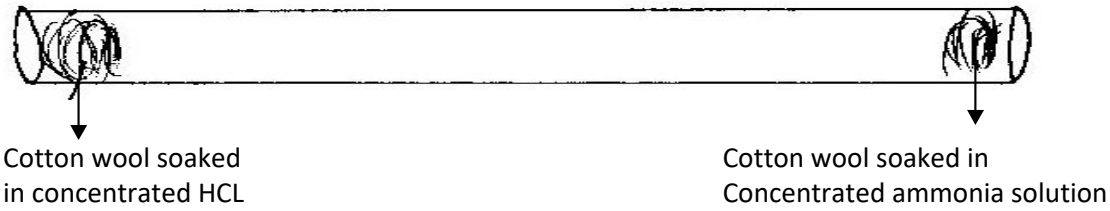
3) The figure below shows a manometer closed at one end and the other end connected to gas cylinder. Figure 2



The liquid has a density of 1.2g/cm^3.Calculate the pressure due to the gas. **(2mks)**

4) Some cotton wool soaked in concentrated ammonia solution and hydrochloric acid were placed at the ends of a glass tube as shown.

Figure 3

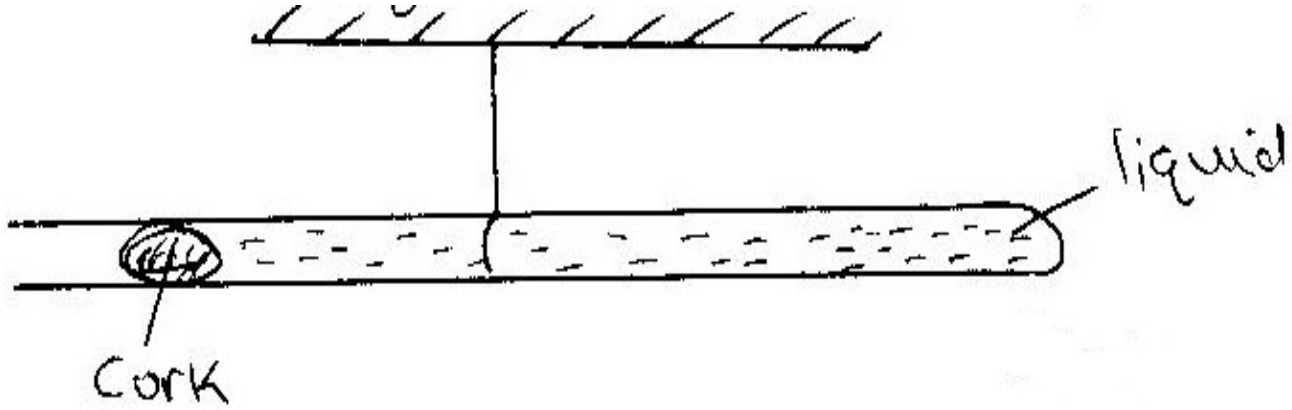


After sometime a white deposit of ammonium chloride forms on the walls of the tube. Using a tick show where the deposit is formed **(1mk)**

Explain your observation. **(1mk)**

5) The figure below shows a liquid in a long cylindrical tube closed at one end with a cork. The cork is tight fitting but movable. The system is in equilibrium.

Figure 4



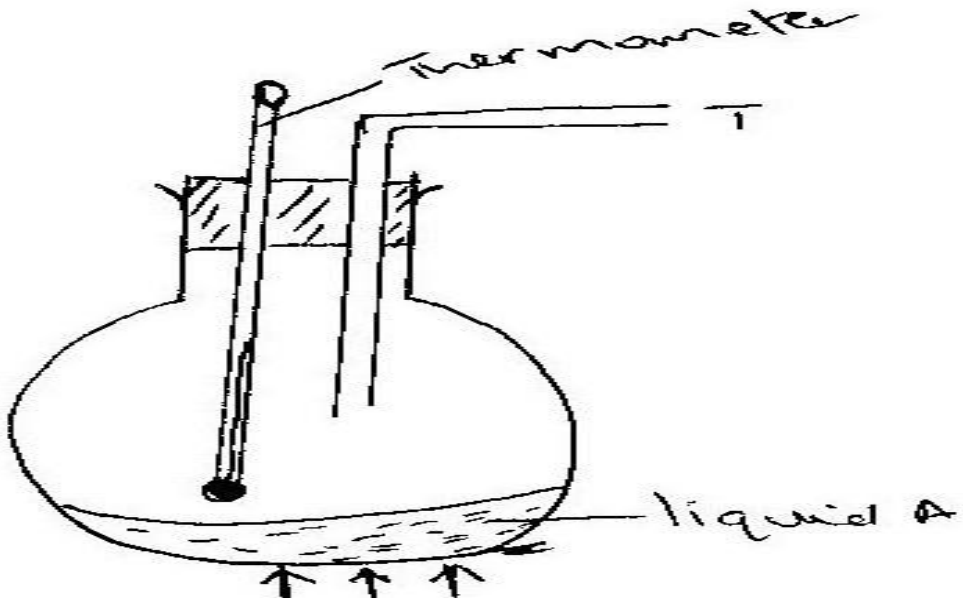
State two observations that would be made when the tube is gently heated uniformly

Briefly explain your observations **(2mks)**

6) a) What do you understand by the term upper fixed point **(1mk)**

b) The diagram below shows an arrangement used to determine the upper fixed point of a thermometer which is not graduated.

Figure 5

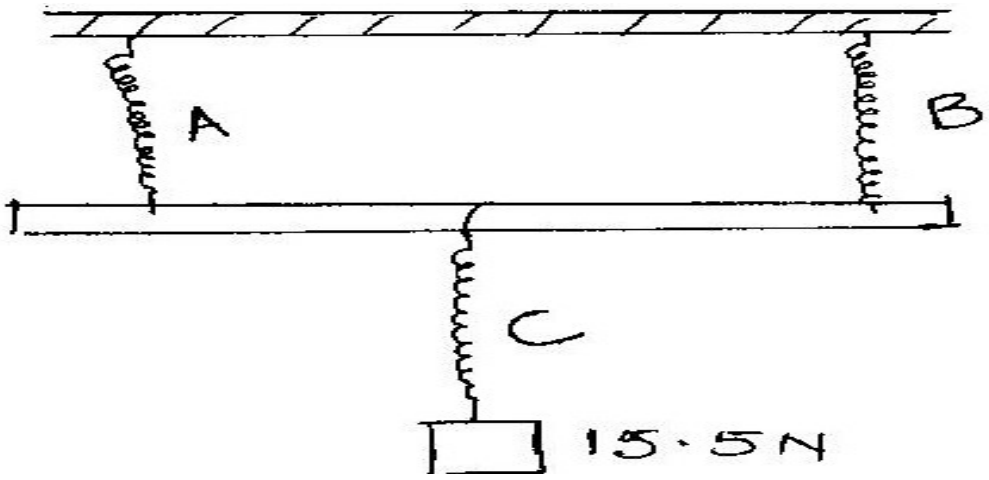


Name liquid A **(1mk)**

Why is the bulb of thermometer not dipped in liquid A **(1mk)**

7) Three identical springs A,B and C are used to support a 15.5N weight as shown below.

Fig 6



If the weight of the horizontal beam is 0.5N, determine the extension of each spring given that 4N causes an extension of 1cm **(3mks)**

8) By the use of a diagram explain how a strong wind can lift off the roof of a building. **(2mks)**

9) Two stones of equal masses are hung as shown below. One hangs from an inextensible thread while the other hangs from an inextensible thread tied to a light spring as shown below. When the two masses are raised to the same height and suddenly dropped, thread A breaks while B does not explain **(3mks)**

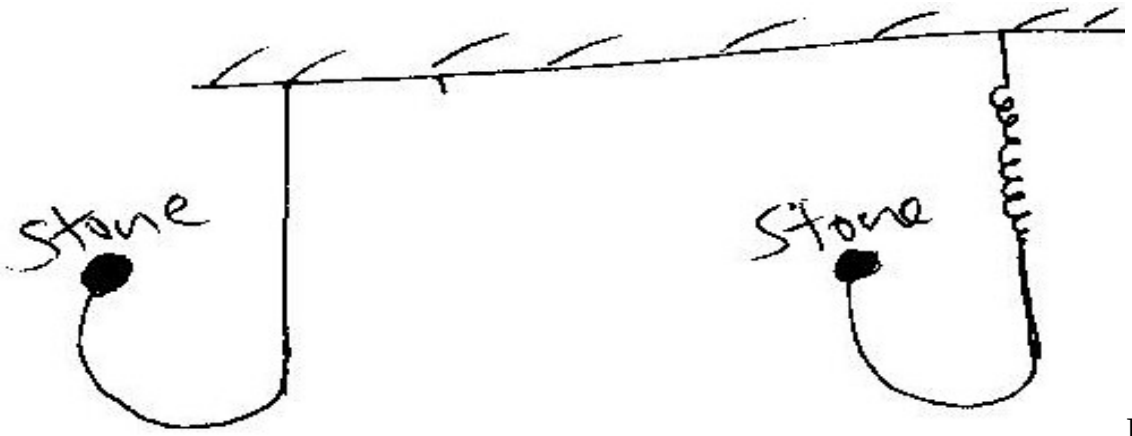


Figure 7

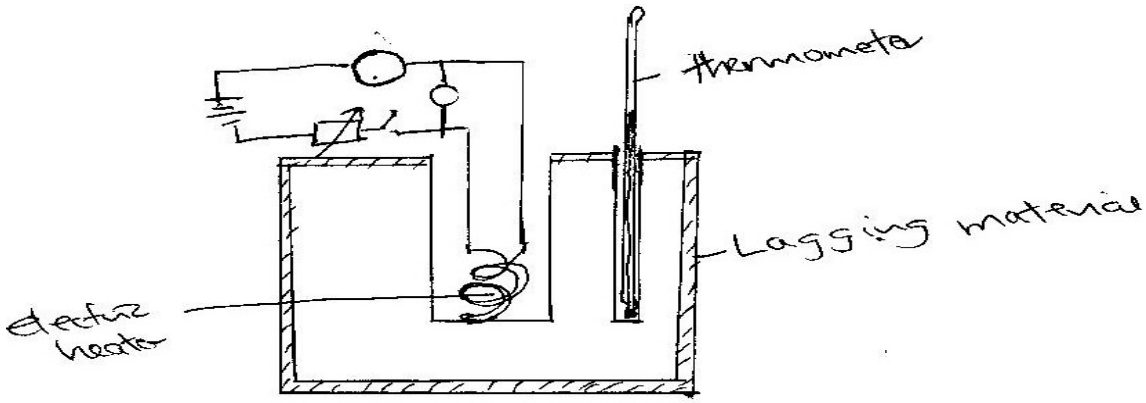
10) A volume of $1.0m^3$ of the gas was collected at atmospheric pressure and temperature 27º C. This gas was compressed into a cylinder of volume $0.2m^3$ and stored at 20º C .At what pressure was this gas stored (atmospheric pressure 1atm) **(2mks)**

SECTION B(55 marks)

11) a) A hot room cannot be cooled by leaving the door of a refrigerator

b) The set-up below is used to determine the specific heat capacity of an aluminum block.

Figure 8



Label the voltmeter and ammeter in the diagram **(2mks)**

State and explain two precautions taken in the above experiment **(4mks)**

In such an experiment a heater rated 2500w was switched on for 2 minutes. Within this time the temperature of the block rose from 16º C to 186º C. If the block has a mass of 2kg, what is the specific heat capacity of aluminum? **(3mks)**

12) a) State 2 factors that affect the magnitude of centripetal force of an object moving a long a curved path. **(1mk)**

b) A stone is tied to a light string of length 0.5m if the stone has a mass of 20g and is swung in a vertical circle with a uniform angular velocity of 6 revolutions per second determine:

The period , T **(2mks)**

The tension of the string when the stone is at

i) bottom of the swing **(3mks)**

ii) the top of the swing **(2mks)**

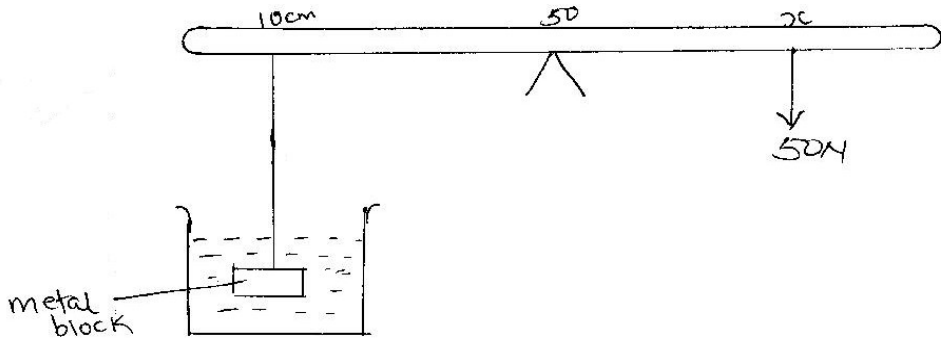
iii) linear velocity **(3mks)**

13) a) State the law of flotation **(1mk)**

A piece of wood floating with three fifth of its volume immersed in water .What is the density of the wood (density of water 1000kg/m^3) **(2mks)**

A metal block of mass 3kg and volume 500cm^3 is hang at the 10cm mark of a uniform meter rule and then is completely submerged in water in a beaker as shown in he diagram below.

Figure 9



Show all the force acting on the metal block **(3mks)**

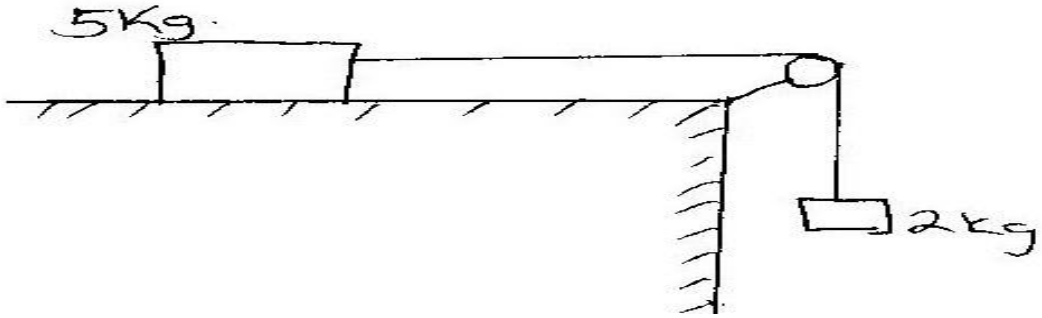
If the rule is pivoted at the 50cm mark determine the point x at which a 50N weight should be placed 50 as to balance it (density of water =1000kg/m^3,g=10N/kg) **(4mks)**

14)

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

b) The figure below shows a 5kg mass attached to a 2kg mass by a light inextensible string which passes over a frictionless pulley. The force of friction between the horizontal table and the block is 4N. The block is released from rest so that both masses move through a distance of 0.5m.

Figure 10



Calculate:

The work done against friction **(2mks)**

The acceleration of the system **(4mks)**

15) The velocity of the 2kg mass at the end of 0.5m **(3mks)**

State the energy changes which occur from the time the motion started until 2kg mass hit the ground. **(2mks)**

Draw a diagram to show how a single pulley can be used to give a V.R of 2 (1mk)

b) In an experiment using a pulley system the following result were obtained.

Load(N)	5	10	20	30	40	50
Effort(N)	3	4.5	6.5	8.5	10.5	12.5
% efficiency	33.3	44.4	61.5	70.6	76.5	80
MA						

Complete the table **(2mks)**

Plot a graph of M.A against efficiency. **(5mks)**

Use your graph to determine the V.R of the pulley system **(2mks)**

Give two reasons why the efficiency of any machine is always less than 100%. **(2mk)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 7 PAPER 2

TIME: 2 HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

SECTION A: 25 MARKS

1. Figure 1 represents an object PQ in front of a plane mirror.

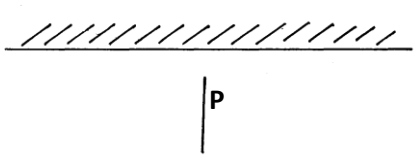


Fig 1

Sketch rays to show the position of an image formed. **(2mks)**

2. a) Define radioactivity. **(1mk)**

b) Uranium $^{238}_{92}U$ emits an alpha particle to become another element x as shown.

$$^{238}_{92}U \longrightarrow {}^{P}_{Q}X + \text{alpha particle}$$

Give the value of Q

3. An object moves as shown below and takes 1.4 seconds

O → A → O → B → O → A → O

B

Determine the frequency of vibration of the object. **(2mks)**

4. You are provided with a circular soft iron ring, long length of wine, galvanometer, switch rheostat three dry cells. In the space provide sketch how you could assemble a step-up transformer. **(2mks)**

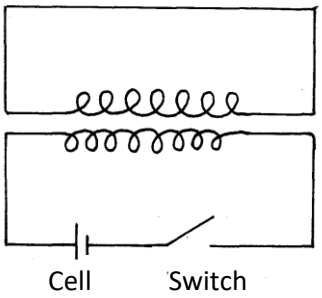
5. a) Arrange the following radiations in order of increasing wave length: microwaves, gamma rays, purple Light, ultra-violet and infra-red **(1mk)**

b) Calculate the wave length of radiowave of frequency 0.5×10^8 Hz. **(2mks)**

6. a) State Lenz's law. **(1mk)**

b) Two coils are placed near each other as shown in fig 2 below. Give two possible ways of increasing the deflection on the galvanometer. **(2mks)**

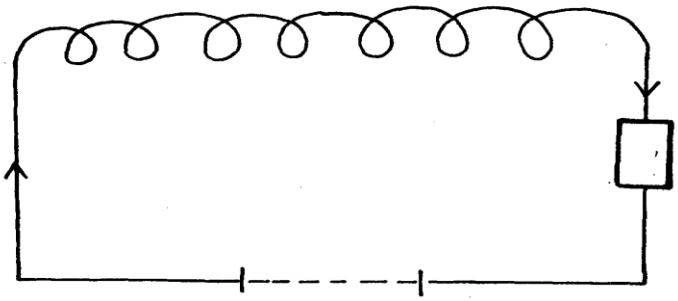
Fig 2



7. A narrow beam of electrons in a cathode ray oscilloscope (C.R.O) strikes the screen producing a spot. State what is observed on the screen if a low frequency a.c source is connected across the y-input of the C.R.O **(1mk)**

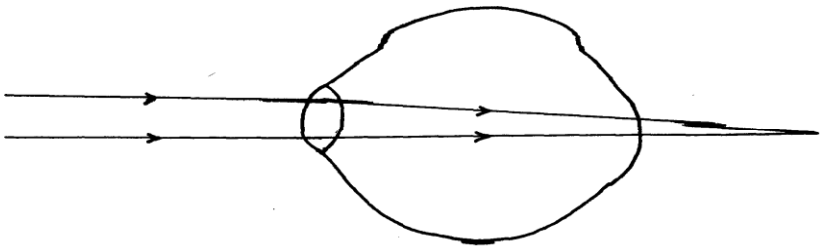
8. State one difference between charging by contact and charging by friction. **(1mk)**

9. Indicate the magnetic filed pattern in and outside of the solenoid shown in fig 3 below. **(2mks0** Fig 3



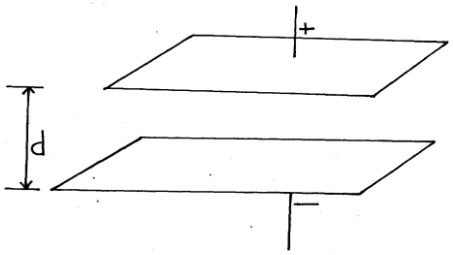
10. The critical angle of the air glass interface is 48.12^o calculate the refractive index of the glass. **(2mks)**

11. The following figure 4 shows an eye defect



Illustrate on the same diagram how the defect could be corrected. **(2mks)**

12. The figure 5 below represents two parallel plate capacitor separated by a distance d. Each plate has an area A square units.



Suggest **two** adjustments that can be made so as to reduce the effective capacitance.**(2mks)**

SECTION B (55 MARKS)

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

13. (a) Distinguish between a wavertrain and a waveform. **(2mks)**

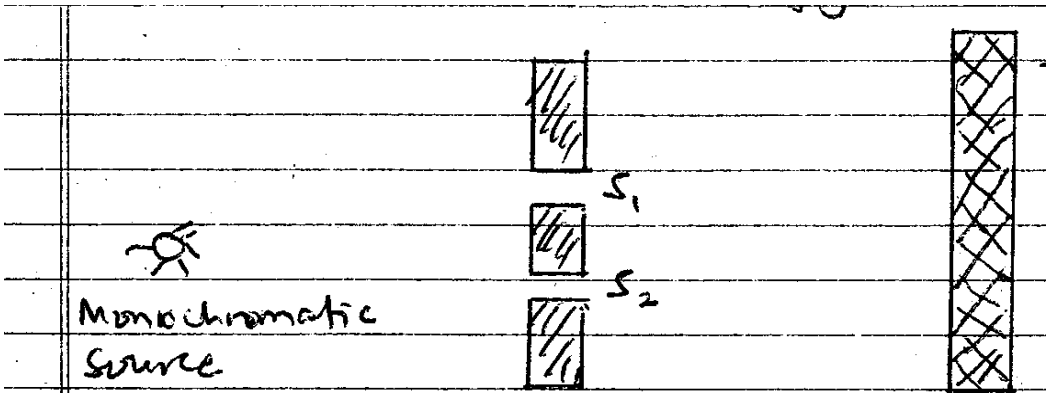
(b) A mine worker stands between two vertical cliffs 400m from the nearer cliff. The cliffs are x distance apart. Every time he strikes the rock once, he hears two echoes, the first one after 2.5 seconds and the second follows 2 seconds later. From this information calculate ;

(i) the speed of the sound in air. **(2mks)**

(ii) the value of x **(3mks)**

(c) In an experiment to observe interference of light waves a double slit is placed close to the source as in the figure 6 below

Fig 6



State the function of the double slit. **(1mk)**

Describe what is observed on the screen. **(2mks)**

State what is observed on the screen when

the slit separations S_1S_2 is reduced. **(1mk)**

white light source is used in place of monochromatic source. **(1mk)**

14. a) The figure below shows a parallel connection of 3 bulbs.

(i) What happens to the brightness of B_1 when the switches S_1 S_2 and S_3 are switched on one after the other? **(1mk)**

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

(iii) why is the parallel connection preferred in domestic lighting to the series connection? **(1mk)**

b) when two resistors R_1 and R_2 are connected in series to a 10V battery a current of 0.5A flows through the circuit. When only R_1 is connected to the battery the ammeter reading is 0.8A calculate

(i) the resistance of R_1 **(2mks)**

(ii) the resistance of R_2 **(2mks)**

(iii) the current flowing through R_1 and R_2 when the two are now connected in parallel. **(2mks)**

15. a) Explain the effect on the X-rays produced when the anode voltage is increased. **(2mks)**

b) A stream of X- rays is passed close to the cap of a negatively charged electroscope as shown in the figure below.

(i) the leaf divergence is found to reduce Explain this observation **(2mks)**

(ii) What effect will increase in the cathode current have on the above observation? Explain your answer **(2mks)**

(c) An x –ray tube operates on 80KV potential

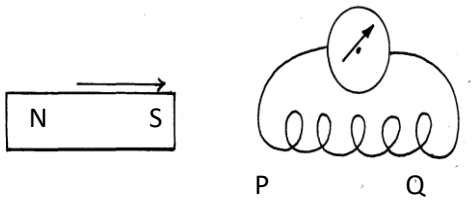
Calculate

(i) the energy gained by the electrons. **(2mks)**

(ii) The minimum wavelength of the x-rays produced. **(3mks)**

16. a) The figure 9 below shows two free ends of a coil connected to a galvanometer. When the north pole of a magnet is moved towards the coil, the pointer deflects towards the right hand sides.

Fig 9



State with reason the behaviour of the pointer when;

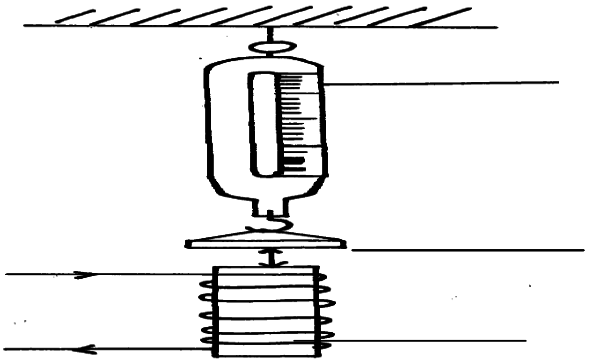
(i) the north pole of the magnet is held stationary near P. **(2mks)**

(ii) the south pole of the magnet is made to approach the coil from end Q. **(2mks)**

(b) In an attempt to investigate how electromagnetic force varies with current, a student from Wayaga secondary school set up the arrangement fig.10 below

P

Fig 10



(i) Why is the current passed through the solenoid? **(1mk)**

(ii) What happens to the iron suspended from the spring balance when a current is passed through the solenoid. **(1mk)**

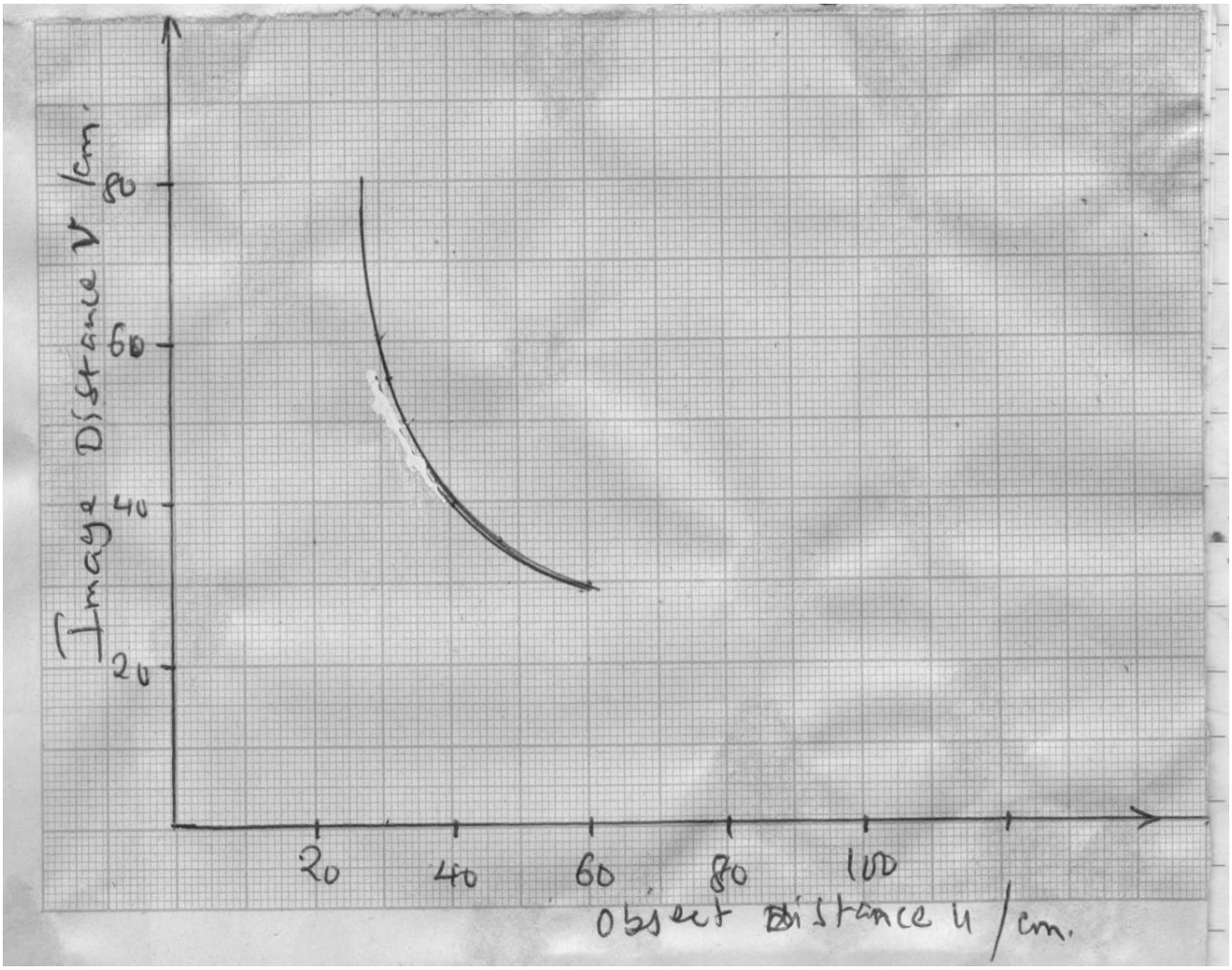
(iii) What is observed on the spring balance reading when the current passing through the solenoid is reduced? **(1mk)**

(iv) Sketch a graph of magnetic force against current that can be obtained from the results of the experiment above. **(2mks)**

(v) A part from increasing the amount of current through the solenoid, state **two** ways of improving the efficiency of the electromagnet. **(2mks)**

17. (a) With the help of a ray diagram explain how a lense can be used as magnifying glass. **(3mks)**

(b) in an experiment to determine the focal length of a convex lense the results were represented in the graph in figure below.



(i) Use the graph to determine the focal length of the lens used in the experiment. **(3mks)**

Determine the magnification of the image when the object is 30cm from the lens. **(3mks)**

(iii) Explain the property of light that is evidence in the formation of a rainbow **(2mks)**

(d) Explain two conditions under which light moves from medium to another of different optical densities without refraction**.** **(2mks)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 8 PAPER 1

TIME: 2 HRS

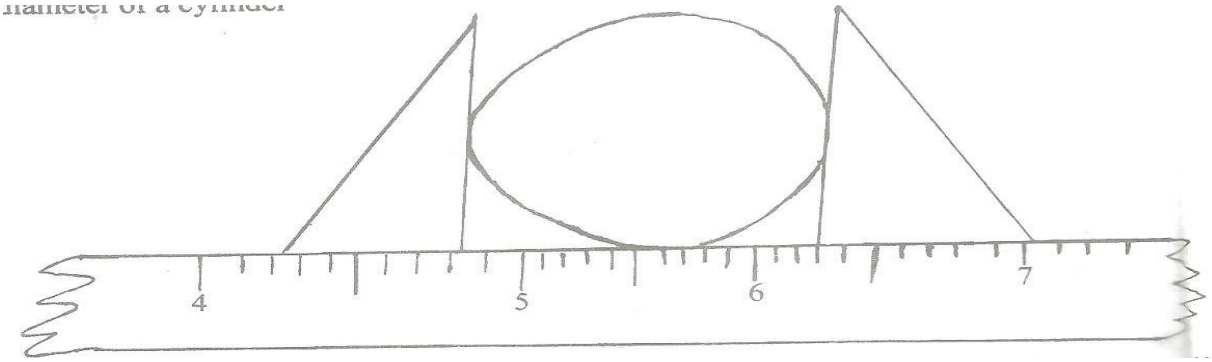
NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

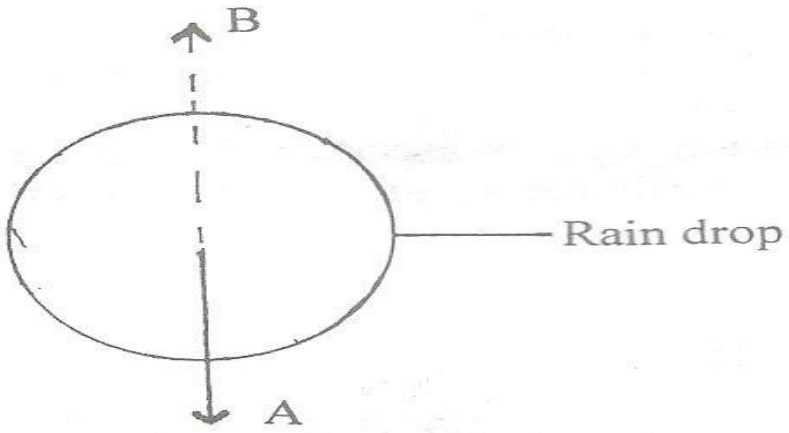
SECTION A: 25 MARKS

1. Figure 1 below is an arrangement of two set squares and a ruler used to determine the external diameter of a cylinder 4 5 6 7 Fig. 1



Record the diameter of the cylinder (1mk)

2. Figure 2 below shows the forces acting on a rain drop which is falling to the ground A B Rain drop Fig 2

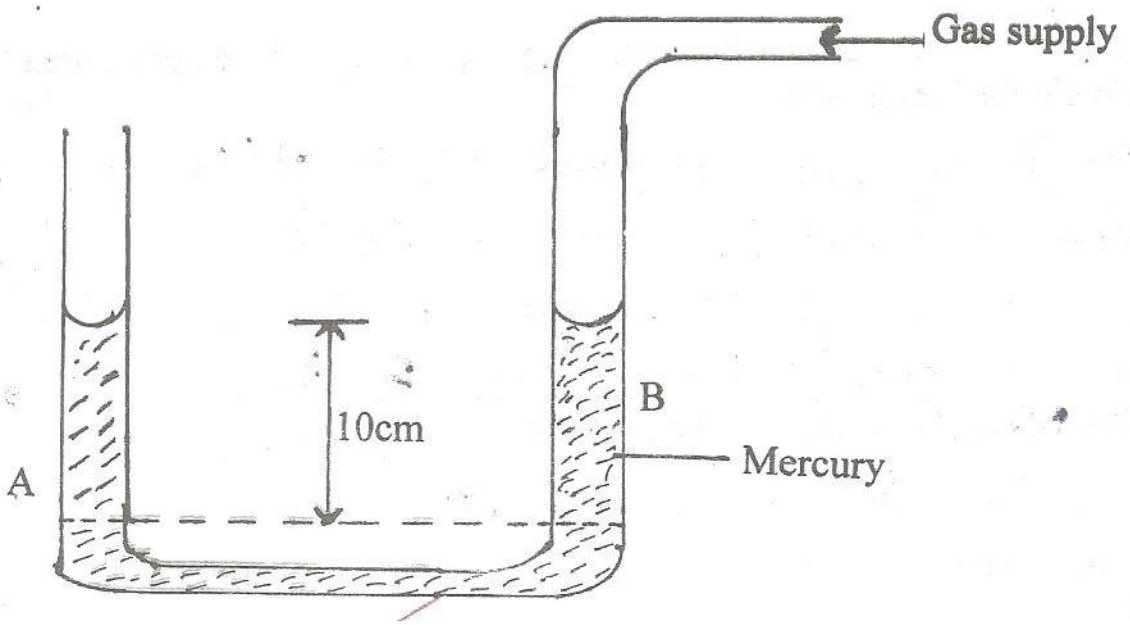


Name force A which causes the drop to fall **(1mk)**

Force B is the force opposing the motion of the drop. State one of the possible causes of this force **(1mk)**

3. Figure 3 below shows a U-tube connected to a gas supply. Determine the pressure of the gas. (Atmospheric pressure = 76cmHg) **(2mks)**

A B 10cm Mercury Gas supply Fig 3



4. Passengers are not allowed to stand on a moving bus. State and explain the reason **(2mks)**

5. The figure below shows some thumb pins fixed on a piece of wood. A piece of paper is then stuck on the thumb pins Pins Wood Piece of paper Fig 4

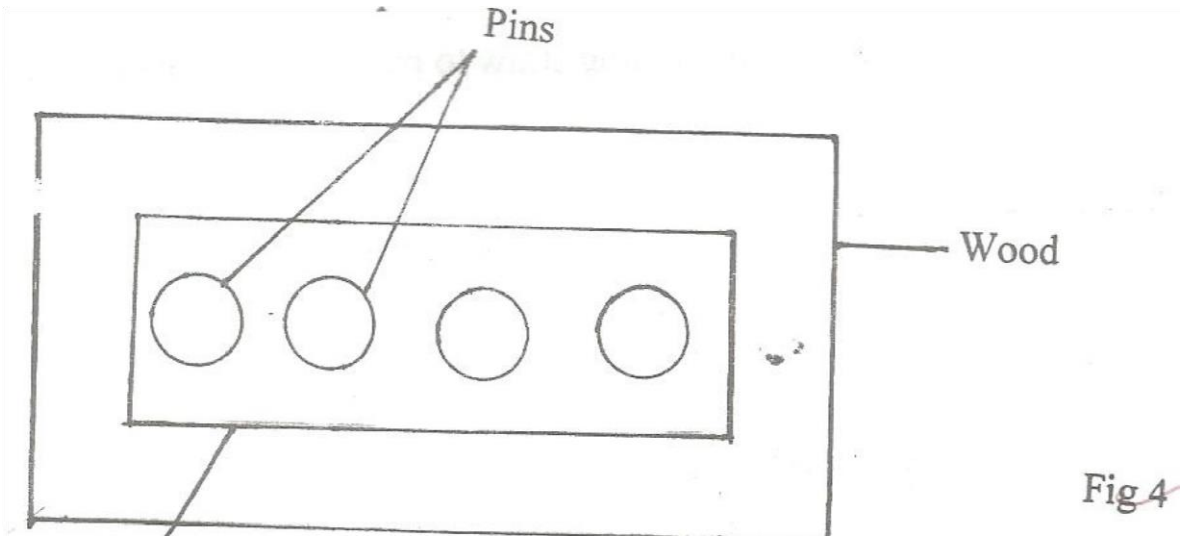


Fig 4

When the set-up is passed over a Bunsen burner flame, the paper gets charred except on areas above the thumb pins. Explain this observation **(2mks)**

6. The diagram below shows an arrangement used to determine the upper fixed point of ungraduated thermometer

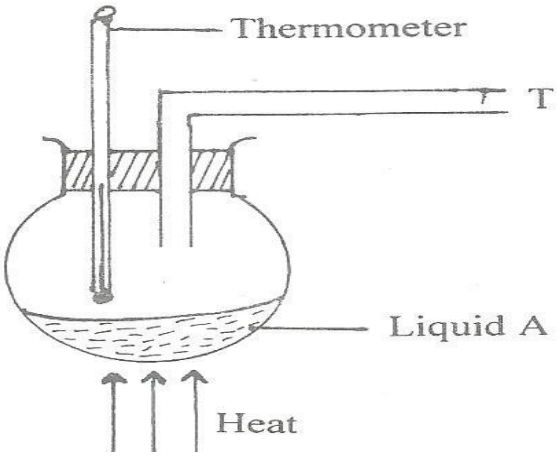
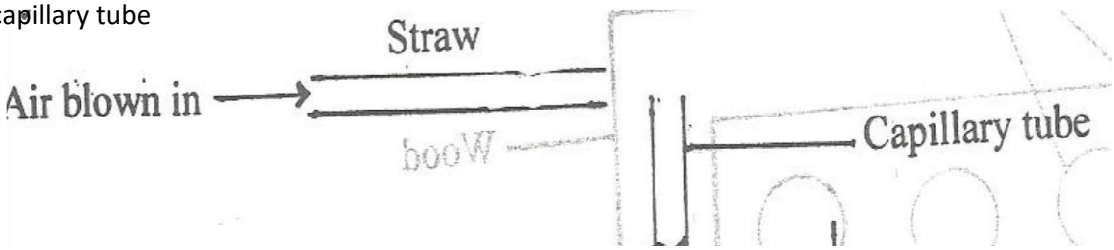


Fig 5

Name liquid A **(1mk)**

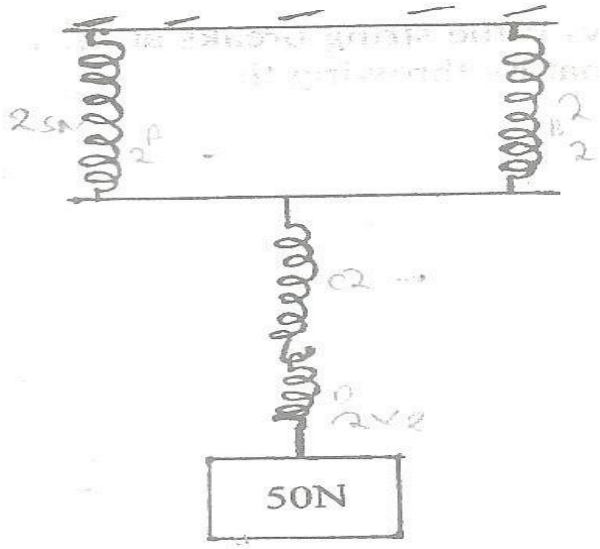
Give a reason why the bulb of the thermometer is not dipped in liquid A **(2mks)**

7. In the diagram shown below, air is blown through a drinking straw to pass over the open end of a capillary tube



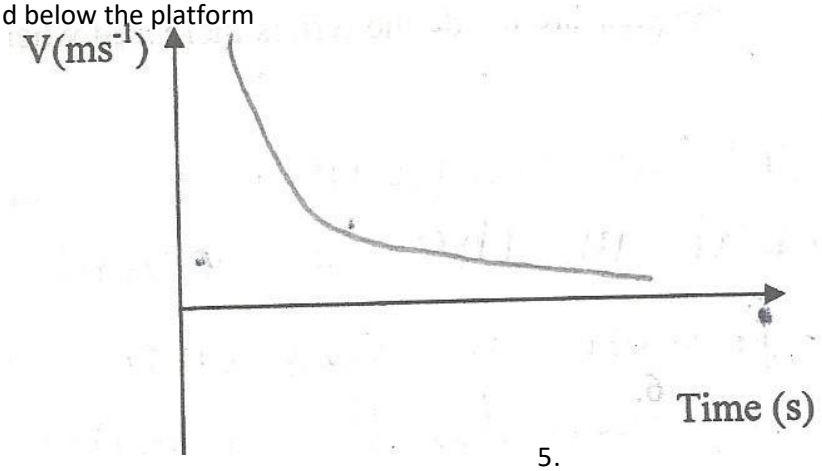
State and explain the observation **(2mks)**

8. The springs A, B, C and D are identical and each extends by 2cm when a force of 10N is suspended from it 50N Fig 6



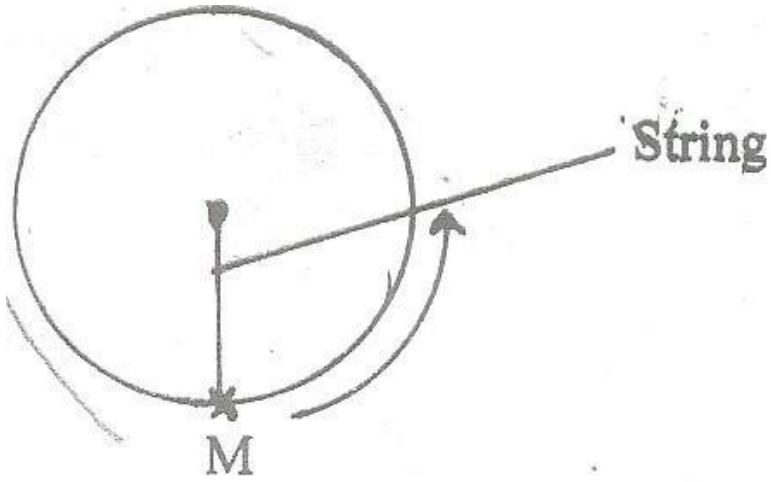
Determine the extension of the system **(3mks)**

9. On the axis provided below, sketch a velocity-time graph of a motion of a stone thrown vertically upwards from the edge of a platform and eventually the stone lands without bouncing on the ground below the platform **(1mk)**



5.

10. The figure below shows the path of a mass M attached to a string being whirled in a horizontal circle



Sketch on the diagram the path the mass follows if the string breaks at the position shown **(1mk)**

11. A fisherman on a boat offloads fish from the boat by throwing them to the land. State two observable changes as he ressumes fishing **(2mks)**

12. Am oil drop of volume $0.004cm^3$ spread into a film of diameter 28cm. Estimate the diameter of one molecule of the oil. (Leave your answer in standard form) **(3mks)**

13. Using the idea of particles explain why the pressure inside the tyre is increased when it is pumped up **(1mk)**

SECTION B (55 MARKS)

Answer ALL the questions

14. A student carried out an experiment to investigate the relationship between temperature and length of air column in a school laboratory. He obtained the results and plotted the graph below.

From the graph, determine

(i) The length of the air column at 50^0C **(1mk)**

(ii) The slope of the graph **(3mks)**

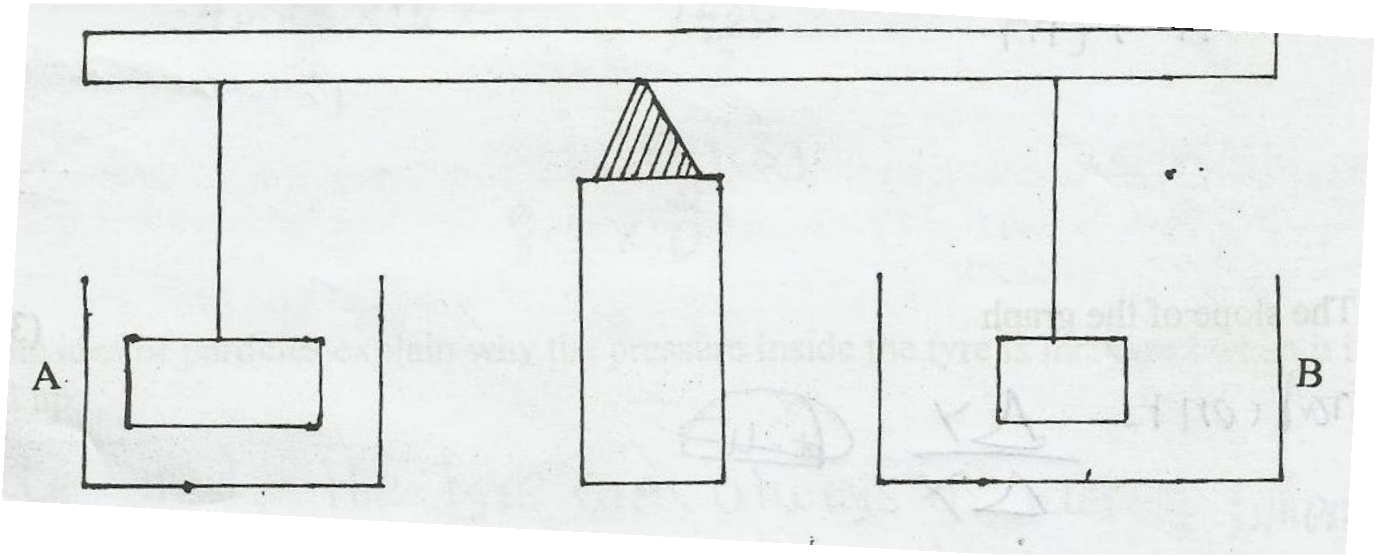
(iii) The equation relating the length Ycm of the air column with temperature x^0C **(1mk)**

State the law that relates temperature of a fixed mass of a gas with its volume **(1mk)**

Explain why this law is not entirely obeyed by the air column as suggested by the graph **(2mks)**

15. (a) Define moment of a force **(1mk)**

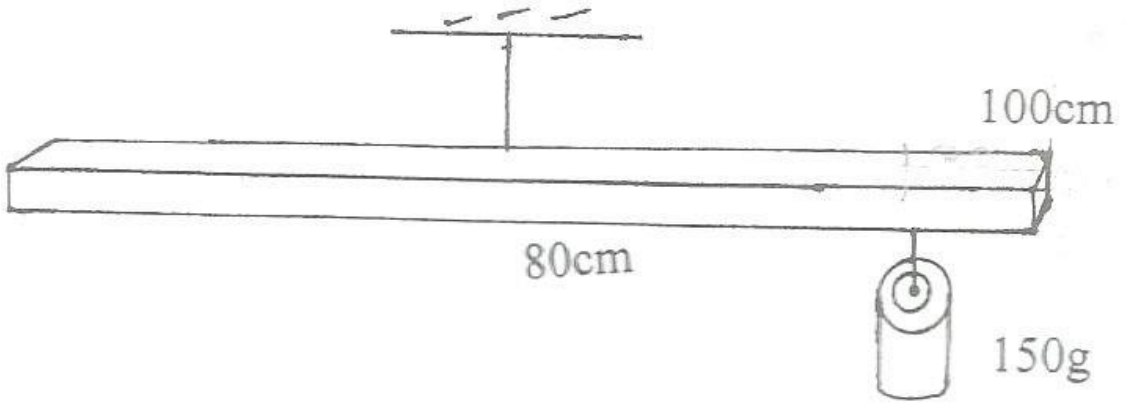
(b) The figure below shows a uniform bar in equilibrium



8.

When water is added into the beaker A and B until the weights are submerged, it is observed that the bar tips towards B. Explain this observation **(2mks)**

(c) A uniform metre rule of uniform width 2.5cm and thickness 0.5cm is suspended at the 80cm mark and kept balanced by hanging a mass of 150g at 100cm mark



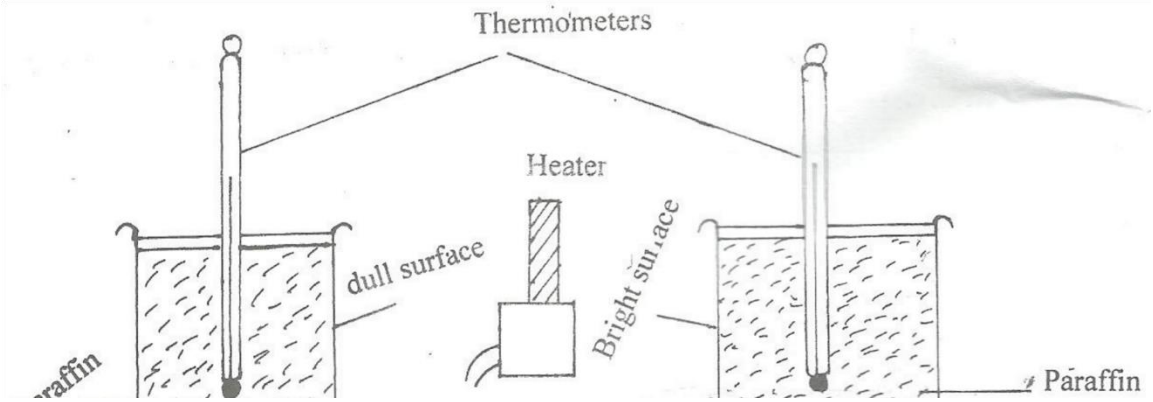
Determine

(i) The mass of the metre rule **(3mks)**

(ii) The density of the material of the metre rule **(3mks)**

(iii) The tension T in the string **(2mks)**

16. Two similar cans are partly filled with equal quantities of paraffin. Each can is covered by a lid holding a thermometer as shown below. The cans are placed on a wooden bench at the same distance from a radiant heat



One has a dull black surface and the other bright silver surface. The following temperatures were recorded

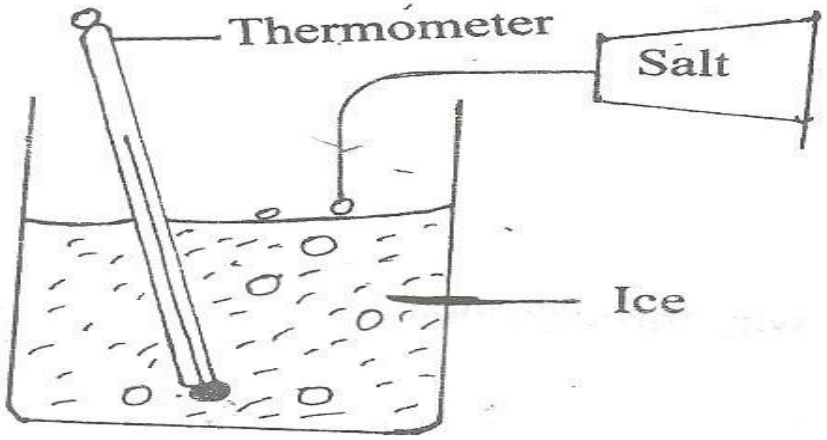
Time (minutes	0	1	2	3	4	5
Temperatures (^{0}C) dull surface	19	21	23	25	27	29
Temperature (^{0}C) bright surface	19	20	21	22	23	24

(a) Study the table above and explain why there is a difference between the rates of heating of the two cans **(1mk)**

(b) Explain why the heat from the heater could reach the can by only radiation but not through either conduction or convection **(2mk)**

(c) Give a reason why paraffin is a better liquid to be used in this experiment than water **(1mk)**

(d) A student put some small pieces of ice in a beaker and sprinkled salt on the ice. He stirred until the ice melted and took the temperature of the content in the beaker as shown below.

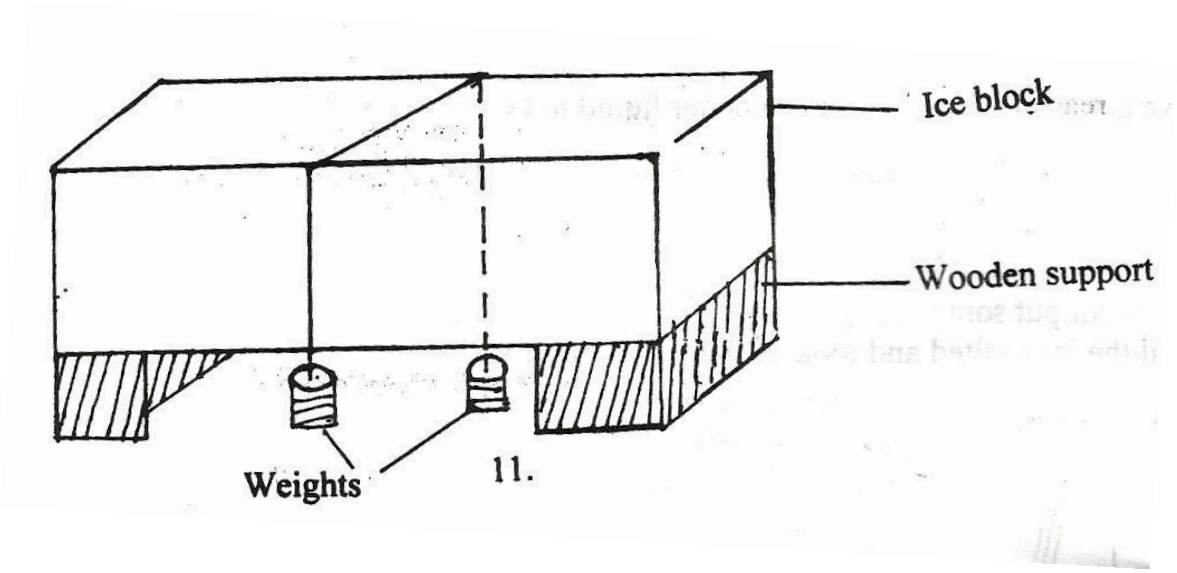


(i) State the observation made **(1mk)**

(ii) Explain the observation made **(1mk)**

(e) The figure below shows a block of ice with two heavy weights hanging such that the copper wire connecting them passes over the block of ice

Ice block Wooden support Weights



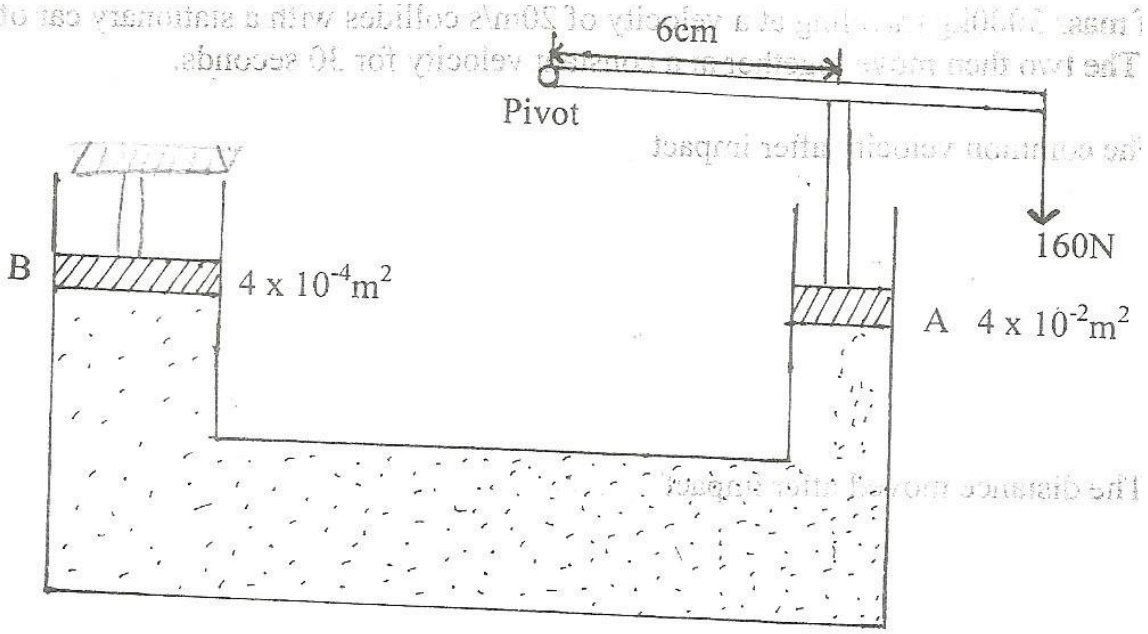
11.

(i) It is observed that the wire gradually cuts its way through the ice block, but leaves it as one piece. Explain **(4mks)**

(ii) What change would be observed if the copper wire is replaced by a cotton thread **(1mk)**

(f) A jet of dry steam at 100^0C is sprayed on the surface of 100g of dried ice at 0^0C contained in a well-lagged calorimeter of negligible heat capacity until all the ice has melted and the temperature begin to rise. The mass in the calorimeter when the temperature reaches 40^0C is found to be 120g. Assuming that the specific latent heat of fusion of ice is $336000 Jkg^{-1}k^{-1}$ specific heat capacity of water is $4200 Jkg^{-1}k^{-1}$. Determine the specific latent heat of vaporization of water. **(4mks)**

17. The figure below shows a hydraulic press used to lift a load L. The effort applied is 160N at the end of the lever 36cm long and pivoted at the other end. The plunger is 6cm from the pivot. The area of the plunger piston A is $4 \times 10^{-2}m^2$ and that of the load piston B is $4 \times 10^{-4}m^2$ 6cm Pivot 160N B $4 \times 10^{-4}m^2$ A $4 \times 10^{-2}m^2$



Determine

(a) Pressure exerted at piston A **(3mks)**

(b) Weight of the load L being lifted **(3mks)**

(c) If the small piston moves down a distance of 5cm, determine how far upwards the larger piston moves **(2mks)**

18. (a) State Newton's second law of motion **(1mk)**

(b) A bus of mass 3000kg traveling at a velocity of 20m/s collides with a stationary car of mass 600kg. The two then move together at a constant velocity for 30 seconds.

Find

(i) The common velocity after impact **(3mks)**

(ii) The distance moved after impact **(2mks)**

(iii) The impulse **(2mks)**

(iv) Kinetic energy before collision **(2mks)**

(v) Kinetic energy after collision **(2mks)**

(vi) State a reason why kinetic energy before collision is not the same as kinetic energy after collision **(1mk)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 8 PAPER 2

TIME: 2 HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

SECTION A: 25 MARKS

1. The figure 1 below shows how two magnets are stored in pairs with keepers at the ends

Explain how the keepers keep the magnets from demagnetization

(2mks)

2. State two advantages of an alkaline battery over a lead acid battery **(2mks)**

3. The figure 2 shows a negatively charged rod brought slowly near the cap of a positively charged leaf electroscope

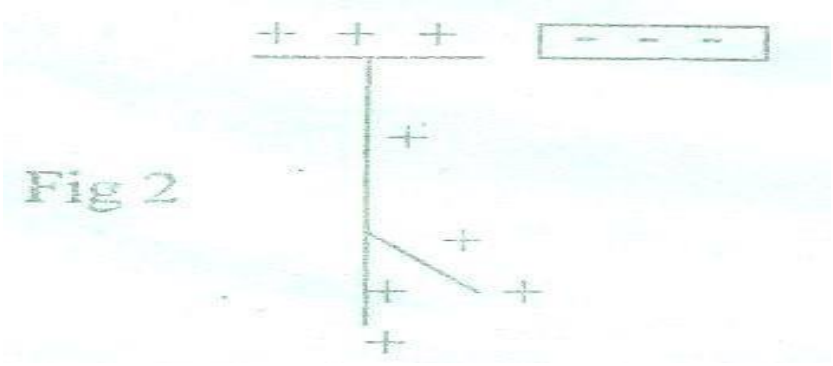
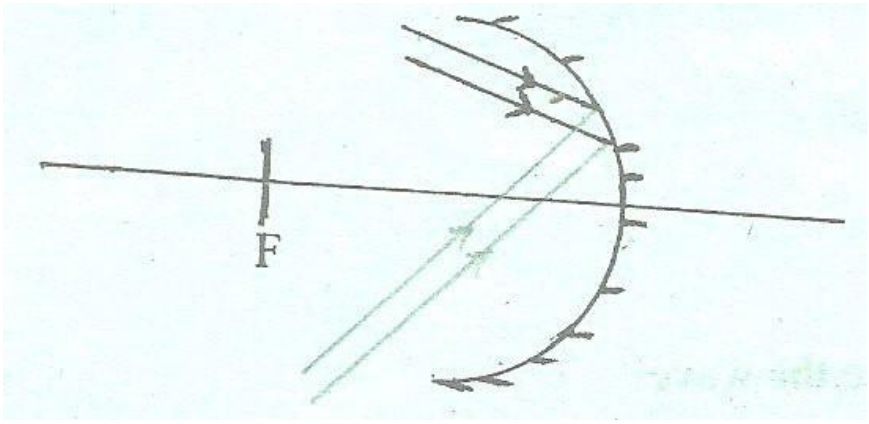


Fig 2

State what is observed and explain your observation **(3mks)**

4. Give a reason why the core of the electromagnet of an electric bell is made of soft iron and not **steel** **(1mk)**

5. The figure 3 shows two parallel rays incident on a concave mirror. F is the focal point of the Mirror



On the same diagram sketch the path of the rays after striking the mirror **(2mks)**

6. (a) Which of the quantities: wavelength, amplitude and velocity change when

(i) A wave is reflected **(1mk)**

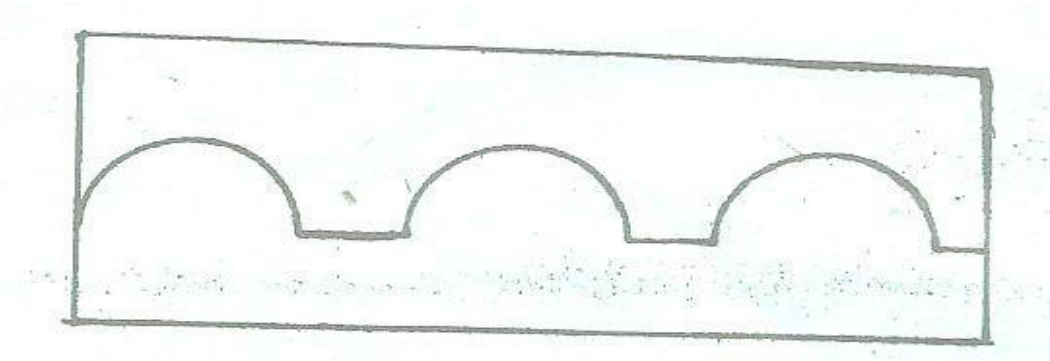
(ii) A wave is refracted **(2mks)**

7. A capacitor of capacitance 2000μ F is charged to a potential of 6V. Calculate the charge stored in the capacitor **(3mks)**

8. A current of 13A flows through a heating element of resistance 8.5Ω for 1.5 minutes. Calculate

the quantity of heat supplied (3mks)

9. With the time base switched on the following traces wave obtained on the C.R.O as shown below



Draw a circuit diagram that can be used to produce the wave **(3mks)**

10. The half life of a radioactive substance is 1 minute. If the reading of 200 microamperes is obtained on a rate meter at a given time, what is the reading three minutes later ` **(3mks)**

SECTION II (55 MARKS)

11. (a) Give one example of

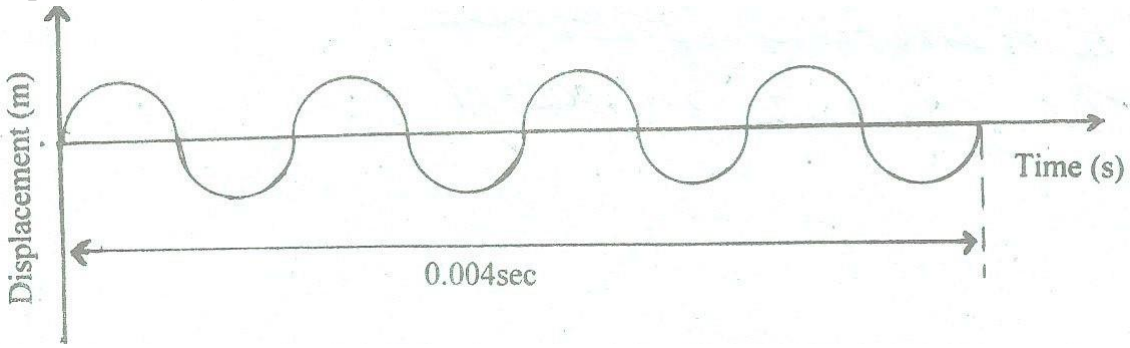
(i) Transverse wave **(1mk)**

(ii) Longitudinal wave **(1mk)**

(iii) What is the main difference between these two types of waves **(2mks)**

(b) The figure below shows the displacement time graph for a wave

Displacement (m) Time (s) 0.004sec



(i) How many complete cycles are shown **(1mk)**

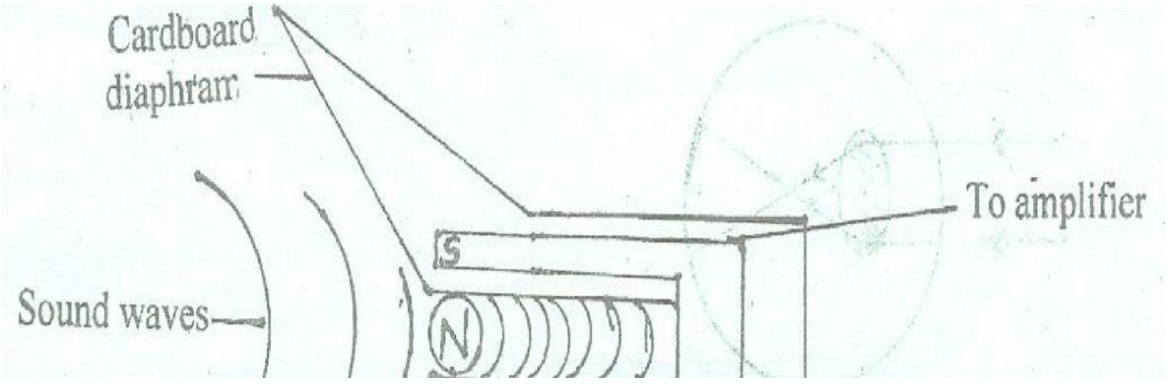
(ii) What is the frequency of the wave form shown **(2mks)**

(c) A radiowave has a frequency of 3MHz and travels with a velocity of 3 x 10^8m/s.

What is its wavelength **(3mks)**

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

(b) The figure shows a simple microphone which sound waves from the person talking cause the cardboard diaphragm to vibrate Cardboard diaphram Sound waves To amplifier Coil Magnet



(i) Explain how a varying current is induced in the cell when the diaphragm **vibrates(3mks**

(ii) State two ways in which the induced current in (i) above can be increased **(2mks)**

(c) An ideal transformer has 2000 turns in the primary circuit and 200 turns in the secondary circuit. When the primary circuit is connected to a 400V ac source the power delivered to a resistor in the secondary is found to be 800W. Determine current in

(i) The secondary circuit **(3mks)**

(ii) The primary circuit **(3mks)**

13. (a) A defective eye focuses a distant object as shown below

(i) State the eye defect **(1mk)**

(ii) Suggest a suitable lens to correct the defect **(1mk)**

(iii) Draw on the same diagram a suitable correction of the defect **(2mks)**

(b) An object is placed 15cm from a diverging lens of focal length 12cm

Find

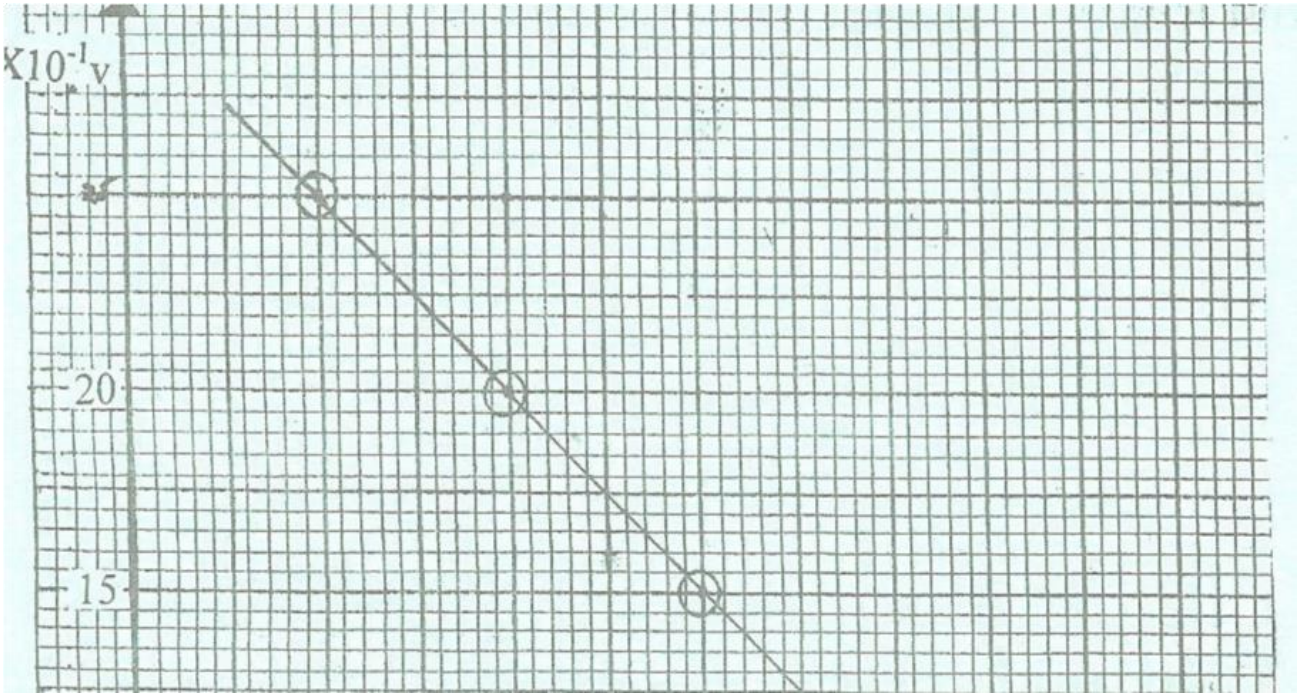
(i) Position of image **(3mks)**

(ii) Nature of image **(2mks)**

(iii) Magnification of the lens **(2mks)**

(iv) Power of the lens **(2mks)**

14. The graph below shows the variation of potential difference against current for a certain set up



Draw a possible set up that can be used to carry out this experiment **(2mks)**

Describe how the experiment was carried out **(3mks)**

From the graph, determine

(i) Electromotive force, E **(2mks)**

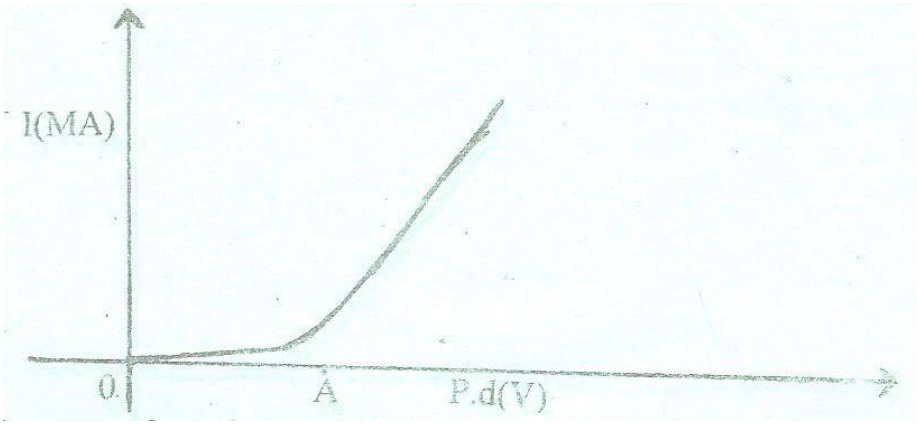
(ii) Internal resistance of cells used **(3mks)**

15. (a) Distinguish between intrinsic and extrinsic semi-conductor **(2mks)**

(b) (i) A junction diode is used as a rectifier. Draw a simple circuit diagram to show how two junction diodes and a centre-tapped transformer can be used to produce a full wave rectified a.c **(3mks)**

(ii) Name other two uses of a junction diode **(2mks)**

(c) The graph in fig shows a forward bias characteristic of a P-N junction



The depletion layer increases from O to A. explain what is meant by depletion layer **(3mks)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 9 PAPER 1

TIME: 2 HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

SECTION A: 25 MARKS

1. i) Determine the reading of the vernier callipers shown in figure 1 below.

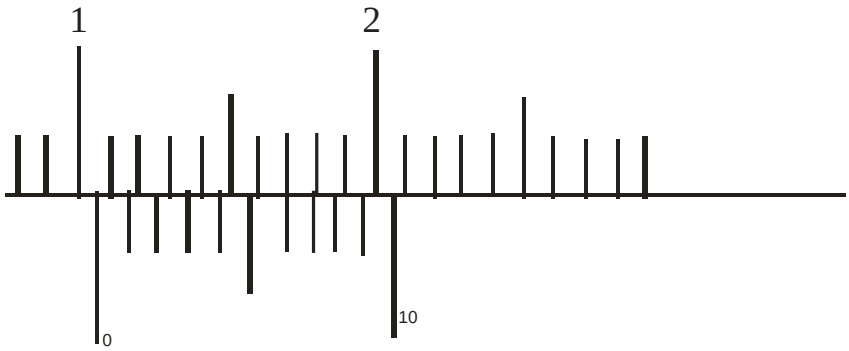


Figure 1

Reading **(1Mark)**

ii) If the instrument above has zero error of -0.02cm, determine the actual; reading of the vernier callipers. **(1 Mark)**

2. Highlight **two** facts which shows that heat from the sun does not reach the earth surface by convection. **(2 Marks)**

3. Water tanks in houses are erected as high as possible. Explain. **(1 Mark)**

4. Two burettes A and B were arranged as shown below.

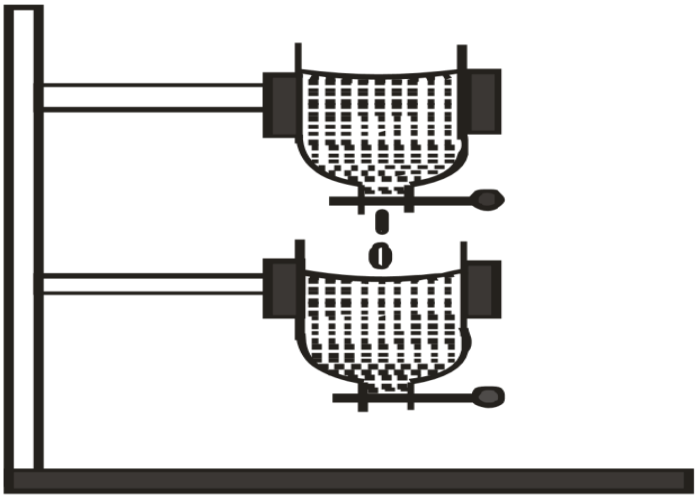


Figure 2

Burette A leaked into burette B at a rate of 10 drops per minute. If the initial reading on both burettes was 25ml, what would be their readings at the end of one hour if B does not leak and the average volume of one drop of water is $2.0 \times 10^{-8} m^3$? **(3 Marks)**

5. Highlight **one** problem caused by capillarity. **(1 Mark)**

6. The figure below shows spherical balls placed at different positions on a surface.

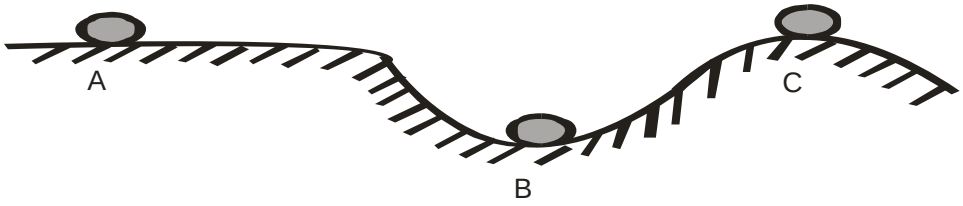


Figure 3

Describe the state of equilibrium of the ball in each position. **(3 Marks)**

7. State any **two** differences between boiling and evaporation. **(2 Marks)**

8. Figure 4 shows a uniform wooden bar 50cm long whose weight is 5N. Determine the distance X and

Y if the bar is balanced. **(3 Marks)**

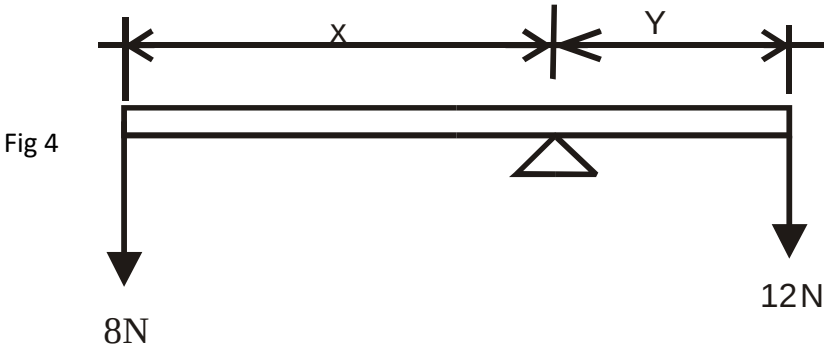


Fig 4

9. When a body is partially immersed in a liquid, it appears lighter than it actually is. Explain. **(1 Mark)**

10. Figures 5 below shows capillary tubes, one immersed in water and another immersed in mercury.

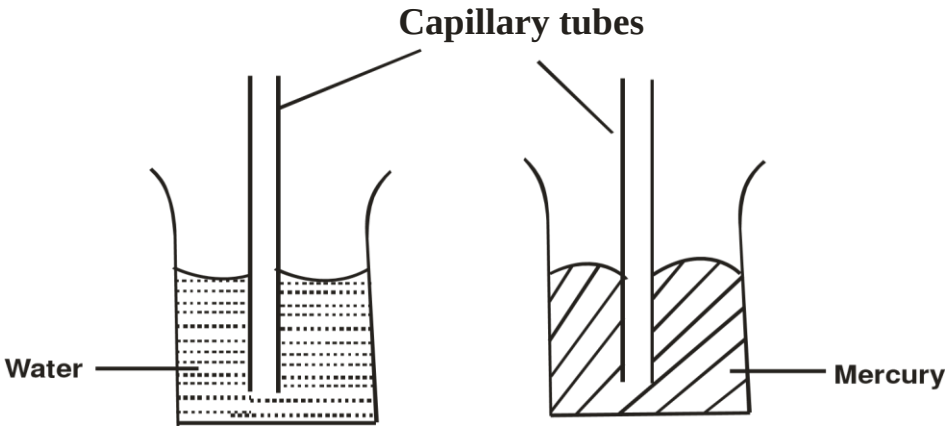


Figure 5

Complete the diagrams above to show the levels of water and mercury in the capillary tubes. **(2 Marks)**

11. State the property of Freon that makes it useful as a refrigerant liquid. **(1 Mark)**

12. Figure 6 below shows two glasses of different thickness.

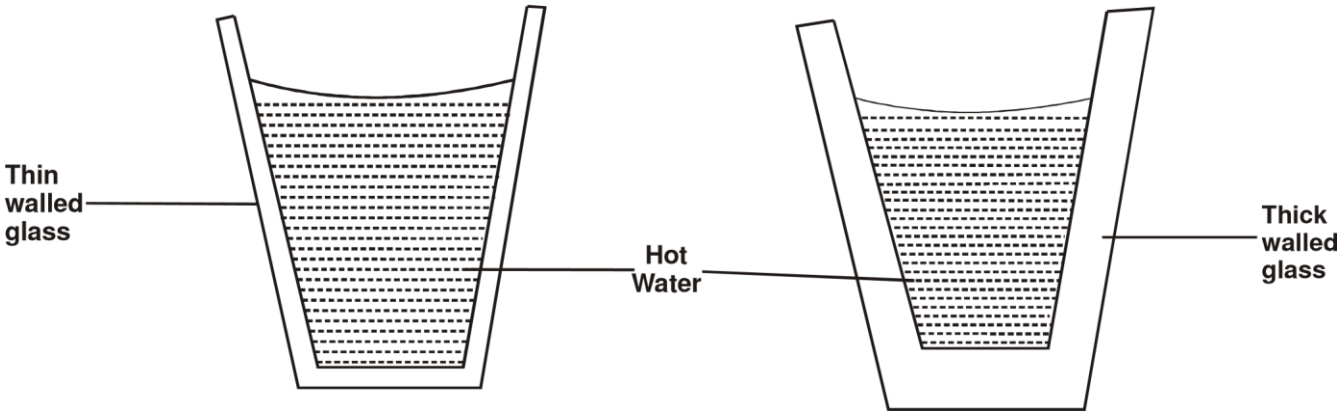


Figure 6

Hot water was poured in both glasses. What is likely to be observed and why? **(2 Marks)**

13. Define the term banking as used in uniform circular motion. **(1 Mark)**

14. State **one** factor which make gases compressible. **(1 Mark)**

SECTION B (55 MARKS)

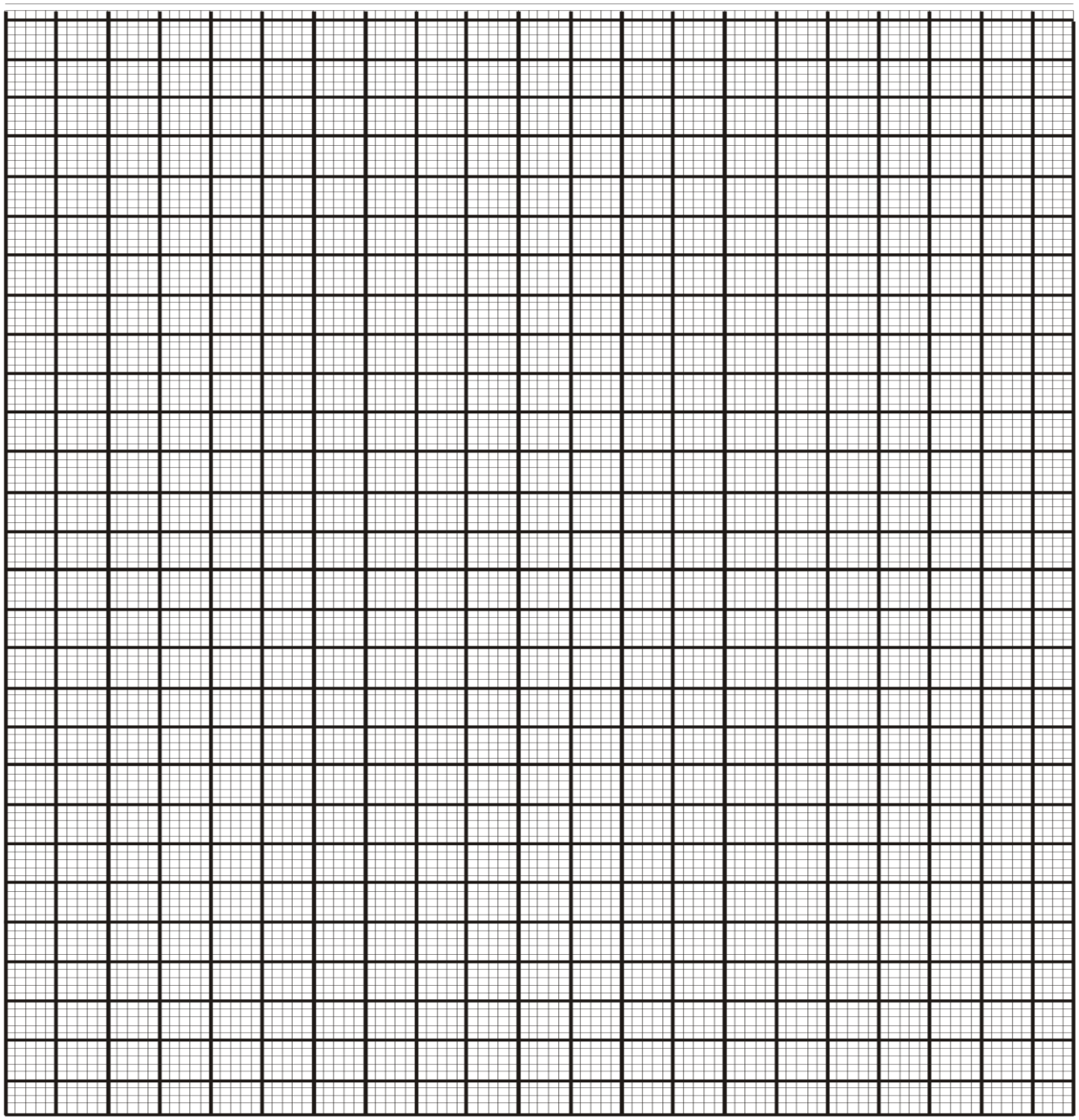
15. a) State Boyle's law. **(1 Mark)**

b) A group of students carried out an experiment in a laboratory to verify Boyle's law and recorded their results in the table below.

Pressure (N/m^2)$x10^3$	400	320	160	80
Volume (mm^3)	2.0	2.5	5.0	10.0
(mm^3)	0.5			

i) Complete the table. **(1 Mark)**

ii) On the grid provided, plot a graph of pressure (y-axis) against $\frac{1}{volume}$. (5 Marks)



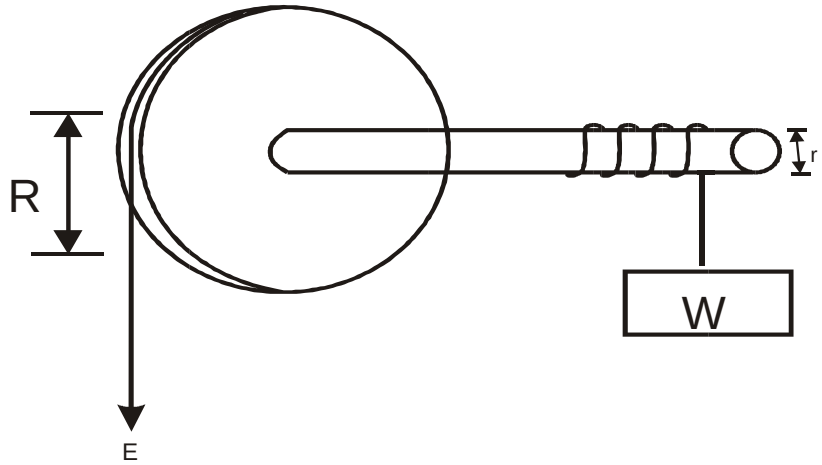
From your graph, determine the volume when the pressure was 240K N/m^2. **(2 Marks)**

State **one** physical property of the gas which was kept constant during the experiment.**1 M**

c) A mass of oxygen gas occupies a volume of 1200cm^3 at 27^{o}c and a pressure of 1.2 atmospheres. It is compressed until its volume is 600cm^3 and its pressure is 3.0 atmospheres. What is the temperature of the gas after compression? **(3 Marks)**

16. a) A machine is a device that enables work to be done more easily and conveniently. State any two ways in which a machine makes work easier. (**2 Marks)**

b) Figure 7 shows a wheel and axle being used to raise a load W by applying an effort E. The radius of the wheel is R and of the axle is r. Figure 7



i) Show that the velocity ratio (V.R) of this machine is given by . **(3 Marks)**

ii) Given that r = 5cm, R = 50cm, determine the effort required to raise a load of 200N if the efficiency ( ) of the machine is 90%. **(4 Marks)**

iii) It is observed that, the efficiency of the machine increases when it is used to lift large loads. Give a reason for this. **(1 Mark)**

17. a) State the law of flotation. **(1 Mark)**

b) A rectangular block of cross section area 0.08m^2 is immersed in a liquid of density 1200kgm^{-3}. The top and the lower surfaces are 20cm and 80cm below the surface of the liquid respectively

i) What is the downward force on the top of the block? **(2 Marks)**

ii) Calculate the upthrust on the block. **(3 Marks)**

c) A block of glass of mass 0.25kg floats in mercury of density 1.36 x 10^{4}kgm^{-3}. What volume of the glass lies under the surface of mercury? **(3 Marks)**

d) The weight of a cube in air is 0.5N. When immersed in water, it weighs 0.44N and in oil weighs 0.46N. Calculate the relative density of the oil. **(3 Marks)**

18. a) i) State any necessary assumption made in the study of the fluid flow. **(1 Mark)**

ii) Highlight any **two** conditions under which the flow of the fluid becomes turbulent**. (2 Marks)**

b) Figure 8 below shows the cross section of an aeroplane wing, with the aeroplane moving in the direction shown by the arrow.

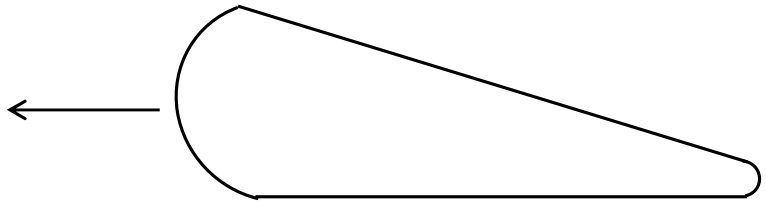


Figure 8

i) Sketch the streamlines to show how air flows past the wing as the aeroplane moves (1 Mark) ii) Explain how dynamic lift of the aeroplane is caused by the wing. **(3 Marks)**

c) A water pipe of diameter 5.2cm is connected to another pipe of diameter 1.3cm. The speed of water in the smaller pipe is $3ms^{-1}$. Calculate,

i) The speed of water in the larger pipe. **(2 Marks)**

ii) The mass flux if the density of water is $1g/cm^3$. **(1 Mark)**

19. The tape in figure 9 below was obtained from an experiment using a ticker timer of frequency 50Hz. The tape was pulled by a trolley.

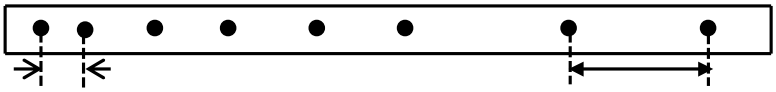


Figure 9

If the trolley that was pulling the tape was accelerating,

i) Show on the diagram, the direction of acceleration of the trolley. **(1 Mark)**

ii) Calculate the acceleration of the trolley. **(3 Marks)**

b) A stone is allowed to fall freely from the top of a tower 60 metres high. At the same time, a second stone is thrown vertically upwards with a velocity of 20m/s from the ground. Find;

i) The time taken by the two stones before they meet. **(4 Marks)**

ii) The height at which the two stones meet. **(2 Marks)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 9 PAPER 2

TIME: 2 HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

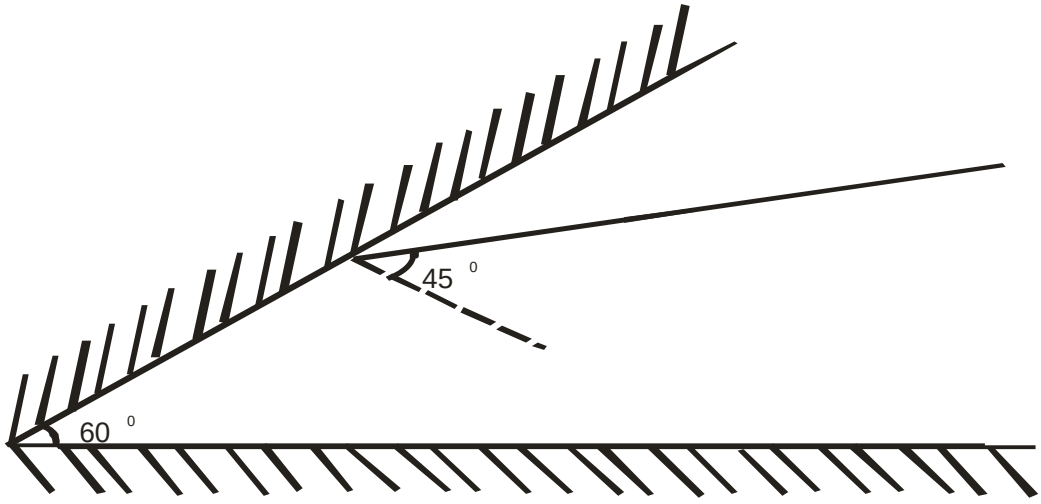
DATE……

SECTION A: 25 MARKS

1. Give a reason why it is not advisable to smoke a cigarette near a charging battery. **(1Mark)**
2. Figure 1 below shows a cross section of an electric mortor. On the diagram, show the direction of the force on to the two conductors. **(2 Marks)**

Figure 1

3. Figure 2 below shows a ray of light incident on a mirror at an angle of 45º. Another mirror is placed at an angle of 60º to the first one as shown.



i) Sketch the path of the ray until it emerges, indicating all the angles. **(2 Mks)**

ii) Calculate the number of images formed when an object is placed between the two mirrors. **(1Mark)**

4. State the functions of the following features of a lighting arnestor.

i) Sharp spikes **(1 Mark)**

ii) Thick copper rod **(1 Mark)**

5. An electric immersion heater is rated 240V, 3kW and is to be connected to a main supply, using 10A fuse. Showing your working, state whether the fuse is suitable or not. **(2 Marks)**

6. State the Snell's law. **(1 Mark)**

7. State any **two** differences between electromagnetic waves and mechanical waves. **(2 Marks)**

8. State with a reason the effect on X-rays produced in an X-ray tube, when the accelerating potential difference across the tube is increased. **(2 Marks)**

9. State the function of the control grid of the cathode ray oscilloscope and state how it is achieved. **(2 Marks)**

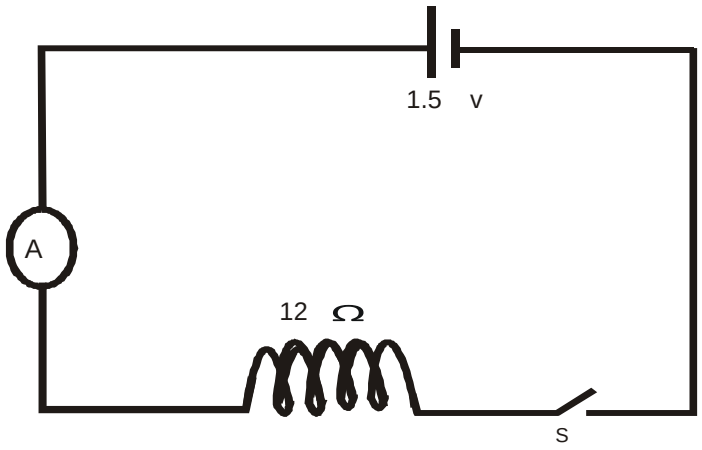
10. a) Define the term "radioactivity." **(1 Mark)**

b) Uranium U emits an alpha particle to become another element X^{92}, as shown in the equation below.

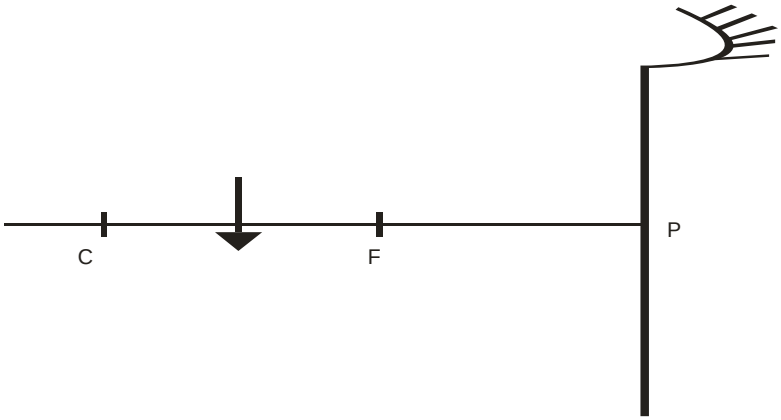
$$^{238}_{92}U \longrightarrow {}^{A}_{Z}X + \text{alpha particle}$$

Give the values of A and Z. **(1 Mark)**

11. The ammeter in the circuit in figure 3 has a negligible resistance. When the switch S is closed, the ammeter reads 0.1. Calculate the internal resistance of the battery. **(2 Marks)**



12. Figure 4 shows an object in front of a concave mirror. Complete the diagram to locate the position of the image formed. **(2 Marks)**



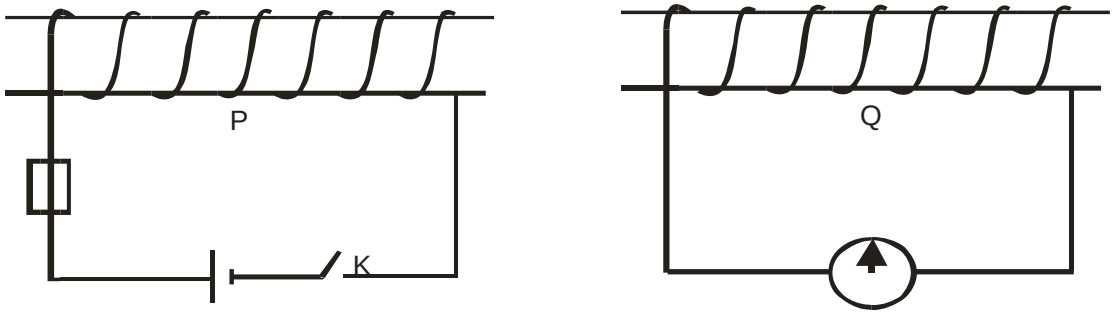
13. Explain why in a transformer, it is alternating current which is fed to the primary coil and not the direct current**.** **(1 Mark)**

14. A lens has a focal length f of 12.5cm. Determine its power. **(1 Mark)**

SECTION B (55 MARKS)

15. a) State the **two** conditions necessary for electromagnetic induction to take place. **(2 Marks)**

b) Figure 5 shows two coils P and Q placed close to each other.



When the switch k is closed, an e.m.f is induced in coil Q. Similarly, an e.m.f is induced in coil Q when the switch K is opened.

i) Explain why the induced current in coil Q is higher when the switch K in coil P is opened than when it is closed. **(2 Marks)**

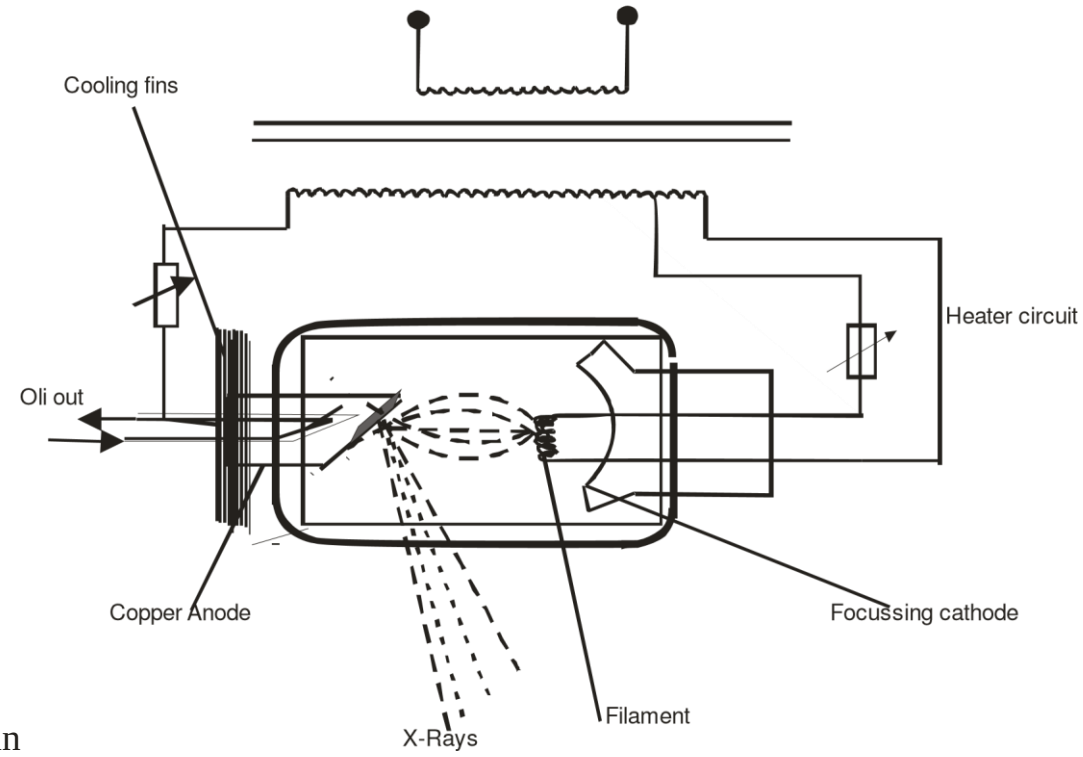
ii) With the help of diagrams, show the direction of the induced current in coil Q when the switch k is closed and when it is opened. **(2 Marks)**

iii) Which phenomenon is being demonstrated in this set up? **(1 Mark)**

iv) Suggest a way in which the induced e.m.f in the secondary coil Q can be increased. **(1 Mark)**

c) A transfomerr uses 240v a.c supply to deliver 9.0A at 80V to a heating coil. If 10 percent of the energy taken from the supply is lost in the transformer itself, determine the current in the primary winding. **(3 Marks)**

16. Figure 6 shows the essential components of an x-ray tube.



a) i) Explain how electrons are produced by the cathode. **(2 Marks)**

ii) State a reason why the cathode is concane shaped. **(1 Mark)**

iii) State **two** ways in which cooling is achieved in this X-ray machine. **(2 Marks)**

b) Explain why:

i) It would be necessary for the target to rotate during operation of this machine. **(1 Mark)**

ii) The machine should be surrounded by a lead shield. **(1 Mark)**

c) If the accelerating potential difference is 100kV, calculate;

i) The kinetic energy of the electrons arriving at the target ($e=1.6 \times 10^{-19}c$). **(2 Marks)**

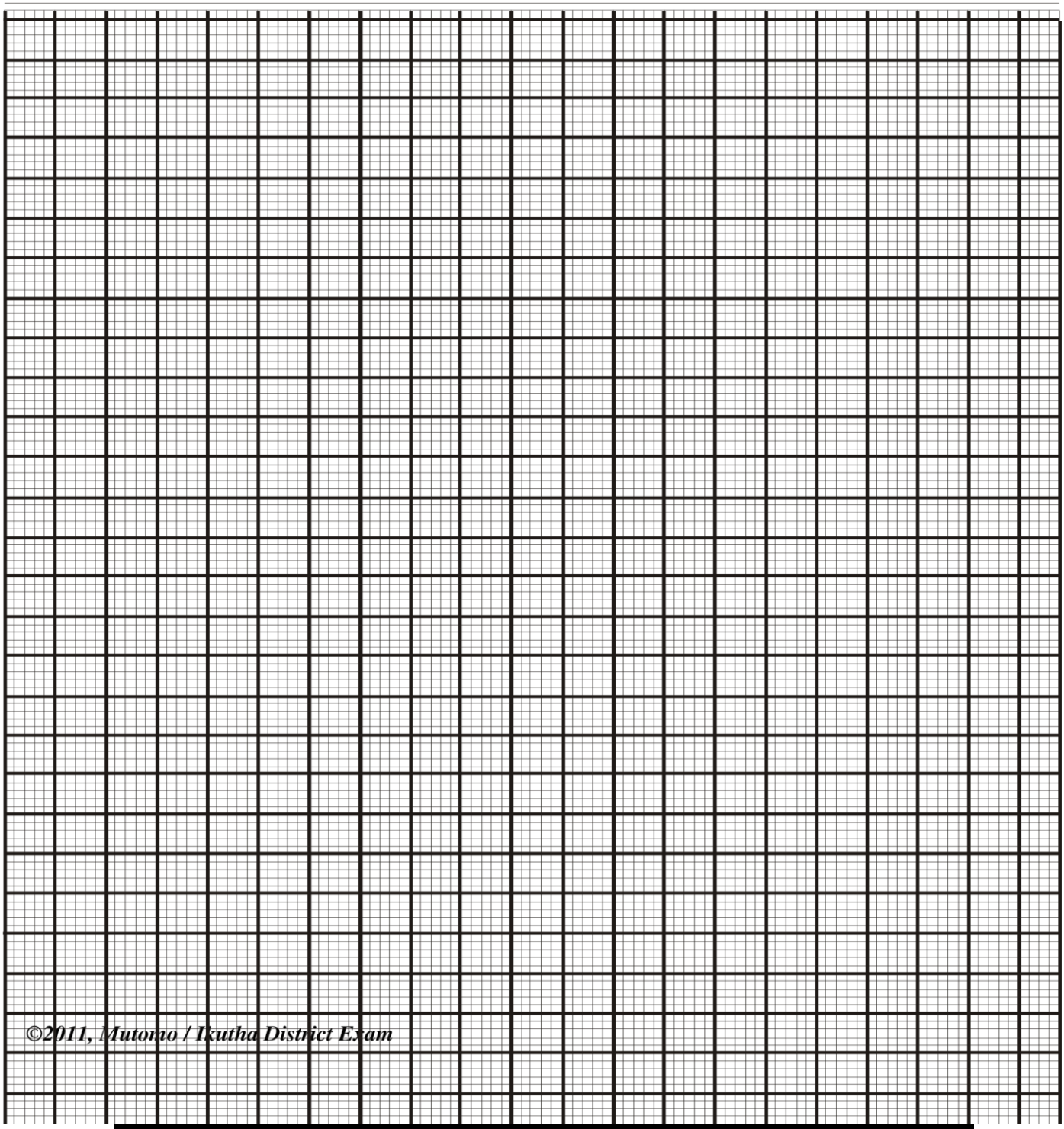
ii) The minimum wavelength of the emitted x-rays if 0.5% of the electron energy is converted into x-rays ($h = 6.63 \times 10^{-34}Js$, $c = 3.0 \times 10^{8}m/s$). **(3 Marks)**

17. a) What is the meant by the term work function? **(1 Mark)**

b) When the frequency of the illuminating radiation is just equal to the threshold frequency of the surface, no photoelectric effect is observed. Explain why. **(1 Mark)**

c) In a photoelectric effect experiment, a certain surface was illuminated with radiation of different frequencies and stopping potential determined for each frequency. The results were then recorded as shown below.

i) Plot a graph of stopping potential (y –axis) against frequency. (4 Marks)



Stopping potential V_s(v)	1.83	1.42	1.10	0.6	0.2
Frequency f(Hz) x 10^{14}	8.0	7.0	6.0	5.0	4.0

ii) From the graph, determine the Planck's constant, h and the work function of the surface given that $eV_s = hf - hf_o$ ($e = 1.6 \times 10^{-19}$c). **(4 Marks)**

d) A surface whose work function ϕ is 2.46eV is illuminated by light of frequency 3.0 x 10^{15}Hz.

Calculate the maximum kinetic energy of the ejected photoelectrons. (h=6.63 x 10^{-34}js).

(3 Marks)

18. a) Highlight **one** distinguishing factor between convex and concane lenses.**(1 Mark)**

b) There are **two** cases under which a converging lens can produce magnified images.

i) With the aid of ray diagram(s), show the position of the object and the image in each case. **(4 Marks)**

ii) State any **two** differences between the images in the two cases. **(2 Marks)**

c) A convex lens forms an image five times the size of the object on a screen. If the distance between the object and the screen is 120cm, determine the focal length of the lens. **(3 Marks)**

19. a) i) State the difference between progressive and stationary waves. **(1 Mark)**

ii) Give **two** distinctions between the way sound waves and electromagnetic waves are transmitted. **(2 Marks)**

b) A student stands between two walls and 400m from the nearest wall. The walls are x metres apart. Every time the student claps, two echoes are heard by the student, such that the first echo comes after 2.5seconds while the second echo follows 2 seconds later. Use this information to calculate;

i) The speed of sound in air. **(2 Marks)**

ii) The separation distance x between the two walls. **(3 Marks)**

c) State **two** factors affecting the speed of sound in gases. **(2 Marks)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 10 PAPER 1

TIME: 2 HRS

NAME…… INDEX NO……..…

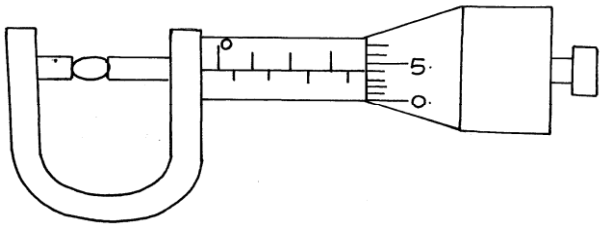
SCHOOL…….. SIGN……

DATE……

SECTION A: 25 MARKS

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

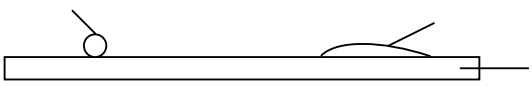
Fig.1



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,

Mercury drop



Water drop **Fig. 2**

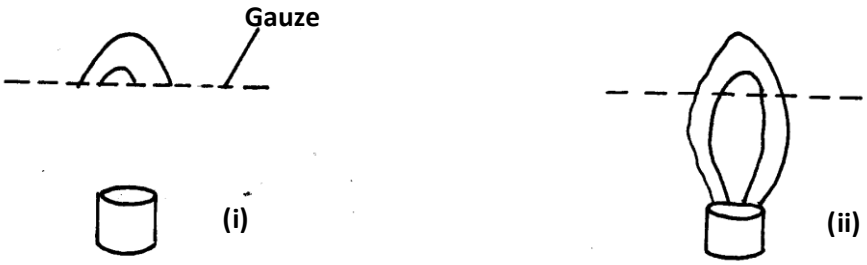
Glass

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

3. State why diffusion is faster in gases than in liquids. **(1mk)**

4. When a Bunsen burner is lit above a wire gauze, it is observed that the flame initially burns above the gauze shown in figure 3 (i). After sometime, the flame burns below as well as above the gauze as shown in figure 3(ii).

Fig. 3

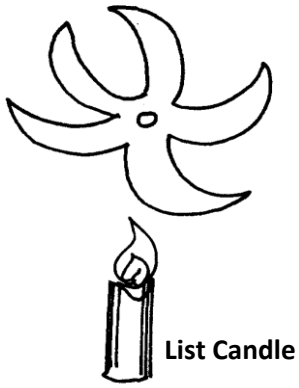


Explain the observation. **(2mks)**

5. In an experiment to demonstrate Brownian motion, smoke was placed in a smoke cell and observed using a microscope. The smoke particles were seen moving randomly in the cell. Explain the observation. **(1mk)**

6. A paper vane in a horizontal axis was placed above a Bunsen burner as shown in figure 4.

When the burner was lit, the paper vane begun to rotate. Explain the observation. **(2mks)**

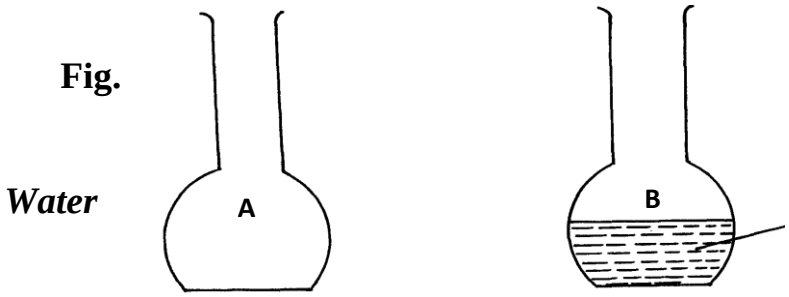


An electric kettle with shiny outer surface is more efficient than one with a dull outer surface, give a reason for this. **(1mk)**

7. What is the reason why trailers carrying heavy loads have many wheels. **(1mk)**

8. Two flasks **A** and **B** were placed on a horizontal surface as shown in figure 5.

Fig. 5

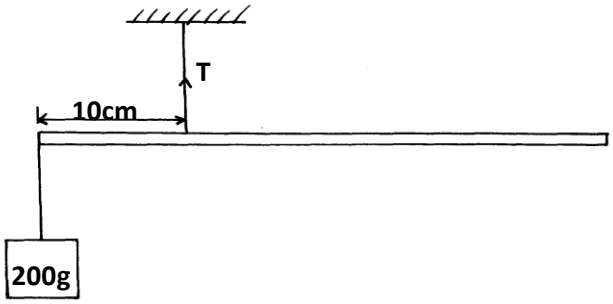


State and explain which flask is more stable. **(2mks)**

10. Figure. 6 below shows a metre rule balancing when a mass of 200g is hung at one end.

Determine the tension, T in the string. **(3mks)**

Fig. 6



11. State Newton's second law of motion. **(1mk)**

12. A pipe of diameter 12mm is connected to another of diameter18mm. if water flows in the wider pipe at the speed of 2m/s, determine the speed of water in the narrow pipe. **(3mks)**

13. On the axes provided in the figure 7, sketch the graph showing variation in pressure with volume of a fixed mass of gas that obeys Boyle's law. **(1mk)**

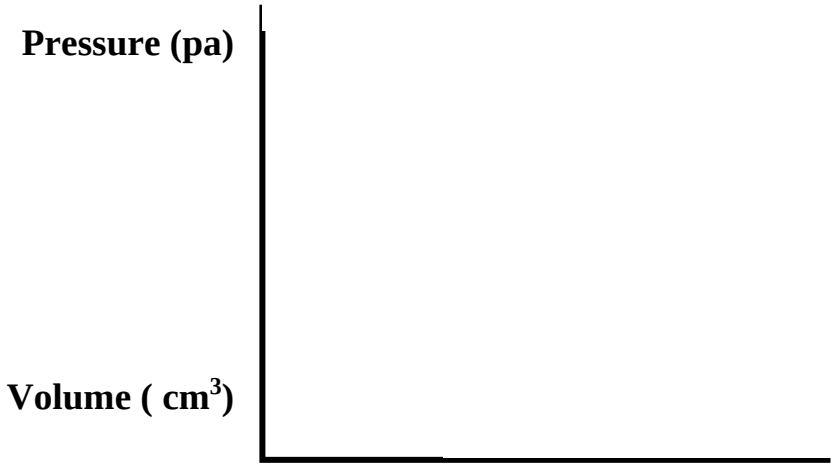


Fig. 7

14. An oil drop has a volume of 0.01mm3. When it is placed on the surface of water, it spreads out to form a circular patch of area 500cm2.

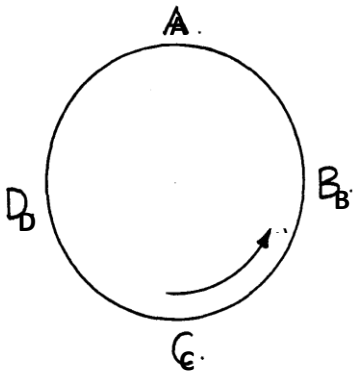
(i) Calculate the size of the molecule of the oil. **(3mks)**

(ii) State **one** assumption made in (i) above. **(1mk)**

SECTION B (55 MARKS)

15. (a) A stone is whirled in a vertical circle as shown in figure 8 below. A, B,C and D are various positions of the stone in its motion.

Fig. 8



The stone makes 2 revolutions per second in a circle of radius 0.4m, and has a mass of 100g.

(i) Calculate:

I The angular velocity **(2mks)**

II The centripetal force **(2mks)**

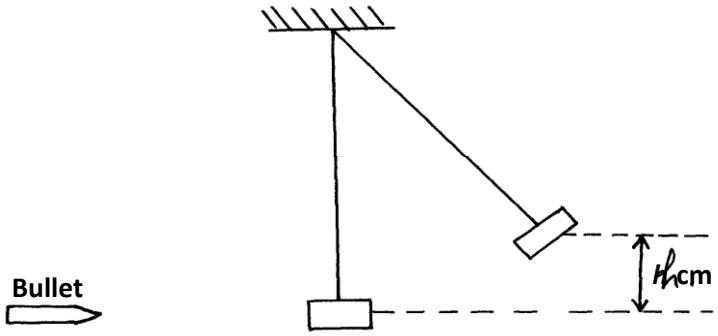
(ii) At **C** where the stone has acquired a constant angular speed, the string cuts. On the same

diagram (figure 8), sketch the path of the stone. **(1mk)**

(iii) The stone takes 0.5 seconds to land on the ground. How high is point C above the ground. **(2mks)**

(iv) How far does it travel horizontally before hitting the ground. **(2mks)**

(b) A bullet of mass 200g traveling at a velocity of 600m/s hits a bag of sand of mass 29.8 kg hanging from a support as shown in figure 9 below. The bullet embed itself in the sand and the bag swings to the right and rises through a vertical height, h (cm). Calculate the vertical height, h that the bag and the bullet rises. **(3mks)**

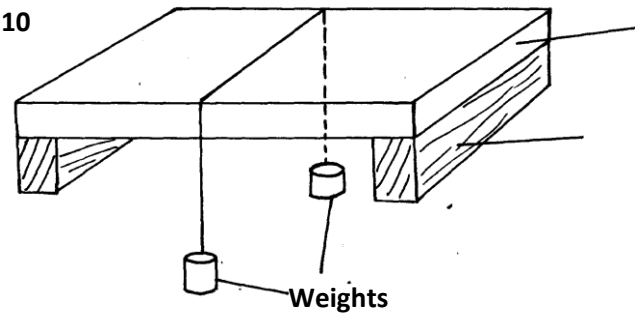


16. (a) Define specific latent heat of fusion of a substance. **(1mk)**

(b) Figure 10 below shows a block of ice with two heavy weights hanging such that the copper wire connecting them passes over the block.

Ice block

Fig. 10



(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)**

17. (a) State Hooke's law. **(1mk)**

(b) (i) A vertical spring of unstretched length 30cm is clamped at its upper end. When sand is placed on a pan attached to the lower end of the spring its length becomes 45cm. When a 20g mass is placed on top of the sand, the length increases to 55cm. Determine the mass of the sand. **(3mks)**

(ii) If the spring in (i) above is compressed from its original length to 24 cm, calculate the work done in compressing the spring. **(2mks)**

(c) Figure 11 below shows the variation of force with extension for a certain spring.

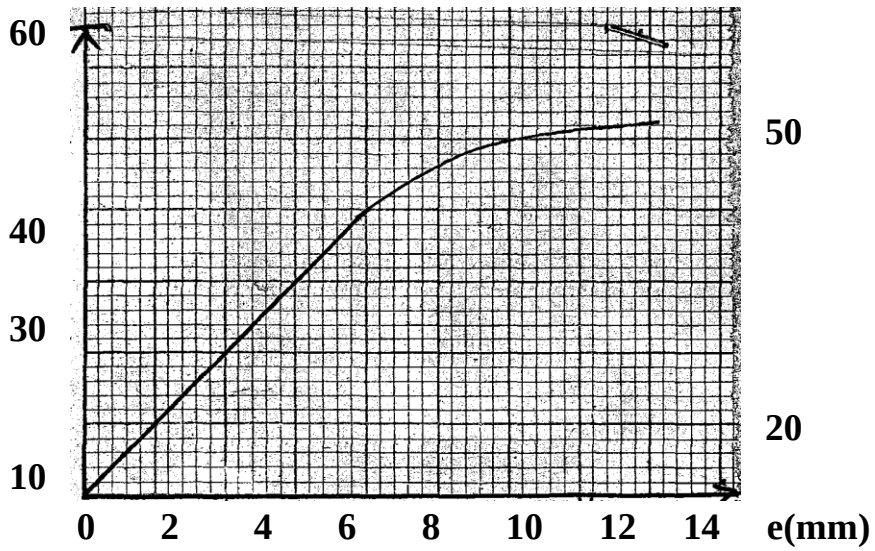


Fig. 11

(i) Determine the spring constant of the spring used. **(3mks)**

(ii) On the same axes, sketch the variation of force with extension for another similar spring whose length is double the first spring. **(1mk)**

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

(b) Figure 12 shows a piece of cork held with a light thread attached to the bottom of a beaker. The beaker if filled with water.

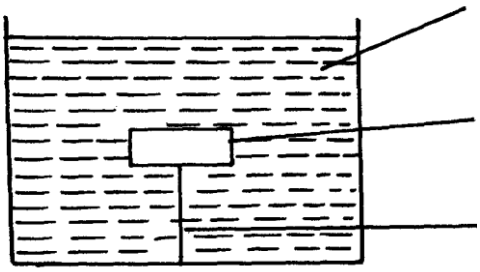


Fig. 12

(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)**

19. (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 20N 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. **(2mks)**

(d) Figure 12 below shows two pulley arrangements used to lift different loads.

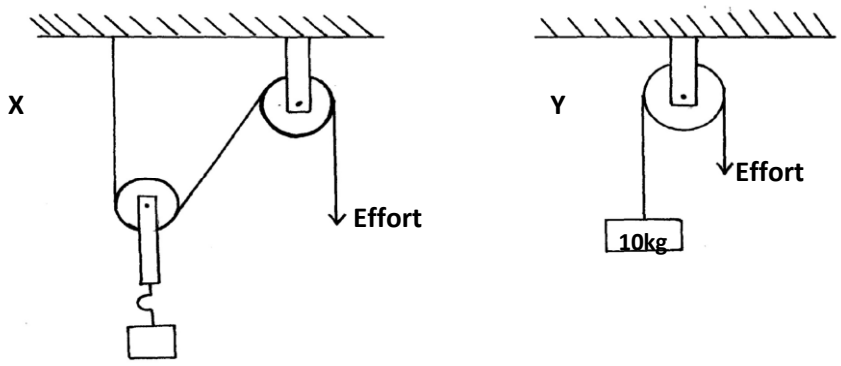


Fig. 13

Which of the systems, between **X** and **Y** is more efficient. Explain. **(2mks)**

KCSE FINAL PREDICTION

PHYSICS

TRIAL 10 PAPER 2

TIME: 2 HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

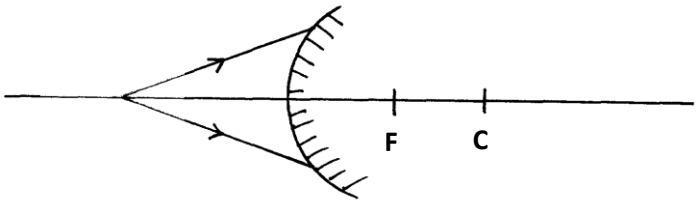
DATE……

SECTION A: 25 MARKS

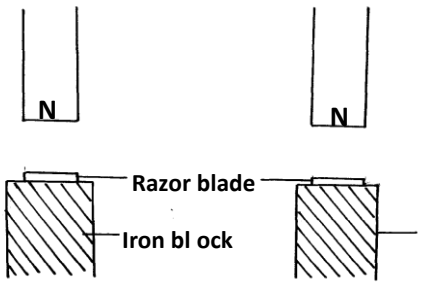
1. Figure 1. shows two rays incident on a curved mirror. Draw the approximate path of each ray after

reflection. **(1mk)**

Fig. 1



2. Two similar razor blades were placed one on a wooden block and the other on an iron block as shown in figure 2.



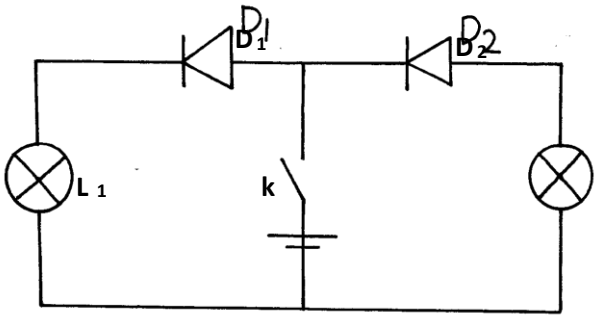
Wooden block

It was observed that the razor blade on the wooden block was attracted to the magnet while the other on iron block was not. Explain. **(1mk)**

3. The activity of a radioactive substance initially at 400 counts per second in 36 minutes. Determine the half-life of the substance. **(2mks)**

4. Figure 3 is a circuit with 2 bulbs and components **D**.

Fig. 3



(i) State the observation made when switch **K** is closed. **(1mk)**

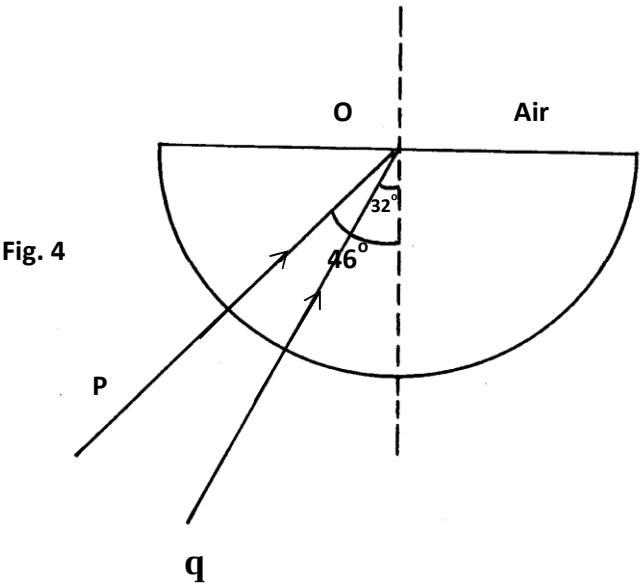
(ii) Account for the observation made above. **(1mk)**

5. State **two** conditions necessary for total internal reflection to occur. **(2mks)**

6. An electric kettle is rated 3KW, 250V. Determine the resistance of the coil. **(2mks)**

7. Figure 4 below shows two rays p and q entering a semi circular glass block whose critical angle is 44° the rays are incident at an air glass boundary at point **O**.

Fig. 4



(i) Complete the path of the two rays from point **O.** Label $\mathbf{p^l}$ and $\mathbf{q^l}$ the corresponding rays. **(2mks)**

(ii) Calculate the refractive index of the material of glass used above.

(2mks)

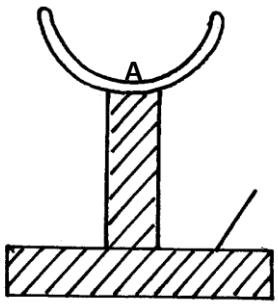
8. Two heaters **A** and **B** are connected in parallel across a 10volts supply. Heater **A** produces 1000J of heat in one hour while B produces 200J in half an hour. Calculate the ratio **RA/RB**. **(3mks)**

9. State **two** qualities that are used to determine whether accumulator require charging or not. **(2mks)**

10. When the hole on a pin hole camera is made larger the image formed becomes larger. State **one** other change on the image formed. **(1mk)**

11. Figure 5 below shows a negatively charged conductor resting on an insulator.

Fig. 5



Insulator

(i) Show the distribution of charge on the conductor. **(1mk)**

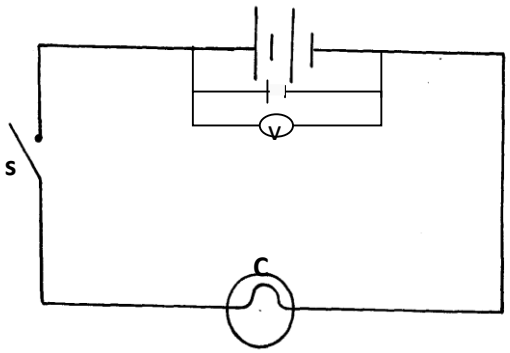
(ii) A proof plane is made to touch the part marked A and then transferred to the cap of a negatively charged electroscope. State and explain what you will observe in the leaf of the electroscope. **(1mk)**

12. With aid of a diagram explain why convex mirror is preferred for use in supermarkets for surveillance to plane mirrors. **(1mk)**

13. Express 10picofarads in S.I units. **(1mk)**

14. Figure 6 below represents a simple circuit diagram containing cells of e.m.f 1.5V each.

Fig. 6



(i) What does component **C** represent. **(1mk)**

(ii) Determine the reading of **V** when the switch is open. **(1mk)**

SECTION B (55 MARKS)

15. (a) State the faraday's law of electromagnetic induction. **(1mk)**

(b) Coil carrying a large alternating current is placed close to a copper ring suspended freely on a silk thread as shown in the diagram below.

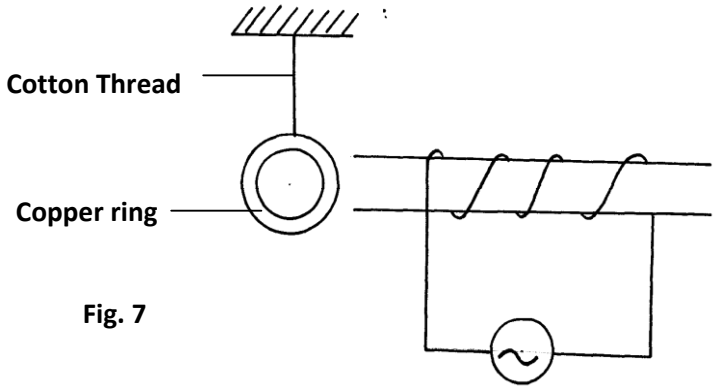


Fig. 7

(i) Explain why the ring is repelled continuously. **(2mks)**

(ii) State and explain what would be observed when a direct current is used instead of an alternating current. **(2mks)**

(c) The diagram below is a simplified illustration of an e.m.f generator.

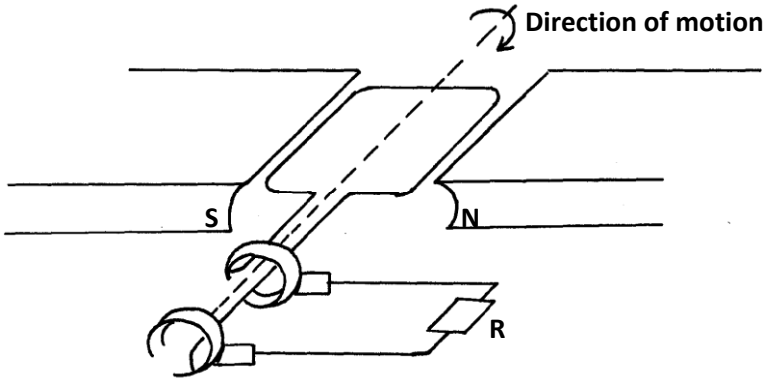


Fig. 8

(i) Show the direction of induced current through **R** when the coil is in the position shown in the diagram. **(1mk)**

(ii) State **three** ways of increasing the amount of induced current in this set up. **(3mks)**

(iii) On the axes below sketch a graph to show how potential difference across **R** varies with the inclination angle. The coil is initially horizontal. **(1mk)**

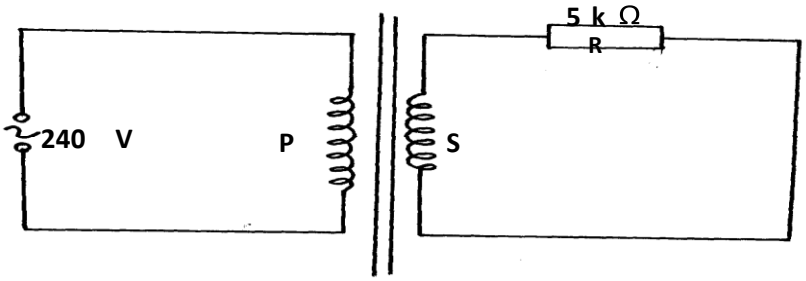
Fig. 9

(d) State and explain any **two** ways by which energy losses are minimized in a transformer. **(2mks)**

(e) The figure below shows a step-down transformer connected to a 240V mains socket.

The primary coil has 4000 turns while the secondary coil has 200 turns. The efficiency of the transformer is 60% and a current of 50A flows through **R**. Calculate the current though **S**.(3mks)

Fig. 10



16. Figure below shows the structure and circuit of a modern X-ray tube:

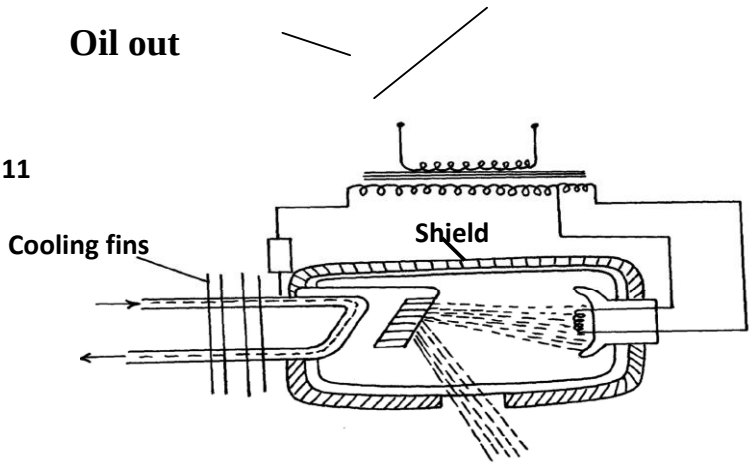


Fig. 11

Filament

Tungsten

X -rays

Tanget

(a) (i) Briefly explain how electrons are produced by the cathode. **(1mk)**

(ii) How are the electron produced accelerated towards the anode. **(1mk)**

(iii) Why is the target made of tungsten. **(1mk)**

(iv) How is cooling achieved in this kind of x-ray machine. **(1mk)**

(v) Why would it be necessary for the target to rotate during operation of this machine. **(1mk)**

(vi) Why is the tube evacuated. **(1mk)**

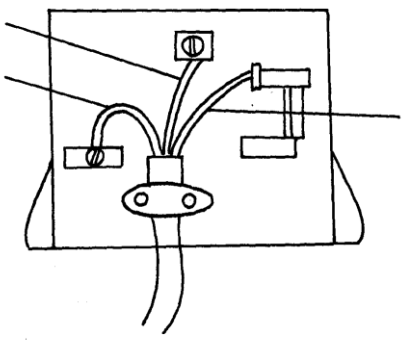
(vii) Why is the machine surrounded by a lead shield. **(1mk)**

(b) If the accelerating voltage is 100KV. Calculate:

(i) Kinetic energy of the electrons arriving at the target. ($e=1.6x10^{-19}C$) **(3mks)**

(ii) If 0.5% of the electron energy is converted into x-rays. Determine the minimum wavelength of the emitted x-rays. ($h=6.63x10^{-3}4J.S$ and $C=3.0x10^{8}ms^{-1}$) **(3mks)**

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



Brown

Green/yellow

Blue

Fig. 12

(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 7.00 p.m to 10.30 p.m.

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

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

18. (a) State **two** differences between stationary and progressive waves. **(2mks)**

(b) When air is blown into a closed pipe through the open end as shown below the vibration produces longitudinal wave which travels along the pipe and undergoes a reflection at the end. The reflected wave then interferes with the incident wave to form a stationary wave.

Using the diagram derive the fundamental frequency of the wave. **(3mks)**

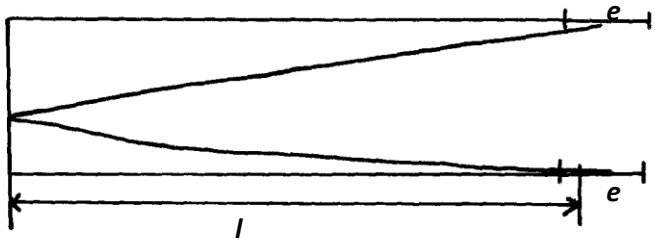
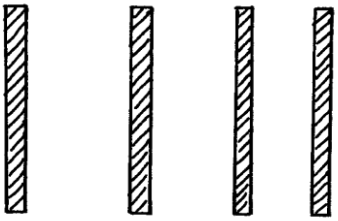


Fig. 13

(c) Figure below represents the fringe pattern in a double slit experiment when monochromatic Red light was used.

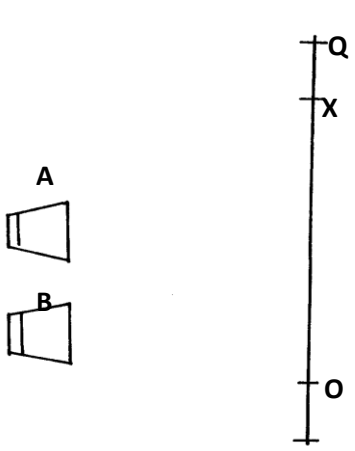


Shaded area is red while unshaded area is black.

(i) Explain using the wave theory of light why black and red fringes occur. **(2mks)**

(ii) State and explain how the pattern would change if monochromatic blue light were used while the rest of the experiment remaining unchanged. **(2mks)**

(d) In the figure below which is drawn to scale 1:20 two loudspeakers **A** and **B** connected to signal generator (not shown) produces sound waves of frequency 15,000Hz. An observer walking along **PQ** hears loud and low sounds at alternate positions.



(i) Explain how the observations are made. **(2mks)**

(ii) At point **O**, a loud sound is heard and at point **X**, the next loud sound is heard. Use this information and the diagram to determine the velocity of sound in air. **(4mks)**

THE END

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