KCSE 2023 FINAL PREDICTION

PHYSICS

(KCSE PREDICTIONS 1-10)

Confidential Analysis of Possible Expected sample KCSE Questions most likely to be tested in the Forthcoming KNEC examinations scheduled for November 2023.

The following are Expected Questions in KCSE 2023 EXAM.

CONFIDENTIAL!

For Marking Schemes

Mr Isaboke 0746 222 000 / 0742 999 000

SUCCESS TO ALL CANDIDATES

KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 1

232/1

PHYSICS

PAPER 1 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

Write your name, index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided.
*This paper consists of **TWO** Sections: **A** and **B**.*
*Answer **ALL** the questions in section **A** and **B**. All working **MUST** be clearly shown.*
KNEC mathematical tables and silent non-programmable electronic calculators may be used.
Candidates should answer the questions in English.
Take: ***Acceleration due to gravity,*** $g = 10\ m/s^2$

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A (25 MARKS)

Answer all the questions in this section.

1. A measuring cylinder calibrated in cm^3, water and a weighing balance were used to find the density of a stone. The arrangement was as shown in **Figure 1**.



Figure 1

Determine the density of the stone. **(3 marks)**

Give a reason to why the players draw their hands backwards as the ball is caught in cricket. **(1 mrk)**

2. **Figure 2** shows a lift pump used to draw water from a well.

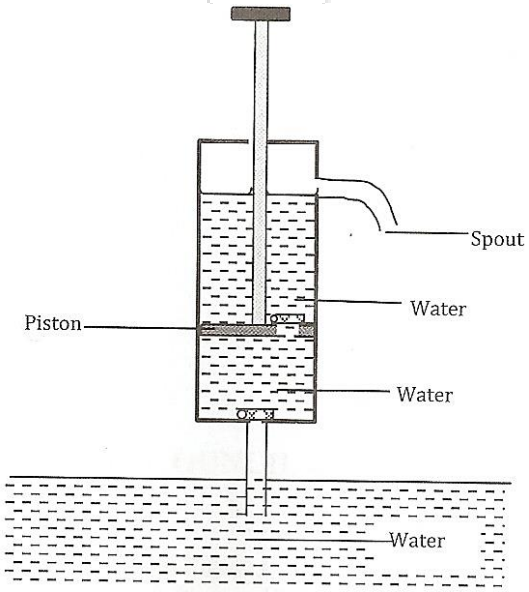


Figure 2

Give one limitation of using this type of a pump. **(1 mark)**

A lift pump can lift water to a maximum height of 10 m. Determine the maximum height to which the pump can raise paraffin. (*Take density of paraffin as 800 kgm^{-3}, density of water as 1000 kgm^{-3} and gravity as 10 N/kg*). **(3 marks)**

3. **Figure 3** shows a pith ball inside a transparent flask. When a jet of air is blown over the mouth of the flask as shown, the pith ball is observed to rise from the bottom.

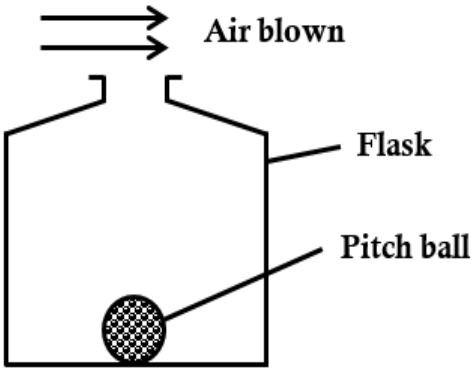


Figure 3

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

4. A uniform metal strip of mass 450 g and length 100 cm is placed on a pivot and kept in equilibrium by force F as shown in **Figure 4**.

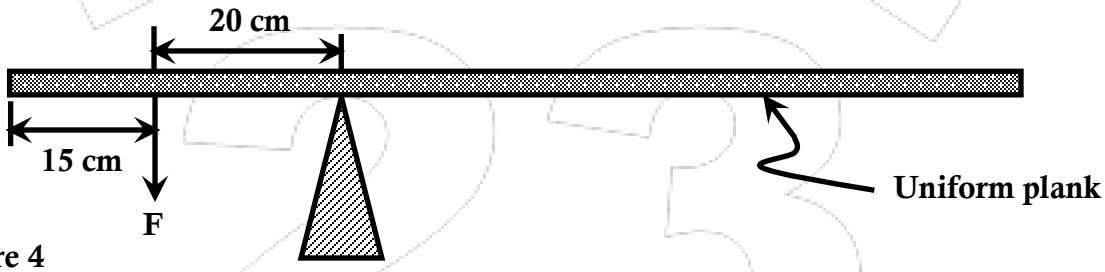


Figure 4

Determine the value of F. **(2 marks)**

5. Two match sticks are placed on water in a basin a few centimeters apart as shown in **Figure 5**.

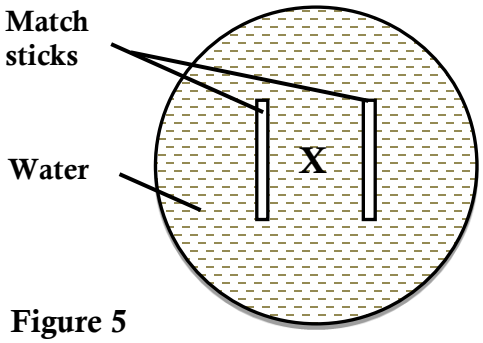


Figure 5

State and explain the observation made when a drop of soap solution is placed at a point marked X between the match sticks. **(2 marks)**

6. The three springs shown in **Figure 6** are identical and have negligible weight. The extension produced on the system of springs is 25 cm.

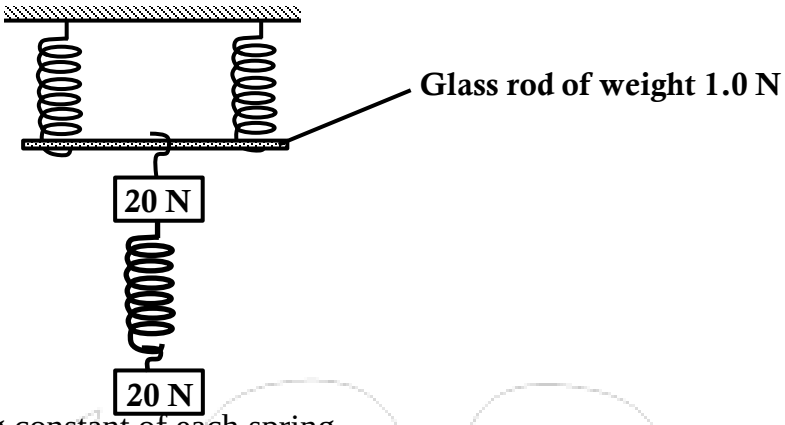


Figure 6

Determine the spring constant of each spring. **(3 marks)**

7. **Figure 7** shows two identical balloons A and B filled with air and their open ends closed tightly. They are put at equal distances from a metallic tank holding hot water. The sides of the tank facing the balloons are painted differently.

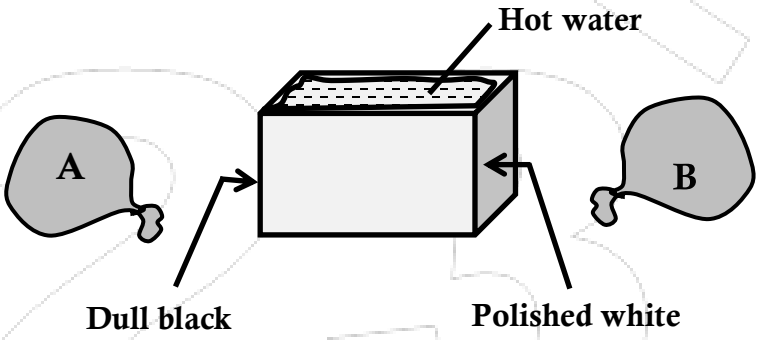


Figure 7

It is observed that balloon A expands more than balloon B. Explain this observation. **(1 mark)**

An oil drop of volume $1.922 \times 10^{-8}\ m^3$ spreads on water surface to form a patch of area $7.069 \times 10^{-2}\ m^2$. Determine the diameter of an oil molecule in the oil drop. **(2 marks)**

8. **Figure 8** shows apparatus used to study Brownian motion using smoke trapped in a smoke cell.

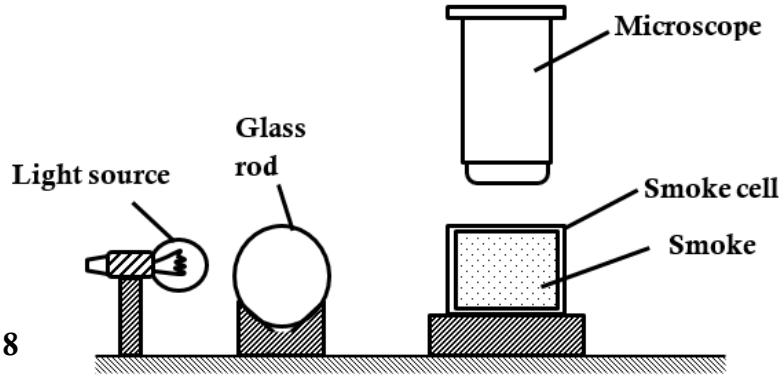


Figure 8

State and explain what is observed when looking at the trapped smoke using the microscope.

(2 marks)

9. **Figure 9** shows a part of a clinical thermometer.

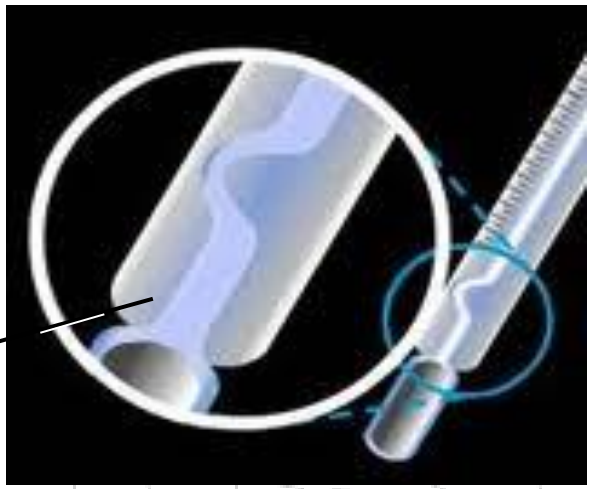


Figure 9

Name the feature labeled K**.** **(1 mark)**

State the importance of this feature**.** **(1 mark)**

10. **Figure 10** shows a passenger bus with luggage compartment under the seats.



Figure 10

Explain why bus body-builders would prefer to build luggage compartments under the seats rather than on roof racks. **(1 mark)**

SECTION B (55 MARKS)

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

11. (a) The hammer in **Figure 11** is being used to pull out a nail weight) that is stuck into a wooden surface. Take the lengths a = 13.0 cm and b =1.5 cm. (Assume the force (F) applied to the nail is vertical and that F = Friction between the nail and wooden surface which resists the nail from being pulled out).

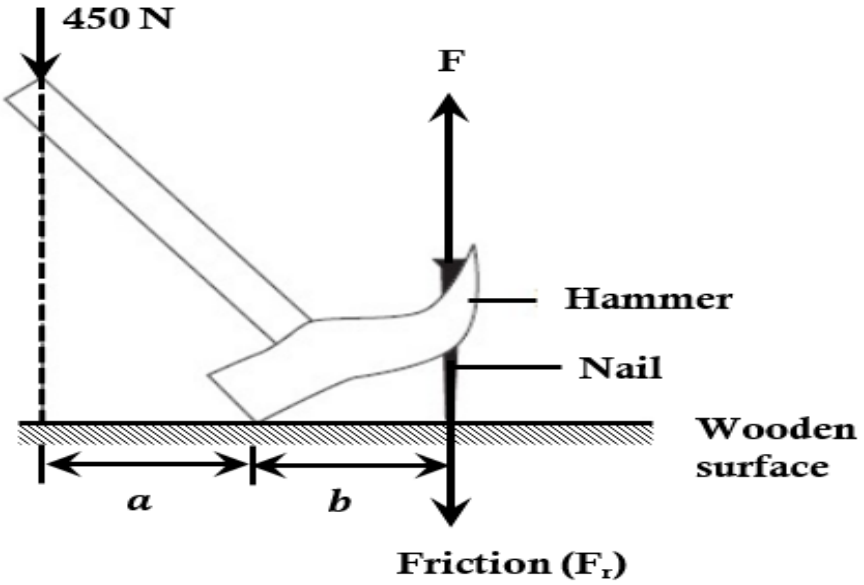


Figure 11

Given that the force applied on the handle is 450 N;

Determine the magnitude of force (F) applied to the nail. **(3 marks)**

Determine the mechanical advantage of the hammer. **(2 marks)**

Determine the velocity ratio of the hammer. **(2 marks)**

Calculate the efficiency of the hammer. **(2 marks)**

State the assumption made for the value of efficiency in (iv) above to be as it is. **(1 mark)**

(b) A block and tackle system is made up of three pulley wheels on top and two pulley wheels at the bottom in **Figure 12**.

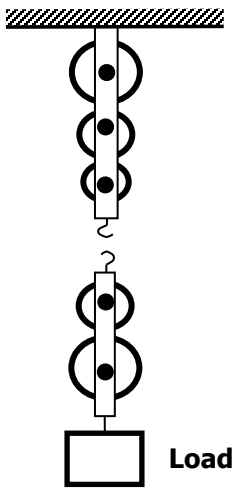


Figure 12

Complete the diagram by drawing the chain which passes over the wheels and indicate where the effort is applied. **(1 mark)**

12. (a) **Figure 13 (a)** shows a column of air trapped by mercury thread 5cm long in a vertical tube with its mouth facing upwards. The length of the enclosed air column is 10 cm. Given that the atmospheric pressure is 750 mmHg, determine the length of air column, ***l***, when the tube is placed vertically but with mouth facing downwards as in **Figure 13 (b)**.

(**3 marks)**

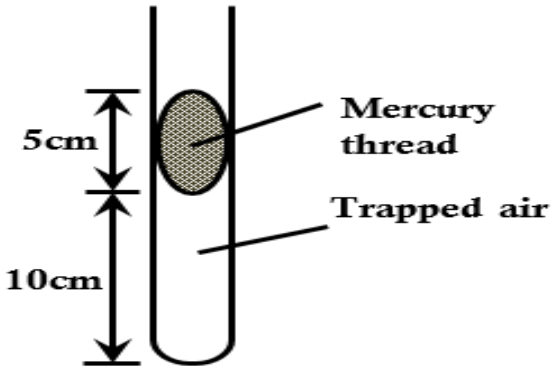


Figure 13 (a)

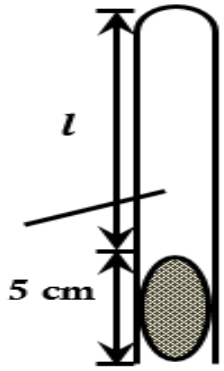


Figure 13 (b)

(b) **Figure 14** shows a simple set up for pressure law apparatus.

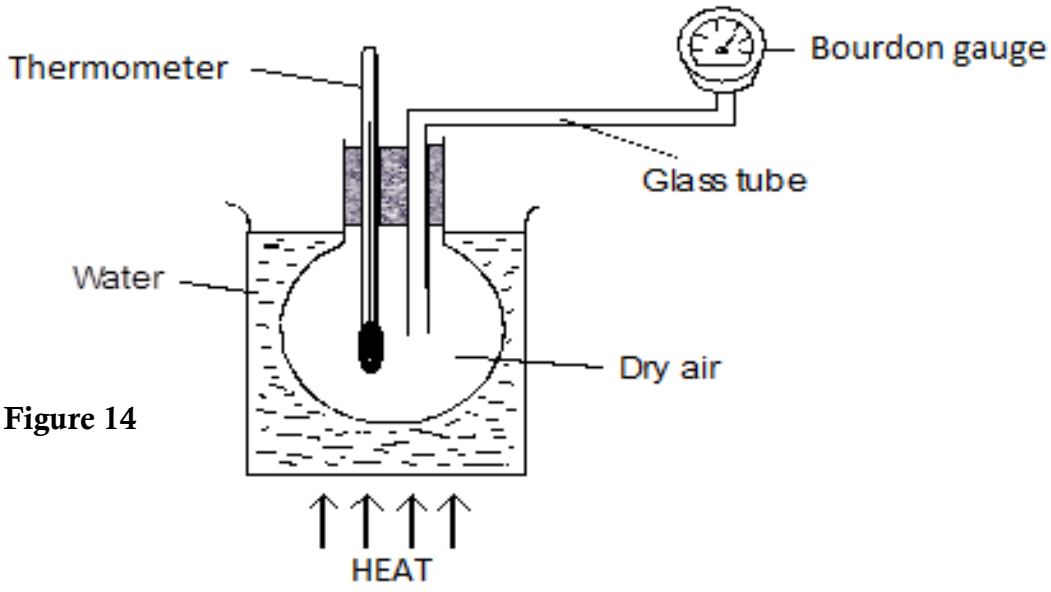


Figure 14

Describe how the apparatus may be used to verify pressure law. Initial reading of pressure and temperatures are recorded. **(3 marks)**

(c) The graph in **Figure 15** shows the relationship between the pressure and temperature for a fixed mass of an ideal gas at a constant volume.

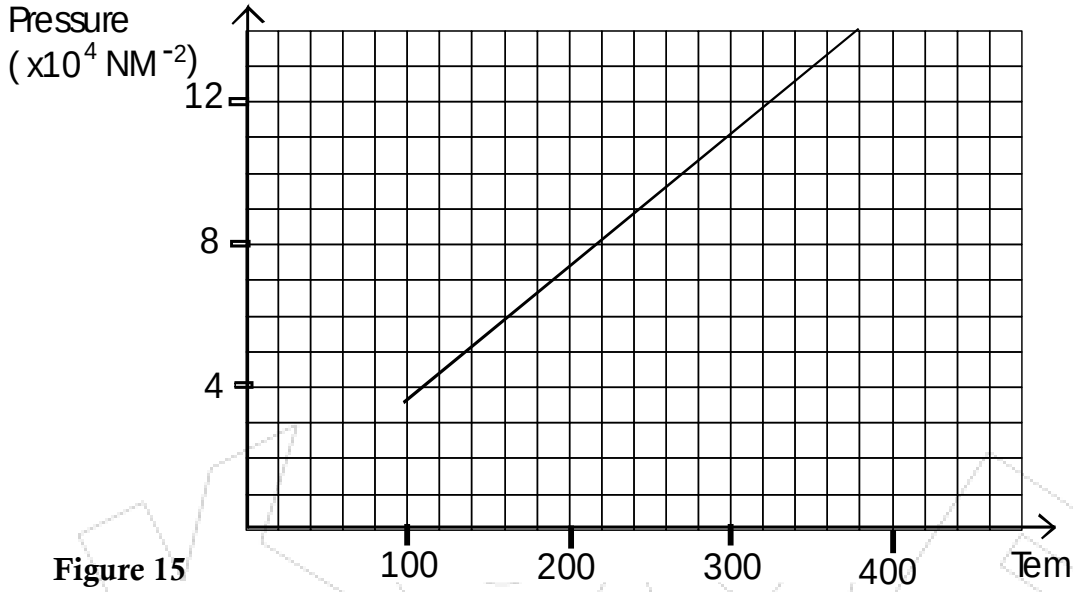


Figure 15

Given that the relationship between pressure, P, and temperature, T in Kelvin is of the form $\boldsymbol{P = kT}$ where $\boldsymbol{k}$ is constant, determine from the graph, value of $\boldsymbol{k}$. **(3 marks)**

13. (a) State the law of flotation. **(1 mark)**

(b) Figure 15 shows a piece of cork held with a light thread attached to the bottom of a beaker. The beaker is filled with water.

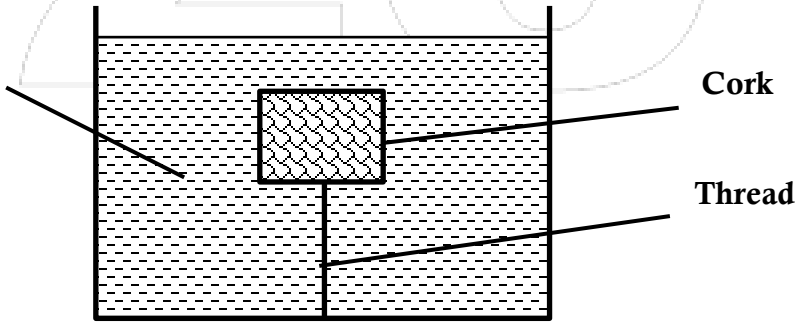


Figure 15

Write an expression showing the relationship between the forces acting on the cork. **(1 mark)**

If the thread breaks name another force which will act on the cork**.** **(1 mark)**

(c) **Figure 16** shows a metallic rod of length 12 cm and uniform cross-sectional area 8 cm^2 suspended from a spring balance with 8 cm of its length immersed in water. The density of the material is 2.7 g/cm^3 (Take the density of water = 1.0 g/cm^3).

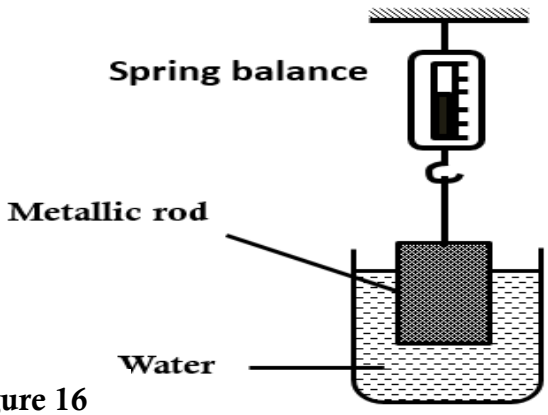


Figure 16

Determine;

The mass of the metallic rod**.** **(2 marks)**

The up thrust acting on the metallic rod**.** **(2 marks)**

The reading of the spring balance. **(2 marks)**

14. (a) A force of 100 N acts on a ball of mass 500 g for 0.5 s before the ball rolls down on the horizontal ground.

Calculate the velocity at which the ball set off with. **(2 marks)**

If the frictional force between the ball and the ground is 2 N, calculate the distance the ball travels before it comes to a stop. **(3 marks)**

(b) The world record for men's 100 m sprint stood at 9.58 s as set by Usain Bolt in 2009. If the athlete accelerates to a steady speed in the first 1.5 seconds and he runs at this speed to the finish line, at what steady speed does he run? **(2 marks)**

(c) An object of mass 200 g is attached to one end of a light inextensible string and whirled in a vertical circle of radius 0.5 m and center O as shown in **Figure 17**.

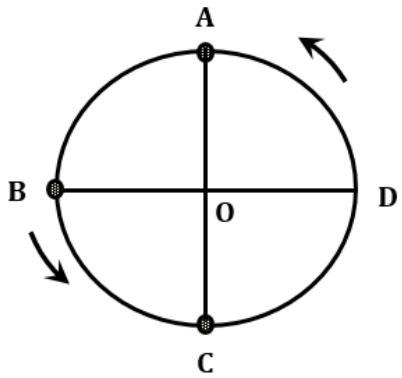


Figure 17

State two forces acting on the stone as it is whirled in the vertical circle. **(2 marks)**

15. Sketch, on the axes below, a graph of the magnitude of the tension in the string in a complete revolution through point **A**, **B**, **C** and **D**. **(1 mark)**



If the tension in the string when the object is at the lowest point C is 39 N, calculate the tangential velocity $\boldsymbol{v}$ of the object**.** **(3 marks)**

(b) A passenger bus is travelling uniformly at 20 m/s when the driver observes a police roadblock ahead. The driver takes 1.0 s before applying brakes which brings the bus to rest with a uniform retardation of 5.0 m/s^2. Sketch a velocity-time graph for the bus from the instant the driver notices the roadblock until the bus comes to rest. **(1 mark)**

16. (a) In an experiment to determine the specific latent heat of vapourization, $\boldsymbol{l_v}$, of water, steam of mass 40 g at 100 ℃ is passed into 150 g of water containing 87g of ice at 0 ℃ in a container of heat capacity $4.5 \times 10^2\ JK^{-1}$. The temperature of the water rises to 60 ℃.

(***Take the specific heat capacity of water as*** $\boldsymbol{4.2 \times 10^3\ Jkg^{-1}K^{-1}}$ ***and specific latent heat of fusion of ice as*** $\boldsymbol{3.4 \times 10^5\ Jkg^{-1}}$).

Determine the:

heat lost by steam to condense to water at 100 ℃. **(1 mark)**

heat lost by condensed steam to cool to 60 ℃. **(2 marks)**

heat absorbed by the ice, water and the container. **(3 marks)**

specific latent heat of vapourization of water. **(3 marks)**

(b) Some water in a round-bottomed flask was heated until it started boiling. Heating was stopped and the water stopped boiling. The rubber tube was clipped and the flask turned upside down as shown in **Figure 18**.

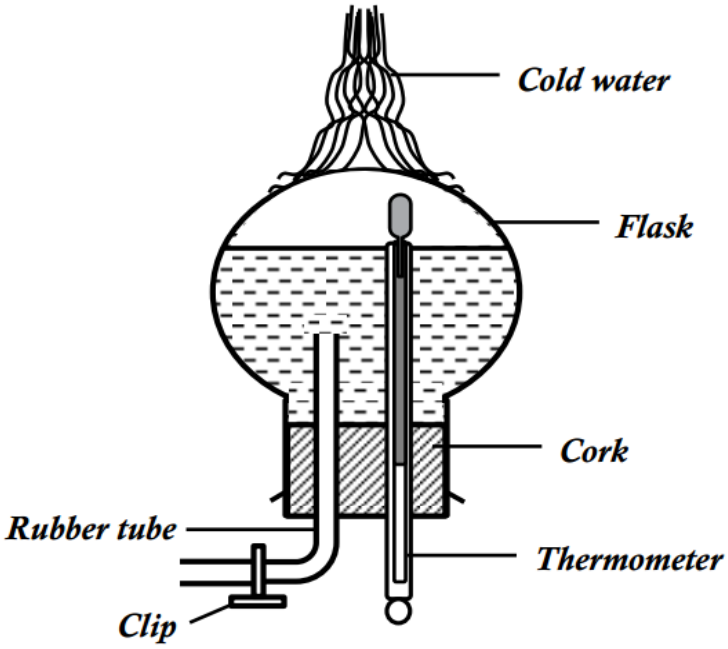


Figure 18

When cold water was poured onto the flask, the water started boiling again.

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

Explain why water started boiling when cold water was poured onto the flask**.** **(2 marks)**

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KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 1

232/2

PHYSICS

PAPER 2 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

- *Write your name and Admission number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *This paper consist of **two** section **A** and **B***
- *Answer all the questions in the spaces provided*
- *All working **must** be clearly shown in the spaces provided.*
- *Non programmable silent electronic calculator may be use*

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A (25MKS)

Answer all questions in this section

1. **Figure 1** below shows an object O placed in front of a plane mirror. A ray of light is drawn coming from object O and striking the mirror at P. After striking the mirror, the ray of light is reflected

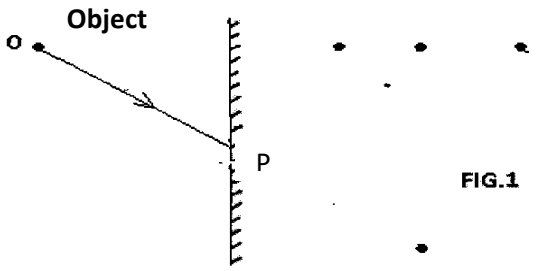


FIG.1

(i) Which of the four dots represents correct position of the image of O? label this dot **Q**

(1mk

(ii) By drawing a line on the diagram above to represent ray at P, mark the angle of reflection and label it r.

(1mk)

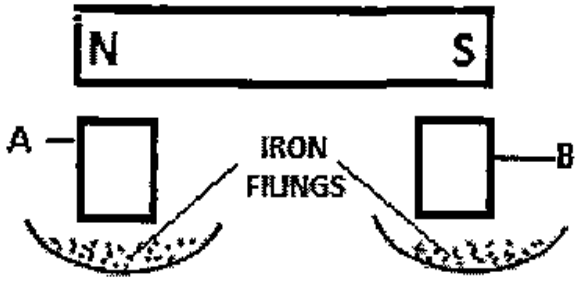
2. A charged conductor is slowly brought near the cap of a positively charged electroscope. The leaf first collapses and then diverges. State the charge on the conductor

(1mk)

3.Give a reason why it is necessary to leave the caps of the cells open when charging an accumulator.

(1mk)

4. Figure 2(a) and 2(b) below shows a simple experiment using a permanent magnet and two metal bars A and B. The permanent magnet was placed close to the iron fillings as shown in Fig 2(a) and then removed. The metal bars attracted the iron filings as shown in Fig 2b.



During attraction

FIG. 2a



After

FIG. 2b

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

5. **Figure 3** below shows two parallel current carrying conductors P and Q placed close to one another. Current flows in the opposite directions



Fig. 3

Sketch on the figure the magnetic field pattern formed by the two conductors **(1mk)**

6. **Figure 4** below shows two identical lamps lamps **L1** and **L2** connected to a battery.

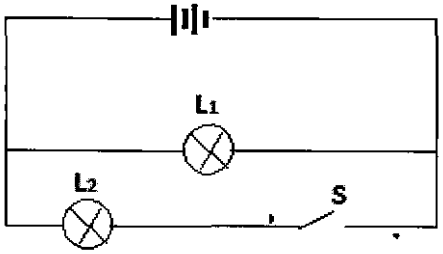


Fig 4

(a) Using an arrow, indicate on the diagram above the direction of the convectional current **(1mk)**

(b) State the effect if any, of closing switch S on L1 **(1mk)**

7. **Figure 5** below shows a ray light incident on water-kerosene interphase

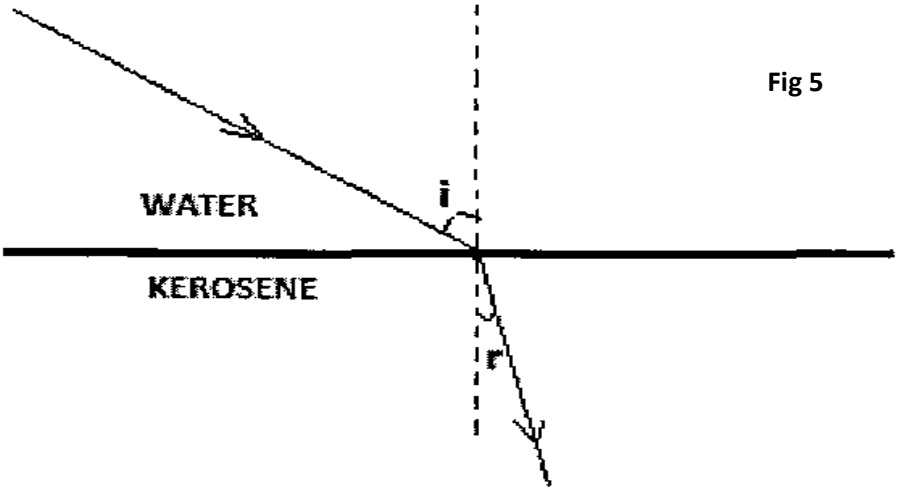


Fig 5

State which one of the two liquids has a higher absolute refractive index **(1mk)**

8. **The table** in figure 6 below shows part of the electromagnetic spectrum in order of decreasing wavelength.

A	B	INFRA RED RADIATION	VISIBLE LIGHT	C	D

Fig. 6

(a) How are waves **C** produced? **(1mk)**

(b) State one use of the wave **D** **(1mk)**

9. The source of sound and two listeners are position close to a tall building as shown in the fig.7

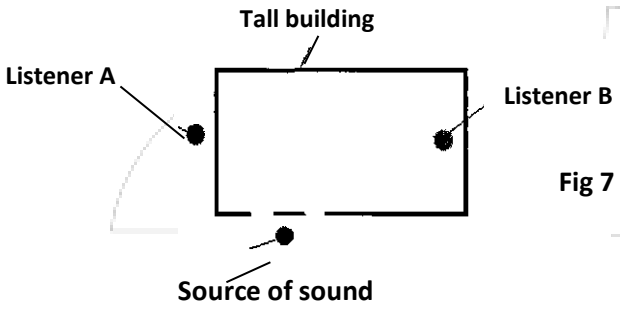


Fig 7

(a) **State** the property of sound by which Listener A is able to hear the sound produced **(1mk)**

(ii) Listener **B** is moving directly towards Listener **A** and has a problem hearing the sound produced. Explain **(2mks)**

10. **A** house has a lighting circuit operated from a 240V mains supply. Four bulbs rated 40W, 240V and six bulbs rated 100W, 240V are switched on for 5 hours a day. Determine the monthly bill for the consumer given that the cost of electricity is at Kshs.5.50 per unit.

(*Take 1 month= 30 days and the standing charge is sh.150)* **(3mks)**

11. **State two** properties of x-rays similar to those of visible light. **(2mks)**

12. State any **one** condition under which a pinhole camera may form an image on its screen which has the same size as the object. **(1mk)**

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

(b) Explain how the intensity of radiation affects the photo-electric effect **(1mk)**

14. Figure 8 below shows an eye defect

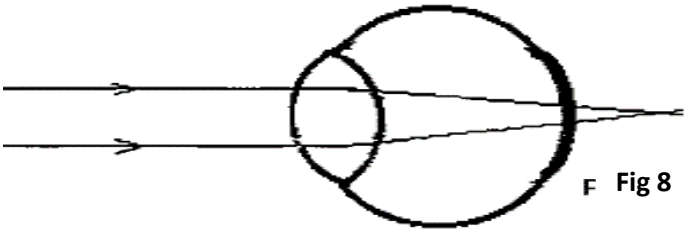


Fig 8

Use a ray diagram to show how the defect above could be corrected **(2mks)**

SECTION B (55 MARKS)

15. a) An object **O** stands on the principal axis of a concave mirror as shown in figure 9 below

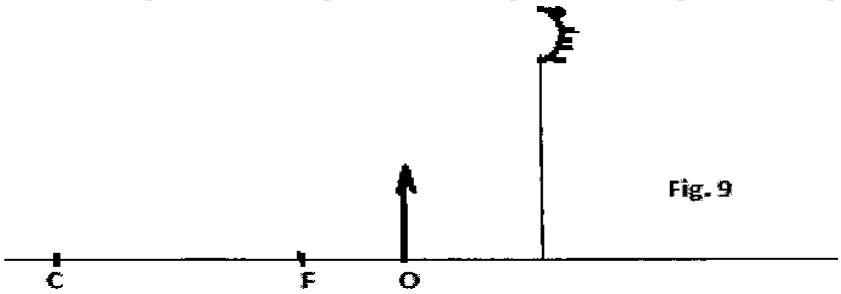
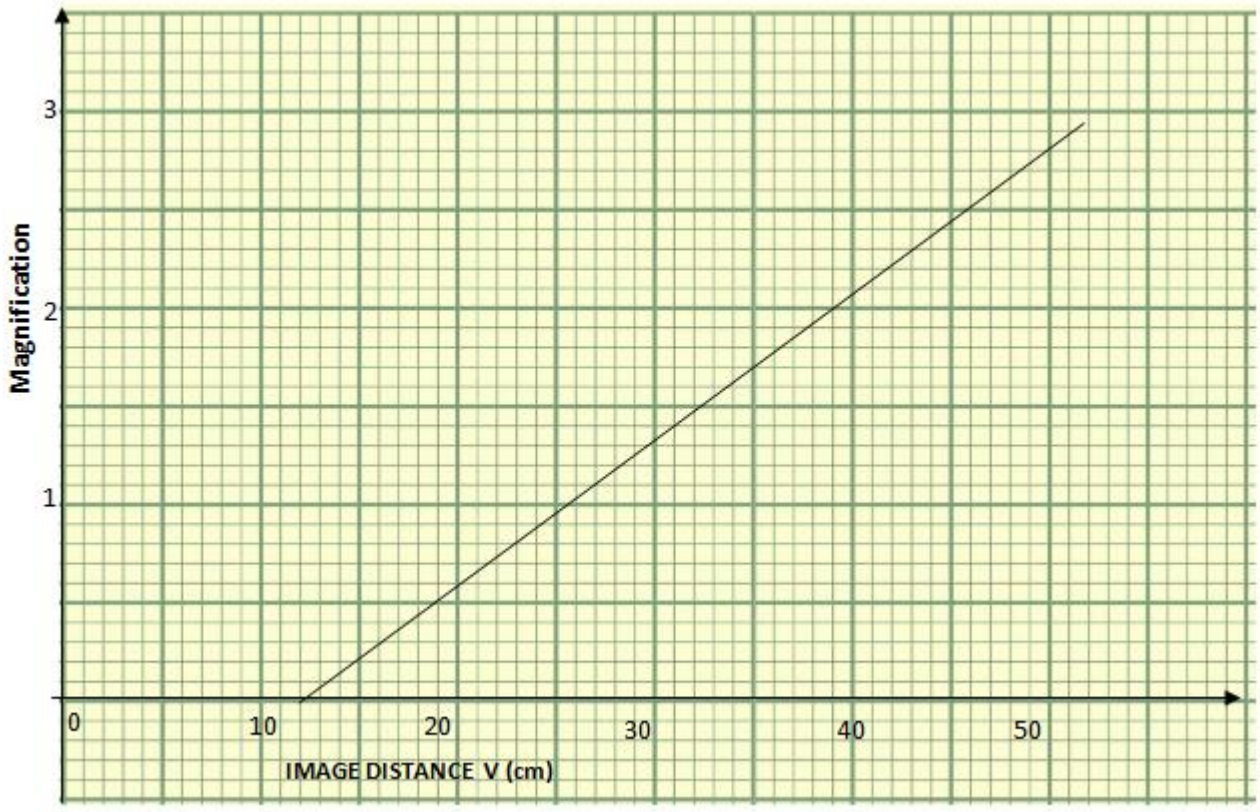


Fig. 9

(i) By drawing suitable rays, show the position of the image **(3mks)**

(ii) Determine the magnification of the image formed **(3mks)**

(b) In experiment to determine the focal length of a concave mirror, a group of form two students collected some data and used the results to plot the graph shown in figure 10 below.



Using the graph above, determine:

(i) The object position when the image position is 45cm **(2mks)**

(ii) Slope of the graph **(3mks)**

(iii) The focal length of the mirror.

(2mks)

16. (a) Students set up a mass attached to a spring such that when it oscillates it taps on water surface in a wide shallow tank as shown in figure 11 below.

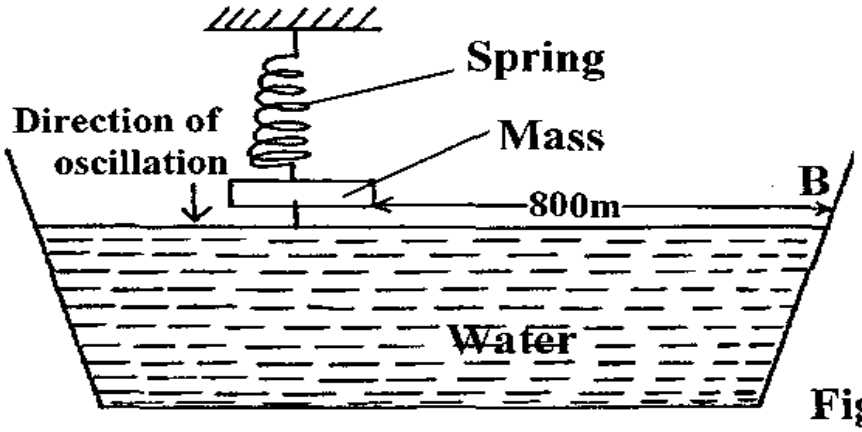


Fig. 11

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

Determine

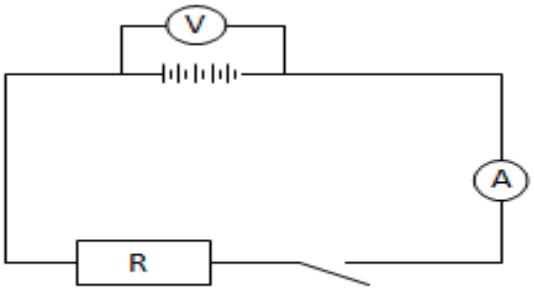
(i) The periodic time of mass **(2mks)**

(ii) The frequency of the waves produced on the water surface **(1mk)**

(iii) The speed of the waves if the students counted four ripples between the mass and end B of the tank **(3mks)**

(b) State any **one** factors that would increase the speed of sound in air **(1mks)**

c) It was noted that for the circuit diagram below when S was open the voltmeter gave a reading of 12V but when the switch was closed the voltmeter reading drops to 10V.



i) Explain why there is a difference in the reading on the voltmeter when the switch is open and when it is closed. **(2 mks)**

ii) Name one example of a non ohmic coductor **(1 mk)**

iii) If the ammeter gave a reading of 0.8A when S is closed, determine the value of R. **(2 mks)**

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

(ii) Figure 12 below shows a pair of parallel plates of a capacitor connected to a battery

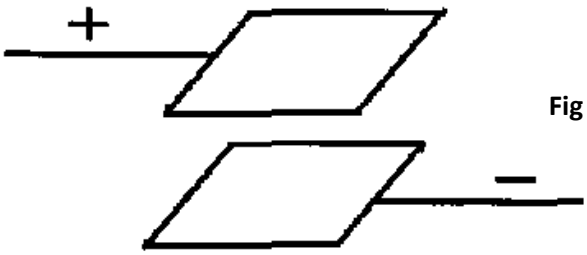


Fig 12

State with a reason the effect of moving the positive plate on the capacitance. **(2mks)**

(I) Vertically downwards

(II) Horizontally to the left **(2mks)**

(b) The circuit diagram in figure 13 below shows four capacitors connected between two points **A** and **B**

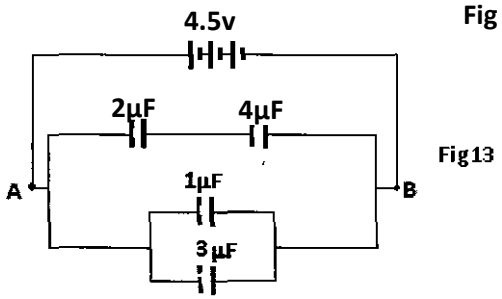


Fig 13

Fig13

i) Determine the capacitance across **AB** **(3mks)**

(ii) Calculate the total energy stored in the 4μF capacitor **(3mks)**

18. (a) A student is provided with two resistors of value 2Ω and 6 Ω

(i) Draw a circuit showing the resistor connection that provides the greatest current **flow** **(2mks)**

(ii) Calculate the total resistance of the circuit *(assume negligible internal resistance)* **(2mks)**

(b) Given that the battery in your circuit in a(i) has an e.m.f of 3V and internal resistance 1.2Ω. Calculate the current through

(i) The 6Ω resistor **(3mks)**

(ii) The 2Ω resistor **(2mks)**

19. The graph in the figure 14 below shows the relationship between the attractive forces of an electro magnetizing current

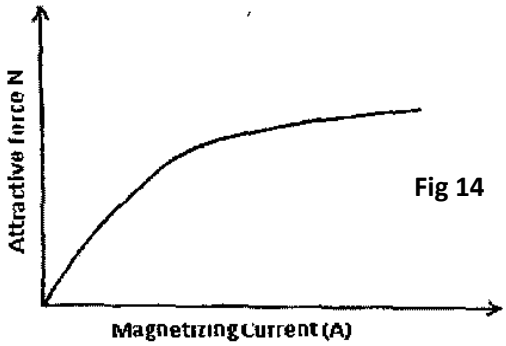


Fig 14

(a) Give reasons for the shape of the graph by domain theory **(3mks)**

(b) On the same fig.14, sketch a graph for the case where the soft iron core is replaced with steel. **(2mks)**

(c) Two similar razor blades were placed one on a wooden block and the other on an iron block as shown in figure 15.

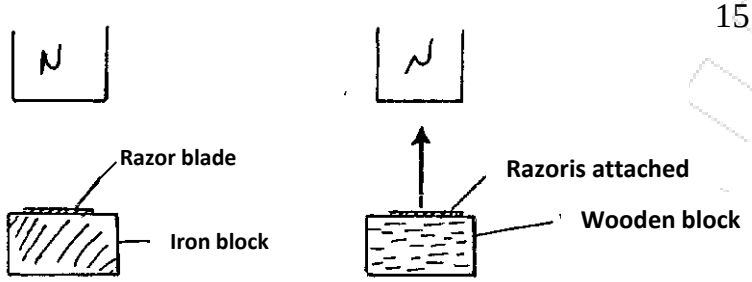


Fig. 15

State and explain the observation on the razor blade;

(b) On the iron block **(3mks)**

(ii) On the wooden block **(2mks)**

KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 2

232/1

PHYSICS

PAPER 1 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

Write your name, index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided.
*This paper consists of **TWO** Sections: **A** and **B**.*
*Answer **ALL** the questions in section **A** and **B**. All working **MUST** be clearly shown.*
KNEC mathematical tables and silent non-programmable electronic calculators may be used.
Candidates should answer the questions in English.
Take: ***Acceleration due to gravity,*** $g = 10\ m/s^2$

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A (25 MARKS)

Answer all the questions in this section.

1. The figure 1 below shows a section of a micrometer screw gauge when used to measure the diameter of a cylindrical rod of mass 2.5g.

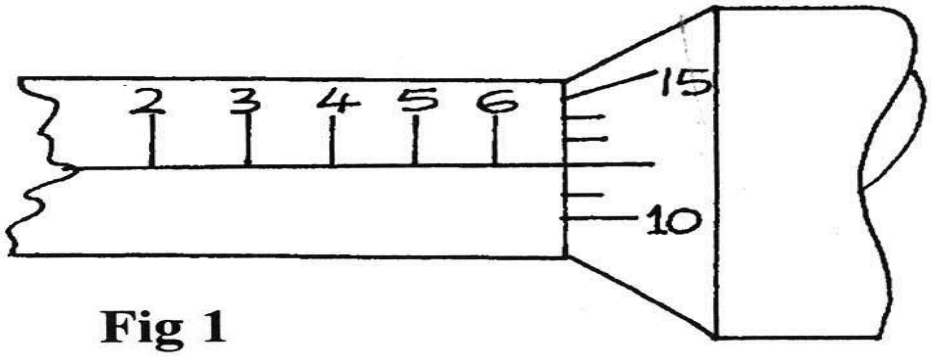


Fig 1

a) What is the diameter of the rod? **(1mark)**

b) If the length of the rod is 14cm, determine its density. **(3marks)**

2. The density of a solid decreases after heating. Explain. **(2marks)**

3. When a drop of oil is placed on the surface of water it spreads out forming a circular patch. Explain this observation. **(2marks)**

4. A uniform meter rule is balanced as shown in the figure 2 below.

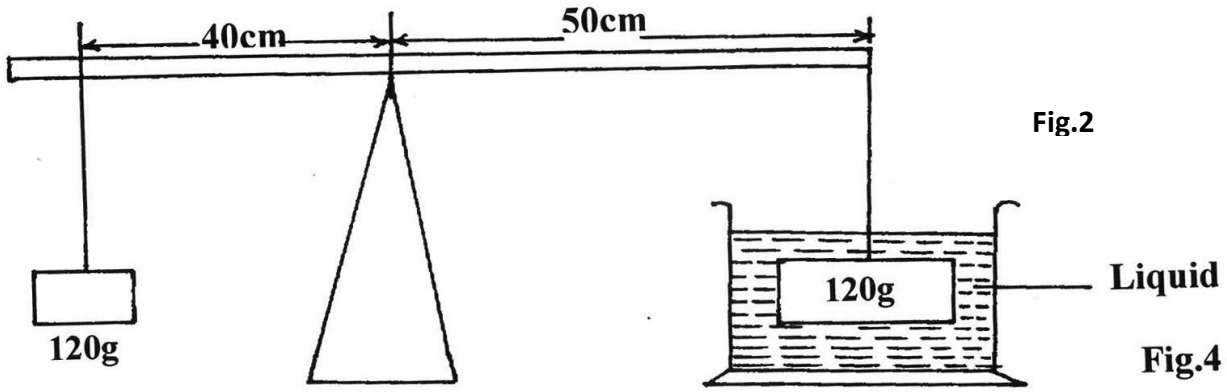


Fig.2

Fig.4

The volume of the immersed object is 13. 5cm^3. Determine the relative density of the liquid.

(3marks)

5. Give a reason why a person may nose bleed after ascending a high mountain. **(1mark)**

6. A turntable of radius 10cm is rotating at 42 revolutions per second. Determine the linear speed of a point on the circumference of the turntable. **(3marks)**

7. Figure 3 below shows a glass filled with hot liquid placed on a table immediately after wiping with water. State and explain what is observed when one tries to lift the glass after a few minutes. **(2marks)**

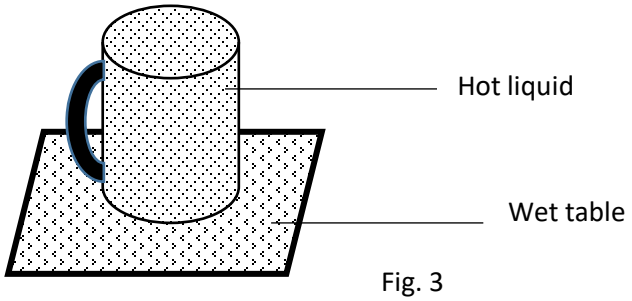


Fig. 3

8. In using the lift pump to raise water from a bore hole. It is observed that practically the height the water is raised cannot be 10m and more. Give two reasons for this observation.**(2marks)**

9. When a mass of 2kg is hang from a single spring, the spring extends by a distance 10cm. Determine the total extension in the set up in Figure 4 below given that the springs are identical **(2marks)**

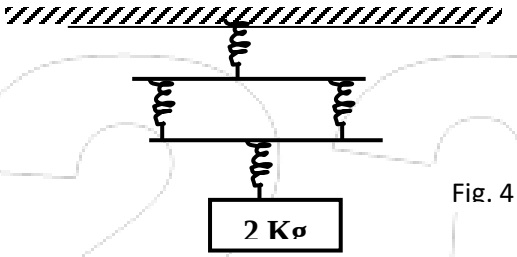


Fig. 4

10. Define the term viscosity. **(1mark)**

11. State one reason why the efficiency of a machine is always less than 100% **(1mark)**

12. State two factors that determine the critical speed for a car moving along a curved road. **(2marks)**

SECTION B (55 MARKS)

Answer all the questions in this section in the spaces provided

13. (a) State the law of Floatation. **(1mark)**

(b) A submarine made of iron was observed to float in water while a piece of iron rod sinks in water. Explain this observation **(2marks)**

(c) A solid displaces 5.0cm^3 of liquid when floating and 20cm^3 when fully immersed in it. Given that the density of the solid is 1.2g/cm^3. Calculate

i) The weight of the solid **(2marks)**

ii) Upthrust on the solid when floating **(1mark)**

iii) The density of the liquid **(3marks)**

iv) The upthrust when the body is fully submerged **(3marks)**

(d) Define the term relative density as used in liquids **(1mark)**

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

(b) Water of mass 400g at a temperature of 60^{o}C is put in a well lagged copper calorimeter of mass 160g. A piece of ice at 0^{o}C and mass 40g is placed in the calorimeter and the mixture stirred gently until all the ice melts. The final temperature, T, of the mixture is then measured. (*Specific latent heat of fusion of ice = 334000J/kg, specific heat capacity of water = 4200J/kgK specific heat capacity of copper = 400J/kgK*)

Determine:

(i) The heat absorbed by the ice during melting. **(2marks)**

(ii) Total heat gained by the melted ice (*Give your answer in terms of T*) **(2marks)**

(iii) Total Heat lost by the water and Calorimeter **(3marks)**

(iv) The final temperature T of the mixture. **(2marks)**

c) Figure 5 below shows a block of ice with two heavy weights hanging such that the copper wire connecting them passes over the block of ice block resting on wooden support.

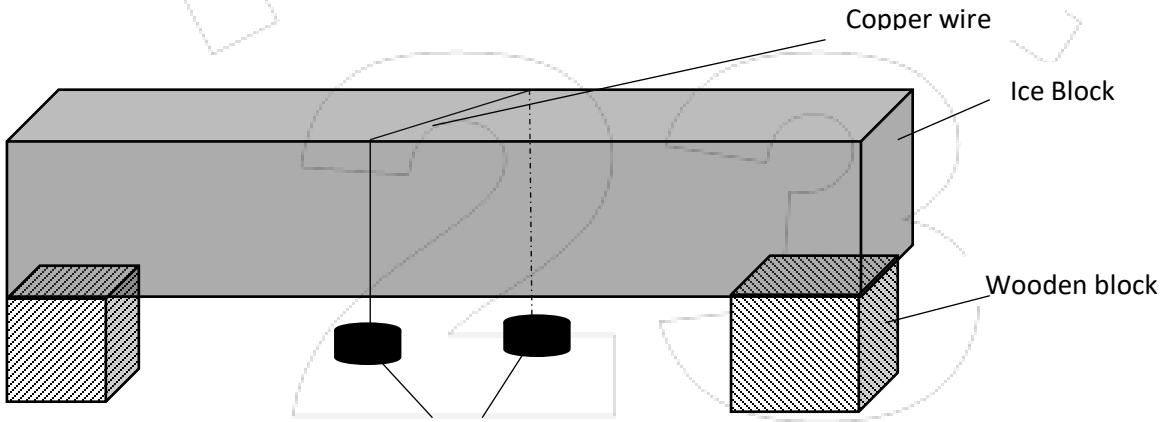


Fig. 5

It is observed that the wire gradually cuts its way through the ice block, but the ice is left as one piece. State the factor behind the observation. **(1mark)**

15. (a) (i)Define the Impulsive force in terms of momentum. **(1mark)**

(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. **(3marks)**

(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 force of 4N is acting between the block and surface.

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

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

(c) Explain why a paratrooper flexes his legs as he lands. **(2marks)**

16. The figure 6 **below** shows an inclined plane, a trolley of mass 30kg is pulled up a slope by a force of 100N, parallel to the slope. The trolley moves so that the centre of mass C travels from points A to B.

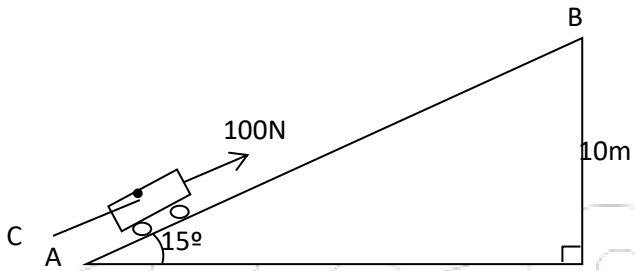


Fig. 6

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

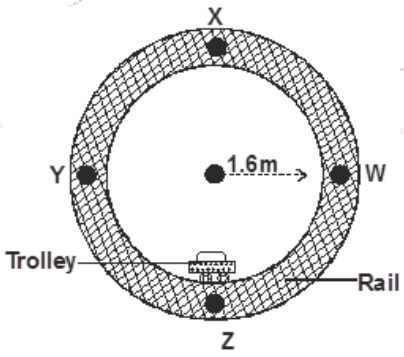
(ii) Determine the work done by the force in moving the trolley from **A** to **B**. **(2marks)**

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

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

(v) Determine the mechanical advantage of the system. **(2marks)**

17. Figure 7 below shows a trolley moving on a circular rail with a vertical plane, given that the mass of the trolley is 250g and the radius of the rail is 1.6m.



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

ii) Find the angular velocity at point Z **(2marks**

iii) The force exerted on the rail at this point Z. **(3marks)**

iv) State one application of circular motion in daily life**.** **(1mark)**

KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 2

232/2

PHYSICS

PAPER 2 (THEORY)
TIME: 2 HOURS

NAME……

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INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

- *Write your name and Admission number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *This paper consist of **two** section **A** and **B***
- *Answer all the questions in the spaces provided*
- *All working **must** be clearly shown in the spaces provided.*
- *Non programmable silent electronic calculator may be use*

FOR EXAMINER'S USE ONLY

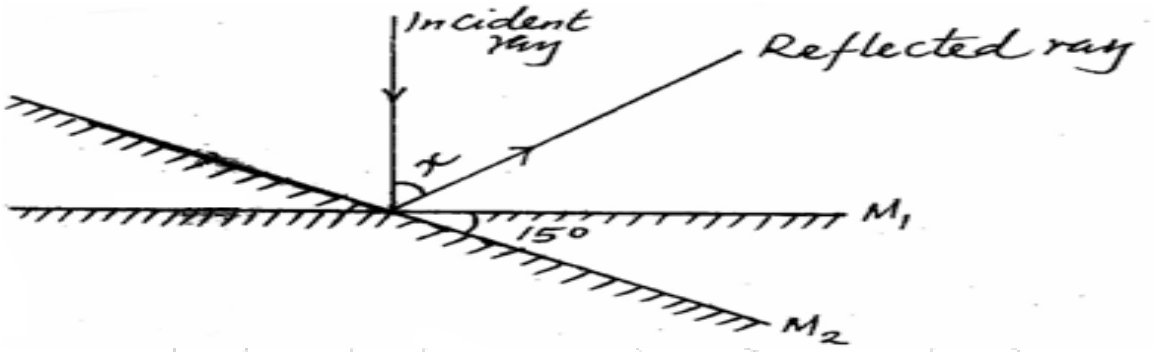
SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A {25 MARKS }

Answer all the questions

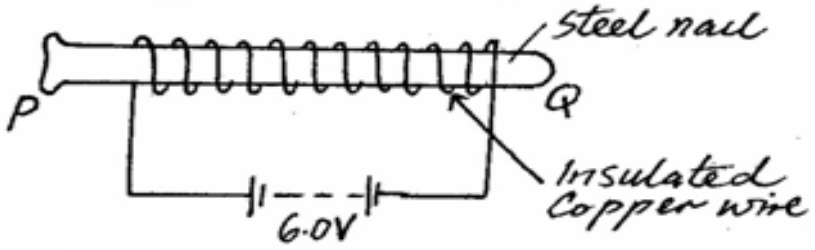
1. State t**wo** conditions under which a pinhole camera may form an image on its screen which has the same size as the object**.** **(2mks)**

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



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

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

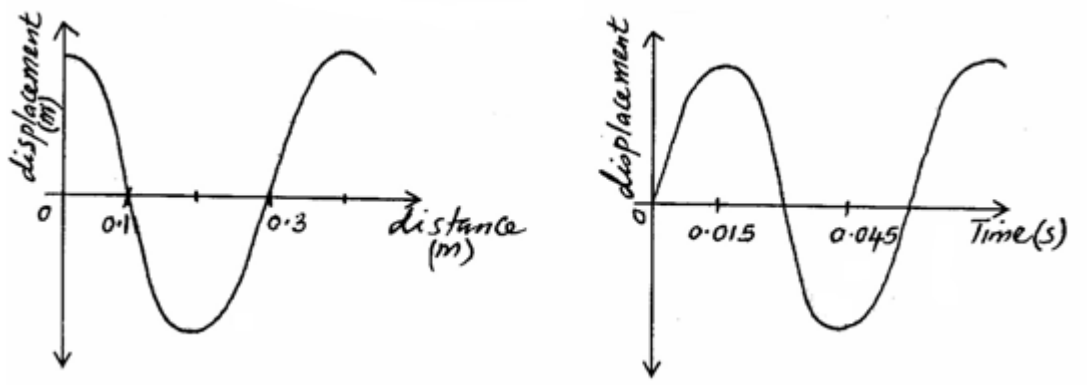


P: _____

Q: _____

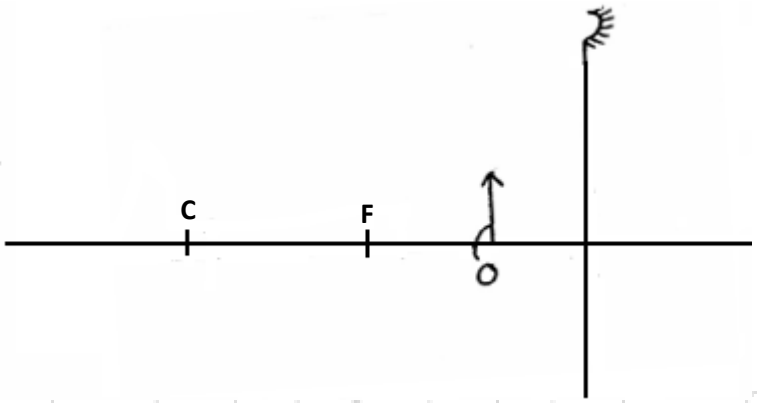
4. A small chain is often seen hanging at the back of a petrol carrying lorry. State and explain its significance. **(2mks)**

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



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

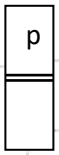
6. An object O is placed in front of a concave mirror and on the principal axis, as shown in the figure **below**. Complete the light ray diagram to locate the position of the image. **(3mks)**



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

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

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



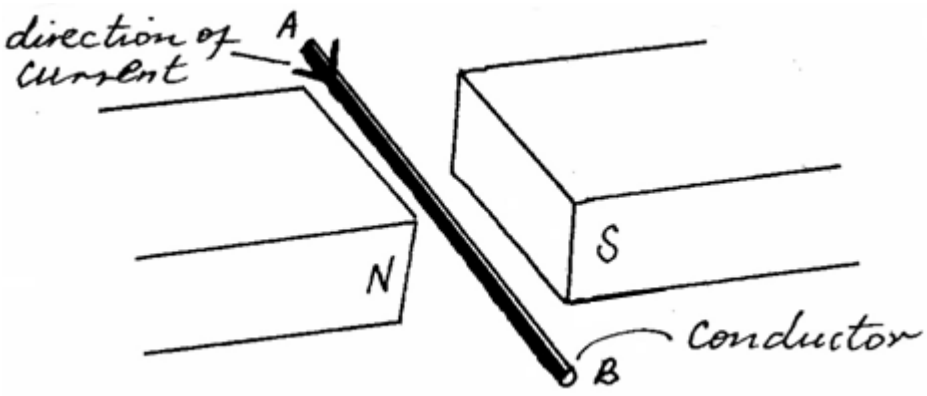
On the same diagram, show how a cell may be connected so that it is reverse biased. **(1mk)**

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

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

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

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



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

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

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

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

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

SECTION B: (55 MARKS)

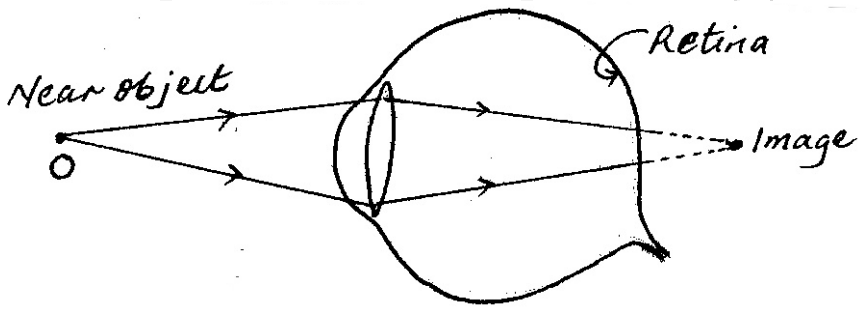
Answer question in this section in the spaces provided.

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

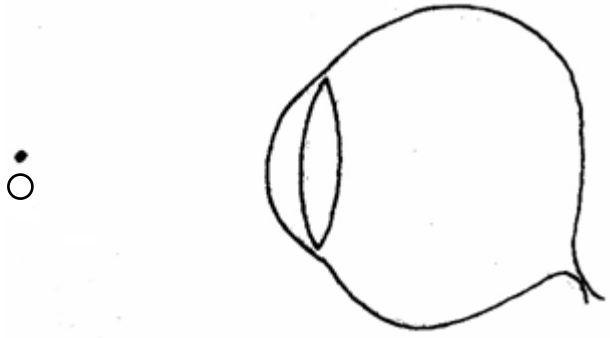
(b) The critical angle of a certain material medium is 43.2º. Determine the refractive index of the material. **(2mks)**

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

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



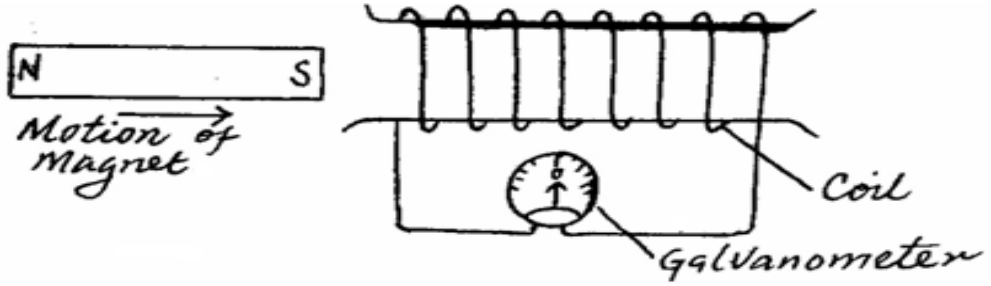
(iii) On the figure **below** show how the defect can be corrected. **(2mks)**



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

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

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



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

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

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

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

(i) Determine

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

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

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

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

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

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

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

Thermionic emission. **(1mk)**

Photoelectric emission. **(1mk)**

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

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

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

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

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

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

Calculate:-

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

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

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

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

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

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

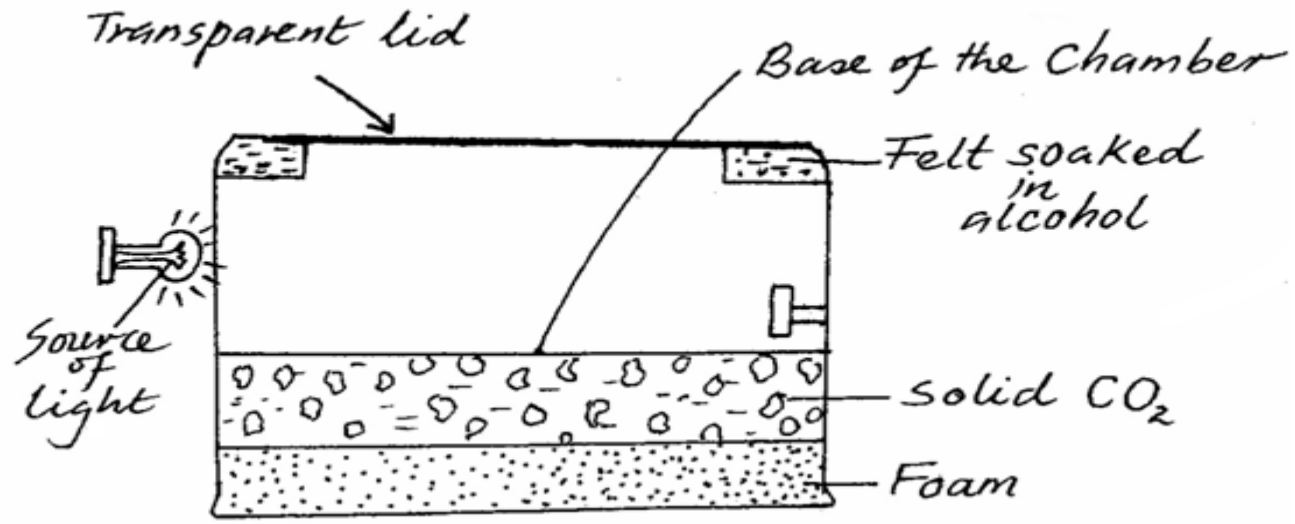
(b) The graph **below** shows the activity (disintegrations per minute) of a sample of carbon-14 against the time in years.

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

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

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

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



(i) State the function of the following:

I. Alcohol. **(1mk)**

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

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

KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 3

232/1

PHYSICS

PAPER 1 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

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Candidates should answer the questions in English.
Take: ***Acceleration due to gravity,*** $g = 10\ m/s^2$

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SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
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	TOTAL SCORE	80	

SECTION A (25 MARKS)

Answer all the questions in this section.

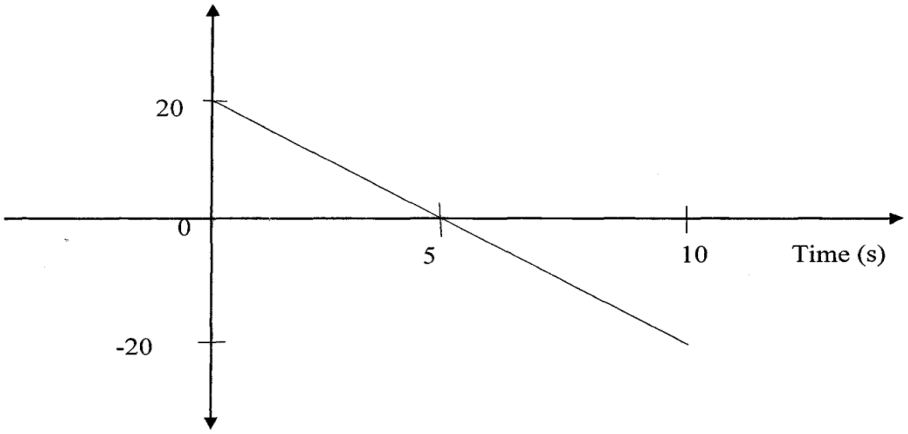
1. Name the branch of physics that deals with solar water heating system. **(1 mark)**

2. Define the term "Ideal gas" as used in gas **laws** **(1 mark)**

3. At Thompson falls water, falls through a height of 30m. Calculate the final temperature if the temperature at the top is 14°C (Take g = 10 N/kg and s.h.c of water = 4200 J/kgK) **(3 marks)**

4. State two conditions that must be fulfilled for a body to be in equilibrium **(2 marks)**

5. The figure below shows a graph of velocity against time for a moving body.



Determine the distance covered by the body during the 10 seconds **(3 marks)**

6. Smoke is enclosed in smoke cell and sealed. When illuminated and viewed under a microscope, it is observed to be moving in continuous random motion. State and explain the observation when cold water is poured on the smoke cell**.** **(2 marks)**

7. The pressure inside a submarine is maintained at 500m of mercury(500mHg). Determine the depth at which the submarine will be safe from implosion taking the density of water as $1.025g/cm^3$ and atmospheric pressure = 760cmHg. (Take the density of mercury as 13600 Kg/m^3**)** **(3 marks)**

8. Explain why two cars are likely to crush as they travel at high velocities sideways**.** **(2 marks)**

9. When a body of mass 0.25kg is acted on by a force, its velocity changes from 5.0 m/s to 7.5m/s, determine the impulse of the force**.** **(2 marks)**

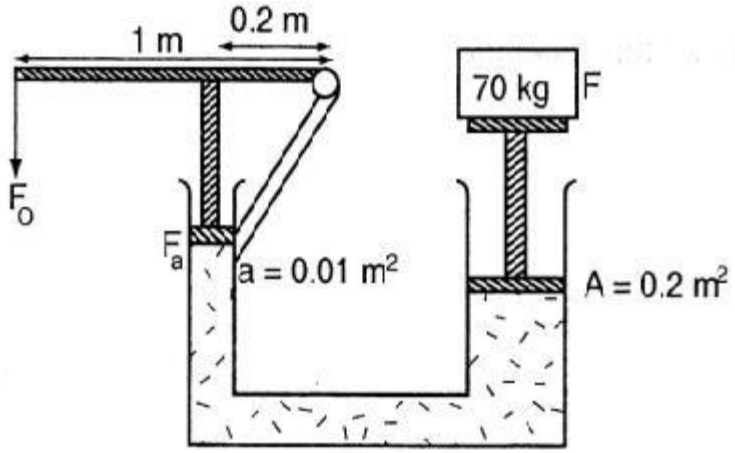
10. State two factors that affect the spring constant of springs made from the same wire. **(2mks)**

11. Draw a well labeled diagram of a clinical thermometer**.** **(3 marks)**

12. Differentiate between solids, liquids and gases in terms of thermal conductivity. (**1 mark)**

SECTION B (55 MARKS) Attempt ALL questions in this section.

13. The figure below shows a hydraulic press supporting a load F.



a) What properties of oils make them suitable for use in hydraulic machines such as the one above? **(2marks)**

b) If A and a are areas of cross-section of the pistons, and the lengths of the arm are as given, find:

i. The force $\mathbf{F_a}$ **(2 marks)**

ii. The force $\mathbf{F_0}$ **(2 marks)**

c) The mechanical advantage of the machine **(1mark)**

d) The velocity ratio of the **machine** **(3 marks)**

e) State one reason why the efficiency of a pulley system is always less than 100**%** **(1 mark)**

14. a) State Newton's third law of motion. **(1 mark)**

b) Distinguish between elastic and inelastic collision. **(2 marks)**

c) A mini bus of mass 2000kg travelling at a constant velocity of 20m/s collides with a stationary car of mass 1000kg. The impact takes 2 seconds before the two moves together at a constant velocity for half a minute. Calculate.

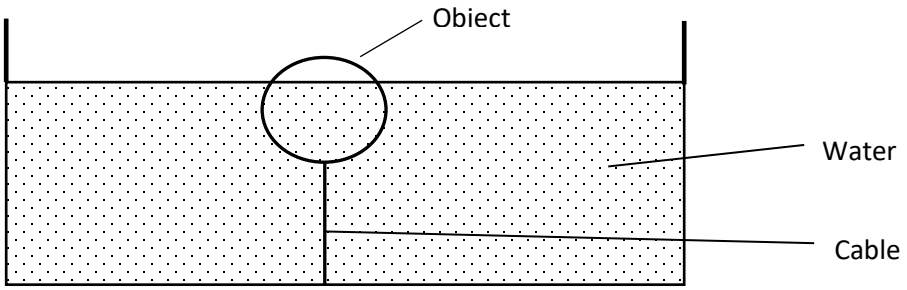
i) The common velocity **(3 marks)**

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

iii) The change in Kinetic energy. **(3 marks)**

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

b) The figure below shows a floating object of volume 4000cm^3 and mass 10g. It is held as shown in water of density 1.25g/cm^3 by a light cable at the bottom so that ¾ of the volume of the object is below the water surface (Assume the upthrust due to air is negligible).



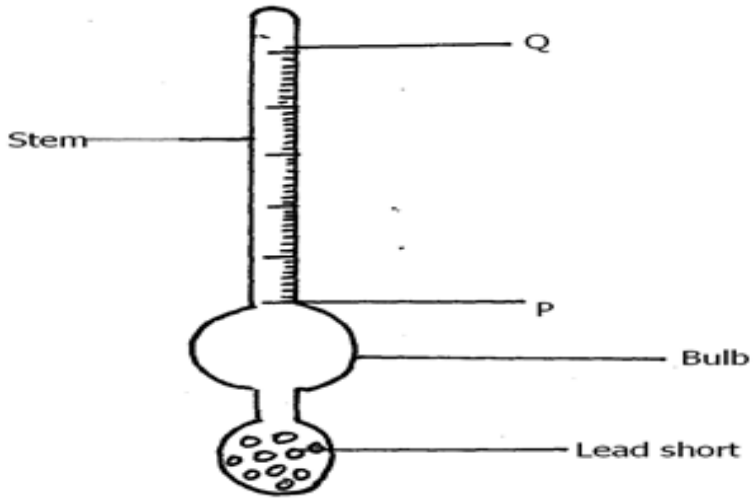
i) Calculate the volume of the object under water. **(2 marks)**

ii) Calculate the weight of water displaced. **(3 marks)**

iii) Determine the tension in the cable. **(2 marks)**

iv) Calculate the density of the object. **(2 marks)**

c) The diagram below shows a car acid hydrometer.



(i)Indicate on the diagram above the minimum and the maximum measurement to be taken.

(1 mark)

(ii) State the reason why

I. The bulb is wide. **(1 mark)**

II. Lead shots are **used** **(1 mark)**

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

b) In an experiment to determine the specific latent heat of vaporization of water, steam at 100°C was passed into water at 5°C contained in a well-lagged copper calorimeter. The following measurements were made;

Mass of calorimeter 50g

Initial mass of water 70g

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

Final temperature of mixture = 30°C

(Specific heat capacity of water =4200 Jkg^{-1} K^{-1}, specific heat capacity for copper =390 Jkg^{-1} K^{-1})

(i) Determine the:

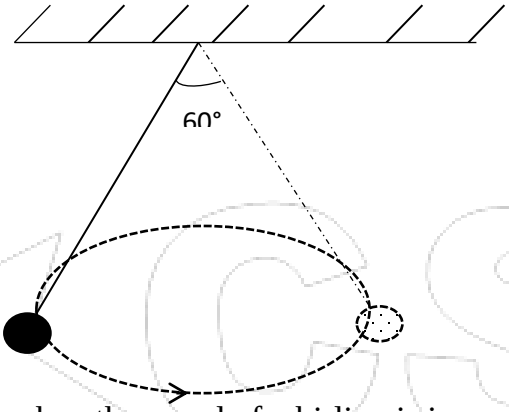
I. Mass of condensed **steam** **(2 marks)**

II. Heat gained by the calorimeter and **water** **(3 marks)**

(ii) Given that L is the specific latent heat of vaporization of steam, determine the value of L. **(3 marks)**

17. a) Define the term angular velocity. **(1 mark)**

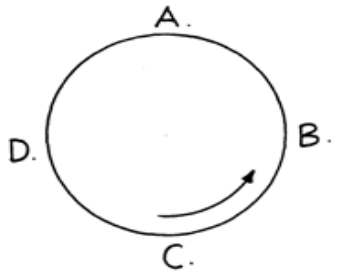
b) A body of mass 5 kg is whirled horizontally making a conical pendulum as shown in the diagram below



i. State what happens when the speed of whirling is increased **(1 mark)**

ii. If the radius of the path is 50cm and the centripetal force is 285N. Determine the linear velocity of the **mass** **(3 marks)**

c) A stone is whirled in a vertical circle as shown in the figure below using a string of length 40 cm. A, B, C and D are various positions of the stone in its motion. The stone makes 2 revolutions per second and has a mass of 100g.



i) Calculate:

I. The angular velocity **(2 marks)**

II. The tension on the string at position **A** **(3 marks)**

(ii) At C where the stone has acquired a constant angular speed, the string cuts. What is the name given to the path followed by the stone? **(1 mark)**

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KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 3

232/2

PHYSICS

PAPER 2 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

- *Write your name and Admission number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *This paper consist of **two** section **A** and **B***
- *Answer all the questions in the spaces provided*
- *All working **must** be clearly shown in the spaces provided.*
- *Non programmable silent electronic calculator may be use*

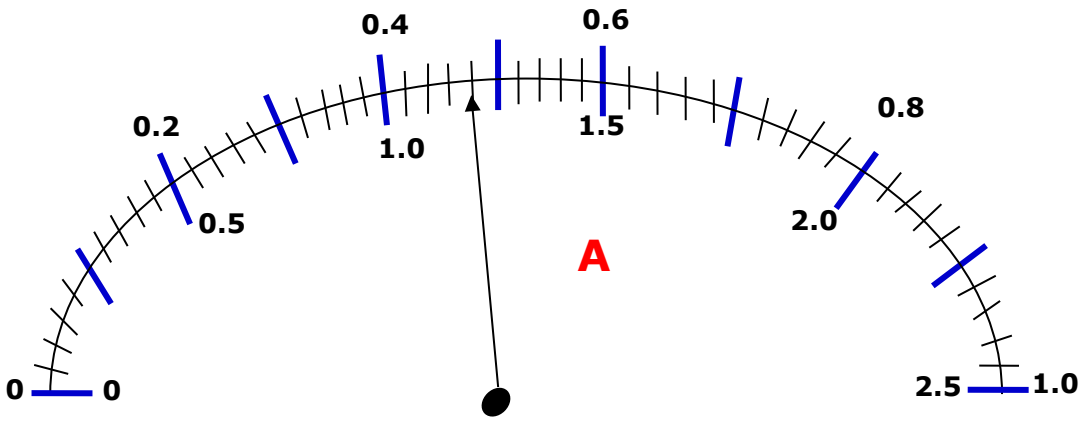
FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A {25 MARKS }

Answer all the questions

1. Figure 1 below shows an ammeter used to measure current flowing through a section of a conductor. The student used the upper scale.



State the reading from the meter. **(1mark)**

2. Why is it safer to carry explosive fuels in metal cans instead of plastic can? **(1mark)**

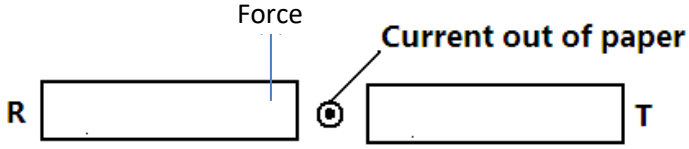
3. What do you understand by rating **9W, 240v** indicated on an energy saving electric bulb?

(1mark

4. (a) Bulb **X** lights while bulb **Y** does not. Explain. **(1mark)**



(b) Figure 3 shows a force on a conductor carrying current when placed in a magnetic field.



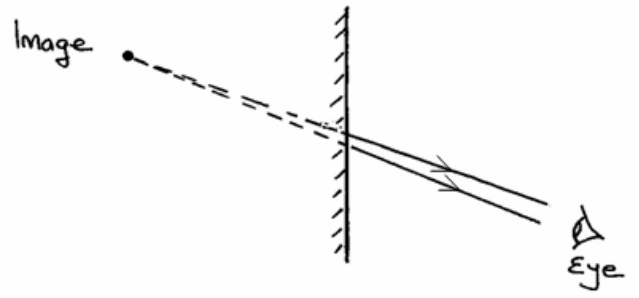
State the polarities ends R and T. **(1mark)**

T _____

R _____

5. What property does a fuse wire have that make it suitable for controlling excessive currents in circuits? **(1mark)**

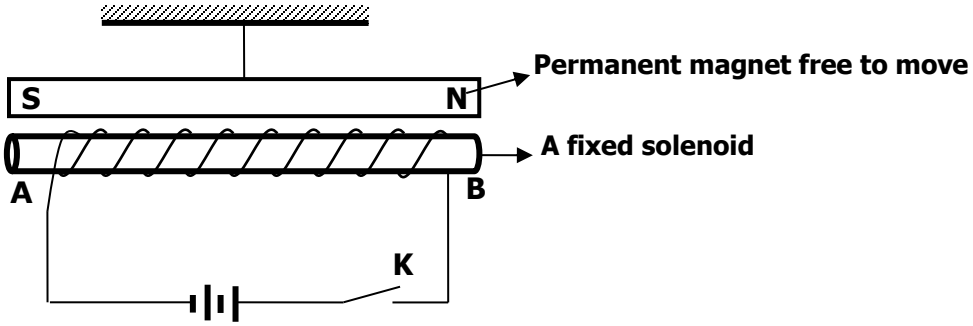
6. (a) The figure 4 below shows an image formed in a plane mirror.



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

(b) An object is placed 20cm in front of a **convex** lens of focal length 15cm. State one characteristic of the image formed. **(1 mark)**

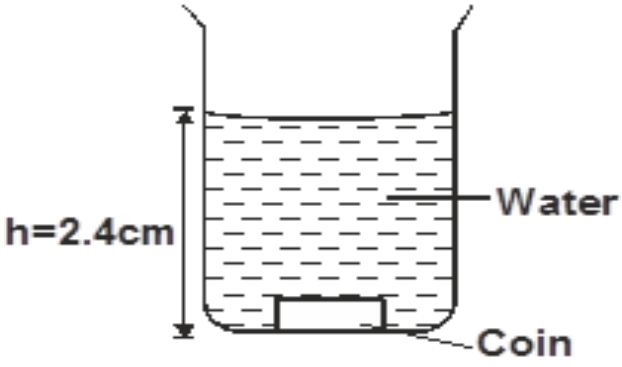
7. Figure 6 below shows an arrangement of a cylindrical bar magnet suspended freely close and parallel to a fixed solenoid.



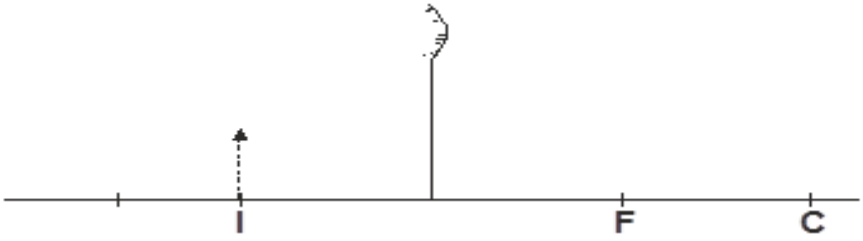
Explain what motion you are likely to observe in the arrangement when switch K is closed.

(1mark)

8. A coin is placed at the bottom of a beaker filled with water to a height of 2.4cm as shown in the figure 7 below. Given that the refractive index of water is 1.33, determine the vertical displacement of the coin. **(2 marks)**

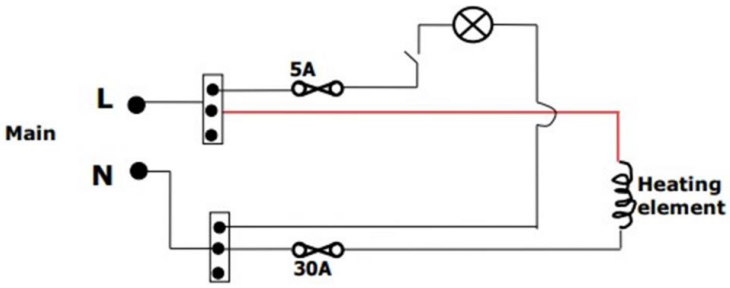


9. (a)The figure 8 below shows an image I formed by an object placed in front of a convex mirror. C and F are the centre of curvature and principal focus of the mirror respectively. Using appropriate rays locate the object position. **(2 marks)**



(b)State one difference between sound waves and electromagnetic waves **(1mark)**

10. (a) The fig 4 below shows a section of a circuit in domestic wiring.

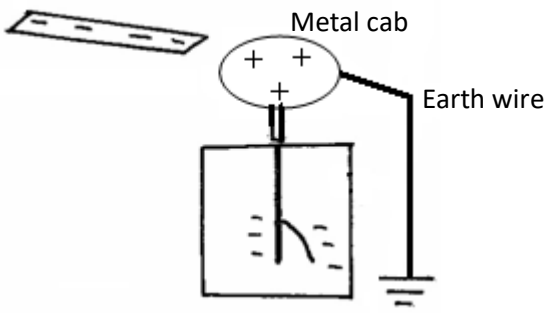


Identify one defect in the wiring. **(1mark)**

(b) State **one** danger of high voltage transmission of electricity over long distances**. (1mark)**

11. Radium $^{226}_{86}R$ disintegrates into a new stable element lead $^{206}_{84}Pb$ how many alpha and Beta particles are emitted **(2marks)**

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

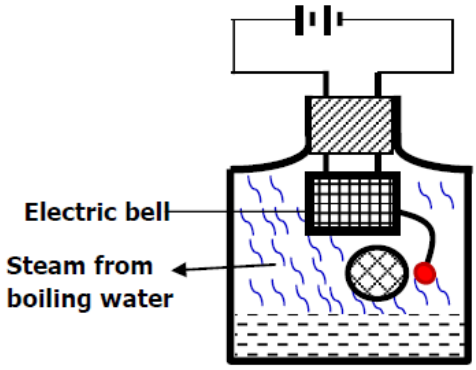


i) the reason why the cap of the electroscope is made circular. **(1 mark)**

ii) On the same diagram, show the direction of the flow of electrons on the earth wire. **(1mark)**

13. An electric heater is found to have a resistance of **950Ω** when operating normally on a **240V** mains. Find the power of the heater. **(2marks)**

14. ..(a) The figure below shows a set up by a student investigating propagation of sound waves.



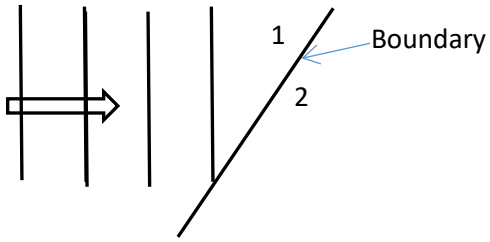
Explain what happens to the sound from the bell as the bottle and its contents are cooled to 0°C .

(1mark)

(b) In determining the depth of an ocean an echo sounder produces ultrasonic sound. Give one reason why this sound is preferred **(1mark)**

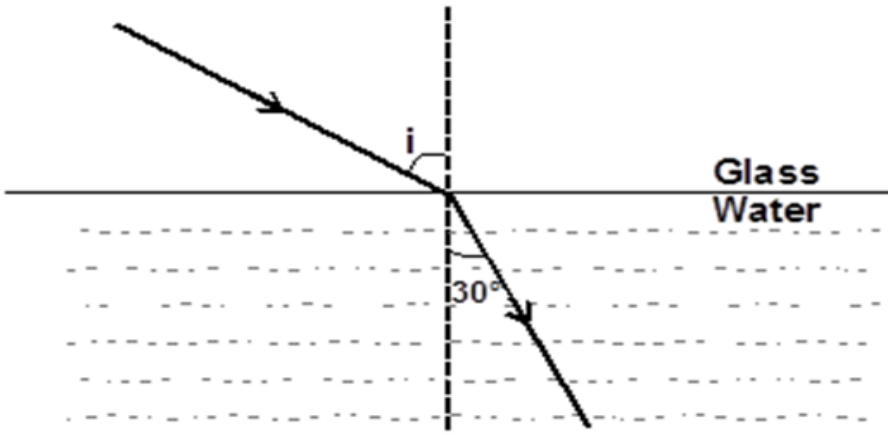
SECTION B (55 marks)

15. a) he figure below shows wave fronts approaching the boundary between two media



The speed of the wave in medium (1) is higher than in medium (2). On the same diagram complete the figure to show the wave fronts after crossing the boundaries **(1mark)**

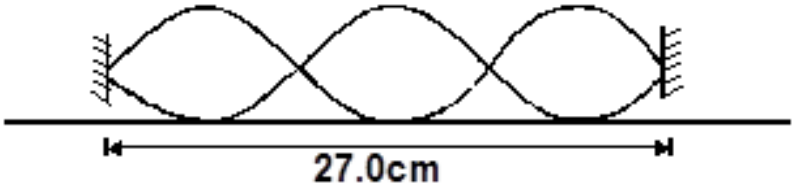
b**)** A ray of light is incident on a glass-water interface as shown in figure 11 below.



Calculate the angle of incidence i. (Take the refractive index of glass and water $^{3}/_{2}$ and $^{4}/_{3}$ respectively. **(3 marks)**

(c.) Prisms are preferred to plane mirrors for use in periscopes. State one reason for this. **1 mark**

d) The figure below shows a standing wave on a string of length 27cm.



Determine the wavelength of the wave. **(3 marks)**

e) The figure below shows a longitudinal wave that takes 0.32s to move from point X to Y and at a speed of 50m/s.



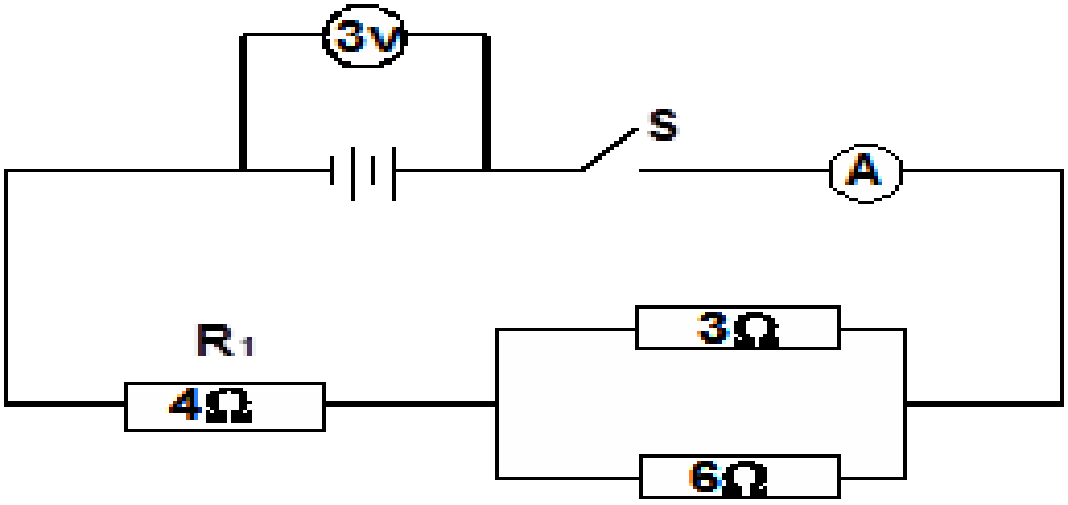
Calculate

i) the frequency of the wave **(2marks)**

ii) the wavelength of the wave **(2marks)**

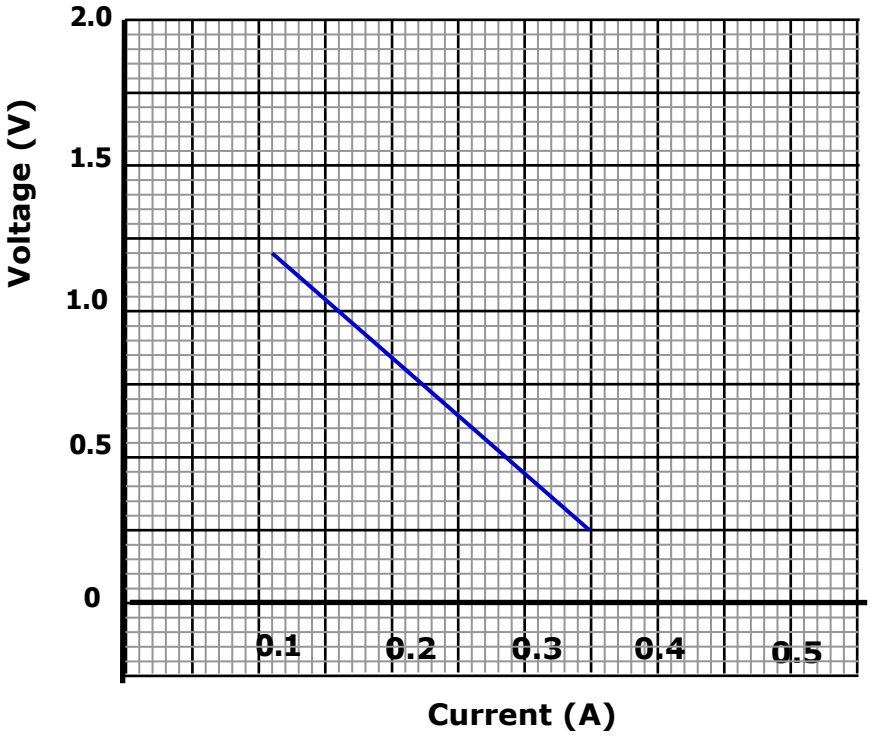
16. a) State one advantage of an alkaline accumulator over lead acid accumulator. **(1 mark)**

b) Figure below shows resistors in a circuit.



Calculate Current through the 4 Ω resistor. **(3 marks)**

c) The graph below shows the Voltage current relationship for a certain battery.

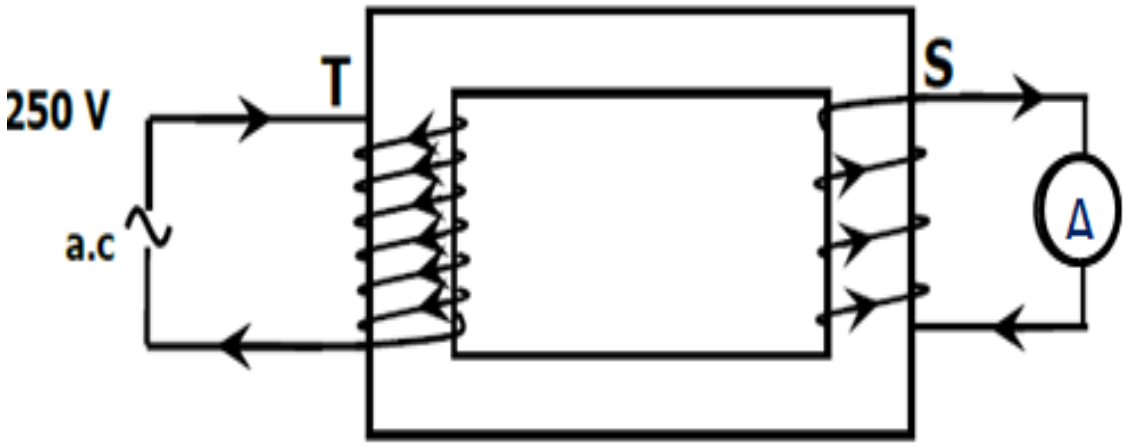


Determine:

(i) The e.m.f of the cell. …… **(1mark)**

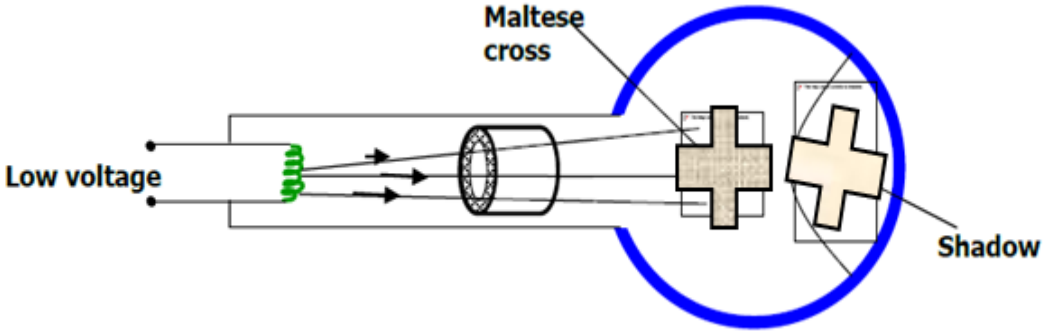
(ii) The internal resistance of the cell. **(3marks)**

(e) Two coils T and S are wound on a soft iron core as shown. T has 1000 turns while S has 600 turns and resistance of 100Ω



Calculate the maximum current measured by the ammeter. **(3marks)**

17. (a) The fig. shows as simple form of cathode ray tube, which produces a sharp shadow of a Maltese cross on a fluorescent screen.

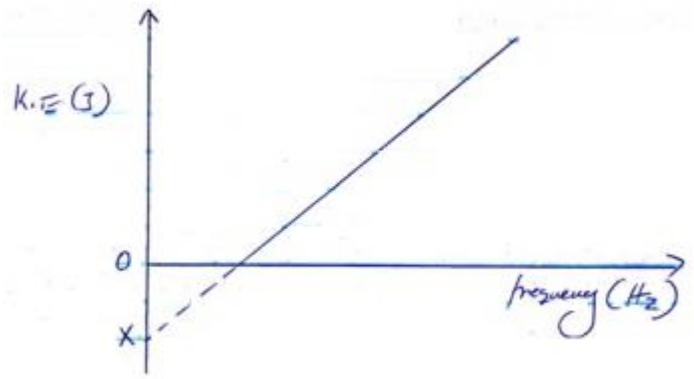


(i) Explain what is meant by cathode rays. **(1mark)**

(ii) What property of cathode rays does the fig. above illustrate (**1mark)**

(b) State one factor that affects photoelectric emission from a given metal surface. (**1mark)**

c). A graph of K.E of photoelectrons emitted by metal surface A against the frequency of radiation used is as shown below



From the graph;

i) What is the significance of the gradient of the graph? **(1mark)**

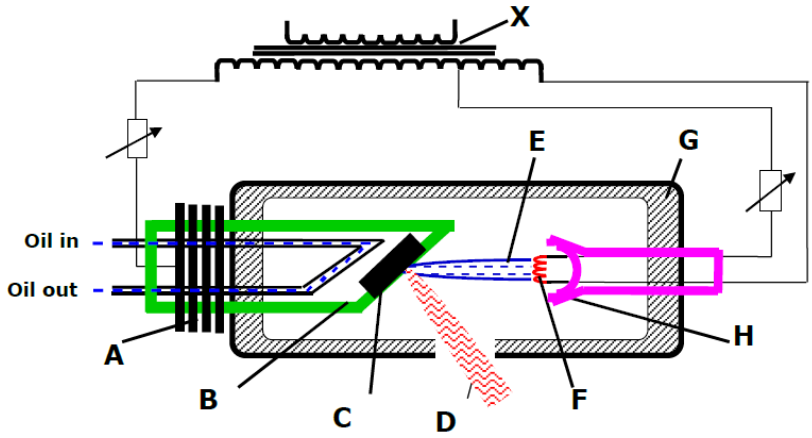
ii) What is the significance of OX **(1mark)**

d) The threshold frequency for potassium is 5.37 x 10^{14}Hz. When the surface of potassium is illuminated by incident radiation from a source, photoelectrons are emitted with the speed of 7.9 x10^{5}m/s. Given that h=*6.62 x 10^{-34} JS and m_e=9 x 10^{-31}kg,* calculate:

i) The work function for potassium **(2marks)**

ii) The frequency of the incident radiation from the second source. **(3marks)**

18. Figure below shows the features of an X-ray tube.



a) Name the parts marked with letters **A** and **H** **(2marks)**

b) Why is tungsten or Molybdenum metal most suitable materials for making part **C**

(1mark)

c) Why is part **B** made of thick copper metal **(1mark)**

d) Why should the machine should be surrounded by material **G**? **(1mark)**

e) Why is the tube evacuated? **(1mark)**

f) What effect will increasing current at **F** have on x-ray produced? **(1mark))**

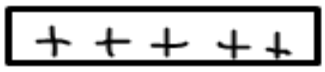
g) What effect will increasing the p.d. between at **B** and **F** have on the x-rays produced **(1mark)**

h) State **one** way in which cooling is achieved in this X-ray machine. **(1mark)**

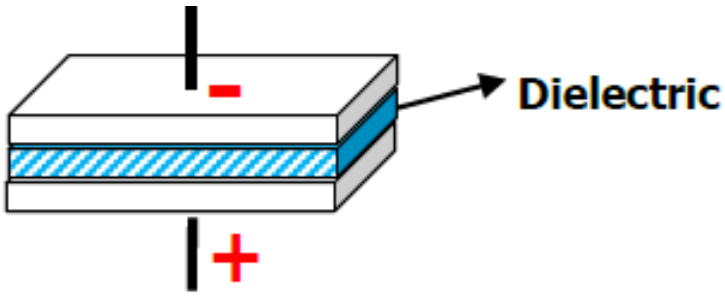
19. .(a) State one difference between a capacitor and a cell. **(1mark)**

(b) Sketch the electrostatic field pattern due to the arrangement of the charges shown **(1mark)**





(c)The diagram shows a parallel plate capacitor with a dielectric material in between the plate.



State how each of the following quantities are affected when the dielectric material is pulled out of the parallel plates.

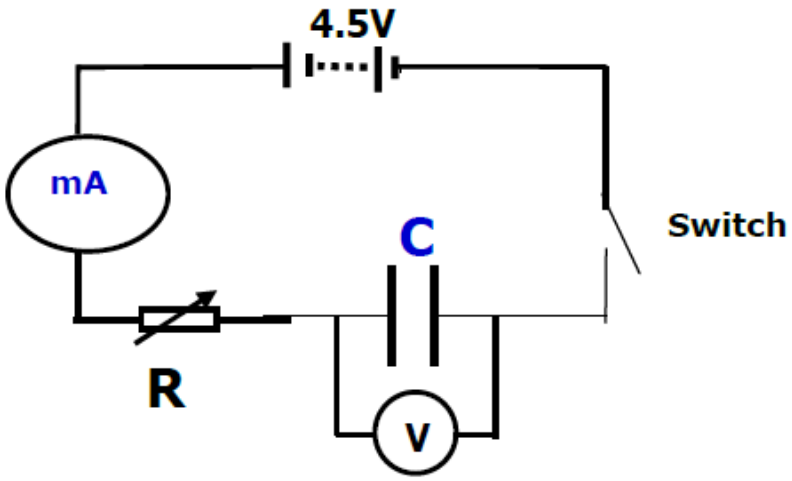
(i) The p.d across the plates. **(1mark)**

(ii) The charge on the plates. **(1mark)**

(iii) The capacitance of the system. **(1mark)**

(d)Three capacitors of 1.5μF, 2.0 μF and 3.0 μF are connected in series to p.d. of 12V. Find the total charge stored in the arrangement **(3marks)**

(e)The figure below shows a capacitor **C** being charged.



State what would be observed on the following when the switch is closed:

(i) The milliameter **(1mark)**

(ii) The voltmeter **(1mark)**

(iii) Explain how the capacitor is charged. **(2marks)**

(c) On the axis provided, sketch the graph of voltage (V) against time (t) **(1mark)**

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KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 4

232/1

PHYSICS

PAPER 1 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

Write your name, index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided.
*This paper consists of **TWO** Sections: **A** and **B**.*
*Answer **ALL** the questions in section **A** and **B**. All working **MUST** be clearly shown.*
KNEC mathematical tables and silent non-programmable electronic calculators may be used.
Candidates should answer the questions in English.
Take: ***Acceleration due to gravity,*** $g = 10\ m/s^2$

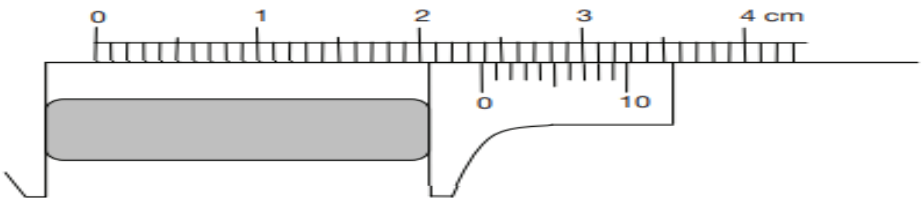
FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A (25 MARKS)

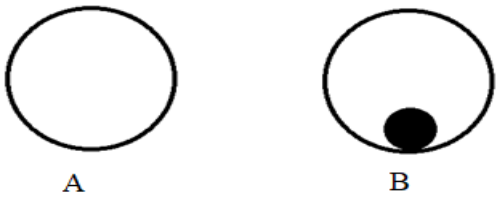
Answer all the questions in this section.

1. The diagram below show a vernier taking the length of a rod whose correct length is 25.4 mm. (Refer the figure below)



Determine the zero error. **(2 marks)**

2. The figure below shows two drums A and B. Drum A is empty while drum B has a cylindrical rod.

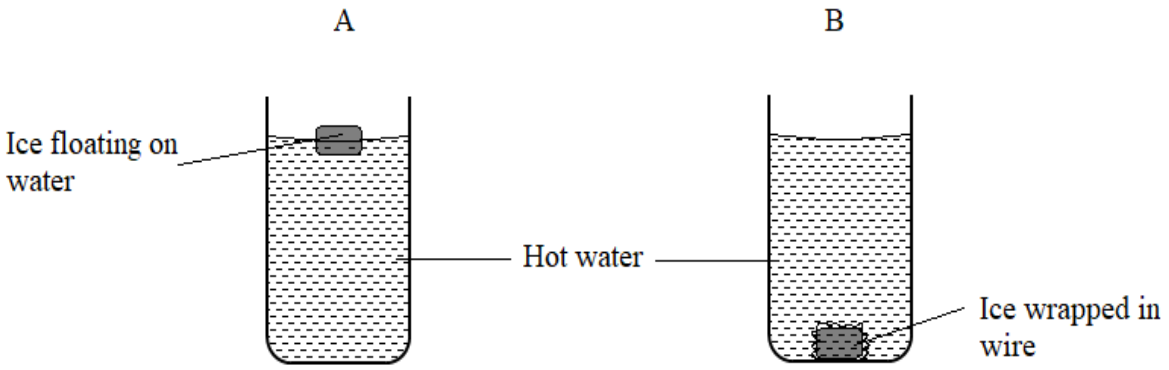


If the two drum are given the same rolling force, state and explain which drum stops first (**2 marks**)

3. An astronaut weighs 500 N on earth and 80N on the surface of another planet. Given that the gravitational field strength of the earth is 10 N/kg, calculate the gravitational field strength of the planet. **(2 marks)**

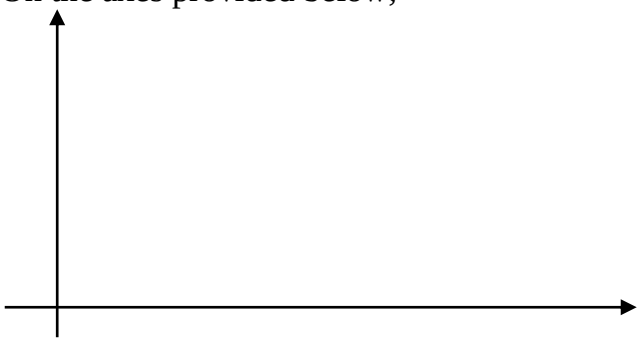
4. In order to estimate the height of a tree, a student measured the length of its shadow and found it to be 3.2 metres. A metre rule that she had produced a shadow of length 240 centimetres. What is the estimation of the tree height? **(3 marks)**

5. The figure below shows two identical containers A and B containing equal amounts of water and an identical ice block.



State with reason, which water cools faster, assuming the gauze absorbs negligible heat **(2 marks)**

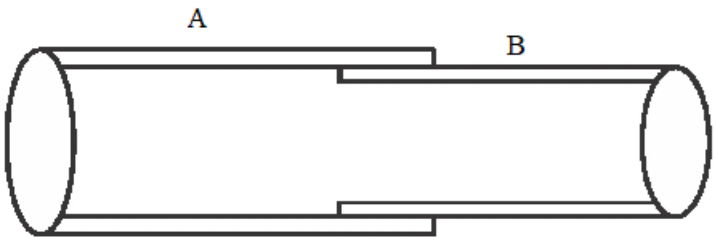
6. On the axes provided below,



(i) Sketch a graph of pressure (P) against reciprocal of volume $(^1/_V)$ of a fixed mass of an ideal gas at a constant temperature. **(1 mark)**

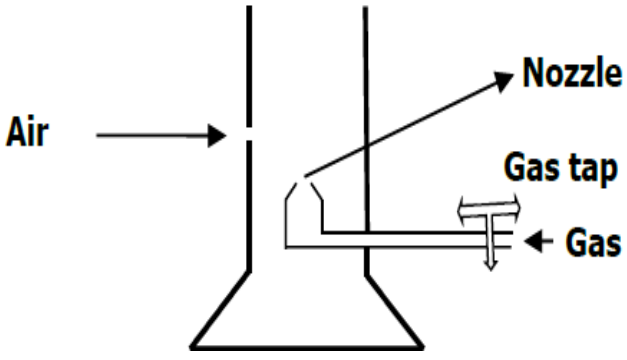
(ii) State the physical quantity represented by the gradient. **(1 mark)**

7. The figure below shows two pipes A and B of different expansivities tightly fitted onto each other at the junction. When some ice was placed at the junction, it became easy to separate the conductors.



Explain which of the two was a better conductor of heat. **(2 marks)**

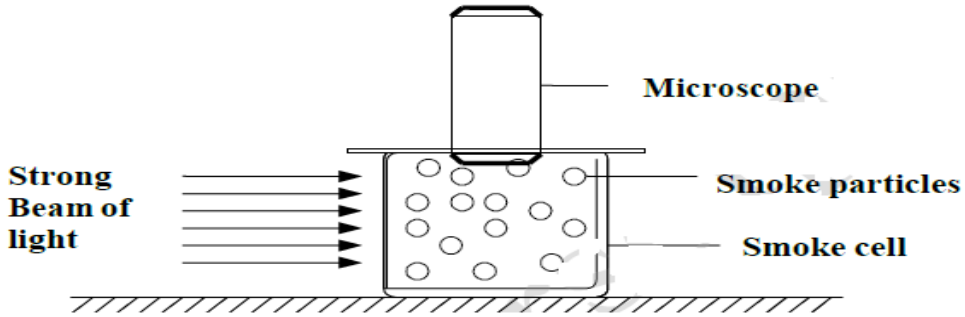
8. The figure below shows a Bunsen burner.



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

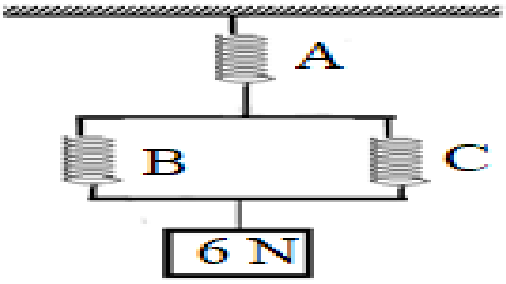
9. (a) Define Brownian motion **(1 mark)**

(b) The figure below shows apparatus used to observe the behaviour of smoke particles in a smoke cell



State one reason why smoke is used in the experiment. **(1 mark)**

10. Three identical springs each of spring constant 10N/m and weight 0.5N are used to support a load as shown.

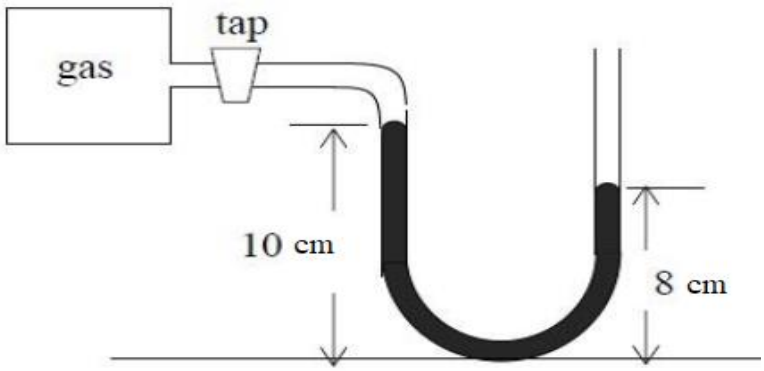


Determine the total extension of the system **(2 marks)**

11. Other than the friction in a screw jack, state the reason it why it can't be 100% efficient.

(1 mark)

A U-tube containing mercury is used as a manometer to measure the pressure of a gas in a container. When the manometer has been connected and the tap opened, the mercury in the U-tube settles as shown in the diagram below.



If the atmospheric pressure is 760 mmHg and the density of mercury is 13 600 kg/m^3, calculate the pressure of the gas in Pascals. **(3 marks)**

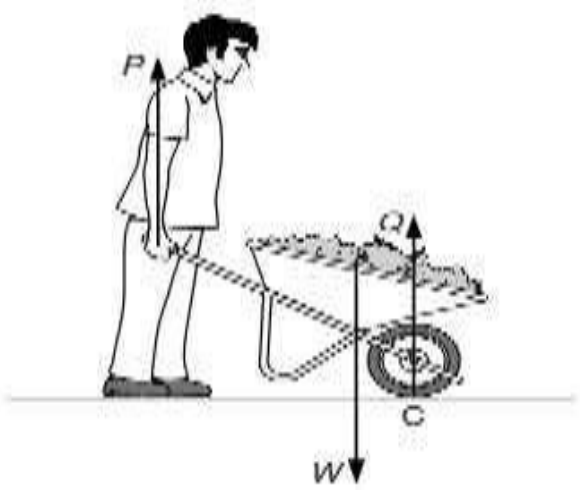
Section B (55 marks)

Answer all questions in this section in the spaces provided

14.

a) State the two conditions necessary for a system of forces acting on a body to be in equilibrium **(2 marks)**

b) The figure shows a loaded wheelbarrow held in equilibrium by a gardener. The wheel of the wheelbarrow is in contact with the ground at point C



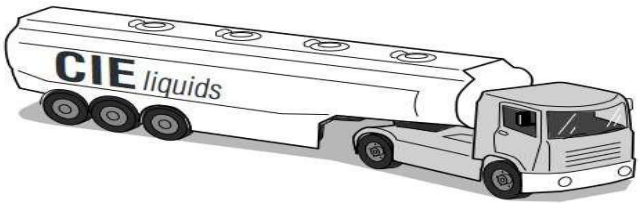
There are three vertical forces acting on the wheelbarrow P is the upward force applied by the gardener. Q isthe upward force of the ground on the wheel at point C.W is the weight of the wheelbarrow and its contents.

Explain why the force P is less than the force

i. By considering the forces P, Q and W**,(2 marks)**

ii. By considering the moments of the forces P and W about point C**.(2 marks)**

c) The figure shows a tanker lorry full of liquid. Study the diagram and answer the questions that follow



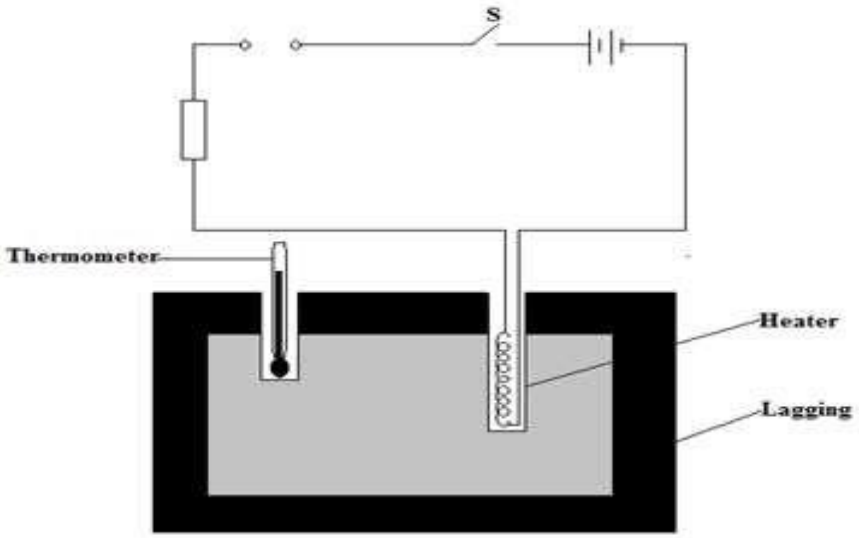
i. The tanker delivers the liquid and drives away empty. Compare the acceleration of the empty tanker withthe acceleration of the full tanker for the same resultant force**(2 marks)**

ii. Given that empty tanker has a weight of 50 000 N. The forward force is 6000 N and the total resistive force is 2000N. Determine the acceleration of the tanker**(3 marks)**

15.

a) A warm bottle of soda placed in ice at 0°C cools faster than when the same soda is placed in water at thesame temperature. Explain this observation(**2 marks)**

b) The figure shows an incomplete circuit set up that can be sued in an experiment to determine the specificheat capacity of a solid block by electric method. Study the diagram and answer the questions that follow

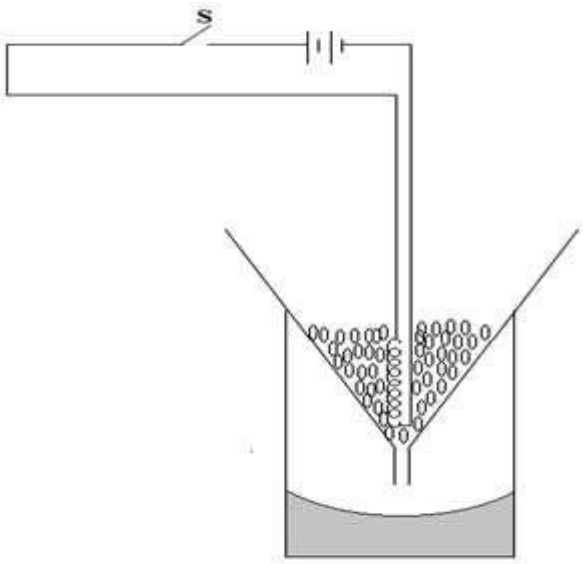


i. State the purpose of the rheostat in the experiment**(1 mark)**

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

iii. Other than temperature, state three measurements that should be taken(**3 marks)**

c) The figure shows a set-up of apparatus used in an experiment to determine the specific latent heat offusion of ice. Study the diagram and answer the questions that follow



The following readings were noted after the heater was switched on for 10 minutes

- **Mass of the beaker=260g**
- **Mass of the beaker +melted ice =280g**

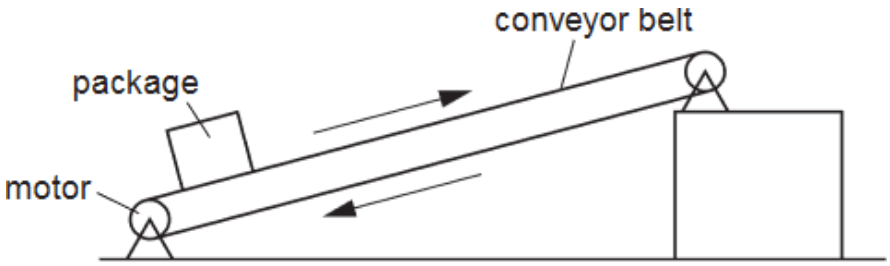
Determine

i. The energy supplied by the 120W heater in the 10 minutes **(3 marks)**

ii. The specific latent heat of fusion of the ice (**3 marks)**

iii. The experiment value for the specific latent heat of fusion of ice obtained is less than the theoreticalvalue. Give one reason for this observation **(1 mark)**

16. The figure shows a conveyor belt transporting a package to a raised platform. The belt is driven by amotor.



The mass of the package is 36 kg.

Determine

a) The increase in the gravitational potential energy (G.P.E.) of the package when it is raised through a vertical height of 2.4 m**.(2 marks)**

b) The power needed to raise the package through the vertical height of 2.4 m in 4 s**(2 marks)**

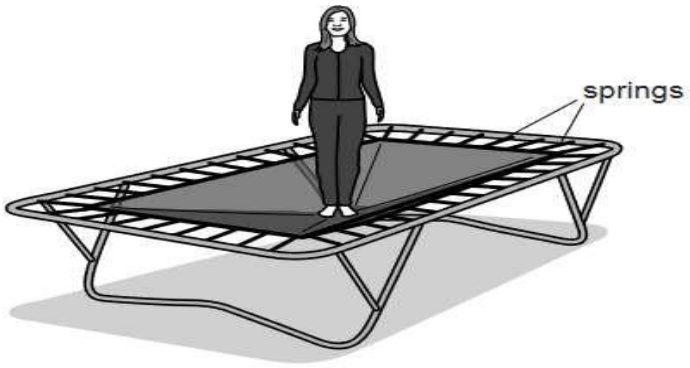
c) The electrical power supplied to the motor is much greater than the answer to (b).

Explain how the principle of conservation of energy applies to this system**.(2 marks)**

d) Assume that the power available to raise packages is constant. A package of mass greater than 36 kg is raised through the same height. Suggest and explain the effect of this increase in mass on the operation of the conveyer belt.(**2 marks)**

17. An athlete of mass 64 kg is bouncing up and down on a trampoline.

At one moment, the athlete is stationary on the stretched surface of the trampoline as shown in the figure below.



a) State the form of energy stored due to the stretching of the surface of the trampoline.**(1 mark)**

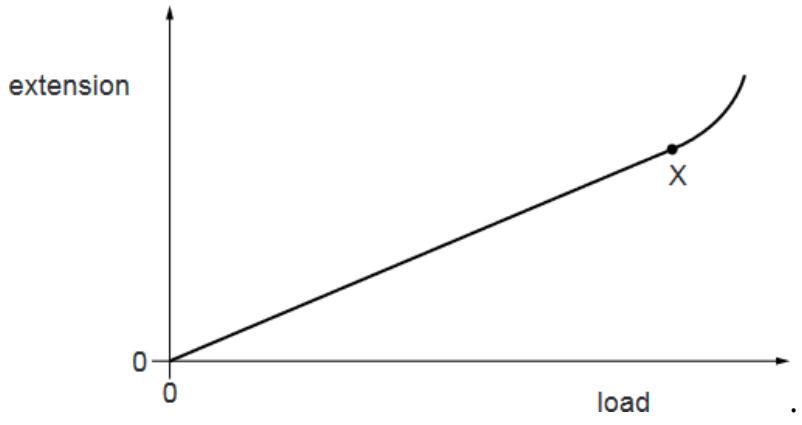
b) The stretched surface of the trampoline begins to contract. The athlete is pushed vertically upwards and she accelerates. At time t, when her upwards velocity is 6.0 m / s, she loses contact with the surface. Determine

i. Her kinetic energy at time t**.(2 marks)**

ii. The height at which the kinetic energy will be zero**(2 marks)**

c) In practice, she travels upwards through a slightly smaller distance than the distance calculated in (ii).Suggest why this is so**. (1 mark)**

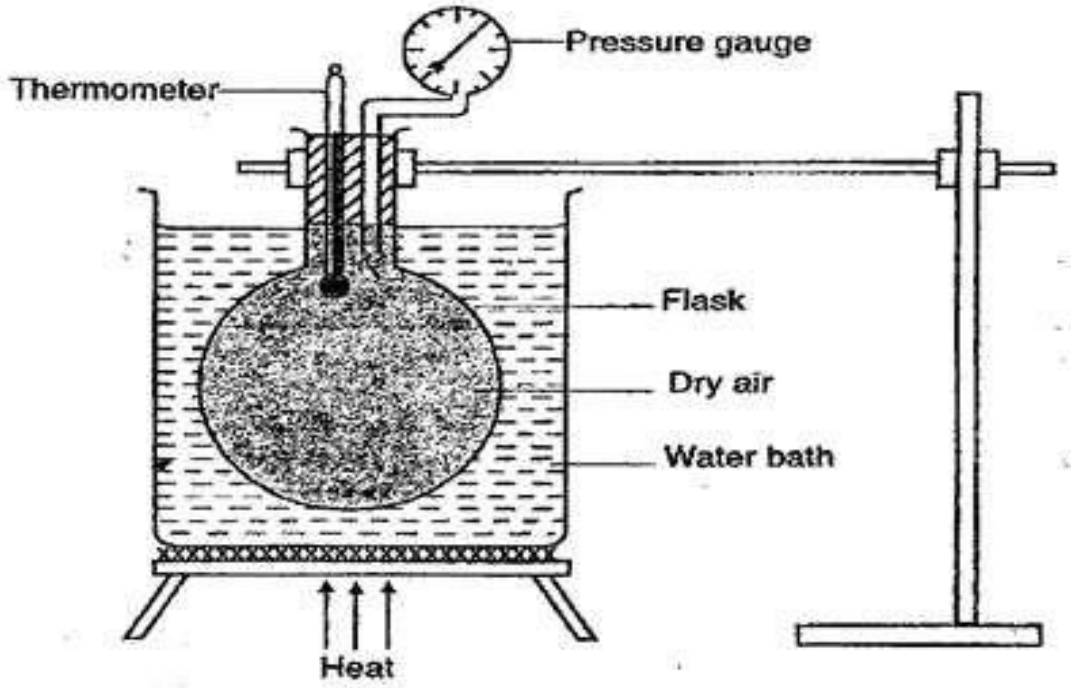
d) The trampoline springs are tested. An extension-load graph is plotted for one spring. Fig. 3.2is the graph



On the same axes sketch a graph of another spring whose spring constant is higher than the trampoline spring (1mark)

18.

a) The diagram below shows a set-up used to investigate a particular gas law. Study the diagram and answerthe questions that follow



i. State with a reason which gas law is being experimented by the set-up **(2 marks)**

ii. Name the two factors that are held constant in the experimented **(2 marks)**

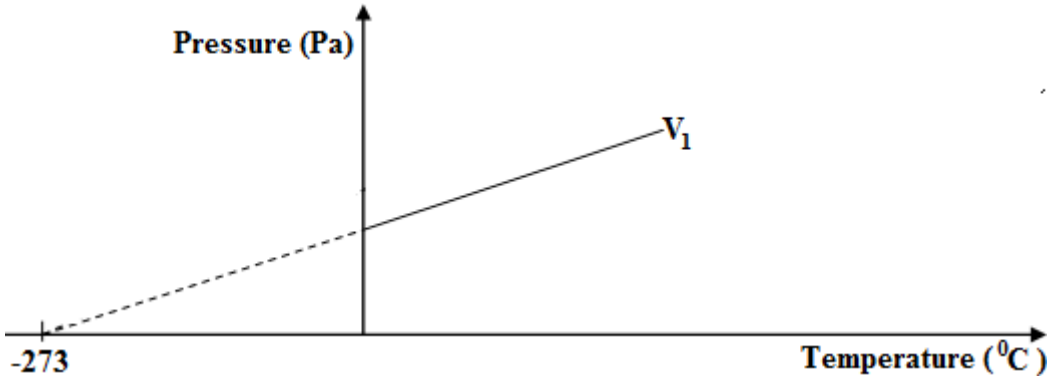
iii. Give the reason why heating is done through a water bath **(1 mark)**

b) Figure (a) shows 52cm of air trapped by a mercury column of 10cm while figure (b) shows the column ofair when the glass tube is inverted



Determine the atmospheric pressure in mmHg (3 marks)

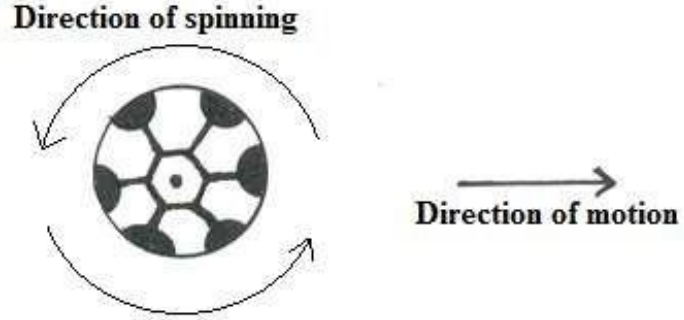
c) The graph below shows the relationship between the pressure and temperature of a gas of volume V1



On the same axis sketch another graph for a gas of a larger volume. **(1 mark)**

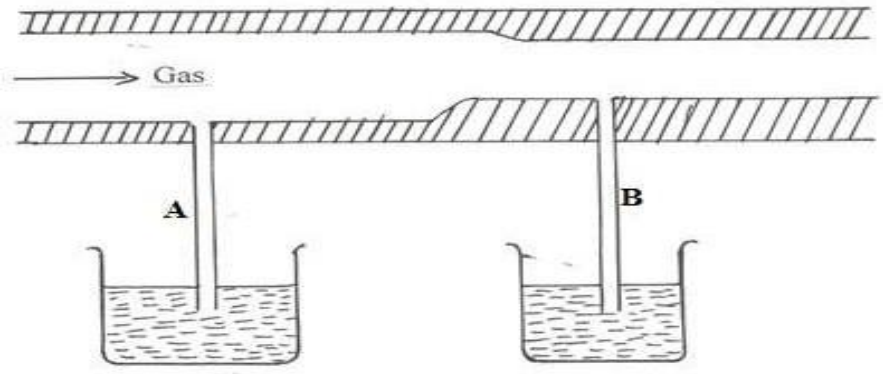
d)

i. The figure below shows a ball spinning in anticlockwise direction through still air



The horizontal distance covered by the ball is observed to be longer than when the ball is not spinned.Explain how the spinning increases the range of the ball **(3marks)**

ii. The figure below shows gas flowing along a pipe of non-uniform cross-sectional area. Two pipes A andB are dipped into liquids as shown below.



Indicate the levels of the liquids in A and B giving a reason for your answer

KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 4

232/2

PHYSICS

PAPER 2 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

- *Write your name and Admission number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *This paper consist of **two** section **A** and **B***
- *Answer all the questions in the spaces provided*
- *All working **must** be clearly shown in the spaces provided.*
- *Non programmable silent electronic calculator may be use*

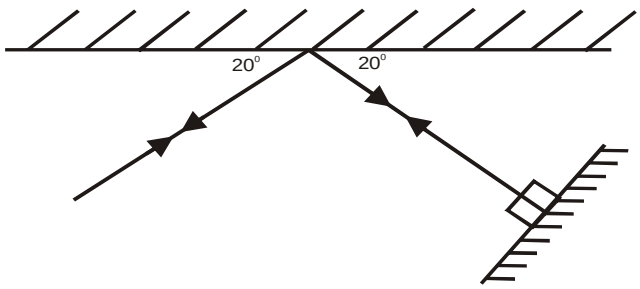
FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A {25 MARKS }

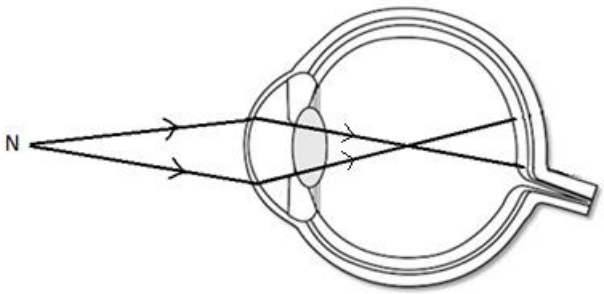
Answer all the questions

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



Determine the angle between the two mirrors. **(2marks)**

2. The figure shows the eye defect



(a) Name the defect **(1mark)**

(b) State how the defect can be corrected. **(1mark)**

3. Explain why a plain sheet of paper and a plane mirror both reflect light yet only the plane mirror forms images while paper cannot form images. **(2 marks)**

4. What property of light is suggested by the formation of shadows? **(1 mark)**

5. An object placed **15 cm** from a convex lens forms an upright image which is magnified two times. Determine the focal length of the lens. **(3 marks)**

6. State **one** advantage of a lead-acid accumulator over a nickel-iron accumulator. **(1 mark)**

7. An electric bulb rated, **40W** is operating on **240 V** mains. Determine the resistance of its filament. **(3 marks)**

8. Explain why earthing is necessary in the domestic wiring circuit. **(1 mark)**

9. A positively charged rod is brought near the cap of a leaf electroscope. The cap is the earthed momentarily by touching with the finger. Finally, the rod is withdrawn. The electroscope is found to be negatively charged. Explain how this charge is acquired. **(2 marks)**

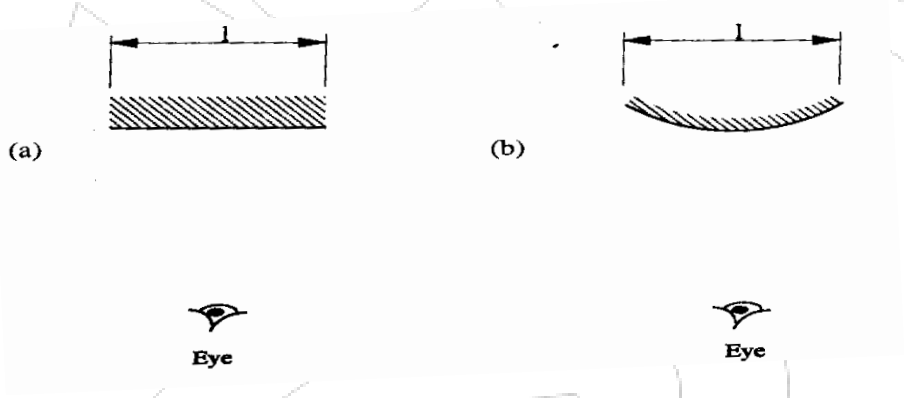
10. The force on a conductor carrying a current in a magnetic field can be varied by changing, among others, the magnitude of the current and the magnetic field strength. Name any other factor that can be changed to vary the force **(1 mark)**

11. The table below carries information on the type of radiation, detector and use for some of the electromagnetic radiations.

Type of radiation	Detector	Use
Microwave	Crystal detector, solid state diodes	.....
.....	Thermopile, blackened bulb thermometer	Warmth sensation

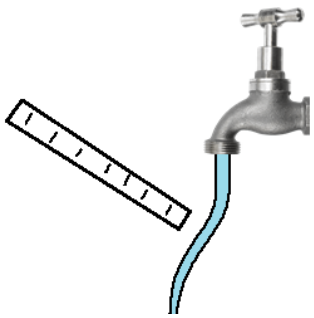
Fill in the blank spaces. **(2 mark)**

12. The figures below show a convex mirror and a plane mirror of equal aperture



By sketching a pair of incident and reflected rays for each(a) and (b) show how the convex mirror provides to the eye, a wider field of view than a plane mirror. **(2marks)**

13. Water is flowing in a very narrow stream from a water tap (faucet). A negatively-charged plastic strip is held close to the stream of water, as shown in the figure below.



The stream of water moves towards the plastic strip. Explain why this observation. **(2marks)**

SECTION B (55 MARKS)

14. a) Distinguish between transverse waves and longitudinal waves. **(2 marks)**

b) Plane water waves travels from a deep end into a shallow end in a swimming pool at a velocity of 4m/s. if the wavelength of these waves in deep end is 6cm and in the shallow end is 1.5cm, determine the velocity of these waves in the shallow end. **3 marks)**

c) State one factor that affects the velocity of sound in a solid. **(1mark)**

d) A disc siren with 200 holes is rotated at constant speed making 0.5 revolutions per second. If air is blown towards the holes, calculate:

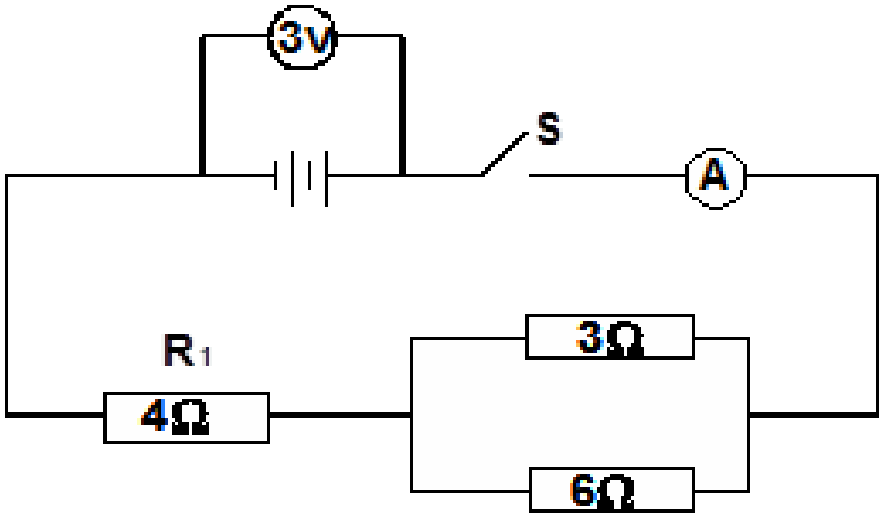
i) The frequency of sound produced. **(3marks)**

ii) The wavelength of the sound produced if velocity of sound in air is $340ms^{-1}$ **2 marks)**

c). State one way of reducing echoes in a room? **(1 mark)**

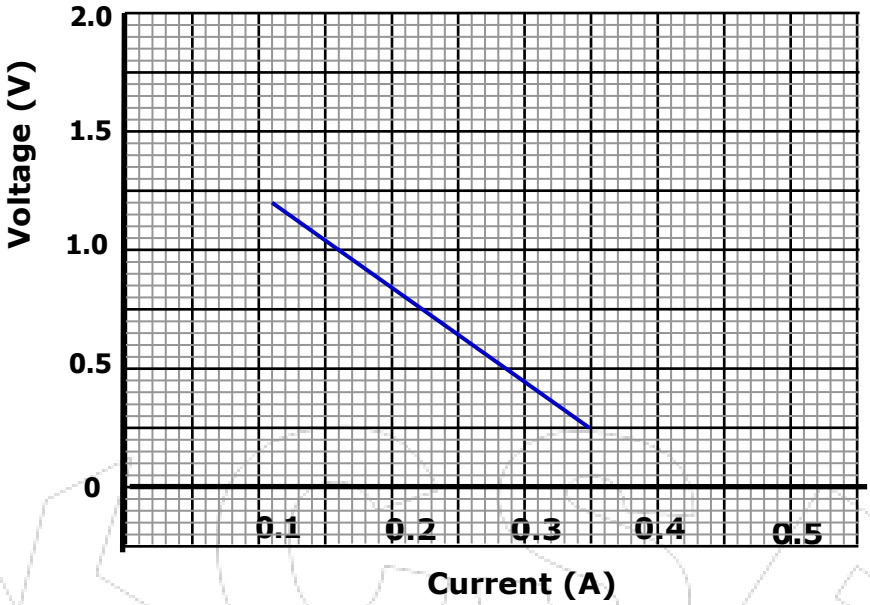
15. a) State one advantage of an alkaline accumulator over lead acid accumulator. **(1 mark)**

b) Figure below shows resistors in a circuit.



Calculate Current through the 4 Ω resistor. **(3 marks)**

c) The graph below shows the Voltage current relationship for a certain battery.

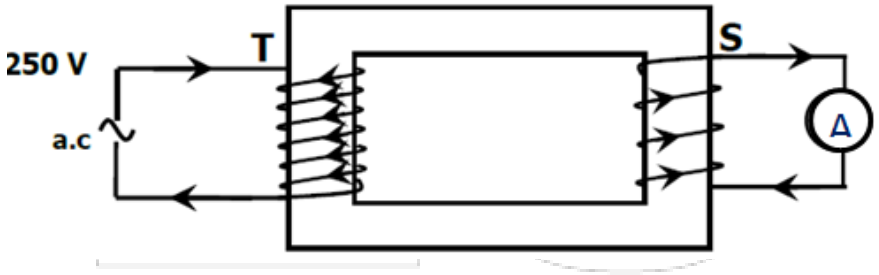


Determine:

(i) The e.m.f of the cell. **(1mark)**

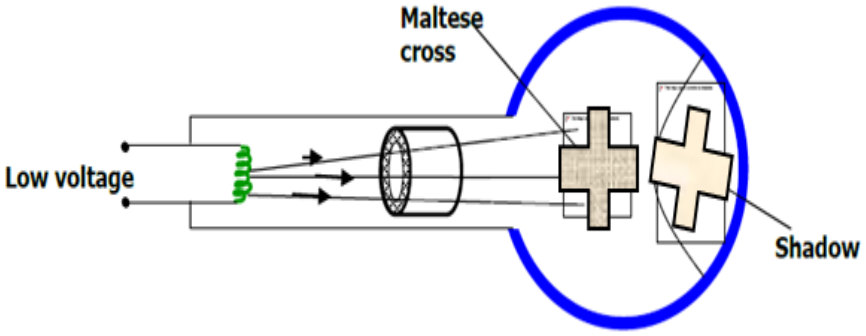
(ii) The internal resistance of the cell. **(3marks)**

(e) Two coils T and S are wound on a soft iron core as shown. T has 1000 turns while S has 600 turns and resistance of 100Ω



Calculate the maximum current measured by the ammeter. **(3marks)**

16. (a) The fig. shows as simple form of cathode ray tube, which produces a sharp shadow of a Maltese cross on a fluorescent screen.

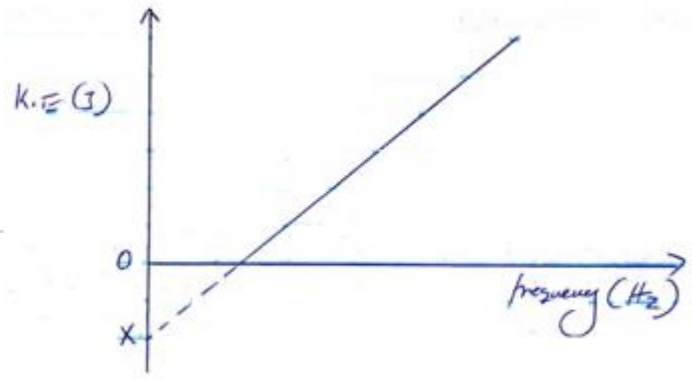


(i) Explain what is meant by cathode rays. **(1mark)**

(ii) What property of cathode rays does the fig. above illustrate **(1mark)**

(b) State one factor that affects photoelectric emission from a given metal surface. **(1mark)**

c). A graph of K.E of photoelectrons emitted by metal surface A against the frequency of radiation used is as shown below



From the graph;

i) What is the significance of the gradient of the graph? (1mark)

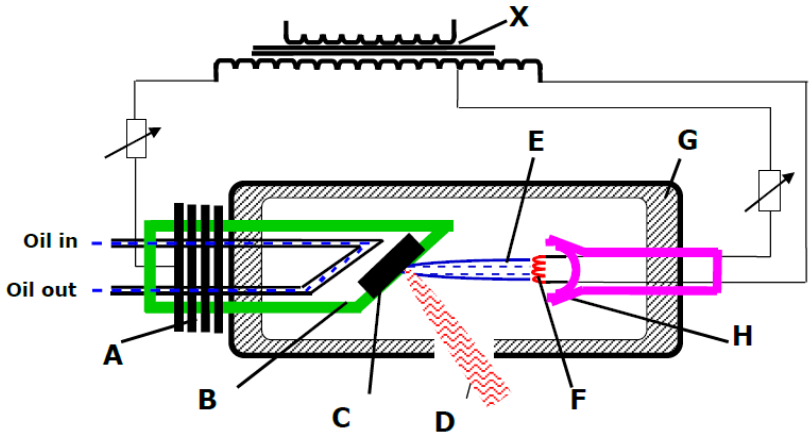
ii) What is the significance of OX (1mark)

d) The threshold frequency for potassium is 5.37 x 10^{14}Hz. When the surface of potassium is illuminated by incident radiation from a source, photoelectrons are emitted with the speed of 7.9 x10^{5}m/s. Given that h=*6.62 x 10^{-34} JS and m_e=9 x 10^{-31}kg, c*alculate:

i) The work function for potassium **(2marks)**

ii) The frequency of the incident radiation from the second source. **(3marks)**

17. Figure below shows the features of an X-ray tube.



a) Name the parts marked with letters **A** and **H** **(2marks)**

b) Why is tungsten or Molybdenum metal most suitable materials for making part **C** **(1mark**)

c) Why is part **B** made of thick copper metal **(1mark)**

d) Why should the machine should be surrounded by material **G**? **(1mark)**

e) Why is the tube evacuated? **(1mark)**

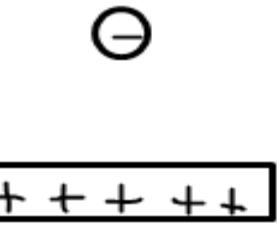
f) What effect will increasing current at **F** have on x-ray produced? **(1mark))**

g) What effect will increasing the p.d. between at **B** and **F** have on the x-rays produced**(1mark)**

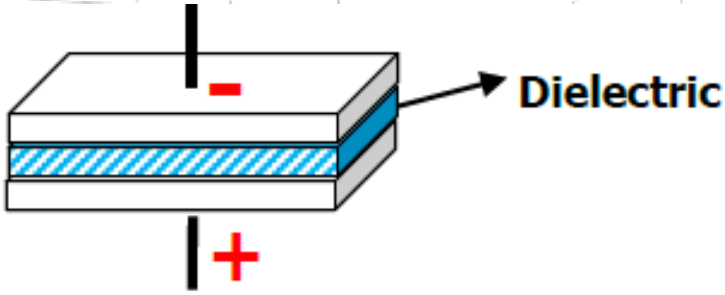
h) State **one** way in which cooling is achieved in this X-ray machine. **(1mark)**

18. .(a) State one difference between a capacitor and a cell. **(1mark)**

(b) Sketch the electrostatic field pattern due to the arrangement of the charges shown**(1mark)**



(c)The diagram shows a parallel plate capacitor with a dielectric material in between the plate.



State how each of the following quantities are affected when the dielectric material is pulled out of the parallel plates.

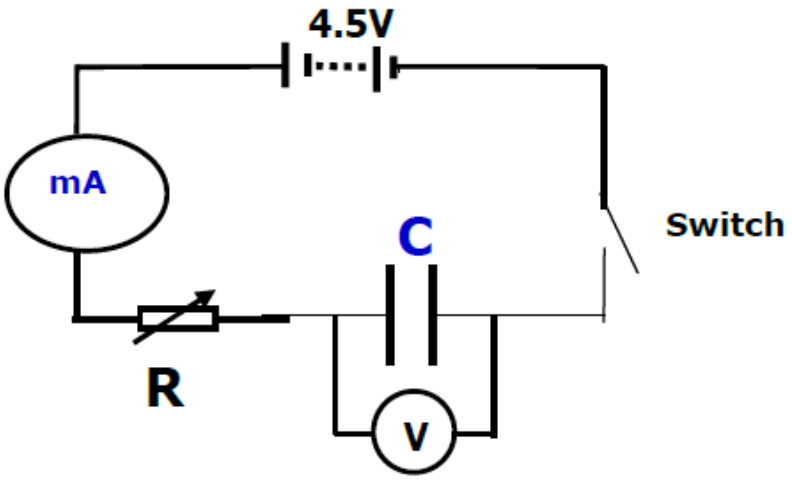
(i) The p.d across the plates. **(1mark)**

(ii) The charge on the plates. **(1mark)**

(iii) The capacitance of the system. **(1mark)**

(d)Three capacitors of 1.5μF, 2.0 μF and 3.0 μF are connected in series to p.d. of 12V. Find the total charge stored in the arrangement **(3marks)**

(e)The figure below shows a capacitor **C** being charged.



State what would be observed on the following when the switch is closed:

(i) The milliameter **(1mark)**

(ii) The voltmeter **(1mark)**

(iii) Explain how the capacitor is charged. **(2marks)**

(c) On the axis provided, sketch the graph of voltage (V) against time (t) **(1mark)**



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KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 5

232/1

PHYSICS

PAPER 1 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

Write your name, index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided.
*This paper consists of **TWO** Sections: **A** and **B**.*
*Answer **ALL** the questions in section **A** and **B**. All working **MUST** be clearly shown.*
KNEC mathematical tables and silent non-programmable electronic calculators may be used.
Candidates should answer the questions in English.
Take: ***Acceleration due to gravity,*** $g = 10\ m/s^2$

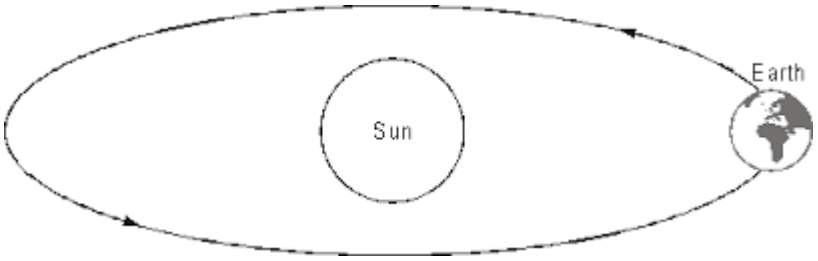
FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A (25 MARKS)

Answer all the questions in this section.

1. The diagram below shows the earth moving around the sun continually . State the branch of Physics that would be concerned with this. **(1 mark)**

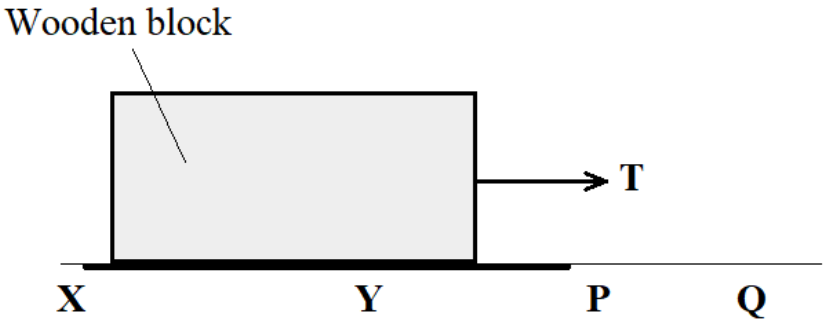


2. The diameter of a steel ball is measured using a vernier callipers which has divisions of 0.1cm on its main scale (MS) and 10 divisions of its vernier scale (VS) match 9 divisions on the main scale. Three such measurements for a ball are given as

S.No.	MS (cm)	VS divisions
1	0.5	8
2	0.5	4
3	0.5	6

If the zero error is – 0.03 cm, calculate then mean corrected diameter of the steel ball. (3 marks)

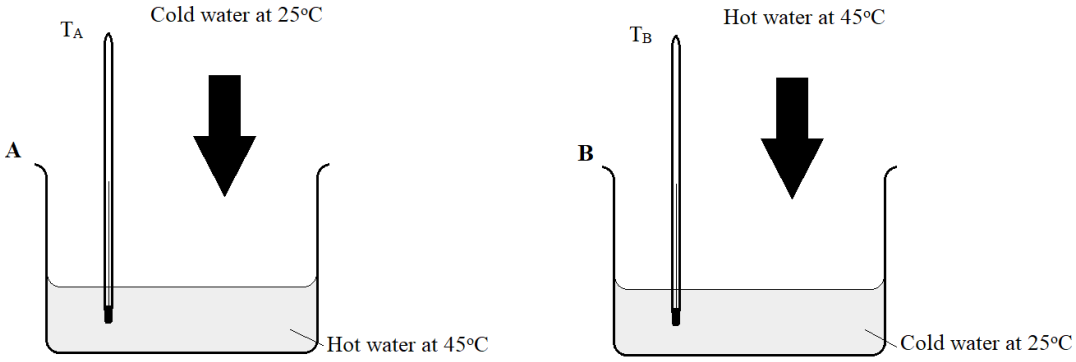
3. A wooden block on a horizontal surface is pulled by a constant horizontal force **T** as shown in the diagram below, at two different sections. The block moves with constant velocity along **XY**. Section **XYP** is rough, while **PQ** is smooth. Use the information to answer questions that follow.



(a) Describe the motion of the block as it enters section **PQ**. **(1 mark)**

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

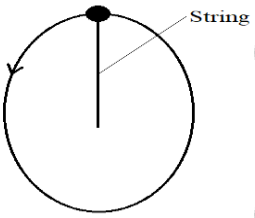
4. Two identical well lagged cans **A** and **B**, each has equal volumes of water and are fitted with thermometers $\mathbf{T_A}$ and $\mathbf{T_B}$ as shown in the figure below. Water in **A** is at 45°C, while water at **B** is at room temperature of 25°C. Cold water is poured carefully in **A** and simultaneously, an equal mass of hot water is poured in **B**.



(a) State which of the thermometers record a lower reading after a short while **(1 mark)**

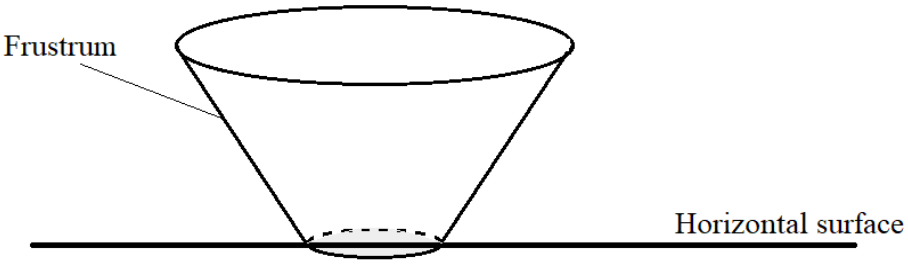
(b) Give reason for your answer in **(a)** above **(1 mark)**

5. A stone of mass 200g is whirled on a vertical circle at constant speed of 3m/s, as shown in the diagram below.



Determine the tension **T** in the string when the stone is at its uppermost point shown, given that the string is 40cm long. **(3 marks)**

6. Below is a solid frustrum of a cone, resting on its narrow end on a horizontal flat surface. The solid is made of a uniform material.



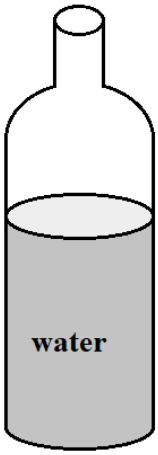
(a) Name the state of equilibrium of the solid on the surface. **(1 mark)**

(b) Locate the centre of gravity of the cone, and mark it **M** **(2 marks)**

7. Some pollen grains were placed in water to study Brownian motion in liquids. State and explain the nature of the observed motion. **(2 marks)**

8. When estimating the diameter of an oil molecule, a student measured the diameter of an oil drop using vernier callipers. State the assumption she made in this measurement. **(1 mark)**

9. A form one student at Upper Secondary School had a tin can half filled with water, as shown in the figure below.



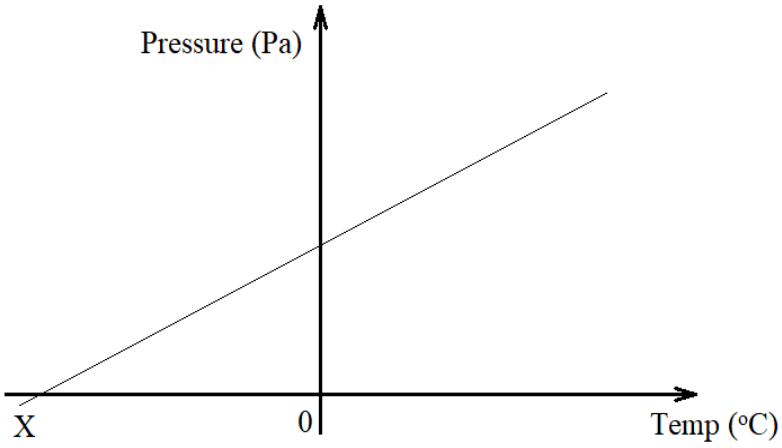
She heated the water and let it to boil for some time. The open top was then sealed, and cold water poured on the can. The can was observed to crash in. State why:

(a) The water was let to boil for some time. **(1 mark)**

(b) Cold water was poured on the can. **(1 mark)**

(c) Explain why the tin can crushed in **(2 marks)**

10. The temperature if a gas in a container of fixed volume was gradually lowered, and the corresponding pressure measured. Below, is a sketch graph showing the variation of pressure with temperature from the experiment.



(a) Define temperature **X** using kinetic theory of matter **(1 mark)**

(b) State the reason why temperature **X** cannot be achieved **(1 mark)**

11. A steel wire of length 20cm was coiled several times to make a spring. The spring was loaded with various weights and a graph of *Force* against *extension* plotted as indicated in *Fig i* below.

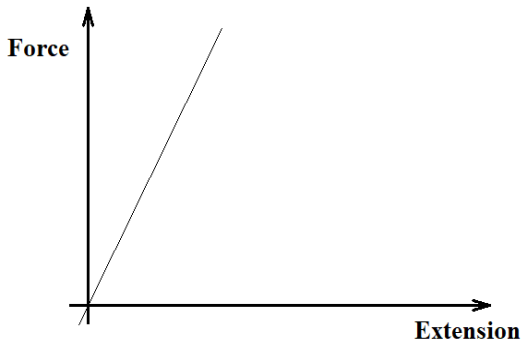


Fig i

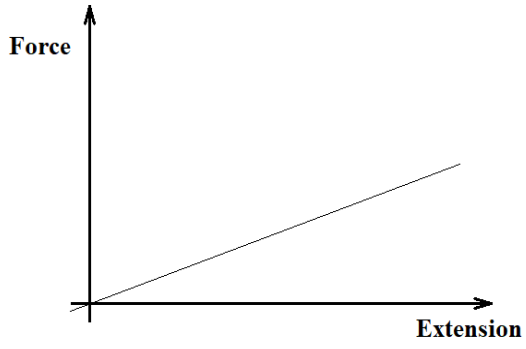


Fig ii

State any **two** changes that could be made on the spring to obtain the graph in *Fig ii* **(2 marks)**

SECTION B (55 marks)

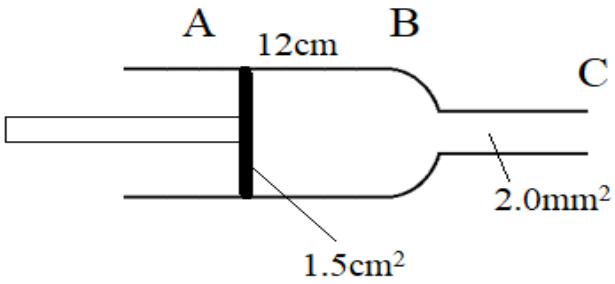
Answer all the questions in this section in the spaces provided

12.

(a) State Bernoulli's principle. **(1 mark)**

(b) In deriving the equation of continuity, it is assumed that the fluid is non-viscous. Explain the effect of increase in fluid viscosity on the type of flow. **(2 marks)**

(c) The figure below shows water in a horizontal tube of two different sections, **AB** and **BC**.

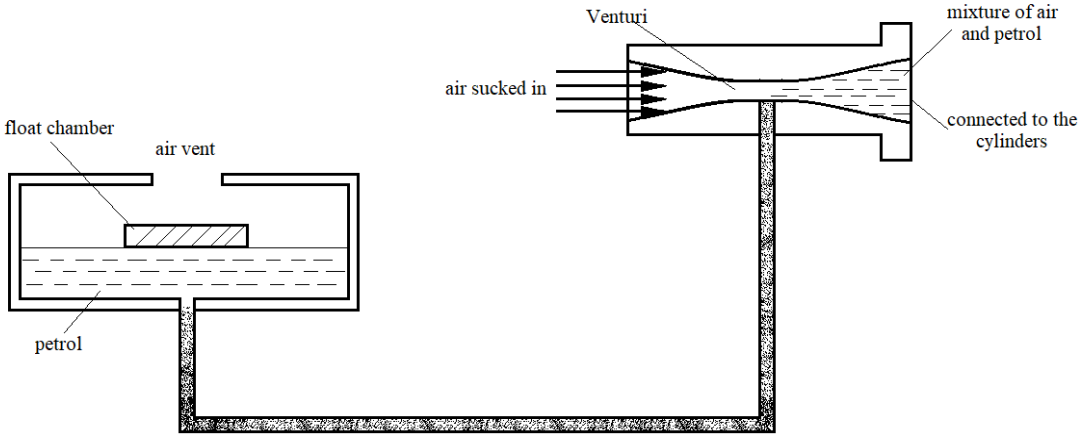


The cross-sectional area on the piston is $1.5cm^2$ while that of section **BC** is $2.0mm^2$. If the piston moves 12cm from **A** to **B** in 3 seconds, calculate:

i) The volume flux of water **(3 marks)**

ii) The speed of water through section **BC** **(2 marks)**

(d) Below is a cross-sectional diagram of a carburettor used to supply petrol for combustion in a car engine

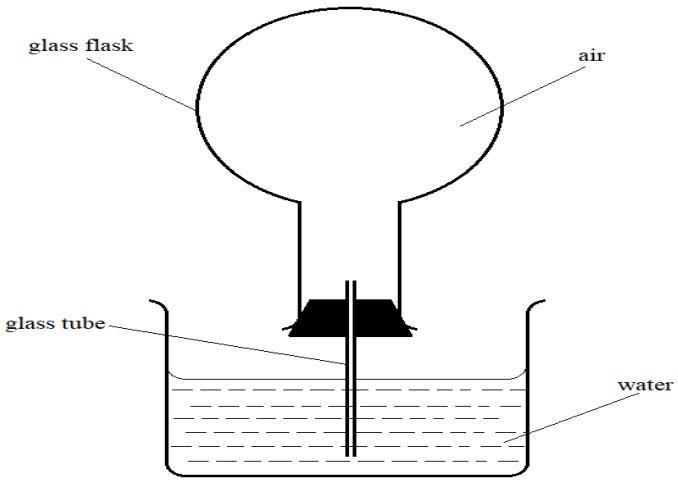


Explain how this carburettor is able to draw petrol into the combustion cylinders **(3 marks)**

13.

(a) A covid vaccine is only suitable when stored at a temperature of -40^{o}C. A nurse had a choice of measuring the temperature of this vaccine using either a mercury thermometer or an alcohol thermometer. Explain which of the two thermometers would be suitable. **(1 mark)**

(b) Below is a glass flask fitted with a tube and inverted in water.



The temperature of the surrounding is slowly lowered.

i) State the observation on the liquid level in the glass tube **(1 mark)**

ii) Give a reason for the above observation **(2 marks)**

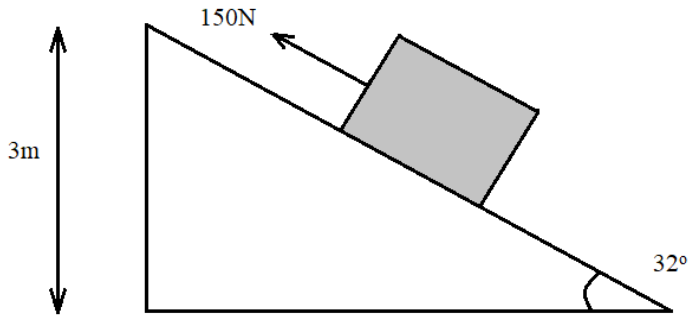
(c) You have been provided with the following apparatus:

A glass bulb filled with mercury fitted onto a hollow stem, ice, boiling water in a can and a grid of equal squares. Use this apparatus to describe an experiment to make a graduated thermometer whose scale is in Celsius. **(4 marks)**

14.

(a) Define velocity ratio as used in machines **(1 mark)**

(b) The figure below shows a load of mass 20kg being pulled up an inclined plane with a constant force of 150N. The plane makes an angle of 32°C with the horizontal, and a height of 3m.



Determine:

i) The work done on the load **(2 marks)**

ii) Work done by the effort **(2 marks)**

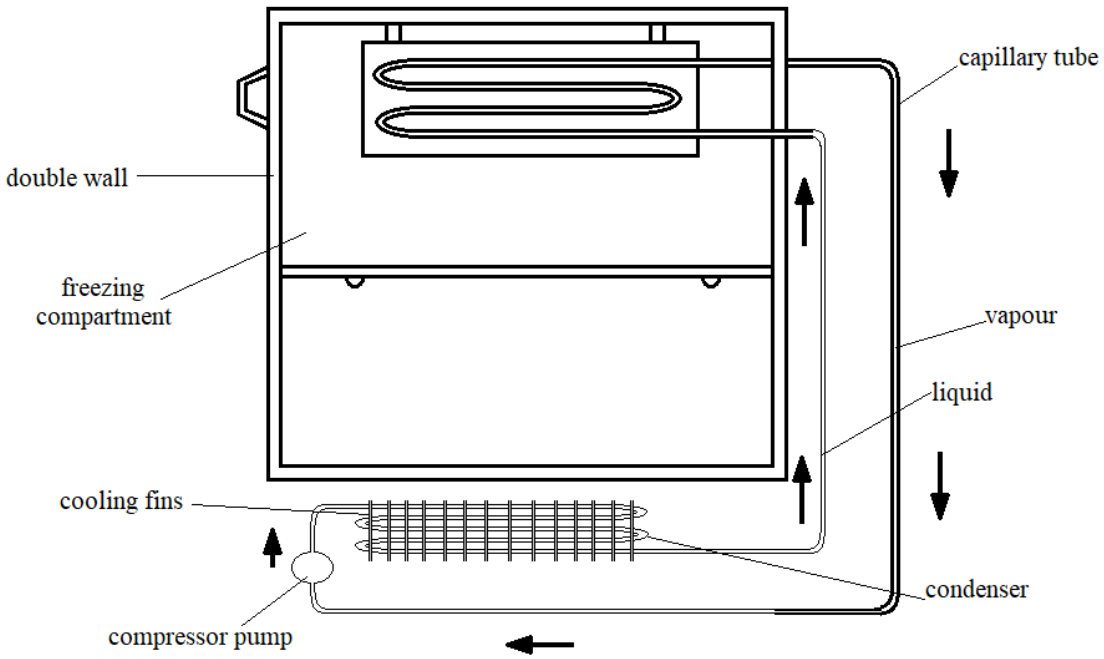
iii) The efficiency of the system **(2 marks)**

iv) The work done against the friction between the plane and the block **(1 mark)**

15.

(a) Distinguish between heat capacity and latent heat of fusion of a substance **(1 mark)**

(b) Below is a figure showing a common refrigerator used for domestic purposes. A volatile liquid circulates in the capillary tubes.



i) State the reason why the diameter of the capillary tube is made wider at the freezing compartment. **(1 mark)**

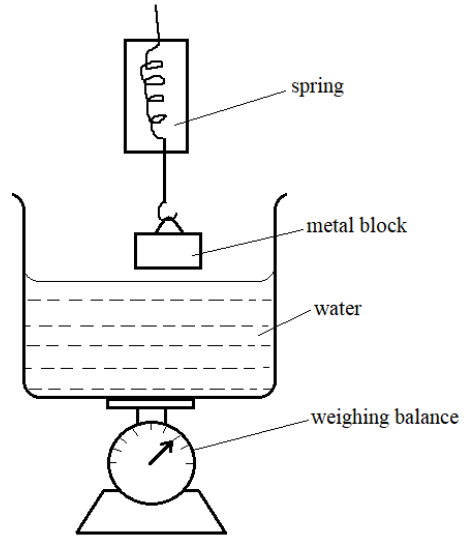
ii) Explain the function of the compression pump. **(2 marks)**

iii) Give a reason why food items are placed below the widened copper tube (**1 mark)**

(c) In an experiment to determine specific latent heat of vaporization of water, steam of mass 12g at 100°C was passed into 80g of water initially at 23°C in a container of negligible heat capacity. The temperature of water rises by 74K. Use the information to determine specific latent heat of vaporization of water (take specific heat capacity of water as 4.2kJ/kg/K and boiling point of water as 100°C). **(4 marks)**

16.

(a) The figure below shows a weighing balance on which a beaker containing some water is placed. The reading of the weighing balance and the spring balance are initially 2.80N and 2.70N respectively.



i) The metal block is gradually lowered into water. State the observation made on:

A) The spring balance reading **(2 marks)**

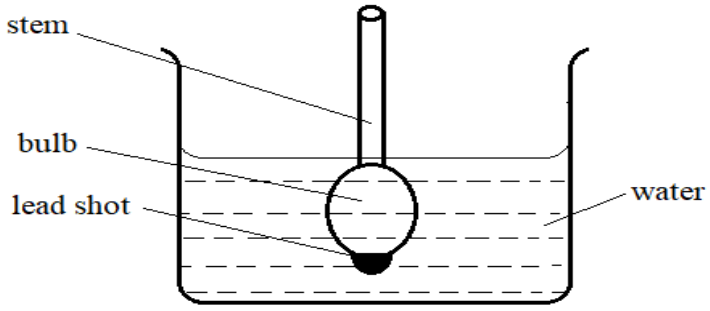
B) The weighing balance reading

ii) The reading of the spring balance when the block is fully submerged in water is 2.36N. Determine the:

A) Reading of the weighing balance **(2 marks)**

B) The density of the stone **(2 marks)**

(b) Below is a figure showing a hydrometer floating in water.



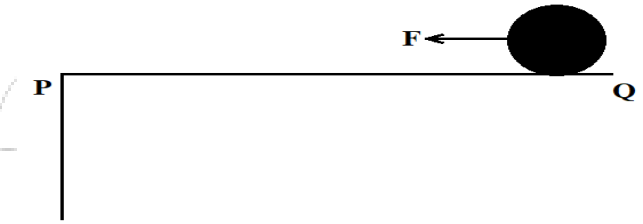
i) State the function of the following: **(2 marks)**

A) Wide bulb

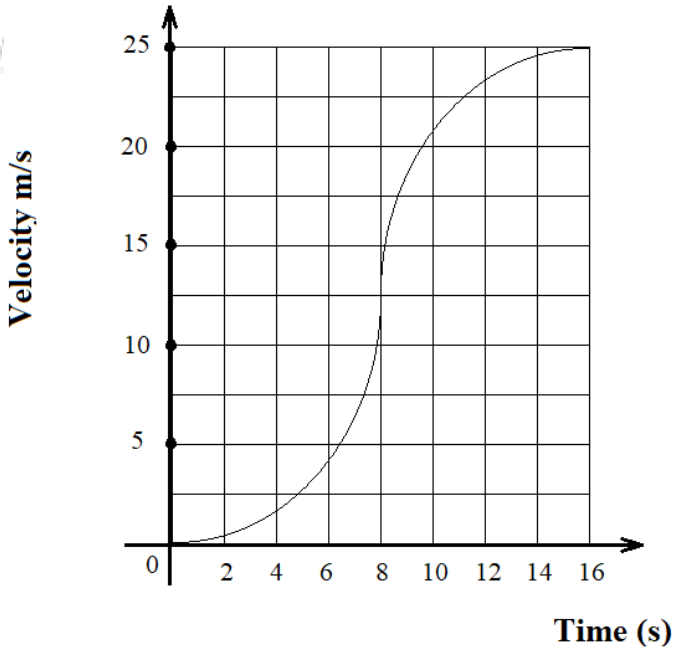
B) Lead shot

ii) Salt solution is added to the water. State the observation made on the hydrometer. **(1 mark)**

17. A metal ball of mass 20kg at rest is pulled by a force and moves along a horizontal friction compensated table as shown below. The pull is withdrawn when the ball is at **P** after travelling 16 seconds from **Q**.



Below is a velocity-time graph for the motion of the ball as it moves along the tabletop.



(a) Determine the distance **PQ** travelled along the tabletop. **(3 marks)**

(b) Calculate:

i) The average acceleration between time t = 8 seconds and t = 16 seconds **(2 marks)**

ii) The average force acting between t = 8s and t = 16s. **(2 marks)**

(c) From **P** the ball falls to the ground a distance 22.5m from the foot of the table. Calculate the height of the table. **(3 marks)**

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KCSE 23

KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 5

232/2

PHYSICS

PAPER 2 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

- *Write your name and Admission number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *This paper consist of **two** section **A** and **B***
- *Answer all the questions in the spaces provided*
- *All working **must** be clearly shown in the spaces provided.*
- *Non programmable silent electronic calculator may be use*

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A {25 MARKS }

Answer all the questions

1. **Figure 1** shows a ray of light incident on a mirror at an angle of 45^0. Another mirror is placed at an angle of 45^0 to the first one as shown

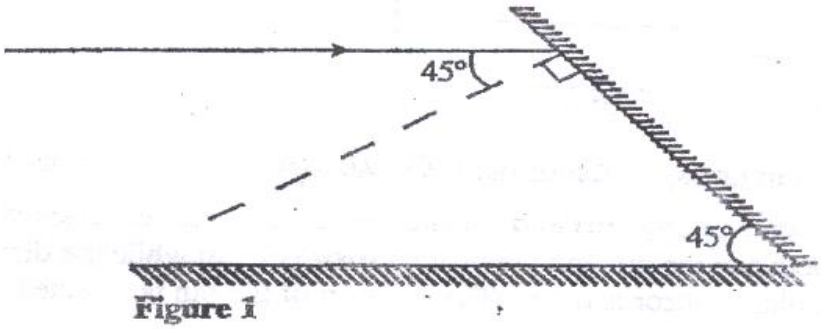


Figure 1

Sketch the path of the ray until it emerges **(2 mks)**

2. **Figure 2** shows a soft iron bar AB placed in a coil near a freely suspended magnet.

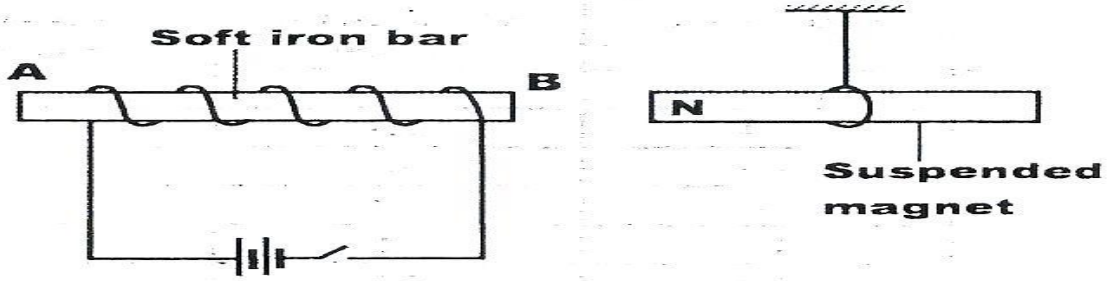


Figure 2

Explain the observation made when the switch is closed. **(2 mks)**

3. Table 1 shows radiations and the irrespective frequencies.

Type of radiation	Yellow light	Gamma rays	Radio waves	Micro waves
Frequency (Hz)	1×10^{15}	1×10^{22}	1×10^{6}	1×10^{11}

Arrange the radiations in the order of increasing energy. **(l mk)**

4. State the reason why electrical power is transmitted over long distances at very high voltages. **(1 mk)**

5. A boy standing in front of a cliff blows a whistle and hears the echo after 0.5s. He then moves 17 metres further away from the cliff and blows the whistle again. He now hears the echo after 0.6s. Determine the speed of the sound. **(4mks)**

6. **Figure 3** shows a human eye with a certain defect

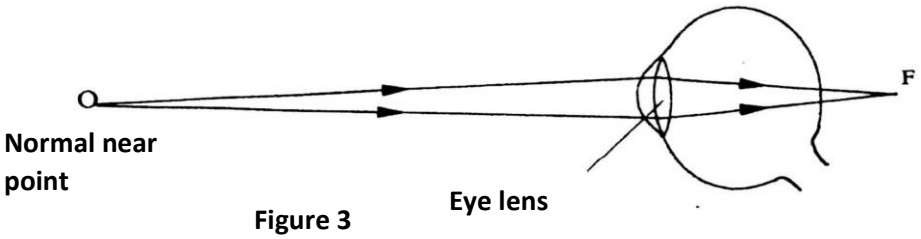


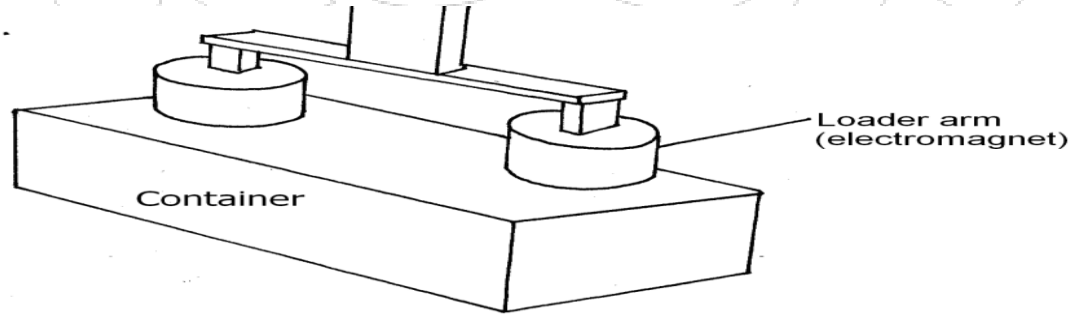
Figure 3

(i) Name the defect **(1 mk)**

ii) On the same diagram, sketch the appropriate Len and rays to show how the defect can be corrected. **(2mks)**

7. Polarisation is a defect of a simple cell. State how it reduces the current produced and how this defect can be minimized **(2mks)**

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

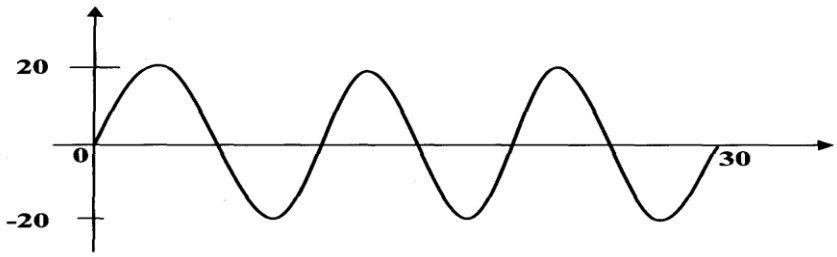


(i) Why should the container be made of iron or steel **(1mk)**

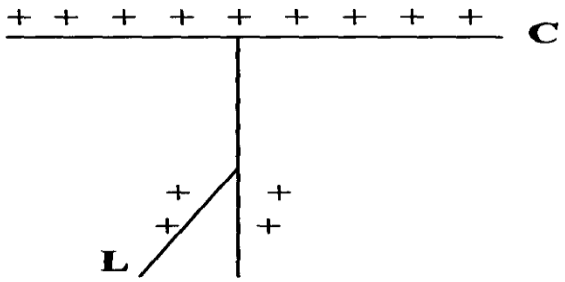
(ii) State two ways in which the loader can be made to lift heavier container **(2mks)**

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

10. **The** diagram below shows part of a wave form. The numbers on the diagram show scales in meters. If the speed of the wave is $20ms^{-1}$, determine the frequency and wavelength of the wave. **(3mks)**



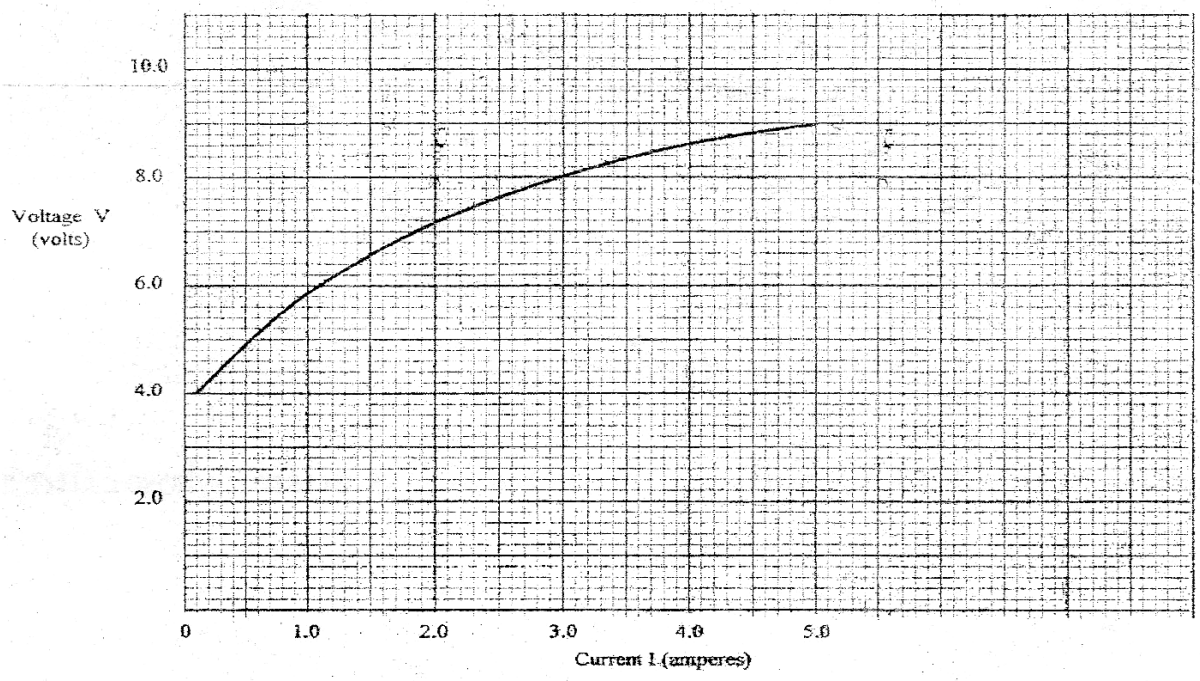
11. A gold leaf electroscope is positively charged as shown in the diagram below where **C** is the cap and **L** is the gold leaf. State and explain what happens to **L** when a positively charged rod is brought near **C** without touching it. **(2mks)**



SECTION B (55 Marks)

Answer all the questions in this section in the spaces provided

12 a) Figure 8 shows graph of potential difference V (volts) against a current (ampere) for a certain device.



From the graph

(i) State with a reason whether or not the device obeys ohms law **(2marks)**

(ii) Determine the resistance of the device at

(I) 1 = 1.5A

(II) 1 = 3.5A

(iii) From the results obtained in (ii) translate how the resistance of the device varies as the current increases **(1mark)**

(iv) State the cause of this variation in resistance **(1mark)**

b) Three identical dry cells each of e.m.f. 1.6V are connected in series to a resistor of 11.4Ω. A current of 0.32A. How is the circuit? Determine:

(i) The total e.m.f. of the cell **(1mark)**

(ii) The internal resistance of each cell **(3marks)**

13 (a) State the meaning of the term 'principal focus' as applied in lenses **(1mark)**

(b) You are provided with the following apparatus to determine the focal length of a lens:

- A biconcave lens and lens holder
- A lit candle
- A white screen
- A metre rule

(i) Draw a diagram to show how you would arrange the above apparatus to determine the focal length of the lens **(1mark)**

(ii) Describe the procedure you would follow

(iii) State two measurements that you would take **(2marks)**

(iv) Explain how the measurements in (iii) would be used to determine the focal length.

(c) An object is placed 30cm in front of a concave lens of focal length 20cm. Determine the magnification of the image produced. **(4marks)**

14 (a) State what is meant by 'electromagnetic induction' **(1mark)**

(b) Figure 9 shows a simple electric generator

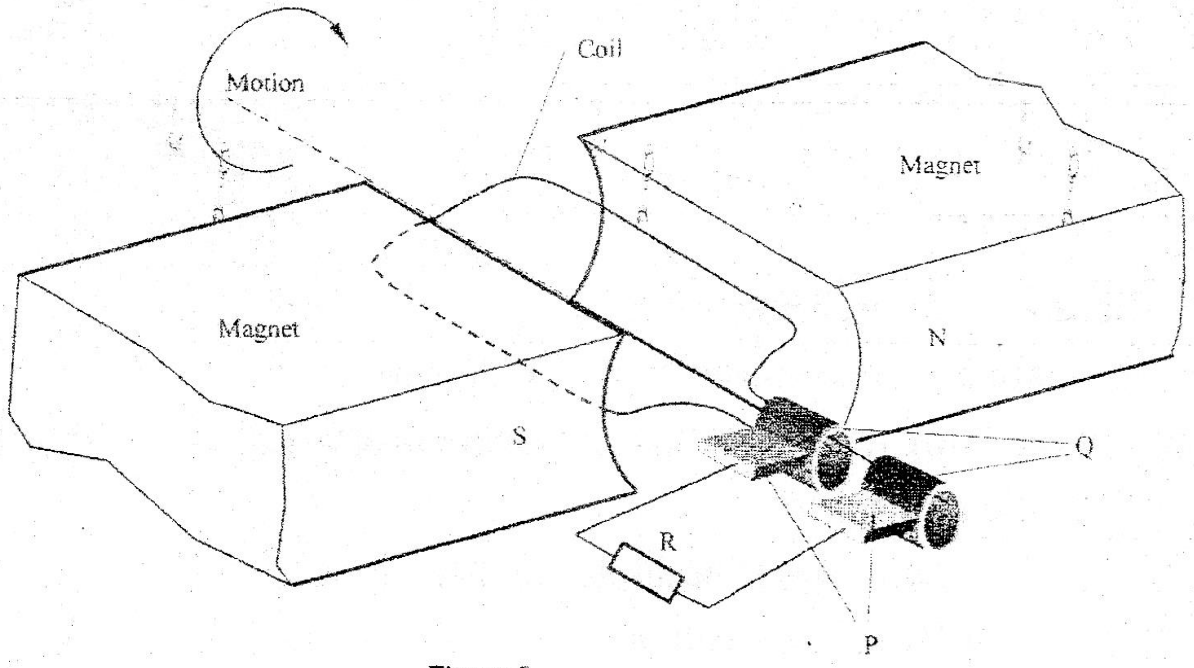


Figure 9

(i) Name the parts labeled P and Q **(2marks)**

(ii) Sketch on the axes provided a graph to show how the magnitude of the potential difference across R changes with the line I

(iii) State two ways in which the potential differences produced by such a generator can be increased. **(2marks)**

(c) In a transformer, the ratio of primary to the secondary turns is 1:10. A current of 500mA flows through a 200Ω resistor in the secondary circuit. Assuming that the transformer is 100% efficient; determine;

(i) The secondary voltage **(1mark)**

(ii) The primary voltage **(2marks)**

(iii) The primary current **(2marks)**

15 (a) State two differences between cathode rays and electromagnetic radiations

(b) Figure 10 shows the main features of a cathode ray oscilloscope (CRO)

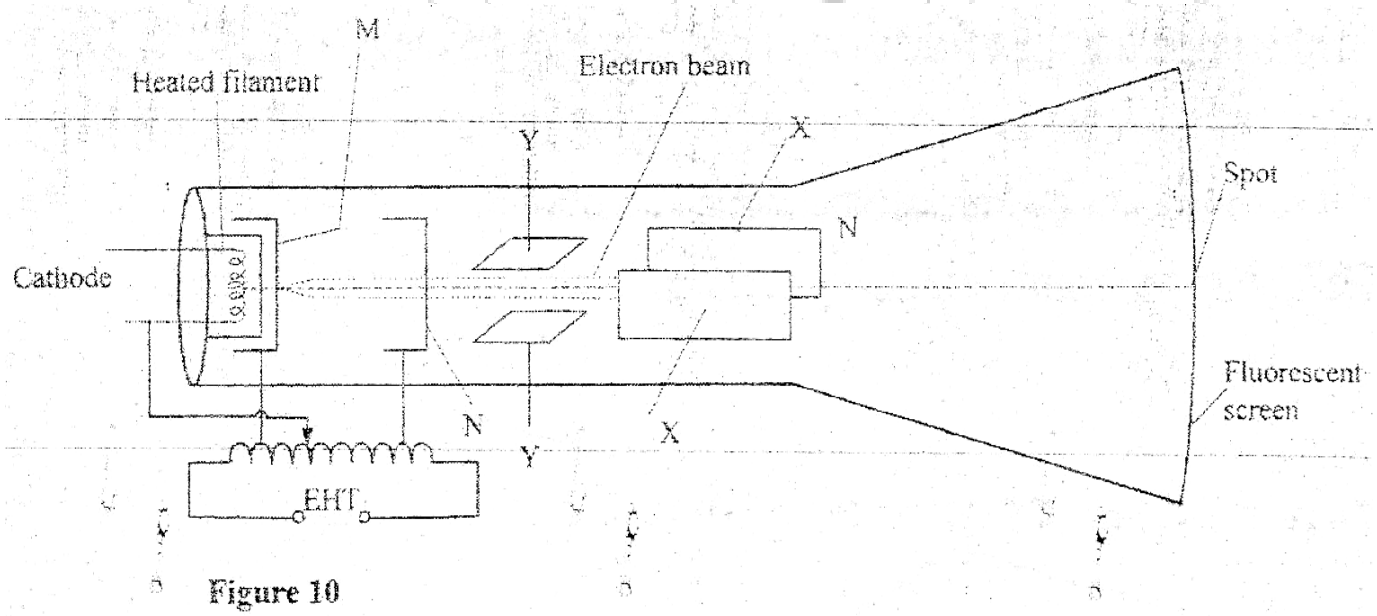


Figure 10

(i) Name the parts labeled M and N

(ii) Explain how electrons are produced in the tube.

(iii) When using the CRO to display waveforms of voltages state where the following should be connected

(I) The voltage to be displayed on the screen

(II) The time base volume

(iv) State why the tube is highly evacuated

(c) Figure 11 shows the waveform of a voltage displayed on the screen of a CRO. The Y gain calibration was 5V per cm

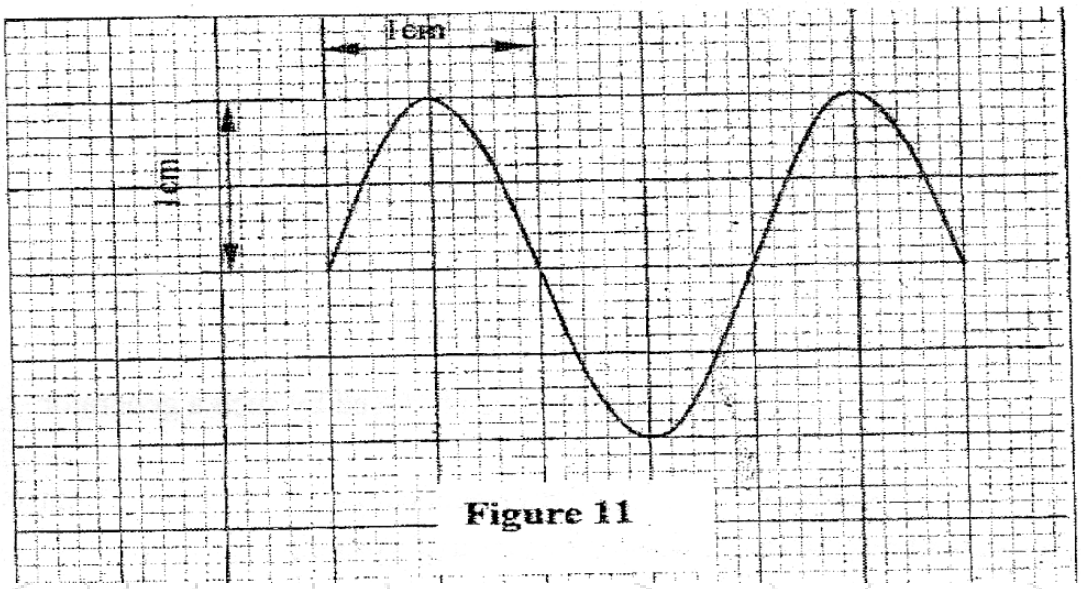


Figure 11

(i) Determine the peak-to-peak voltage of the Y input

(ii) Sketch on the same figure the appearance of the waveform after the voltage of the input signal is halved and it's frequency is doubled **(2marks)**

16. a) It is observed that when ultra – violet radiation is directed onto a clean Zinc plate connected to the cap of a negatively charged leaf electroscope, the leaf falls.

i. Explain this observation. **(1mark)**

ii. Explain why the leaf of the electroscope does not fall when infrared radiation is directed onto the zinc plate. **(1mark)**

b) State the effect on the electrons emitted by the photoelectric effect when the intensity of incident radiation is increased. **(1mark)**

c) The maximum wavelength required to cause photoelectric emission on a metal surface is 8.0×10^{-7} m. The metal surface is irradiated with light of frequency 8.5×10^{14} Hz.

(Take lev = 1.6×10^{-19} J , c = 3.0×10^{8} m/s , h= 6.63×10^{-34} Js)

Determine:

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

ii) .The work function of the metals in electron volts. **(2marks)**

iii) .The maximum Kinetic energy of the electrons. **(3marks)**

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KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 6

232/1

PHYSICS

PAPER 1 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

Write your name, index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided.
*This paper consists of **TWO** Sections: **A** and **B**.*
*Answer **ALL** the questions in section **A** and **B**. All working **MUST** be clearly shown.*
KNEC mathematical tables and silent non-programmable electronic calculators may be used.
Candidates should answer the questions in English.
Take: ***Acceleration due to gravity,*** $g = 10\ m/s^2$

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A (25 MARKS)

Answer all the questions in this section.

1. Figure 1 shows a section of a burette filled with a colourless liquid.



Figure 1 (a)



Figure 1 (b)

Figure 1

Figure 1(b) shows a magnified scale indicating new level of liquid in the burette after some volume ***x*** of the liquid has been removed.

(a) State the new level of the liquid shown in figure 1(b). **(1mk)**

(ii) Determine the value of ***x***. **(1mk)**

2. A form one student set up the apparatus as shown in figure 2.

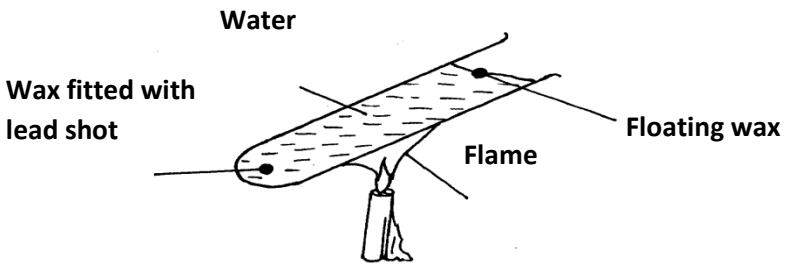


Figure 2

The boiling tube was heated in the middle as shown

(i) Which wax melted? **(1mk)**

(ii) Explain your answer in (i) above. **(1mk)**

3. State the SI unit of gravitational field intensity. **(1mk)**

4. Define force in terms of momentum **(1mk)**

5. A body is uniformly accelerated from rest to a final velocity of $100ms^{-2}$ in 10s. Determine the distance covered. **(2mks)**

6. Figure 3 shows a siphon used to empty a tank.

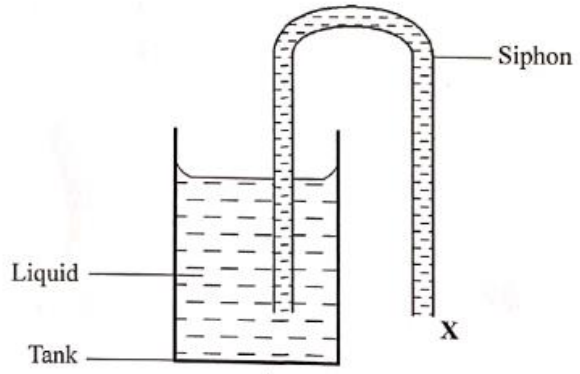


Figure 3

In order to start the siphon, give a reason why the tube must be filled with a liquid and end X must be below the level of the liquid in the tank**.** **(2mks)**

7. Explain how a piece of chalk can be used to demonstrate that matter is made up of tiny particles**.** **(1mk)**

8. The figure 4 shows a uniform meter rule of weight 1N with two weights of weight **0.18N** and **0.12N** suspend from its ends.

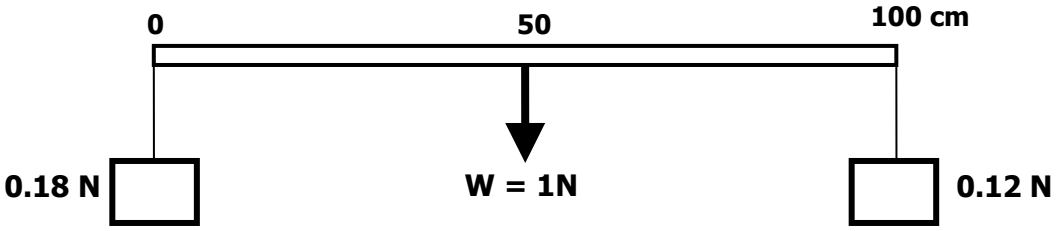


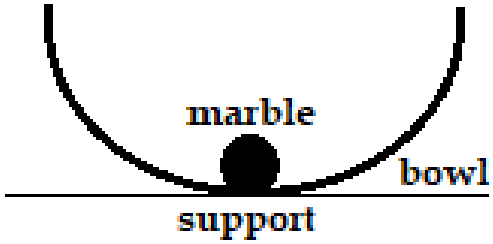
Figure 4

Determine how far from the 0.18 N weight a pivot should be placed in order to balance meter rule. **(3mks)**

9. State **any two** changes that can be made to a fluid flowing in a streamline flow to make it turbulent flow**.** **(2mks)**

10. The solid marble shown below is in a stable equilibrium. On the space provided, sketch the same marble in a neutral state of equilibrium **(1mk)**

Figure



11. Show that the impulsive force on an object can be expressed as F = ma**.** **(3mks)**

12. Figure 6 shows a beaker full of water at $90^{o}C$. The beaker is fitted with two identical thermometers A and B and a cold wet clothe wrapped around the middle of the beakers as shown in the diagram.

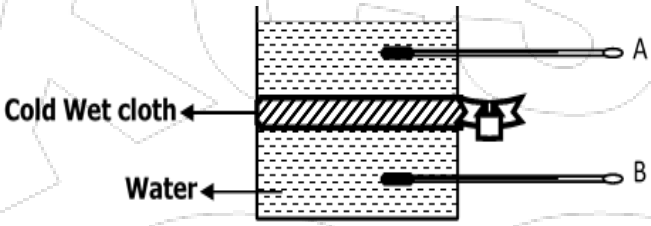
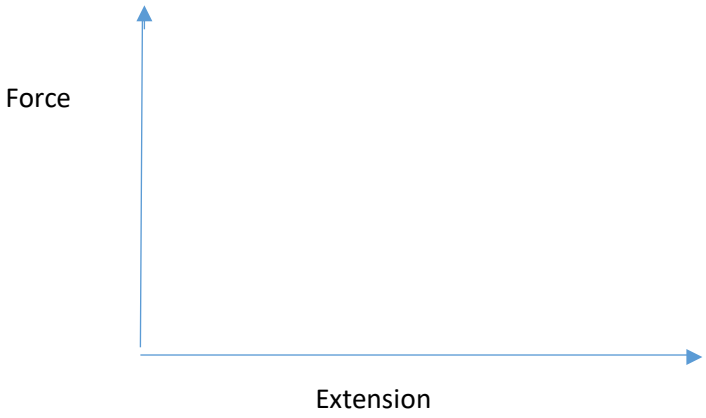


Figure 6

(i) State which thermometer will show a lower reading after some minutes. **(1mk)**

(ii) Explain your answer in (i) above. **(1mk)**

13. Two springs X and Y are defined as follows: X has a spring constant of 25N/m and Y has a spring constant of Y. Sketch on the axes below graphs representing the behaviour of X and Y. **(1mk)**



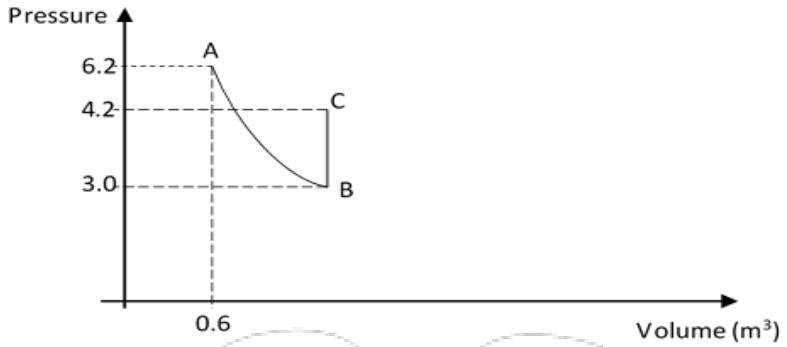
14. In an oil drop experiment to determine the size of an oil molecule certain assumptions are usually made. State any two assumptions**.** **(2mks)**

SECTION B (55 MARKS)

Answer all questions in the spaces provided below each question.

15. (a) The graph in figure 7 shows changes of pressure and volume of a fixed mass of a gas.

Figure 7



(i) Calculate the volume of the gas at B. **(4mks)**

(ii) I. Name the gas law represented by the graph between B and C. **(1mk)**

II. Give one way of increasing pressure at constant volume between B and C. **(1mk)**

(b) Show that density of a fixed mass of a gas is directly proportional to the pressure at constant temperature. **(3mks)**

16. (a) Define ***angular velocity*** as used in circular motion. **(1mk)**

(b) The graph in figure 8 was obtained in an experiment to investigate the variation of the centripetal force, F, with the radius, r of the circle on a turn table.

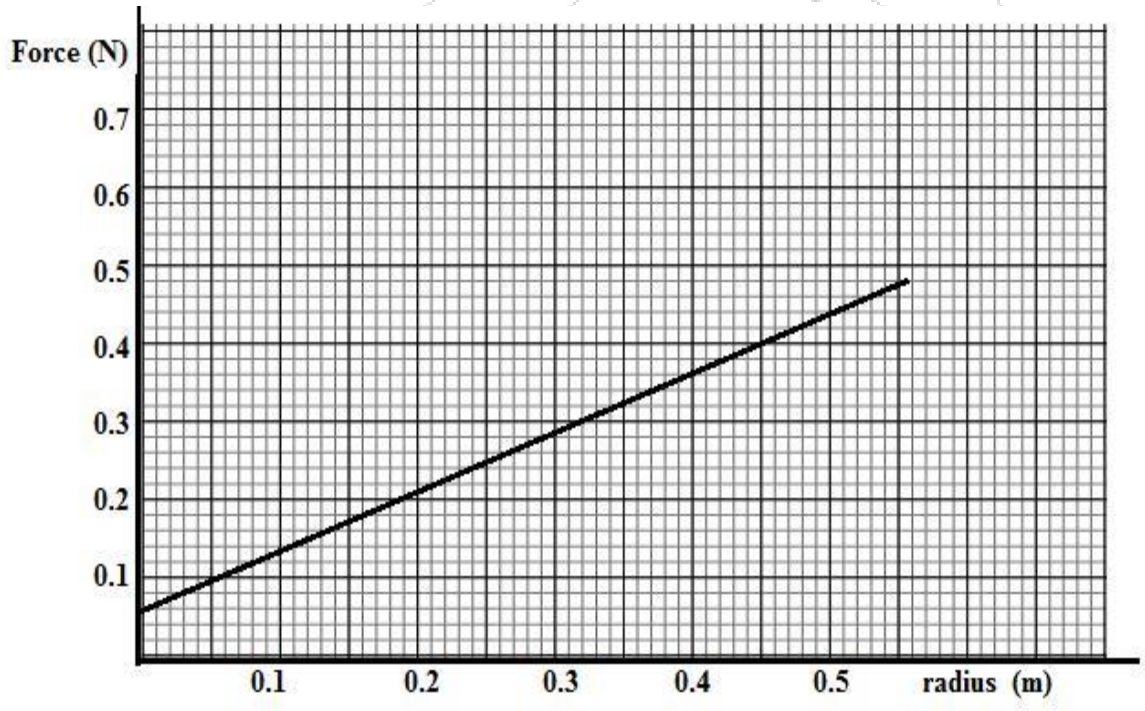


Figure 8

Given that the relationship between force, F, and radius, r, is of the form $F = m\omega^2 r + C$. Where c is a constant. Determine the angular velocity, **w** and the constant **C** of the body given that m = 100g. **(4mks)**

(c) Explain why the earth is said to be accelerating when revolving around the sun at constant speed**.** **(1mk)**

(d) Figure 9 below shows a toy attached to a string and made to move along a vertical circle in an anti-clockwise direction.

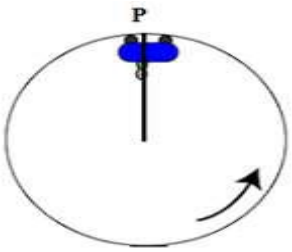


Figure 9

(i) Sketch on the diagram above, the path followed by the trolley if the string cuts when it is at position P. **(1mk)**

(ii) the variation of tension in the string with time as the trolley moved along the vertical circle was plotted in the graph shown in figure 10.

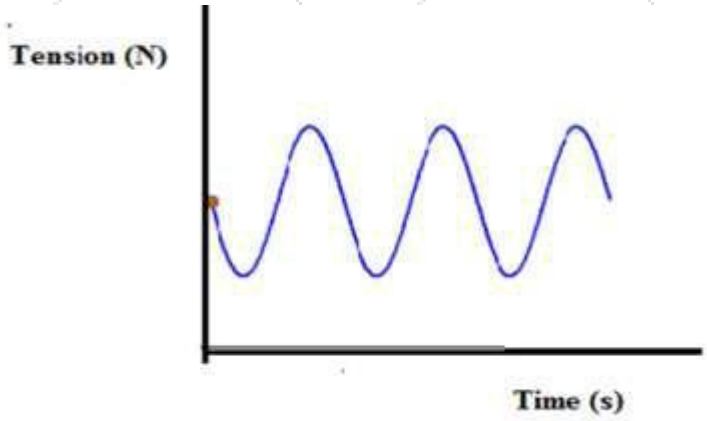


Figure 10

I. Mark on the graph the points **T** corresponding to position **P** in the circle shown in figure 12 above **(1mk)**

II. Give a reason why the graph is not touching the time **axis** **(1mk)**

e) A body moving with uniform angular velocity found to have covered an angular distance 170 radians in t seconds. Thirteen seconds later it is found to have covered a total angular distance of 300 radians. Determine t. **(4mks)**

17. (a) The figure 11 shows a domestic refrigerator.

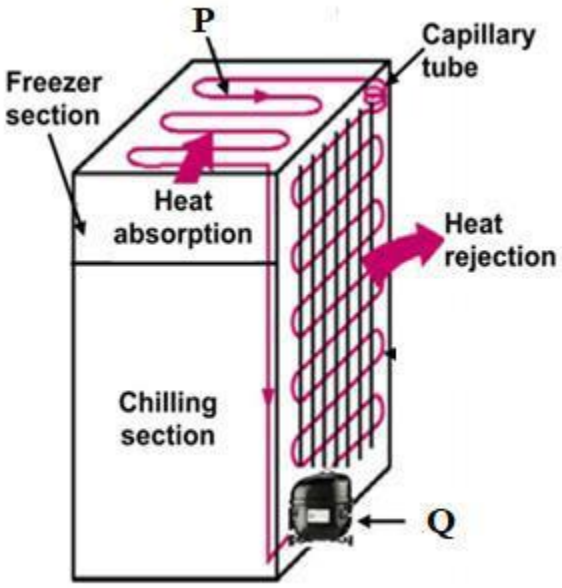


Figure 11

(i) Name the parts P and **Q** **(2mks)**

(ii) Explain how cooling is achieved in the refrigerator**.** **(3mks)**

(iii) The shelves in a refrigerator are made of metal gauze instead of metal plates. Explain. **(2mks)**

(b) A copper can together with a stirrer of total heat capacity 60J/k contains 200g of water at 10^{o}C. Dry steam at 100^{0}C is passed in while the water is stirred until the whole reach a temperature of 30^{0}C. Determine the mass of steam condensed. (Specific heat capacity of water=4200J/kgK and specific latent heat of vaporization of steam(water) =2260000J/kg). **(5mks)**

c) Increase in pressure increases the boiling point of a liquid. Explain how a pressure cooker helps in achieving this situation**.** **(2mks)**

18. (a) State the law of flotation. **(1mk)**

(b) You are provided with the following;

-A block of wood, a spring balance, thin thread, overflow can, measuring cylinder and some liquid.

With the aid of labelled diagram(s) describe an experiment to verify the law of flotation. **(5mks)**

c) Determine the minimum volume of copper that must be attached to a cork of mass 25g so that the two just submerge in water. (Relative density of copper and cork are 9.0 and 0.25 respectively**).** **(3mks)**

d) State two reasons why density bottle may be preferred to measure relative density. **(2mks)**

19 (a) Figure 12 shows a lever being used to raise a load of 100N.

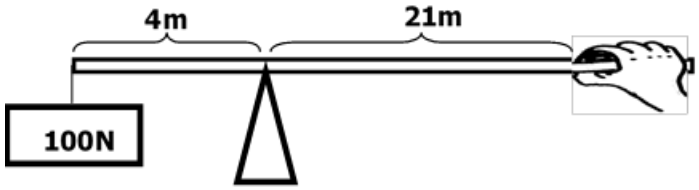


Figure 12

(i) Determine

(I) the effort applied. **(2mks)**

(II) The velocity ratio and mechanical advantage. **(2mks)**

III) Efficiency of the machine. **(2mks)**

(b) Give two ways in which the mechanical advantage could be increased. **(2mks)**

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KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 6

232/2

PHYSICS

PAPER 2 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

- *Write your name and Admission number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *This paper consist of **two** section **A** and **B***
- *Answer all the questions in the spaces provided*
- *All working **must** be clearly shown in the spaces provided.*
- *Non programmable silent electronic calculator may be use*

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A {25 MARKS }

Answer all the questions

1. **Figure 1** shows a ray of light incident on a plane mirror. The mirror is rotated **anticlockwise** through an angle of $\mathbf{10^0}$.

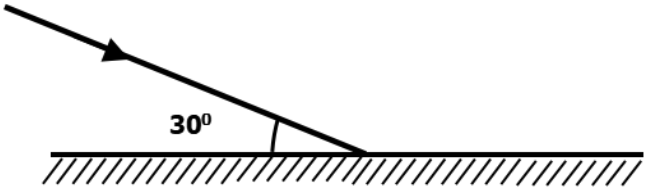


Figure 13

Determine the angle between the incident ray and the new reflected ray. **(2marks)**

2. **Figures 2 (a)** and **2 (b)** show two circuits with identical cells and bulbs.

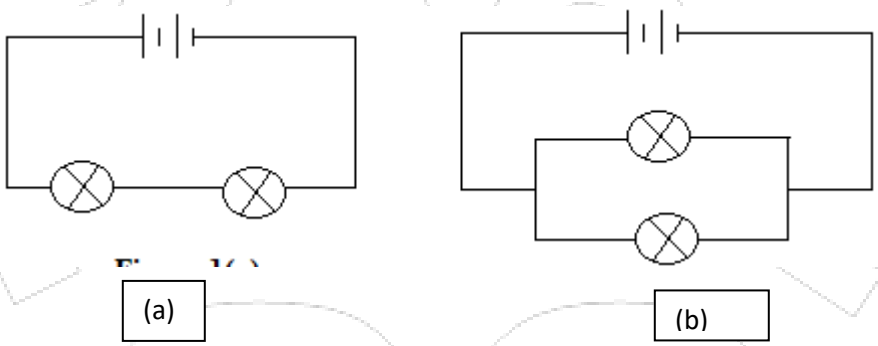


Figure 14

State, with a reason, in which circuit the bulbs will be brighter. **(2 marks)**

3. **Figure 3** shows a wooden rod placed between two bar magnets.

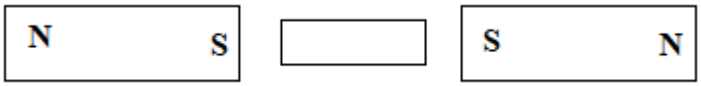


Figure 15

Sketch the resulting magnetic pattern in the arrangement in **figure 3**. **(1 mark)**

4.**Figure 4** shows a circuit used by a student to investigate the effect of current on a coil.

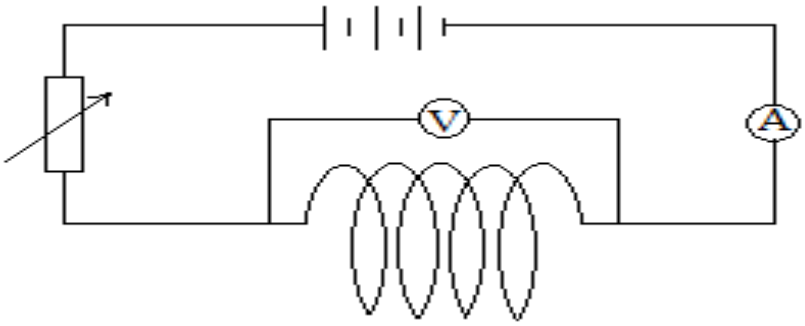


Figure 16

(i) The coil feels warmer after closing the switch. Explain. **(1 mark)**

(ii) The ammeter and voltmeter reading in **figure 4** is 1.5A and 4.1V respectively. Calculate the energy developed in 1 minute. **(2 marks)**

5.Give the difference between Infra-red and Ultraviolet radiation in terms of their production **(1 mark)**

6. On the grid provided below, show the display on the CRO screen of an **AC** signal peak voltage 400V and a frequency 50Hz when the time base is on. (Y-gain at 200V/div, time base at 5ms/div**)** **(2 marks)**

7. Figure 5 shows a virtual image I formed by a convex mirror.

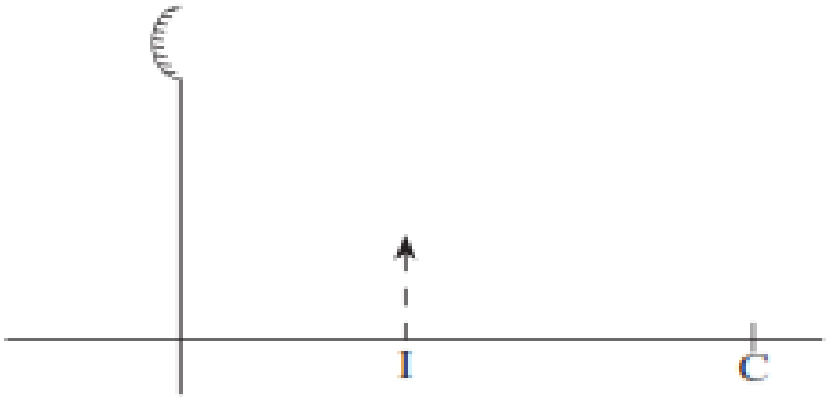


Figure 17

Draw a ray diagram to locate the object**.** **(3 marks)**

8. The figure 6 shows a cathode ray beam entering a magnetic field, perpendicular to the plane of the paper. Complete the diagram to show the path of the beam in the field. **(1 mark)**

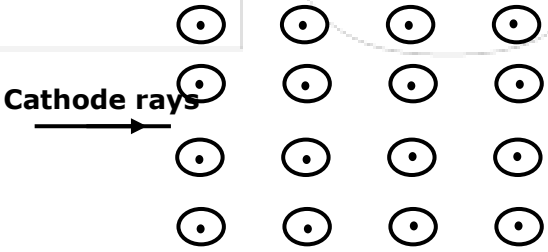


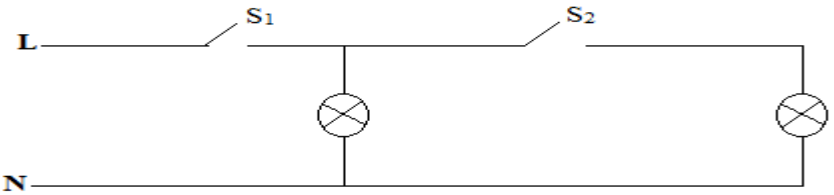
Figure 6

9. Uranium 235 was bombarded with a neutron and fission took place in the following manner.

$$^{235}_{92}U + ^{1}_{0}n \longrightarrow ^{90}_{38}Rn + ^{a}_{b}X + 10\,^{1}_{0}n$$

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

10. **Figure 7** shows bulbs connected in a household.



(i) Identify any mistake in the circuit. **(1 mark)**

(ii) Draw the correct connection of the circuit. **(1 mark)**

11. The resistance of a metal conductor increases with increase in temperature. Explain **(2 marks)**

12. State what is meant by the term doping as used in diode. **(1 mark)**

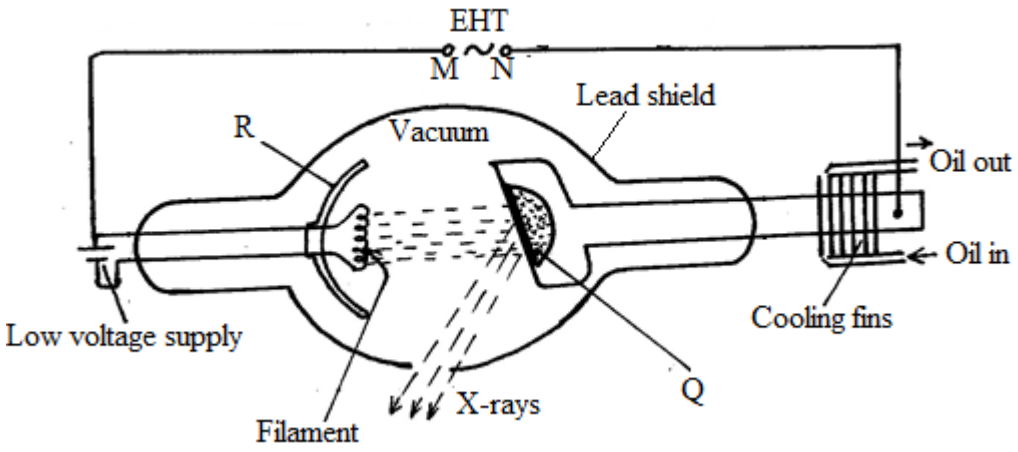
13.Two students stand 300m from a wall. One bangs two pieces of wood together and at the same time, the other starts a stop watch. They hear an echo after 1.8 seconds. Determine the speed of sound in air. **(2 marks)**

14. Define wavelength as used in longitudinal wave**.** **(1 mark)**

SECTION B (55 MARKS)

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

15 a) Figure 8 shows the parts and circuit of a modern X-ray tube.



(i) State and explain how the following changes affect the nature of X-rays produced:

I. increasing the potential across MN. **(2 marks)**

II. increasing the filament current. **(2 marks)**

(ii) The material of Q should withstand a lot of heat. State the source of heat in the tube. **(1 mark)**

(iii) State the property of lead which makes it suitable as a shield. **(1 mark)**

(iv) Give a reason for the shape of part R. **(1 mark)**

b) A 5μF and a 3μF capacitor are connected in series with a 6V battery.

(i) Sketch and label the circuit diagram showing the arrangement. **(2 marks)**

(ii) Determine;

I. The potential difference across the 5μF. **(4 marks)**

II. The charge stored in the circuit. **(1 mark)**

(d) State one use of a charged gold leaf electroscope. **(1 mark)**

16.(a) State what is meant by the term mutual induction. **(1 mark)**

(b) **Figure 9** shows two coils wound on a laminated soft iron core. It is connected to a 300V mains supply.

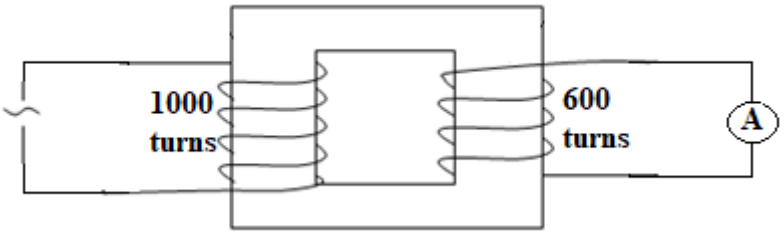


Figure 9

(i) Identify the type of the transformer in **figure 9**. (1 mark)

(ii) The transformer in **figure 9** loses 20% of the input energy into heat per second. Determine the maximum current measured on the ammeter, if the input current is 2A. **(3 marks)**

(iii) Explain how energy losses in the transformer in **figure 9** are minimized by having:

(I) a soft iron core. **(1 mark)**

(II) a laminated core. (1 mark)

(b) Figure 10 shows two identical copper coils X and Y placed close to each other. Coil X is connected to a DC power supply while coil Y is connected to a galvanometer.

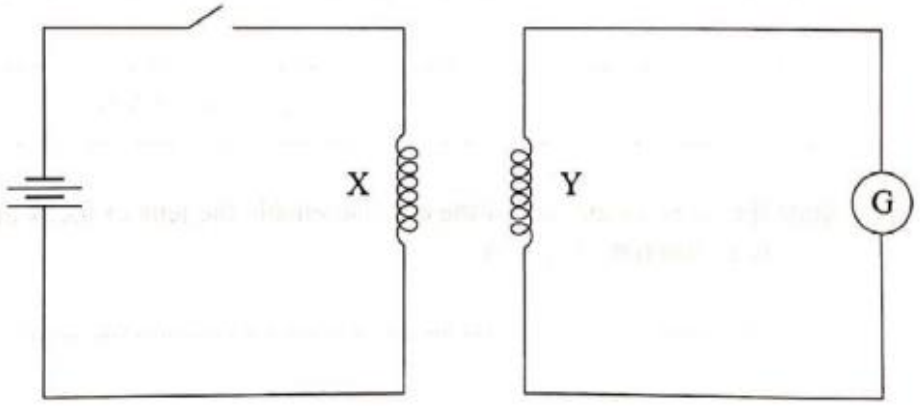


Figure 10

i) Explain what is observed on the galvanometer when the switch is closed. **(4mks)**

ii) State what is observed on the galvanometer when the switch is opened. **(1mk)**

17. (a) Apart from light moving from an optically denser medium to less dense medium, state the other condition for total internal reflection. **(1 mark)**

(b) **Figure 11** below shows the path of light through a transparent material placed in air.

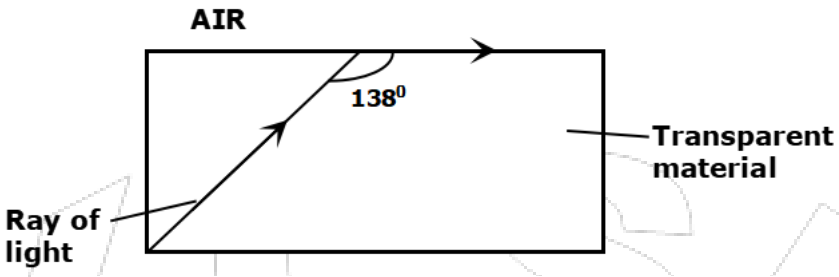


Figure 11

Determine the refractive index of the transparent material. **(3marks)**

c) (i) Figure 12 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 eye piece lens L_e. Complete using ray construction how the arrangement would produce the final image. **(3 marks)**

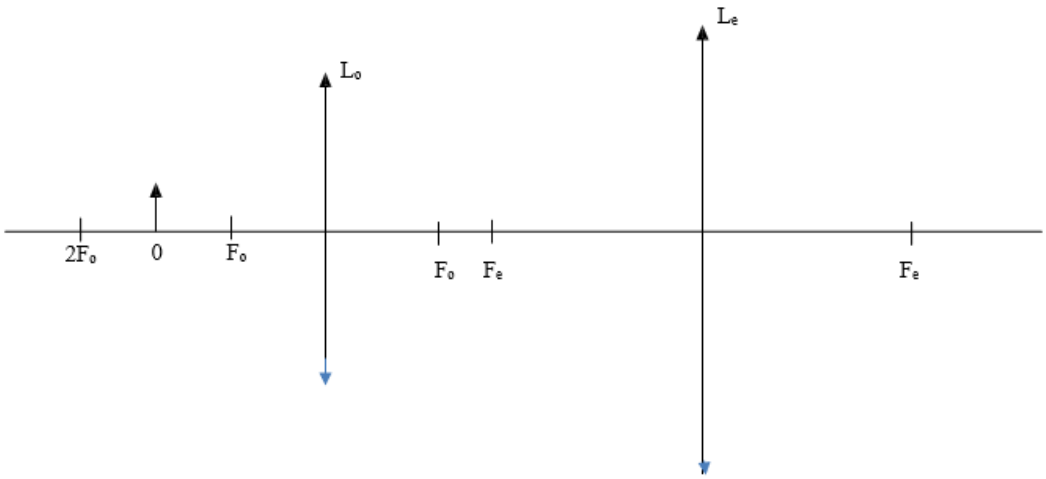


Figure 12

(i)An object is placed 25cm from the objective lens of focal length 15cm.On the other side of the objective lens another converging lens of focal length 30cm is placed as the eye piece lens. The distance between the two lenses is 52.5cm. Determine;

I. The position of the first image. **(3 marks)**

II. The position of the final image from the eye piece lens. **(3 marks)**

18. State **two** factors which determine the speed of photoelectrons emitted from a metal surface.

(2 marks)

c) **Figure 13** shows a graph of the square of the maximum velocity $(V_{max})^2$ of the emitted photoelectrons against the frequency (f) of the radiation causing photoelectric effect on a clean zinc plate.

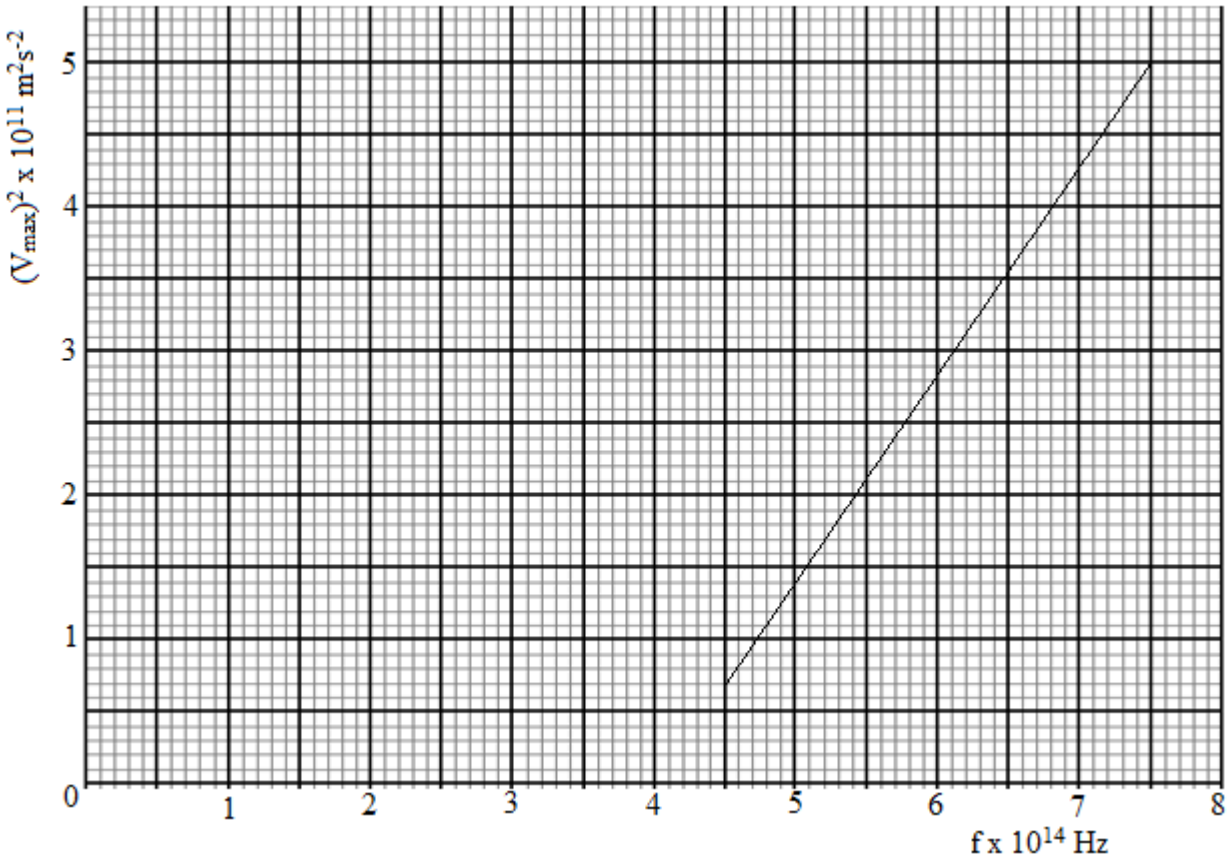


Figure 13

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

The equation of the line is $V^2 = \frac{2h}{m}f - \frac{2h}{m}f_o$ where m = 9.11 x 10^{-31} kg

(ii) From the graph determine the:

(I) minimum frequency of the radiation that will cause emission of electrons from the zinc surface.

(1 mark)

(II) Planck's constant. **(2 marks)**

(III) minimum amount of energy required to just emit electrons from the zinc surface.

(2 marks)

19. Figure 14 shows a set up for observing interference of waves from two sources S_1 and S_2. The points C and D represent positions of the constructive and destructive interference respectively as observed on the screen.



Figure 14

(a) If the observation was made in a ripple tank, describe:

(i) How the two sets of coherent waves were produced. **(2 marks)**

(ii) How the constructive and destructive interferences are identified. **(1 mark)**

(b) Explain how the constructive interference C and destructive interference D patterns are produced. (2 marks)

(c) Draw:

(i) The line joining all points where waves S_1 and S_2 have travelled equal distance. Label it A. **(1 mark)**

(ii) The line joining all points where waves from S_2 have travelled one wavelength further than the waves from S_1. Label it B. **(1 mark)**

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KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 7

232/1

PHYSICS

PAPER 1 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

Write your name, index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided.
*This paper consists of **TWO** Sections: **A** and **B**.*
*Answer **ALL** the questions in section **A** and **B**. All working **MUST** be clearly shown.*
KNEC mathematical tables and silent non-programmable electronic calculators may be used.
Candidates should answer the questions in English.
Take: ***Acceleration due to gravity,*** $g = 10\ m/s^2$

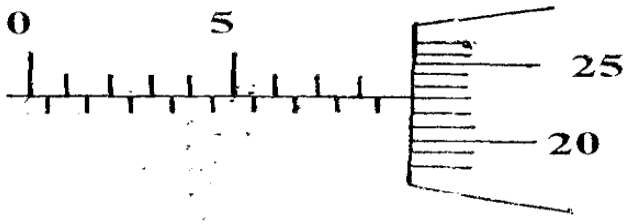
FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

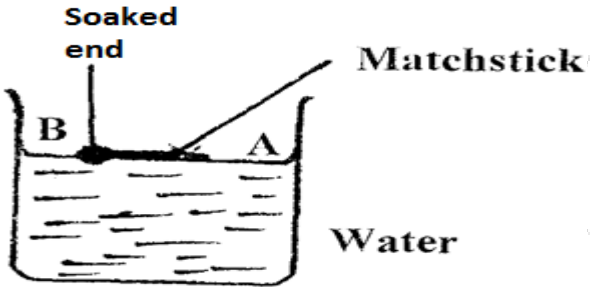
SECTION A (25 MARKS)

Answer all the questions in this section.

1. The figure shows the reading of micrometre screw gauge that has a zero error of -0.25mm. What is the actual length of the object being measured **(2marks)**



2. The figure below shows a matchstick soaped on one end and placed on the surface of clean water as shown.



The matchstick is observed to move towards a certain direction

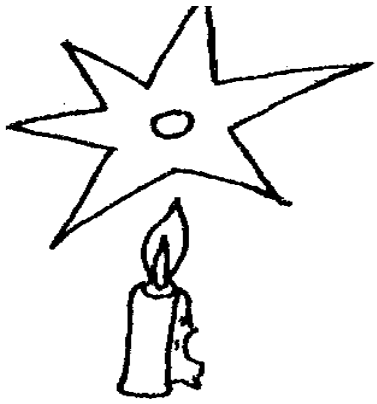
i) State the direction (A or B) **(1mark)**

ii) Explain **(1mark)**

3. Two liquid X and Y have density 1.25g/cm^3 and 1.5g/cm^3 respectively. Calculate to 2d.p the density of the mixture containing 40% by mass of X the rest being Y **(3marks)**

4. A uniform meter rule pivoted at its 15cm mark is balanced by a 200g mass suspended at the 5cm mark. Determine the weight of the meter rule **(3marks)**

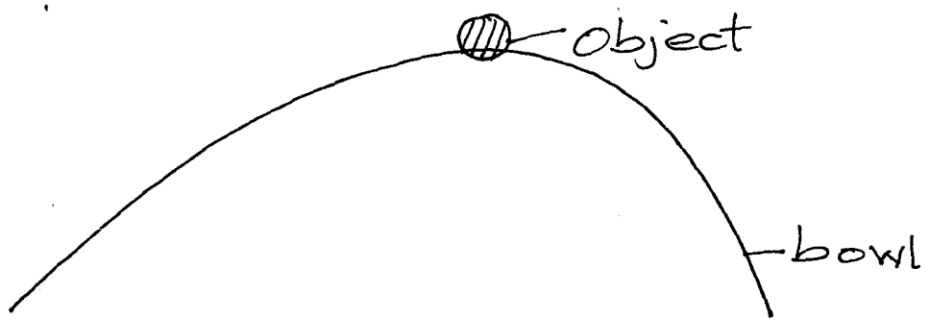
5. A paper windmill in a horizontal axis was placed about a candle as shown in the figure



When the candle was lit the paper windmill began to rotate. Explain this observation.

(2marks)

6. **An** object was placed on an inverted bowl as shown.

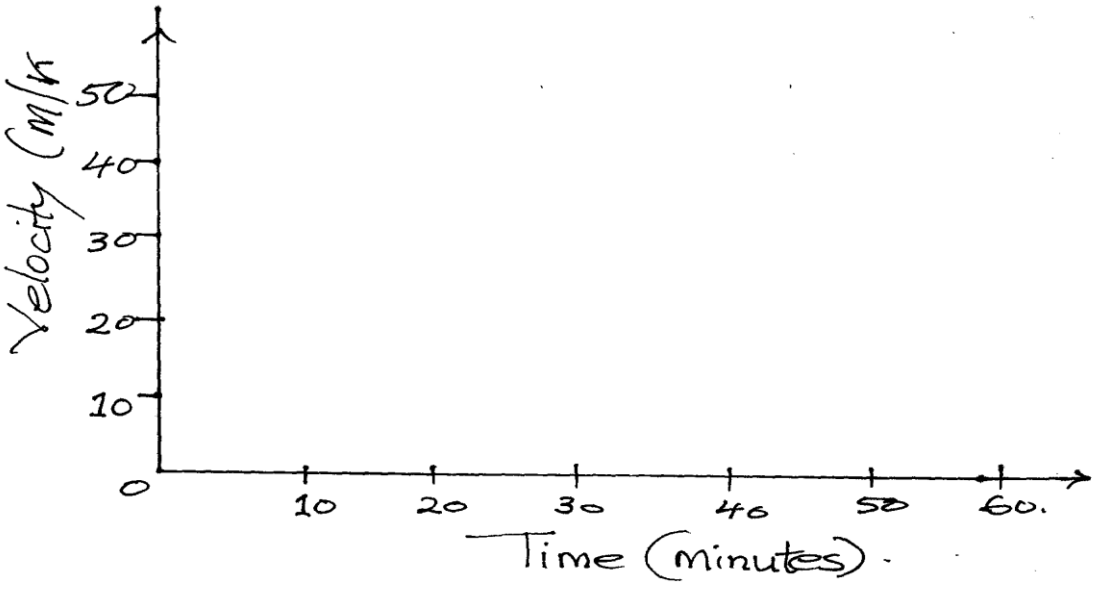


i) State the type of stability above. **(1mark)**

ii) Define the type stability above. **(1mark)**

7. A pipe of diameter 12mm is connected to another pipe of radius 9mm. if water flows in the wider pipe at the speed of 2m/s what is the speed in the narrow pipe. **(3marks)**

8. A car starting from rest accelerates uniformly for 5minutes to reach 30m/s. It continues at this speed for the next 20minutes and then decelerates uniformly to come to stop in 10 minutes. On the axes provided sketch the graph of velocity against time for the motion of the car **(1mark)**



9. A diver was swimming in a swimming pool of uniform depth of 0.8m from the surface of water. If atmospheric pressure acting on the surface of water is 103000pa calculate the total pressure experienced by the diver. (density of water = $1g/cm^3$, g= $10m/s^2$) **(2marks)**

10. The boiling point of water is known to be at 100°C. A student heated some water and noticed that it boiled at 101°C state two possible reasons for this observation. **(2marks)**

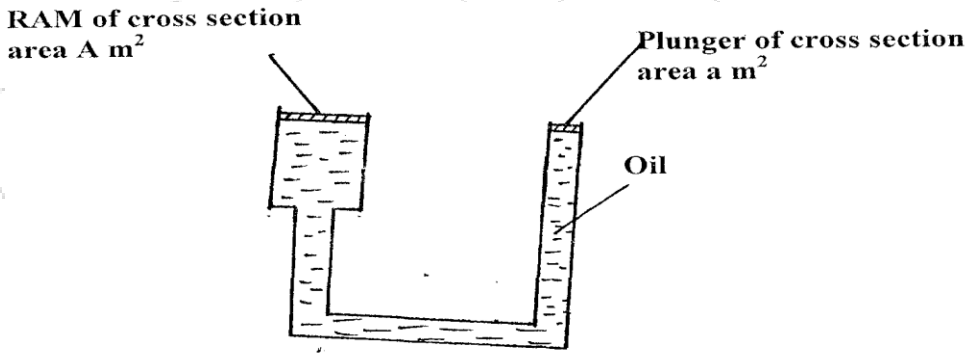
11. Explain the difference between a liquid and a gas in terms of intermolecular distance and force. **(2marks)**

12. State the source of energy for gases in the atmosphere. **(1mark)**

SECTION B 55 MARKS

13. Define the term velocity ratio of a machine **(1mark)**

b) Figure below shows part of a hydraulic press. The plunger is the position where effort is applied while the ram piston is the position where load is applied. The plunger has a cross-section area a m^2 while the ram piston has a cross-section area Am^2



When the plunger moves down a distance d, the ram piston moves up a distance d.

i) State the property of liquid on which the working of the hydraulic press works **(1mark)**

ii) Derive an expression for the velocity ratio (V.R) in terms of A and a **(3marks)**

c) A machine of velocity ratio 45, overcome a load of 4.5×10^3N, When an effort of 135N is applied.

Determine

i) The efficiency of the machine **(3marks)**

ii) The percentage of work that goes to waste **(1mark)**

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

b) Water of mass 200g at a temperature of 60°C is put in a well lagged copper calorimeter of mass 80g. A piece of ice at 0°C and mass 20g is placed in the calorimeter and the mixture stirred gently until all the ice melts. The final temperature T of the mixture is then recorded. (Take; specific latent of fusion of ice=334000J/kg, s.h.c of water =4200j/$kg^{-1}k^{-1}$, s.h.c of copper =900J/$kg^{-1}k^{-1}$

Determine:

i) The heat absorbed by the melting ice at 0^oC **(1mark)**

ii) The heat absorbed by the melted ice (water) to rise to temperature T. (answer may be given in terms of T) **(2marks)**

iii) The heat lost by the warm water and the colorimeter (answer may be given in terms of T) **(2marks)**

iv) The final temperature of the mixture **(3marks)**

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

b) A matatu starts from rest and accelerates to cover a distance of 49m in 7seconds. Determine its acceleration. **(2mks)**

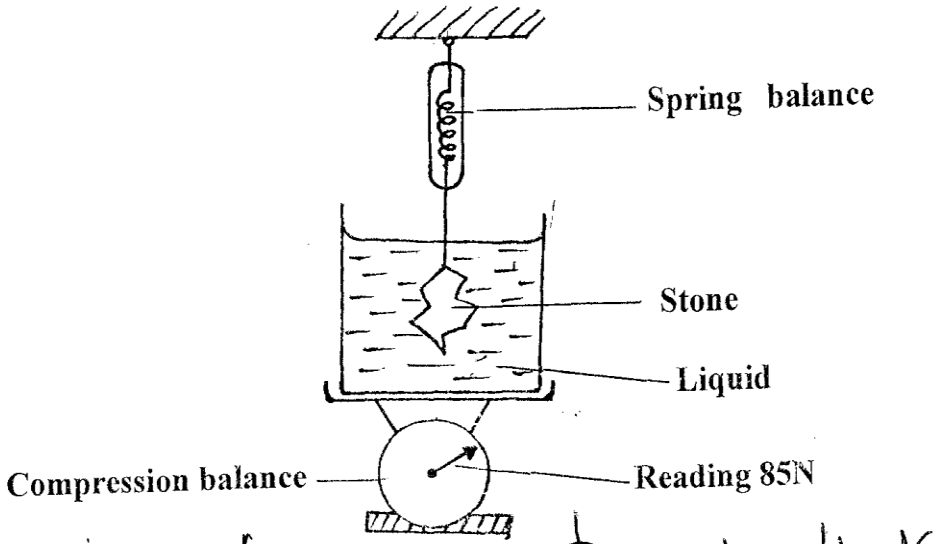
(c) A trolley moving on a horizontal bench of height 1.2m strikes a barrier at the edge of the bench. The brass mass on the top of the trolley flies off on impact and lands on the ground 2.5m from the edge of the bench. Determine

i) The time taken by the brass mass to reach the ground. **(2marks)**

ii) The speed at which the trolley struck the barrier **(2marks)**

d) A passenger dropped a coin held at his hands in a stationary bus and it landed at his feet. State and explain the position it will land if he repeat it once again and the bus was assumed to be moving in a straight line at constant speed **(2marks)**

16. Figure below shows of mass 4kg immersed in liquid and suspended from a spring balance with a string. The beaker was placed on a compression balance and shown the reading of 85N. The density of the stone was $3000kg/m^3$ while the density of the liquid was $800kg/m^3$



a) State Archimedes principle **(1mark)**

b) Determine

i) Volume of the liquid displaced **(2marks)**

ii) Up thrust on the stone **(2marks)**

iii) Reading of the spring balance **(2marks)**

c) Find the volume of hydrogen gas filled balloon that will carry a 300kg load in air (density of air $=1.3kg/m^3$ while that of hydrogen $=0.9kg/m^3$) **(3marks)**

17.a) State Boyles law **(1mark)**

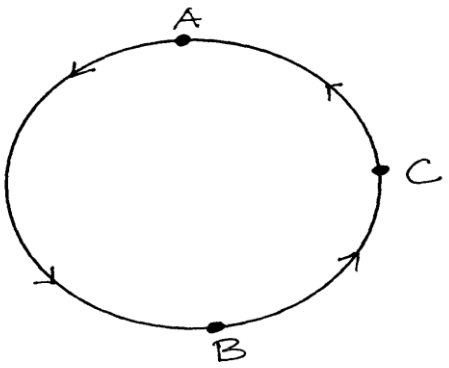
b) State the measurements taken in verifying the law above **(2marks)**

c) Explain how measurement above are used to verify Boyles law. **(3marks)**

d) At 30^oC, pressure of a gas is 60cmHg. At what temperature would the pressure of the gas rise to 100cmHg if the volume is kept constant. **(3marks)**

18.a) A car of mass 1500kg moves round a circular track of radius 1200m at a constant speed of 20m/s what is the centripetal force action on the car. **(3marks)**

b) The figure below shows a stone of mass 10kg being whirled using a rope in a vertical circle of radius 2.5m



State what provides the centripetal force at points.

i) A **(1mark)**

ii) B **(1mark)**

iii) C **(1mark)**

c) Calculate the maximum tension on the body if it was moving ate a linear velocity of 10m/s. **(3marks)**

($g=10m/s^2$)

KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 7

232/2

PHYSICS

PAPER 2 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

- *Write your name and Admission number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *This paper consist of **two** section **A** and **B***
- *Answer all the questions in the spaces provided*
- *All working **must** be clearly shown in the spaces provided.*
- *Non programmable silent electronic calculator may be use*

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A {25 MARKS }

Answer all the questions

1. Sketch the magnetic field pattern given by a current carrying conductor in the magnetic field shown in the figure below. Also show the direction of the forces produced on the conductor **(2 mks)**



2. State any two ways in which energy is lost in a transformer, and briefly explain each loss can be minimised. **(2 mks)**

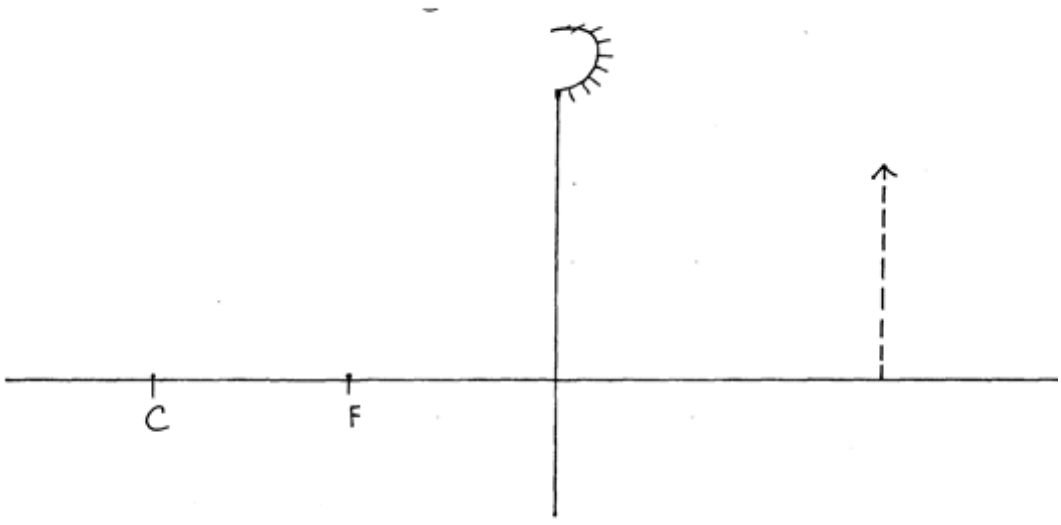
3. Below is part of the electromagnetic spectrum in order of increasing wavelength

A	B	C	Visible light	infrared	D	C

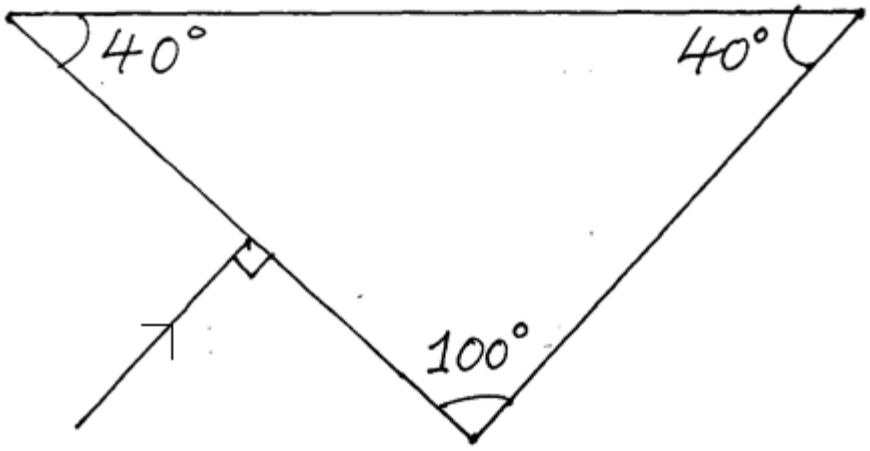
How are waves A Produced **(1 mk)**

4.a) State one similarity and one difference between a camera and a human eye. **(2 mks)**

b) The figure below is a concave mirror used to form a virtual, magnified image. Complete the ray diagram to show the position of the object **(3 mks)**



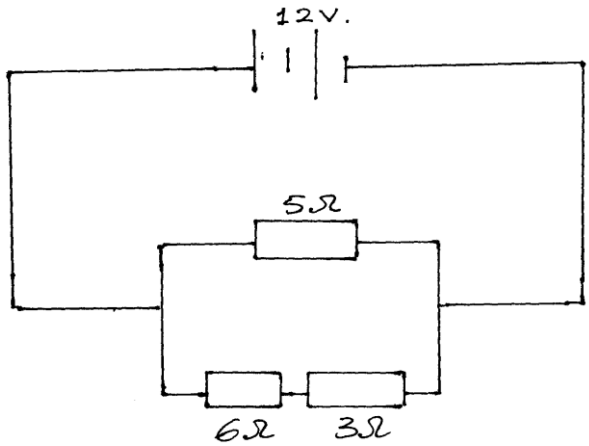
5) The figure below shows a ray of light incident on a glass prism



Given that the critical angle of the glass is 39^0, sketch on the diagram the path of ray through the prism until it exits the prism **(2mks)**

6. A sharp point of a pin is held over a positively charged electroscope. State and explain the observation made on the electroscope **(2mks)**

7. The figure below is a circuit of 3 resistors connected to a 12v battery

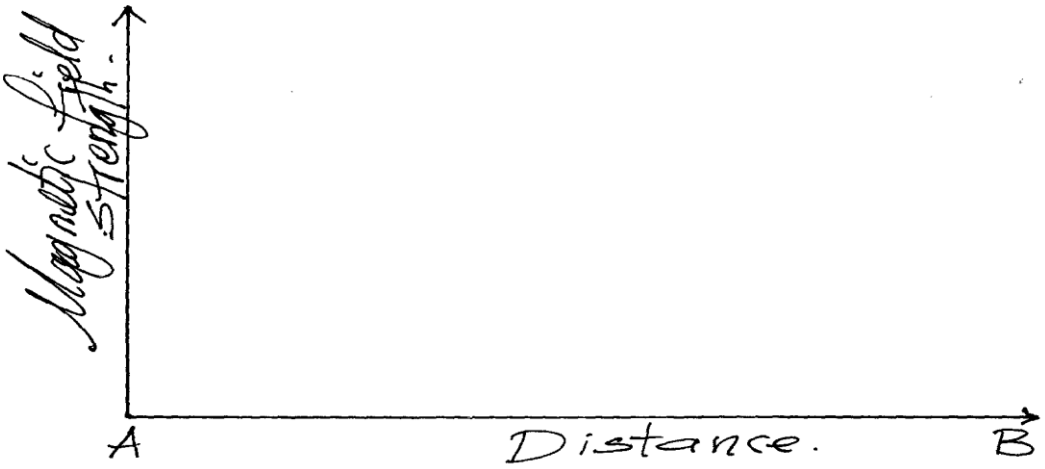


Determine the P.d across the 3Ω resistor **(3mks)**

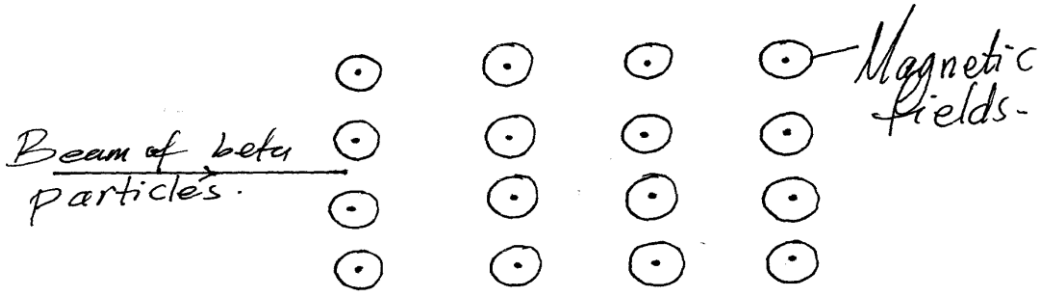
8. The figure below shows a magnet. Point A and B are in front of the magnet



On the axis provided sketch a graph showing how the magnetic field strength changes the A to B **(2mks)**



9. The figure below shows a beam of beta particles entering a magnetic field whose direction below

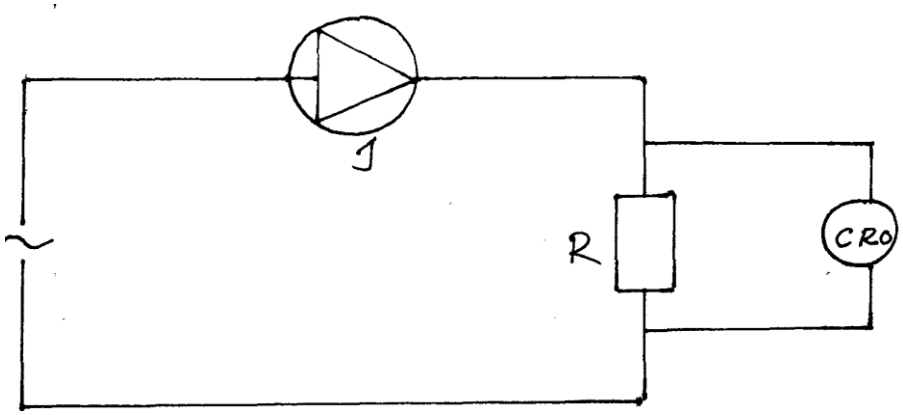


Complete the diagram to show the path of the beta particles as they pass through magnetic field and out of it **(1mk)**

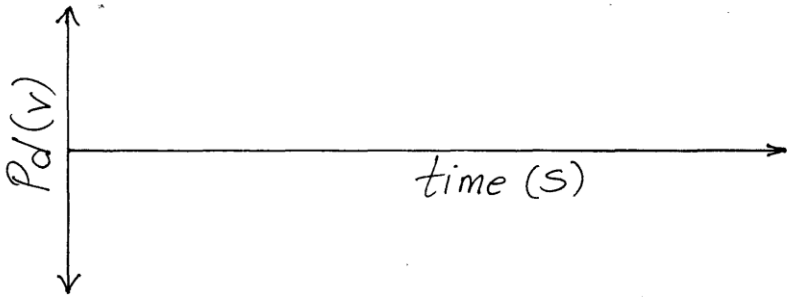
10. A girl standing 400m from the foot of a high cliff claps her hand and the echo reaches her 2.32 seconds later. Calculate the velocity of sound in air using this observation. **(2mks)**

11. Explain two of ways of dealing with defect of polarisation in a simple cell **(2mks)**

12. The figure below shows an a.c source connected across diode D and Resistor R

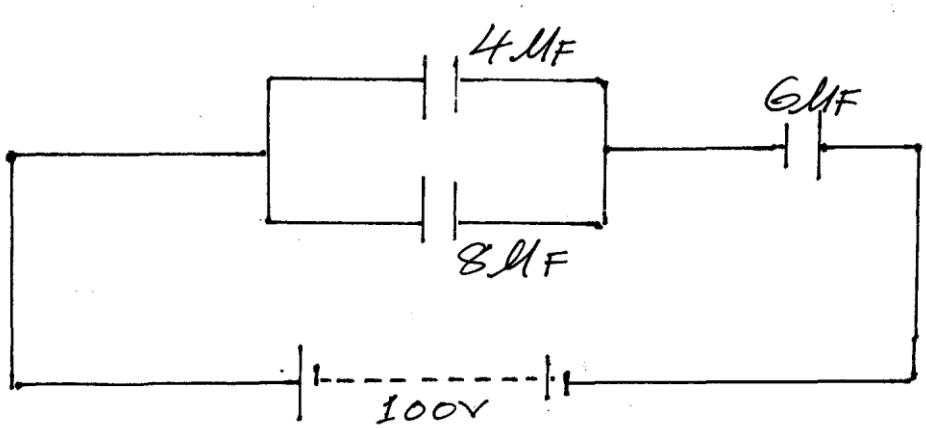


On the axis provided sketch the output voltage as observed in the CRO **(1mk)**



SECTION B (55 MARKS)

13.a) The figure below shows a system of capacitor connected to a 100v d.c supply.



From this circuit determine:

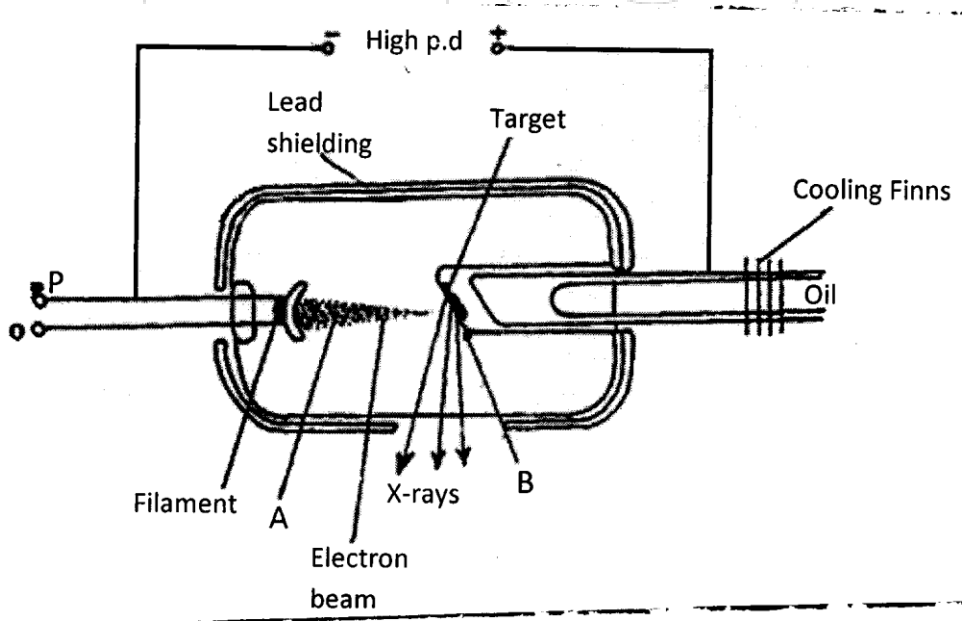
i) Its effective capacitance **(2mks)**

ii) The charge through the $6\mu F$ capacitor **(2mks)**

iii) The p.d across $8\mu F$ capacitor **2mks)**

b) State any two factors that affects the capacitance of a parallel plate capacitor **(2mks)**

14.a) The figure below shows the features of an x-ray tube



i) Name the parts labelled A **and B** **(2mks)**

A……..

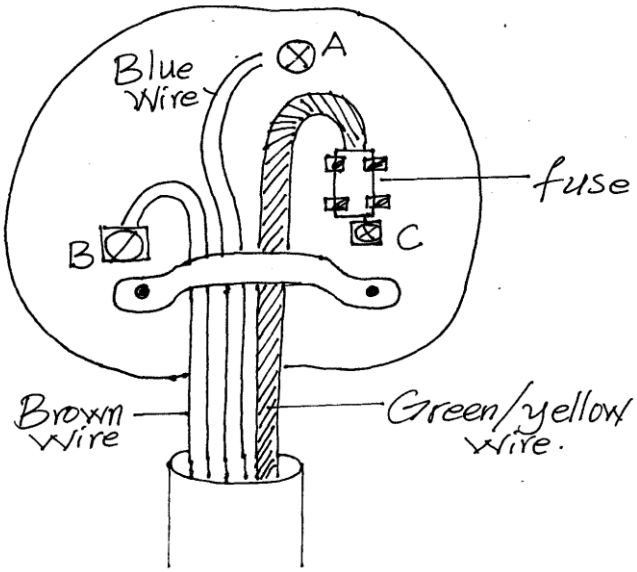
B……..

ii) Explain the effect of increasing the potential P on x-rays produced **(2mks)**

iii) During the operation of the tube, the target become very hot. Explain how this heat is caused **(2mks)**

b) In a certain x-ray tube, the electrons are accelerated by a p.d of 12kv. Assuming that all energy goes to produce x-rays, determine the frequency of x-ray produced ($h=6.62\times10^{-34}$Js and $e^{-}=1.6\times10^{-19}$C) **(3mks)**

15. The figure below shows a connection to a 3 pin plug as viewed from its back

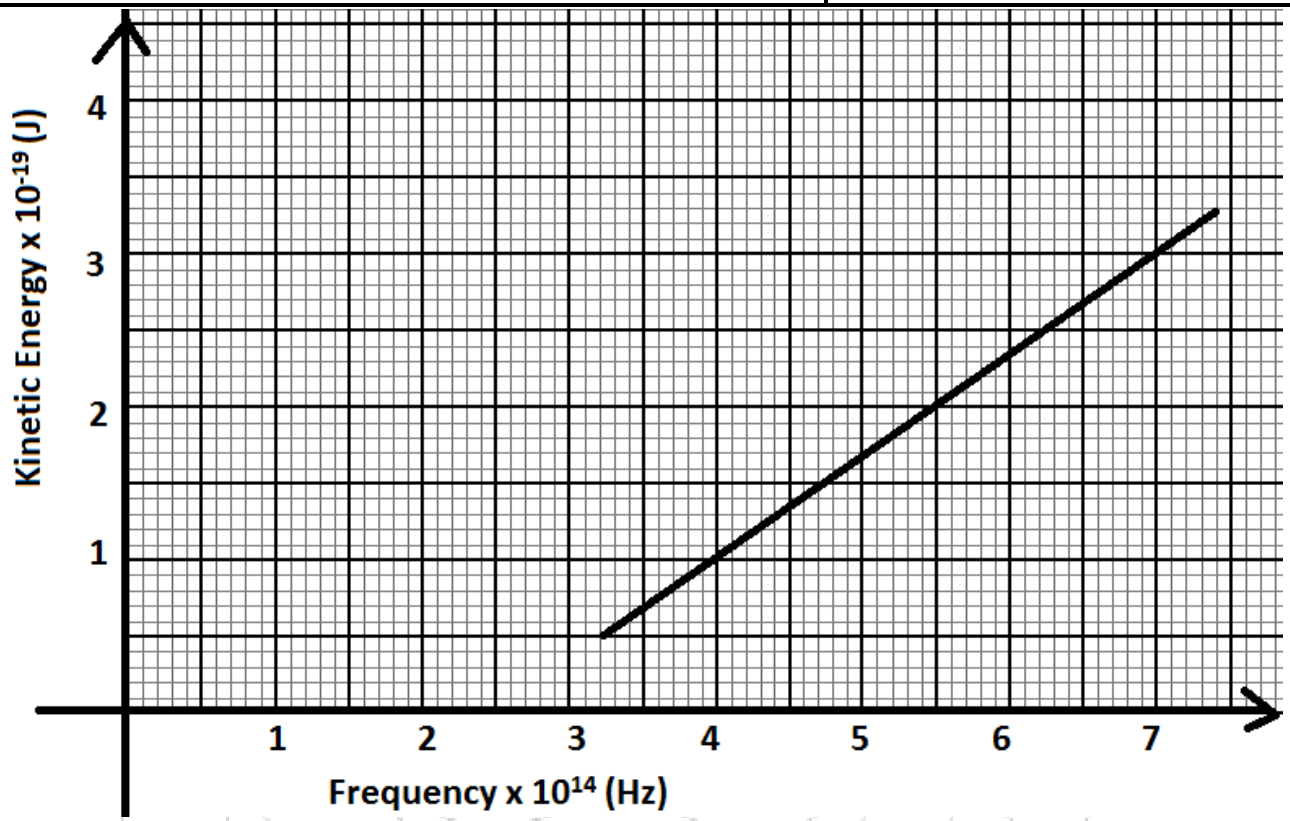


i) Name the terminal pin labelled A **(1mk)**

ii) State any two mistakes with wiring of his 3pin plug **(2mks)**

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

b) The figure below is graph of K.E of electrons against frequency of radiation in photo – electric effect in cathode metal plate



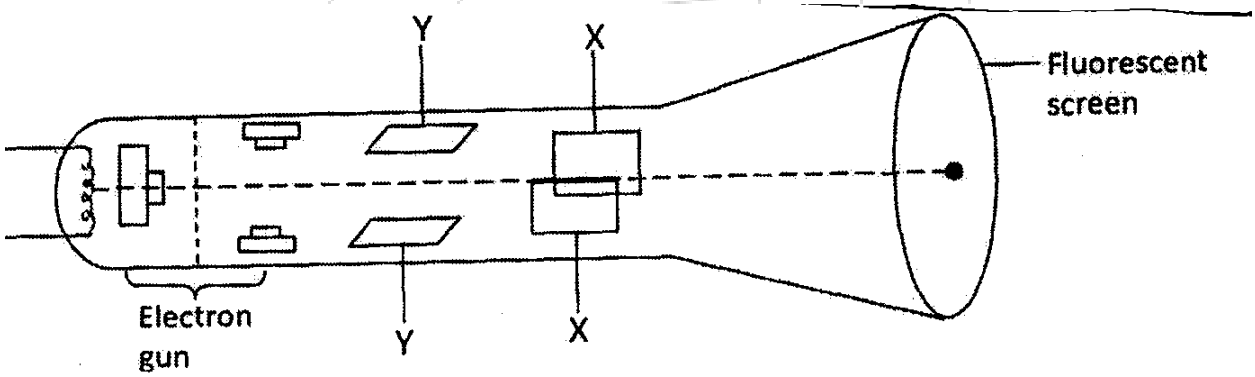
From the graph, determine

i) Threshold wavelength (λ)of the cathode metal surface **(2mks)**

ii) Plancks constant (h) of cathode **(2mks)**

iii) Work function of cathode in ev **(2mks)**

16.a) The figure below shows a simple cathode ray tube

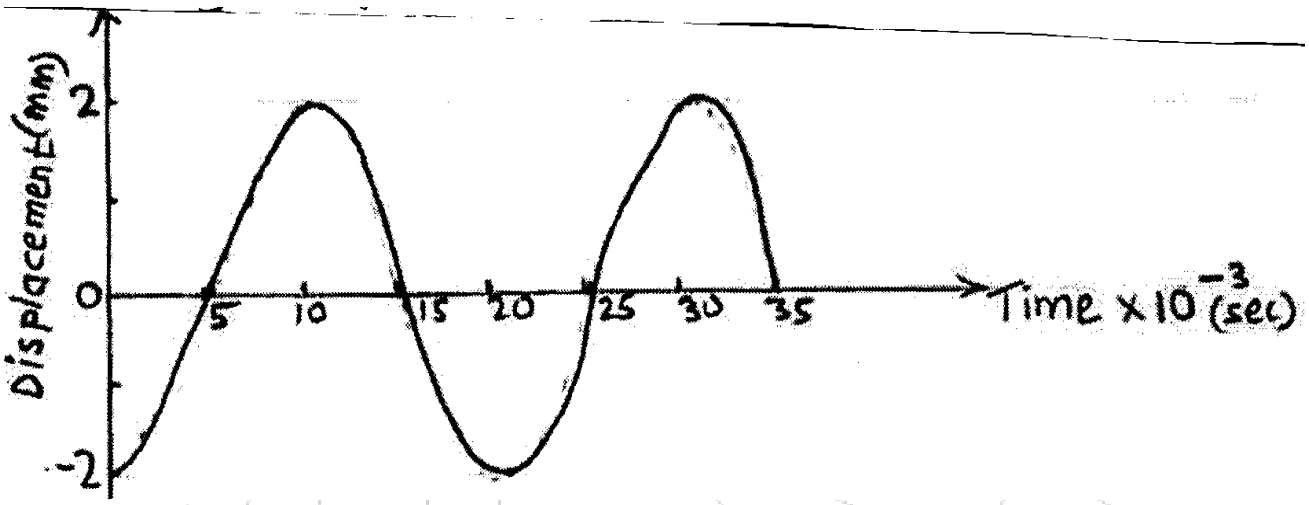


i) Explain how the electrons are produced in the tube **(2mks)**

ii) State one function of the anode **(1mk)**

iii) At what part of the cathode tube would the time base be connected? **(1mk)**

b) The figure below represent a displacement time graph for a wave moving with a velocity of 80cm/s

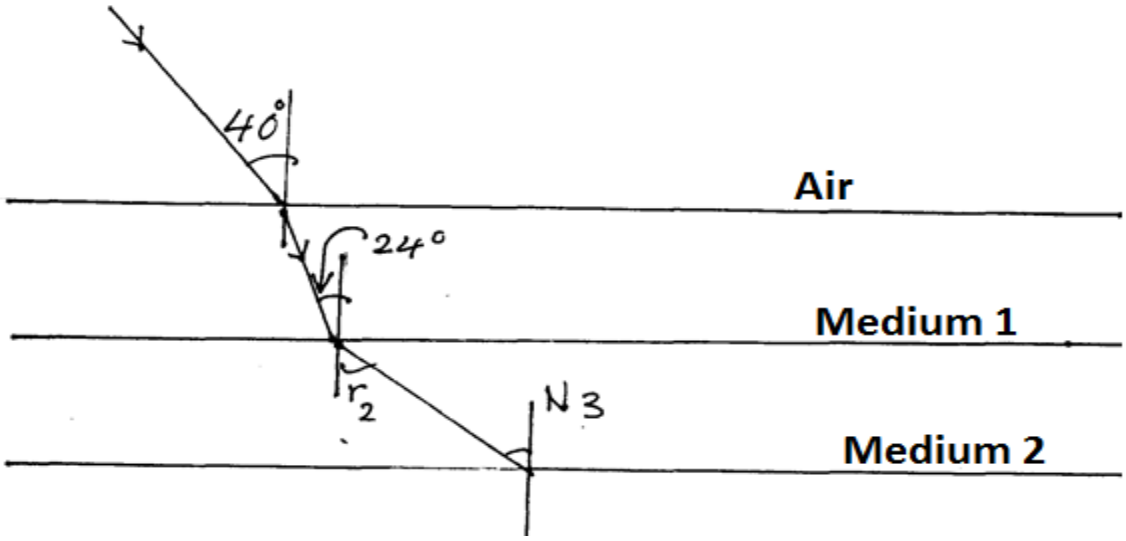


Determine the wave

i) Frequency (f) **(2mks)**

ii) Wavelength (λ) **(2mks)**

c) A ray of light traveling through air in to medium 1 and 2 as shown in the figure below.

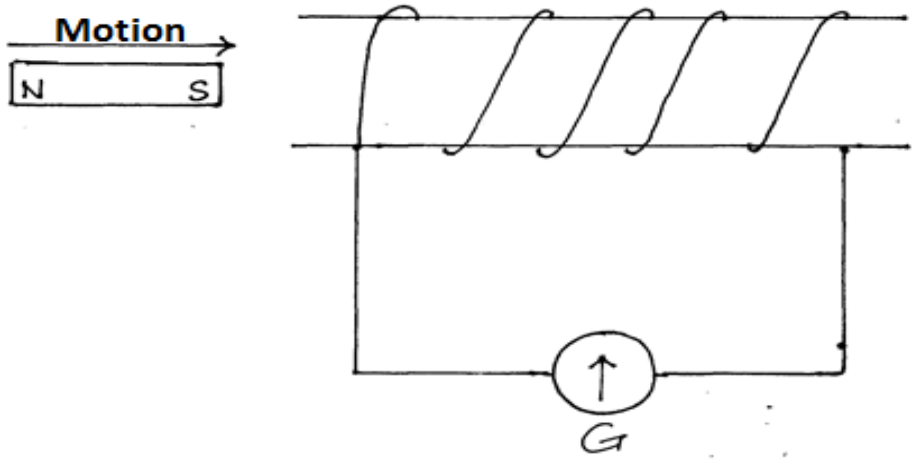


i) Calculate the refractive index of medium 1 **(1mk)**

ii) Angle of refraction r_2 in medium 2 **(2mks)**

17.a) State the lenz's law of electromagnetic induction. **(1mk)**

b) A bar magnet is moved into a coil of insulated copper wires connected to a centre zero – galvanometer (G) as shown in the figure below



i) With arrows show the direction of induced current in the coil (1mk)

ii) Explain clearly what is observed on the galvanometer when the south pole of a magnet is moved into the coil and then withdrawn **(2mks)**

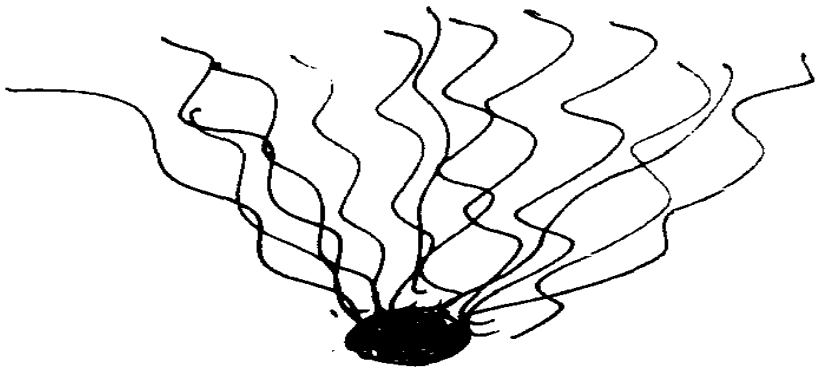
c) A transformer has 1600 turns in the primary coil and 80 turns in the secondary coil. If the transformer is 80% efficient and its primary coil is 240v with a current of 0.75A, determine

i) The secondary e.m.f of its coil **(2mks)**

ii) The output power in its secondary coil **(2mks)**

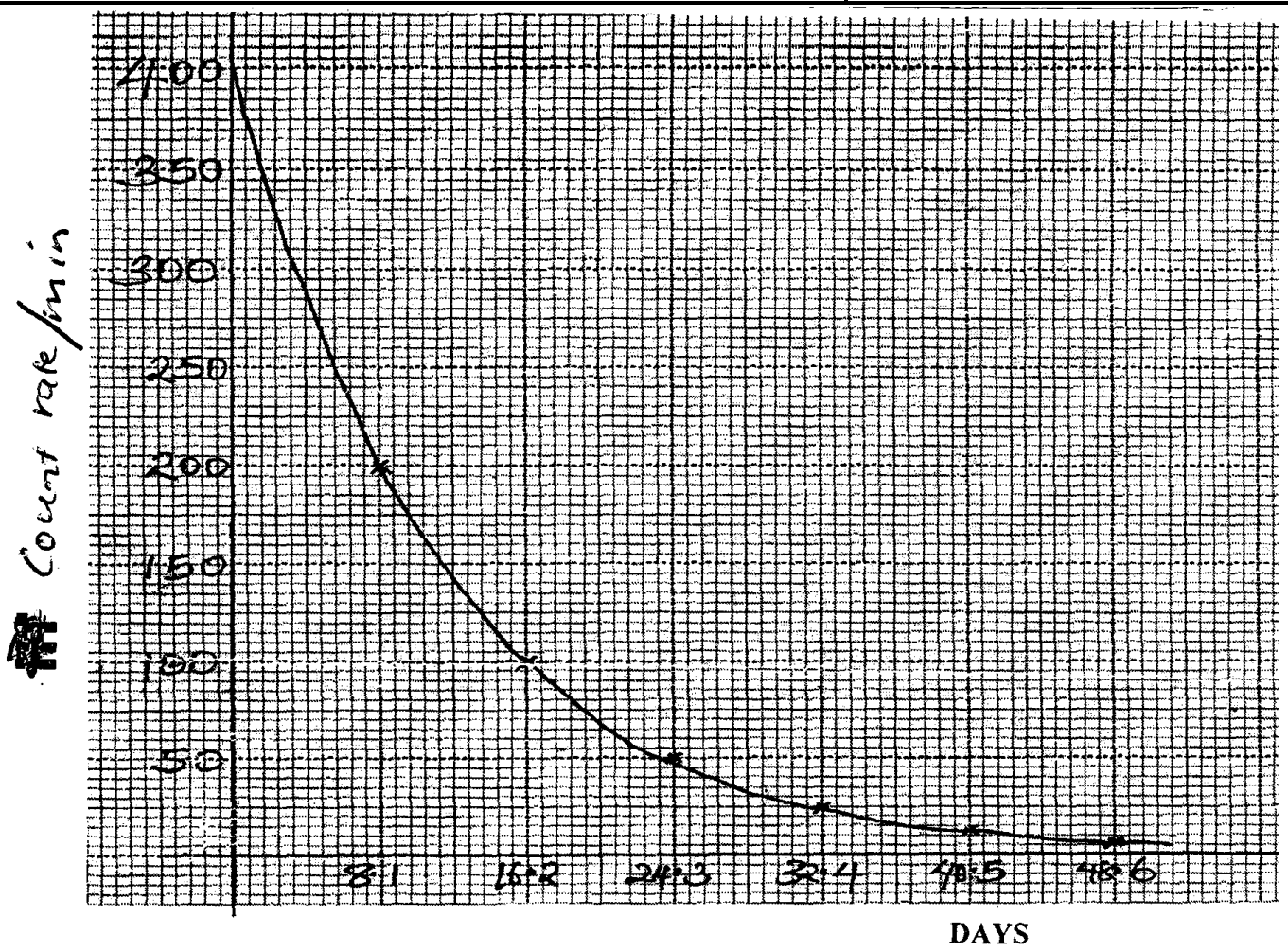
18.a) Define the term radioactivity **(1mk)**

b) The figure below shows tracks formed in a diffusion cloud chamber given by a certain radioactivity sample



State the type of radiations emitted by this sample, explain your answer **(2mks)**

c)i) The figure below shows radioactive decay of iodine



ii) What fraction of this iodine will have decayed after 3 half – lifes (2mks)

d) The average count rate of a radioactive material sample is 92 counts per second. After 420 seconds, the count rate had dropped to 29 counts per second. Given that the background count rate was 20 counts per second, determine the half life of this sample. **(3mks)**

KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 8

232/1

PHYSICS

PAPER 1 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

Write your name, index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided.
*This paper consists of **TWO** Sections: **A** and **B**.*
*Answer **ALL** the questions in section **A** and **B**. All working **MUST** be clearly shown.*
KNEC mathematical tables and silent non-programmable electronic calculators may be used.
Candidates should answer the questions in English.
Take: ***Acceleration due to gravity,*** $g = 10\ m/s^2$

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

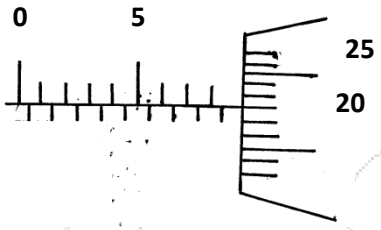
SECTION A (25 MARKS)

Answer all the questions in this section.

(Take g=10N/kg or 10m/s^2)

1. Figure 1 below shows the reading from a micrometer screw gauge that has a zero error of – 0.25mm. What is the actual diameter of the object. **(2mks)**

Figure 1.



2. Two table tennis balls hang at the same level suspended from a thread a short distance apart. A stream of air is blown between the balls. State and explain what happen to the balls. **(2 mks)**

3. Give a reason why heat transfer by radiation is faster than heat transfer by conduction. **(1mk)**

4. Distinguish between density and relative density **(1mk)**

5. State and explain how the motion of the smoke particles changes when the temperature inside the smoke cell is lowered. **(2mks)**

6. On the axes provided sketch density-temperature graph, when water is heated from a temperature of 0°C to 10°C. Show the temperature at which water has the highest density. **(2mks)**

7. A uniform metre rule whose mass is 150g is balanced by suspending a 10g mass and a 20g mass on its ends as shown in figure 2 below.

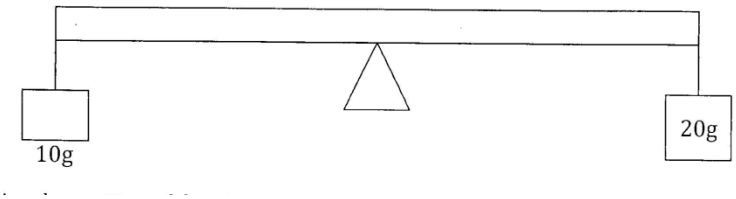


Figure 2.

Determine the position of the pivot. (3mks)

8 Figure 3 below represents a simple fire alarm. Explain how it works. (3mks)

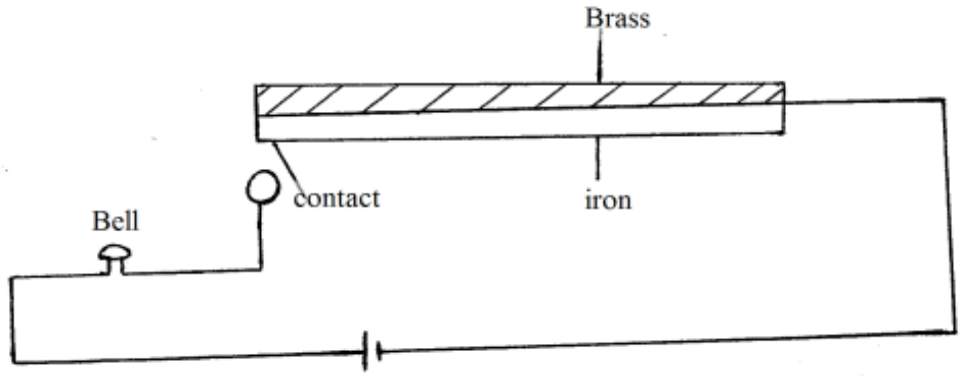


Figure 3.

9 . Figure 4 below shows a section of a pipe with different cross-sectional areas. If water flows with a velocity of 5m/s in section A, what would be the velocity of water in section B? **(2mks)**

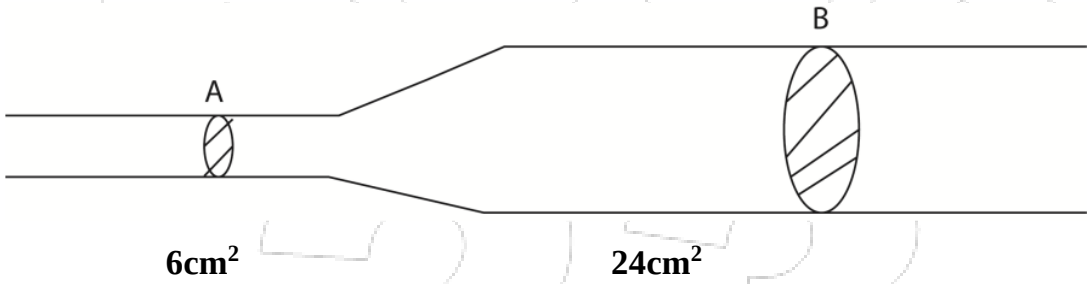


Figure 4.

10. State two factors that would raise the boiling point of a liquid. **(2mks)**

11. A car of mass 1500kg negotiates a level roundabout of radius 40m at a speed of 72km/h. Calculate the centripetal force acting on the car. **(3mks)**

12. A spring of elastic constant ***K*** has its length increased from 4.00m when unloaded to 4.25m when loaded with a 75N weight. Assuming that the elastic limit is not exceeded, determine the value of K**.** **(2marks)**

SECTION B (55 Marks)

Answer all questions in this section in the spaces provided

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

(ii) Explain why a hollow metal sphere floats on water while a solid metal sphere of the same material sinks in water. **(2mks)**

(b) Figure 5 below shows a uniform block of uniform cross-sectional area of 6.0cm^2 floating on two liquids A and B. The lengths of the block in each liquid are shown. Given that the density of liquid A is 800kg/m^3 and that of liquid B is 1000kgm^{-3} determine the:

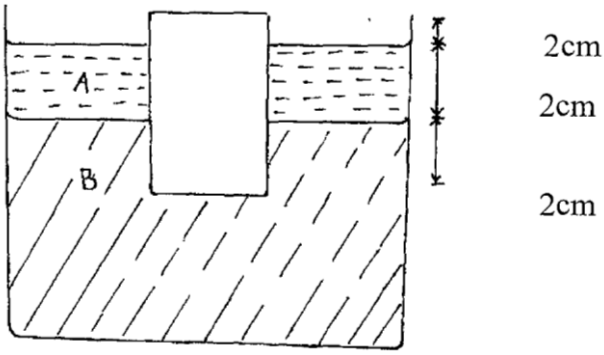


Figure 5.

(i) Weight of liquid A displaced **(2mks)**

(ii) Weight of liquid B displaced **(2mks)**

(iii) Density of the block **(3mks)**

14. Figure 6 shows a fair ground ride trolley **M** of mass 120Kg carrying two passengers of average mass 40Kg released at point ***P*** of a frictionless curved surface ***S***. Upon reaching the horizontal, it collided with a stationery trolley **N** of mass 140Kg carrying three passengers of average mass 60Kg. If the two trolleys moved together with a common velocity along the horizontal for 1.2 seconds before coming to rest, determine:

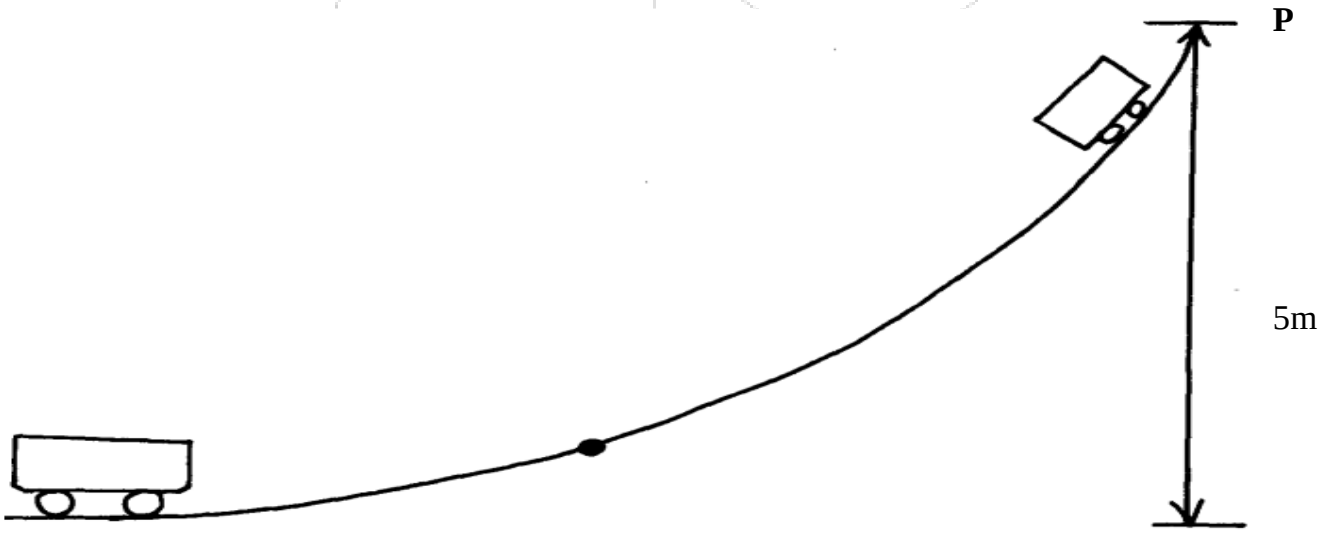


Figure 6.

a) The gravitational potential energy of the trolley at point ***P*** **(3mks)**

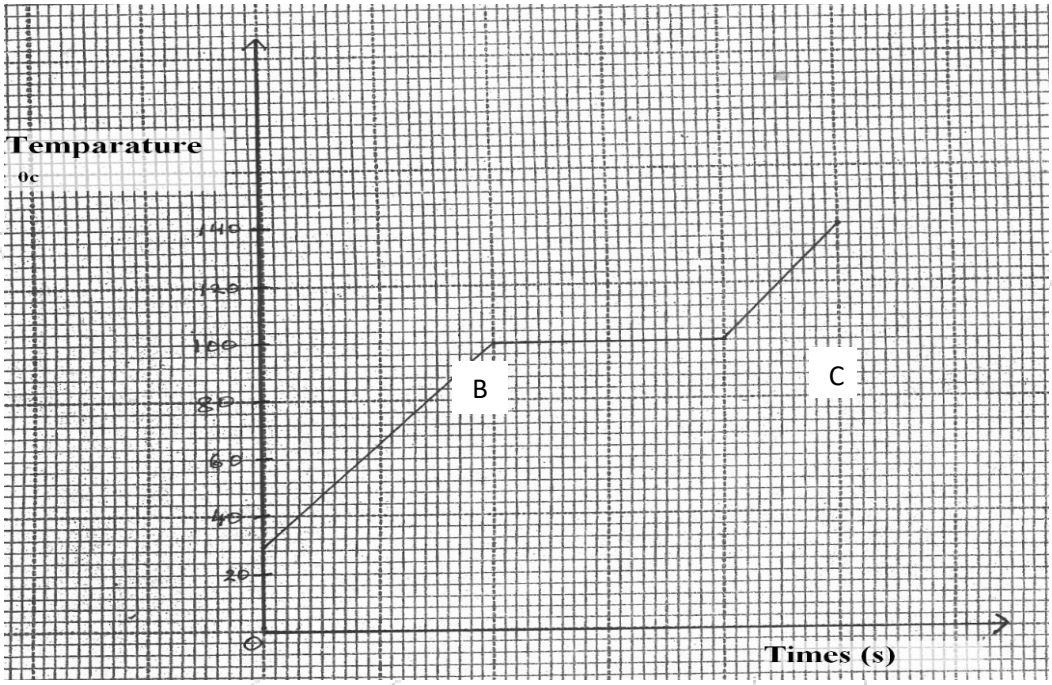
(b) The velocity of trolley ***M*** just before it collides with trolley *N* (**3mks)**

(c) The common velocity of the two trolleys after collision**.** **(3mks)**

(d) The impulse **(3mk)**

15 a) State the difference between evaporation and boiling. **(1mk)**

b) The graph below shows the boiling process of water, Use it to answer the questions that follow.



(c) State the room temperature from the graph. **(1mk)**

ii) State what is happening along BC in the graph **(1mk)**

c) 50g of stream at 100^0C was passed into cold water at 20^0C. The temperature of the mixture was 50^0C. Taking specific heat capacity of water as 4200 J kg^{-1} K^{-1} and specific latent heat of vapourisation of water as 2260 $kJkg^{-1}$ and ignoring heat losses, determine.

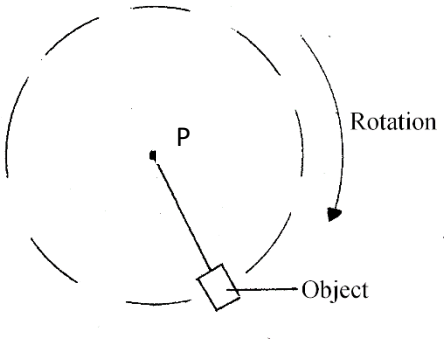
i) Quantity of heat lost by the steam. **(3mks)**

ii) Quantity of heat transferred from the condensed steam to the cold water **(3mks)**

iii) Mass of the cold water **(3mks)**

16. a) Define centripetal acceleration . **(1mk)**

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



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

ii) The object makes 6 revolutions per second. Determine the angular velocity of the object.**(2mks)**

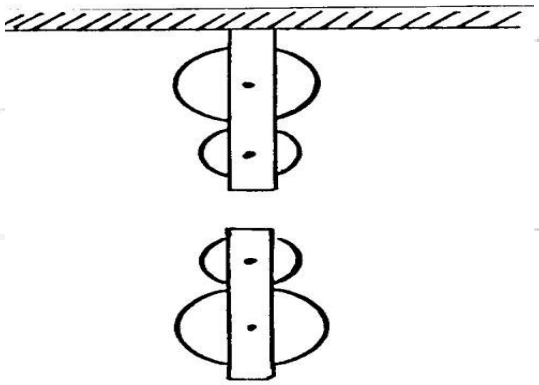
c) A stone is tied to a light string of length 0.5 m. If the stone has a mass of 20g with a uniform angular velocity of 6 revolutions per second, determine.

i) The period **(2mks)**

ii) The tension of the string when the stone is at the bottom of the swing. **3mks)**

d)) State **two** factors affecting centripetal force. **(2 mks)**

17. a) Complete the diagram below to show how the pulley can be used to raise a load, **L** by applying an effort, **E.** **(1mk)**



a) The pulley system above has a mechanical advantage of 3. Determine;

(i) the velocity ratio of the system. **(1mk)**

(ii) the efficiency of the system**.** **(2mks)**

(iii) the effort when a load of 60N is raised**.** **(2mks**

(c) The reading on a mercury barometer at a place is 700 mm. The barometer contains some air which exerts a pressure of $10N/m^2$. Determine the pressure at that place in N/m^2 **(3mk)**

KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 8

232/2

PHYSICS

PAPER 2 (THEORY)
TIME: 2 HOURS

NAME……

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Kenya Certificate of Secondary Education.

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A		25	
B		55	
	TOTAL SCORE	80	

SECTION A {25 MARKS }

Answer all the questions

1. **Figure 1** below shows the set – up for a simple cell.

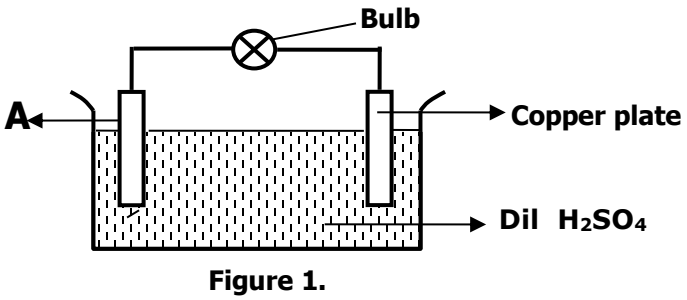


Figure 1.

i) Explain how electrode **A** becomes negative **(1mk)**

(ii) Explain why the bulb goes off after only a short time. **(1mk)**

2. a) **Figure 2** shows an object, a screen and light sources X, Y and Z.

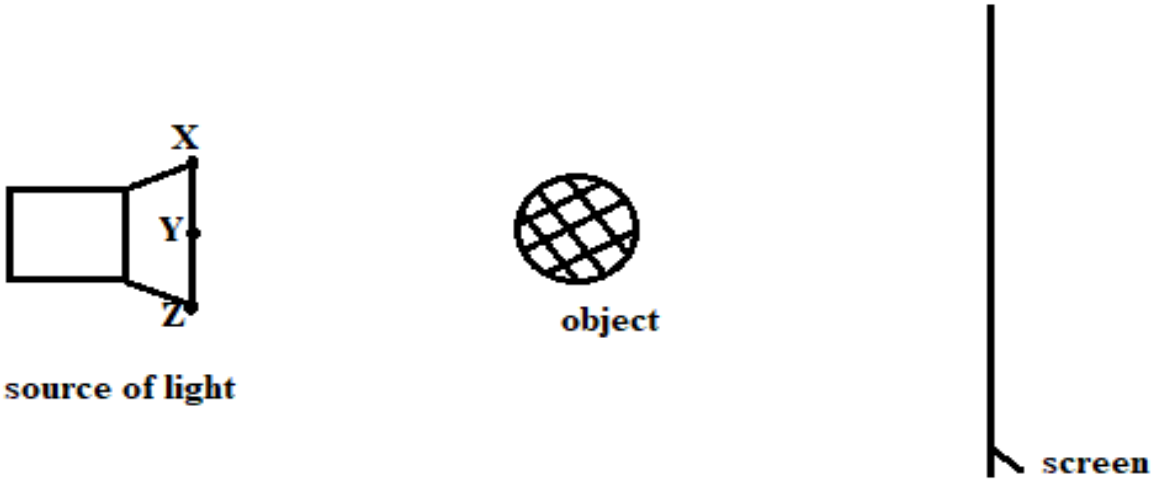


Figure 2.

i) Complete the diagram to show the formation of a shadow **(2mks)**

ii) State one property of the object that makes it possible for its shadow to be formed **(1mk)**

3. A highly negatively charged rod is gradually brought close to the cap of a positively charged electroscope. It is observed that the leaf collapses initially and then diverges. Explain the observation. **(2mks)**

4. Distinguish between thermionic emission and photoelectric effect. **(1mk)**

5. Explain why mains electricity is transmitted through alternating current and not direct Current **(1mk)**

6. **Figure 3** shows two mirrors inclined at an angle of 30° to each other. A ray of light is incident on mirrorM_1 as shown

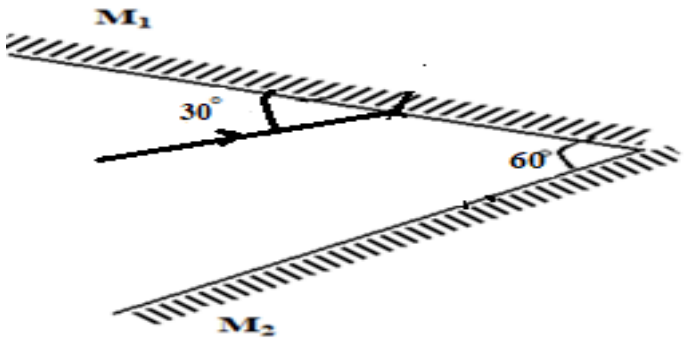


Figure 3.

Sketch the path of the ray to show its reflection **(1mk)**

7. **Figure 4** below shows sound waves in air produced by a vibrating tuning fork. R is an air molecule on the path of the waves.



Figure 4.

i) Using a line, indicate on the diagram a distance **d** equal to one wavelength of the wave. **(1mk)**

ii) In the space provided below, show with an arrow the direction of motion of the air molecule **R** as the waves pass. **(1mk)**

8. **Figure 5** below shows a bar magnet attracting steel pin as shown

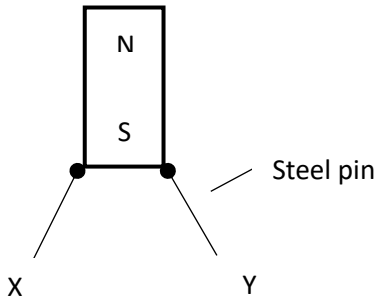


Figure 5

State and explain what would happen when a North pole of a bar magnet is brought near the tips of steel pin X and Y. **(2mks)**

9. **Figure 6** below shows a wave profile for a wave whose frequency is 5Hz.

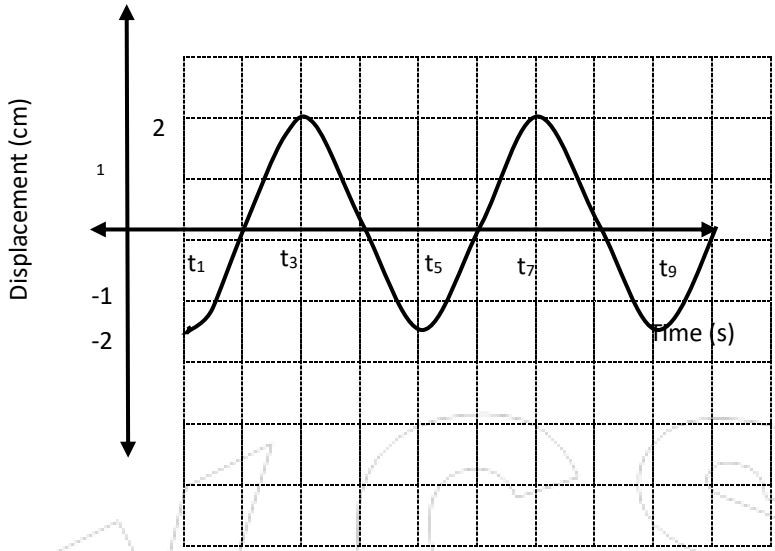
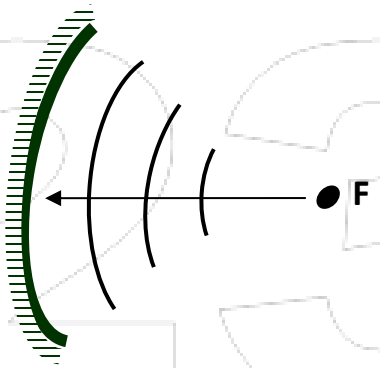


Figure 6

Determine the value of t_8. **(2mks)**

10. **Figure 7** below shows circular waves originating from the principal focus F of a concave mirror and moving towards the mirror.



Complete the diagram to show the reflected waves. **(1mk)**

11. Two heating coils A and B connected in parallel in a circuit produces power of 36W and 54W respectively. What is the ratio of the resistance of B to that of A **(3mks)**

12. **Figure 8** below shows the path of light through a transparent material placed in air.

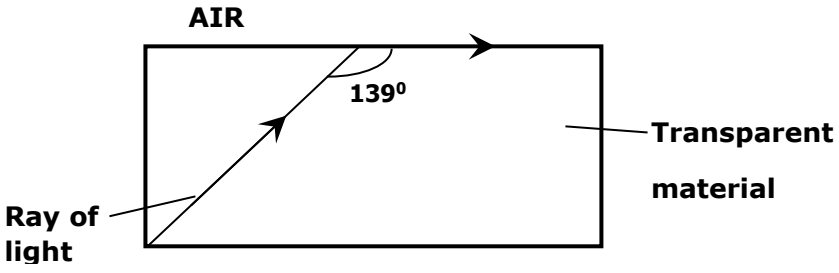
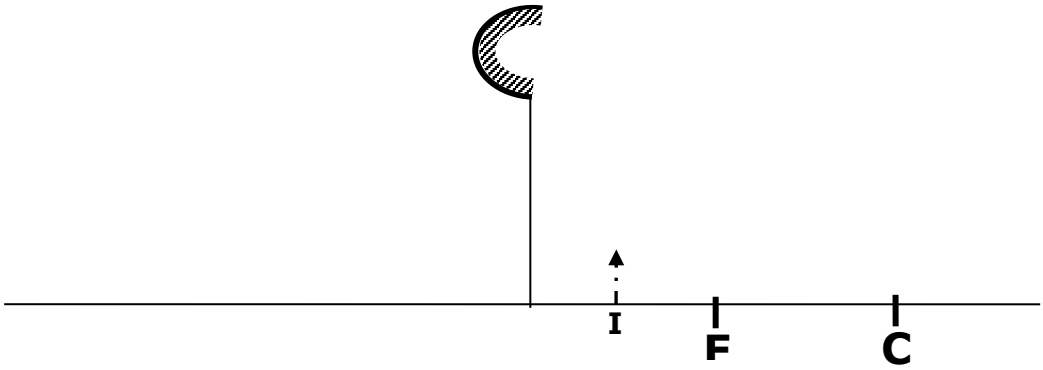


Figure 8.

Calculate the refractive index of the transparent material. **(3mks)**

13. **Figure 9** below shows an image; I formed by an object placed in front of a ***convex mirror***. On the diagram draw appropriate rays and locate the position of the object. **(2mks)**



SECTION B (55 marks)

Answer all the questions in this section in the spaces provided

14 (a) **Figure 10** below shows two charged plates close to each other

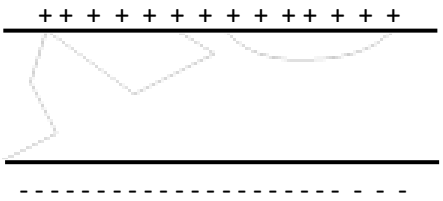


Figure 10.

(i) Complete the diagram to show the electric field patterns between the plates **(1 mark)**

(ii) Without changing the area of overlap, suggest any one way of increasing the charge stored per unit voltage on the plates **(2 mks)**

(b) **Figure 11** shows two coils P and Q placed close to each other. When the switch **S** is closed, an e.m.f is induced in coil Q. Similarly, an e.m.f is induced in coil Q when the switch **S** is opened.

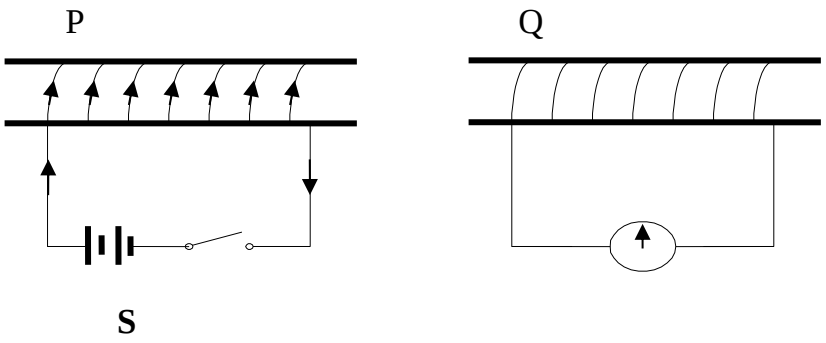


Figure 11.

Explain why the induced current in coil Q is higher when the switch **S** in coil P is opened than when it is closed. **(2 mks)**

(b) The diagram in **Figure 12** below shows an induction coil used to produce sparks.

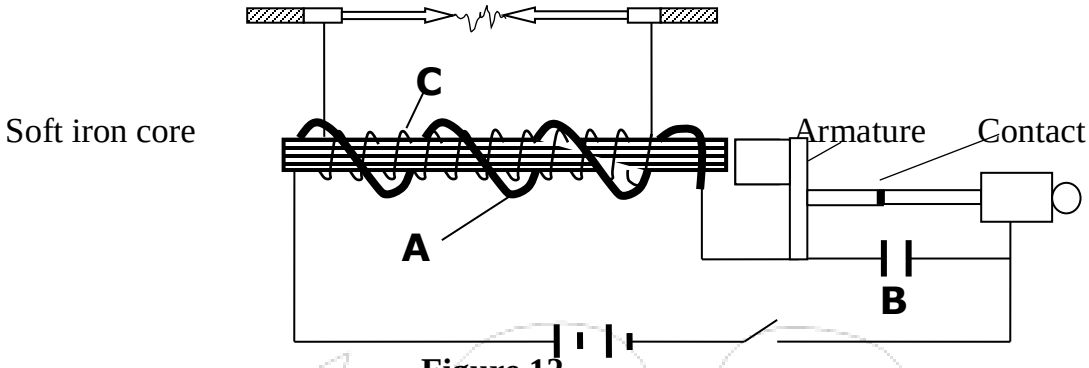


Figure 12.

(i) Name parts labeled **A,** and **C** **(2mks)**

(ii) Briefly explain how the induction coil works. **(3mks)**

(c) State the function of part B in the diagram. **(1mk)**

15. (a) **Figure 13** below shows a graph of resistance against reciprocal of current. Use it to answer the questions that follow.

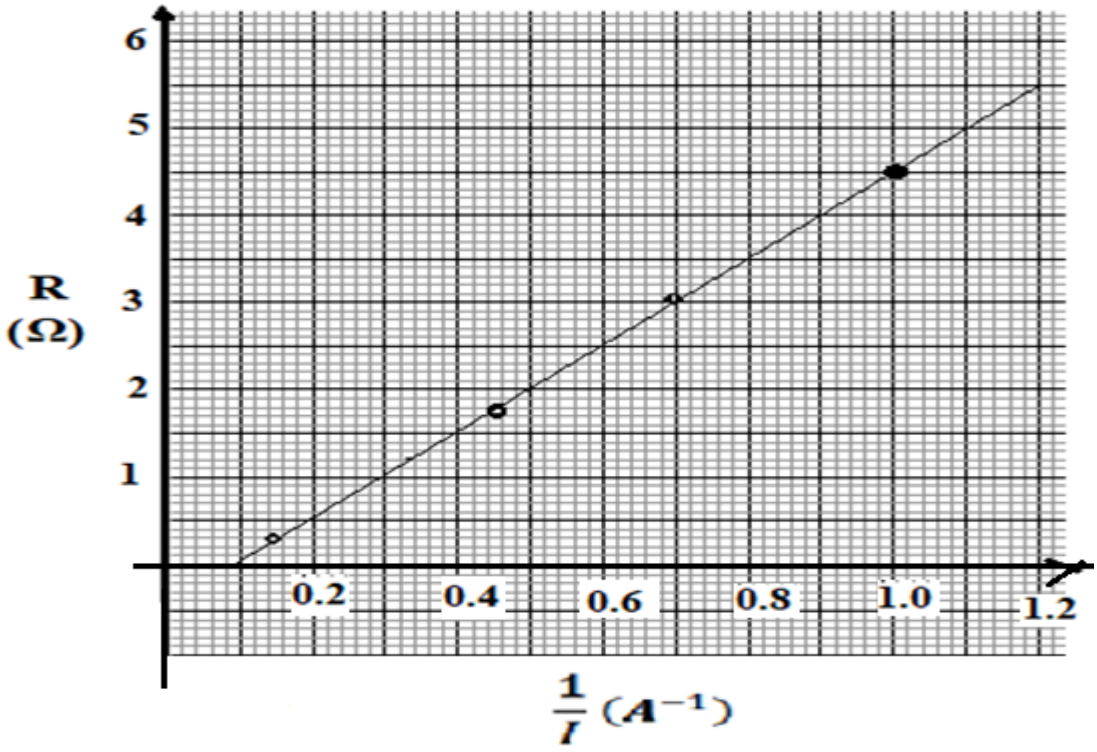


Figure 13

i) Find the internal resistance, r. **(2mks)**

ii) Determine the e.m.f, E of the cell. **(2mks)**

(b) Three resistors of resistance 2 Ω, 3 Ω and 4 Ω, are to be connected to a cell such that they have the least effective resistance.

(i) Draw a circuit to show how they can be connected to achieve this**.** **(1mk)**

(ii) Determine the least effective resistance of the three resistors. **(2mks)**

(c) An electric iron rated 240V, 750w is to be connected to a 240v mains supply through a 3A fuse. Determine whether the fuse is suitable or not. **(3mks)**

16. (a) (i) Name the metal used to shield X-rays operators from the radiation. Give reasons why it is used. **(2mks)**

(ii)In a television set, magnetic fields are preferred for use as deflection system instead of electric fields. Explain. **(2mks)**

(b) **Figure 14** below show regions of the complete electromagnetic spectrum.

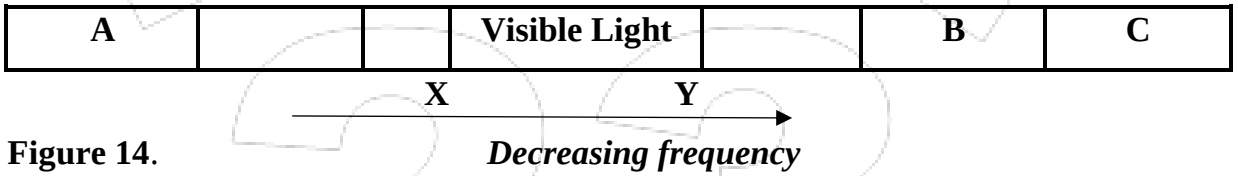


Figure 14.

(i) Name the colour of light at X and Y **(2mks)**

(ii) Name a suitable detector for radiation B **(1mk)**

(c) A student connected a circuit as shown in **Figure 15** below, hoping to produce a rectified output.

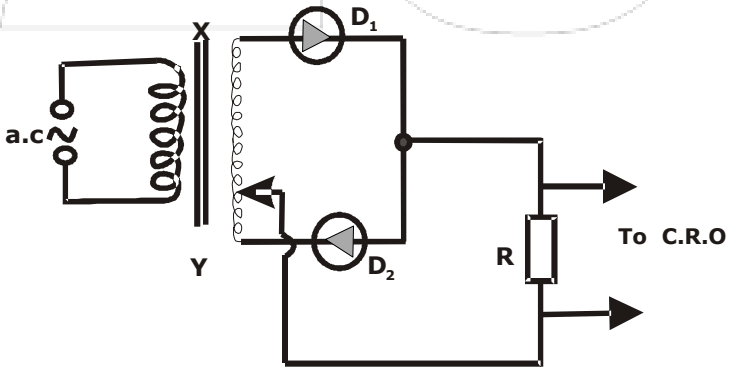
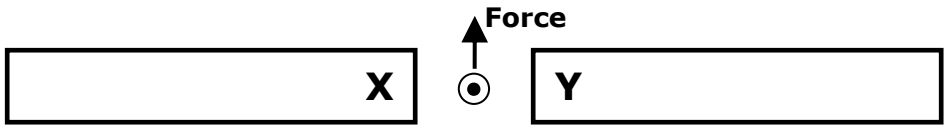


Figure 15.

(i) Sketch the graph of the output on the CRO screen in the space below**.** **(1mk)**

(ii) Explain how this output is produced **(2mks)**

(d) The figure shows a current – carrying conductor in a magnetic field direction of force on the wire is as shown by the arrow.



State the polarities of A and B. **(2mks)**

X ……..

Y. ……

17. (a) A typical nuclear fission reaction in a nuclear reactor is given below.

$$^{235}_{92}U + {}^{1}_{0}n \longrightarrow {}^{148}_{57}La + {}^{85}_{35}Br + x\,{}^{1}_{0}n$$

(i) What is meant by nuclear fusion? **(1mk)**

(ii) Find the value of x. **(1mk)**

(iii) How are the neutrons produced used in the reactor? **(1mk)**

(b) Figure 16 below shows the diagram of a Geiger – Muller tube connected to a power supply and a pulse counter.

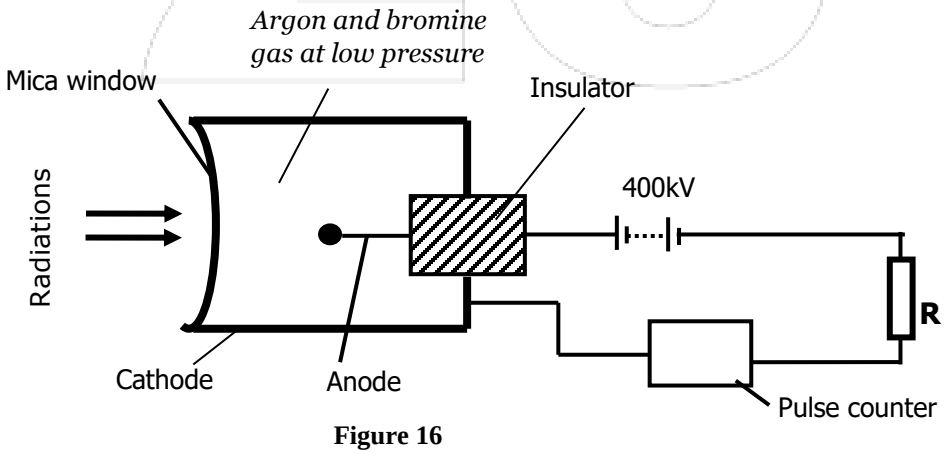


Figure 16

(i) Why should the Argon gas be at low pressure? **(1mk)**

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

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

(c) **Figure 17** below shows an arrangement used to investigate photoelectric effect

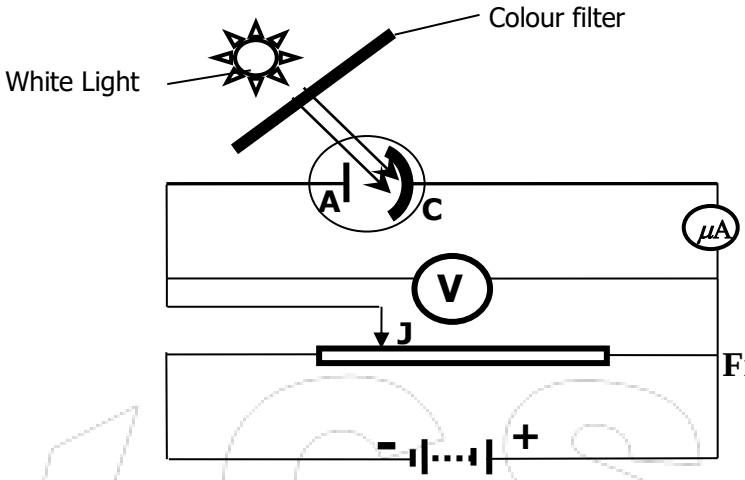


Figure 17

i) What is the purpose of the colour filter? **(1mk)**

ii) State two measurable quantities in this set up **(2mks)**

iii) State how the intensity of light affects photo current **(1mk)**

18. (a) Under what conditions does a converging lens form Virtual images **(1 mk)**

(b) Sketch on a diagram to illustrate how a convex lens is used as a magnifying glass. **(3mks)**

(c)The diagram in **Figure 18** below shows a three-pin plug.

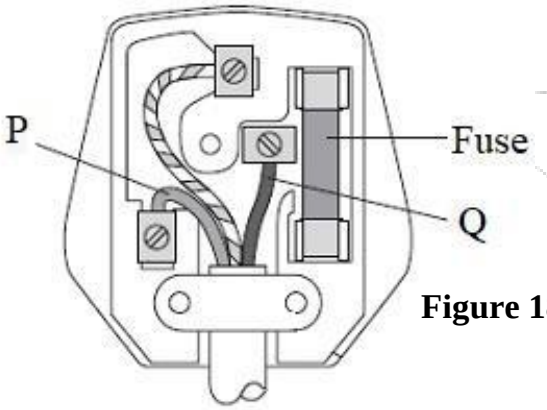


Figure 18.

(i) Name the colour of conductors P and Q **(2 marks)**

P ……

Q ……

(ii) Why is the earth pin longer than the rest in the three-pin plug shown above? **(1 mark)**

(b) **Figure 19** shows the displacement of a practice in progressive wave incident on a boundary between deep and shallow regions.

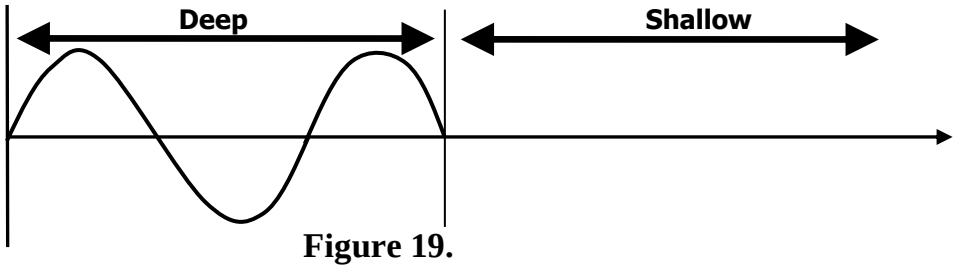


Figure 19.

(i) Complete the diagram to show what is observed after boundary. **(1mk)**

(ii) Explain the observation in (i) above. **(1mk)**

(c) Concave mirrors are used by dentists to examine teeth. By use of a ray diagram show how this is achieved. **(3 marks)**

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KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 9

232/1

PHYSICS

PAPER 1 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

Write your name, index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided.
*This paper consists of **TWO** Sections: **A** and **B**.*
*Answer **ALL** the questions in section **A** and **B**. All working **MUST** be clearly shown.*
KNEC mathematical tables and silent non-programmable electronic calculators may be used.
Candidates should answer the questions in English.
Take: ***Acceleration due to gravity,*** $g = 10\ m/s^2$

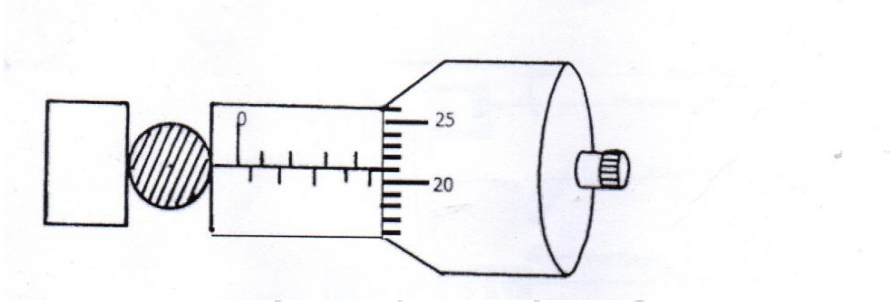
FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A (25 MARKS)

Answer all the questions in this section.

1. A spherical ball bearing 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 0.11 mm.



What is the diameter of the ball bearing**?** **(2 marks)**

2. a) Boiling water is not used for sterilization of clinical thermometer. State the reason for this. **(1 mark)**

b) State how the clinical thermometer is sterilized. **(1 mark)**

3. Between mercury and alcohol, state with a reason, which of the two liquids is used in a thermometer to measure temperature in areas where temperatures are below - 40 ^{o}c. **(2 marks)**

4. State what happens to the position of C.O.G of a body in the following states of equilibrium if the body is slightly pushed.

a) Stable equilibrium. **(1mark)**

b) Unstable equilibrium**.** **(1mark)**

c) Neutral equilibrium. **(1mark)**

5. Using kinetic theory of matter, distinguish between solids and liquids states of matter in terms of intermolecular forces and spaces between particles. **(2 marks)**

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

7. The following data was obtained from an experiment to determine the size of palm oil molecule.

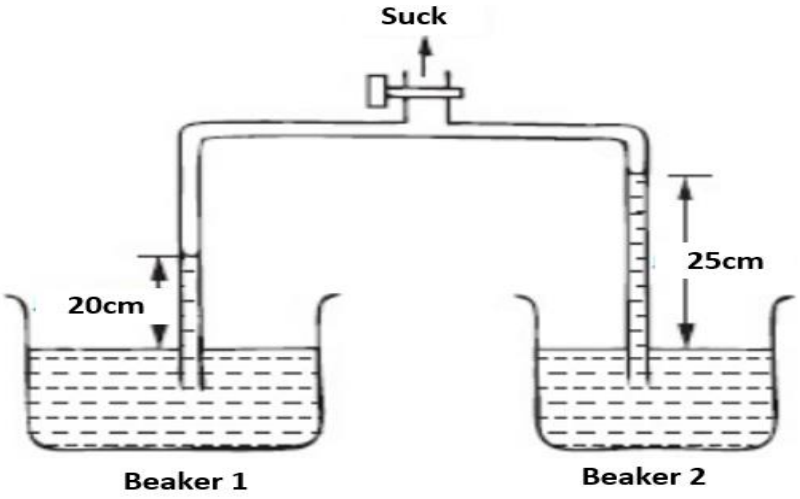
- Volume of 50 drops of palm oil = 1.5 X 10 $^{-9}$ m^3
- Area of a patch from one drop of the oil. = 8.0 cm^2

Determine the size of a palm oil molecule. **(3 marks)**

8. Explain why it is dangerous for a bus to carry standing passengers**.** **(2 marks)**

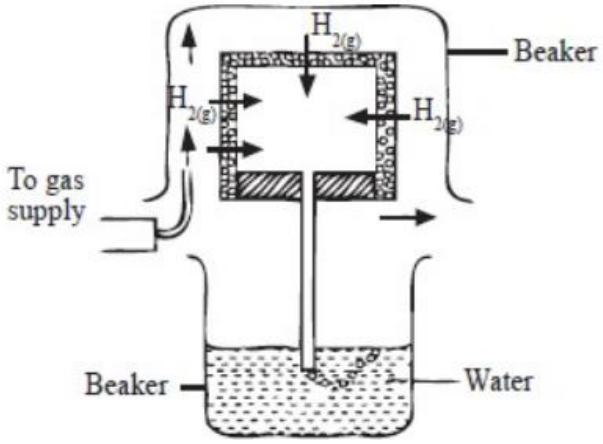
9. State two factors that affects the spring constant of a spring. **(2 marks)**

10. Two liquids were sucked up in two identical tubes as shown in the figure below



Given that the liquid in beaker 2 is water of density 1 g/cm^3 determine the density of liquid in beaker 1**.** **(3 marks)**

11. The figure below shows an arrangement to demonstrate diffusion through a porous pot.



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 marks)

SECTION B (55 MARKS)

12. a) State the law of conservation of linear momentum. **(1 mark)**

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

c) A bus of mass 2500 kg travelling at a constant velocity of 15 m/s collides with a stationary car of car of mass 800 kg. The impact takes 0.5 seconds before the two move together at a constant velocity for 20 seconds.

Calculate;

i) The common velocity after the impact. **(3 marks)**

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

iii) The impulsive force. **(3 marks)**

13. a) A body moving at a constant speed in a circular path is said to be accelerating. Explain. **(1 mark)**

b) Define angular displacement. **(1 mark)**

b) A body of mass 450g tied to s a string of length 60 cm, is moved in a horizontal circle at a constant speed of 240 revolutions per minute.

Determine;

i) Angular velocity of the body. **(2 marks)**

ii) Tension in the string. **(2 marks)**

c) The above body in b) is released and falls to the ground 2.6 m below it.

Calculate;

i) The time it takes to reach the ground. **(2 marks)**

ii) Maximum horizontal distance it travels from the point of release. **(3 marks)**

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

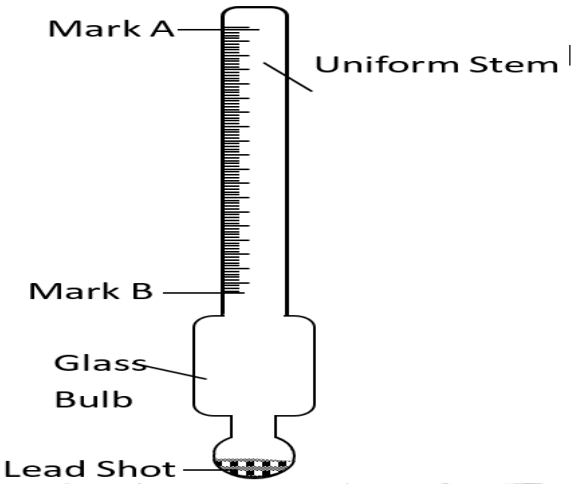
b) An object weighs 5.2 N in air, 3.2 N when completely immersed in water and 1.8 N when completely immersed in an acid.

Calculate;

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

ii) Density of the acid. **(3 marks)**

c) The figure below shows a simple hydrometer which is suitable for measuring density of liquids varying between 0.8 g/cm^3 and 1.2g/cm^3.



i) State the purpose of the lead shots in the glass bulb. **(1 mark)**

ii) State how the hydrometer would be made more sensitive. **(1 mark)**

iii) Indicate on the diagram the mark corresponding to 0.8 g/cm^3 and 1.2 g/ cm^3. **(1 mark)**

15. a) Define the term specific latent heat of fusion. **(1 mark)**

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

- mass of calorimeter = 100 g
- initial mass of water = 150 g
- initial temperature of water = 18 ^{o}c
- final mass of calorimeter + water + condensed steam = 264 g
- final temperature of the mixture = 68 ^{o}c

(Specific heat capacity of water = 4200J/kgK and specific heat capacity of aluminium = 400J/kgK)

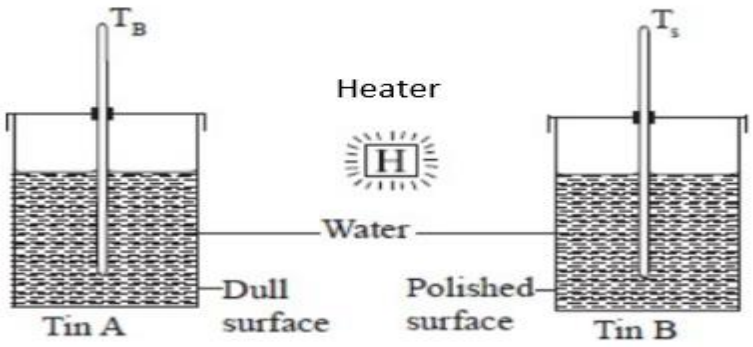
i) Determine;

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

II) Heat gained by the calorimeter and water. **(3 marks)**

iii) Given that $\mathbf{L_V}$ is the specific latent heat of vaporization of steam, determine the value of $\mathbf{L_V}$. **(3 marks)**

c) Two similar cans are partly filled with equal quantities of paraffin. Each holds a thermometer, is covered with a lid and stands on a wooden bench at the same distance from a source of radiant heat as shown below.



i) Explain why heat from the heater could not have reached the cans by;

I) Conduction. **(1 mark)**

II) Convection. **(1 mark)**

ii) Explain why there is a difference in the thermometer readings after some time. **(1 mark)**

iii) How can the set up in the figure above be adjusted in order to produce the same results? **(1 mark)**

16. a) Define velocity ratio of a machine. **(1 mark)**

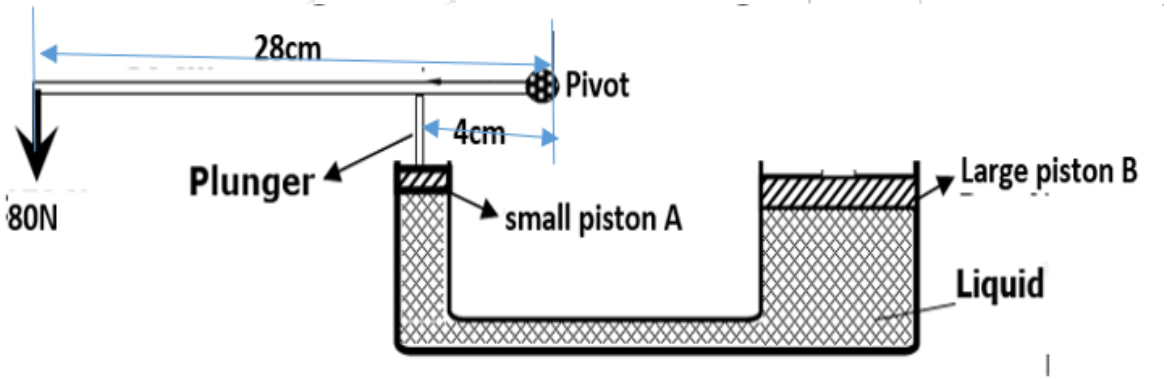
b) The effort piston of a hydraulic machine is of radius 2.8 cm, while that of the load piston is of radius 14 cm. the machine raises a load of 120 kg at a constant velocity. If the machine has an efficiency of 80%.

Calculate;

i) The velocity ratio of the hydraulic machine. **(2 marks)**

ii) The effort needed to raise the load. **(3 marks)**

c) The figure below shows a hydraulic press that is worked by applying a force of 80 N ta the end of a lever 28 cm long pivoted at the other end. The smaller piston is 4 cm from the pivot. The area of the piston A is 2 cm^2 and that of B is 10 cm^2.



Determine;

i) The force applied to piston A. **(2 marks)**

ii) The force exerted on the piston B by the liquid. **(2 marks)**

iii) The mechanical advantage of the hydraulic press. **(2 marks)**

KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 9

232/2

PHYSICS

PAPER 2 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

- *Write your name and Admission number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *This paper consist of **two** section **A** and **B***
- *Answer all the questions in the spaces provided*
- *All working **must** be clearly shown in the spaces provided.*
- *Non programmable silent electronic calculator may be use*

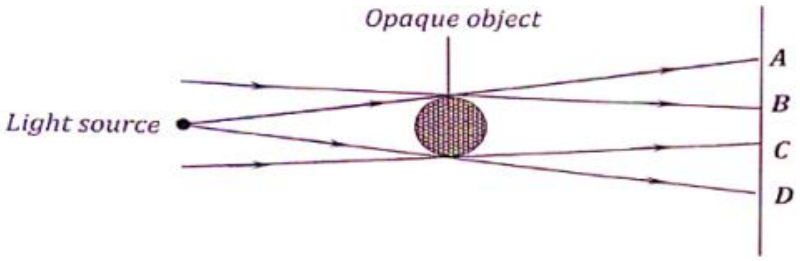
FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A {25 MARKS }

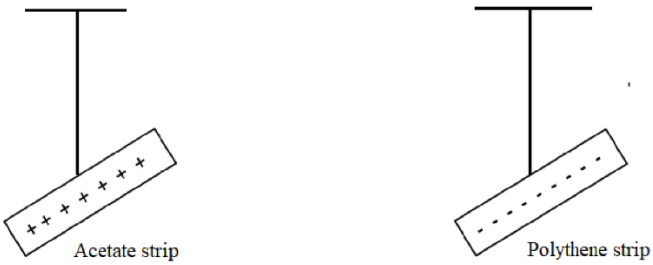
Answer all the questions

1. The figure1 below shows three point source of light with an opaque object placed between them and the screen



State and explain the nature of shadow formed a long B and C **(2marks)**

2. The diagrams below show a positively charged acetate strip and a negatively charged polythene strip freely suspended and isolated.



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

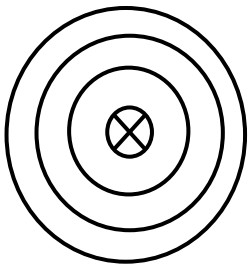
X **..... (1 mark)**

Y **..... (1 mark)**

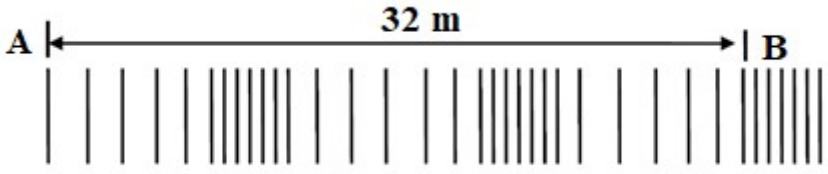
3. (a) State any one way of reducing the magnetic force of attraction of a magnet **(1mark)**

(b) Show the direction of the magnetic field in the conductor carrying current shown below.

(1mark)

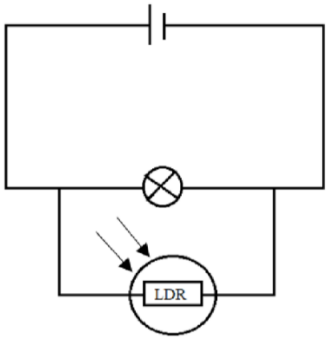


4. The diagram below shows waves generated from a tuning fork. If the wave takes 0.1 second to move from point A to B. determine the frequency of the wave. **(2marks)**



5. Other than current state one other factor that affect the magnitude of force on a current carrying conductor placed in a magnetic field. **(1mark)**

6. A student connected the set up below in the laboratory. Explain the observation made on the bulb when the set-up below is taken to a dark room **(1 mark)**



7. A radioactive carbon – 14 decays to nitrogen by beta emissions as shown.

$$^{14}_{6}C \rightarrow {}^{X}_{7}N + {}^{0}_{Y}e$$

Determine the values of X and Y in the equation

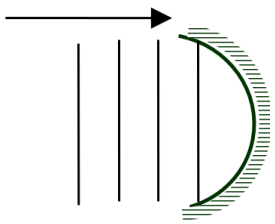
X=…….. …….. (1mark)

Y = …… (1mark)

8. (a) state the reason for topping up a lead-acid accumulator with distilled water. (1mark)

(b) State one quality that is used to determine whether accumulators require charging or not. **(1mark)**

9. Figure 8 shows wave fronts of water waves approaching a concave surface.

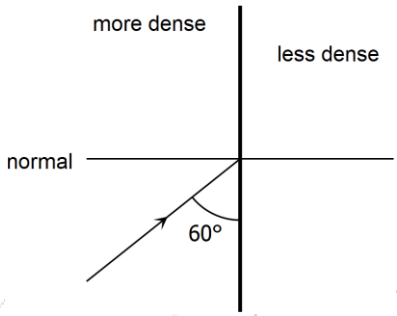


(i) Complete the diagram to show the wave fronts formed after striking the surface. **(1 mark)**

(ii) What is the effect on velocity of the above if it moves from shallow to deep region **(1marks)**

10. A person standing 110 m from the foot of a cliff claps his hands and hears a sound 0.75 seconds later. Find the speed of sound in air. **(2 marks)**

11. Figure 9 below shows light travelling from more optically dense to less optically dense medium.



a) On the same diagram, sketch a ray to show the direction of the refracted ray**.** **(1 mark)**

b) If the refractive index of the denser medium is 1.42, calculate the angle of refraction. **(2marks)**

12. Eleven (11) images are formed when two mirrors are inclined at an angle between them. Determine the size of angle between the inclined **mirrors** **(2 marks)**

13. (a) The figure10 below is part of electromagnetic spectrum.

A		Visible light	UV	

Name one detector of A **(1 mark)**

(b) Define focal length of a curved reflecting surface **(1 mark)**

SECTION B 55 MARKS

14. a) (i) State any one condition necessary for two sources of waves to be coherent **(1 mark)**

(ii) A student walking on a straight perpendicular to two coherent signal generators hears alternating loud and soft sounds. Explain why at some point the sound heard is softer **(1mark)**

b) Explain why radio wave signals are easier to receive than TV waves signals in a place surrounded by hills. **(1mark)**

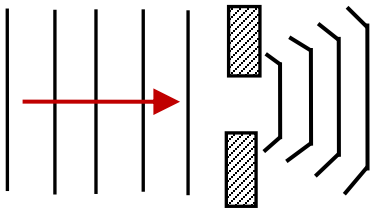
c) In an experiment using a ripple tank the frequency, f of the electric pulse generator was reduced to one third of its original value. How does the new wave length compare with the initial wavelength? (1mark)

d) In a double slit interference experiment, explain the effect on the appearance of the fringes of:

(i) Reducing the separation of the slits but keeping the width of each slit constant. **(1mark)**

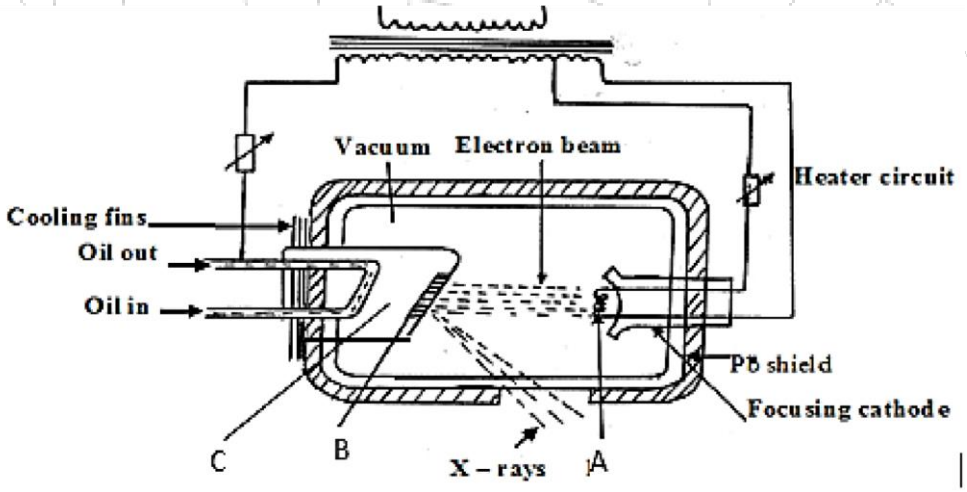
(iii) Making each of the two slits wider but keeping the slit separation constant. **(1mark)**

e) The figure 11 below shows wave fronts before and after passing through an opening.



State what would be observed on the pattern after passing the opening if the wavelength of the wave is increased. **(1 mark)**

15. (a) The figure 12 below shows a X-ray tube.



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

(ii) State the property of the material labelled B on the diagram which makes it suitable for use in the X-ray tube. (1 marks)

(iii) Why is C inclined at an angle of 45^{o}? (1 mark)

(iv) State the adjustment that can be made to vary

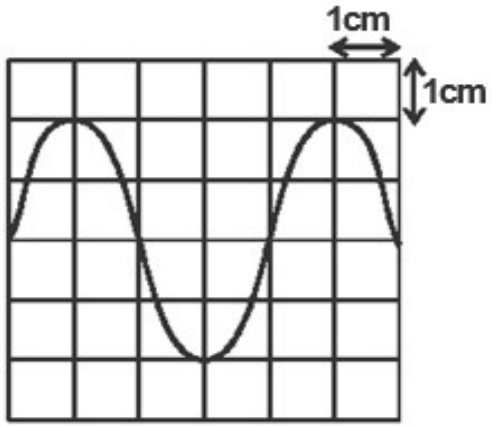
I. The quality of X-rays (1 mark)

II. The quantity of the X-rays. (1 mark)

(v) An x-ray tube has an accelerating potential of 100KV. Determine the maximum frequency of the x-rays produced.*(Plank's constant = 6.63×10^{-34} Js, e = 1.6×10^{-19}C)*

(2 marks)

(b) In a CRO, waveform given below was displayed on the screen when the sensitivity at the Y plate was10V/cm and time base set at 20 milliseconds/cm.



Determine:

(i) The peak voltage **(2marks)**

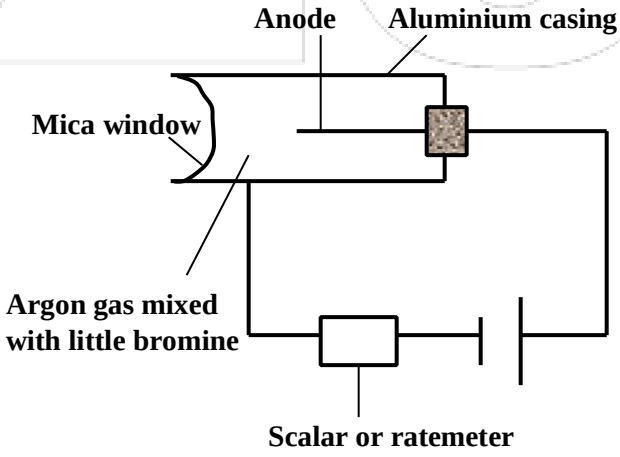
(i) The frequency of the signal **(2marks)**

16. (a) $^{226}_{88}Ra$ decays into $^{222}_{86}Rn$ by emission of an alpha particle. Write a nuclear equation for the decay **(1 mark)**

b) i)What do you understand by the term half-life of a radioactive substance? **(1 mark)**

ii)A G.M tube registers 20 counts. When a radioactive source is brought close to it, it registers 3220 counts and 120 counts 30 hours later. What is the half-life of this substance? **(2 marks)**

c) The figure 14 below shows a G.M tube.

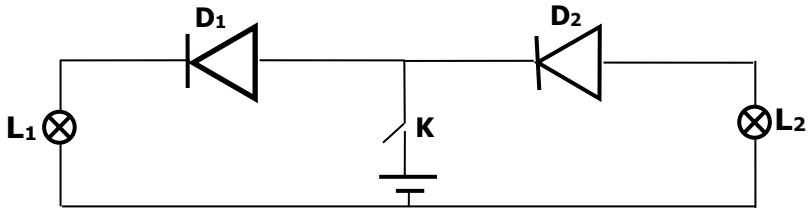


i) Explain the purpose of the bromine **(1 mark)**

(ii)Briefly explain how the Geiger Muller tube works to detect radiations. **(2 marks)**

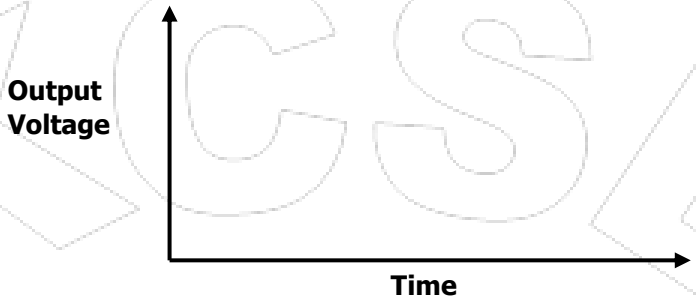
(iii) When beta and alpha radiations are passed through a magnetic field, the beta radiations are deflected more than the alpha radiations. Give a reason for this observation. **(1 mark)**

(d) The figure below is a circuit with two identical bulbs and components, Diodes 1 and 2.



(i) State and explain the observation made when switch **K** is closed. **(2marks)**

(ii) On the axes provided below, sketch the graph of output voltage against time for a full wave rectifier **(1mark)**



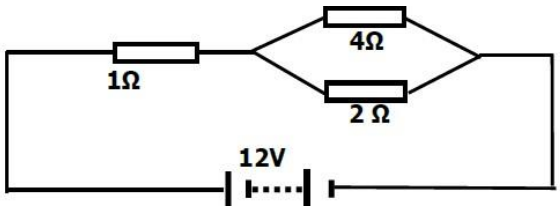
(iii) A capacitor is now connected across the output. Explain its effect on the output. **(1mark)**

17. (a)You are provided with a rheostat, 2 cells, a voltmeter, an ammeter, a switch and a fixed resistor.

i) Draw a circuit diagram that can be used to verify Ohm's law. **(2 marks)**

ii) Describe how the above set up can be used to determine Ohms law. **(3marks)**

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



Calculate the current through the 4Ω resistor **(3 marks)**

(d) (i) An electrical emersion heater is rated as **240V, 500W**. What does this information mean? **(1mark)**

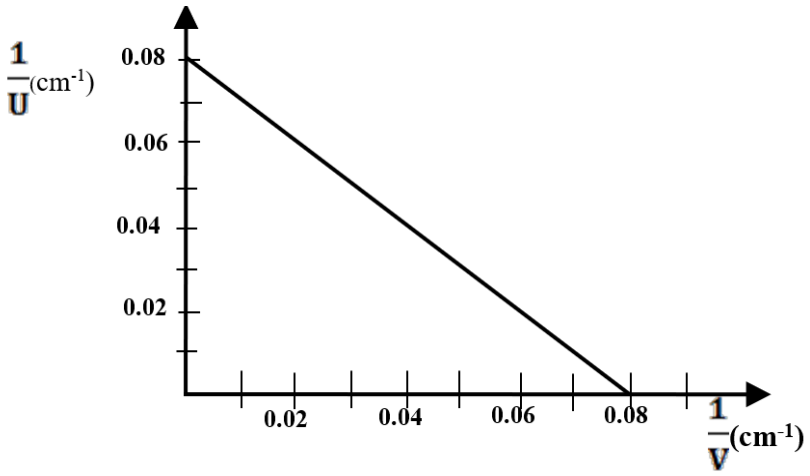
(ii) Calculate the resistance of the element used in the heater**.** **(2marks)**

18. (a)A ray of light travelling from water to glass makes an angle of incident of 30^0. Find the angle of refraction in the glass. Refractive index of water $= \frac{4}{3}$. Refractive index of glass $= \frac{3}{2}$

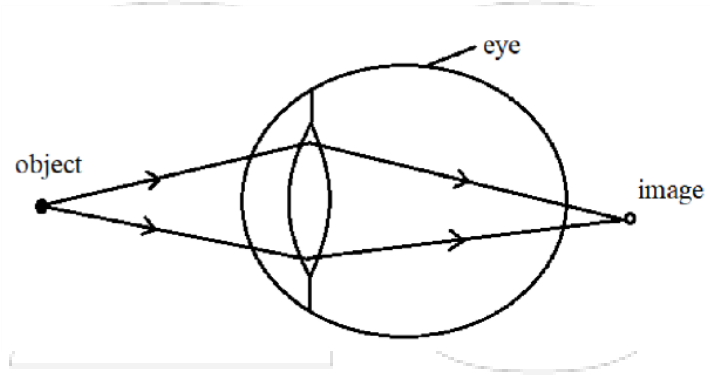
(2 marks)

(b) State one necessary and sufficient condition for total internal reflection to occur **(1mark)**

c) The graph below shows the variation of **1/V** and **1/U** in an experiment to determine the focal length of the mirror. Determine the focal length. **(2marks)**



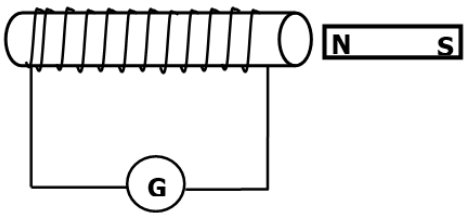
d) The figure below shows a human eye defect.



i) State one possible cause of this defect. **(1 mark)**

ii) On the diagram, show how the defect is corrected. **(1 mark)**

19. a) A bar magnet is moved into a coil of an insulated copper wire connected to a zero- centre-galvanometer as shown below



(i) Show on the figure above the direction of the induced current in the coil

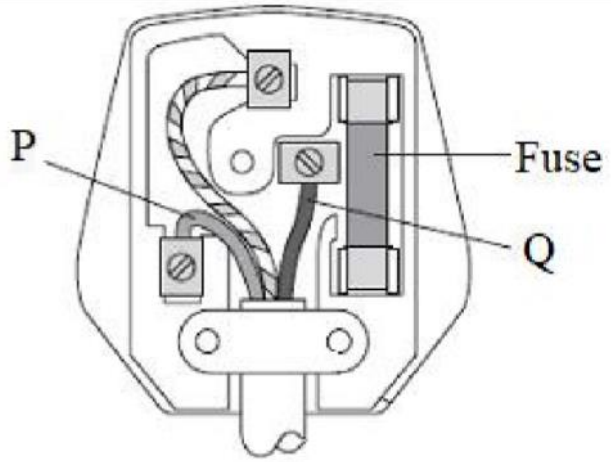
(1 mark)

(ii) State what is observed on the galvanometer if the south pole of the magnet was moved into and then withdrawn from the coil. **(1 mark)**

(b) A transformer has 800 turns in the primary and 40 turns in the secondary winding. The alternating voltage connected to the primary is 240V and current of 0.5.A. If 10% of the power is dissipated as heat within the transformer, determine the current in the secondary coil.

(2 marks)

(c) The diagram below shows a three-pin plug.



(i) Name the colour code of conductors Q **(1 mark)**

(ii) Why is the earth pin longer than the rest in the three-pin plug shown above? **(1 mark)**

(iii) Give one advantage of a circuit breaker instead of a fuse in domestic wiring. **(1mark)**

(iv) State one modification can be done to the fuse wire to give it a higher rating? **(1mark)**

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KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 10

232/1

PHYSICS

PAPER 1 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

Write your name, index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided.
*This paper consists of **TWO** Sections: **A** and **B**.*
*Answer **ALL** the questions in section **A** and **B**. All working **MUST** be clearly shown.*
KNEC mathematical tables and silent non-programmable electronic calculators may be used.
Candidates should answer the questions in English.
Take: ***Acceleration due to gravity,*** $g = 10\ m/s^2$

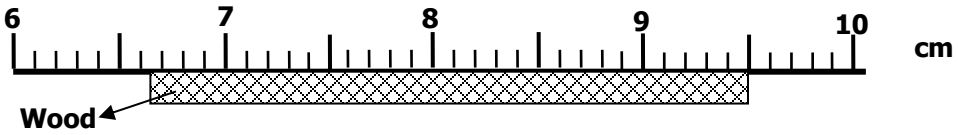
FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A (25 MARKS)

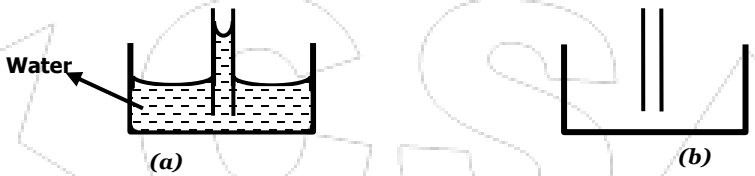
Answer all the questions in this section.

1. The figure below shows a section of a meter rule used to measure length of a piece of wood.



Find the length of the wood **(2marks)**

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



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

(b) Explain the difference if any between figure (a) and (b) **above** **(2 marks)**

3. Explain why a partially inflated balloon released at sea level would become fully inflated at a higher altitude. **(1mark)**

4. A catapult is used to project a stone of mass 40.0g vertically upwards to a height of 50.0m. Calculate the amount of elastic potential energy initially present in the catapult. **(2marks)**

5. A turning effect of force depends on the magnitude of the force. State any other factor that determines the moment of a force **(1mark)**

(i) Mercury is usually preferred over water for use as a barometric liquid. Give a reason for this. **(1mark)**

(ii) .State the property of Freon that makes it suitable for use as refrigerant. (**1mark)**

(iii) Other than the mass of ice, State another physical quantities that remain constant while pure ice is being converted to water. **(1mark)**

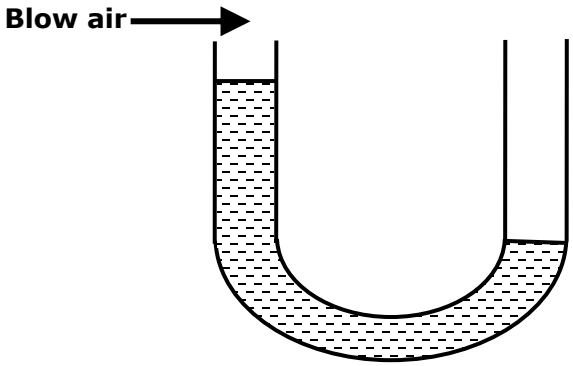
6. Giving a reason, explain why it's advisable for luggage carrier compartment to be put under the seats than at the roof tops of the buses. **(1 mark)**

7. Other than angle of banking, state any other factor that affects the critical velocity of a vehicle negotiating a bend. **(1 mark)**

8. A balloon filled with argon gas of volume 200 cm^3 at the earth's surface where the temperature is 20^0C, and the pressure 760mm of mercury. If it is allowed to ascend to a height where the temperature is 0^0C and the pressure 100mm of mercury, calculate the volume of the balloon. **(2marks)**

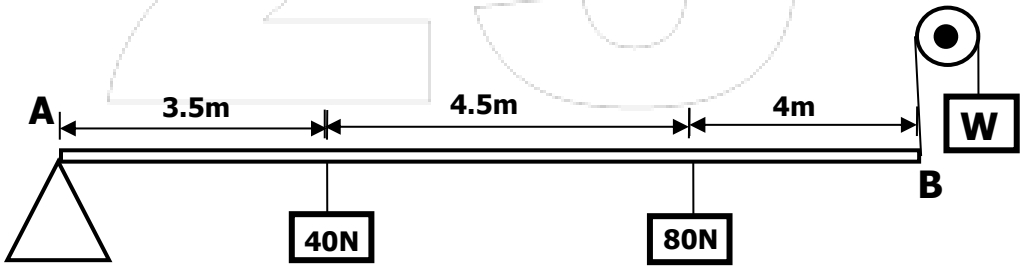
10.It is a common behavior for a high jumper to slightly flex their knees just before landing. Explain the importance of this behavior from your knowledge of physics. **(1mark)**

11. The figure below shows a manometer containing water. Air is blown across the mouth of one tube and the levels of the water changes as shown.



Explain why the level of water in the left limb of manometer is higher**.** **(2 marks)**

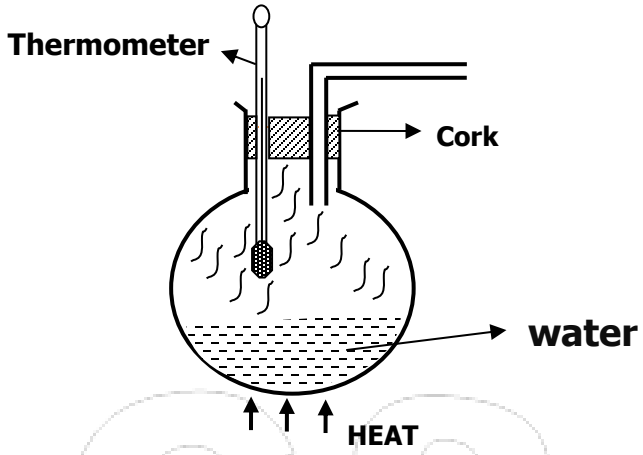
12. The figure below shows a uniform rod AB of weight 20N pivoted at A.



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

13. A cemented floor feels cold to the feet, but a woolen carpet on the same floor feels warm. Explain this. **(1mark)**

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



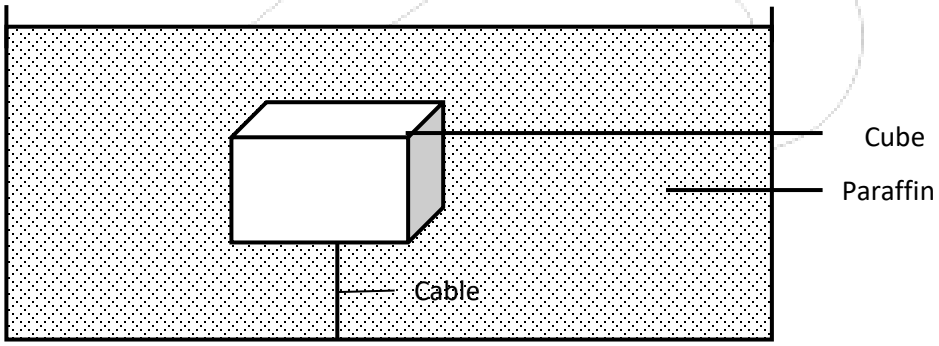
(i) Why is the bulb of thermometer not dipped in the water? **(1mark)**

(ii) Explain how the sensitivity of a thermometer can be improved. **(1mark)**

SECTION B (55 MARKS)

15.(a) State Archimedes' principle . **(1 mark)**

(b) The figure shows a cube of side 2.0 m block and of mass 4,800 kg attached to the base of a tank containing paraffin of density 800 kgm^{-3} by means of an inextensible and light weight cable.



Determine:

(i) The density of the block. **(2marks)**

(ii) The upthrust acting on the block. **(3 marks)**

(iii) The tension in the cable. **(2 marks)**

(iv) The cable is then released, and the block rises to the surface where it subsequently floats. Calculate the fraction of the block which is beneath the surface of the paraffin. **(2 marks)**

16. (a) Give **two** ways of increasing the boiling point of a liquid. **(2 marks)**

(c) A lagged copper calorimeter of mass 0.8 kg contains 0.6 kg of water at 22.0^0 C. A metal nut of mass 0.4 kg is transferred quickly from an oven at 300^0 C to the calorimeter and a steady temperature of 52^0 C is reached by the water after stirring. Given that the specific heat capacity of copper is 400 $Jkg^{-1}K^{-1}$ and that of water is 4200 $Jkg^{-1}K^{-1}$, calculate:

(i) Heat gained by the calorimeter and water. **(3 marks)**

(ii) Energy lost by the metal nut. **(1 mark)**

(iii) The specific heat capacity of the material making the nut. **(3 marks)**

(c) An electric kettle rated 120 V, 60 W is used to melt 20 g of ice at 0^0C to water at 0^0C in 112 seconds, calculate the specific latent heat of fusion of ice**.** **(3 marks)**

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. **(2marks)**

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

(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 45.0g. The bucket is swung horizontally making 6 revolutions per second. Calculate

i) The angular velocity **(2marks)**

ii) The angular acceleration **(2marks)**

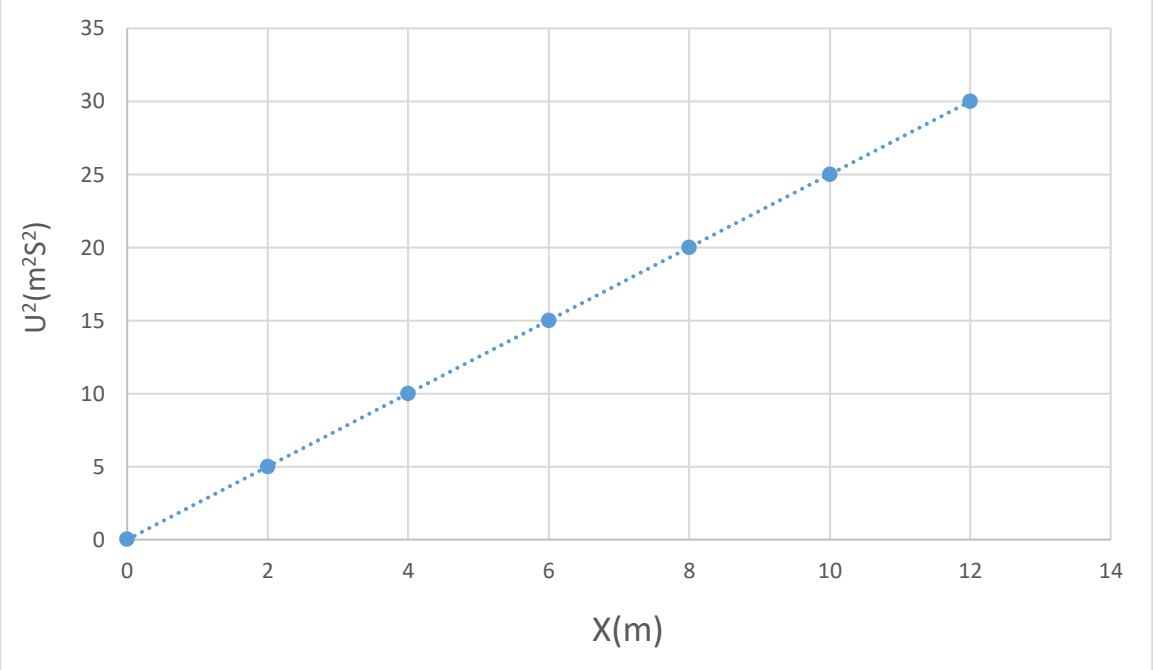
iii) The tension on the string. **(2marks)**

18.(a)(i) During the construction of dams, the base of the dam is widened and curved. Explain**.** **(2 marks)**

(ii) A block of density 1.60 g/cm^3 and measures 3.0cm by 5.0cm by 7.0cm was placed on the ground. Determine the difference between the maximum and minimum pressure that would be exerted on the ground by the block. **(3 marks)**

b) i)State Newton's second law of motion **(1 mark)**

ii)A wooden block resting on a horizontal bench is given an initial velocity U so that it slides on the bench for a distance X before it stops. Various values of X are measured for different value of the initial velocity. The figure below shows a graph of U^2 against X.



i)Determine the slope S of the graph **(3 marks)**

ii) Determine the value of k given that $U^2 = 20kX$ where k is a frictional constant for the surface **(2marks)**

iii)State with a reason what happens to the value of k when the roughness of the bench surface is reduced **(2 marks)**

19.a)(i) State the kinetic theory of gases. **(1 mark)**

(ii) State the reason why it is easier to separate water into drops than to separate a solid into smaller pieces. **(1mark)**

c) (i) State Hooke's **law** **(1mark)**

(ii) Two identical helical springs are connected in series. When a 50g mass is hang at the end of the springs, it produces an extension of 2.5 cm. Determine the extension produced by the same mass when the springs arc connected in parallel. **(3marks)**

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

(ii) Draw a suitable set up that can be used to verify Charles's law. **(3marks)**

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KCSE 2023 FINAL PREDICTION

EXPECTED EXAM 10

232/2

PHYSICS

PAPER 2 (THEORY)
TIME: 2 HOURS

NAME……

SCHOOL…… **SIGN**……

INDEX NO…… **ADM NO**……

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO CANDIDATES

- *Write your name and Admission number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *This paper consist of **two** section **A** and **B***
- *Answer all the questions in the spaces provided*
- *All working **must** be clearly shown in the spaces provided.*
- *Non programmable silent electronic calculator may be use*

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A		25	
B		55	
	TOTAL SCORE	80	

SECTION A {25 MARKS }

Answer all the questions

1. State one property of image formed by a pinhole camera**.** **(1mk)**

2. Other than density, state another factor that affect the speed of sound in a solid. **(1mk)**

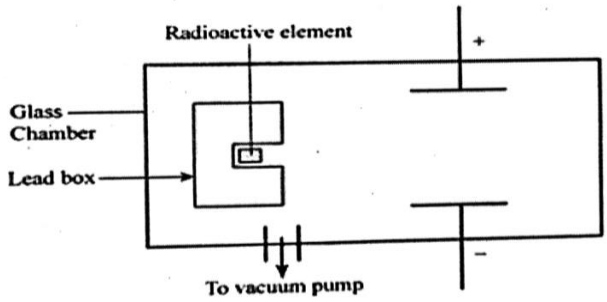
3. A radio wave has a frequency of 3MHz and travels with a velocity of 3.0 x10^8 m/s. Calculate its wavelength. **(2mks)**

4. Draw a circuit diagram to show P-N junction diode in the reverse biased mode. **(2mks)**

5. Explain why the walls of studio are padded with woolen **materials** **(1mk)**

6. (a) Define the term **''radioactivity''** **(1mk)**

(b)The figure below shows a radioactive element placed in an evacuated glass chamber. The element produces alpha,beta and gamma emissions. The three emission pass through an electric field



Complete the diagram to show the path of each of the emissions. **(3mks)**

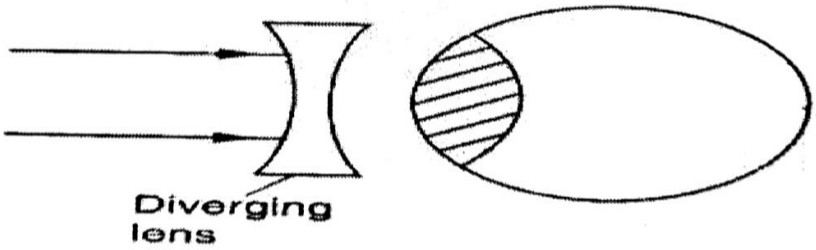
7. Explain why radio waves signals are easier to receive in a place surrounded by hills. **(2mks)**

8. State two ways of minimizing electrical power losses during transmission of electric power. **(2mks)**

9. Give a reason why convex mirror is preferred to a plane mirror for use as a driving mirror **(1mk)**

10. State two ways of minimizing local action in a simple cell**.** **(2mks)**

11. The figure below shows a defect of vision being corrected by concave lens placed infront of the eye.



(i) Name the defect. **(1mk)**

(ii) Complete the rays to show the effect of the lens. **(2mks)**

12. State one use of microwaves . **(1mk)**

13. Determine the speed of light in water given that the speed of light in air is 3.0×10^8 m/s and the refractive index of water is 1.33 **(3mks)**

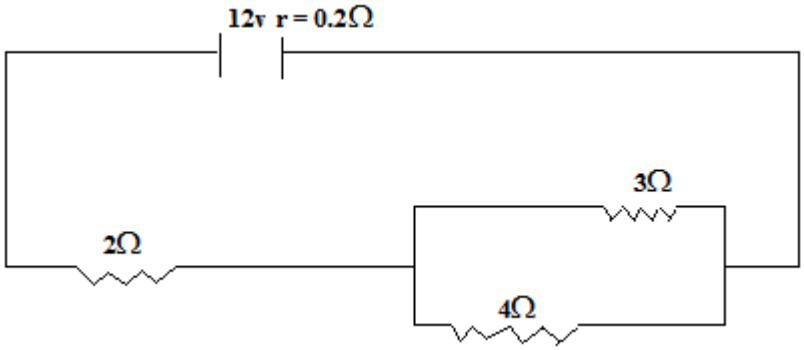
SECTION B (55 MARKS)

Answer all questions in this section.

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

b) Give one factor that affect the resistance of a metallic conductor. **(1mk)**

c)The figure below shows three resistors connected to 12V supply of internal resistance of 0.2Ω.



Calculate

i) The effective resistance. **(3mks)**

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

(d) (i) Define the term ' doping' **(1 mk)**

(ii) Briefly explain how silicon is used to make an p-type semi-conductor. **(3 mks)**

(iii) State one application of a diode. **(1mk)**

15.(a) Why is the cap of the gold leaf electroscope circular? **(1mk)**

(b)A match stick is lit near the cap of a charged electroscope.State and explain the observation made. **(2mks)**

(c)State one factor that affects the capacitance of a parallel plate capacitor. **(1mk)**

(d)A 10μF capacitor is charged to potential difference of 300V and isolated.It is then connected in parallel to a 5μF capacitor.Calculate:

(i) The resultant potential difference**.** **(3mks)**

(ii)The total energy in the two capacitors after connection. **(3mks)**

16.(a)State the Faraday's law of electromagnetic induction. **(1mk)**

(b)Give two factors that affect the magnitude of the induced em.f **(2mks)**

(c)A transformer with primary coil of 400 turns and secondary coil 200 turns is connected to 240 V a.c mains.

(i) Calculate the secondary voltage . **(2mks)**

(ii)If the primary current is 3.0 A and secondary is 5.0A.Calculate the efficiency of the transformer **(3mks)**

(d)State how the following are minimized in a transformer .

(2mks)

(i) Hysteresis loss……

(ii)Eddy currents……

(e) Explain why the alternating voltage is used in a transformer. **(1mk)**

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

(b)Distinguish between thermionic emission and the photoelectric emission. **(1mk)**

(c)State one factor that determines the velocity of photoelectrons produced on the metal surface when light shine on it. **(1mk)**

(d)The threshold wavelength of a photoemissive surface is 5.55×10^{-7} m.(Take speed of light $C=3.0 \times 10^{8}$ m/s,plancks constant $h=6.63 \times 10^{-34}$ Js and mass of an electron $Me=9.1 \times 10^{-31}$kg.)

Calculate:

(i)Its threshold frequency **(3mks)**

(ii)The work function of the surface **(3mks)**

(e)The maximum speed with which a photoelectron is emitted if the frequency of the radiation is 6.2×10^{14} Hz

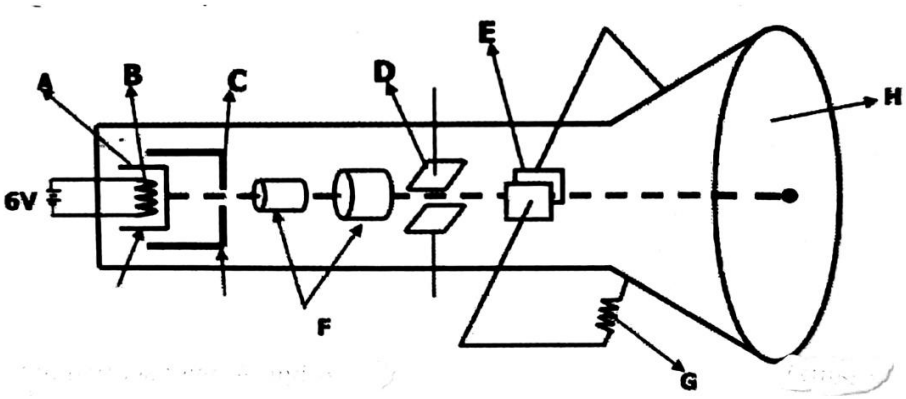
(3mks)

18.(a) State one similarity between cathode rays and X-rays**.** **(1mk)**

(b) Give two uses of X-rays in medicine **(2mks)**

(c)In a T.V set magnetic fields are preferred for use as deflection system instead of the electric field. Explain **(1mk)**

(d)The figure below represent a cathode ray oscilloscope (C.R.O).



i)Name the parts labelled A and C **(2mks)**

A……

C……

ii)What is the function of part labelled D **(1mk)**

(iii)Explain how electrons are produced in the C.R.O. **(1mk)**

(iv) State the reason why the part labelled F has variable potential difference**.** **(1mk)**

(v)Give a reason why the tube is evacuated**.** **(1mk)**

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KILA LA HERI