KCSE MOCKS

PHYSICS

SET 2

FOR MARKING SCHEMES

CALL/WHATSAPP

0705525657

MOCK TRIALS 1-10

A COMPILATION OF PHYSICS MOCKS
IDEAL IN KCSE REVISION PURPOSES

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KCSE MOCK TRIAL 1

232/1

PHYSICS

PAPER 1

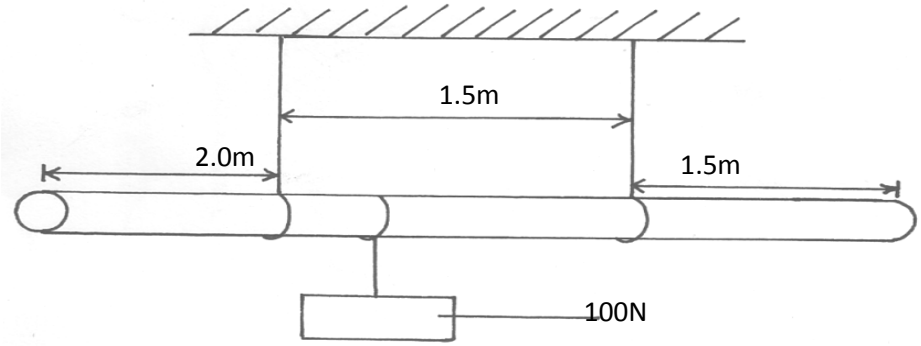
TIME: 2 HOURS

INSTRUCTIONS TO THE CANDIDATES:

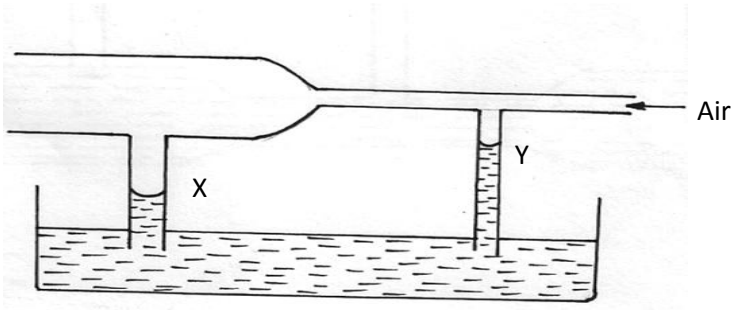
1. 50 drops of a liquid were released from a burette which was originally reading $22cm^3$ to give new reading of $56cm^3$. Calculate the volume of each drop.
(2mrks)

2. A uniform plank of wood weighing 50N and of length 5m is suspended by two ropes **A** and **B** 1.5m apart. **A** is 2m from end and **B** is 1.5m from the other end as shown in fig 1 below. **A** block of weight 100N is suspended from the centre of the plank.

Calculate the tension $\mathbf{T_A}$ on the string **A.** (3mrks)



3. The fig below shows a horizontal tube with two vertical pipes **X** and **Y** dipped in water. Air flows through the tube from right to Left. The water level in **X** is low lower than in **Y**.



Explain this observation
(2mrks)

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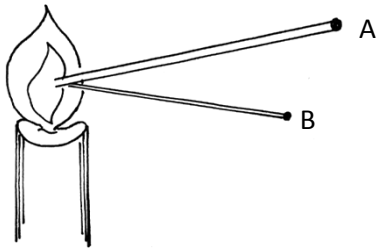
4. Some water is heated in a beaker from 0^0 C sketch the graph of mass **y** axis verses temperature for the water.(1mrk)

5. Two aluminum rods **A** and **B** of the same length are held over a burner flame. Equal pleads of wax are attached to the ends as shown below.



It is observed that the wax on **A** melts faster. Explain
(2mrks)

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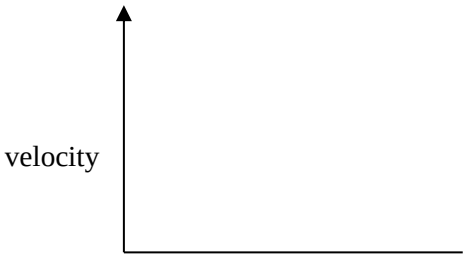
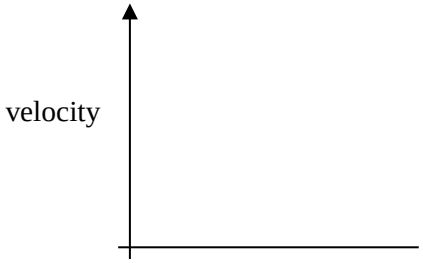
6. **A** steel sphere **A** is released in a tall transparent water jar containing water. At the same time and height another similar steel sphere **B** is released in air sketch on the axes below the velocity time graphs for sphere **A** and **B**.



Sphere **A**



Sphere **B**

(2mrks)

7. Water is not a suitable barometric liquid. Explain

(1mrk)

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8. A pipe of diameter 6cm is connected to another of diameter 30mm. If water flows in the wider pipe at a speed of $4ms^{-1}$ .Determine the speed of the water in the narrow pipe.
(3mrks)

9. A body is projected vertically upwards from the top of a building. Assuming that it lands at the base of the building .Sketch the velocity time graph for this motion.
(2mrks)

10. A student heated equal amount of water in two aluminium containers **A** and **B** by a flame of equal hotness. If **A** was bigger than **B**, in which container will it take longer time to boil the water and why?
(2mrks)

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11. 0.2 kg of copper at80^0C is put in a well lagged brass calorimeter of mass 0.1kg containing 0.16kg of sea water at 20^0C. Calculate the final steady temperature of the mixture.

Take specific heat capacity of Copper = 400 $Jkg^{-1}k^{-1}$

Brass = 380J $kg^{-1}k^{-1}$

Sea water = 3900J $kg^{-1}k^{-1}$

(3mrks)

12. State **two** features that make the clinical thermometer more sensitive.
(2mrks)

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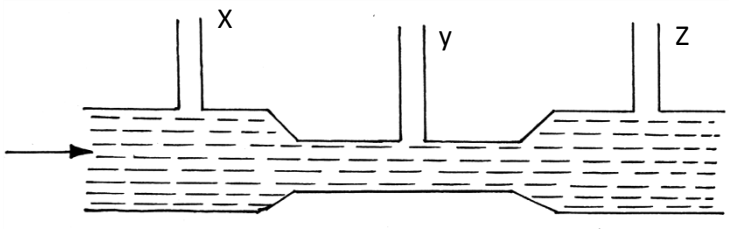
SECTION B (55MARKS)

13. (a) The figure below represents a tube through which a liquid is flowing as shown by the arrow



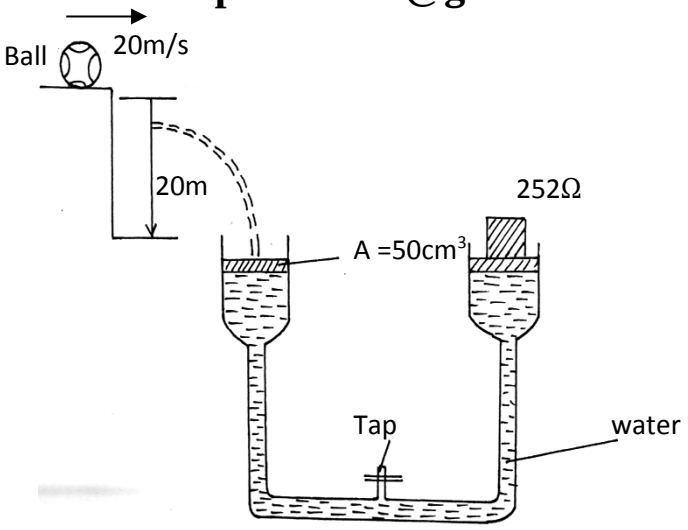
On the diagram show the relative positions of the level of the liquid in sections marked **X, Y** and **Z.** (1mrk)

(b) A lown sprinkler has 20 holes each of cross- sectional area $2x\ 10^{-2}cm^2$ is connected to a hose pipe of cross- section area $2.4cm^2$. If the speed of water in the hose pipe is 1.5m/s. (3mrks)

(i) Calculate the flow rate in the hose pipe. (3mrks)

(ii) The speed of water as it emerges from the hose pipe (3mrks)

14. The figure below shows a ball of mass 50kg being thrown from the top of a wall 20m high with a horizontal velocity of 20m/s. It struck the piston **A** of hydraulic lift and no water splashed out .The other piston **B** had a weight of 25200N placed on it. Assuming the top was opened at the time the ball struck the piston **A**.



Determine

(i) The time taken by the ball to strike the surface of piston **A.** (3mrks)

(ii) The distance from the foot of the wall to where it hit piston **A**. (2mrks)

(iii) The vertical velocity with which the ball struck piston A. (2mrks)

(iv) The force with which the ball struck piston **A.** (2mrks)

(iv) The area of piston **B** if the load on piston **B** did not move and that the **two** pistons were initially at the same level. (2mrks)

15. (a) State the principal of transmission of pressure. (1mrk)

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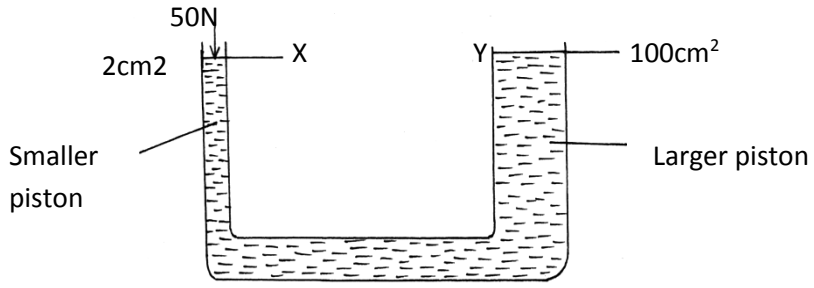
(b) The figure below shows the principle of a hydraulic force.



16. (a) State the pressure law for ideal gas. (1mrk)

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(b) At 20ºC the pressure of a gas is 50cm of mercury . At what temperature would the pressure of the gas fall by 30cm of mercury. Give the temperature in degree celsius.
(3mrks)

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

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(d) A hole of area 2.0cm^2 at the bottom of a tank 2m deep is closed with a cork. Determine the force on the cork when the tank is filled with water. Take density of water = 1000kg/m^3 and g = 10m/s^2

(4mrks)

17. (a) Define specific heat capacity.
(1mrk)

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

- Mass of calorimeter = 60g
- Initial mass of water = 80g
- Initial room temperature of water = 15ºc
- Final temperature of mixture =45ºc
- Final mass of water + calorimeter + condensed steam = 160g

Specific heat capacity of water= 4200 J kgk^{-1} and specific heat capacity of copper = 390 J $kg^{-1}k^{-1}$

Calculate :

(i) Mass of condensed steam
(1mrk)

(ii) Given that L_v is the specific latent heat of the vaporization of steam,

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

(b) Determine the value of L_v (2mrks)

18. (a) State Hooke's law (1mrk)

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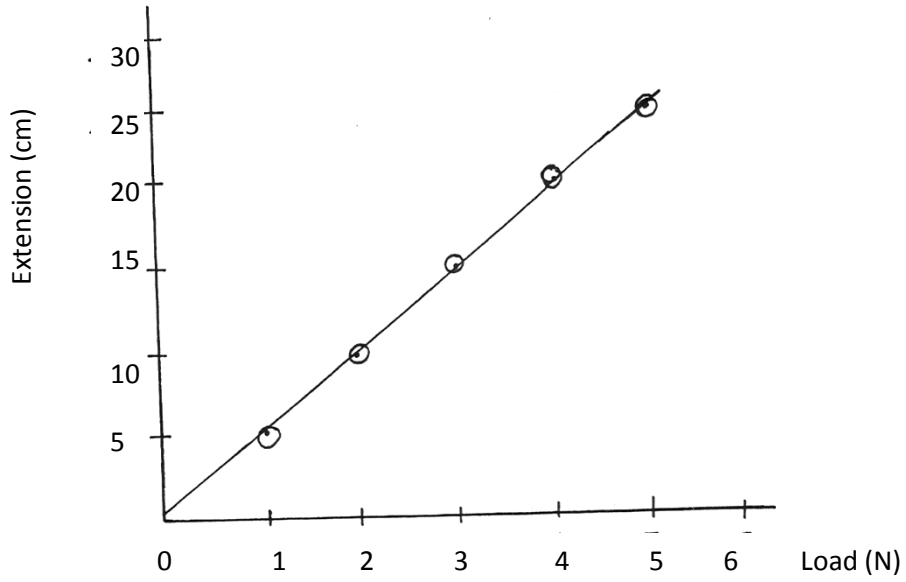
(b) The graph shows the variation of extension of a helical spring with the load hanging on it.



Determine from the graph the proportionality constant of the spring (3mrks)

(c) State **two** factors that affect the proportionality constant of a vertical string.
(2mrks)

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(ii) Given that the Lv is the specific latent heat of vaporization of steam

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

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

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KCSE MOCK TRIAL 1

232/2

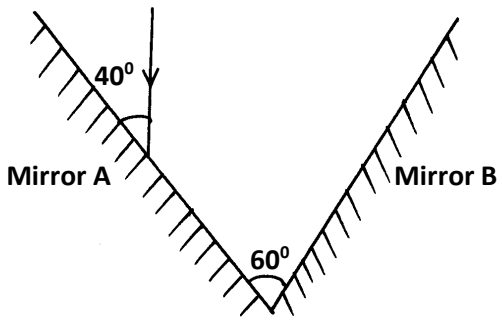
PHYSICS

PAPER 2 (Theory)

TIME: 2 HOURS

SECTION A (25 MARKS)

1. A ray is incident on two mirrors inclined at 60^0 as shown in the diagram below. (2mks)



Determine the angle of reflection on mirror **B**, hence trace the path of the ray as it leaves mirror **B.**

2. State and explain the observation made when an acetate rod rubbed with fur is brought close to the cap of a negatively charged electroscope.

(2mks)

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3. State how polarization is reduced in a dry cell. (1mk)

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4. Distinguish between a P-type and a N-type extrinsic semiconductors. (2mks)

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5. State one similarity and one difference between the gamma rays and x-rays based on the mode of generation of the radiations.

i) Similarity (1mk)

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ii) Difference (1mk)

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6. **X**-rays are produced by a tube operating at 10^4 Volts. Calculate the wavelength of the radiation.

(Take h=6.63x10^{-34}Js, e=1.6x10^{-19}C, c =3x10^{8}m/s)

(3mks)

7. State how a vertical trace can be obtained on the screen of a cathode ray oscilloscope. (1mk)

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8. A boat sends a sound signal in the middle of Lake Victoria and an echo is heard after 6 seconds. Determine;

i) The depth of the lake. (2mks)

ii) The frequency of the signal stated in (i) above. (1mk)

(Take speed of sound in water = $1440ms^{-1}$, wavelength = 0.4m)

9. A concave mirror produces an erect image of magnification **2**. If the focal length of the concave mirror is 30cm, find the distance of the object from the mirror. (3mks)

(Hint: the image is virtual)

10. State Lenz's law of electromagnetic induction. (1mk)

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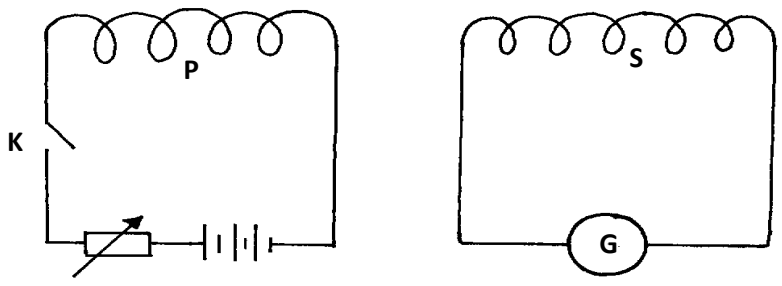
11. The coils **P** and **S** are connected as shown below. **P** is connected to a battery, rheostat and a switch **K**. **S** is connected to a galvanometer **G**.



State the behaviour of the pointer on **G** in the following cases;

i) When **K** is switched on (closed) (1mk)

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ii) When **K** is opened. (1mk)

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12. A current of **5mA** passes through a wire of length 1.0m, radius $1.0x10^{-4}$mm and resistivity $1.1x10^{-6}\Omega m$. Calculate the rate at which heat is given off by the wire. (Assume temperature is constant.)

(3mks)

SECTION B (55 MARKS)

13. a) Define the term photoelectric effect. (1mk)

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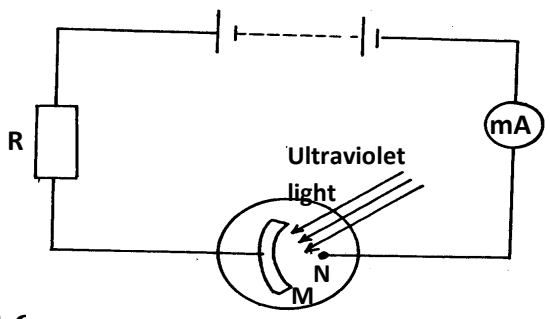
b) The diagram below shows a circuit to investigate the photoelectric effect using a photocell.



i) Explain why the milliameter shows a reading when ultraviolet light is shone as in the diagram.

(3mks)

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ii) State with a reason how the milliameter reading is affected when the intensity of light is increased.
(2mks)

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iii) State one practical application of a photocell. (1mk)

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c) A laser beam of intensity $2x10^{-1}Nm^{-2}$ and wavelength $\lambda=5x10^{-7}m$ hits a wall 5m away. How many photons per second are emitted?

(3mks)

(Take $h=6.6x10^{-34}Js$, $c=3x10^{8}ms^{-1}$)

14. a) Differentiate between a nuclear fussion and nuclear fission. (2mks)

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b) The equation below represents a nuclear reaction.

$$^{218}_{84}P_o \longrightarrow {}^{218}_{85}A + {}^{q}_{p}Y$$

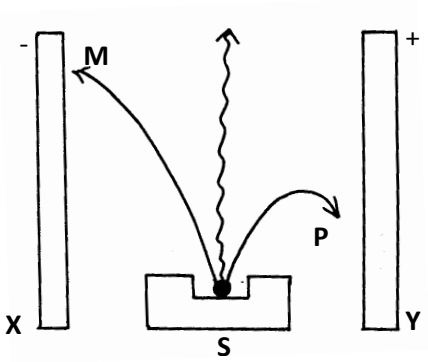
i) Determine the values of **p** and **q.** (1mk)

p……..……..

q……..……..

ii)Identify **Y**……...……. (1mk)

c) The figure below represents deflection of various radiations from a radioactive source S placed in electric field between two plates **X** and **Y.**



Identify the radiations marked with letters **M** and **P.**

(1mk) **M**……

P……

d) What do you understand by the term 'Random decay' (1mk)

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e) A sample of radioactive substance initially has $8x10^{25}$ particles. The half life of the sample is 98 seconds. Determine the number of particles that will have decayed after 294 seconds. (3mks)

15. a) State Snell's law. (1mk)

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b) Find the angle of incidence of a ray of light on one phase of a 60^0 prism if the ray is just totally internally reflected on meeting the next face. (3mks)

(Take refractive index of glass = 1.5)

c) Explain why glass prisms are preferred for use in periscopes to plane mirrors. (1mk)

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d) i) State **two** ways in which a photographic camera is different from the human eye. (2mks)

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ii) Determine graphically in the space below the position, size and nature of the image of an object 2cm high placed 30cm away from a diverging lens of focal length 20cm. (5mks)

(Use the scales vertically: 1cm rep 1cm, horizontally: 1cm rep 10cm)

16. a) Differentiate between a transverse wave and a longitudinal wave. (2mks)

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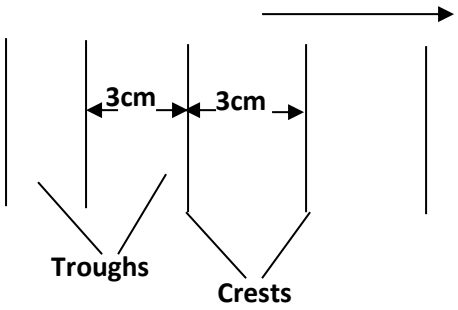
b) Water ripples are caused to travel across the surface of a shallow tank by means of a suitable straight vibrator.

The distance between successive crests is 3.0cm and the waves travel 25.2cm in 1.2s.



Calculate:

i) The velocity of the waves. (2mks)

ii) The frequency of the vibrator. (3mks)

17. a) State any two disadvantages of direct transmission of electricity from power generating stations at a large current through the transmission cables. (2mks)

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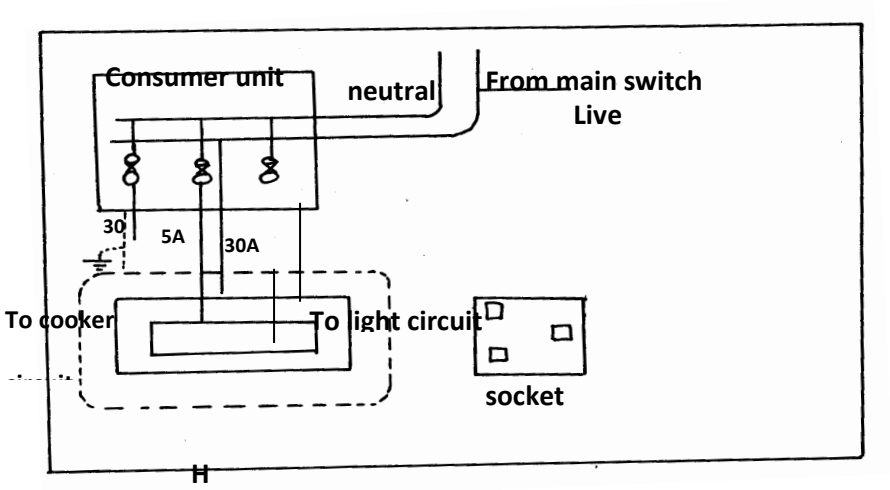
b) The diagram below represents part of a domestic wiring system.



i) Identify any two mistakes in the wiring above and explain how they should be corrected. (4mks)

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ii) Identify the circuit **H** represented above.

(1mk)

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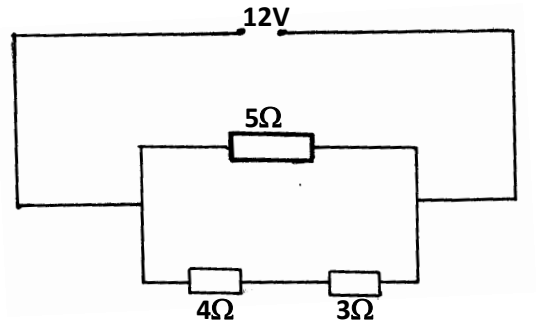
c) Complete the wiring to the socket in the wiring system **H** above. (1mk)

18. a) The figure below represents a circuit diagram of three resistors connected to a 12V battery.

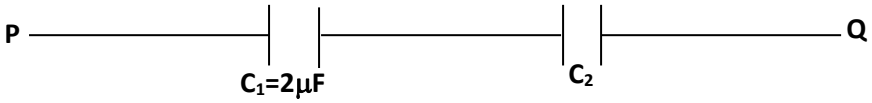


Determine;

i) The effective resistance for the arrangement above. (2mks)

ii) The potential difference across the 3Ω resistor. (3mks)

b) The figure below shows part of the circuit containing two capacitors $\mathbf{C_1}$ and $\mathbf{C_2}$.



If $\mathbf{C_1}$=**2μF** and the **Pd** across **PQ** is **150V** while the total charge in the capacitors is $1.8\text{x}10^{-4}$ coulombs. Determine the capacitance of $\mathbf{C_2}$. (4mks)

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KCSE MOCK TRIAL 2

232/1

PHYSICS

Paper 1

Time: 2 Hours

1. a) Distinguish between the shadow formed by a point source of light and by an extended source of light.

(2 mks)

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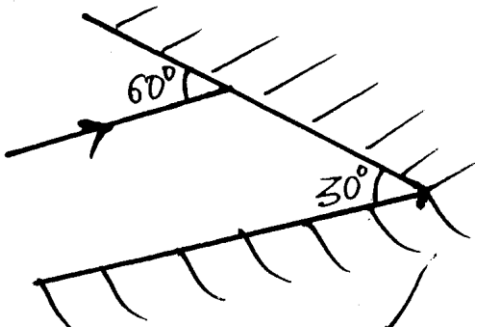
b) The following figure shows two mirrors inclined at an angle of 30^0 to each other. A ray of light is incident on one mirror as shown below.



On the diagram, trace the reflected ray (2 mks)

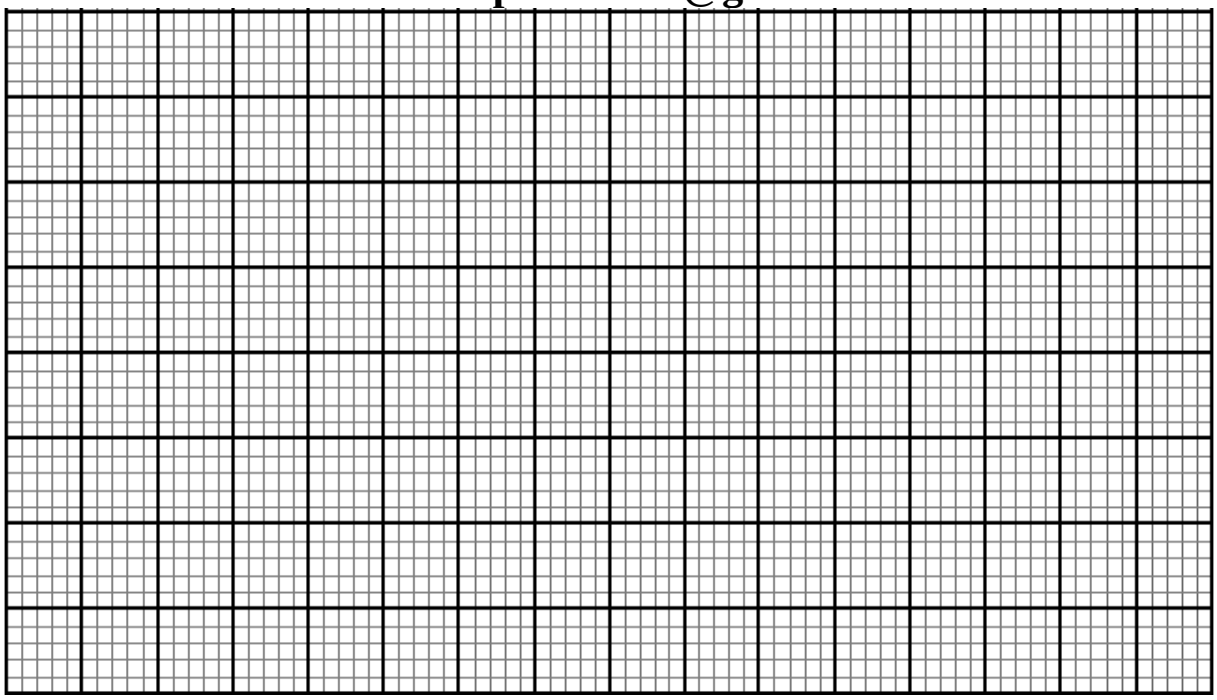
2. An object 5cm high is placed 5 cm from a concave mirror of focal length 10cm. By scale drawing, determine ,

(i) Image size

(ii) Image distance

(iii) Nature of image formed

On the grid provided. (4 mks)



3. Give two similarities between a camera and human eye (2 mk

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4. (a) A battery is rated at 70AL. How long will it work if it steadily supplies a current of 4A.

(1 mk)

(b) State one advantage of a lead-acid accumulator over a dry cell. (1 mk)

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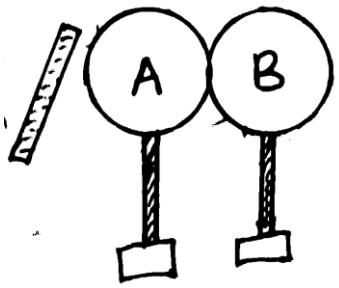
5. Two identical spheres A and B each standing on an insulated base are in contact. A negatively charged rod is brought near sphere A as shown below.



In what way will A differ from B if separated while the rod is near? (1 mk)

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6. (a) Give two factors affecting capacitance of a capacitor. (2 mks)

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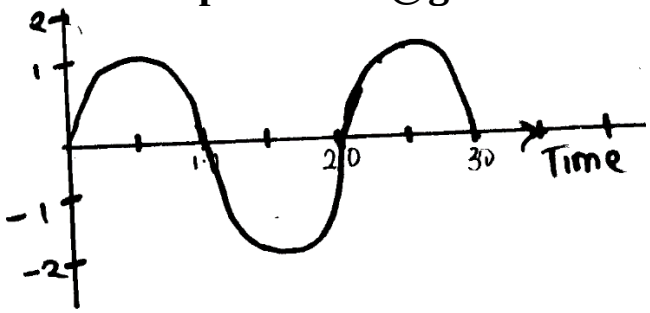
(b) A $2\,\mu F$ capacitor is a charged to a potential difference of 120V. Find the energy stored in it. (2 mks)

7. The figure below represents an oscillation taking place at a particular point while a sound wave in a gas passes the point. The vertical axis is labelled displacement.



i) Explain what is meant by displacement in this context. (2 mks)

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ii) From the figure above determine

(a) The period (1 mk)

(b) The frequency (1 mk)

8. An x-ray machine produces radiation of wavelength 1.0×10^{-11}, calculate;

(a) The frequency of the radiation (2 mks)

(b) Its energy content (Plank's constant to be 6.63×10^{-34} Js) (2 mks)

9. (a) Give three factors that determine heating effect by an electric current. (3 mks)

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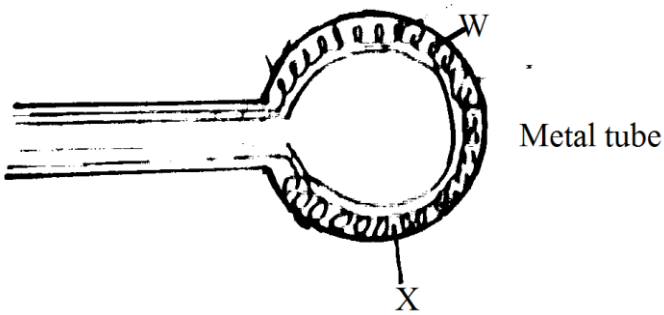
(b) A 60w bulb is used for 36 hours, determine;

(i) The energy consumed in Kwh (1 mk)

(ii) The cost of using the bulb for 36 hours at sh. 1.55 per Kwh. (1 mk)

(c) The figure below represents part of an electric cooker coil.



(i) State why the part labelled W is coiled (1 mk)

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(ii) State the property of material X that makes it suitable for its use. (1 mk)

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(d) (i) What is the use of a fuse in an electric circuit (1 mk)

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(ii) State the advantage of transmitting power at

(a) Very high voltage (1 mk)

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(b) Alternating voltage (1 mk)

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10. (a) State any two properties of magnets (2 mks)

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(b) Why is it that repulsion is the surest test of polarity of a magnet as opposed to attraction.

(2 mks)

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(c) Use the domain theory to explain the process of magnetism. (2 mks)

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d) i) Draw the magnetic field pattern around the magnets below

ii) Give one application of thin behaviour of soft iron. (1 mk)

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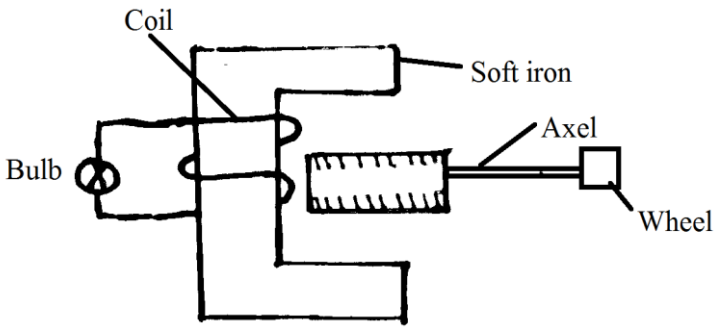
(e) The figure shows a cross-section of a bicycle dynamo. The wheel is connected by an axle to a permanent cylinder magnet and is rotated by the bicycle tyre.



i) Explain why the bulb light (2 mks)

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ii) How can the bulb be made brighter. (2 mks)

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11. (a) What is meant by radio-active decay? (2 mks)

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(b) Half life of a certain radioactive element is 16 years.

(i) What fraction of the element will be remaining after 48 years? (2 mks)

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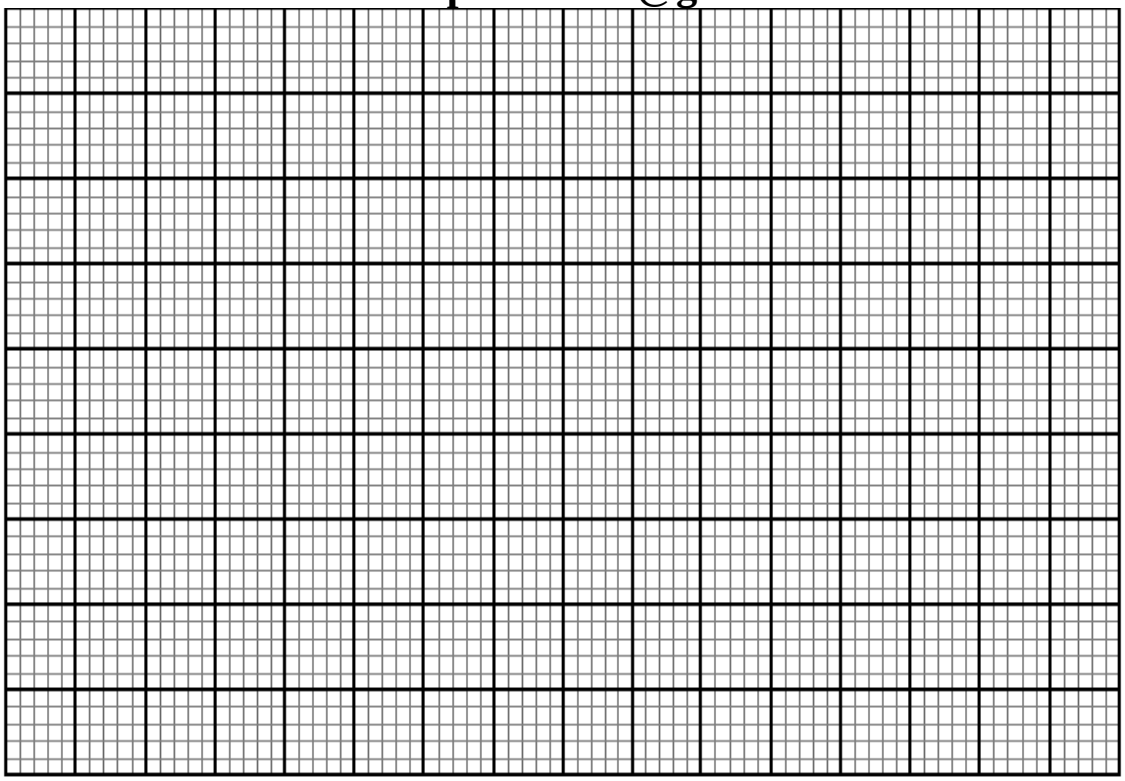
(ii) What fraction of the element will have decayed after 64 years? (2 mks)

(c) The following data was obtained from the reading of a counter connected to Geiger Muller tube placed infront of a radioactive source.

Time in minutes	0	4	8	12	16
Count rate per minutes	800	520	345	225	145

From the table above;

(i) Plot the graph of count-rate (per minute) against time (minutes) (2 mks)



(ii) Determine the half-life of the radioactive source (1 mk)

(iii) Explain the nature of the graph. (2 mks)

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12. (i) Explain how P-type semi-conductor is formed. (2 mks)

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(ii) Explain the nature of the graph. (2 mks)

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12. (i) Explain how P-type semi-conductor is formed. (2 mks)

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(ii) Distinguish between intrinsic and extrinsic semi conductors (2 mks)

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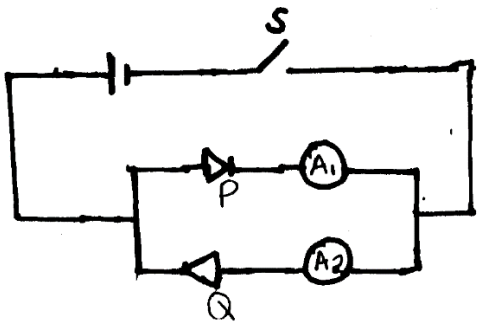
(iii) The figure below shows a circuit with two diodes P and Q and a cell.



Explain the observation which would be made if S is closed. (2 mks)

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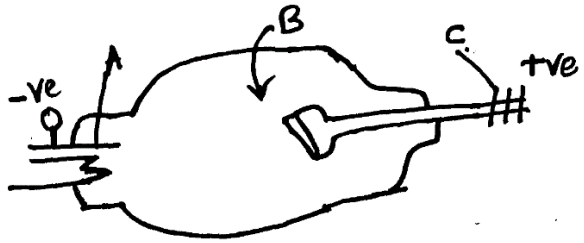
13. (a) The diagram below shows simplified diagram of an x-ray tube.



(i) Name parts A, B and C.

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(ii) What adjustments would be made to

a) Increase the penetrating power of the X-ray produced (1 mks)

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b) Increase the intensity of the rays produces (1 mk)

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(iii) Name a suitable material for the part marked B and give a reason for your choice.

(2 mks)

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(iv) Name a suitable material for the part marked C and state its purpose (2 mks)

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(v) Why is it necessary to maintain a vacuum inside the tube? (2 mks)

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(vi) Satet one use of X-rays in the following areas. (2 mks)

a) Medicine

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b) In industry

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(b) (i) State two factors which would affect the resistance of a metal conductor other than the temperature. (2 mks

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(ii) Define potential difference and state in SI units (1mk)

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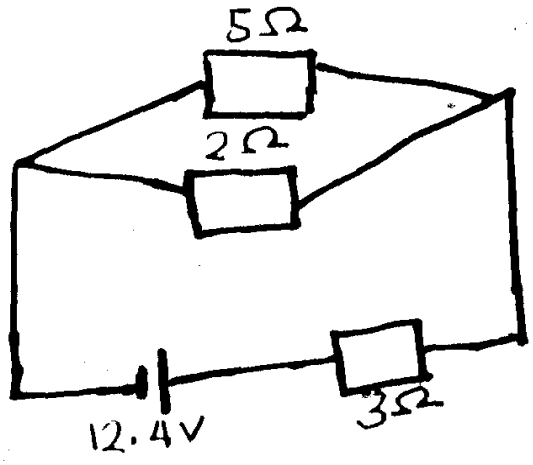
(iii) In the following configuration of resistors, determine the current through the 5 Ω resistor. (2 mks)



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KCSE MOCK TRIAL 1

232/2

PHYSICS

Paper 2

Time: 2 Hours

1. (i) Name the error that arises from not reading the metre rule normally. (1 mk)

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(ii) Name the instrument suitable for measuring the following;

(a) Thickness of your hair (1 mk)

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b) Diameter of a marble of 3.65 cm (1mk)

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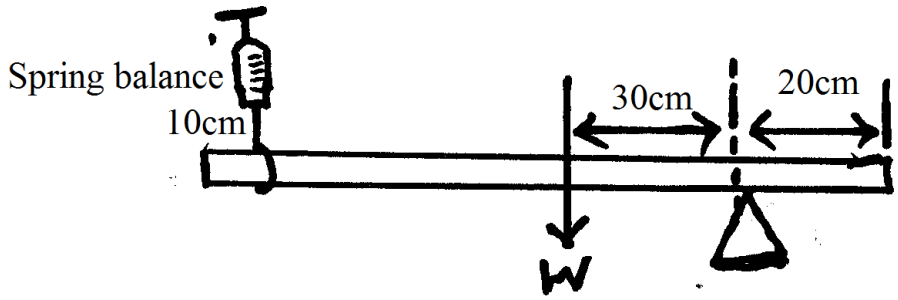
2. The figure below is a uniform metre rule pivoted near the end. It is kept in equilibrium by spring balance.



If the reading indicated by the spring balance is 1.2N determine the weight of the metre rule.

(2 mks)

3. Name two forces acting on bodies which are not in contact. (2 mks)

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4. (a) Define force and state its SI units (2 mks)

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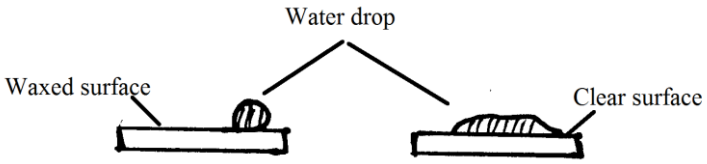
(b) The figure below shows water drops on two surfaces. In (a) the glass surface is smeared with wax while in (b), glass surface is clean.



Explain the difference in the shape of the drops. (2 mks)

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(c) The weight of a stone on the earth's surface is 6.5N. Calculate the weight of the same stone on another planet where g=6N/kg. (Take g from the earth to be 10N/kg) (2 mks)

5. (a) Explain why in uniform circular motion, even though the speed is constant the bodies will undergo acceleration. (2 mks)

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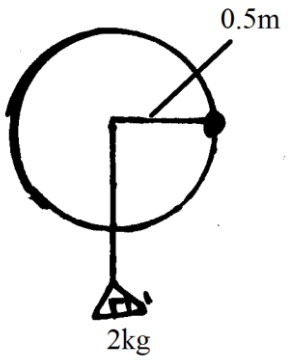
(b) The figure below shows a body of mass 1 kg in a circle.



Calculate the angular velocity of the body if the body experienced a friction of 2N on the surface as it moves. (3 mks)

6. The diagram below shows water with negligible viscosity flowing steadily in a tube if different cross sectional area. If at point A the cross sectional area is $120cm^3$ and the velocity of water is 0.40m/s, calculate the velocity at B where the cross sectional area is $4.0cm^2$ (2 mks)

7. (a) When observed through in microscope pollen grains particles in water move about irregularly. Explain this observation. (2 mks)

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(b) A bottle containing ammonia solution is placed at the back of the laboratory. Give a reason why its smell may not be detected in other parts of the laboratory if the temperature of the solution is kept very low. (2 mks)

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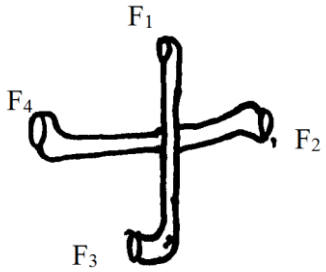
…….8. Figure below shows a water sprinkler in action.



Name any pair of forces that constitute a coupe. (1 mk)

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SECTION B

9. (a) A trolley of mass 0.5kg moving with a velocity of 1.2m/s collides with a second trolley of mass 1.5 moving in the same direction with a velocity of 0.2m/s

(i) What is an inelastic collision. (2 mks)

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(ii) Determine the velocity of the trolley after collision. (2 mks)

(b) (i) Define impulse in terms of momentum. (1 mk)

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(ii) For a particle of mass m on which is initially moving vertically downwards with velocity u, obtain an experiment for changes in kinetic energy after

a) it has moved under gravity for time t. (2 mks)

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b) It has moved freely under gravity for a vertical h. (2 mks)

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(c) A lead ball is placed on the surface of viscous oil and released.

(i) State three forces acting on the ball as it fall through the oil. (3 mks)

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(ii) State which forces vary during the fall and explain the reason for the variation. (1 mk)

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(iii) What is meant by the term terminal velocity of the ball. (1 mk)

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(iv) Sketch a graph showing the variation of the displacement of the ball with time from the time it was released.

(1 mk)

10. (a) An object weighs 2.6N in air and 2.2N when completely immersed in water. Determine the relative density of the object. (2 mks)

(b) When a stone is placed on water, it sinks but when the same stone is placed in a block of wood, both are found to float Explain this observation. (2 mks)

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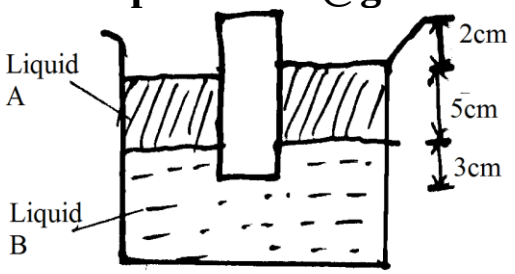
(c) The figure below shows a rectangular block of height 10cm floating vertically in a beaker containing 2 immiscible liquids. A and B of densities 800kg/m^3 respectively. The block is 3cm long by 2cm wide by 10cm high.



If the length of the block is liquid A is 3cm and that in B is 5cm, determine;

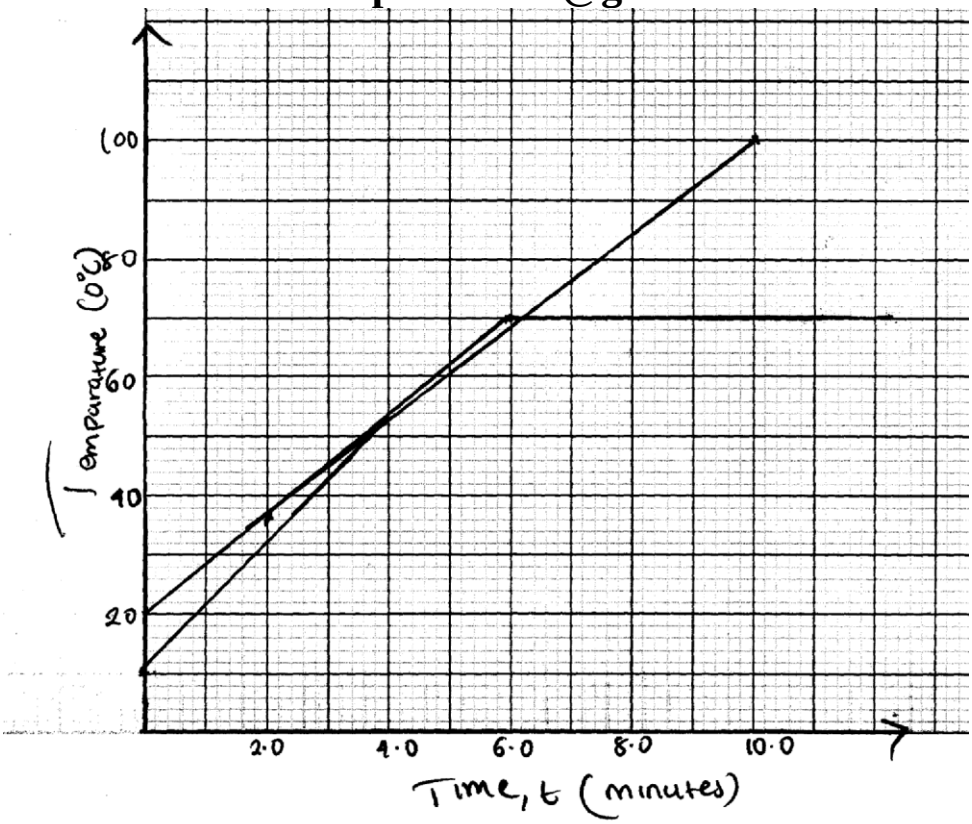
(i) Weight of the liquid A displaced. (3 mks)

(ii) Weight of the liquid B displaced. (3 mks)

11. (a) The figure below shows a wire with weight attached to the end and passed over a block of ice.

It is observed that the wire cuts through the block remains as one piece. (3 mks)

(b) An unknown mass of water and 400g of alcohol were heated separately each of them by a heater rated 220V, 2.5A. Temperature of both liquids were taken and recorded at some intervals. The graphs OMN and OBC show variation of temp with time for alcohol and water respectively.



i) State what is observed on alcohol after the sixth minute (1 mk)

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ii) Explain why there is no temperature change in alcohol after 5 minutes. (2 mks)

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(c) (i) Determine the amount of heat energy required to raise the temperature of water from 36^0C to 88^0C .

(ii) Determine the marks of water used in this experiment. Take specific heat capacity of water to be $4200Jk^{-1}gk^{-1}$ (3 mks)

12. (i) Name one machine whose velocity ratio is less than one. (1 mks)

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(ii) State one reason why the efficiency of a machine is always less than 100% (1 mks)

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(iii) Sketch a graph of efficiency against mechanical advantages (M.A) (2 mks)

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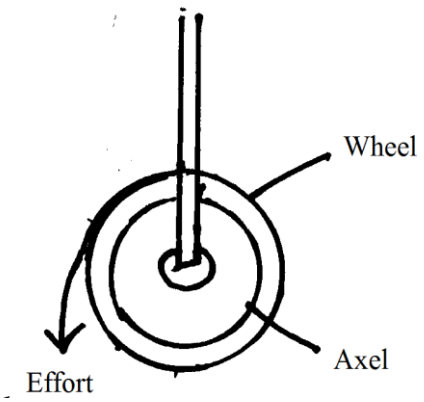
(iv) The diagram in the figure below shows a wheel and axle used as a machine, whose efficiency is 80% to raise 400N of building materials. The wheel and axle have diameters of 75cm and 15cm respectively.



(v) Mark on the diagram the correct position and direction of the load to be lifted.(2 mks)

(b) Name the principle on which this machine works. (1 mk)

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(c) Calculate the effort needed to raise the load. (3 mks)

13. (i) It is observed that when a bubble rises from the bottom of a glass filled with water to the top in size increases. Explain the observation. (2 mks)

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(ii) A ballon is filled with air to a volume of 200ml at a temperature of 293K. Determine the volume when the temperature rises to 353K at the same pressure. (2 mks)

(iii) Differentiate between an ideal gas and real gas. (1 mk)

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(iv) Using a well-labeled diagram, describe an experiment to verify Charles's law.(3 mks)

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KCSE MOCK TRIAL 2

232/1
PHYSICS
PAPER ONE
2 hours

1. A micrometer screw gauge has a zero error of 0.12mm.Sketch the reading of the micrometer screw gauge when used to measure the size of a ball of diameter 3.44mm. (1 mark)

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2. **Figure 1 (a) and 1(b)** shows capillary tubes inserted in water and mercury respectively.

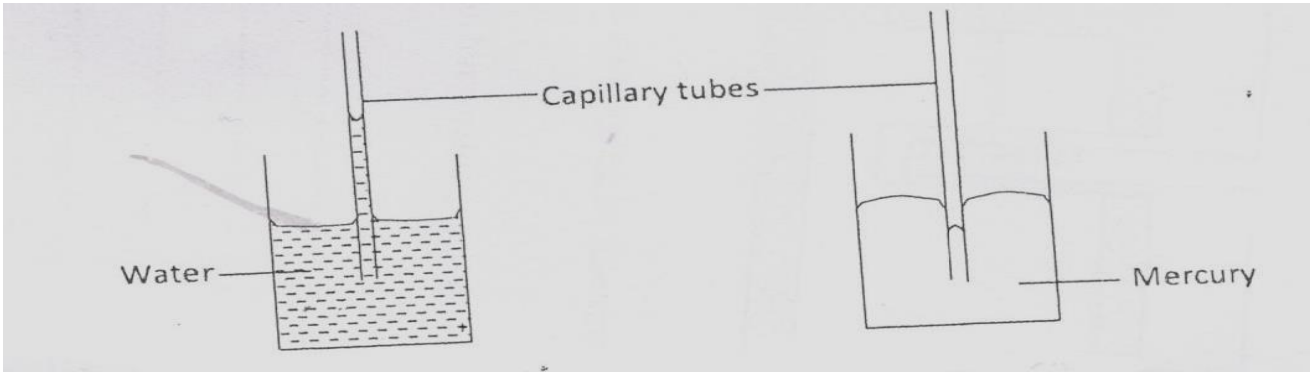

Figure 1(a) **Figure 1(b)**

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

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3. A block of mass 500g and measuring 30cm by 25cm by 15cm rests on a flat floor. Determine maximum pressure exerted on the floor. (3 marks)

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4. In **figure 2** ammonia gas and an acid gas diffuse and react to form a white deposit on the walls of the glass tube. Explain why the white deposit forms nearer end B than A. (1mark)

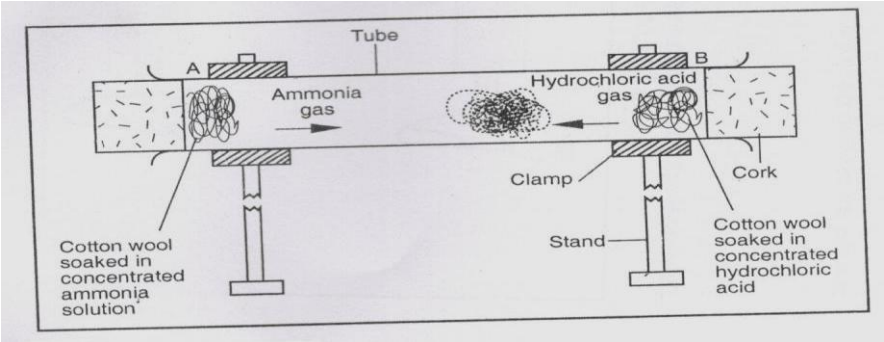

Figure 2

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5. A man wants to fit a brass ring tightly onto a steel rod of equal diameter to the inner diameter of the ring. Explain how this can be achieved. (2 marks)

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6. State how conduction and radiation is minimized in a thermos flask. (2 marks)

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7. A body moving around a circle is accelerating and yet the speed is constant. Explain. (1 mark)

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8. **Figure 3** shows a uniform bar of mass 0.8kg supported by a spring balance at its centre and the bar is at equilibrium.

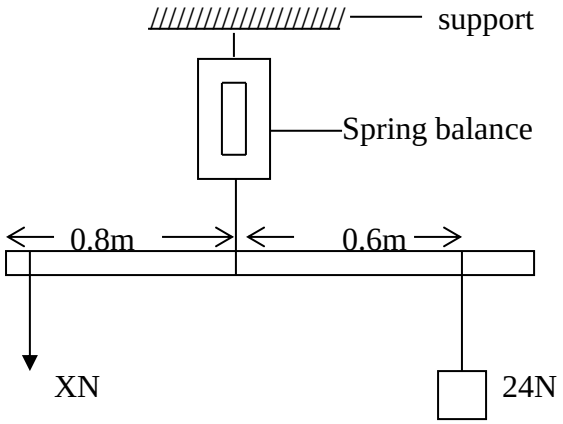

Figure 3

Determine the:

(a) value of X (3 marks)

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(b) reading of the spring balance (1mark)

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9. **Figure 4** shows a load-extension graph for various loads hung from a single spring.

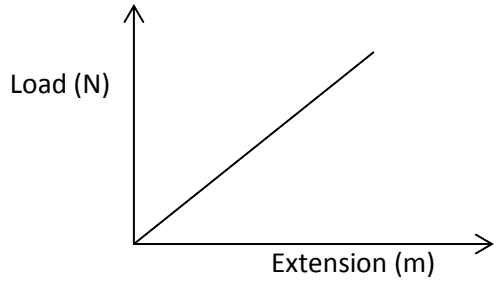

Figure 4

On the same axes, sketch a graph for a spring double the diameter of the first one.

(1mark)

10. An aeroplane is moving horizontally through still air at uniform speed. State with reason what is observed when the speed of the plane is increased. (2marks)

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11. A crane lifts a load of 2000kg through a vertical distance of 4.0 m in 5 seconds. Determine the power developed by the crane. (3 marks)

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12. Sketch a displacement time graph for a freely falling body and describe the motion. (2marks)

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13. State the law of inertia. (1mark)

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SECTION B (55 marks)

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

14. **Figure 5** shows a crate of mass 70kg being pushed by a man with a force of 150 N along the plane AB.

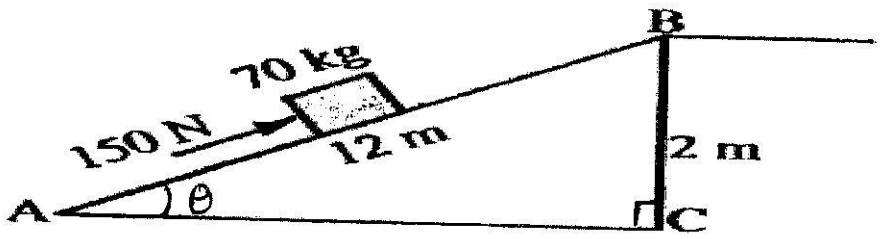

Figure 5

(a) Show that V.R of the inclined plane is given by $\frac{1}{Sin\theta}$ (2 marks)

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(b) Determine the work done:

(i) by the force of the man. (2marks)

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(ii) on the mass. (2marks)

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(iii) to overcome friction. (1mark)

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(c) Determine the efficiency of the inclined plane. (2marks)

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(d) Explain why the efficiency above is not 100% . (1mark)

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15.(a)**Figure 6** shows incomplete set up that can be used in an experiment to determine the specific heat capacity of a solid of mass m by electrical method.

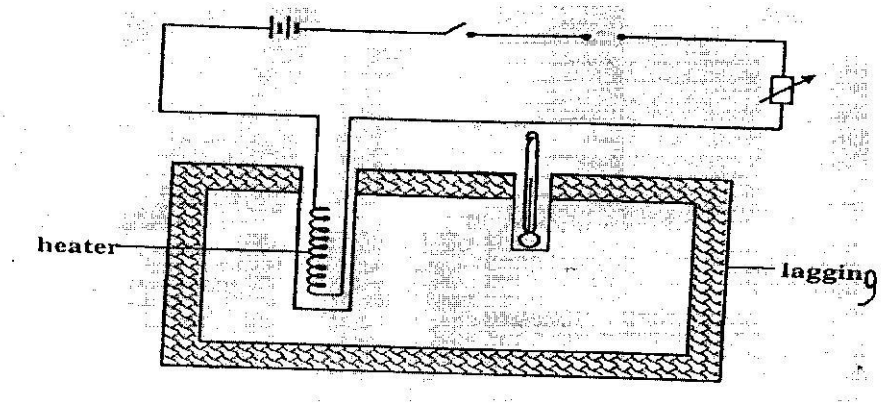

Figure 6

(i) Complete the diagram by inserting the missing components for the experiment to work.(2 marks)

(ii) State four measurements that should be taken. (2 marks)

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(iii) The final temperature was recorded as Θ. Write an expression that can be used to determine the specific heat capacity of the solid. (2 marks)

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(b) **Figure 7** shows a graph of temperature against time for a 200g mass of ice at -14^{0}C slowly heated by an electric heater of power 30W.

Figure 7

I) Determine the:-

(i) the time corresponding to the line AB (2marks)

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(ii) The time corresponding to the line BC (2marks)

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II) Determine the specific heat capacity of ice (3marks)

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(Specific heat capacity of water = 4200J/kgK and specific latent heat of fusion of ice = 336000J/kg)

16. (a) When the temperature of a gas in a closed container is raised, the pressure of the gas increases. Explain how the molecules of the gas cause the increase in pressure. (2 marks)

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(b) **Figure 8** shows a set up that may be used to verify Boyle's law.

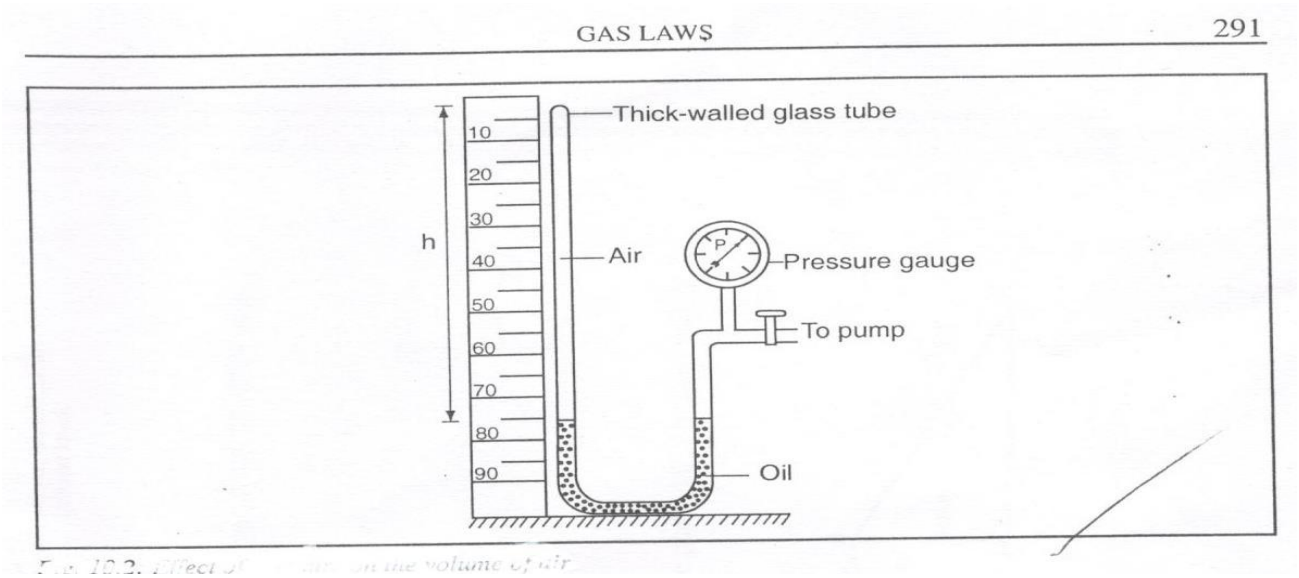

Figure 8

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

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(ii) Explain how the measurements taken in (i) above may be used to verify Boyle's law. (3 marks)

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(c) A certain mass of hydrogen gas occupies a volume of $1.5m^3$ at a pressure of $1.6x10^5$Pa and temperature 14^0C.Determine its volume when the temperature is 0^oC at a pressure of $1.0x10^5$ Pa. (3 marks)

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17. (a) State the principle of conservation of linear momentum. (1 mark)

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(b) Distinguish between elastic and inelastic collision. (1 mark)

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(c) A striker kicks a ball of mass 200g initially at rest with a force of 78N.Given that the foot was in contact with the ball for 0.30s; determine the take off velocity of the ball. (3 marks)

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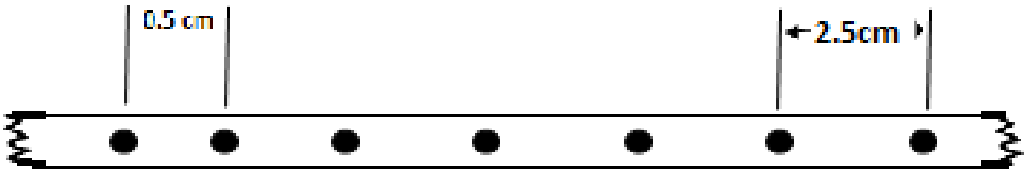
(d)the figure below represents a part of a tape pulled through a ticker timer by a trolly moving down an inclined plane. If the frequency of the ticker timer is 50Hz, calculate the acceleration of the trolly



(2 marks)

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(e)A ball is thrown horizontally from the top of a vertical tower of height 75m and strikes the ground at a point 80m from the bottom of the tower. Determine the:

(i) time taken by the ball to hit the ground. (*Acceleration due to gravity=10m/s^2)* (3 marks)

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(ii) initial horizontal velocity of the ball. (2 marks)

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18 (a) State the Archimedes' principle. (1 mark)

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(b) A block of wood of mass 300g is held under water by a string attached to the bottom of the container. The tension in the string is 0.6N.Determine the density of the wood.*(Gravitational field strength =10N/kg and Density of water=1000kg/m^3*) (4marks)

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(c) Define angular velocity. (1mark)

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(d) State one way in which the centripetal force on a body of mass m can be reduced. (1 mark)

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(e) A turntable of radius 5cm is rotating at 40 revolutions per second. Determine the linear speed of a point on the circumference of the turn table. (3 marks)

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KCSE MOCK TRIAL 2

232/2

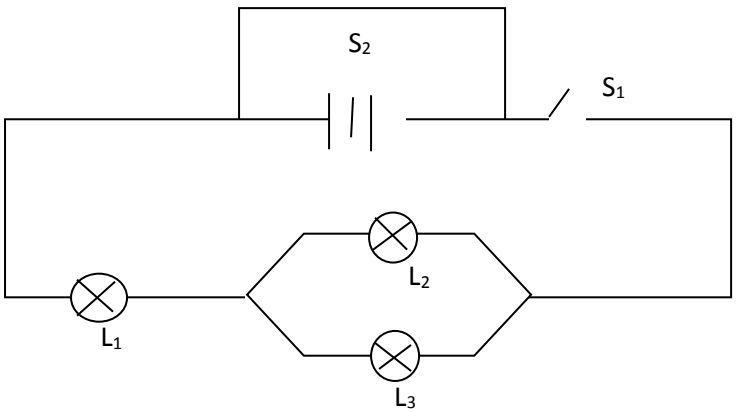
PHYSICS

TIME: 2 HRS

1. Determine the number of images formed when an object is placed between two plane mirrors inclined at an angle of 20° to each other. (1mark)

2. State and explain what will be observed when a wire is connected between a positively charged electroscope and uncharged electroscope. (2marks)

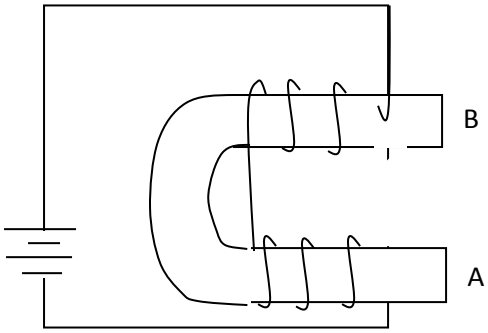
3. Figure shows an electrical circuit including two switches S_1 and S_2 and three identical lamps L_1 , L_2 , L_3.



i) Compare the brightness of L_1 and L_2 when switch S_1 is closed. (1mark)

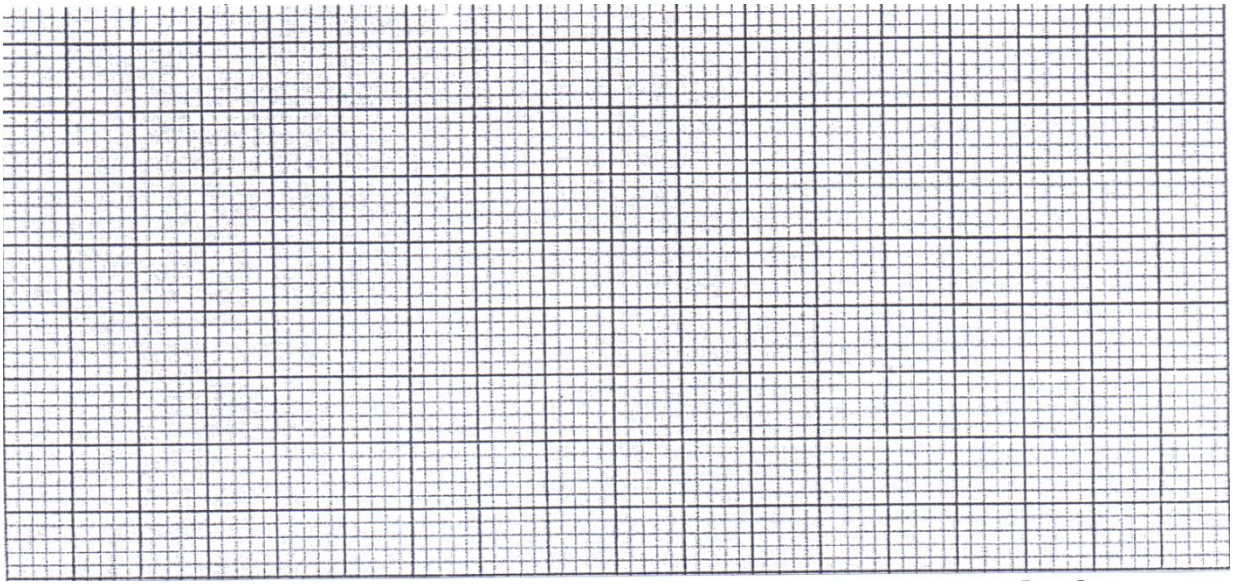
ii) State what will be observed when all the switches are closed (1mark)

4. a) The figure shows a horse shoe electromagnet. Determine the polarity at the ends A and B. (1mark)

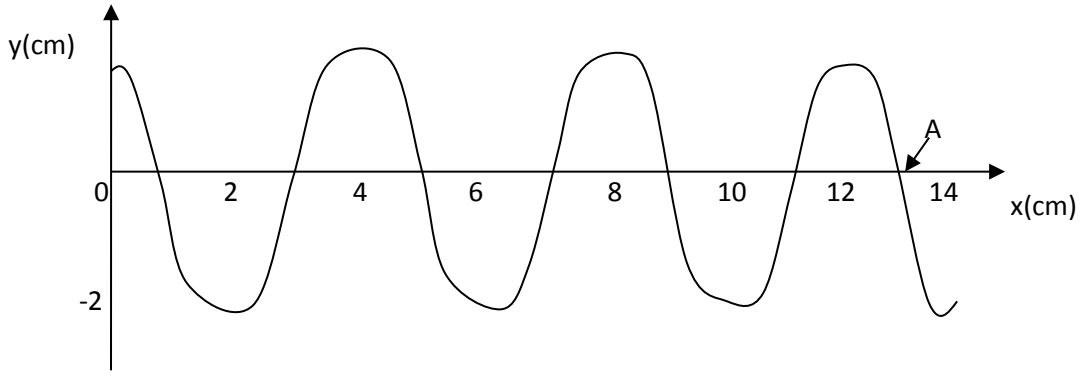


b) Two steel needles are placed at the poles A and B state and explain what happens to the needles. (2marks)

5. An object 5cm tall is placed in front of a concave mirror of focal length 15cm. Using a ray diagram and the grid below, determine the distance of the image from the object. (2marks)



6. Figure shows a transverse wave travelling along the X-axis



If the time taken by the wave to move from 0 to A is 0.13 seconds determine the;

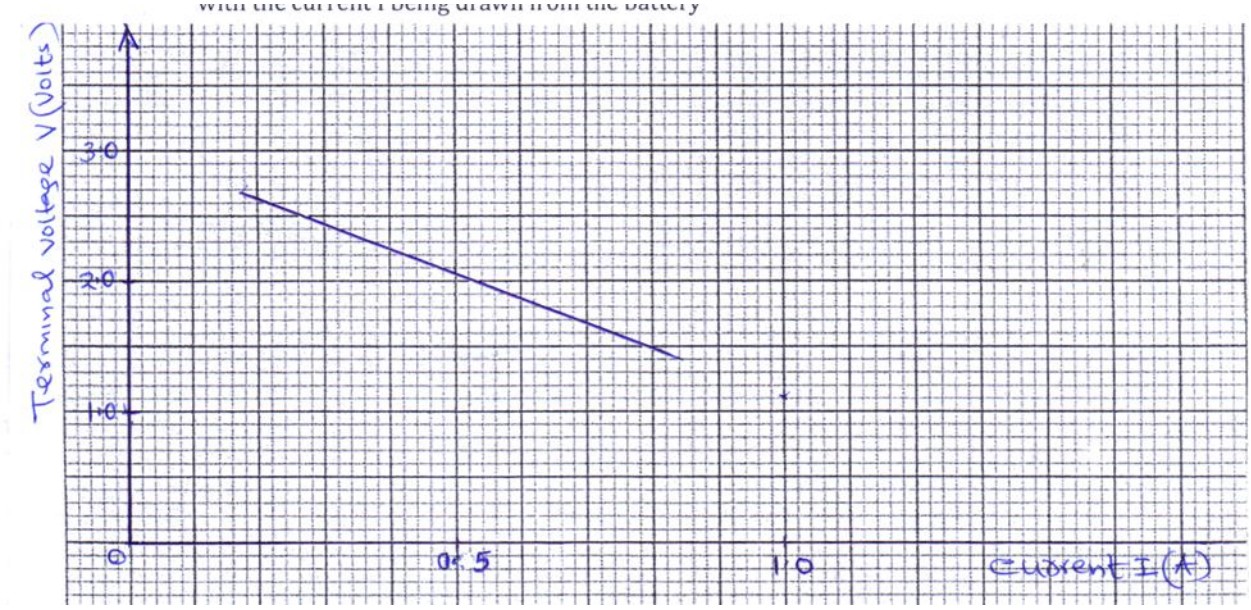
i) Frequency of the wave. (1mark)

ii) Speed of the wave. (2marks)

7. i) An optical fibre provides an efficient way of transmitting light energy. State and explain the property of light behind its functioning. (2marks)

ii) State the advantages of optical fibre over ordinary cables. (1mark)

8. The diagram below shows how the terminal voltage V of a certain battery varies with the current 1 being drawn from the battery



Given that E=1 (R+ r)

From the graph determine the

I. internal resistance, r, of the battery. (2marks)

II. e. m. f, E, of the battery. (1mark)

9. Arrange the following radiation in the order of their increasing energy given the radiations below and their wavelengths. (1mark)

Type of radiation	Yellow Light	Gamma rays	Radio waves	Micro wave
Wave Length (m)	3.0×10^{-7}	3×10^{-14}	300	3×10^{-3}

10. State Lenz's law.

11. A consumer has the following appliances operating in his house for the time indicated in a day.

. Two 60W, 250V bulbs for 30 minutes

. One 1000W, 250V fridge for 10hours

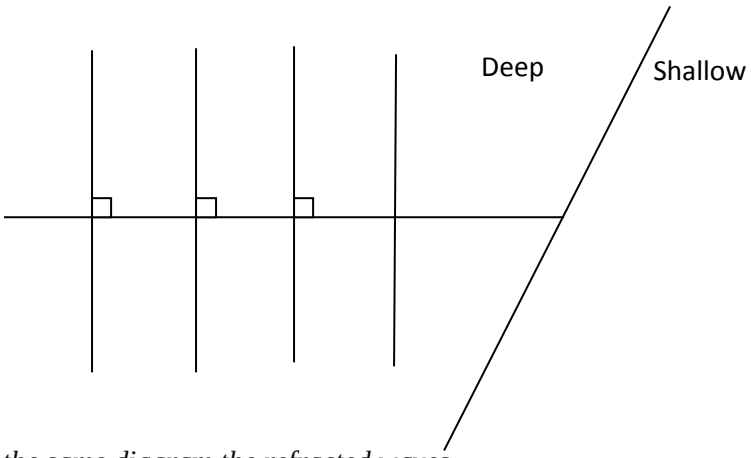
. One 3KW, 250V heater for 2 hours

Calculate:

a) Total power in kwh in 30 days assuming that power consumption per day is the same. (2marks)

b) Cost of electricity consumed in 30days if 1 unit cost sh.1.50 *(1mark)*

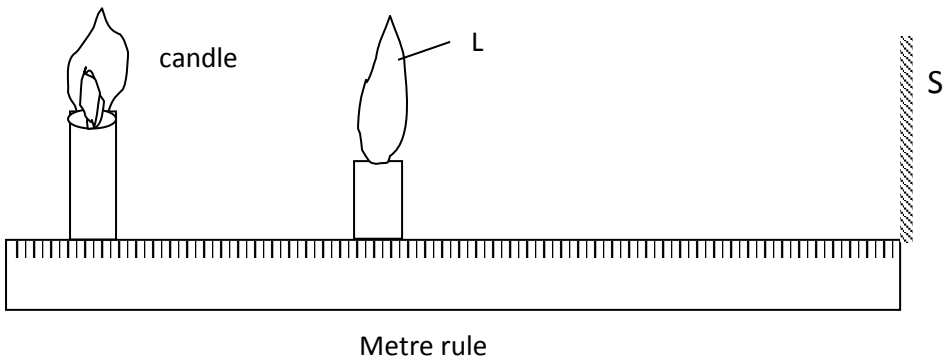
12.The diagram below shows water ripples generated in a ripple tank moving from deep to shallow end.



Sketch on the same diagram the refracted waves. *(1mark)*

SECTION B (55 MARKS)

13. a) Figure shows an experimental set up consisting of a mounted lens L, a screen S, a meter rule and a candle.

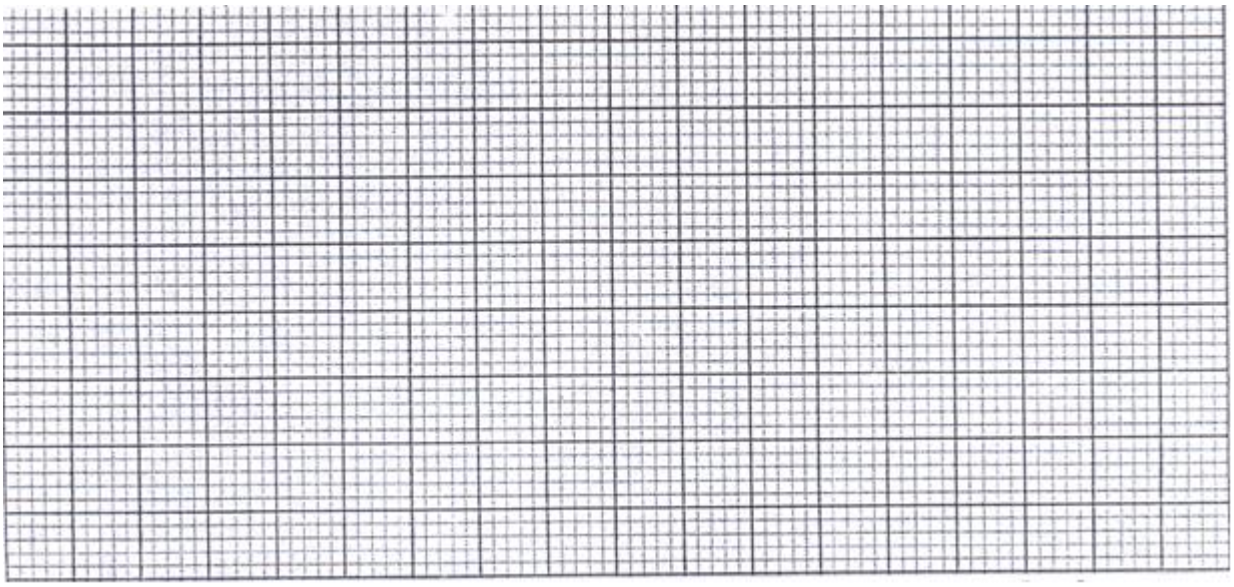


i) Describe how the setup may be used to determine the focal length of the lens. (4marks)

ii) State the reason why the setup would not work if the lens was replaced with a diverging lens. (1mark)

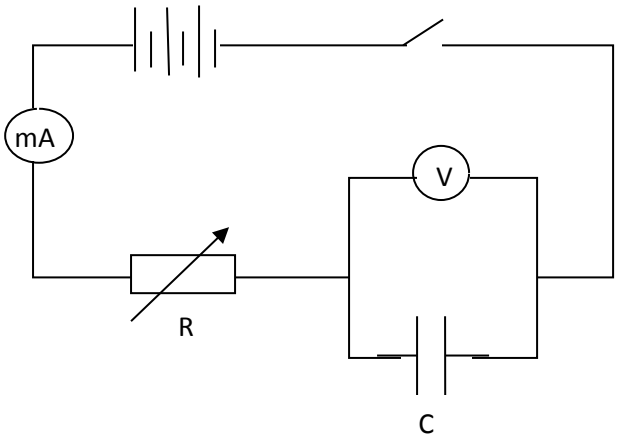
b i) A real object of height 1 cm placed 5cm from a converging lens forms a virtual image 10cm from the lens
(i) determine the focal length of the lens. (2marks)

ii) On the grid provided draw to scale the ray diagram for the setup to show how the image is formed. (2marks)



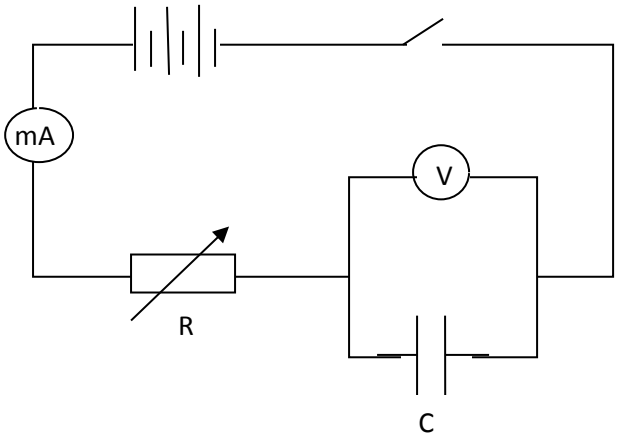
14. a) State one factor that affect the capacitance of a parallel plate capacitor. *(1mark)*

b) The figure below shows three capacitors C_1 ,C_2 and C_3 connected in parallel to a battery V



Show that the effective capacitance C_T is given by $C_{T=}C_{1+}C_{2+}C_3$ *(2marks)*

c) The figure shows a circuit for charging a capacitor



i) State what is observed on the following when the switch S is closed

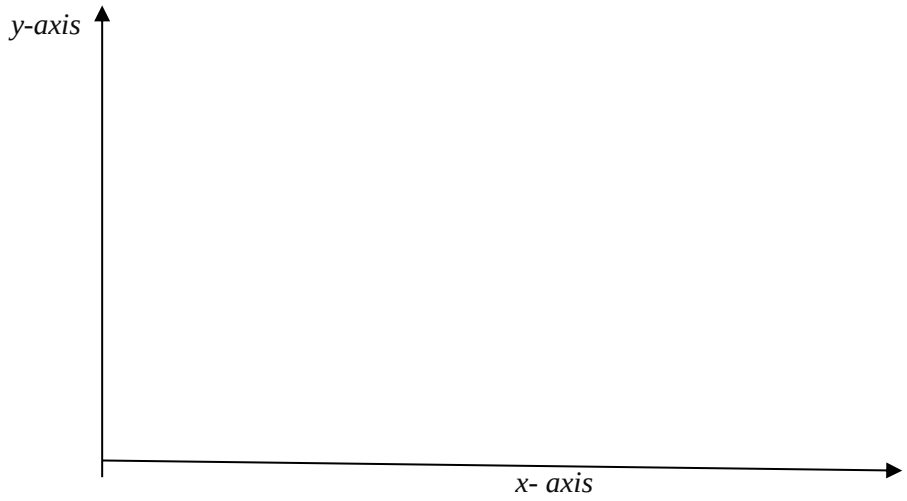
I. the milliammeter *(1mark)*

II. the voltmeter *(1mark)*

ii) Explain how the capacitor works. *(2marks)*

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

iv)Sketch the graph of voltage V(y-axis) against time t when the switch is closed. *(2marks)*



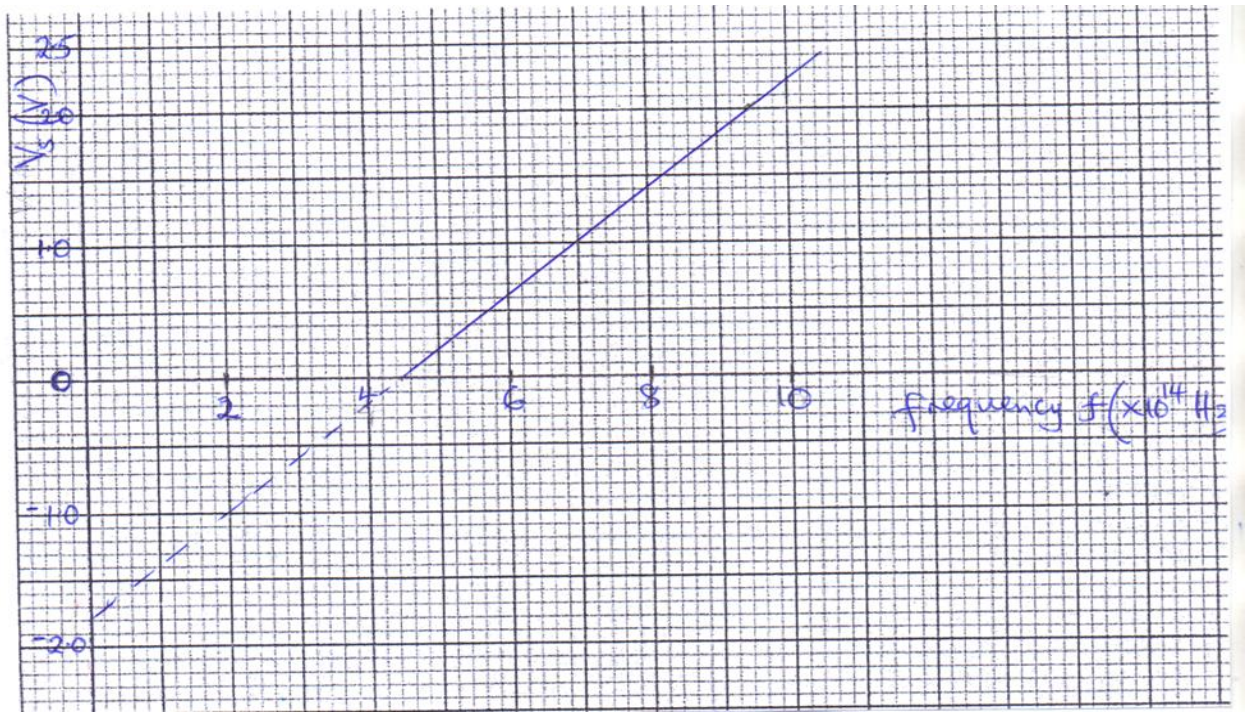
15. a) State two factors that affect photo electric effects. *(2marks)*

b) Define the following terms. *(2marks)*

i) Work function (Wo)

ii) Threshold frequency (f_o) *(2marks)*

c) Light beam was radiated onto a metal surface in an experiment and the results obtained were used to plot a graph of stopping potential Vs against frequency f of the radiation as shown



From the graph determine:-

i) the threshold wavelength λ_o *(2marks)*

ii) Planck's constant h given that

$hf = hf_{o+} eV_s$ $e = 1.6 \times 10^{-19} c$

$c = 3.0 \times 10^8 m/s$ (2marks)

iii) Work function Wo (in eV) (2marks)

iv) Draw on the same axis a graph for a metal of lower work function. (1mark)

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16. a) With the time base switched off the trace shown below was observed in a C.R.O .state the nature of the p.d applied and state to which plate it was applied. (1mark)

b) With the time base switched on the trace shown below was observed in a C. R. O. State the nature of the p.d applied and state to which plate it was applied. (1mark

c)How can a radiographer increase the;

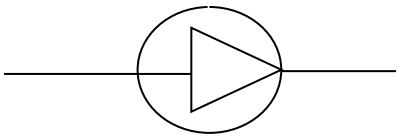
i) intensity (1mark)

ii) energy of x-rays produced by an x-ray tube . (1mark)

d)Calculate wavelength of x-rays whose energy is 9.5eV given that

$c = 6.63 \times 10^{-34}\ Js\ and\ 1eV = 1.6 \times 10^{-19)}$. (3marks)

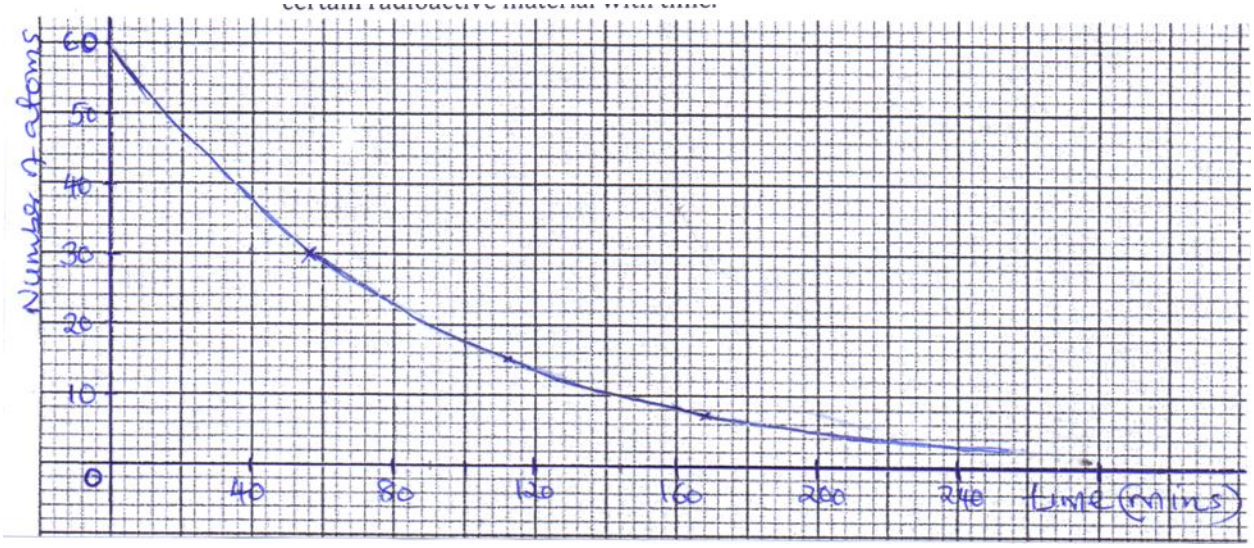
17. a) The diagram below shows a junction diode. Complete the diagram to show how the diode can be connected in a reverse bias mode. (1mark)



b) Explain how an n-type semi –conductor is formed. (1mark)

c) i) Define half- life of a radioactive material. (1mark)

ii) Figure below shows a graph of variation of the number of atoms of a certain radioactive material with time.

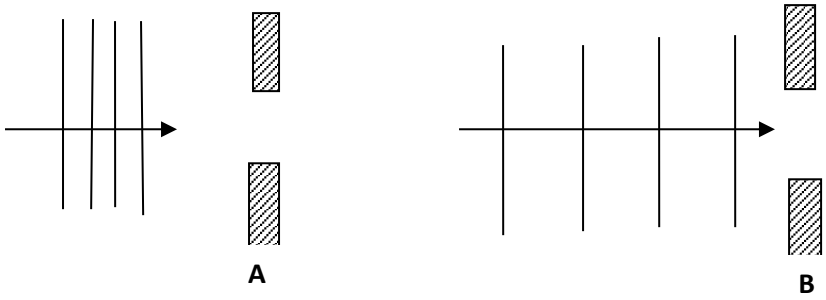


iii) Cobalt – 60 is a radioactive isotope of half-life 5.25years. What fraction of the original atoms in a sample will have decayed after 21 years? (3 marks)

18. a) Distinguish between transverse waves and longitudinal waves. (1mark)

b) A ship in an ocean sends out an ultra sound whose echo is received after 3 seconds. If the wavelength of the ultra sound in water is 7.5cm and the frequency of the transmitter is 20 KHz; determine the depth of the ocean. (3marks)

c) Figure shows water waves of different wavelengths incident on identical apertures A and B.



Complete the diagrams to show the patterns of the waves beyond the aperture in each case. (2marks)

d) Figure shows two speakers S1 and S2 which produce sound of the same frequency they are placed equidistant from a line AB and a line PQ (PQ is perpendicular to line AB)

i) A student walking from A to B hears alternating loud and soft sounds . Explain why at some points the sound heard loud (2 marks)

ii) State the nature of the sound the student hears if he walks along line PQ (1 mark)

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KCSE MOCK TRIAL 3

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PHYSICS

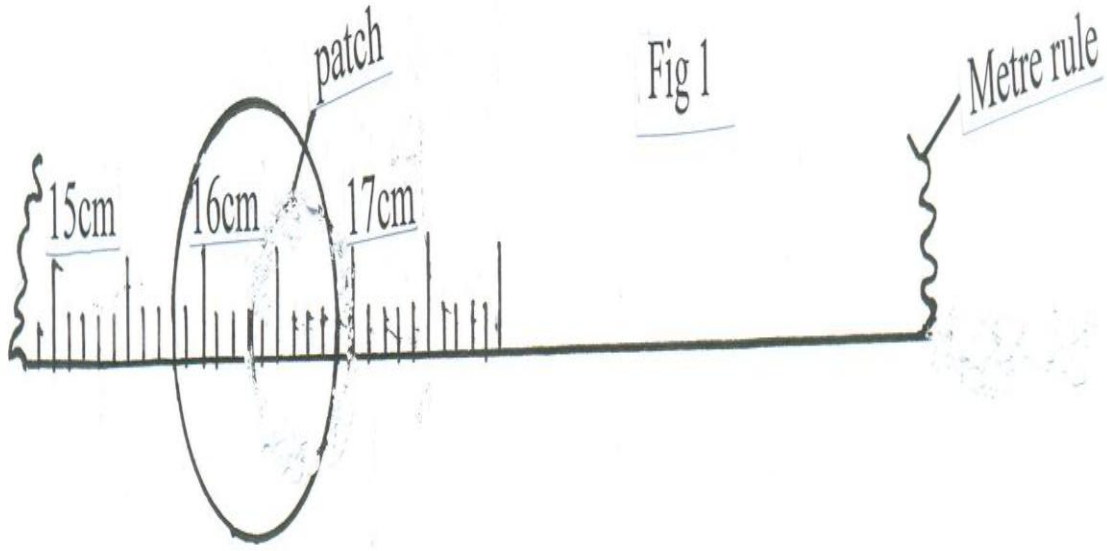
PAPER 1

THEORY

2 HOURS

SECTION A (25 MARKS)

1. An oil drop of volume 1.5 x $10^{-9}mm^3$ was introduced on the surface of water as shown in the figure 1 below. A circular oil patch was formed and its diameter was measured using a metre rule



Determine the size of the oil molecule. (2mks)

(Take $\pi = 3.142$)

2.The fig. 2 below shows a uniform bar pivoted at its center and is at equilibrium.

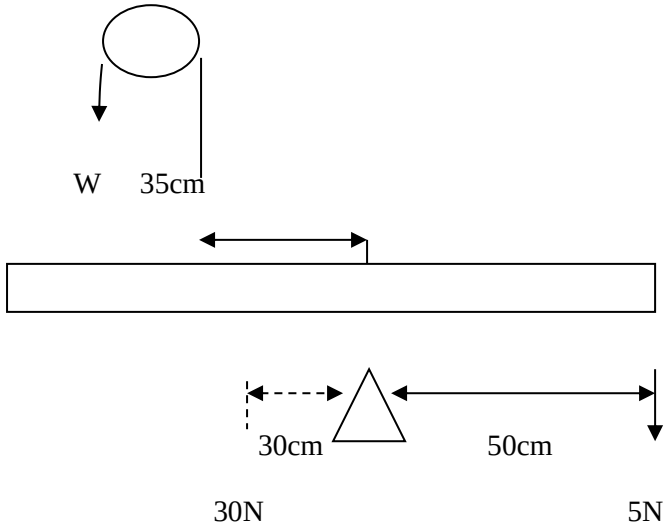


Fig. 4

Determine the value of W. (2 marks)

3. The figure 3 shows a bucket filled with water of mass 5kg tied to a string 2.9m long being rotated in a vertical circle with a constant speed V m/s.

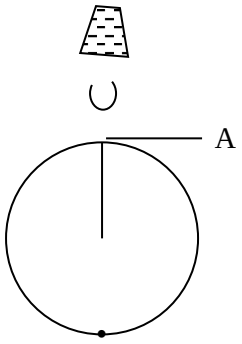
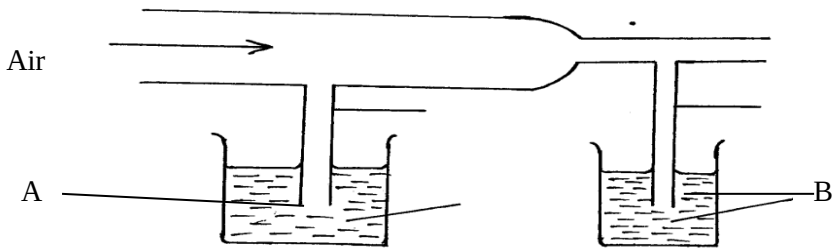


Fig. 3

Calculate the minimum speed the bucket takes to rotate in position A so that the water remains in the bucket. (2marks)

4. The figure 4 shows air flowing through a pipe of non uniform cross sectional area. Two tubes **A** and **B** are dipped into the liquid as shown.



Liquid

a) Indicate the level of the liquid in tubes **A** and **B** (1mk)

b) Explain your answer in part (a) above (1mk)

5. The graph below shows how the velocity of a ball bearing falling in a liquid column varies with the resultant down ward force.

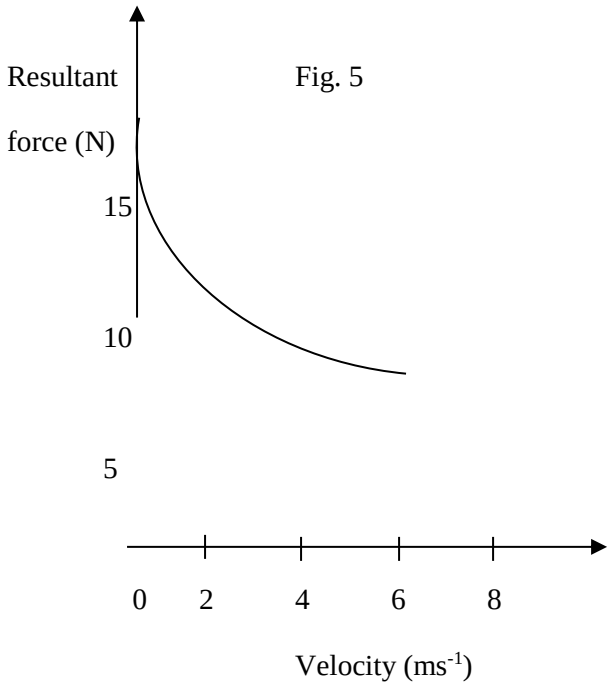


Fig. 5

Determine the terminal velocity of the ball bearing (1mk)

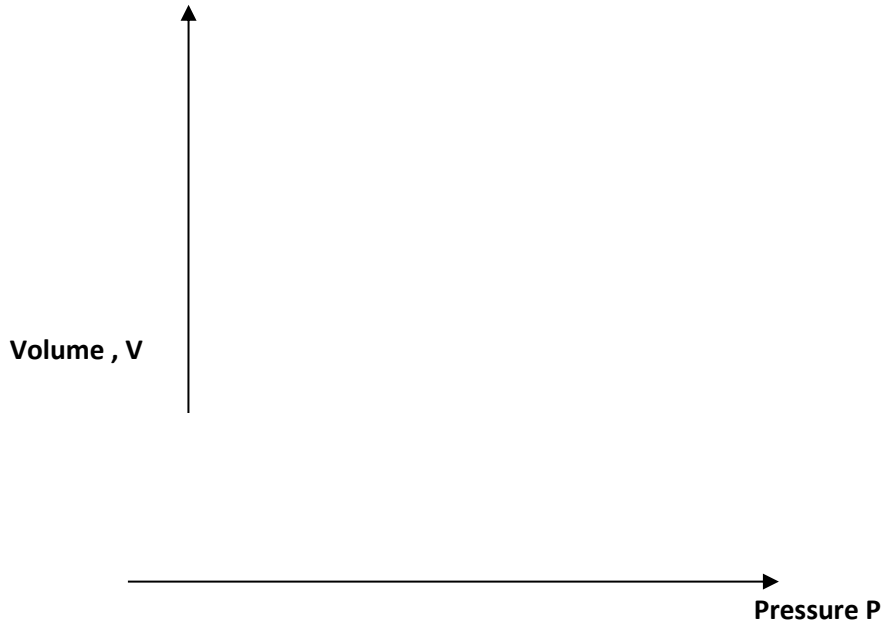
6. State how heat losses by convection and radiation are minimized in a thermos flask. (2 mks)

7. A person of mass 70kg stands on a scale balance in a lift. At a particular instant the lift is moving downward uniformly at 2.8m/s^2. Calculate the reading on the scale in Newton's. (2mks)

8. A hole of area 5cm^2 at the bottom of a tank 2m deep is closed with a cork. Determine the force acting on the cork when the tank is filled with a liquid of density 800kg/m^3. Take atmospheric pressure as 102kpa. (2mks)

9. The barometric height in a town is 65cmHg. Given that the standard atmospheric pressure is 76cmHg and the density of mercury is 13600kg/m^3, determine the attitude of the town. (Density of air is 1.25kg/m^3) (2mks)

10. Sketch a graph of volume of a fixed mass of a gas against pressure on the axes below. (1mk)

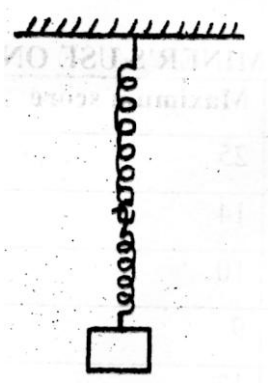


11. The stability of a body can be increased by increasing the base area and lowering its centre of gravity.
State one way of lowering its centre of gravity. (1mk)

12. A body of mass 25kg moving with uniform accelaration has an initial momentum of 60kgm/s and after 10s the momentum is 90kgm/s. calculate the acceleration of the body (2mks)

13. 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)

14. Two springs of negligible weights and of constants K_1 =50N/M and K_2 = 100N/M respectively are connected end to end and suspended from a fixed point as shown in the diagram.



A 200g mass was hung on the lower end. Calculate the spring constant of the combination. (2mks)

SECTION B (55 MARKS)

15. (a) The figure 17 shows a set up of apparatus used in an experiment to determine the specific latent heat of vaporization of water.

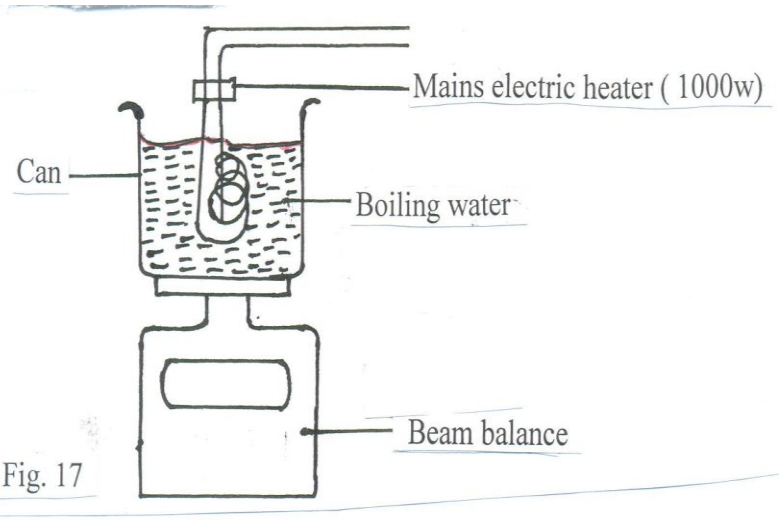


Fig. 17

When water in the can is boiling vigorously, the mass reading on the balance is noted and stop watch started. After three minutes, the stop watch is stopped and the mass reading taken again.

Results

Mass of empty can = 122g

Initial mass of can + water = 178g

Mass of can + water after 3 minutes = 169g

Determine;

(i) Heat energy supplied by electric heater (1000w) for 4 minutes. (2 marks)

(ii) Specific latent heat of vaporization of water. (2 marks)

(iii) Suggest one possible source of error for this experiment. (1 mark)

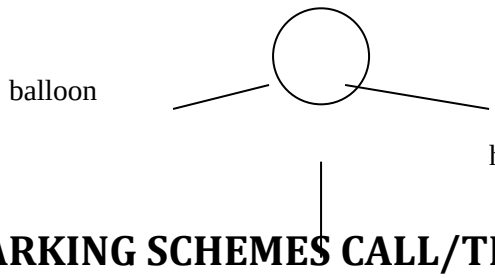
(b) A block of metal of mass 0.2kg and temperature 98^0C is placed in water of mass 0.42kg and temperature 16^0C. If the final temperature of the metal and water is 21^0C, determine the

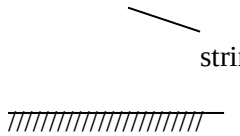
specific heat capacity of the metal. (Take specific heat capacity of water = 4200 J/kgK).
(2 marks)

16.(a) State Archimedes principle (1mks)

(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 = $0.1kgm^{-3}$, density of air = $1.3kgm^{-3}$ find

(i) Total weight of the balloon including the hydrogen gas (2mks)

(ii) The upthrust (2mks)

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

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

(i) Relative density of the solid (2mks)

(ii) Density of the solid

17. (a) Define Angular velocity (1mk)

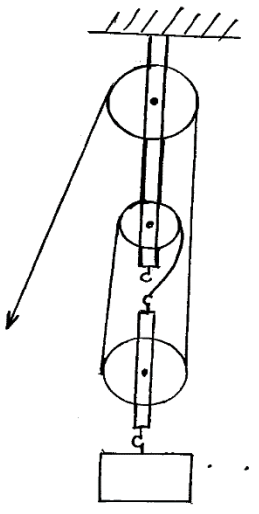
(b) A student tied a 0.060kg mass to the end of a string 0.03m long and whirled it around a horizontal circle of radius 0.015m with a speed of $2ms^{-1}$. Determine the force keeping the body moving in the circle. (2mks)

(c) A centrifuge is used to separate blood cells from blood plasma rotates at 55 revolutions per second. What is the acceleration towards the centre of a centrifuge tube 8.0cm from the centre of rotation. (2mks)

(d) A bullet is fired horizontally from a platform 15m high. If the initial speed is $30ms^{-1}$, determine the maximum horizontal distance covered by the bullet (2mks)

(e) Explain why a body moving with uniform circular motion is said to be accelerating (2mks)

18. (a) The figure below shows a pulley system used for lifting loads.



Load

i) What is the velocity ratio of the pulley system (1mk)

ii) If it's efficiency is 80%. Determine its mechanical advantage. (2mks)

iii) If the load is 300N, determine the effort. (2mks)

(b) Derive an expression for the velocity ratio of the wheel and axle machine if the wheel has a radius of **R** and axle has a radius of **r**. (2mks)

19. (a) Differentiate between distance and displacement (1mk)

(b) A car starts from rest and accelerates uniformly to 15m/s in 5 seconds. It then continues a that speed for 40 seconds and then decelerates uniformly to a stop in 3 seconds.

(i) Sketch the velocity – time graph for the motion. (2mks)

(ii) Determine the distance covered by the car. (2mks)

(iii) Find the average speed of the car during the journey. (2mks)

(c) A trolley of mass1.4kg moving at $0.8ms^{-1}$ on a frictionless horizontal surface was acted on by a force of 0.7N. If the resulting speed of the trolley was $1.7ms^{-1}$, determine

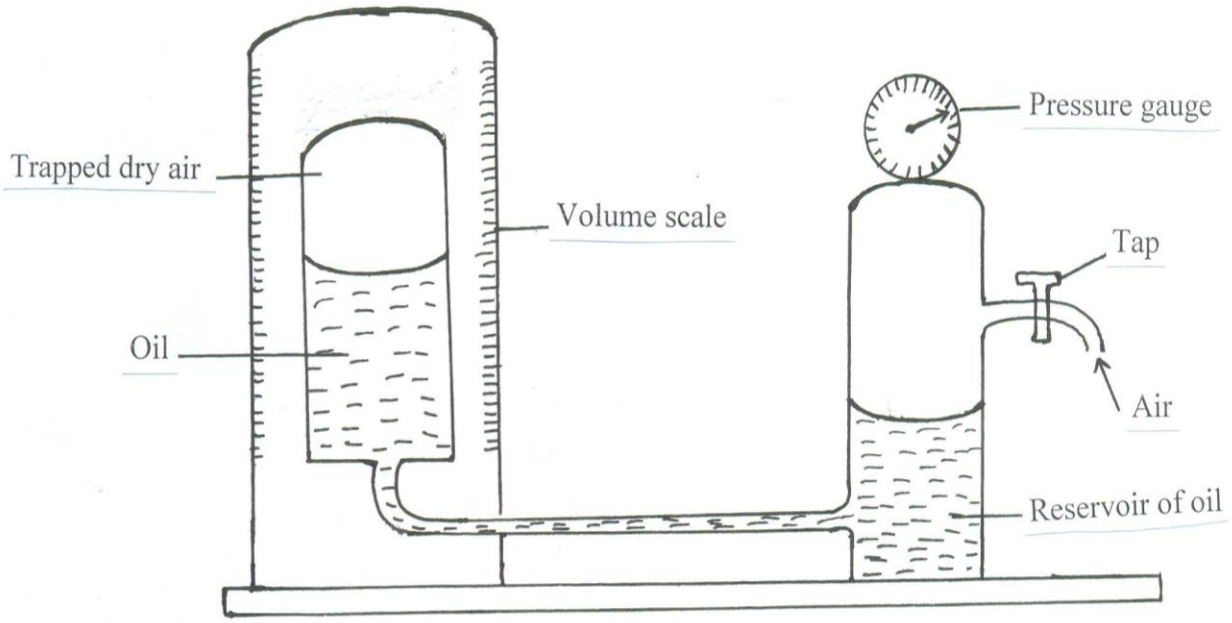
(i) the change of momentum of the trolley. (2mks)

(ii) the time interval the force acted on the trolley (2mks)

(iii) the acceleration of the trolley. (2mks)

20(a) State Boyle's law for an ideal gas (1mk)

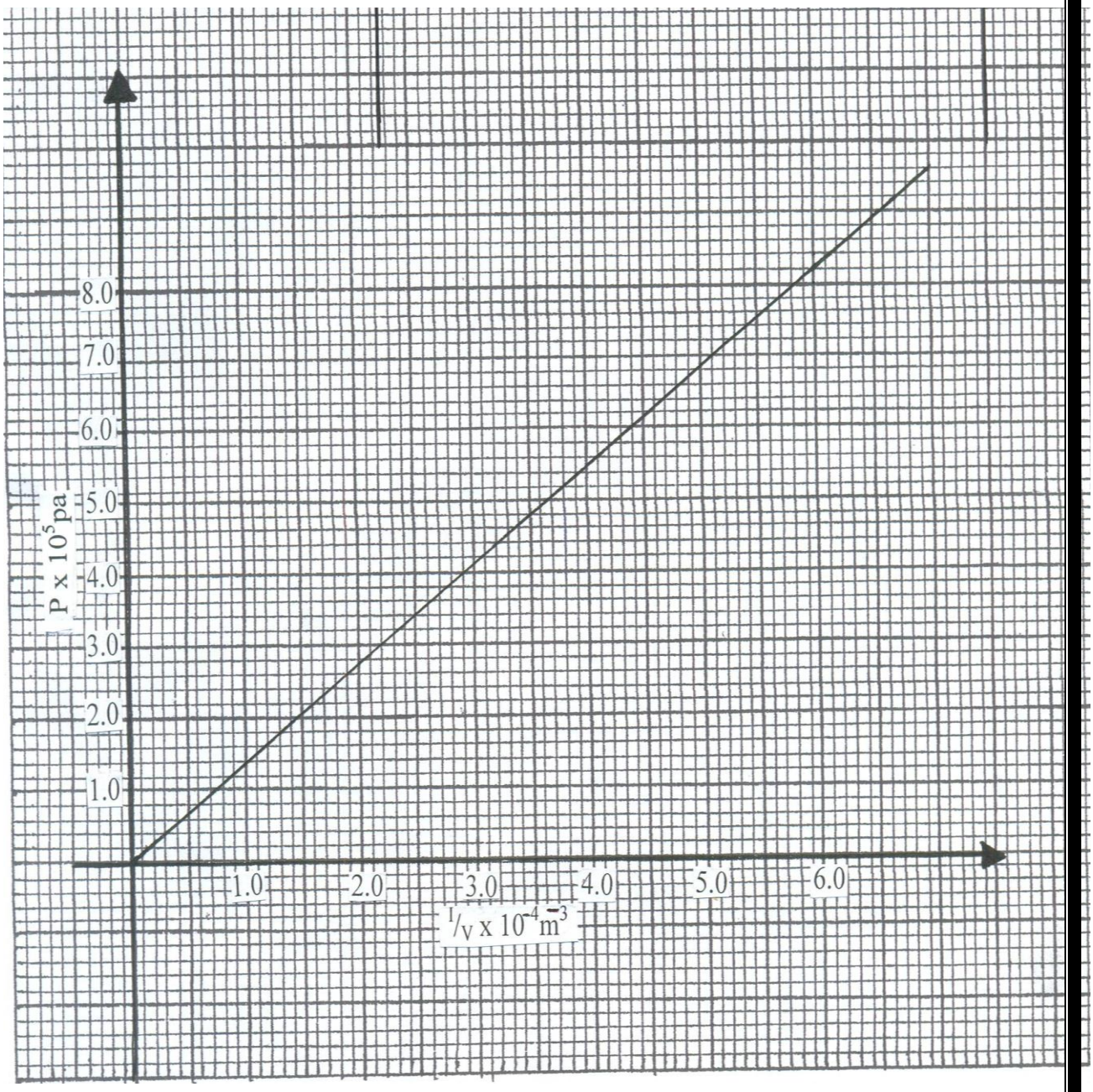
(b) The following set up was used in an experiment to investigate Boyle's law.



(i) Describe how the above set up can be used to investigate Boyle's law. (3mks)

(ii) State one precaution to be observed when performing the experiment (1mks)

(iii) In an experiment similar to the one above, the readings obtained were used to plot a graph below



I. Given that the relation between the pressure P and volume V of the gas is given by PV = K where K is a constant, use the graph to determine the value of K. (2mks)

II. What physical quantity does K represent; Give a reason (1mk)

(c) A fixed mass of a gas has a volume of 1.25litres at 27^0c at atmospheric pressure. It expands at constant pressure to 1.55 litres. Determine the new temperature (2mks)

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KCSE MOCK TRIAL 3

232/2

PHYSICS

PAPER 2

THEORY

2 HOURS

SECTION A (25 MARKS)

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

1. The figure 1 shows a pin hole camera of length 15cm. It produces a magnification of 0.125 when the object is placed at a distance u cm.

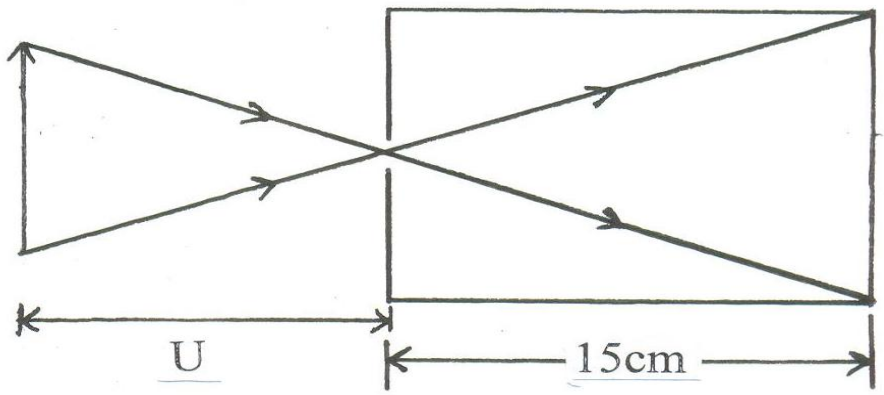
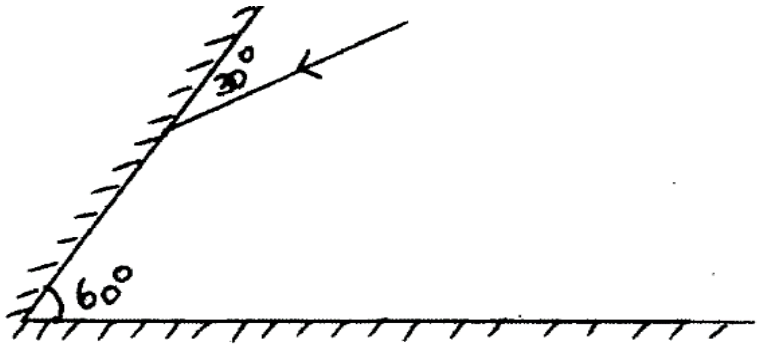


Figure 1

Determine U (2 mks)

2. Two mirrors are inclined at 60^o to each as shown:



Complete the ray diagram to show how it travels after striking the two mirrors and find the angle of reflection on each surface (2mks)

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

4. Figure 4 shows an object, O, infront of a concave mirror and its image I

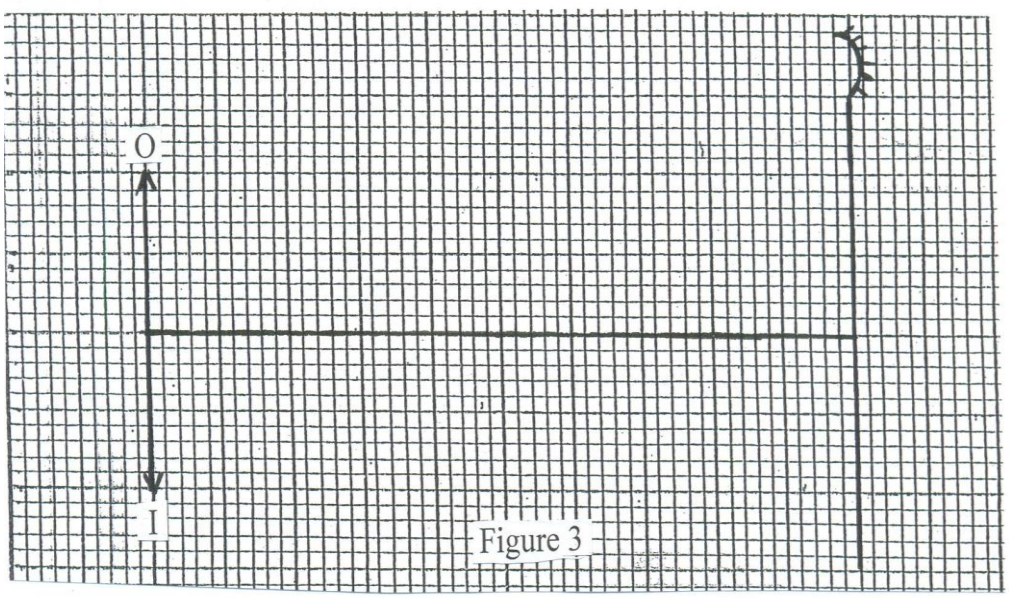


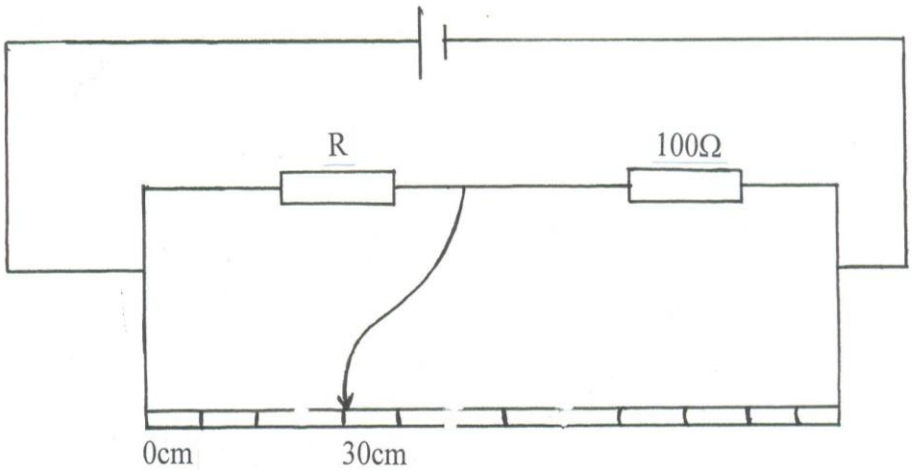
Figure 3

(i) On the same diagram draw appropriate ray(s) to locate focal point, F, of the mirror and determine its radius of curvature (Scale 1 : 5) (2 mks)

5. The figure 5 shows a 100 ohm resistor and an unknown resistor R connected to a metre bridge.

The galvanometer has a zero deflection when the jockey is 30cm. Mark on a wire that is on

a metre scale. Determine the value of the resistor R. (2 mks)



6. The figure 6 below shows the trace of a signal on the C.R.O. Given that the base is set at 100ms/div, determine the frequency of the signal. (2mks)

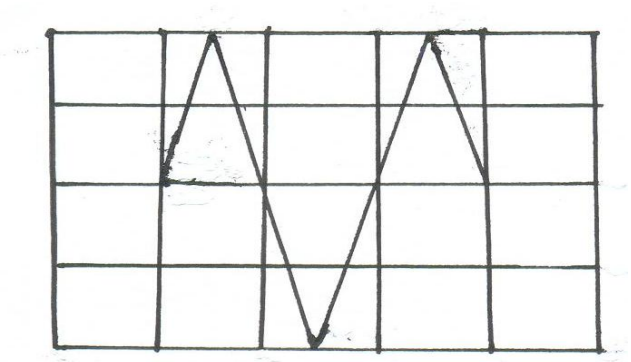


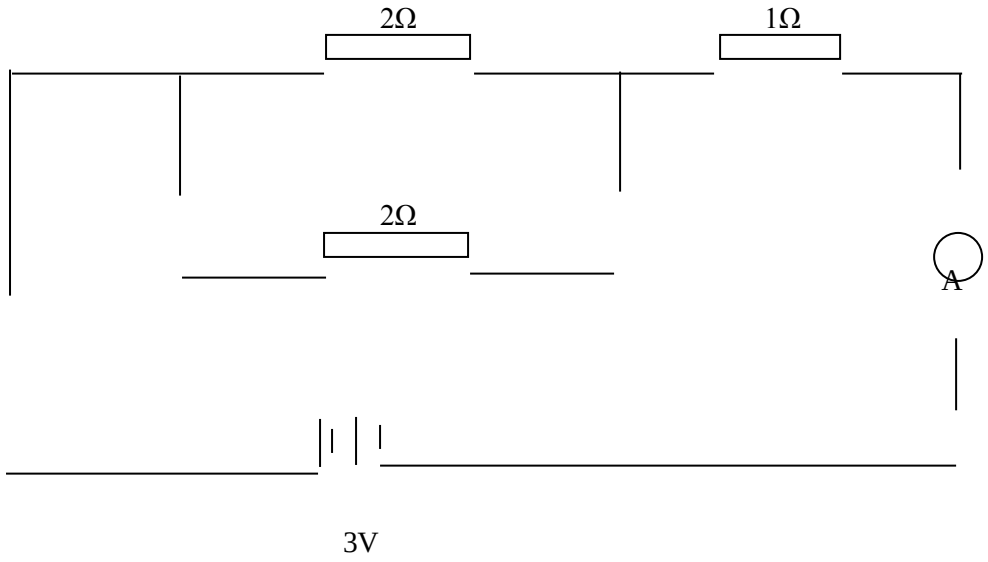
Figure 2

7. Uranium emits an alpha particle to become another element X as shown in the equation below:

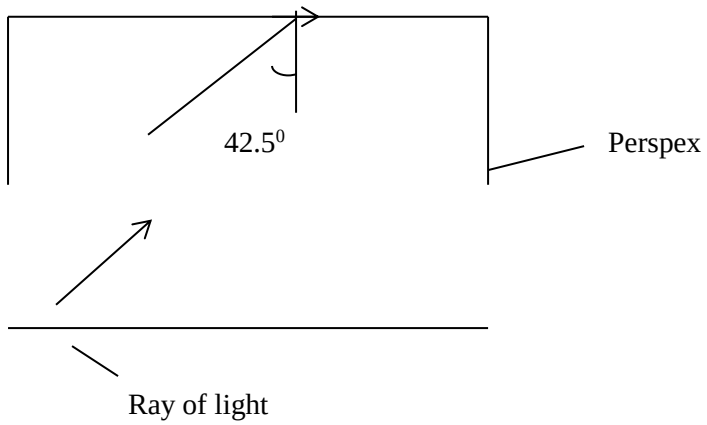
$$\overset{238}{\underset{92}{U}} \longrightarrow \overset{A}{\underset{Z}{X}} + \text{alpha particle}$$

Give the value of A and Z (2mks)

8. Determine the ammeter reading in the figure below assuming the cell has a negligible internal resistance. (3mks)



9. The figure below shows a path of a ray of light through a rectangular block of Perspex placed in air

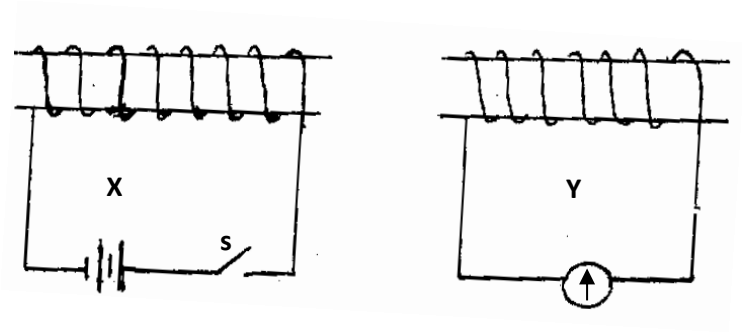


Calculate the refractive index of Perspex (2mks)

10. Arrange the following electromagnetic radiations in order of increasing frequencies. (1mk)

Ultra violet, x – ray, blue light, radio waves

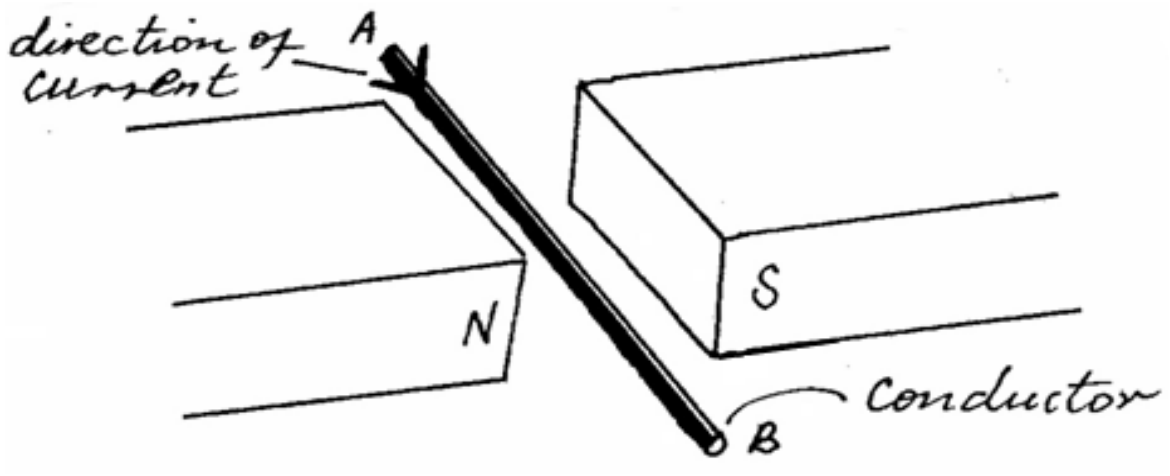
11. Figure below shows two solenoids, **X** and **Y** close to each other.



(a) Name the process by which current is caused in **Y** by closing the switch **S**. (1mk)

(b) Show on the diagram above the direction of current in **Y** as switch **S** closes. Use an arrow. (1mk)

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



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

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

SECTION II (55 MARKS)

Attempt all the questions in this section

13.(a) In an experiment to determine the refractive index of a material using real and apparent depth method, a graph of real depth against apparent depth was draw as shown in figure below.

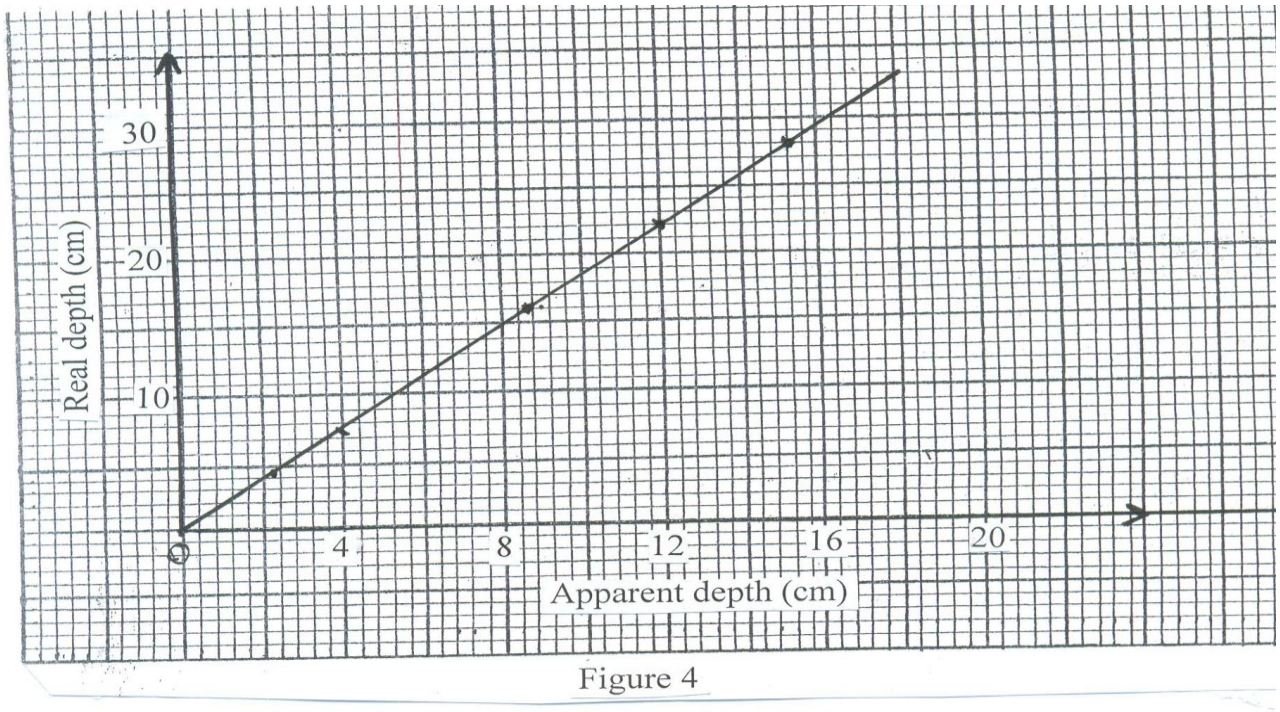


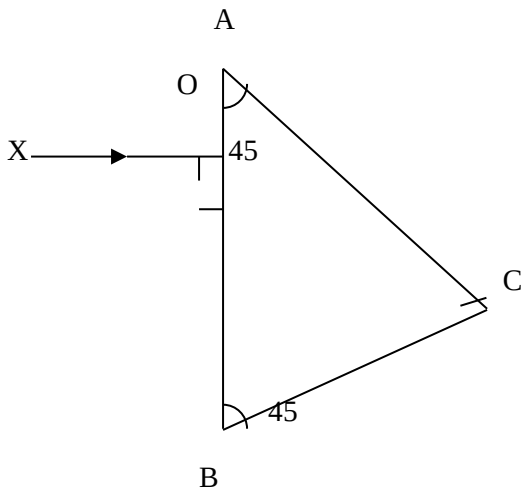
Figure 4

Use the graph to determine:

The refractive index of the material (2mks)

(b) Calculate the critical angle of diamond, given that its refractive index is 2.42 (2mks)

(c)The figure below shows a ray XO incident on side AB of the glass prism. If the critical angle of the glass 42^0, continue the ray until it emerges out of the glass prism. (2mks)

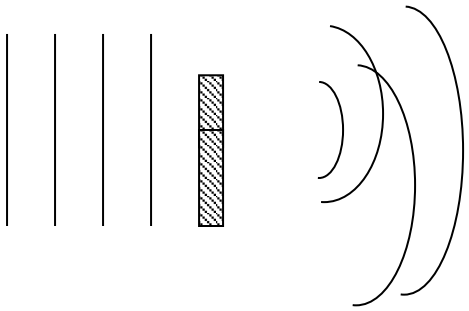


(d) Give two reasons why prisms are preferred to plane mirrors in periscopes and other optical devices. (2mks)

(e) Define dispersion of white light (1mk)

14(a) Define the term diffraction as applied in waves (1mk)

(b) The figure below shows wave fronts before and after passing an opening



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

(i) The gap is made smaller (1mk)

(ii) The gap is made very large (1mk)

(c) When a metre rule was placed in a ripple tank, it was noted that the distance between 8 successive dark lines (crests) was 40cm. The frequency of the vibration was 50Hz.

Determine

(i) The wavelength of the waves in the ripple tank. (2mks)

(ii) The periodic time of the waves. (2mks)

(iii) The velocity of the waves over the water surface. (2mks)

15. The figure shows the parts of an X-ray tube.

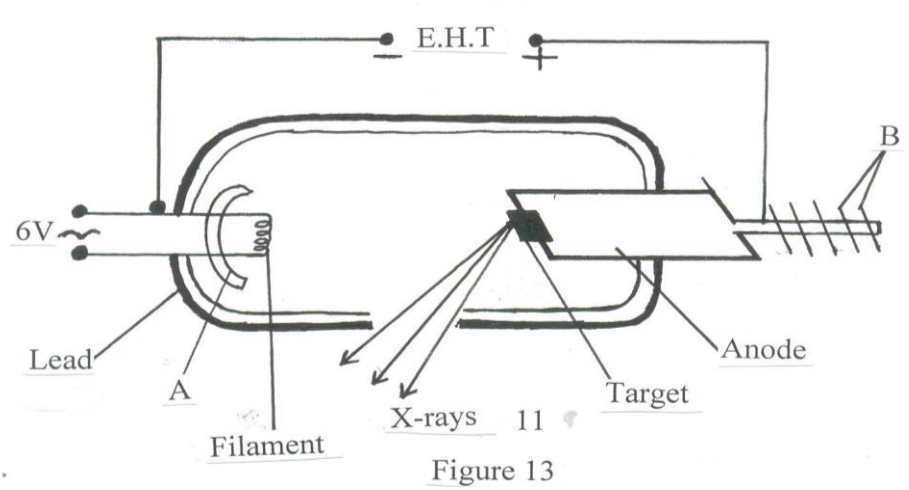


Figure 13

(a) Name the parts labeled A and B. (2 marks)

(b) What is the purpose of the 6V applied to the filament circuit? (2 marks)

(c) Why is the tube surrounded with lead? (1 mark)

(d) Explain how the energy of the X-rays can be increased. (2 marks)

(e) An X-ray tube is operated at a potential of 10kV and a current of 0.2A flows in the tube.

Calculate the number of electrons reaching the target per second.

(Electronic charge = 1.6×10^{-19} coulombs) (2 marks)

16. (a) Define the term 'National grid' as used in domestic wiring. (1mk)

(b) Power from the power stations must be stepped up before transmission. Explain (1mk)

(c) Ogolas's house has five bulbs each rated 60w, two security lights rated 500w and an electric cooker with a resistance of 500Ω. They operate from a mains supply of 240V. Determine the:-

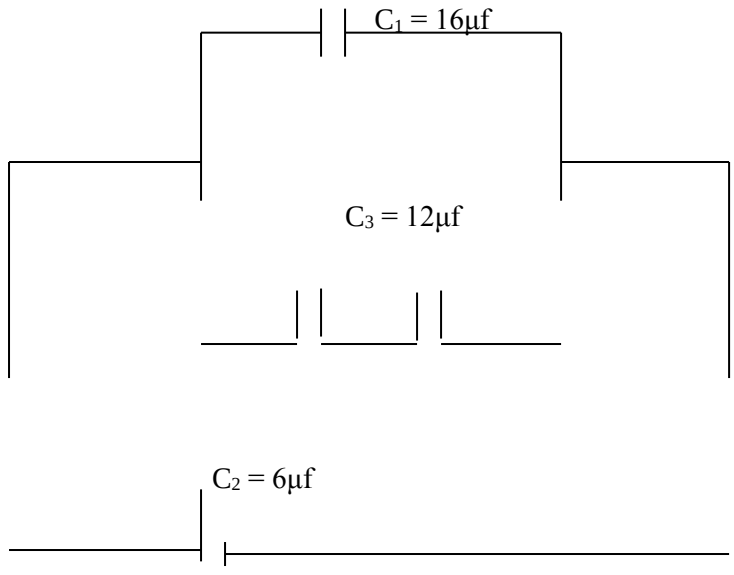
(i) Power rating of the cooker. (2mks)

(ii) Total current drawn from the mains supply. (2mks)

(iii) The cost of the power is kshs 15 per kilowatt - hour. Calculate the cost of using the gadgets above for two hours a day for 7 days. (2mks)

17.(a) Define capacitance of a capacitor (1mk)

(b) Three capacitors are connected as shown in the fig below; with a battery of e.m.f 12.0V and negligible internal resistance.



(i) Calculate the effective capacitance of the capacitor (2mks)

(ii) The potential difference across each capacitor. (3mks)

(c) What are the effects on capacitance of a parallel plate capacitor when

(i) Increasing the area overlap of the plates (1mk)

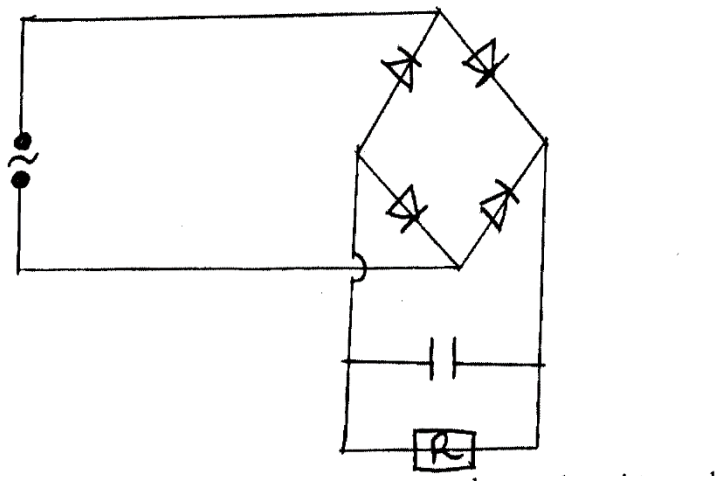
(ii) Increasing the distance of separation of the plates (1mk)

18(a) Define doping (1mk)

(b) Distinguish between a p-type and n-type semi conductors (2mks)

(c) Using a diagram illustrate a forward **P-N** junction (2mks)

(d) The figure below shows a bridge circuit



A apacitor has been connected across the resistor as shown

(i) Sketch of the figure below the wave form when a CRO is connected across the resistor, **R** (1mk)

Displacement(cm)

Time(s)

(ii) On the same axes, sketch a wave form when C.R.O is connected across R when the capacitor has been removed (1mk)

e) I) State Lenz's a law of electromagnetic induction. (1mk)

A transformer has 800 turns in the primary and 40 turns in the secondary winding.

The alternating e.m.f connected to the primary is 240V and the current is 0.5A.

II) Determine the secondary e.m.f (3mks)

III) The power in the secondary if the transformer is 95% efficient. (2mks)

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KCSE MOCK TRIAL 4

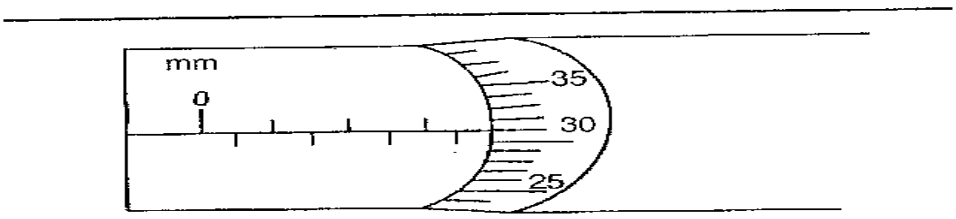
232/1
PHYSICS
PAPER 1

TIME: 2 HOURS

SECTION A (25 MARKS)

ANSWER ALL THE QUESTIONS IN THIS SECTION

1) State the reading on the micrometer screw gauge shown below.



---(1mark)

2) An oil drop forms a circular patch of area $5x10^{-3}$ m^2.If the oil drop has a volume $9x10^{-12}$ m^3, calculate the thickness of the oil molecule

---

---(2marks)

3) Name one non contact force----------

---(1mark)

FOR MARKING SCHEMES CALL/TEXT/WHATSAPP 0705525657

4) A crane just lifts 9940N when an effort of 116N is applied and its efficiency is 75%. Find it's velocity ratio.

---(3marks)

5) The mass of a vessel is 90g and its specific heat capacity is 420J/Kgk. Calculate its heat capacity

---

---(3marks)

6) Explain the term absolute zero temperature----------

---(1mark)

7) Two table tennis balls are suspended from a support by thin string and air is blown between them. Explain the consequent motion of the balls.

---(2marks)

8) State the Hooke's law. ----------

---(1mark)

9) Give **a reason** why heat transfer by radiation is faster than heat transfer by conduction.

---(1mark)

10) The moment of the weight of vertical door does not significantly affect the moment of the force to the door .Give a reason for this----------

---

---(1mark)

11) In the Brownian motion experiment, smoke particles are observed to move randomly. Explain how this motion is caused.----------

---

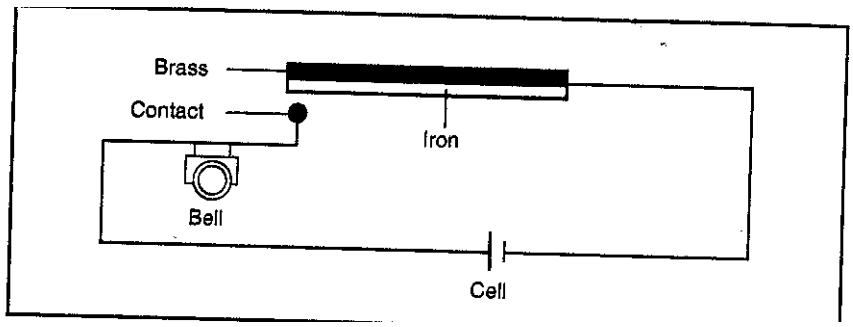
---(2marks)

12) Give **reason** why weight of a body varies from place to place----------

---

---(1mark)

13) The figure below shows a fire alarm circuit. Explain how the alarm functions.



---(2marks)

14) State the **reason** why water spilled on a glass surface wets the surface.

---(1mark)

15) Two liquids of density 1100kg/m^3 and 850kg/m^3 are mixed in equal volumes .The mixture fills a tank of 300cmx40cmx50cm to the brim. Calculate the mass of each liquid.

----------(3marks)

SECTION B (55 MARKS)

ANSWER ALL THE QUESTIONS IN THIS SECTION

16) The figure below shows a hydraulic press system using a lever of negligible mass, on the side of the small piston, pivoted at point P. A force of 50N is applied.

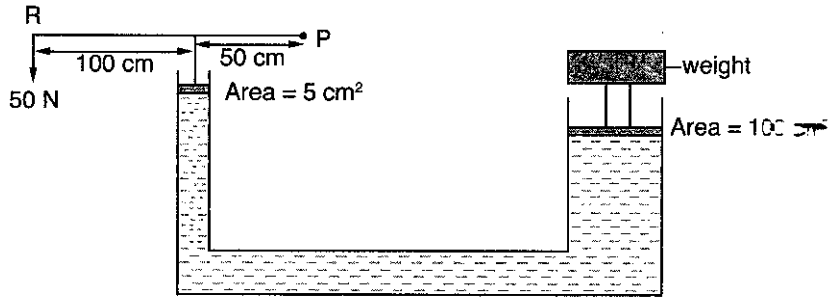


Fig. 4.73

a) Calculate the:

i) Force exerted by the small piston on the liquid

----------(3 marks)

ii) Pressure of the liquid below the small piston.

---(3 marks)

iii) Weight of the object supported on the larger piston

---(3 marks)

b) State two properties of the fluid used in the hydraulic press.

---(2marks)

17) a) State Newton's second law of motion

---(1mark)

b) A body accelerates uniformly from rest to 30m/s in 10s.Find its acceleration

---

---(2marks)

c) A car of mass 800kg moving with a speed of 15m/s crashes into a wall and comes to rest in 0.4 s. Find the :

i) Impulse----------

----------(3 marks)

ii) Average force by the wall

----------(3 marks)

d) A steel ball is released at the top of a tall glass cylinder containing a viscous liquid. Sketch the velocity –time graph for this motion (2 marks)

18) a) State the law of flotation

----------(1mark)

b) A uniform glass test tube of diameter 1.62cm containing lead shots floats in water with 14.9 cm in water.

i) State the function of the lead shots

---(1mark)

ii) Calculate the total mass of tube and its contents

---(4 marks)

iii) Find the length immersed in a liquid of relative density of 1.6

---(3marks)

C) A solid displaces $5cm^3$ of paraffin when floating and $25cm^3$ when fully immersed. Determine the density of the solid (Density of paraffin $=800kg/m^3$)

---(4marks)

19) a) A ball of mass 200g tied to a spring is being whirled in a vertical circle of radius 0.4m with uniform speed. At the lowest position, the tension in the string is 2.8N.Calculate the:

i) Uniform speed of the ball

---(3marks)

ii) Tension in the string when the ball is at the upper most position of the circular path

---

---(3marks)

b) A metal ball of mass 10kg is rotated horizontally by means of a rope 4m long .If its linear speed is 30m/s, find the force that will break the rope.

---(3marks)

c) A body moving with uniform speed in a circular path is accelerates. Explain

---

---(1mark)

20) a) State the principle of moments

---(1mark)

b) A uniform wooden lath measuring 200cm by 25cm by 15cm is suspended at the 150cm mark and balanced horizontally by hanging a mass of 14 kg at the 200cm mark. Calculate the:

i) Mass of the wooden lath

---(3marks)

ii) Density of the material of the wooden lath

---(3marks)

iii) Tension in the rope supporting the system

---(3marks)

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KCSE MOCK TRIAL 4

PHYSICS
PAPER 2
TIME: 2HRS

SECTION A (25 MARKS)

1. Name one source and use of infrared radiation (2mks)

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   ……

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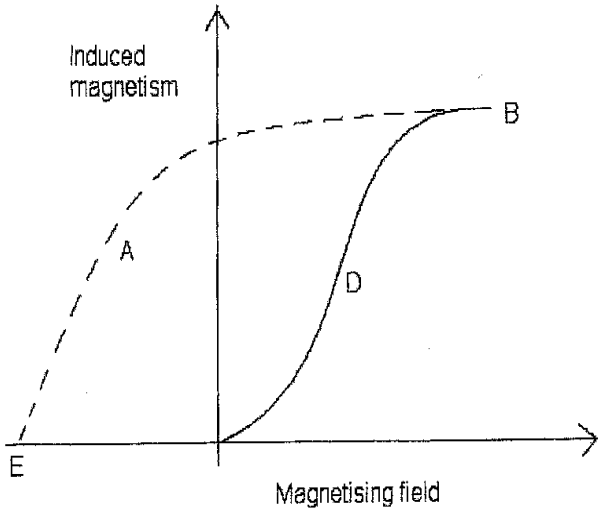
   ……

2. The figure below shows curves obtained with a magnetic material



   State what curves A and B represent (2mks)

   ……

   ……

   ……

   ……

3. State the importance of ear thing in domestic wiring (1mk)

FOR MARKING SCHEMES CALL/TEXT/WHATSAPP 0705525657

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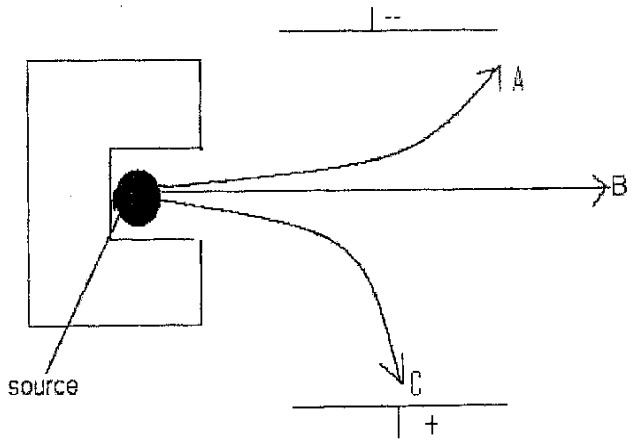
4. The figure below shows the three nuclear radiation labeled A, B, and C under the influence of an electric field.



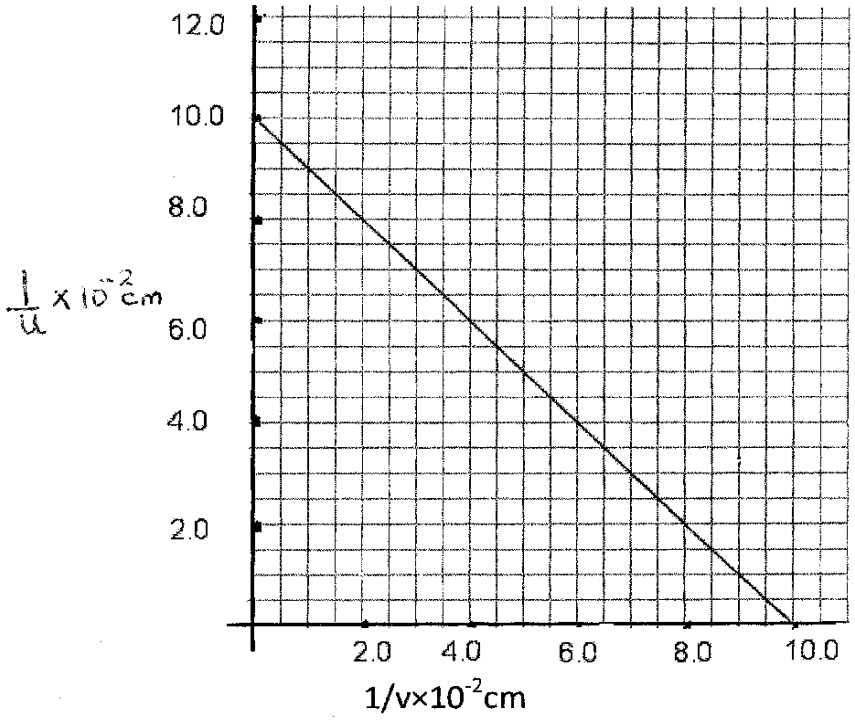
Identify the radiation A, B and C (3mks)

A……

B……

C……

5. In an experiment with a convex lens, image distances were measured when an object was placed at various distances away from the lens. The figure below shows a graph of 1/v against 1/u for the experiment where u is the object and v is the image distance.



Use the graph to find the focal length f of the lens (3mks)

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6. A student synchronizes his watch with a church bell 2km away. The following morning, there is a wind. He notes that the church bell sounded 0.15s later. Assuming his watch is correct and bell was sounded at the usual time. Determine the direction of the wind and its speed. (Assuming the speed of sound in still air is 340ms $^{-1}$) (3mks)

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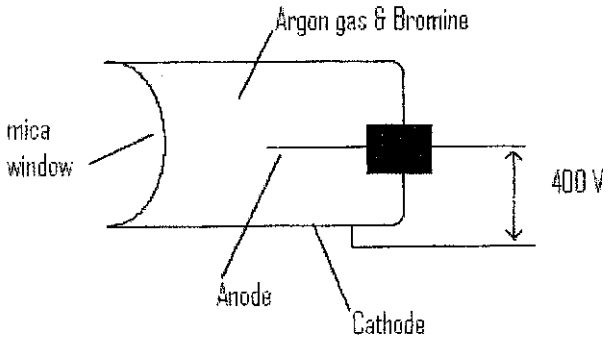
7. The figure below shows a GM tube



i) Give a reason why the mica window is made thin (1mk)

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ii) The tube has got a small amount of bromine. State the purpose of the bromine in the tube (1mk)

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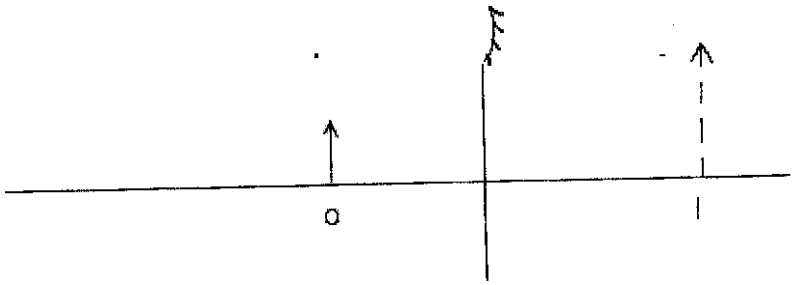
Study the ray diagram below and use it to answer question 8 & 9



8. Complete the diagram by drawing the correct rays on it (1mk)

9. Use your drawing to determine the focal length f of the mirror (2mks)

……

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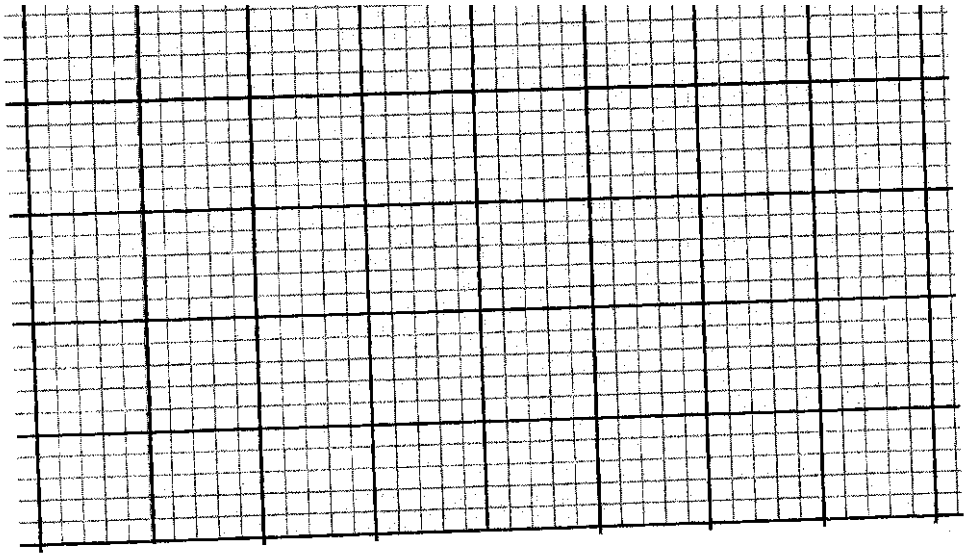
10. A 5V ac signal with a frequency of 50Hz is applied across the y-plates. The y-gain and time base setting is 2.5V/cm and 10Ms/cm respectively. Use the information above to sketch a wave form as seen on CRO screen (3mks)



11. State Faraday's law of electromagnetic induction (1mk)

……

……

……

12. State three points to observe in maintaining a lead-acid battery (3mks)

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SECTION B(55 MARKS)

13. a) State three factors affecting the capacitance or a parallel plate capacitor (3mks)

……

……

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……

……

b) You are provided with the following apparatus
-uncharged capacitor
-Voltmeter
-Milliammeter

-12v battery
-A load resistor
-Two way switch

i) Using the above apparatus draw a circuit diagram that can be used to study the charging and discharging the capacitor. (3mks)

ii) Use the diagram in b(i) to describe how a fully charged capacitor is discharged (2mks)

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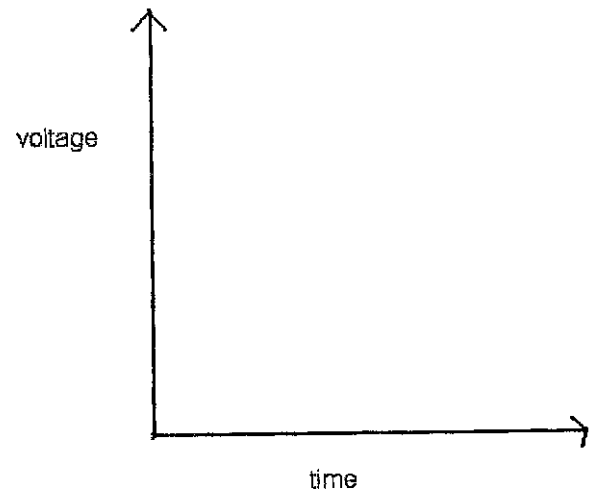
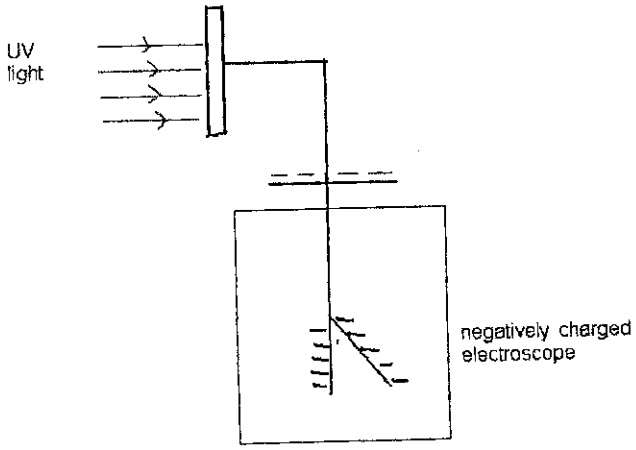
iii) On the axis provided sketch a voltage –time graph of discharging of capacitor (1mk)



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



Explain what happens to the charged electroscope (2mks)

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14. a) With the aid of a well labeled diagram, explain how lunar eclipse occurs. (4mk)

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b) Explain why large convex mirrors are placed at certain points in supermarket (2mks)

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c) An object 2.5 m tall is at a point 8m from a pinhole camera. If the distance of the screen is 8.16m from the object, calculate the size of the image (3mks)

……

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……

……

d) i) Draw a diagram to show how prisms are used in a periscope (2mks)

ii) Calculate the critical angle of a ray of light passing from glass to water, if their refractive indices are $^{2}/_{3}$ and $^{4}/_{3}$ respectively. (3mks)

15. a) State the Ohms' law (1mk)

……

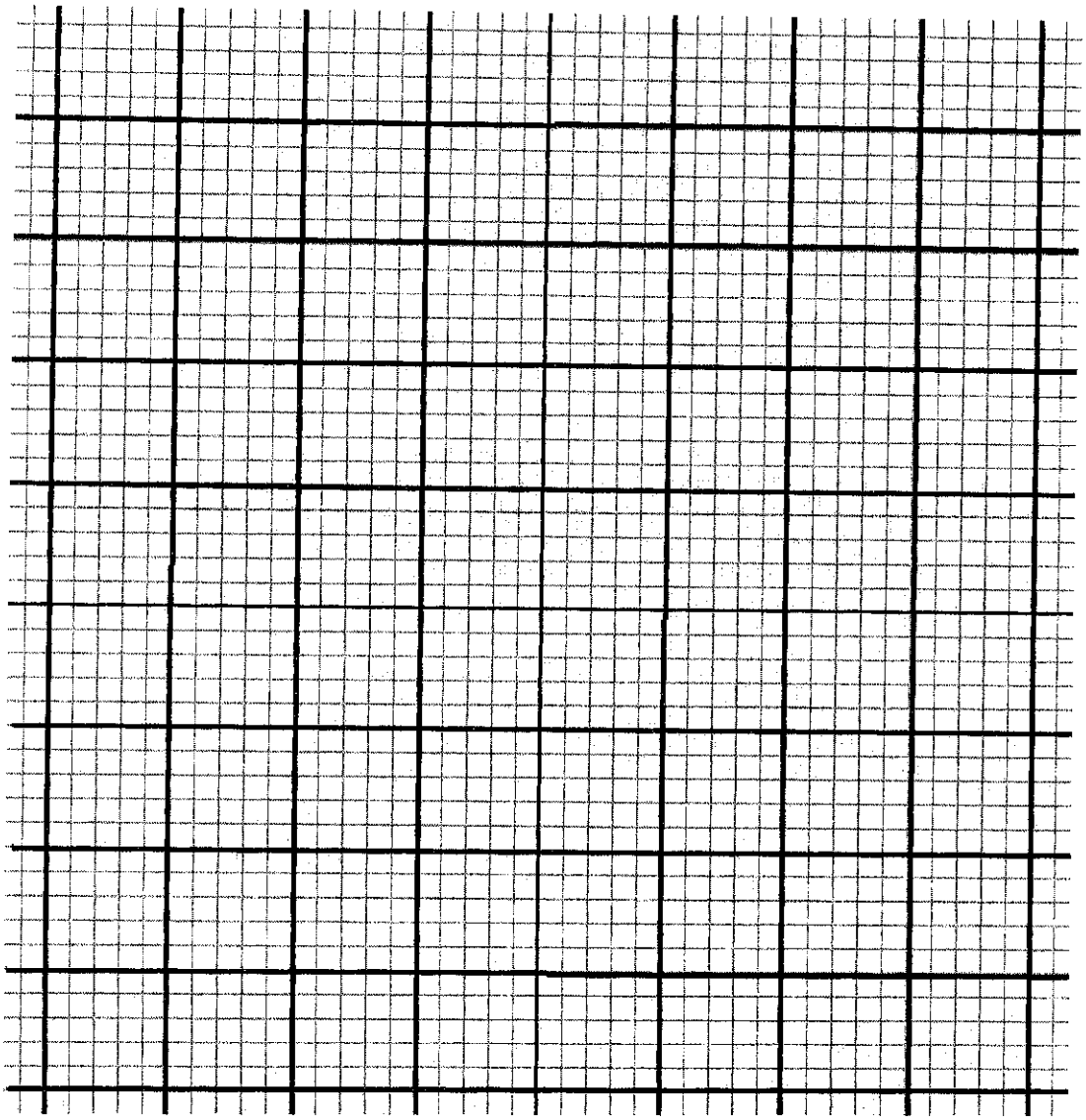
……

……

b) Three resistors x,y and z where x = 200 Ω, y = 100 Ω and z is unknown resistance are connected in parallel. This arrangement is then placed in a circuit and current passing through, and potential difference across its measured the table below shows the result.

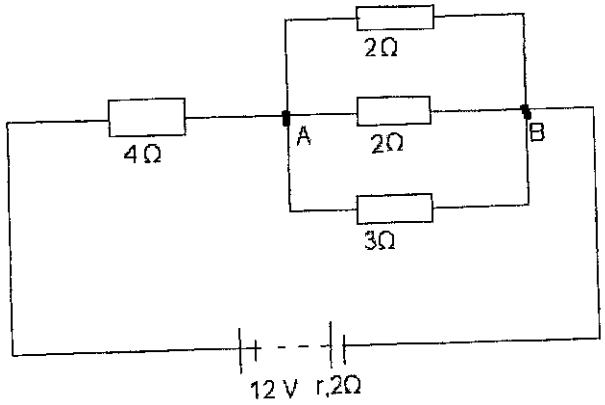
p.d(v)	2.0	4.0	6.0	8.0	10.0	12.0
Current(l) (A)	0.10	0.20	0.30	0.40	0.50	0.60

i) Plot a graph of p.d against current (4mks)



ii) Use your graph to calculate the value of unknown resistance. (4mks)

c) Four resistors are connected in a circuit as shown in the diagram below



Calculate the p.d across AB. (3mks)

……

……

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……

……

16. a) Distinguish between diffraction and refraction of waves (1mk)

……

……

……

……

b) Explain clearly how the following affect light intensity in the young's double slit experiment

i) Separation of the slits (2mks)

……

……

……

ii) Width of the slits (2mks)

……

……

……

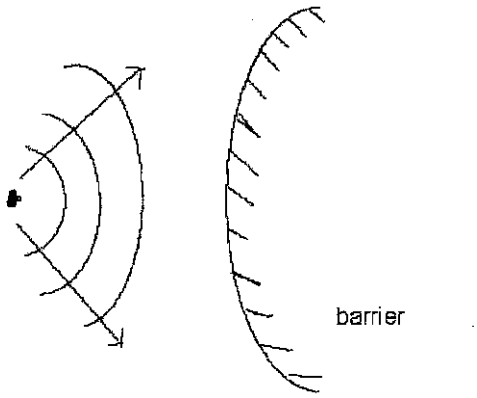
iii) Frequency of incident light (2mks)

……

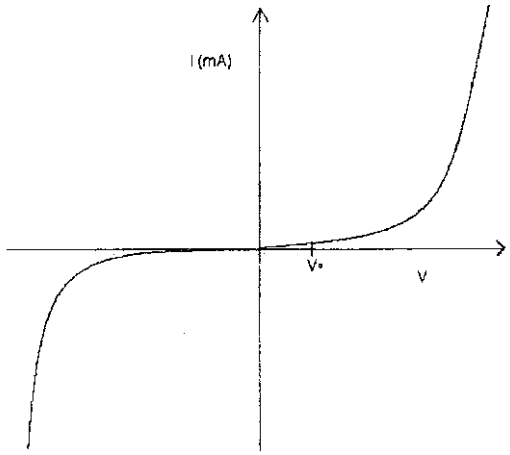
……

……

c) The figure below shows circular wave fronts approaching a convex barrier. Complete the figure to show what happens to the wave fronts after reflection on the barrier. (2mks)



17. The figure below shows current-voltage characteristics of a junction diode.



a) In the forward bios, the diode does not conduct until a certain minimal voltage is reached. Explain the effect (2mks)

……

……

……

……

b) Where the voltage is increased in reverse bias, the diode conducts when a certain voltage is reached. What is the name given to this voltage (1mk)

……

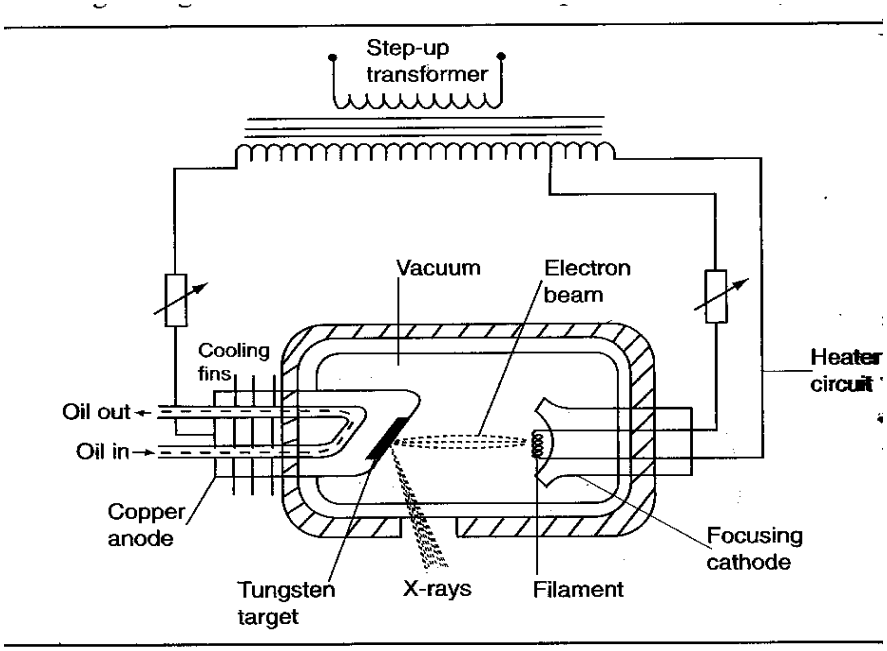
……

c) i) List two properties of x-rays (2mks)

……

……

ii) The figure shows a simplified illustration of an x-ray tube



Explain the following features in an x-ray tube

Low pressure……

……(1 mk)

Lead shield……

……(1 mk)

iii) Explain the adjustment that can be made to obtain hard x-rays (2mks)

……

……

……

……

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KCSE MOCK TRIAL 5

232/1
PHYSICS
PAPER 1

SECTION A (25 MARKS)

1. A spherical ball bearing of mass 0.0024 kg is held between the anvil and spindle of a micrometer screw gauge. The reading on the gauge when the jaws are closed without anything in between is 0.11mm. Use this information and the position of the scale in the **figure 1** below to answer the questions **(a)** and **(b)** below:

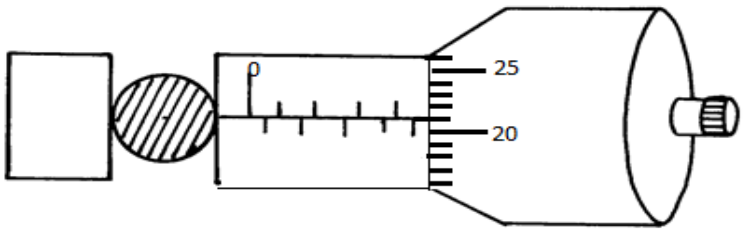

fig 1

a) What is the diameter of the ball bearing? (1 mk)

……

……

……

b) Find the density of the ball bearing correct to 3 significant figures (2 mks)

……

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2. The diagram below shows a wire loop with two threads tied across it. The loop is dipped into a soap solution such that the soap film covers it as shown in **fig 2**

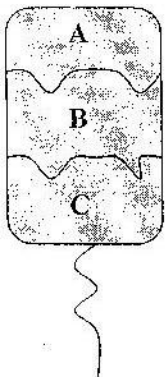
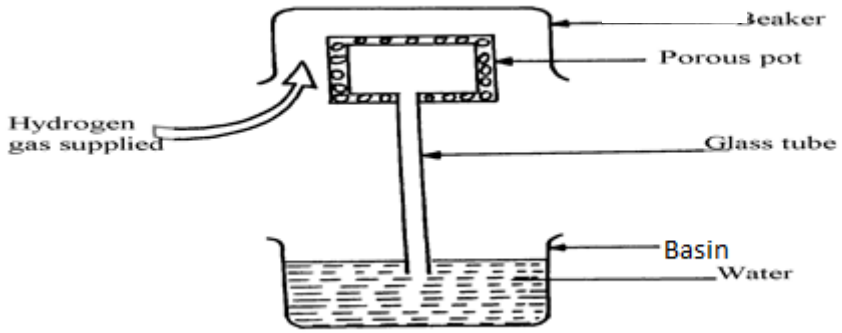


Fig 2

Region B is punctured such that the soap film in that section is broken. On the space alongside the diagram sketch the resulting shape of the wire loop. Give a reason for the shape. (2 mks)

……
……
……

3. The **figure 3** below shows an arrangement to demonstrate diffusion through solids:-



The hydrogen gas is supplied for sometimes then stopped and the beaker removed. State and explain what is likely to be observed when the hydrogen gas supply is stopped (3 mks)

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……

4. Figure 4 shows two identical thermometers. Thermometer **A** has a blackened bulb while thermometer **B** has a silvery bulb. A candle is placed equidistant between the two thermometers

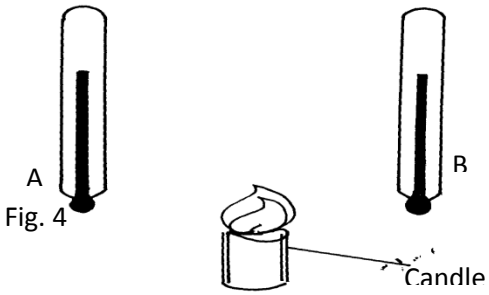

Fig. 4

State with a reason the observations made after some time(2 mks)

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5. A car being driven on a horizontal straight road accelerates uniformly from O to 20m/s. In the first 10s. It continues at that speed for the next 40s and then decelerates to a stop in 5s. Sketch the velocity time graph for its motion. (2 marks)

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……

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

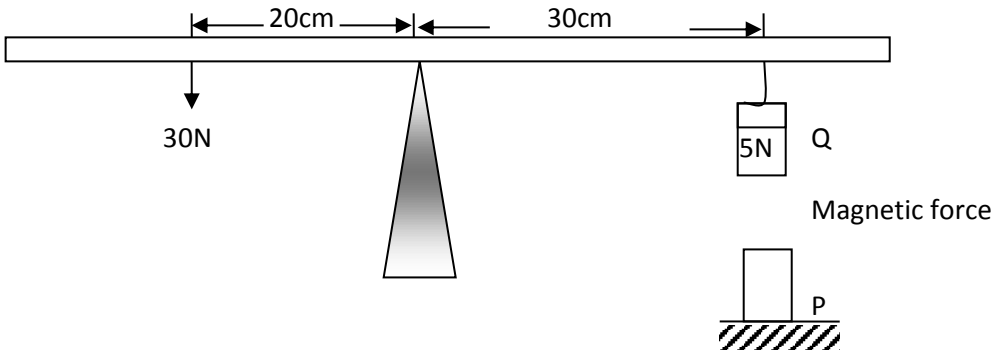

Fig 5

a) Ignoring the weight of the metre rule, calculate the value of the magnetic force between Q and P (2 mks)

……

……

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……

b) Given that the lower end of Q is North pole, state polarity of the end of P facing Q.

(1 mk)

……

7. (a) Give a reason why water is not suitable as a barometric liquid. (1 mk)

……

……

(b)Explain why a lift pump is unable to raise water from a borehole where the level of water is 20m below the ground level. (1 mks)

……

……

8. The diagram below shows a mass of 12g hanged on a set of 6 identical springs. When a mass of 12g was hanged on spring A alone, its extension was 5cm. Find the extension of the combination shown if each spring and each rod has negligible mass (2 mks)

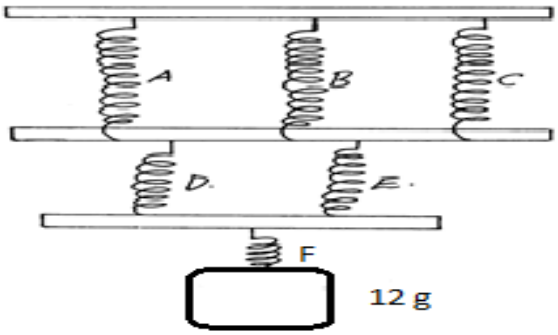

fig 6

……

……

……

9. Sea water of density **1.04g/cm^3** is being pumped into a tank through a pipe of uniform cross-sectional area of 3.142cm^2. If the speed of water in the pipe is 5m/s, determine the mass flux in S.I unit. (2 mks)

……

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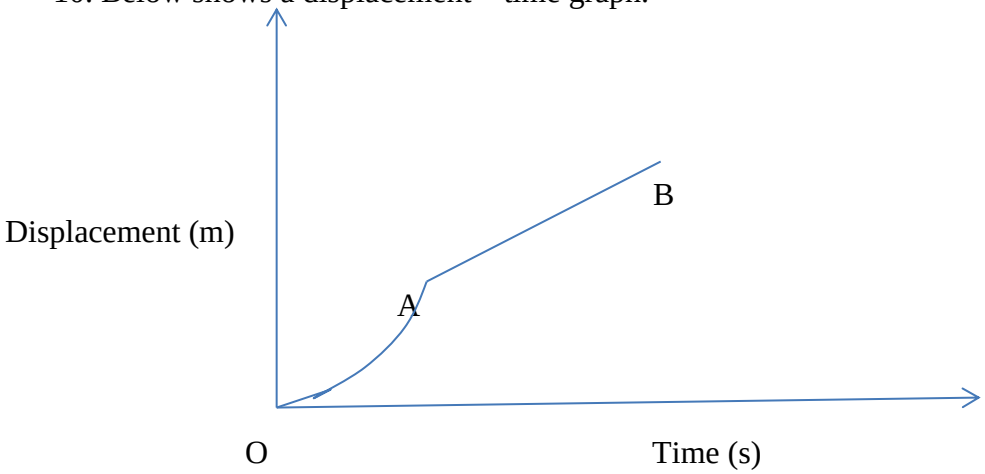
10. Below shows a displacement – time graph.



Describe the motion of the body between points:

OA…… (1 mk)

AB……..(1 mk)

11. A quantity of air occupied 500cm^3 at 15^{0}C when the pressure was 76 cmHg. At what temperature would it occupy 460cm^3 if the pressure was 85cmHg? (2 mks)

……

……

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SECTION B (55 MARKS)

12.a) State the pressure law for an ideal gas.(1 mark)

c) The set up shows an arrangement to determine the relationship between temperature and pressure of a gas at constant volume.

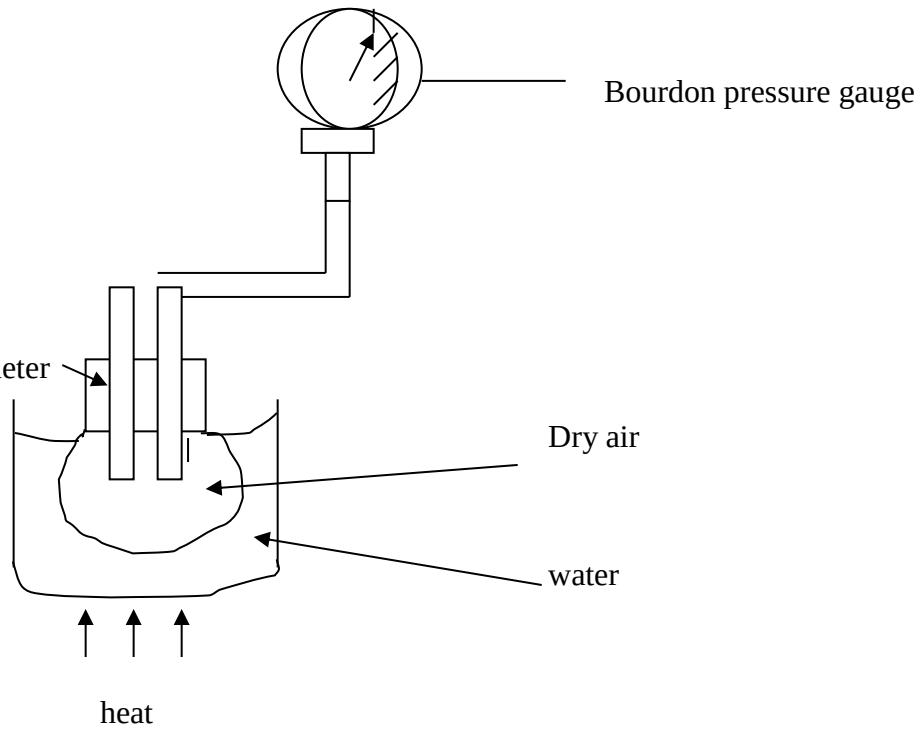

Fig 7

i) Describe how the measurements are obtained in the experiment (3 marks)

ii) Explain how the results from the experiment can be used to determine the relationship between temperature and pressure (2 marks)

c) A bicycle tyre is pumped to a pressure of 2.2×10^5 pa at 23^oc. After a race the pressure is found to be 2.6×10^5 pa. Assuming the volume of the tyre did not change, what is the temperature of the air in the tyre. (3 marks)

d) Air is trapped inside a glass tube by a thread of mercury 240mm long. When the tube is held horizontally the length of the air column is 240mm.

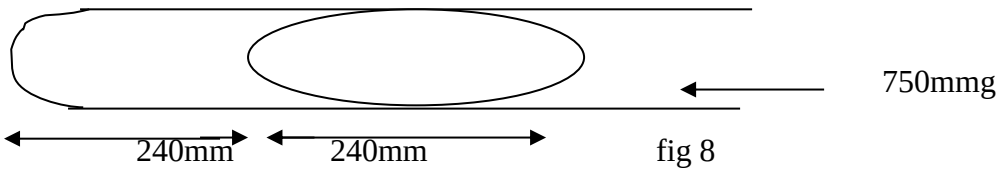

fig 8

Assuming that the atmospheric pressure is 750mmHg and the temperature is constant, calculate the length of the air column when the tube is vertical with open and down.

(3 marks)

13. (a) An object is released to fall vertically from height of 100m. At the same time another object is projected vertically upward with velocity of 40m/s.

(i) Calculate the time taken before the objects meet (3mks)

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……

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……

(ii) At what height do the objects meet? (2mks)

……

……

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

(i) The angular velocity (2mk)

……

……

……

(ii) The angular acceleration (2mks)

……

……

……

(iii) The tension on the string (2mks)

……

……

……

(iii) The linear velocity (1mk)

……

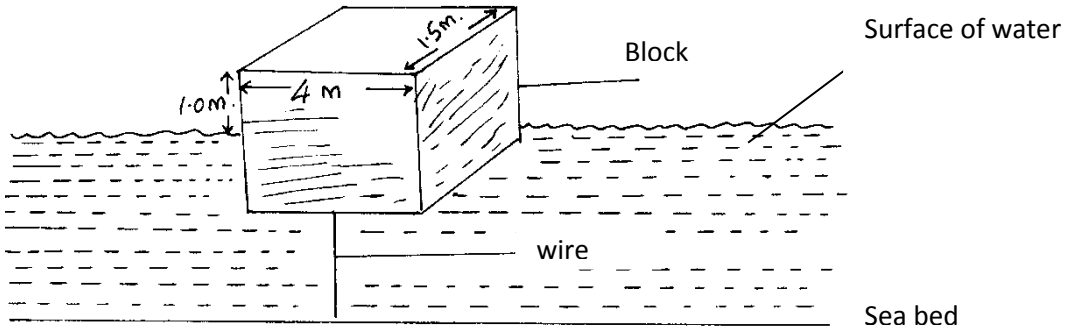
……

14. a) State Archimedes' principle. (1mk)

……

……

(b) The figure 9 below shows a rectangular buoy of mass 4000kg tethered to the sea-bed by a wire. The dimensions are 4m x 1.5m x 2.2m.



Calculate the :-

(i) Weight of sea water displaced by the buoy (density of sea water = 1100kg/m^3)

(3 mks)

……

……

……

(ii) Upward force exerted on the buoy by the water. (1mk)

……

(iii) Tension in the wire (2mks)

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……

(c) A test tube of mass 10g and uniform cross-sectional area 4cm^2 is partly filled with lead shots and floats vertically in water with 5cm of its length submerged.

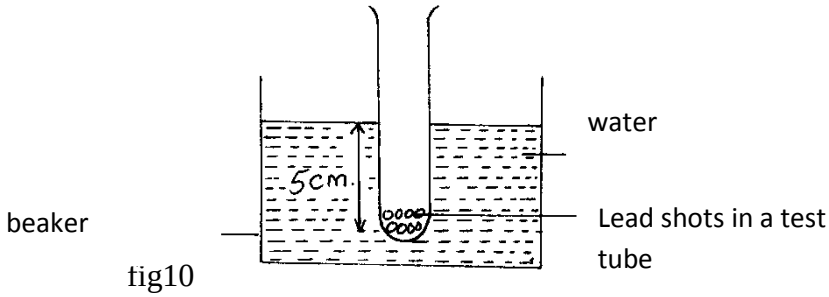

fig10

Find the:-

(i) Mass of the lead shots. (2mks)

……

……

……

……

(ii) Length of the test tube that would be submerged in a liquid of density $0.75g/cm^3$.

(2mks)

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……

……

15. (a) State two differences between boiling and evaporation. (2 mk)

……

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(b) 1200g of a liquid at 10^0C is poured into a well-logged calorimeter. An electric heater rated 1KW is used to heat the liquid. The graph in fig 4 below shows the variation of temperature of the liquid with time.

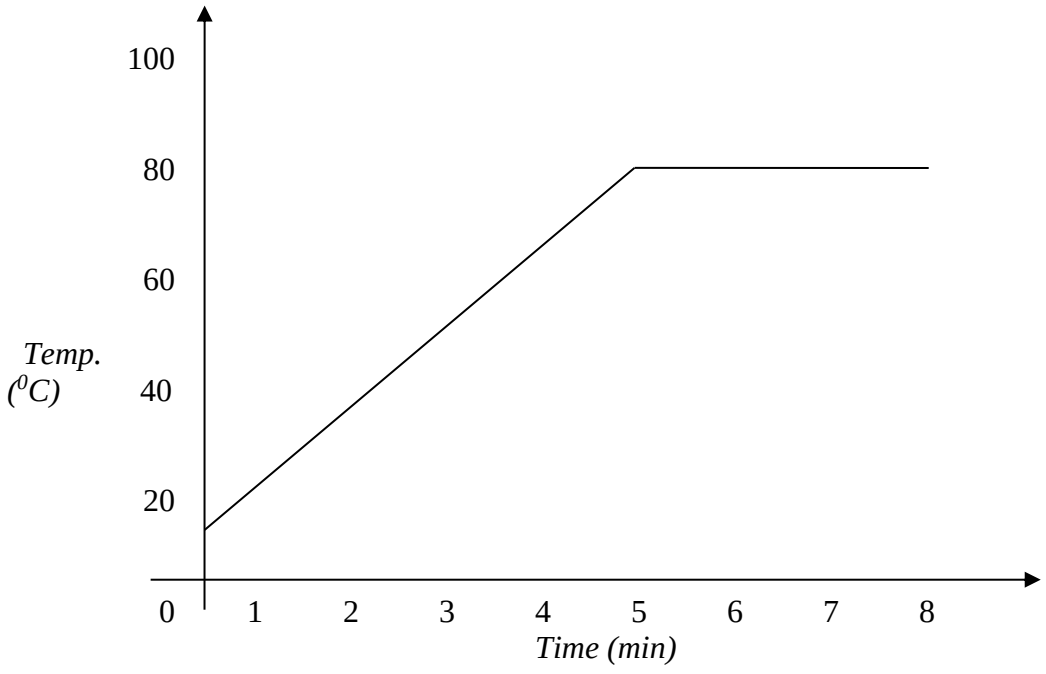

Fig. 4

Use the graph to answer the following questions:

(i) What is the boiling point of the liquid? (1 mk)

……

……

(ii) How much heat is given out by the heater to take the liquid to the boiling point? (2 mks)

……

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…….

(iii) Determine the specific heat capacity of the liquid stating any assumptions made. (2 mks)

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(iv) If 50g of the liquid vapour was collected by the end of the 8^{th} minute, determine the specific latent heat of vaporization of the liquid. (2 mks)

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

……..……

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…….

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

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

(i) Determine the initial common velocity of bullet and wooden block.(2 mks)

……

……..

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

……

……

(c) Two immiscible liquids are poured in an open container to the levels shown in the diagram below.

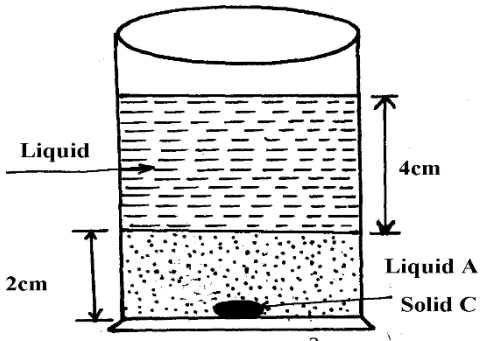

Figure 11

If the densities of the liquids **A** and **B** are 1g/cm^3 and 0.8g/cm^3 respectively and the atmospheric pressure 760 mmHg, find the total pressure acting upon solid **C** at the bottom of the container. (Take density of mercury to be 13.6g/cm^{3}and g = 10 N/Kg) (3 mks)

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KCSE MOCK TRIAL 5

232/2
PHYSICS
PAPER 2
TIME: 2 HOURS

SECTION A (25MARKS)
Answer all the questions in this section

1. Figure (1) below shows two rays of light from an object reflected on a plane mirror

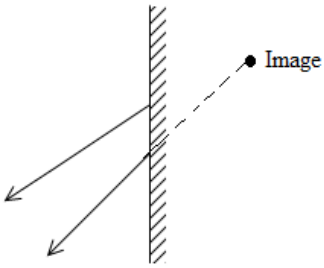


Fig 1.

Using proper ray construction, show the object position (2marks)

2. The fig 2 below shows a ray of light incident on a glass prism

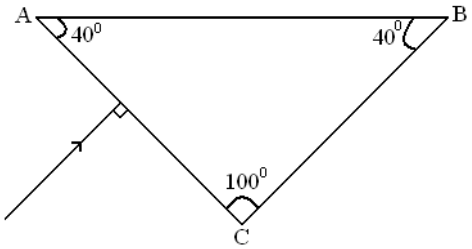
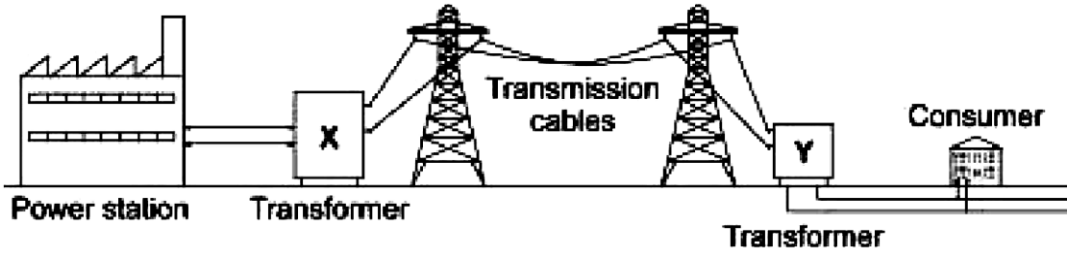


Fig2

Given that the critical angle for the grass is 39^0, **sketch** on the diagram the path of the ray through the prism. (2 marks)

3.The diagram on figure 3 shows the National Grid system.



FOR MARKING SCHEMES CALL/TEXT/WHATSAPP 0705525657

Fig3.

(a) What type of transformer is;

X…… (1mark)

Y……. (1mark)

4. State **one** advantages of using circuit breakers in the consumer unit than using fuse wire. (1marks)

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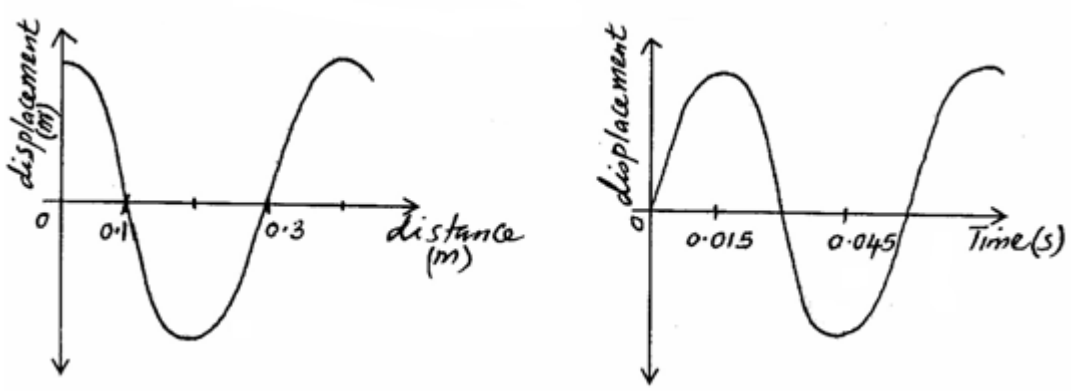
.....

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



Determine the velocity of the wave. (3mks)

6. Figure 4. Below shows a 6V battery connected to an arrangement of resistors. Determine the current flowing through the 2Ω resistor. (3marks)

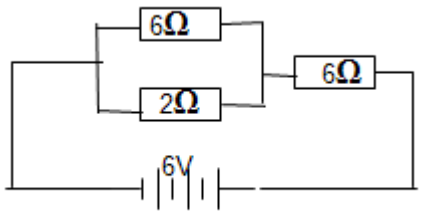


Fig 6.

7. The figure 7 below shows the electromagnetic spectrum.

dio waves	ra-red		ultraviolet	B	mma rays

Fig 7.

FOR MARKING SCHEMES CALL/TEXT/WHATSAPP 0705525657

(a)Identify A (1 mark)
……
(b)State one industrial use of B (1 mark)
……..

8. The diagram (Fig 8) shows a positively charged acetate strip and a negatively charged polythene strip that are freely suspended.

Fig8.

Two rods X and Y are brought up in turn to these two strips. Rod X attracts the acetate strip but repels the polythene strip. Rod Y does not repel either the acetate strip or the polythene strip.
State the type of charge is on each rod. (2mks)
X…….
Y……

9. State **two** advantages of an alkaline accumulator over lead acid accumulator. (2mks)
……
……
……

10. Figure 9 below show a **concave** lens and object.

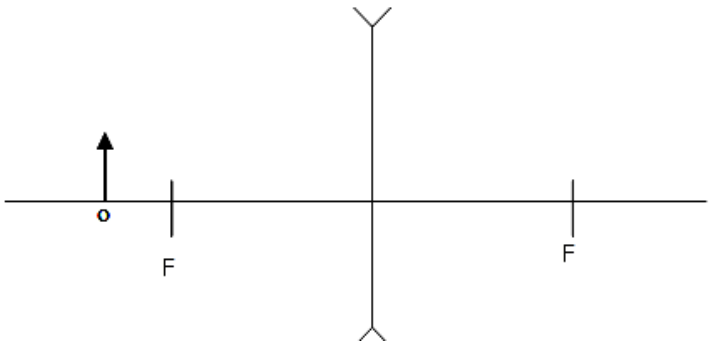


Fig 9.

Sketch the rays to show the image formed. (2marks)

11. Two similar razor blades were placed on a wooden block and the other on an iron block as in **figure 10**.

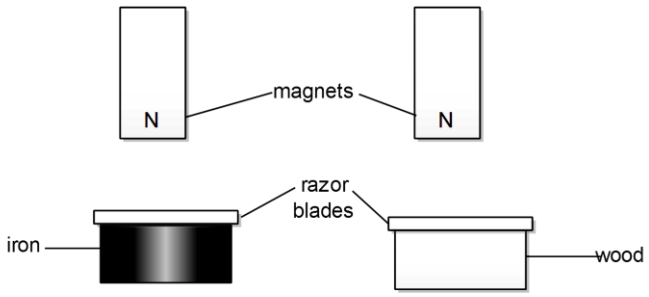


Fig 10.

It was observed that the razor blade on the wooden block is attracted by the magnet while that on the iron block was not.Explain. (2 marks)

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12. The **figure 11** below shows water waves about to pass through a gap. One wave front is shown after it has passed through the gap.

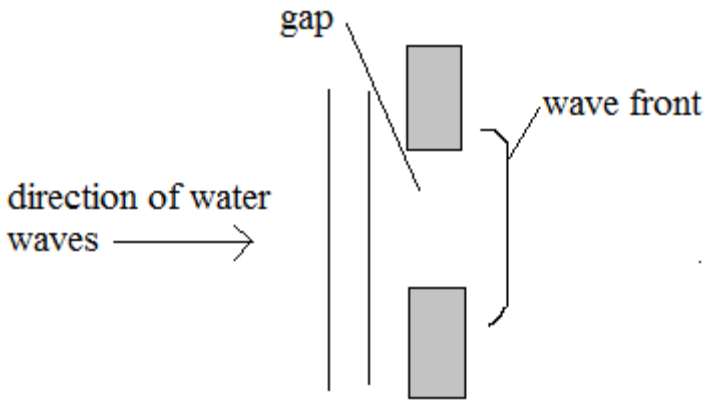

Fig 11

(i) On the diagram, draw two more wave fronts that have passed through the gap. (1mark)

(ii)State two changes which would each make the wave fronts become more curved after passing through the gap. (1 mark)

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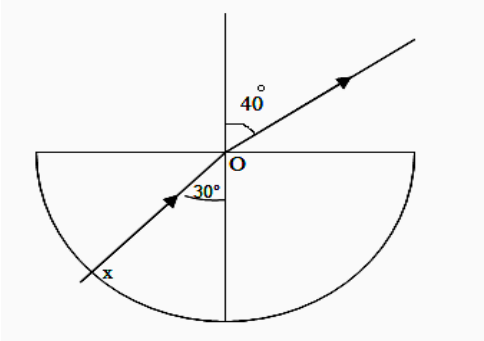
SECTION B (55MARKS)
ANSWER ALL THE QUESTIONS IN THIS SECTION.

13.(a) State what is meant by refractive index of a material. (1 mark)

……
……

(b) Figure 12 represents a ray of light falling normally on the curved surface of a semi-circular plastic block at X, meeting the opposite face at an angle of incidence of 30^0 and emerging into the air at an angle of 40^0.

Fig 12



(i) State and explain what happens to the ray as it moves from:

I) Air to glass at X. (1marks)

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……
…… ……

II) From glass to air at O. (1marks)

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……
……

(ii) Calculate refractive index of the plastic. (3marks)

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(iii) State the conditions to be satisfied for total internal reflection to occur. (2marks)

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FOR MARKING SCHEMES CALL/TEXT/WHATSAPP 0705525657

(iv) Describe how the apparatus above could be used to find the critical angle experimentally. (3marks)

……
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(v)Calculate the critical angle for this plastic. (2marks)

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14. (a) State what is meant by the term capacitance. (1marks)

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.....
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.....

(b) Distinguish between a paper capacitor and an electrolyte capacitor. (1marks)

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.....

(c) State **two** factors that determine capacitance of a parallel plate capacitor (2mks)

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(d) Figure 10 below shows a network of capacitors in series.

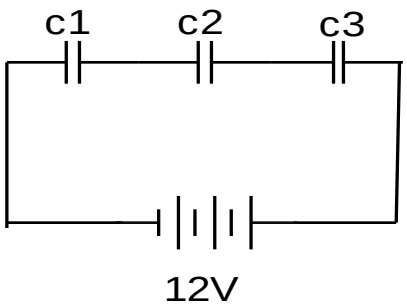

Fig 10.

(i) Derive an expression for their effective capacitance C_E from first principles. (3marks)

……
……
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……

(ii) Given that C_1=10.5μF, C_2 =2μF and C_3= 3μF.
Calculate effective capacitance $C_E$in (2) above and hence

Determine the charge stored on each capacitor. (3marks)

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(e) State two applications of capacitors. (2marks).

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15.(a) Use the **figure 11** below to answer the questions that follows.

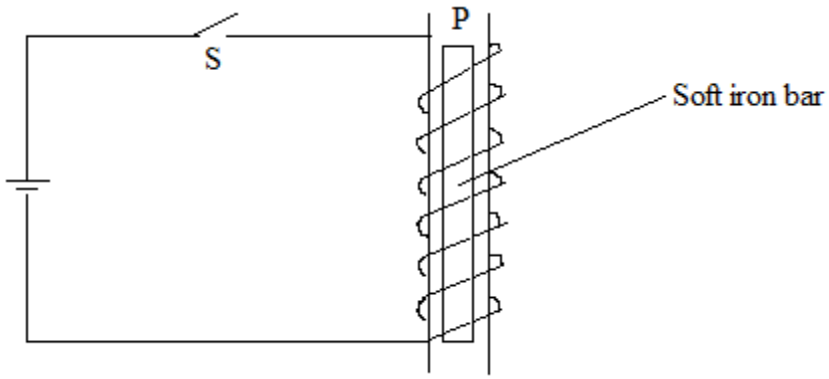

Fig.11

(i) Show the direction of the current on the turns when the switch S is closed. (1marks)

(ii) State the polarity at P (1marks)

……

(iii) Explain using domain theory what happens on the soft iron bar. (1marks)

……

(iv). If steel bar was used instead, what could be the difference? (2marks)

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(b) The following diagram (**figure 12**), shows a part of an electric d.c motor.

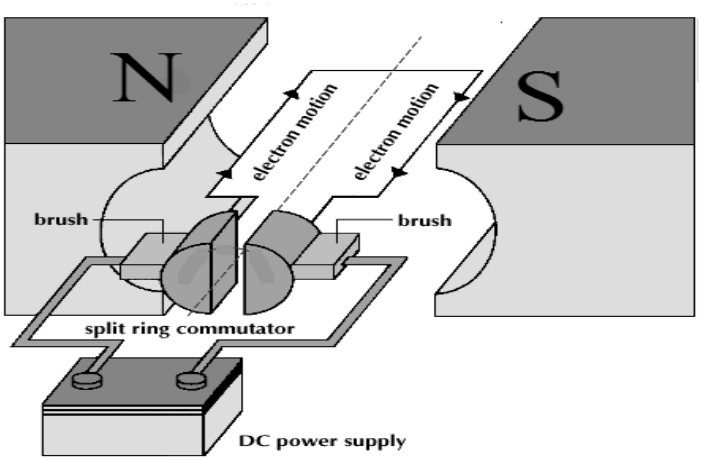

Fig 12.

(i) On the diagram above show the direction of rotation of the coil. (1marks**)**

(ii) State the effect of increasing the number of turns of the rotating coil of an electric motor. (1marks)

……

……

(c)Sketch the magnetic field pattern around the conductor carrying current on figures 13 and 14 shown below. (2marks)

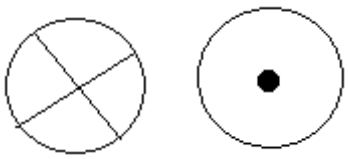

Fig 13. **Fig 14**

16(a) Distinguish between real image and a virtual image. (2mks)

……

……

……

……

(b) The distance between an objectand itsupright image produced by a curved mirror is 40cm. the image is 3 times as tall as the object

(i) State the type of mirror used. (1mk)

……

……

(ii) Determine the object distance (2mks)

(iii) Determine the radius of curvature of the mirror (3 mks)

(iv) State **one** application of the mirror as used in (b) above (1mk)

……
……

17(a) State **Ohm's Law**. (1mk)
……
……
……
……

(b) Explain why a 12V car battery is able to start the motor car engine while eight dry cells of 1.5 v each connected in series will not. (2mks)
……
……
……
……

(c) In figure 15 the current in the circuit is 1.80A

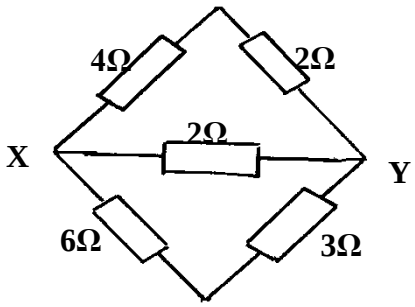

Fig 15

(i)Find the effective resistance between **X and Y**. (3mks)
……
……
……
……
……

(ii)The p.d of the source. (2mks)
……
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……
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(iii)Current through the 3Ω resistor (2mks)

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

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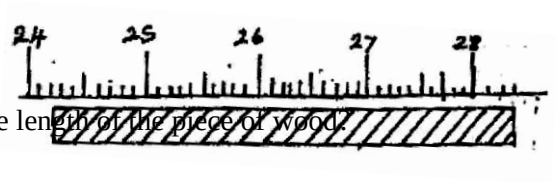
KCSE MOCK TRIAL 6

232 / 1
PHYSICS
PAPER 1
THEORY
TIME: 2 HOURS

SECTION A (25 MARKS)
Answer ALL questions in this section in the spaces provided

1. The diagram below shows a piece of wood whose length is being measured using a strip of measuring tape.



What is the length of the piece of wood?

(1mk)

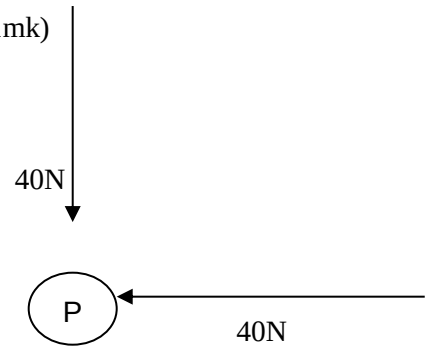
……

……

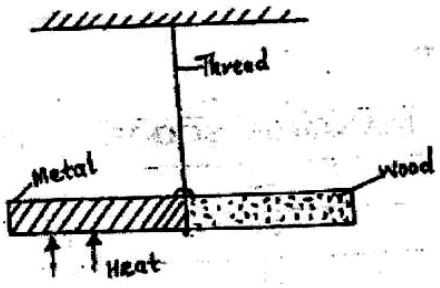
…….

2. The figure below shows two forces acting on an object P. Complete the diagram to show the direction in which P would move.

(1mk)



3. The figure below shows a rod made of wood on one end and metal on the other end. It is 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 and the rod tips to the left. Explain. (2mks)

……

……

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……

4. Explain why a high jumper flexes his knees when landing on the ground.
(2mks)

……

……

……

……

……

5. State **one** way of making the surface tension of a liquid stronger.
(2mks)

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6. (a) What do you understand by the term upper fixed point of a thermometer?
(1mk)

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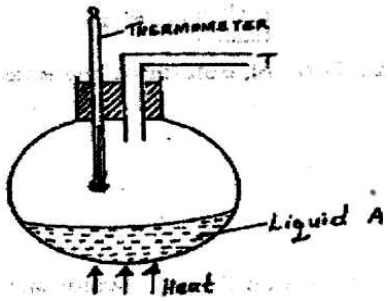
(b) The diagram below shows an arrangement used to determine the upper fixed point of ungraduated thermometer.



(i) Name liquid A.

(1mk)

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(ii) Why is the bulb of thermometer not dipped in liquid A?

(1mk)

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7. Two iron bars A and B with the same cross section area stand on a horizontal table as shown.

State and explain which of the bars is more stable.

(2mks)

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8. The pressure in a moving fluid varies with speed of the fluid. Explain.

(2mks)

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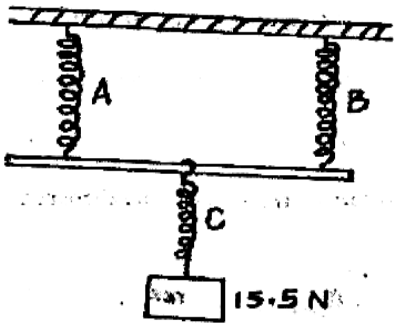
9. Three identical springs A, B and C are used to support a 15.5N weight as shown below.



If the weight of the horizontal beam is 0.5N, determine the extension of each spring given that 4N causes an extension of 1cm. (Assume the weight of the springs is negligible).

(3mks)

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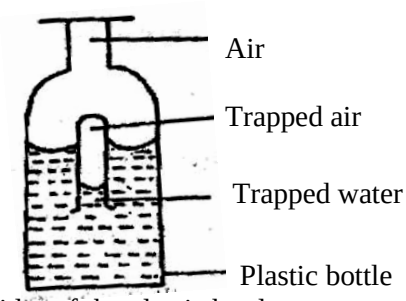
10. The figure below shows an inverted test tube which floats in water enclosed in a plastic bottle.



When the sides of the plastic bottle are squeezed, explain what would be observed.

(3mks)

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11. A liquid at a temperature of 70^0C was poured into a calorimeter containing pure ice. The whole ice was melted and the mixture attained a final temperature, θ.

    Write down an expression for the final temperature explaining any symbols used.

    (3mks)

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    …….

12. A liquid at 80^0C in a cup was allowed to cool for 20 minutes. State **two** factors that determine the final temperature.

    (2mks)

    ……

    …….

    ……

    …….

SECTION B (55 MARKS)

13. (a) Two identical containers A and B are placed on a bench, container A is filled with oxygen gas and B with hydrogen gas such that the two gases have equal masses. If the containers are maintained at the same temperature, state with a reason the container whose pressure is higher.

    (3mks)

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    ……

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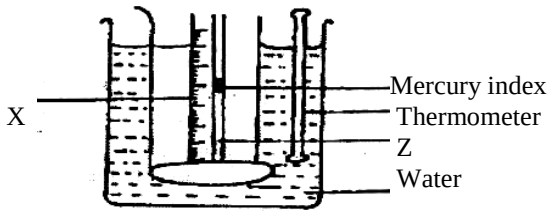
    ……

(b) The figure below shows a set-up of an experiment used to investigate Charles' law.



(i) Name the parts labeled X and Z.

(2mks)

X:……..

Z:……..

(ii) State the measurements to be taken in this experiment.

(2mks)

……

……..……

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(iii) Explain how the reading taken in (ii) above may be used to investigate Charles law.

(2mks)

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(iv) State the **<u>two</u>** purposes of mercury index.

(2mks)

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(v) A constant mass of hydrogen gas occupies a volume of $4.0cm^3$ at a pressure of 2.4×10^5 Pa and temperature of 15^0C. Find its volume at a pressure of 1.6 x 105 Pa when the temperature is 20^0C.

(3mks)

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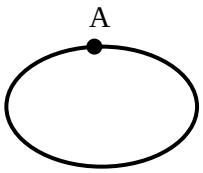
14. (a) (i) The figure below shows a ball being whirled in a clockwise direction in vertical plane. Sketch on the

figure the path followed by the ball if the strings cuts when the ball is at position A.

(1mk)



(ii) A body having uniform motion in a circular path is always accelerating. Explain.

(1mk)

……

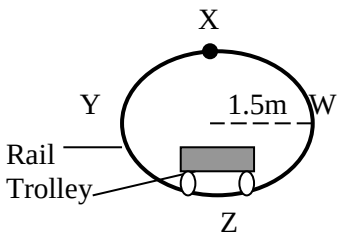
……

……

(b) The figure below shows a trolley moving on a circular rail in a vertical plane. Given that the mass of the trolley is 200g and the radius of he rail is 1.4m:

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

(3mks)



(ii) If the trolley moves with a velocity of 4m/s as it passes point Z, find:

(I) Angular velocity at this point.

(3mks)

(II) The force exerted on the rails at this point.
(3mks)

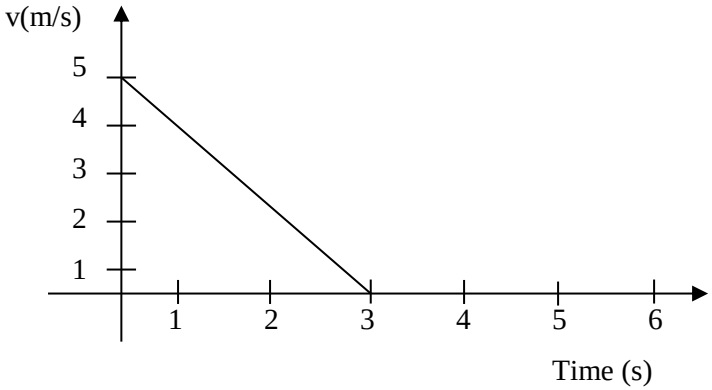
15. (a) Distinguish between velocity and speed.
(1mk)

……

……

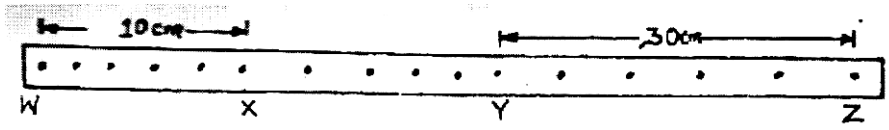
……

(b) The velocity – time graph in the figure below illustrates the motion of a ball which has been projected vertically from the surface of a planet. The weight of the ball on earth is 30N.



Determine the weight of a ball on the planet.
(3mks)

(c) The figure below shows a section of a tape from a ten-tick' timer whose frequency is 50Hz.



Calculate:-

(i) The average velocity of he trolley between points:

(2mks)

WX

YZ

(ii) The acceleration of the trolley.

(3mks)

16. (a) State the law of floatation.

(1mk)

……

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(b) A body weighs 40N in air, 30N when in water and 35N when in liquid X. Find the relative density of liquid X.

(3mks)

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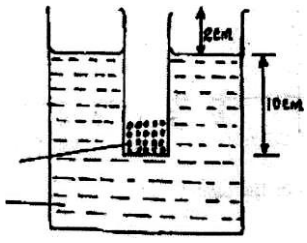
(c) A simple hydrometer is set up with a test-tube of mass 10g and length 12cm with a flat base and partly filled with lead shorts. The test tube has a uniform Cross-sectional area 2.0cm^2 and 10cm of its length is under water as shown in the figure below.



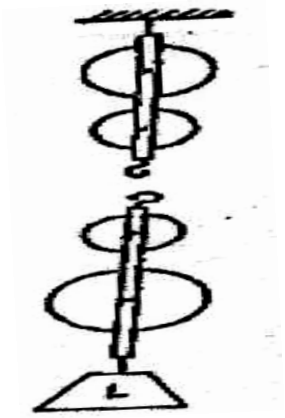
Leadshots

Water

(i) Taking the density of water as 1000kg/m^3, calculate the mass of the lead shots in the tube.(3mks)

(ii) The mass of the lead shorts to be added if it has to displace an equal volume of a liquid of density 1.25g/cm^3.
(3mks)

17. The pulley system in the diagram has two wheels in each block.



(a) Complete the diagram to show the string as the pulley is being used to lift the load L.

(b) The block and tackle pulley system is used to investigate relationship between mechanical advantage and efficiency.

(i) State the measurements to be taken in this investigation.
(2mks)

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……

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……

(ii) In the axes below sketch a graph of efficiency against load.

(2mks)

(iii) A block and tackle pulley system with a velocity ratio of 5 and 60% efficiency is used to lift a load of mass 60kg through a vertical height of 2 metres. Calculate the work done by the effort.

(4mks)

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KCSE MOCK TRIAL 6

232 / 2
PHYSICS
PAPER 2
THEORY
TIME: 2 HOURS

SECTION A (25 MARKS)
Answer ALL questions in this section in the spaces provided

18. The figure 1 below shows the image behind a mirror M.

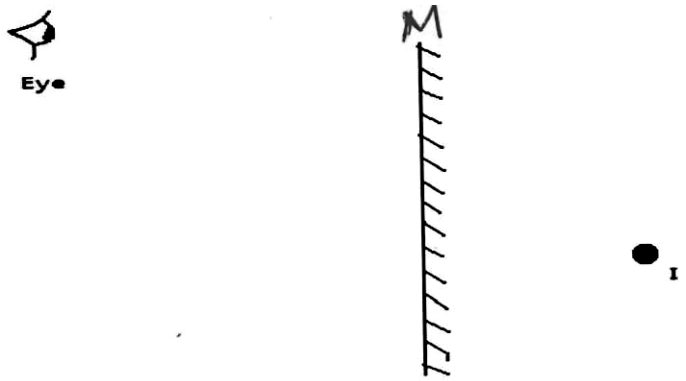


Fig. 1

By ray diagram construction, locate the position of the object.
(2mks)

19. A negatively charged rod is brought near the cap of a leaf electroscope. The cap is then earthed momentarily by touching with finger. Finally the rod is withdrawn. Sate and explain the observation made.
(2mks

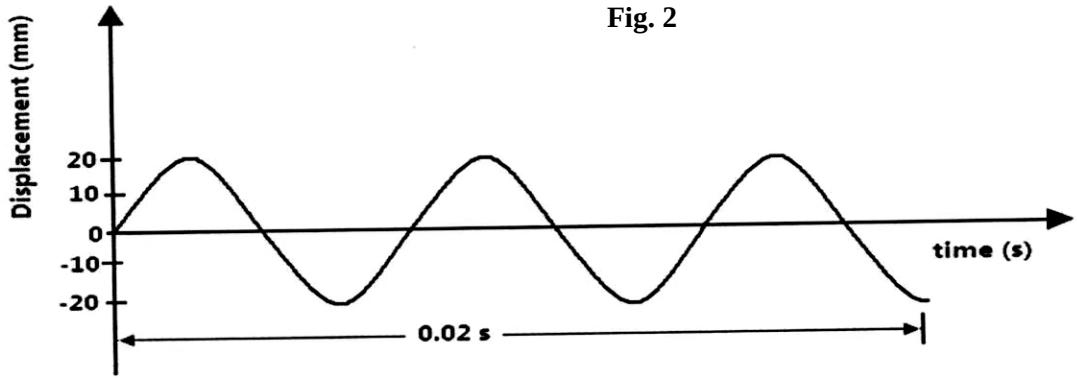
20. A boy observes his face in a concave mirror of focal length 100cm. If the mirror is 80cm away, state **one** characteristic of the image observed. (1mk)

21. The coil of an electric motor is usually wound on a soft iron armature. State **two** purposes of this armature. (2mks)

22. A student stands at a distance 400m from a wall and claps two pieces of wood. After the first clap, the student claps whenever an echo is heard from the wall. Another student starts a stopwatch at the first clap and stops it after the twentieth clap. The stopwatch records a time of 50 seconds. Find the speed of sound (3mks)

23. The figure 2 below shows a displacement time graph for a wave motion.

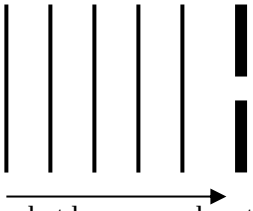
Fig. 2



What is the frequency of the wave?
(2mks)

24. The figure 3 below shows a series of wave fronts one wavelength apart approaching a gap between barriers in ripple tank.

Figure 3



On the same diagram, show what happens when the waves pass through the gap.

(1mk)

25. In figure 4 shown below (not drawn to scale), sketch the path of a ray till it emerges from the prism. (2mks)

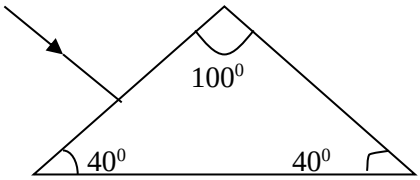


Fig. 4

26. A bulb is rated 100W, 240V. At what rate would it dissipate energy if it is connected to a 220V supply? (3mks)

27. One method of producing a weak magnet is to hold a steel rod in the North South direction and then hammer it continuously for some time. Using the domain theory of magnetism, explain how this method work (2mks)

28. Figure 5 shows a motor connected to a magnetic switch called a relay opened by an ordinary switch S_1. Use the information in the figure to answer questions that follow.

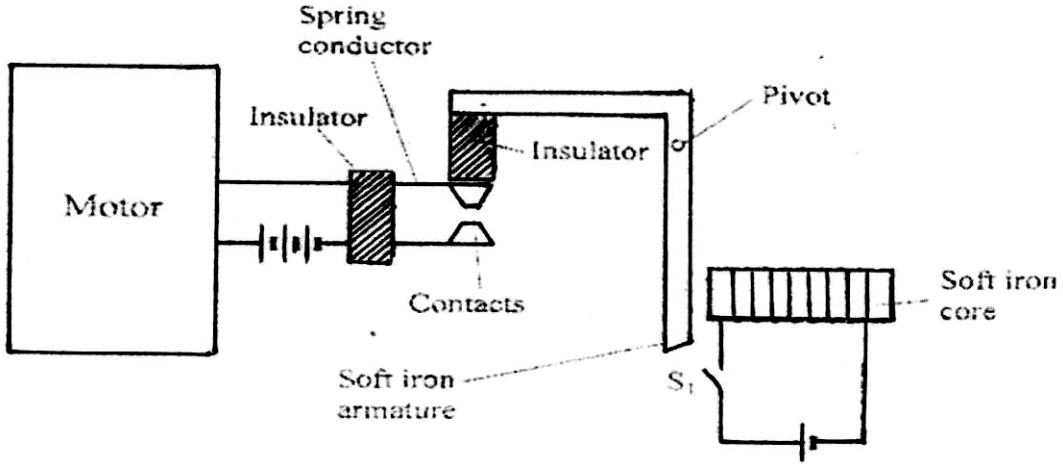


Fig. 5

(i) Explain how the relay switches on the motor when S_1 is closed. (3mks)

(ii) State with a reason the effect on the motor if the iron core is replaced with a steel core and switch S_1 is put on and then off.
(2mks)

SECTION B (55 MARKS)

29. (a) State Ohms law.
(1mk)

(b) Three resistors 1Ω, 3Ω and 5Ω are connected together in a circuit. Draw a circuit diagram to show an arrangement that would give minimum resistance and determine that resistance.
(3mks)

(c) The cell in the figure 6 below has an e.m.f. of 1.8V and negligible internal resistance.

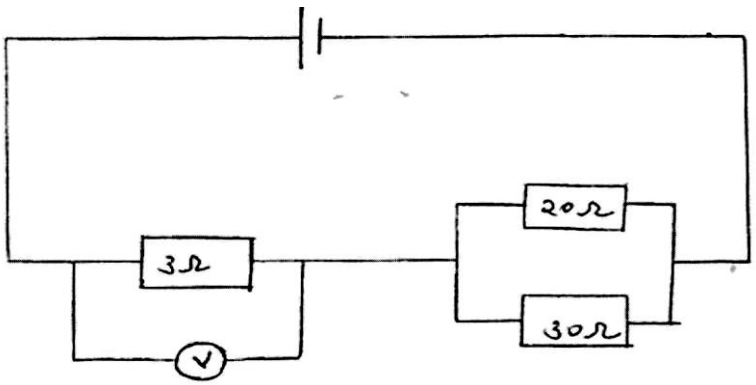


Fig. 6

Determine:-

(i) Total resistance in the circuit. (3mks)

(ii) The current in the circuit. (2mks)

(iii) Reading of the voltmeter. (2mks)

30. (a) State **two** factors that affect the capacitance of a parallel plate capacitor. `
(2mks)

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

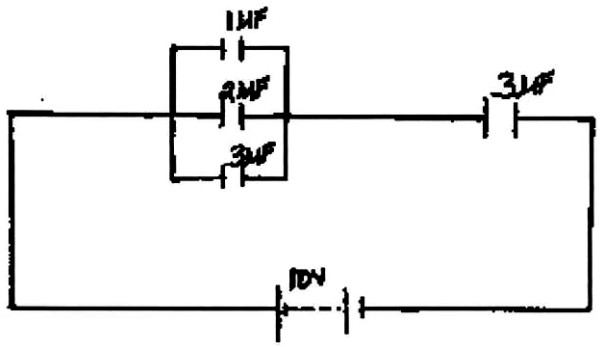


Fig. 7

Determine:-

(i) The total capacitance (3mks)

(ii) The total charge (3mks)

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

31. (a) The figure 8 below shows how rays from a distant and near objects are focused inside a human eye with a certain defect.

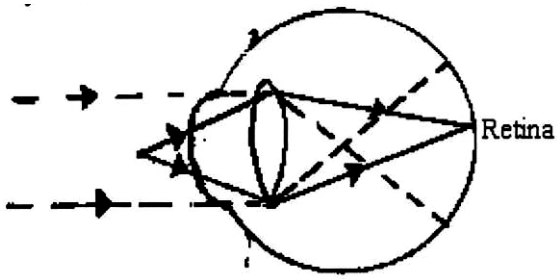


Fig. 8

(i) Name the defect. (1mk)

(ii) State **two** causes f the defect. (2mks)

(iii) Suggest a corrective measure to the defect. (1mk)

(b) The figure below shows an object O placed in front of an objective lens L_o whose focal length f_o is less than f_e, the focal length of the eyepiece L_e. Complete using ray construction how the arrangement would produce a compound microscope.

(3mks)

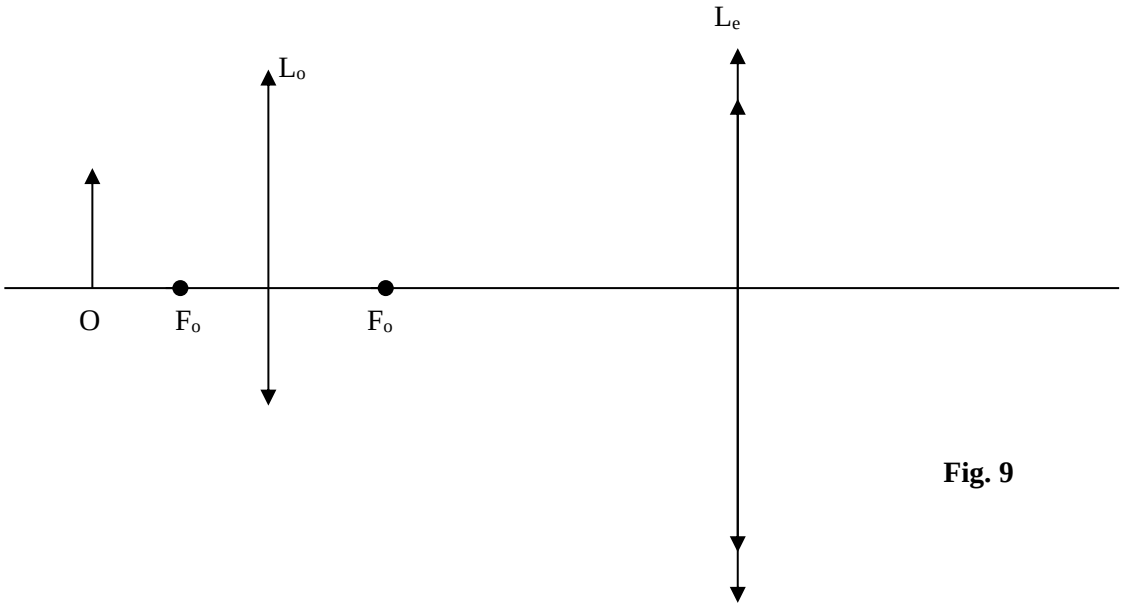


Fig. 9

(c) An object of height 10cm is placed in front of a diverging lens of focal length 25cm and at a distance of 20cm from the lens. Calculate the height of the image formed.
(4mks)

32. (a) State the laws of refraction. (2mks)

(b) When does total internal reflection occur? (2mks)

(c) The figure 10 below represents a ray of light falling normally on the curved surface of a semi-circular glass block A at an angle of 32^0 at O and emerging into air at an angle of 48^0.

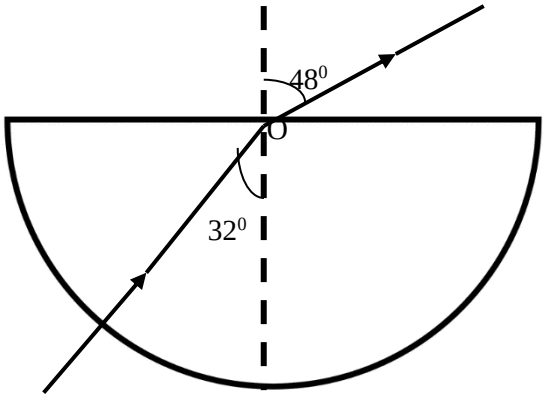


Fig. 10

Calculate the absolute refractive index of the glass of which the block is made. (Assume air is a vacuum).

(d) Explain why sound is audible at night than during the day.
(1mk)

33. (a) State Lenz's law of electromagnetic induction. (1mk)

(b) In the figure 11 below the bar magnet is moved into the coil.

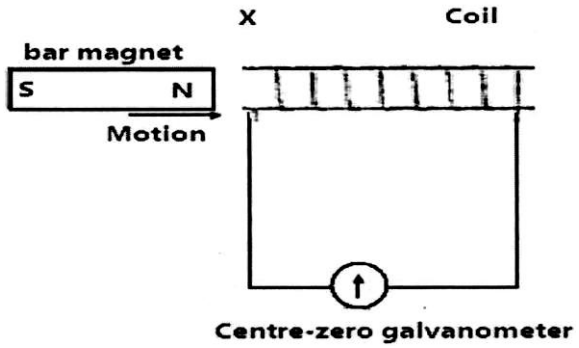


Fig. 11

(i) State and explain what is observed in the galvanometer. (2mks)

(ii) Explain briefly the source of an electrical energy in the circuit. (2mks)

(c) State any **<u>two</u>** ways in which power is lost from the transformer and explain how each loss is minimized.

(2mks)

(d) A transformer is used to provide a potential difference of 100KV to an X-ray tube from 250V a.c mains supply. A current of 100mA flows in ht X-ray tube and the transformer is 100% efficient. Calculate:-

(i) The ratio of the number of turns of the secondary coil to the number of turns in the primary coil.(3mks)

(ii) The current in the primary coil.
(2mks)

(iii) State giving reasons which of the coils of the transformer is thinner.
(2mks)

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KCSE MOCK TRIAL 7

PHYSICS

PAPER 1

INSTRUCTION: ANSWER ALL THE QUESTIONS IN THE SPACES PROVIDED.

- **This paper consists of two sections A and B.**
- **Answer all questions in the spaces provided**
- **All workings must be clearly shown.**
- **Mathematical tables and electronic calculators may be used.**

SECTION A (25 MARKS)

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

1. A student measured the radius of a cylindrical container and gave it as 200NM.
   What instrument did the student use? (1mk)

2. The level of water is a burette is $25cm^3$. if 40 drops of average volume $0.05cm^3$ are run out of the burette, what would be he new level? (1mk)

3. Water and milk are mixed in the ratio 4:1 respectively. If the density of water is $1g/cm^3$ and that of milk is $1.2gcm^{-3}$, find the mass in grams, 0f 2.5 litres of the mixture.
(3mks)

4. The weight of a sack of sawdust on earth is found to be equal to the weight of a sack on the surface of the moon. Explain this.
(1mk)

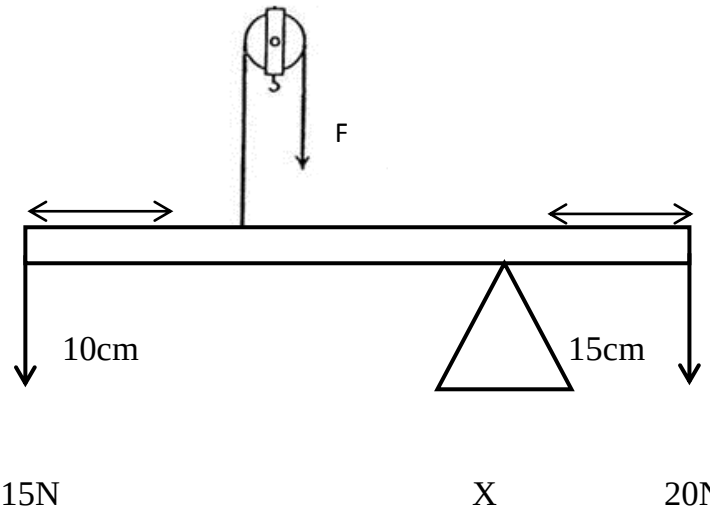
5. A needle floats on pure water, but sinks when a detergent is added to the water. Explain this observation. (1mk)

6. A hole of area 2.0cm^2 at the bottom of a tank of depth 2m is closed with a stopper. Determine the force on the stopper when the tank is filled with water. (Density of water =

1000kgm^{-3} and acceleration due to gravity is 10N/kg). (3mks)

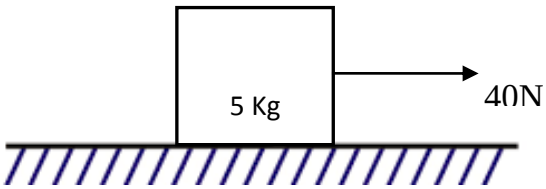
7. A uniform plank of weight 10N and length 50cm is pivoted at a point X along its length. Weights of 15N and 20N and force F act on it as shown below. If the system is in

equilibrium, calculate the value of F.
(2mks)



8. A stone floor feels cold to the feet, but a woolen carpet on the same floor feels warm. Explain this. (1mk)

9. The figure below shows a force of 40N acting on a body mass 5kg. The frictional force of the body is 5N. Determine the acceleration of the body. (3mks)



10. An ungraduated thermometer attached to a centimetre scale reads 7.5cm in melting ice at 0^0c and 23.5cm in steam at 100^0c. The same thermometer reads 5.5cm when placed in a freezing mixture. What is the temperature of the freezing mixture. (3mks)

10. A turntable of radius 8cm is rotating at 66 revolutions per second. Determine its linear speed at a point on its circumference. (3mks)

11. A solid displaces 5.5cm^3 of paraffin when floating and 20.0cm^3 when fully immersed. If the density of paraffin is 0.8g/cm^3, calculate the density of the solid.
(3mks)

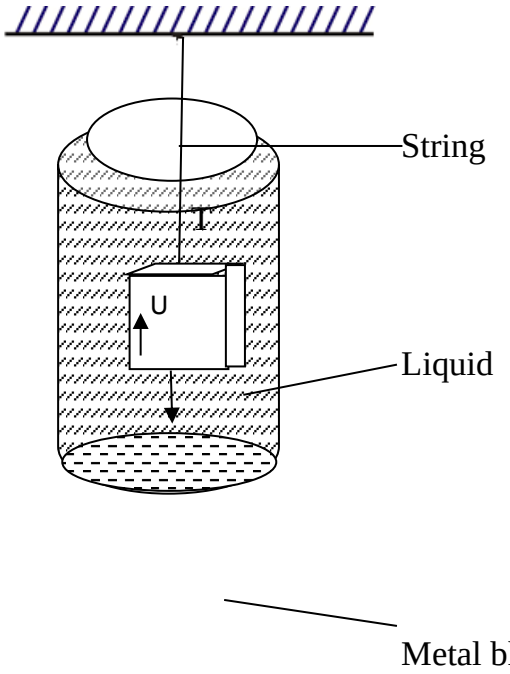
12. A tourist wanted to have a warm bath at 50^{0}c. She had 5.0kg of water in a basin at 80^{0}c. What mass of cold water at 30^{0}c must she add to the hot water to have her bath of choice?

(Neglect heat loss and take specific heat capacity of water a 4200J/kg/k).
(3mks)

SECTION B

14(a) State the law of flotation.

(b) The following set up shows a metal block of density 10500kg/m^3 and dimension 30cm x 20cm x 20cm, suspended inside a liqiud of density 1200kg/m^3. The block is held by a string attached to a point above the liquid. The three forces acting on the block are: Tension T on the string, weight W of the block and upthrust U due to the liquid.



i) Write an expression relating T, W and U if the block is in equilibrium inside the liquid.

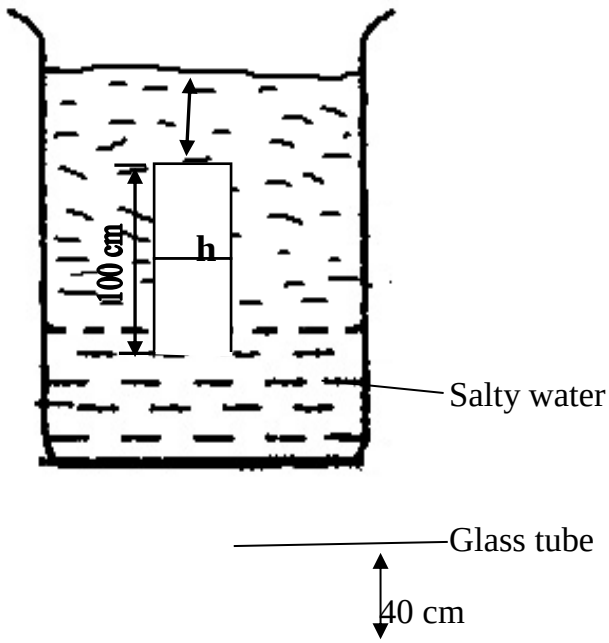
(1mk)

ii) Determine the weight, W, of the block. (2mks)

iii) Determine the weight of the liquid displaced by the fully submerged block.
(2mks)

iv) Determine tension T in the string.
(1mk)

15. The set up below was used by a student to investigate the variation of volume and pressure for a fixed mass of a gas.



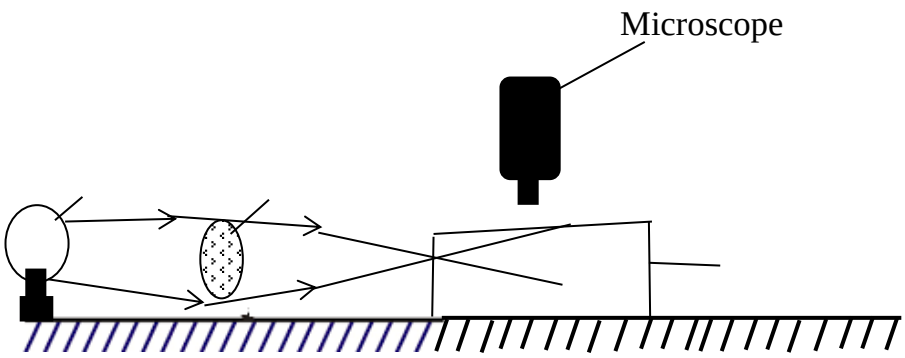
The student lowered a 10m long glass tube of uniform cross sectional area A vertically, mouth downwards into a container of salty water of density 1200 kg/m^3. Water rose to a level of 40cm inside the glass tube. The experiment was performed on a day when the atmospheric pressure was 760mhg and at a constant room temperature. If the density of mercury is 13600kg/m^3 determine:

i) The atmospheric pressure in N/m^2. (2mks)

ii) The height, h, of the tube below the water surface. (2mks)

(b) State the law used in working out the answer to question (ii) above. (1mk)

16. Brownian motion can be studied using the apparatus shown in the following figure. To observe the motion, some smoke is enclosed in the smoke cell and then observed through the microscope.



Smoke cell

(a) Explain the role of the smoke particles, the lens and the microscope in the experiment. (3mks)

(b) State and explain the nature of the motion observed in the smoke particles. (2mks)

(c) What will be observed about the motion of the smoke particles if the temperature in the smoke cell is raised. (1mk)

(d) In an experiment to estimate the thickness of an oil molecule, an oil drop of diameter 0.1cm spread onto a circular patch of diameter 10cm.

i) Determine the volume of the oil drop. (2mks)

ii) Calculate the area covered by the oil patch. (2mks)

iii) Determine the thickness of the oil molecule. (2mks)

iv) State two assumptions made in (d) (iii) above. (1mk)

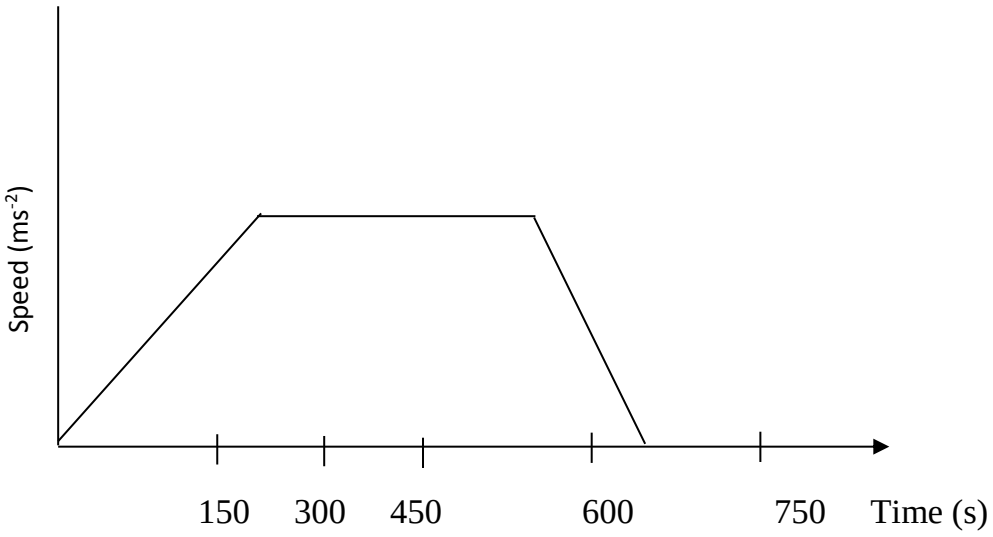
v) State two possible sources of errors in this experiment. (1mk)

17. A stone is thrown vertically upwards from the top of a tower 30m high, with an initial velocity of 20m/s. Determine:

i) The time it takes to reach maximum height. (2mks)

ii) The total time which elapses before it hits the ground. (2mks)

(b) The diagram below shows a speed time graph for train traveling between two stations. The train starts from rest and accelerates uniformly for 150 seconds. It hen travels at a constant speed for 300 seconds and finally decelerates uniformly to rest in 200 seconds.



Given that the distance between the two stations is 10450m, Calculate:

i) the maximum speed attained by the train in km/h. (3mks)

ii) the acceleration for the first 150 seconds. (2mks)

iii) the distance traveled during the last 100 seconds. (2mks)

iv) the time taken to travel the first half of the journey. (3mks)

18(a) Define the term work. (1mk)

(b) The table below shows the values of extension of spiral when various forces are applied to it.

Force F(N)	0	1.0	2.0	3.0	4.0	5.0	6.0
Extension e(cm)	0	0.8	1.5	2.3	3.1	3.8	4.6

i) Plot a graph of force (y-axis) against extension (x axis). (5mks)

ii) Determine the work done in stretching the spring by 4.0cm.. (3mks)

(c) A pump can raise 120kg of water to a height of 10.0m every minutes.

i) What is the power output of the pump. (3mks)

ii) If the efficiency of the pump is 80%, what power must be supplied to the pump? (3mks)

19(a) The following table shows the values of the square of velocity v^2, and distance moved for uniformly-accelerated car. Use the information in the table to answer the questions that follow.

Distance s(m)	0	5	10	15	20	25
Squared velocity v^2 (m^2/s^2)	0	20	40	60	80	100

i) Plot a graph of the square of velocity, v^2(y axis) against the distance, s). (5mks)

ii) From the graph, determine the ecceleration of the car. (3mks)

(b) A body moving at $50ms^{-1}$ decelerates uniformly at $2ms^{-2}$ until it comes to rest. What distance does it cover from the time it starts to decelerates to the time it comes to rest? (4mks)

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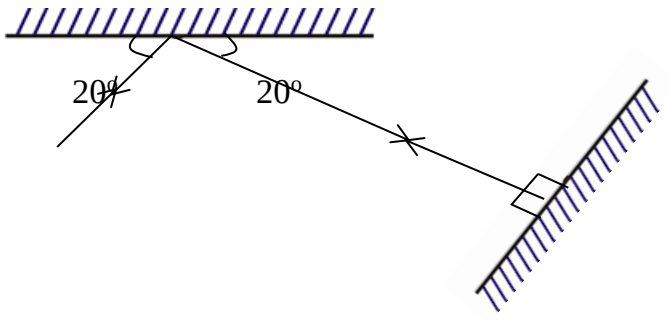
KCSE MOCK TRIAL 7

PHYSICS

PAPER 2

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



Determine the angle between the two mirrors. (2mks)

2. A rod rubbed with a duster is observed to attract tiny pieces of paper. However, as soon as the papers touch the rod, they are repelled. Explain this observation. (2mks)

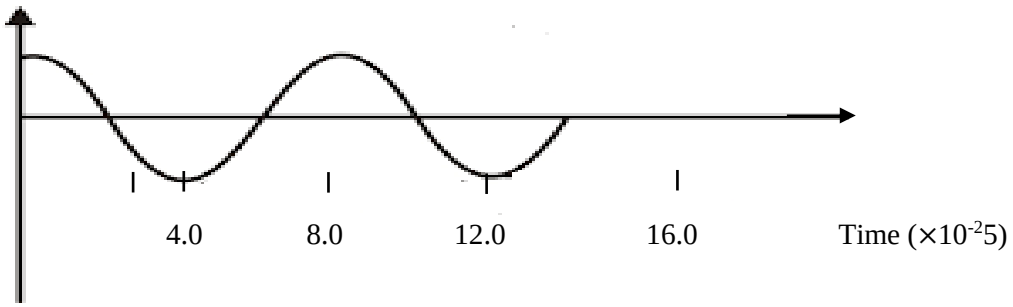
3. State two factors that determine the capacitance of a parallel-plate capacitor. (2mks)

4. State two ways in which polarization reduces the p.d. across a simple cell. (2mks)

5. Using the domain theory of magnetism, explain how heating a magnet weakens its magnet.
(2mks)

6. Explain why the coil is an electric motor is usually would on a laminated soft iron core.
(2mks)

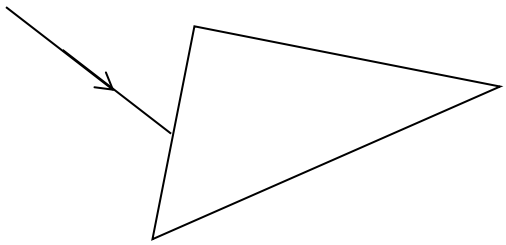
7. The figure below shows a wave on a string.



Determine the frequency of the wave. (3mks)

8. State the difference between sound waves and electromagnetic waves. (1mk)

9. The diagram below shows a ray of light incident on a glass prism at an angle.

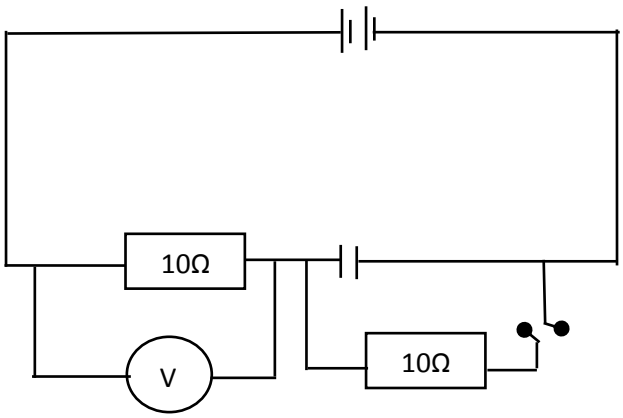


Complete the diagram to show the ray as it emerges from the other side. (2mks)

10. The diagram below shows a circuit containing a battery, two resistors, a capacitor and voltmeter.

Determine the reading on the voltmeter before the switch in closed and after the switch is

closed. (3mks)



C

11. Define the term 'electron volt' (1mk)

12. Sketch a circuit for a p-n diode in reverse bias. (1mks)

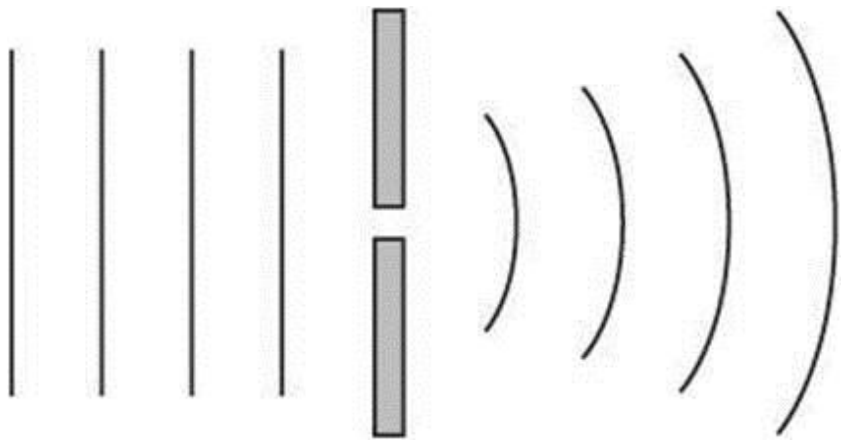
13. You are provided with three resistors of values 1 , 3 and 4 . Draw a circuit diagram to show the three resistors can be arranged so as to produce a resultant resistance of 3.8sl.

(2mks)

SECTION B (50 MKS)

14(a) Define the term 'diffraction' as applied in waves. (1mk)

(b) The diagram below shows wave fronts before and after passing an opening.



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

i) the gap was made smaller. (1mk)

ii) the wavelength was made very large. (1mk)

(c) When a metre rule was placed in a ripple tank where straight waves being produced by vibrator, it was noted that the distance between 12 successive dark lines (crest) was 30cm. the frequency of the b=vibrator was 20HZ. Determine.

i) the wavelength of the waves in the ripple tank. (2mks)

ii) the periodic time of the waves. (2mks)

iii) the velocity of he waves over the water surface. (3mks)

15(a) Define the term "supersonic speed" as applied in sound waves. (1mk)

(b) In an experiment to determine the speed of sound in air, a drum at a point 150m from a vertical wall was struck at varying frequencies while listening to the echo. The echo coincided with the sound from the drum at a time when 20 successive strikes were made within a time of 18.5s.

i) Determine the time taken for the echo to be heard. (2mks)

ii) Determine the speed of sound in air at the place. (2mks)

iii) What difference would you expect if the experiment was repeated on a colder day.

(1mk)

(c) A boy strikes a railway line with a hammer. A railway worker 600m away hears two sounds, one from the railway line and the other from air. If the time interval between the two sounds is 1.65s and the speed of sound in air is 340 m/s determine the speed of sound in the railway line. (4mks)

16(a) Define the term 'virtual image' as applied in lenses. (2mks)

(b) You are provided with the following:

- A convex lens – A screen
- A metre rule - A candle

i) Sketch a diagram of a set-up that can be used in determine the focal length by lens – formula method using the apparatus.
(2mks)

ii) State the measurement that would be taken. (2mks)

iii) Explain how those measurements would be used in determining the focal length of the lens. (3mks)

(c) A small vertical object in placed 9cm from a converging lens of focal length 10cm. Determine the nature of the image formed and the distance of the image from the lens.

(4mks

17(a) State what is meant by half-life of a radioactive substance. (1mk)

(b) The activity of a sample of a radioactive substance was measured over a period of time. The table shows the results obtained.

Activity(disintegration/s)	680	567	473	395	276	160	112
Extension e(cm)	0	1	2	3	5	8	10

i) Plot a graph of activity (y-axis) against time. (5mks)

ii) Determine the half-life of the substance in days. (2mks)

(c) The half life of a radioactive substance is 138 days. A sample of the substance has 8 x 10^{10} undecayed nuclei at time t = 0. How many undecayed nuclei will be left after 690 days? (3mks)

18(a) An x-ray tub produces X-rays whose wavelengths vary from 6.0 x 10^{-13} to 4.5 X 10^{-9}m.

Determine.

i) The range of its frequency of the x rays. (2mks)

ii) the highest energy of he x-rays. (C=3.0 x 10^{8} m/s and h = 6.62 x 10^{-34} js) (3mks)

(b) A Surface with a threshold frequency of 5×10^{14} Hz is irradiated with a radiation of wavelength 6.0×10^{-7}m.

i) Define the term "threshold frequency". (1mk)

ii) Determine the frequency of the radiation used. (2mks)

iii) Calculate the maximum kinetic energy of the photoelectrons emitted. (3mks)

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KCSE MOCK TRIAL 8

232/1

PHYSICS

PAPER 1

TIME: 2 HOURS

SECTION A: 25 MARKS

1. The diameter of a ball bearing of mass 0.045kg is measured using a micrometer screw gauge as shown in figure 1 below. (1 mark)

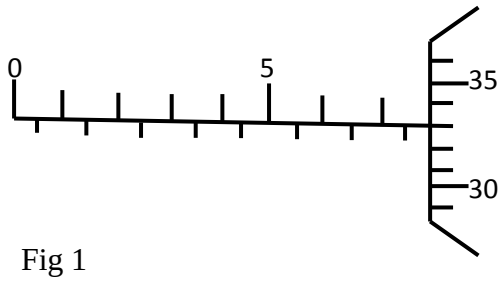

Fig 1

a) Determine the radius of the ball bearing.
(1mark)

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b) Determine the density of the ball bearing. (Take Pi = 3.142) (2 marks)

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Makau drew the graph below. (2 marks)

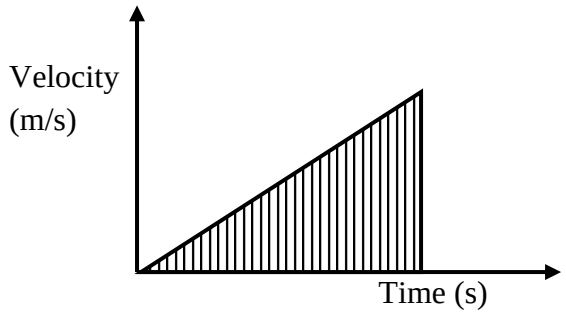

Figure 2

He then worked out the area of the shaded part. State what he was determining. (1 mark)

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2. Give a reason why heat transfer by radiation is faster than heat transfer by conduction. (1 mark)

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3. In smoke cell experiment explain why smoke is preferred. (1mark)

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4. Explain why a river, even on a horizontal ground is faster in some places and slower in others (2marks)

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5. A meter rule of mass 60g is balanced by masses of 24g and 16g suspended from its ends find the position of its pivot from 24g mass.
(3marks)

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6. The figure 3 below shows a bimetallic strip with a wooden handle suspended horizontally using a thin thread.

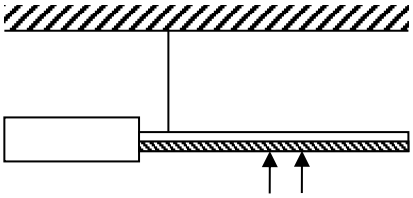

Figure 3

The strip is heated at the point as shown. State and explain the observation made (2marks)

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7. The height of mercury column in a barometer at a place is 64cm what would be the height of a column of paraffin in barometer at the same place. Given that the density of mercury is 13600 kg/m^3 and that of paraffin is $800kg/m^3$.

(3marks)

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8. State three effect of force (3 marks)

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9. Which of the two empty flask placed on a bench is moist stable. Give a reason for your choice.(2 marks)

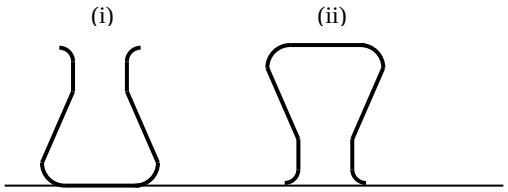

Figure 4

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10. The figure 5 below shows two identical springs A and B each of spring constant of 5N/M supporting a load 50N.

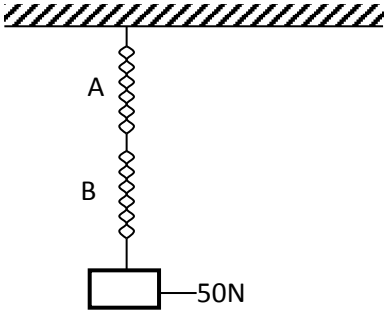

Figure 5

Determine the work done by the load on the springs (ignore the weight of the spring).
(3marks)

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11. Give a reason why a drop of methylated spirit placed at the back of the hand feels colder than a drop of water at the same temperature. (2 marks)

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12. a) The figure 6 below shows a velocity time graph for the motion of a certain body.

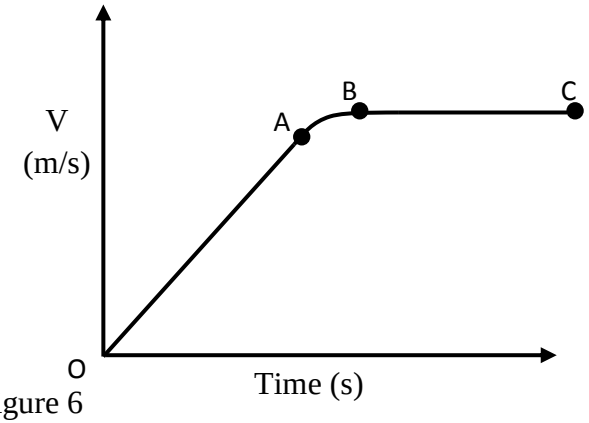

Figure 6

Describe the motion of the body in the region.

i) OA (1 mark)

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ii) AB (1 mark)

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iii) BC (1 mark)

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b) A car moving initially at 10m/s decelerates at 2.5m/s^2. Determine:

i) its velocity after 1.5 s
(2marks)

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ii) the distance moved in 1.5 seconds (2 mark)

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iii) the time taken for the car to stop. (2 mark)

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13. A lead ball is placed on the surface of a viscous oil and released.

i) State the three forces acting on the ball as it falls through the oil (3 marks

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ii) State which force varies during the fall and explain why. (2 marks)

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iii) Sketch a graph showing the variation of velocity of the ball with the time from the moment it was released.
(2marks)

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iv) From the above graph in (iii) mark the terminal velocity. (1 mark)

v) State the necessary condition to attain terminal velocity in part (IV). (1 marks)

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vi) A car of mass 2000kg is moving at 20m/s. calculate the force needed to reduce the speed to 10m/s over a distance of 20m. (4 marks

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14. The figure 7 below shows an incline plane, a trolley of mass 60 kgs being pulled up the slope by a force of 200N parallel to the slope. The trolley is moved from point X to Y.

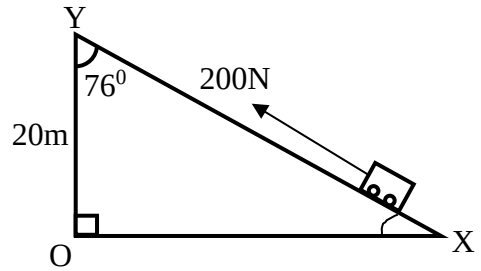

Figure 7

i) Determine work out put (3 marks)

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ii) Work-in put (2 marks)

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iii) Frictional force between the trolley and the inclined plane (2mark)

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iv) The efficiency of the system (3marks)

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v) Velocity ratio of the system (2 marks)

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15. Water of mass 3 kg initially at 20^{o}C is heated in an electric kettle rated 3.0KW. the water is heated until it boils at 100^{o}C (Take specific heat capacity of water = 4200Jkg^{-1}K^{-1}, heat capacity of the kettle = 450JK^{-1} and specific latent heat of vaporization of water = 2.3 x 10^{6} J/kg).
Determine

a) i) Heat absorbed by water (2 marks)

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ii) The heat absorbed by the electric kettle (2 marks)

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iii) Time taken by the water to boil (2 marks)

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iv) How much longer it will take to vaporize all the water
(2marks)

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b) Explain why it's advisable to use pressure cooker at high attitudes. (2 mark)

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16. a) Using the kinetic theory of gases explain how a raise in temperature of a gas causes a raise in the
volume of the gas if the pressure is kept constant. (3 marks)

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b) The figure 8 below shows a set-up that may be used to verify pressure law.

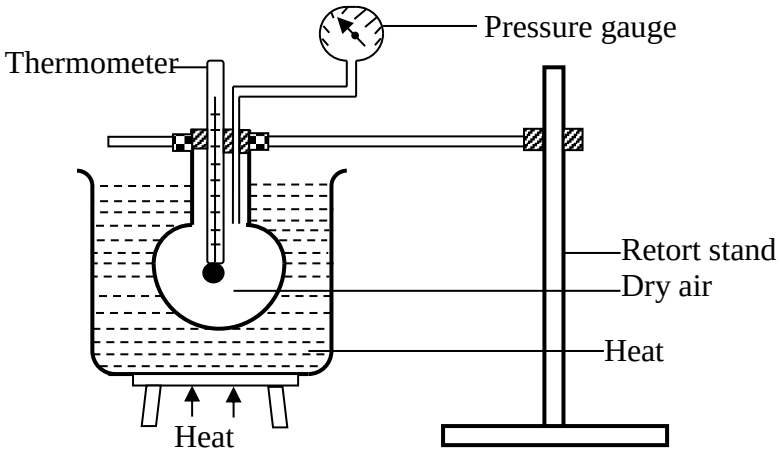

Figure 8

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

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

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c) A certain mass of nitrogen gas occupies a volume of $3.6m^3$ at a pressure of 2.0×10^5 pascals and temperature of 22ºC. Determine its volume when pressure is reduced to 1.2×10^5 pa at temperature of 22ºC.

(3 marks)

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KCSE MOCK TRIAL 8

232/2

PHYSICS

Paper 2

(THEORY)

Time: 2 Hours

SECTION A (25 MARKS)

1. Explain how polarization in a simple cell can be minimized. (1 mark)

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2. Figure 1 below shows the image of an object in a plane mirror.

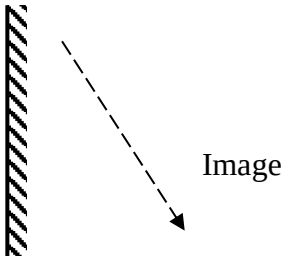

   Figure 1

   Sketch the object as seen in the mirror. (1 mark)

3. Recharging is one of the practices of maintenance of accumulators. State one measurement which used to be taken to help in deciding when the accumulator is due for recharging. (1mark)

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4. Figure 2 shows one ray of light incident normally on face PQ of a glass prism, whose critical angle is 42^{o}.

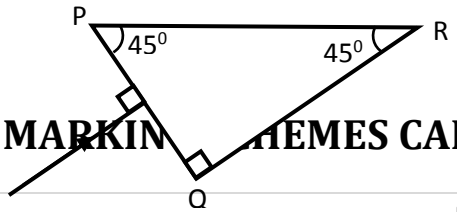

Figure 2

Complete the diagram to show the path of the ray as it passes through the prism.

(2marks)

5. Figure 3 shows a wave form.

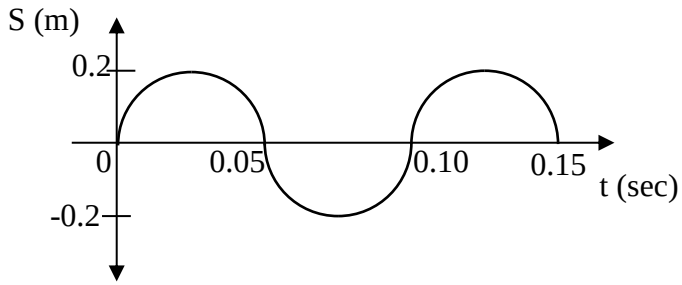

Figure 3

a) State the amplitude of the wave (1 mark)

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b) Calculate the frequency of the wave produced. (3marks)

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6. Figure 4 shows two magnets X and Y with steel pins attached freely.

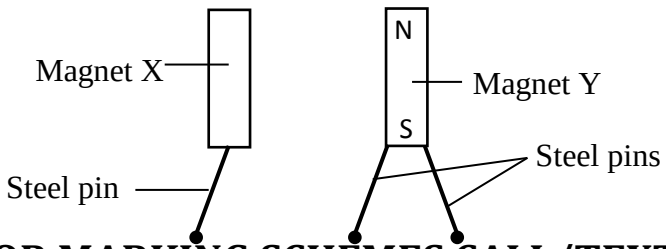

Figure 4

Indicate the poles of magnet X. (1 mark)

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7. Give the difference between hard and soft magnetic materials. Give an example of each. (3 marks)

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8. Figure 8 shows a soft iron rod bend into a U-shaped and an insulated copper wire wound and dc voltage connected.

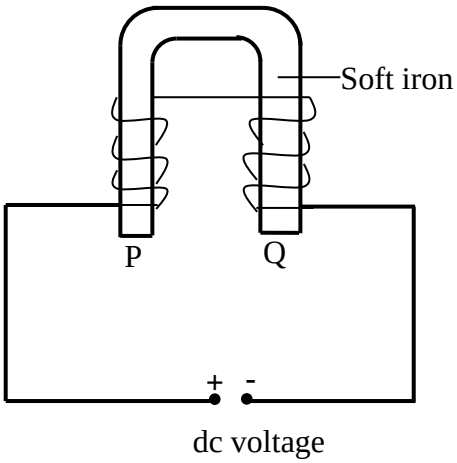

Figure 5

a) Indicate the polarities of ends P and Q

(1mark)

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b) Draw the magnetic field pattern between ends P and Q.

(3marks)

9. Explain what happens when a positively charged electroscope is touched with a finger. (2marks)

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10. Why are theatre halls covered with spongy materials? (1 mark)

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11. State and explain the effect of enlarging the hole of a pin-hole camera on the image formed (2marks)

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12. Figure 6 below shows a ray of light incident on a plane mirror, M.

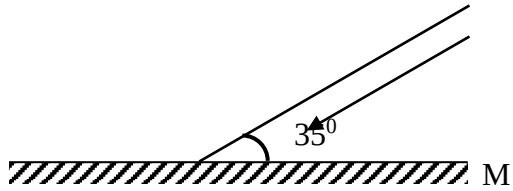

Figure 6

State the angle of reflection (1 mark)

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13. A 10Ω resistor is connected to a battery of e.m.f 8 volts and negligible internal resistance. Calculate the power dissipated by the resistor. (2 marks)

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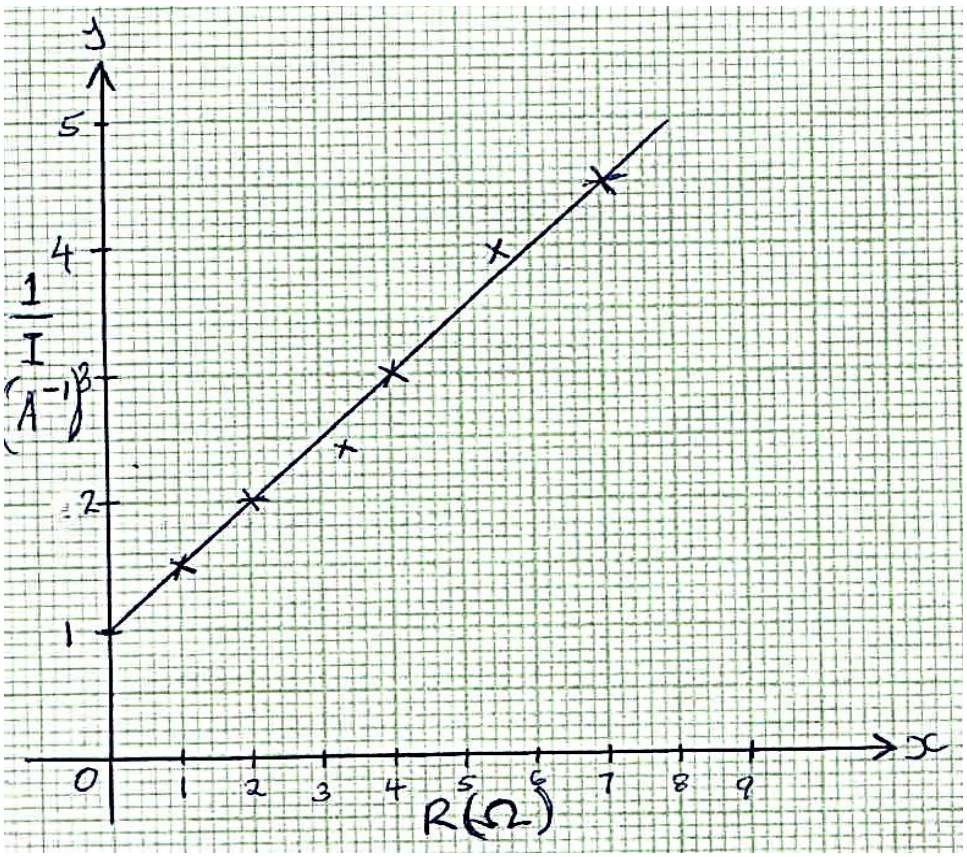
SECTION B (55 MARKS)

Answer all the questions

14. a) The graph below was plotted by a student. Study it and use it to answer the questions that follow:



i) Determine the slope S, of the graph
(3marks)

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ii) Given that the graph obeys the equation $\frac{1}{I} = \frac{R}{E} + \frac{r}{E}$

Determine;

i) The value of E
(2marks)

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ii) The value of r (2 marks)

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b) The figure 7 below shows a battery with resistor connected across its terminals. The e.m.f of the battery is 6.0V.

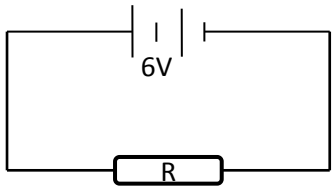

Figure 7

The battery causes 90 coulombs of charge to flow through the circuit in 45 seconds; calculate;

i) the current in the circuit
(3marks)

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ii) the resistance (R) of the circuit (2 marks)

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iii) the electrical energy transformed in the circuit in 45 seconds.
(3marks)

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a) i) Give one difference between transverse and longitudinal waves (1 mark)

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ii) A radio station transmits waves at a frequency of 10Mhz. calculate the wave length of the transmitted waves. (take speed of light in vacuum = 3.0×10^8 m/s (3marks)

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b) i) The refractive index of water is $^4/_3$. Determine the speed of light in water given that speed of light in air is 3.0×10^8m/s. (3 mark

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ii) Given that the critical angle of glass is 42º, calculate the refractive index of glass. (3 marks)

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iii) Figure 8 shows an object O at the base of a beaker full of a liquid. An observer above the beaker sees its image at point Y inside the liquid.

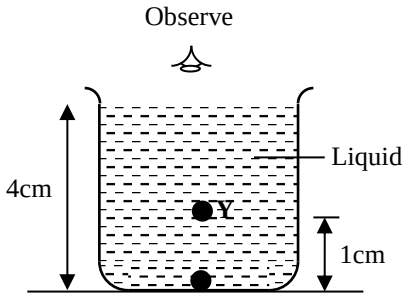

Figure 8

Determine the refractive index of the liquid (3 mark

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15. Figure 9 below shows a circuit where a battery of 4.5volts, switches A and B, two capacitors C_1 = 3μf and C_2 = 5μF and a voltmeter, V are connected.

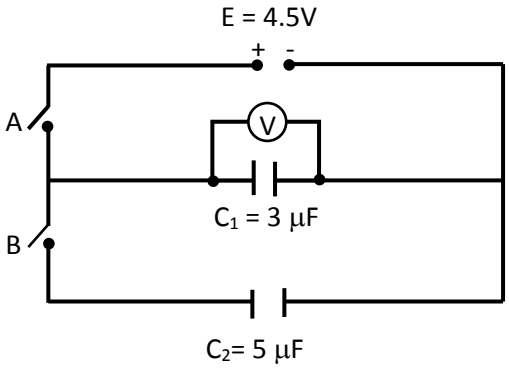

Figure 9

a) Determine the amount of charge on C_1 when only switch A is closed. (3 marks)

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b) Calculate the effective capacitance of the two capacitors
(3marks)

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c) State what would happen on the voltmeter when;

i) Switch A is closed while switch B remains open. (1 mark)

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ii) Switch A is now opened and switch B (1 mark)

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iii) Explain the observation in (ii) above (2 mark)

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16. a) Define focal length and radius of curvature as applied in concave mirrors (2 marks)

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b) The figure 10 below shows a set up used to determine the focal length of a concave mirror by method of no parallax.

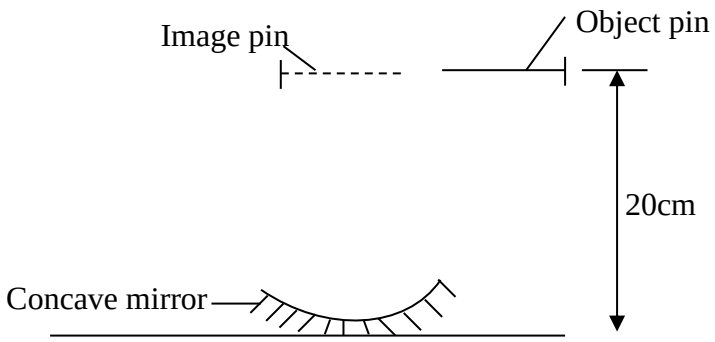

Figure 10

(i) Determine the focal length of the mirror
(1mark)

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(ii) Explain why convex mirrors are preferred as driving mirrors to plane mirrors. (1 mark)

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(iii) State two characteristics of images formed in a convex mirror.
(2marks)

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c) The graph below shows the variation of $\frac{1}{u}$ against $\frac{1}{v}$ for an experiment used to determine the focal
length of a concave mirror.

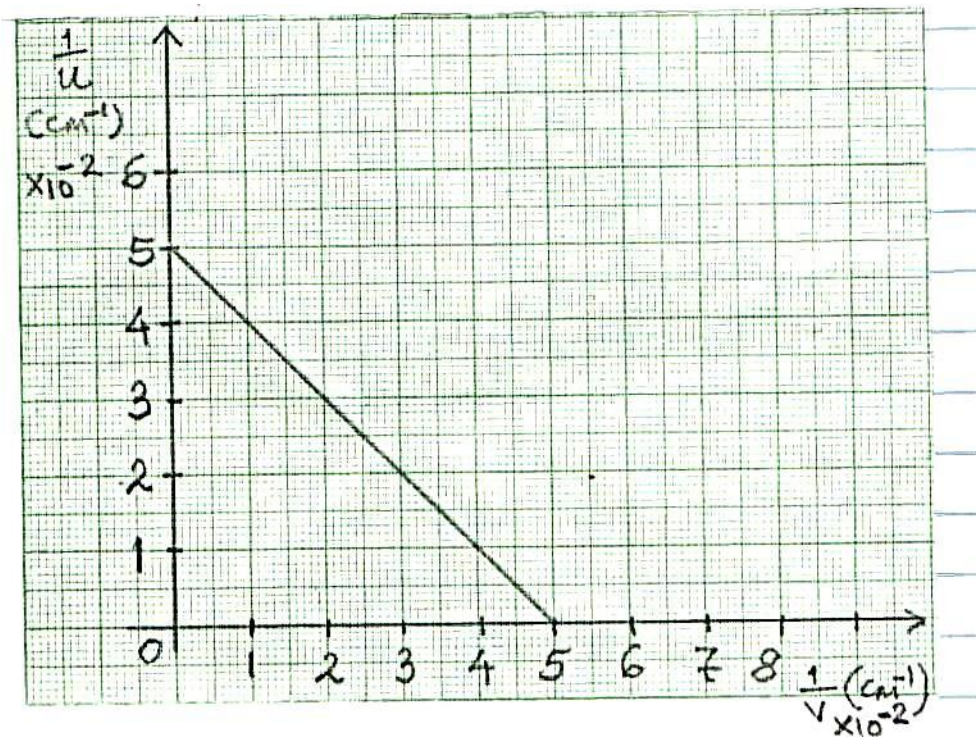

Figure 10

Use the graph to determine the focal length of the mirror. (2 marks)

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17. The figure 11 below shows a transverse wave travelling in water in a tray from shallow end to deep end.

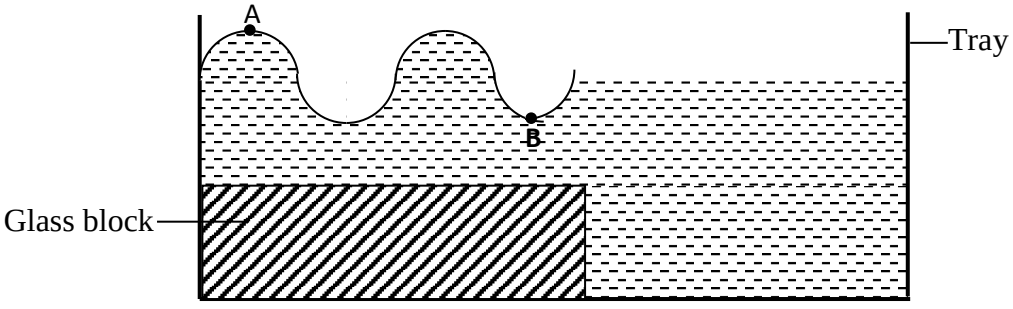

Figure 11

a) Complete the diagram to show the wave as it travel across the tray. (2 marks)

b) State what would happen as the wave travel into the deep end on

(i) Frequency of wave (1 mark)

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(ii) Speed of wave (1 mark)

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(iii) Wavelength of the wave (1 mark)

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c) If the distance between points A and B on the wave is 6m, find the wavelength of the wave. (2 marks)

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d) The figure 12 below shows plane waves incident on a slits.

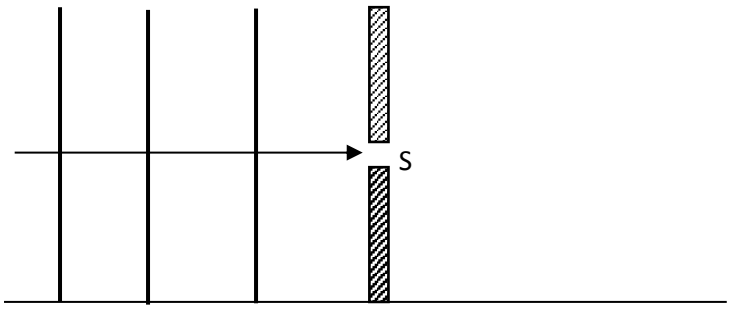

Figure 12

(i) Complete the diagram to show how the waves appear past the slits (1 mark)

(ii) Explain your diagram in d(i) above (1 mark)

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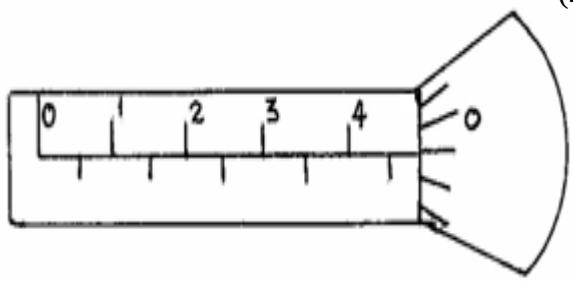
KCSE MOCK TRIAL 9

232/1
Physics
Paper 1
2 hours

SECTION A (25 MARKS)

Answer all questions in this section in the spaces provided:

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

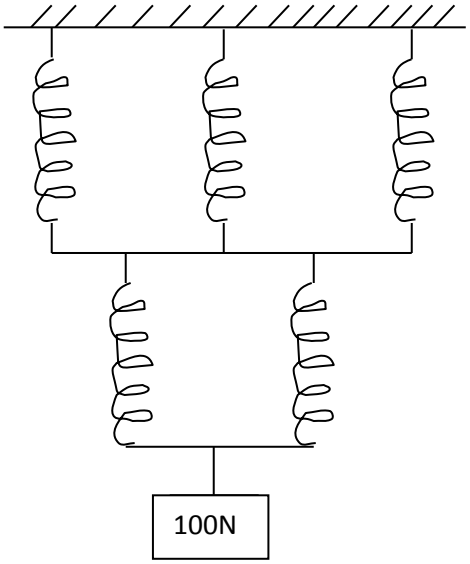


2. (a). State two differences between heat transfer by convection and radiation (2mks)

(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;



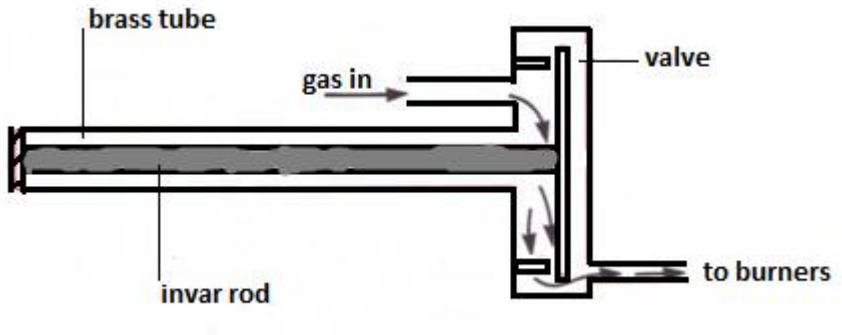
Find:

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

b)The total spring constant. (2mks)

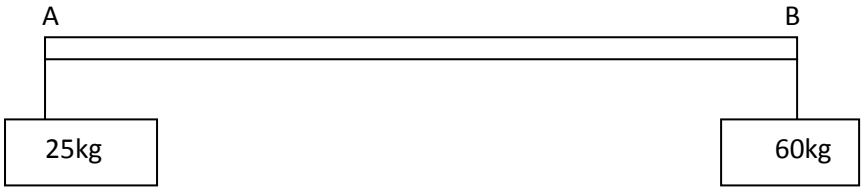
5. (a) The distance between the ice point and steam point on a liquid in glass thermometer is 30cm. what temperature is recorded when the mercury thread is 12cm above the ice point? (2mks)

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.



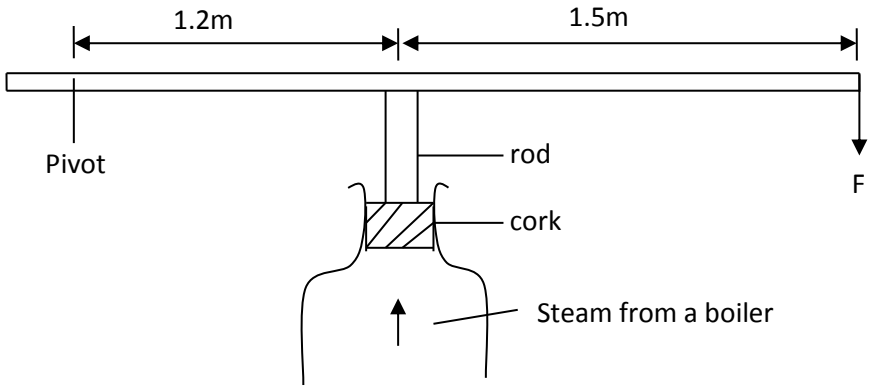
Determine the distance from point A where a support should be placed for the plank to balance horizontally. (3mks)

7. In an experiment to determine the thickness of an oil molecule, an oil drop of volume 3.60 x 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

Answer all questions in this section in the spaces provided:

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

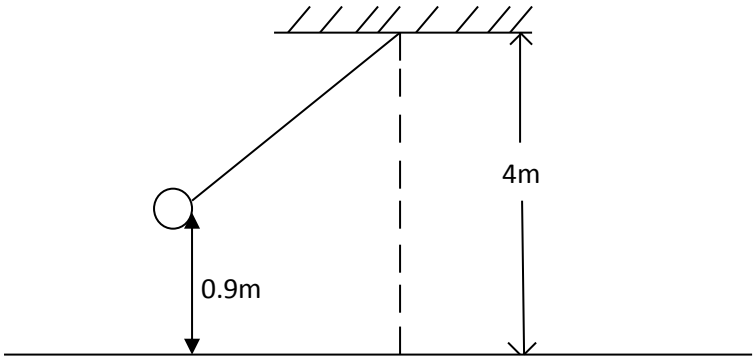
i) Work done (1mk)

ii) Power developed by the crane (2mks)

iii) 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:

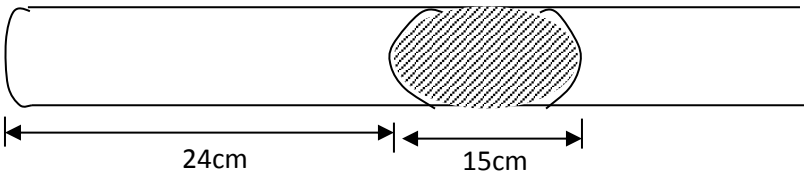


Determine:

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

ii) 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.



i) 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)

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

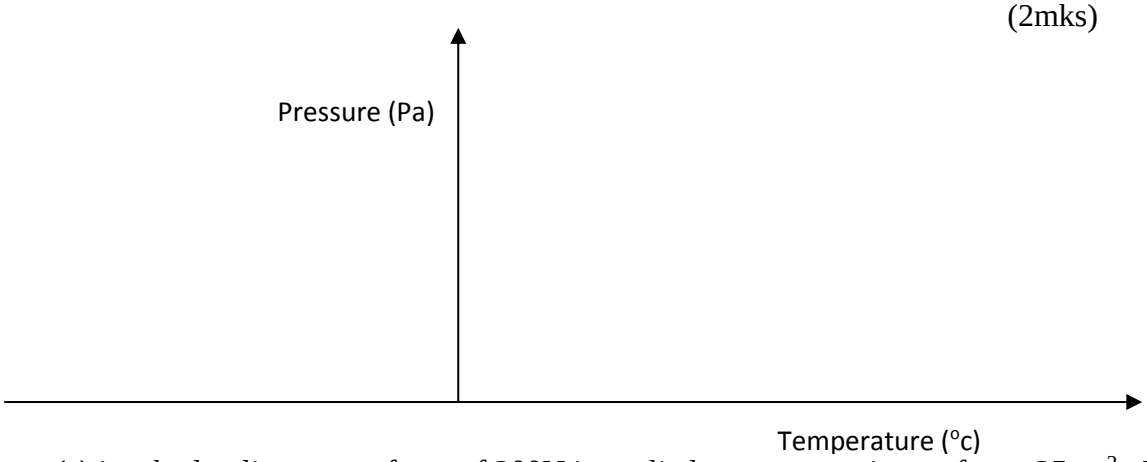
b) Explain why an air bubble increase in volume as it rises from the bottom of a lake to the surface. (1mk)

c) 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)

d) 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)

e) 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)

(c) 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.

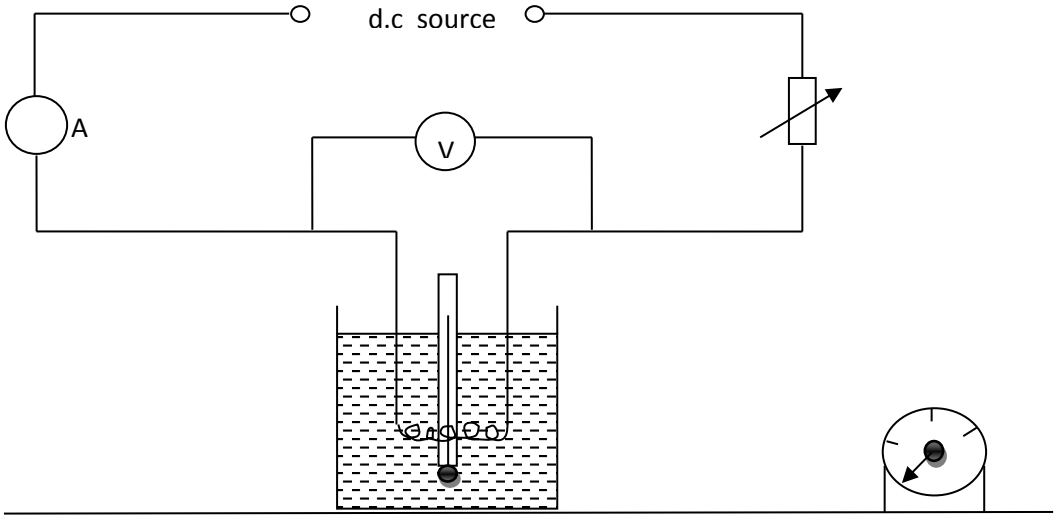
(i) State the purpose of the hot water. (1mk)

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

(d) 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)

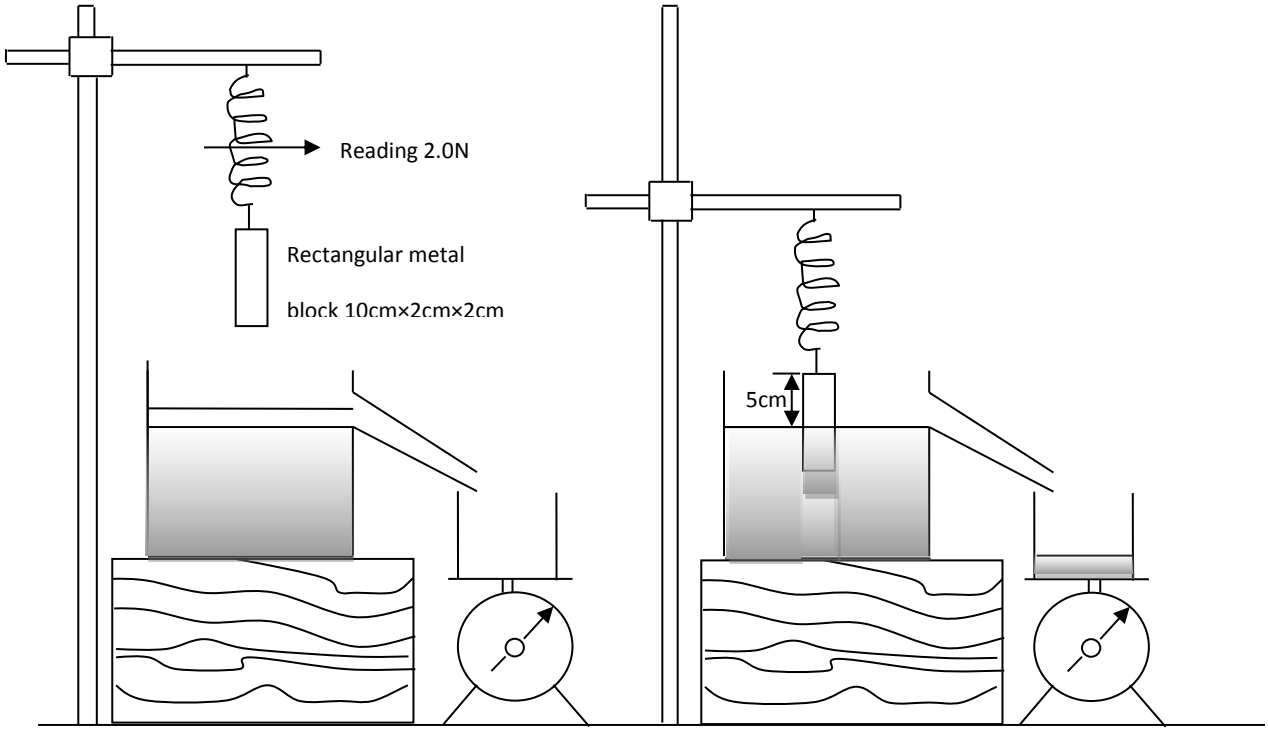
(ii) The temperature will eventually stop rising even though the current is still passing through the heating coil. (1mk)

iii) 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^oc below room temperature and the current passed until the temperature is about 5^oc 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^oc.
(i) Determine how long it takes for the water to boil at 100^oC 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)



Compression balance reading 4N

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

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

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

iv) 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)

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KCSE MOCK TRIAL 9

232/2
Physics
Paper 2
2 hours

SECTION A (25 marks)

1. Describe the changes that can be observed during discharging process of a lead –acid accumulator

(2mks)

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

(2mks)

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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)

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

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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)

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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)

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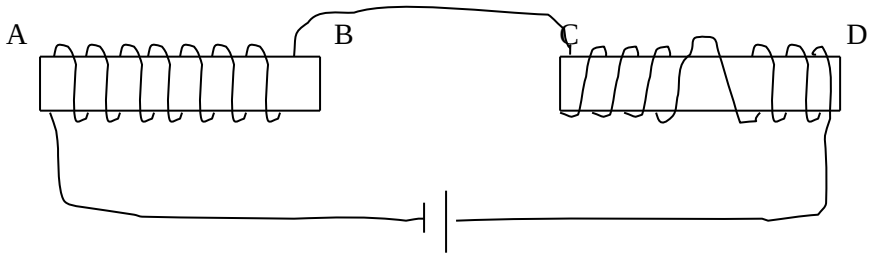
4. Identify the magnetic poles A, B, C and D in the diagram below. (2mks)



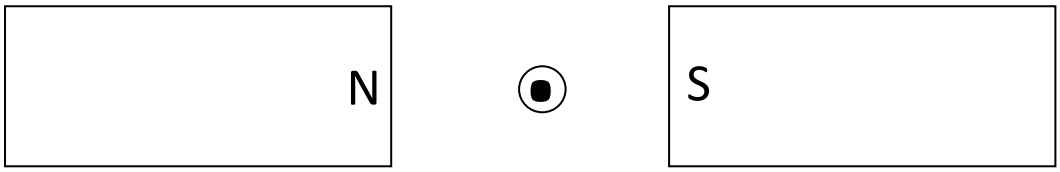
A ……

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)

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

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

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

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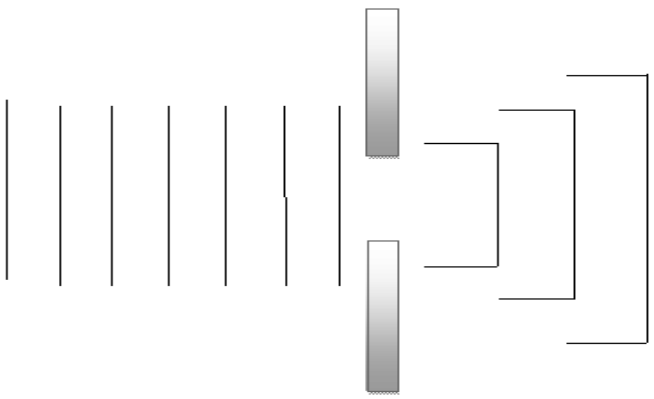
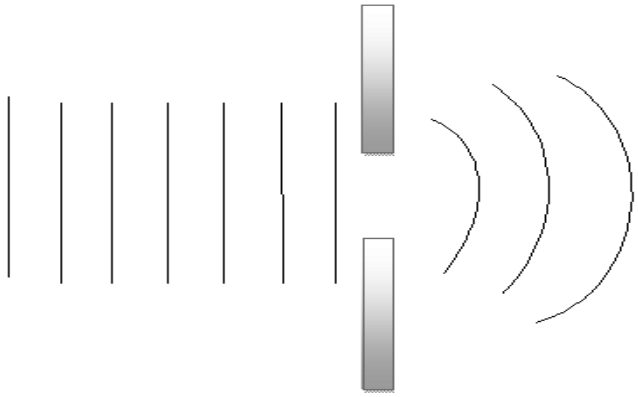
7. The diagram below shows waves being diffracted.



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



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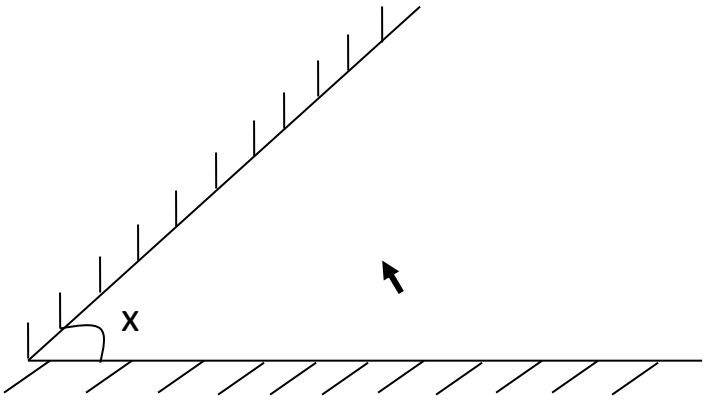
8. The diagram below shows an object placed in front of two mirrors inclined to each other at an angle x



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

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SECTION B (55 marks)

9. a) State Snell's law

(1mk)

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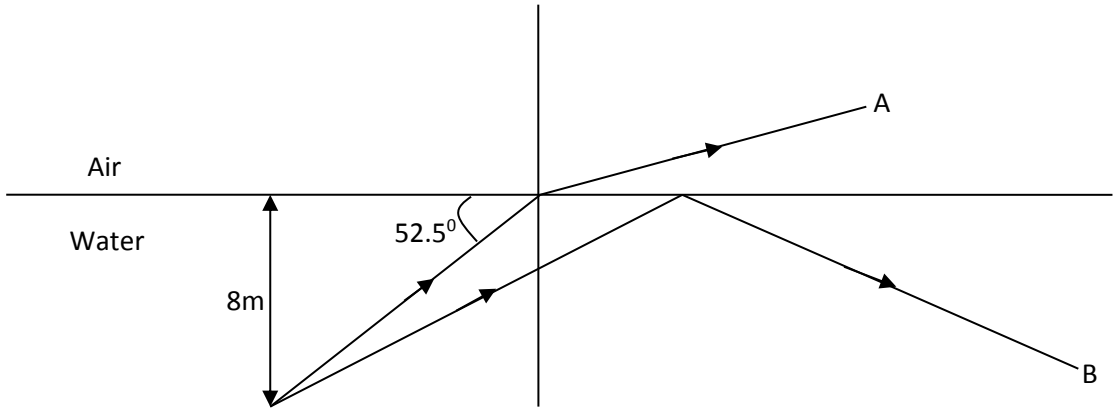
b) The figure below shows a ray of light incident on a water-air interface from a source 8m deep.



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

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

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

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

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

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10. a) define local action

(1mk)

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

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

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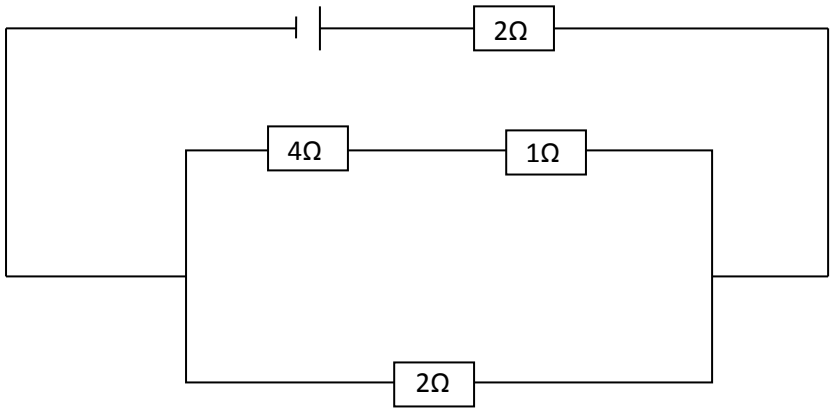
d) The circuit set up shown below makes a current of 1A to flow through the 4Ω resistor



Calculate;

i) The current through the 2Ω resistor (3mks)

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

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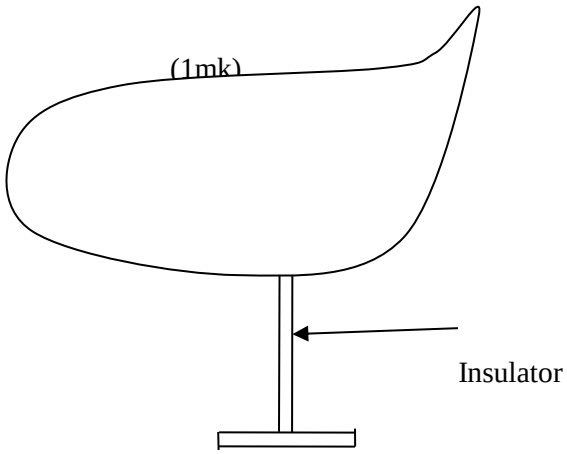
11. Show the charge distribution on the hollow conductor shown below if it is positively charged.



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

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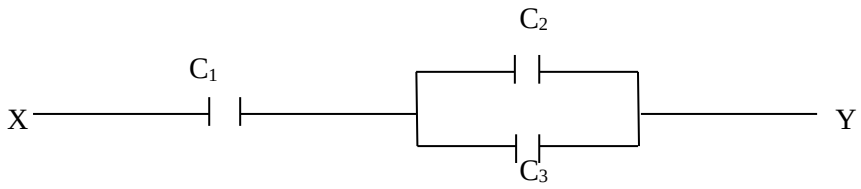
c) The diagram below shows a circuit containing three capacitors.



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

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…… 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)

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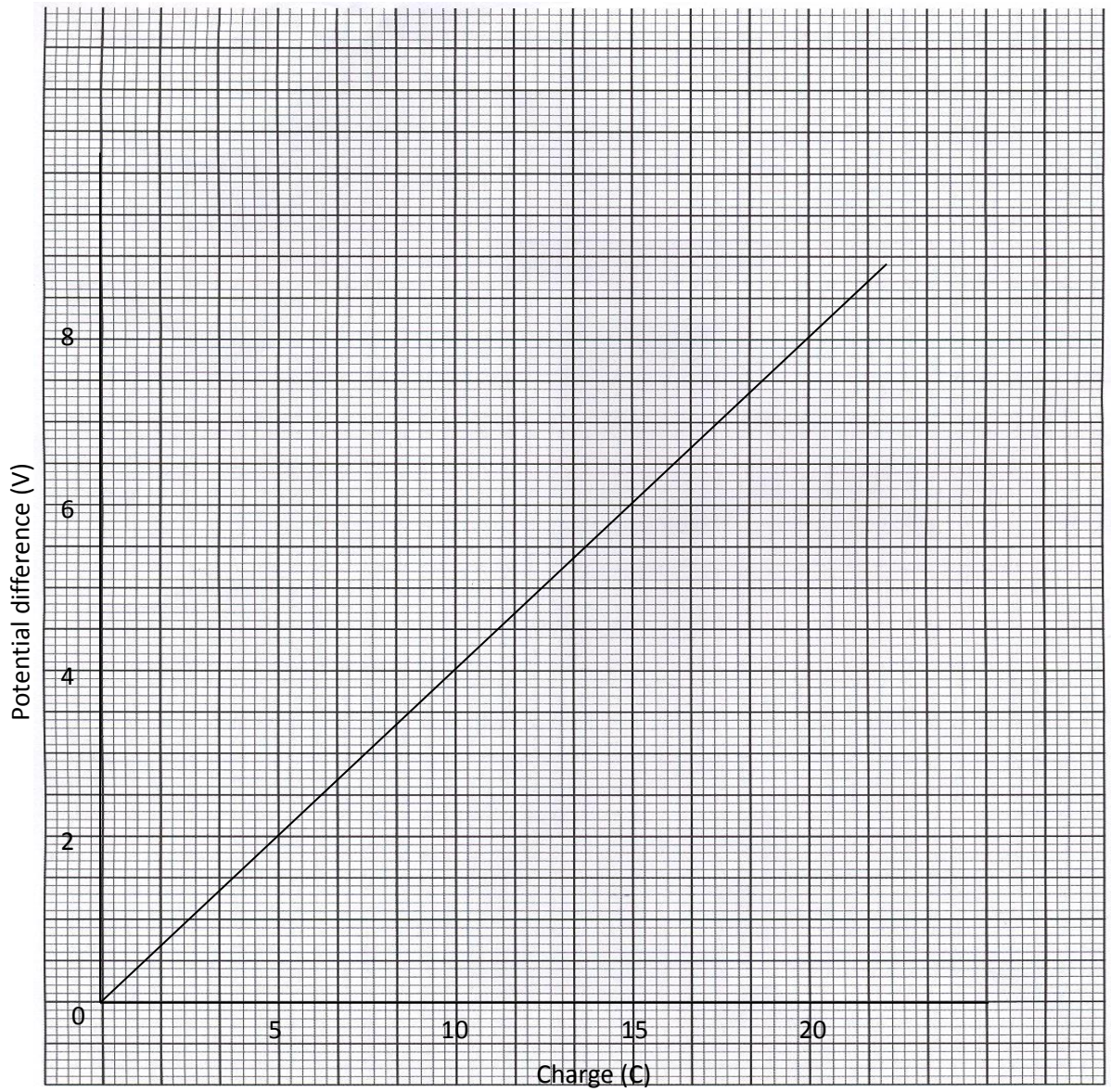
d) The graph below shows the relationship between the voltage drop across a certain capacitor and the charge stored in the capacitor.



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

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

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(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)

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

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

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

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13. a) Define magnification

(1mk)

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

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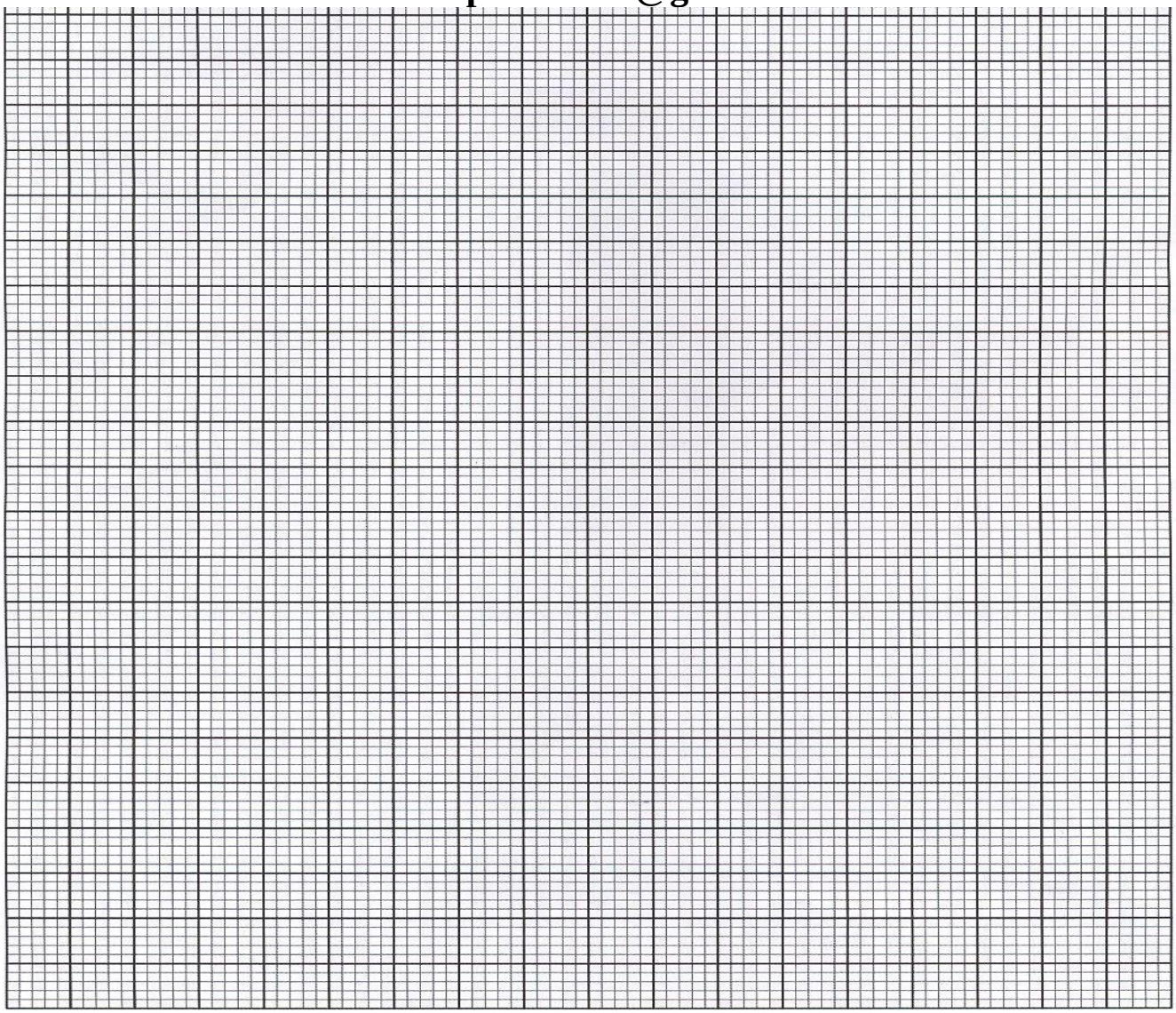
c) a concave mirror of focal length 20 cm forms a real image three times the size of the object. If the object height is 4cm; determine, using graphical method, the:

(i)object distance

(3mks)

(ii) The image distance (1mk)



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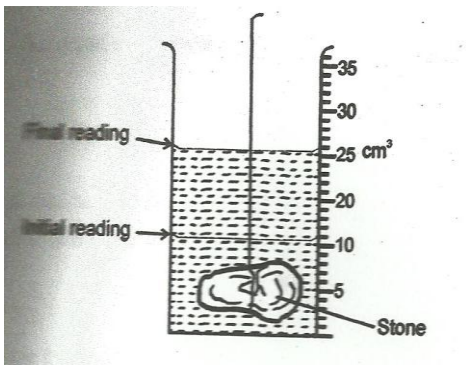
KCSE MOCK TRIAL 10

Physics 232/1

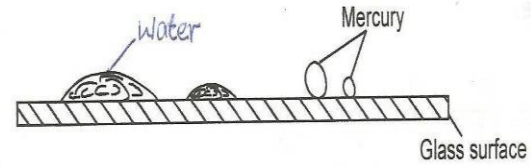
Paper 1

Time: 2 hours

1.The figures below shows the level of water before and after a stone was immersed into the measuring cylinder If the mass of the stone is 200g, determine its density. (3mks)



2. The figure below shows the shapes formed when drops of water and mercury are placed on the surface of a clean glass plate



Explain the difference in the shapes.

Explain the difference in the shapes. (1mk)

3. Explain why air is not used as a brake fluid. (1mk)

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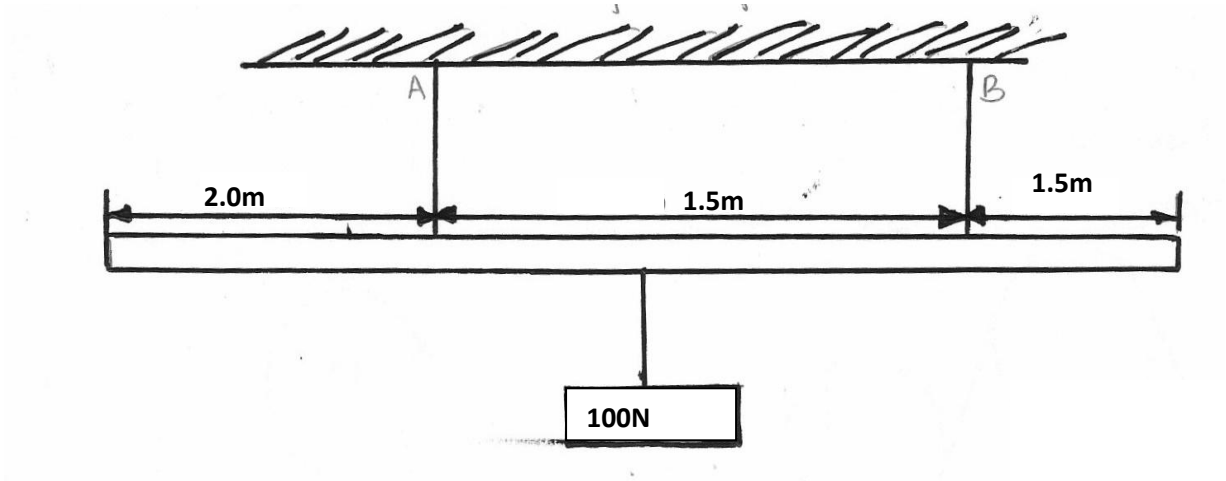
4.) Use kinetic theory to explain pressure law. (1mk)

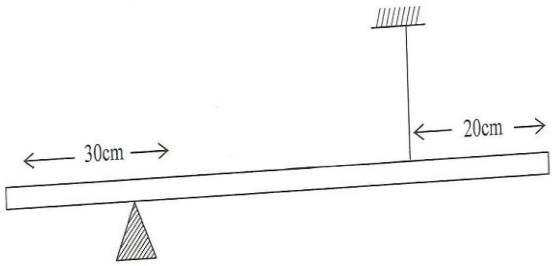
5.) In an oil drop experiment, it was found that one oil drop spread on water to form a patch of diameter 0.8cm and thickness 2.0×10^{-6}mm. Calculate the radius of the drop. (2mks)

6.)A uniform wooden plank weighing 50N and 5m long is suspended by two ropes A and B, 1.5m apart. A is 2m from one end and B is 1.5m from the other end as shown in figure below. A concrete block of weight 100N is suspended from the centre of the plank



Calculate the tension T_A in string A (2mks)

7. The figure below shows a uniform bar of length 1.4m pivoted near one end. The bar is kept in equilibrium by a string as shown.



Given that the weight of the bar is 1.5N, determine the tension in the string. (3mks)

8. The table below shows results of an experiment carried out to study properties of a spring.

Force (N) added	0	5	10	15	20
Length of spring (cm)	10	11	12	13	14

State with a reason whether the experiment was done within elastic limit of a spring. (1mk)

9. A beaker is filled completely with water. A spoon full of common salt is added slowly. The salt dissolves and the water does not overflow. State the reason why water does not overflow. (1mk)

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

11.A bullet is fired horizontally from a platform 15m high. If the initial speed is 300m/s, determine the maximum horizontal distance covered by the bullet. (3mks)

12.A high jumper usually lands on a thick soft mattress. Explain why. (1mk)

13.If the rate of flow of water in the tube is 0.0001 m^3/s. Determine the length of tube it will take its flow in 3 seconds through a cross-section area of $5cm^2$. (3mks)

14.The ice and steam points of a certain graduated thermometer are found to be 15cm apart. What is recorded in ^0c when the length of the mercury thread is 3cm above the ice point?

(2mks)

15.a) Define heat capacity and state its SI units. (2mks)

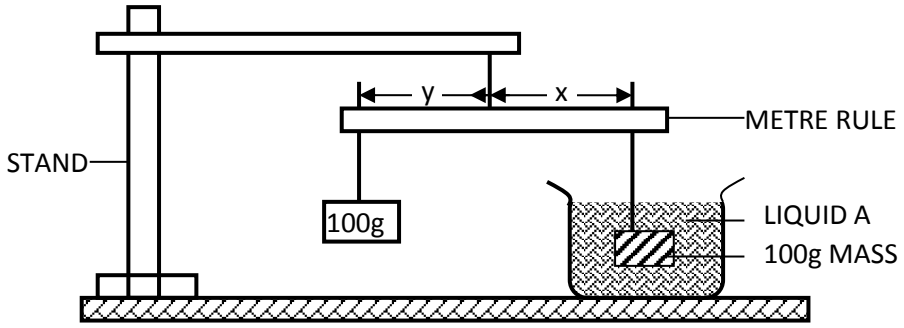
b) i) 200g of ice at -10^oc was slowly heated by an immersion heater rated 200w. The graph below shows how temperature varied with time.

ii)Given that the specific heat capacity for ice is 2100J/kg/k, specific latent heat of fusion for ice 340000J/kg and the specific heat capacity for water is 4200J/kg/k. Calculate the corresponding times for pints B and C. (4mks)

iii) What factors affect the melting point of a solid. (2mks)

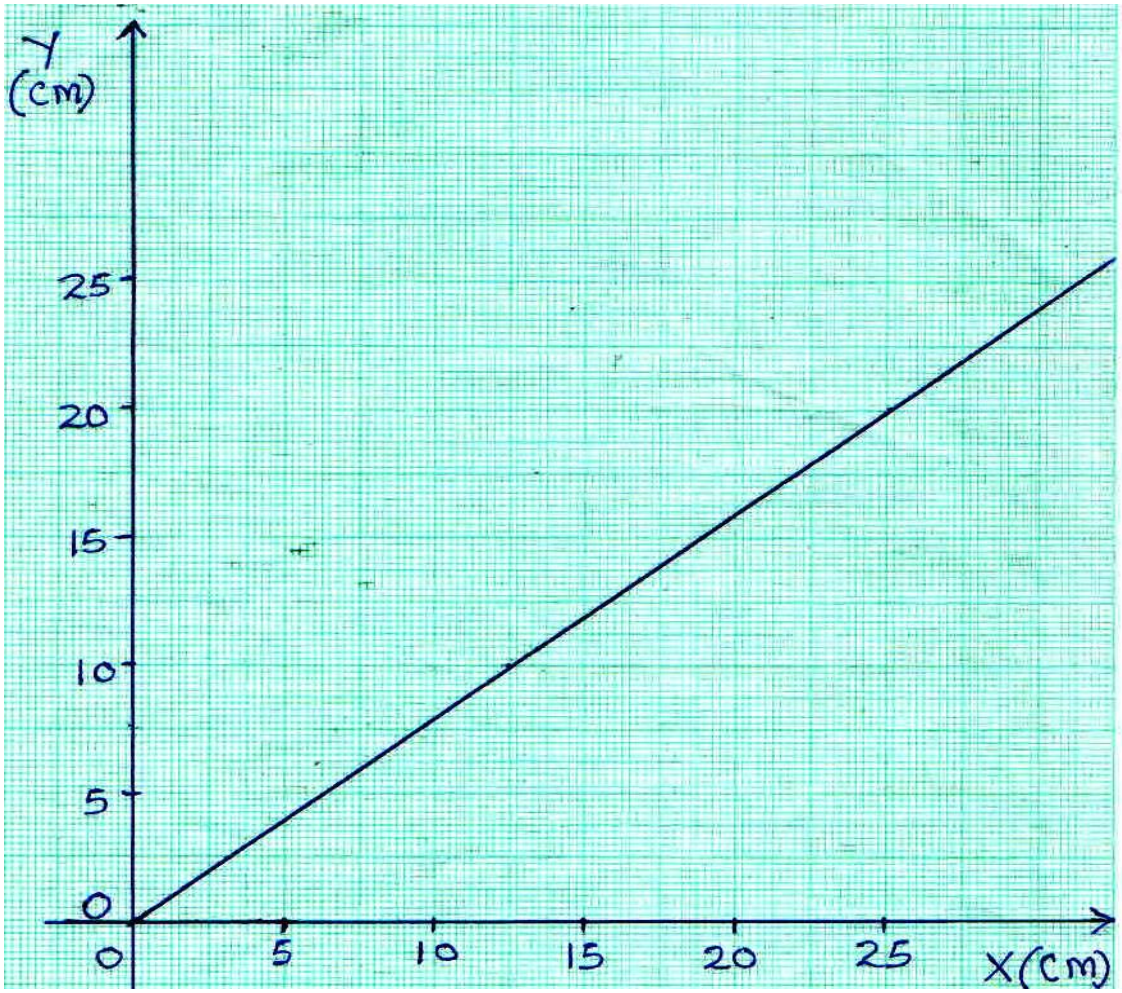
c) i) A sauce pan of mass 0.7kg containing 0.5kg of water is 20oc it takes 5 minutes before the water starts to boil. Find the rate at which heat is supplied to the water by the burner. Take specific heat capacity of the sauce pan as $600Jkg^{-1}k^{-1}$. (3mks)

16. (a) In an experiment to determine the relative density of liquid A, the following set up was used.



The distance x of the mass in liquid A was measured for various length, y of an identical mass of equilibrium and a graph of y against x was drawn as shown in the grid below.

GRAPH OF Y AGAINST X



(i) Determine the gradient, S, of the graph. (2 Marks)

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(ii) If S = $\frac{F}{W}$, where F is the apparent weight of mass in liquid A and W is the actual weight of the mass.

Calculate the value of F and the upthrust u. (3mks)

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(iii) Determine the relative density of the liquid a, Given that the weight of the 100g mass in water was 0.9N. (3mks)

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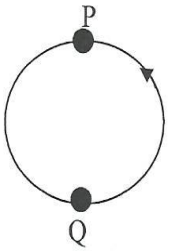
b) A balloon's fabric weighs 10N and has a gas capacity of $2M^3$. If the gas in the balloon weighs 2N and air has density 1.29kg/m3, Find the resultant force on the balloon when it is floating in air. (3marks)

17. a) A body having uniform motion in a circular path always accelerates. Explain. (1mk)

b)the figure below shows the path of an object of mass 200g tied to a string 0.2m and being whirled in a vertical circle at a linear speed of 10m/s.



If the string gets cut when the object reaches point Q,

i) indicate with an arrow on the diagram, the path direction it is likely to move. (1mk)

ii) Determine the force that cuts the string at point Q (3mks)

iii) Calculate the minimum tension (3mks)

c) A body is whirled in a horizontal circle at a frequency of 5Hz. Determine its angular velocity. (3mks)

SECTION B

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

b)What energy transformation takes place when a car battery is used to light a bulb? (2mks)

c) A pulley system has two pulleys on the lower block and one pulley on the upper block. In order to raise the load of 6N, an effort of 2N is applied.

i)Draw a sketch to show the pulley system. (2mks)

ii)Calculate the efficiency of the pulley system. (3mks)

iii)If the lower block weighs 0.4N. What friction force oppose the motion. (3mks)

19. a) Define (1mk)

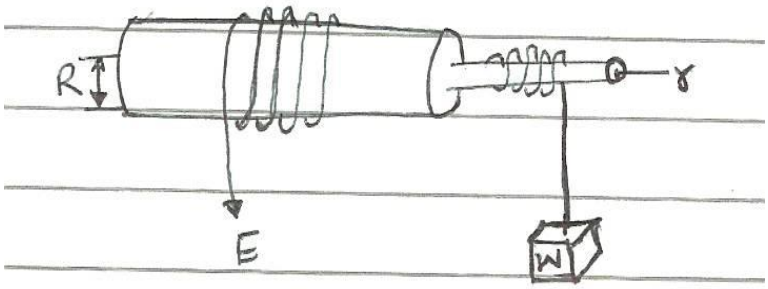
i) Velocity ratio (1mk)

ii)Mechanical advantage (1mk)

iii)Efficiency (1mk)

b)A small pump develops an average power of 80W. It raises water from a borehole to a point 15m above the water level. Calculate the mass of water delivered in one hour. (3mks)

c)The figure shows a wheel and axle being used o raise a load W by applying an effort 'E'. The radius of a large wheel is 'R' and that of a small wheel is 'r'.



i)Show that the velocity ratio (V.R) of this machine is given by R/r. (2mks)

ii)If r = 5cm and R = 8cm, determine the effort 'E' required to raise a load of 40N, given the efficiency of the ma chine is 85%. (3mks)

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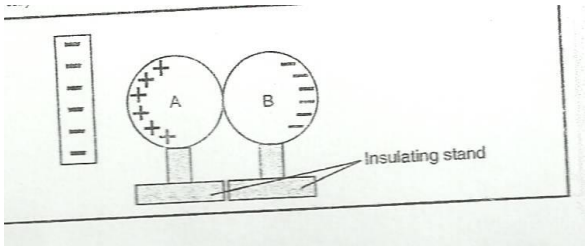
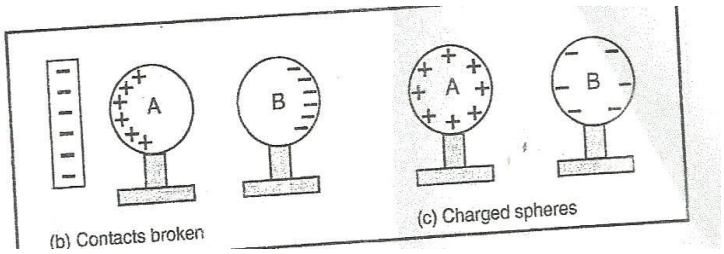
KCSE MOCK TRIAL 10

232 / 2
PHYSICS
PAPER 2
2 HOURS

1.State the laws of reflection of light. (2mks)

2.The diagram below shows how to charge two spheres simultaneously.





On the diagram indicate the charge acquired by spheres A and B in step two. (2mks)

3.Complete the diagram below to show how the lens forms the image. (1mk)

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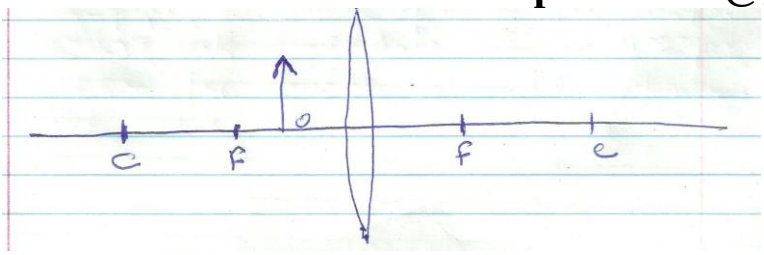
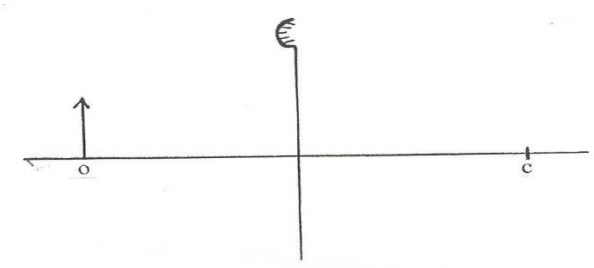


4.)Name one detector of infra-red radiations (1mk)

5) Using a diagram explain how soft iron keepers are used to retain magnetism in stored magnets(2mks)

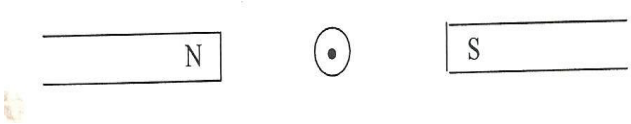
6) A battery is rated 30Ah,determine the amount of current it can supply in 20 minutes (2mks)

7) Sketch rays to show the image formed by the object in the following. (2mks)



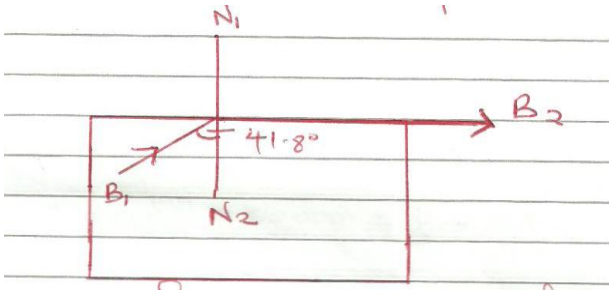
8.Name any one common property of electromagnetic waves. (1mk)

9.The figure below shows a conductor carrying current placed within the magnetic field of two magnets. Complete the diagram by showing the field pattern and the direction of force F that acts on the conductor. (2mk)



10.What is meant by donor impurity in semiconductor. (1mk)

11.The figure below shows ray B, incident through a glass block to air interface.



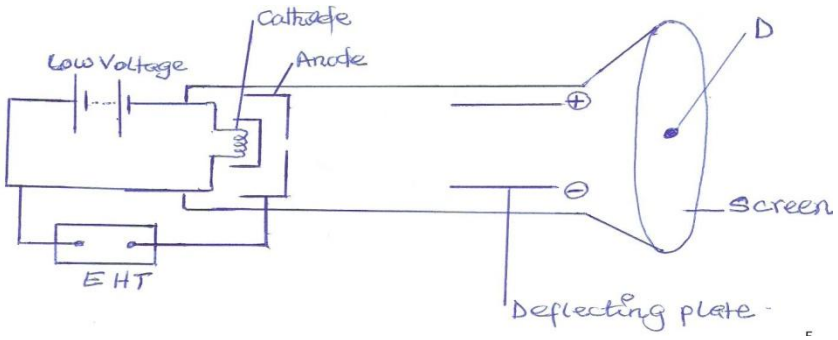
B2 is the emergent ray of B1. Determine the refractive index of the glass block.

12.A pendulum bob takes 0.5 seconds to move from its mean position to a maximum displacement position. Calculate its frequency. (2mks)

13.A potential difference of 50kv is applied across an x-ray tube. Given that the charge of an electron e = 1.6×10^{-19} c and the mass of an electron $m_e = 9.1 \times 10^{-31}$ kg, calculate the velocity of the electron. (3mks)

14.An electric heater is rated 3kw and 240v when in operation. Calculate the cost of running the heater for 5 hours if the cost per kwh is ksh.6.70. (2mks)

15.The diagram below shows part of a cathode ray tube.



i)Explain how the cathode rays are produced. (2mks)

ii) On the same diagram draw the path of the cathode rays to the spot produced on the screen at D. (2mks)

iii)Explain the observation made on the spot when the connection to the high voltage supply are interchanged so that the anode is made negative. (2mks)

iv)What behavior of cathode rays shows that they move on a straight line. (2mks)

v)Name the components of an electron gun of a cathode ray oscilloscope. (3mks)

16.a) In a photoelectric effect experiment, a certain surface was illuminated with radiation of different wavelengths and stopping potential determined for each wavelength. The following results were obtained:

Wavelength ($x\ 10^{-7}$ m)	3.77	4.05	4.36	4.92	5.46
Stopping potential, (V_s), (V)	1.35	1.15	0.93	0.62	0.36
Frequency ($x\ 10^{14}$Hz)					

i)complete the table above given that $c = 3.0 \times 10^8$ m/s (1mk)

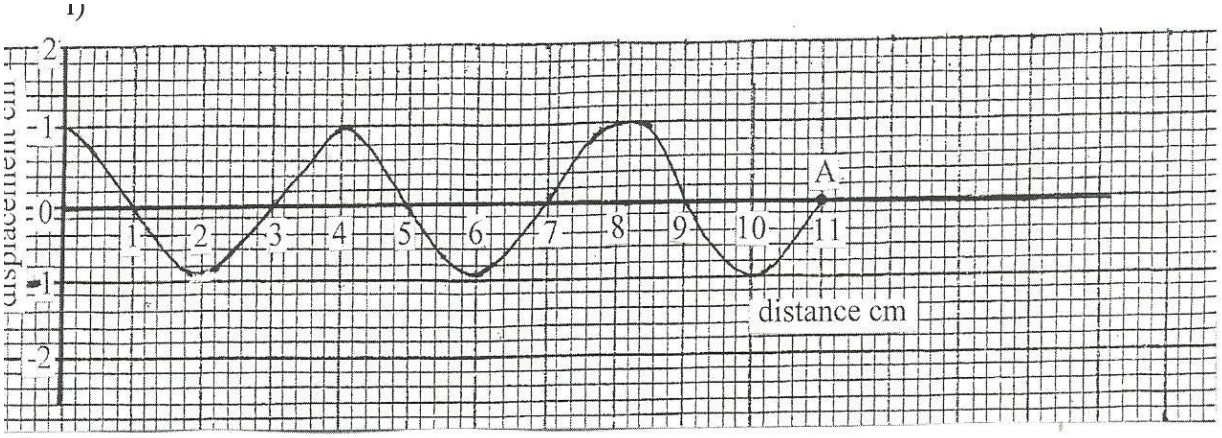
ii)Plot a graph of stopping potential (Y-axis) against frequency (4mks)

iii) Determine plank's constant, h and the work function of the surface given that $eV_s = hf - hf_o$, where $e = 1.6 \times 10^{-19}$ C (3mks)

b) A surface whose work function $Q = 6.4 \times 10^{-19}$ J is illuminated with light of frequency 3.0×10^{15} H_z. Find the maximum velocity of the emitted photo electrons (use value of h obtained in **a(ii)** above) (3mks)

17. a) State the difference between longitudinal and transverse waves. (1mk)

b)The figure below shows a transverse wave travelling along X-axis. T he frequency of the vibrations producing the waves is 20Hz.



i)Determine the amplitude in SI unit. (1mk)

ii) If it takes 0.1375 seconds for the wave to move from O to A, determine the speed of the wave.

(2mks)

ii)Calculate the periodic time of the wave. (2mks)

c i)State two factors affecting the speed of sound in air. (2mks)

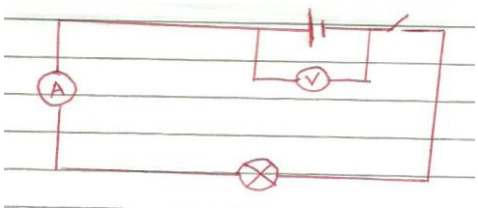
ii)A man makes a loud sound and hears the echo of the sound after 1.25 seconds. If the speed of sound in air is 330ms-1, calculate the distance between the man and the wall causing the echo.

(3mks)

18. Three resistors of resistance 2Ω, 4Ω and 6Ω are connected together in a circuit. Draw a circuit diagram to show the arrangement of the resistor which gives

a) Effective resistance of 3Ω (2mks)

b) In the figure below, the voltmeter reads 2.1v when the switch is open. When the switch is closed, the voltmeter reads 1.8v and the ammeter reads 0.1A.



Determine :-

i) The e.m.f of the cell (1mk)

ii) The internal resistance of the cell. (3mks)

iii) The resistance of the lamp. (2mks)

c. Calculate the length of a wire required to make a resistor of 0.5Ω , if the resistivity of the material is 4.9×10^{-7} Ω m and the cross sectional area is 2.0×10^{-6} m2. (3mks)

19.ai)Define half-life of a radioactive substance. (1mk)

ii)The following radioactive equation, find the value of N and Z.

b) The half-life of radioactive substance is 4 years. How long will the sample take for the activity to decrease to 1/32 of its original value. (3mks)

c)The diagram below shows the cross section of a diffusion cloud chamber used to detect radiation from radioactive source.

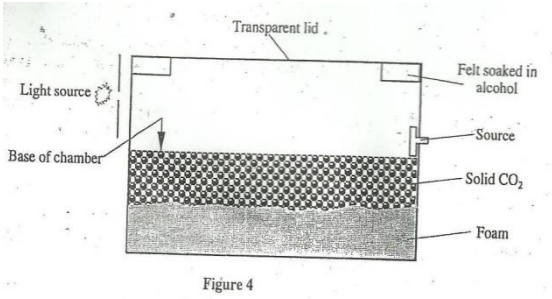


Figure 4

i)State one function of each of the following Alcohol. (1mk)

Solid carbon dioxide (1mk)

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ii)When radio actions from the source enter the chamber some white traces are observed. Explain how these traces are formed and state how the radio action is identified. (4mks)

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ii)A leaf electroscope can also be used as a detector of radio actions. State two advantages of the diffusion cloud chamber over the leaf electroscope as a detector. (2mks)
