KCSE 2023 REGIONAL MOCKS

PHYSICS

THE PDF COMPRISES A COMPILATION OF TOP 4 JOINT NATIONAL MOCKS ACROSS THE 47 COUNTIES FOR THE KCSE CLASS OF 2023

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CONFIDENTIAL!!!

SUCCESS TO ALL KCSE 2023 CANDIDATES!!!

MINISTRY OF EDUCATION (KNEC COMPLIANT)

NAME _____ ADM NO. _____

DATE _____

232/1
PHYSICS
PAPER 1
CLASS OF KCSE 2023
TIME: 2 HOURS

THE NAIROBI & CENTRAL REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

INSTRUCTIONS TO CANDIDATES

- Write your name, school and index number in the spaces provided above.
- Write the date of examination and sign in the spaces provided above.
- This paper consists of two sections, Section **A** and **B**.
- Answer **ALL** the questions in section **A** and **B** in the spaces provided.
- **ALL** answers and working **MUST** be clearly shown.
- Mathematical tables and electronic calculators **may be** used.
- Take acceleration due to gravity, g = 10m/s^2

FOR EXAMINER'S USE ONLY:

Section	Question	Maximum score	Candidate's score
A	1–12	25	
B	13	12	
	14	11	
	15	10	
	16	12	
	17	10	
	TOTAL	80	

1. Figure 1 below shows a micrometer screw gauge being used to measure the diameter of a metal rod. The thimble scale has 50 divisions.

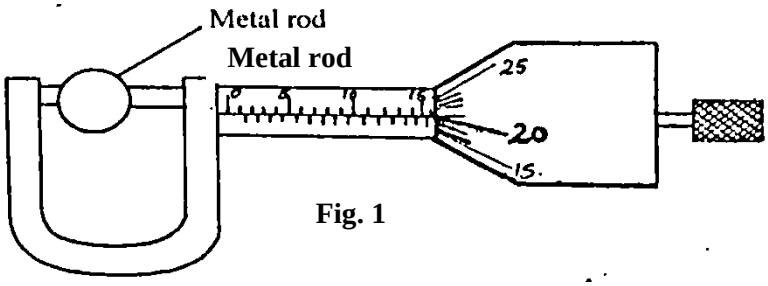

Fig. 1

Find the diameter of the metal rod.
(1 mark)

2. A man of mass 72kg jumps from a small boat on to the lake shore with a forward velocity of $9.0ms^{-1}$.
If the mass of the boat is 216kg, calculate the initial backward velocity of the boat. (3 marks)

3. Explain briefly how the temperature in a green house is kept higher than outside. (2 marks)

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The diagram shown in figure 2 below is an arrangement of three pulley wheels used to help in lifting loads. Use it to answer questions 4 and 5.

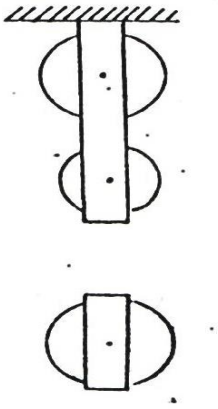


Fig. 2

4. Complete the diagram to show how the rope goes round the wheels, position of the load and the effort. (2 marks)

5. Write down the velocity ratio (VR) of the system.
(1 mark)

_____

6. State how temperature affects the speed of sound in air.
(1 mark)

_____

_____

7. State **two** facts which show that heat from the sun does not reach the earth surface by convection. (2 marks)

_____

_____

_____

8. The diagram in figure 3 below shows water with negligible viscosity flowing steadily in a tube of different cross-section area. If at a point A, the cross section area is 120cm^2 and the velocity of water is 0.40ms^{-1}, calculate the velocity at B where cross section area is 4.0cm^2? (3 marks)

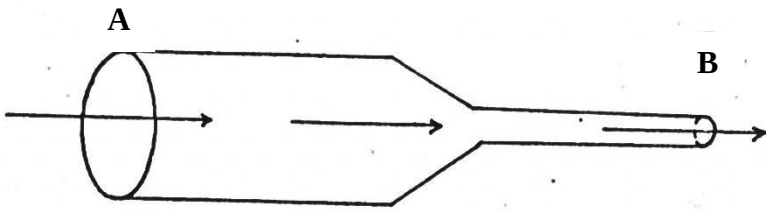


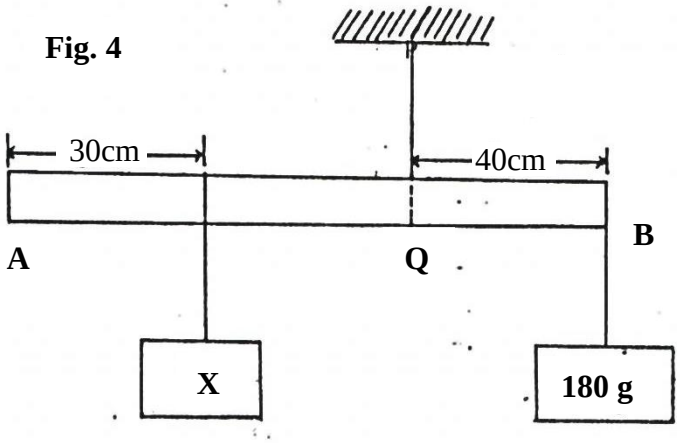
Fig. 3

9. A motor uses an electrical energy at a rate of 200W and raises a mass of 25kg through a vertical distance of 20m in 0.5 minutes. Determine the efficiency of the motor. (3 marks)

How long will it take 240V, 3000W electric immersion heater to raise the temperature of 150 litres of water in a well-lagged calorimeter made of copper of mass 20kg from 15^0 to 70^0C? (3 marks)

10. The diagram shown in the Figure 4 below shows a system in equilibrium with the rule horizontal.
AB is a uniform rule of length 1.0m and weight 1.8N. Calculate the weight of the block X. (3 marks)

Fig. 4



11. State the reason why a trailer carrying heavy loads has many wheels.
(1 mark)

_____

_____

SECTION B (55 MARKS)

Answer ALL the questions

12. A student in Anestar Girls set up an experiment to study the acceleration of a trolley using ticker tape timer. The timer made 50 dots per second on the tape. Dots A to E measured 2.5cm apart and dots E to I measured 4.5cm apart.

a) Using a scale drawing show the dots A, B C, D, E, F, G and I as they appeared on the tape. (3 marks)

b) Determine the velocity of the trolley from:

i) A to E.
(2 marks)

ii) E to I.
(2 marks)

c) Calculate the acceleration of the trolley.
(2 marks)

d) What end of the tape was fixed onto the trolley?
(1 mark)

e) State **two** precautions that the student should take before she takes her final samples of the dots. (2 marks)

13. a) i) What is Brownian motion?
(1 mark)

ii) Describe with the aid of a diagram, the apparatus you could set up in order to demonstrate
Brownian motion of smoke particles suspended in air.
(5 marks)

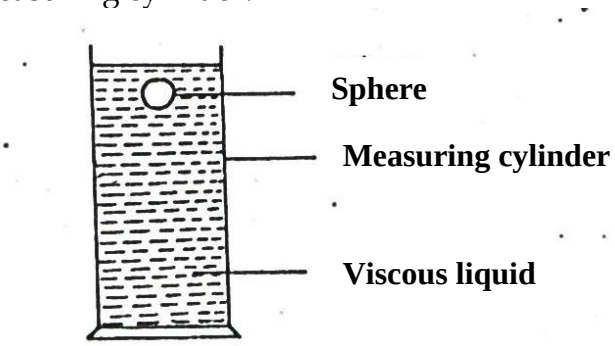
b) An oil drop has a volume of $0.01mm^3$ when it is placed on the surface of some water, it spreadsout to form a circular patch of area $500cm^2$
i) Calculate the thickness of the oil film. (3 marks)

ii) What **two** assumptions have you made in the answer b(i) above.
(2 marks)

14. a) i) Distinguish between inelastic and elastic collisions.
(2 marks)

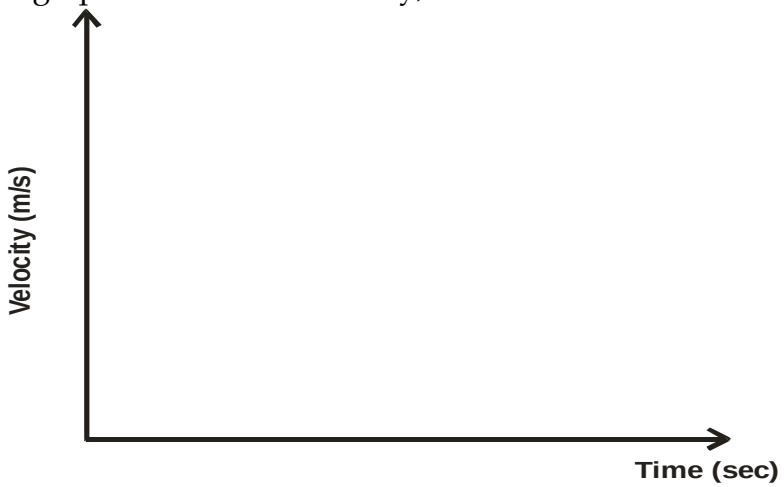
iii) A particle A of mass M moving with an initial velocity, u, makes a head-on collision with another particle B of mass 2M, B being initially at rest. In terms of u, calculate the final velocity of A if the collision is perfectly inelastic. (3 marks)

b) The diagram in Figure 5 below shows a sphere moving in a viscous liquid in a tall measuring cylinder.

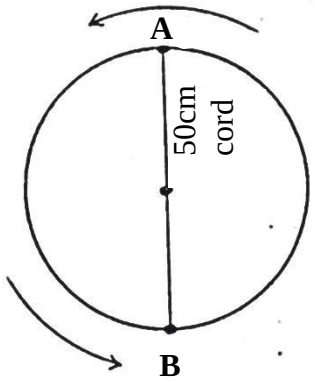


i) Show on the diagram the forces acting on the sphere. (3 marks)

ii) Sketch a graph showing the variation of velocity with time in figure 6 below. Show on the graph the terminal velocity, V_T. (2 marks)



A mass of 1kg is attached to a cord of length 50cm. It is whirled in a circle in a vertical plane at 10 revolutions per second as shown in the figure below.



a) Find the tensions in the cord when the mass is at:

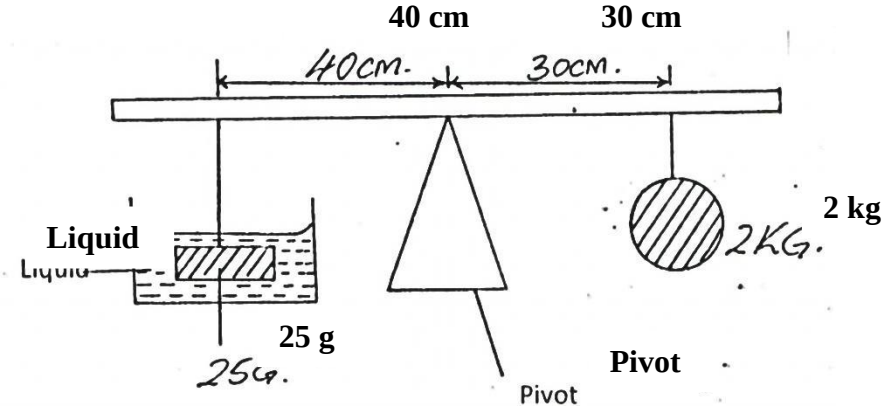
i) Highest point of the circle A.
(2 marks)

ii) Lowest point of the circle B.
(2 marks)

b) i) Describe an experiment to determine specific heat capacity of aluminium block with two holes
drilled in it to accommodate a thermometer and an electric heater.
(5 marks)

ii) An immersion heater rated 90W is placed in a liquid of mass 2kg. When the heater is switched on for 15minutes, the temperature of the liquid rises from 20^0C to 30^0C. Determine the specific heat capacity of the liquid. (3 marks)

15. a) The figure below shows a block of mass 25g and density 200kg/m^3 submerged in a certain liquid and suspended from a homogenous horizontal beam by means of a thread. A mass of 2kg issuspended from the beam as shown in the figure below.



i) Determine the upthrust force acting on the block.
(3 marks)

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

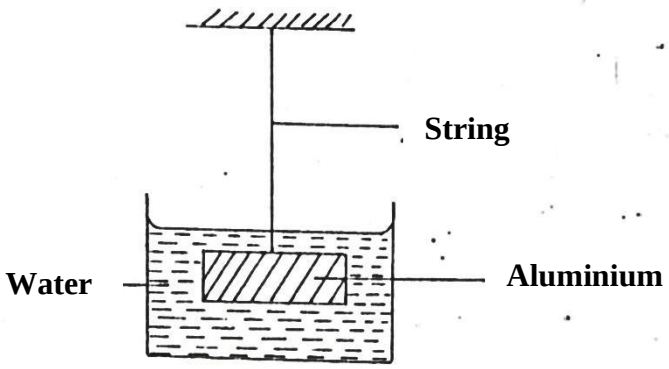
b) i) State the law of floatation.
(1 mark)

_____

_____

_____

ii) The figure below shows a piece of aluminum suspended from a string and completely immersed in a container of water. The mass of the aluminium is 1kg and its density is $2.7 \times 10^3 kg/m^3$



Calculate the tension in the string. (3 marks)

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PHYSICS
PAPER 2
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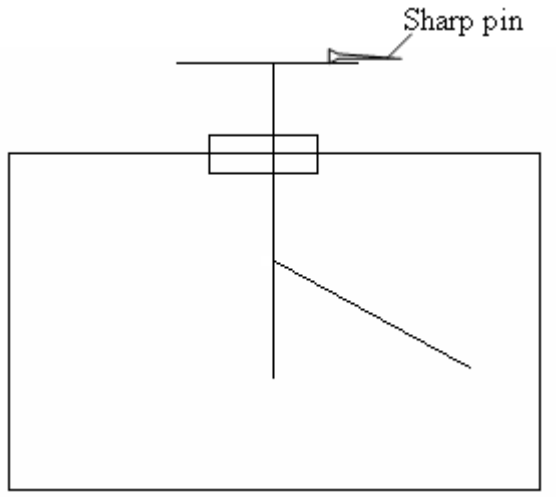
THE NAIROBI & CENTRAL REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

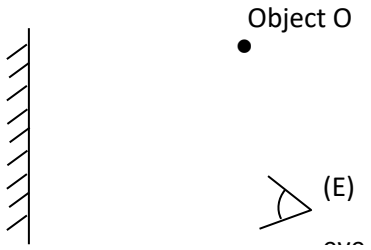
1. State the property of light suggested by the formation of shadows.
(1 mark)

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



Explain why the leaf collapses.
(2 marks)

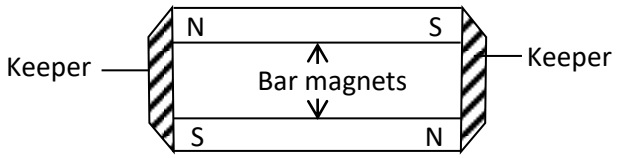
The figure **below** shows an object O placed infront of a plane mirror.



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

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

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



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

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

6. The figure 2 shows a circuit diagram with cells in parallel. Each cell has e.m.f of 1.5V and internal resistance of 0.5Ω and the resistance of the bulb is 6Ω each. Determine the ammeter reading when the switch is closed.
(3mks)

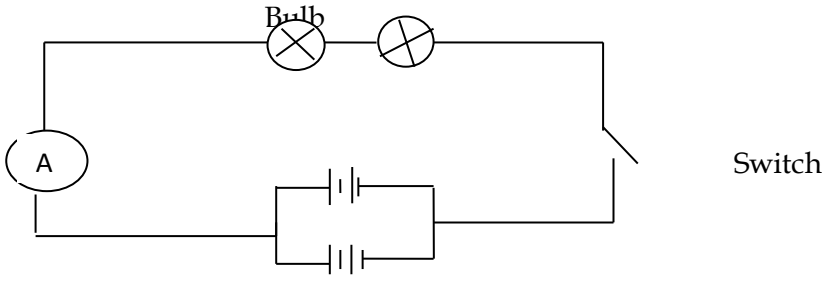


Fig2

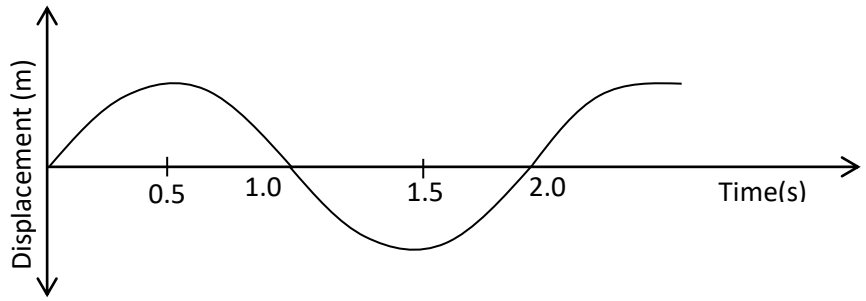
7. An appliance is rate 2.5KW, 240V a.c 50Hz. Explain the meaning of the rating(figures) on this appliance.
(2mks)

8. The following are electromagnetic waves. Arrange them according to their increasing frequency. Gamma rays, microwaves, ultra-violet, TV waves and blue light.
(1mk)

9. Distinguish between a transformer and induction coil.
(2mks)

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

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



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

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

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

13. Kiai noticed that any time he a light from his car and close the door holding the metallic hand he get a slight shock. Explain.
(2mks)

SECTION B (55 MARKS)

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

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

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

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

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

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

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

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

II A 75W bulb for 10 hours per day.

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

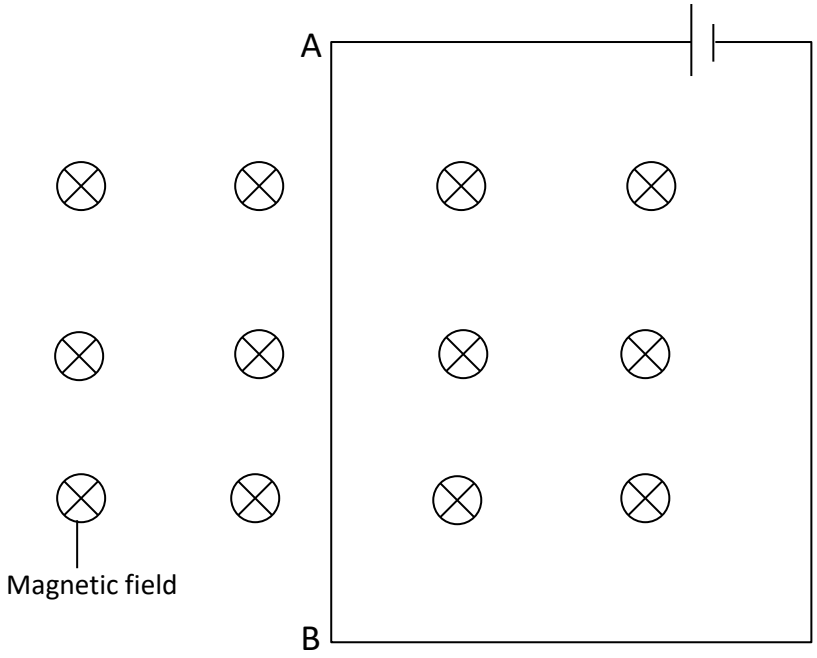
(iii) Find the total monthly bill for the above household if in addition to the energy consumed, the power company charges each consumer.

I A standing charge of Ksh.200.

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

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

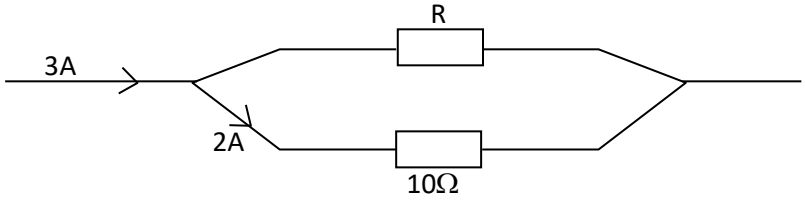
(b) The following figure shows a conductor placed in a magnetic field. Indicate on the diagram the direction of motion of part AB of the conductor.
(2mks)



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

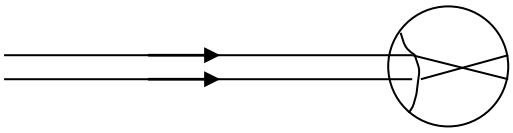
(c) Calculate the length of a nichrome resistance wire of cross-sectional area $7 \times 10^{-8} m^2$ required to make a resistor of 10 ohms. (Take resistivity of nichrome = $1.10 \times 10^{-6} \Omega m$). (3 marks)

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



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

16. The figure below shows rays of light entering a human eye which has a defect.

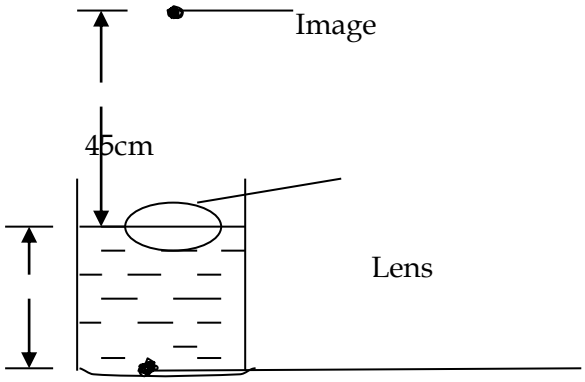


i) Name the defect. (1mk)

ii) State 2 possible causes of the defect. (1mk)

b) Define the accommodation. (1mk)

c) A small bright object O lies at the bottom of a beaker containing water of depth h cm. A convex lens of focal length 15cm is held at the surface of water. The lens forms an image of O at 45cm from the surface of water.

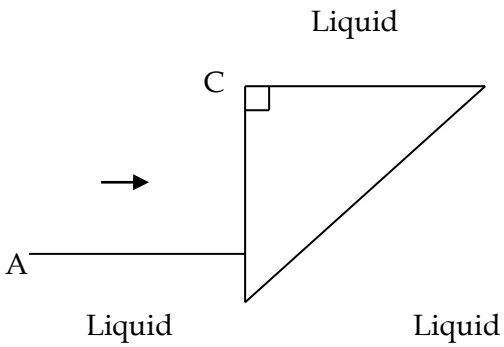


Taking the refractive index of water to be 4/3, determine:

(i) the apparent depth of the object(2mks)

(ii) the real depth h, of the object (2mks)

d. A ray of light is incident at right angles to the face AB, of a right angled isosceles prism of Refractive index 1.6 as shown in the figure below.



If the prism is surrounded by a liquid of refractive index 1.40, determine:

(i) The angle of incidence on the face BC. (2mk)

(ii) The angle of refraction on the face BC. (3mks)

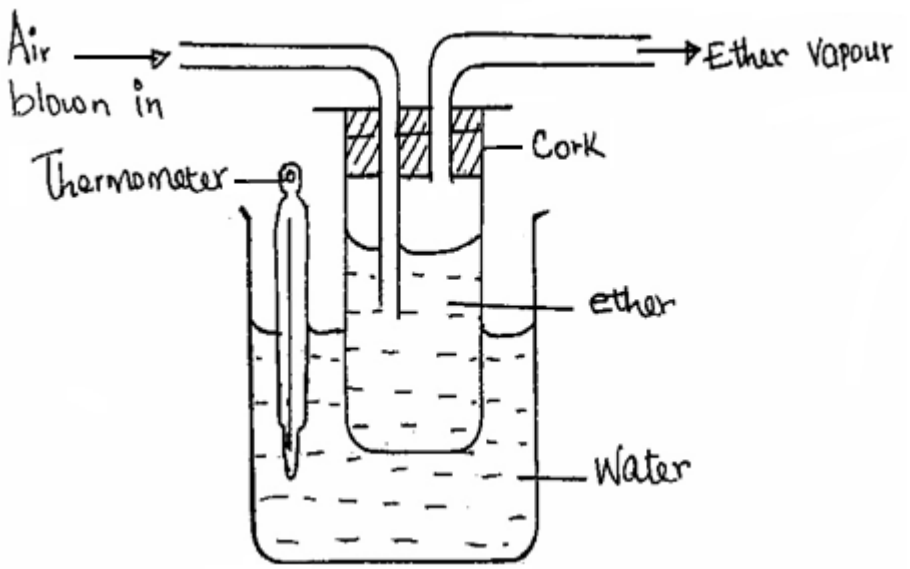
17. State **two** ways through which the rate of evaporation of a liquid may be increased. (2 marks)

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

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

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

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



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

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

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

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

(i) The angular velocity (2mk)

(ii) The angular acceleration (2mks)

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

(iii) The linear velocity (1mk)

MINISTRY OF EDUCATION (KNEC COMPLIANT)

NAME _____ ADM NO. _____

DATE _____

232/3
PHYSICS
PAPER 3 (PRACTICAL)
CLASS OF KCSE 2023
TIME: 2 HOURS 30 MINUTES

THE NAIROBI & CENTRAL REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

CONFIDENTIAL

QUESTION ONE:

Each candidate will require

- Half- metre rule
- Two metre rules (strictly wooden)
- A stop watch
- A piece of sewing thread (thin) 100cm long.
- pendulum bob
- Two retort stand, two bosses and two clamps.
- A lens and a lens holder (focal length 10 cm)
- A candle stick
- A screen
- Screen with a cross-wire

QUESTION TWO

- Each candidate will require:
  - A 100cm nichrome wire mounted on a metre rule(swg 32)
  - A switch
  - An ammeter
  - Two dry cells
  - A cell holder
  - A filament bulb of 2.5v mounted on a holder
  - Eight connecting wires (four with crocodile clips at one end)
  - Voltmeter (0-3V or 0-5V)

NAME _____ ADM NO. _____

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232/3
PHYSICS
PAPER 3 (PRACTICAL)
CLASS OF KCSE 2023
TIME: 2 HOURS 30 MINUTES

THE NAIROBI & CENTRAL REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

INSTRUCTIONS TO CANDIDATES:

- ***(a)*** Write your name and admission number in spaces provided above.
- ***(b)*** Sign and write the date of examination in spaces provided above
- ***(c)*** Answer all the questions in spaces provided in the question paper.
- ***(d)*** You are allowed to spend the first 15 minutes of $2\frac{1}{2}$ hours allowed for this paper reading the whole paper carefully before commencing the work.
- ***(e)*** Marks given for clear record of the observations actually made, their suitability accuracy and the use made of them.
- ***(f)*** Candidates are advised to record their observations as soon as they are made.
- ***(g)*** Non-programmable silent electronic calculators and KNEC Mathematical table may be used.

1. This question consists of two parts A and B; attempt both parts.

PART A (15 MARKS)

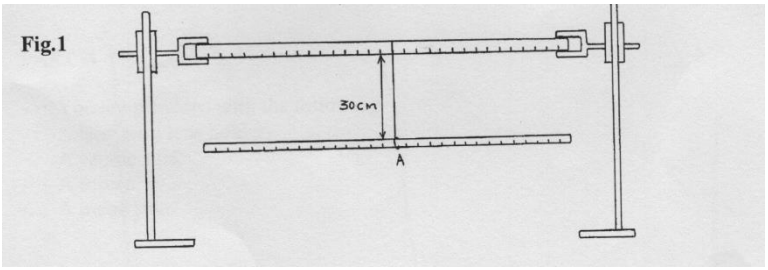
You are provided with the following.

- Two metre-rules
- A stop watch
- A half metre-rule
- Two resort stands, two bosses and two clamps.
- Some sewing thread.
- A pendulum bob.

Proceed as follows:

(a) Clamp one metre rule horizontally on the two stands so that it is on a vertical plane. Suspend the second metre rule so that it balances on one point as shown in figure 1 below. Note the balance point as the centre of gravity of the metre rule.
Let this be point A.

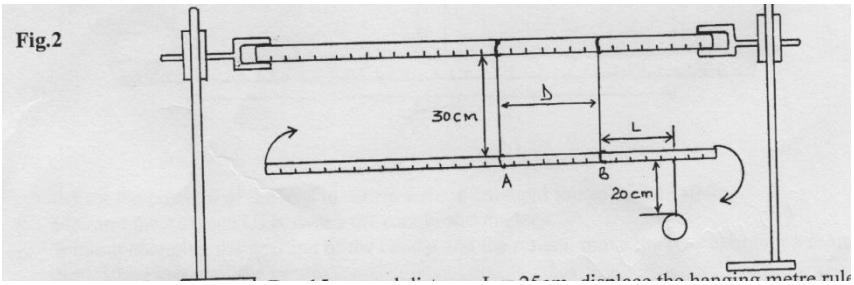
Fig.1



(b) Set the length of the string on which the metre rule is suspended to be 30cm. Tie a second support to the metre rule a distance D from the first string.
Let the point of support be point B.

(c) Suspend the pendulum bob with a string a distance L from B and set the length of the string to 20cm.
See figure 2 below.

Fig.2



Starting with a distance D=15cm, and distance L=25cm, displace the hanging metre rule on a horizontal plane and record the time taken for it to make 20 complete oscillations on table 1.

(d) Repeat part (c) above for other values of D and complete the table.

D(cm)	*Time for 20 oscillations (s)*	*Periodic time (T) (s)*	*T^2 (s^2)*
15			
20			
25			
30			
35			
40			

Table 1

(6mks)

(e) On the grid provided, plot a graph of D (cm) against $T^2(s^2)$
(5mks)

(f) Determine the slope of the graph.
(2mks)

……

……

……

……

……

……

……

……

(g) Use your graph to determine the periodic time when the length of distance D is 33cm. (2mks)

……

……

……

PART B. 5 MARKS

(b) You are provided with the following apparatus:

- Candle
- Lens
- Lens holder
- Metre rule
- Screen with a crosswire
- Screen.

Proceed as follows:

i. Arrange the apparatus as shown in the figure 2 below.

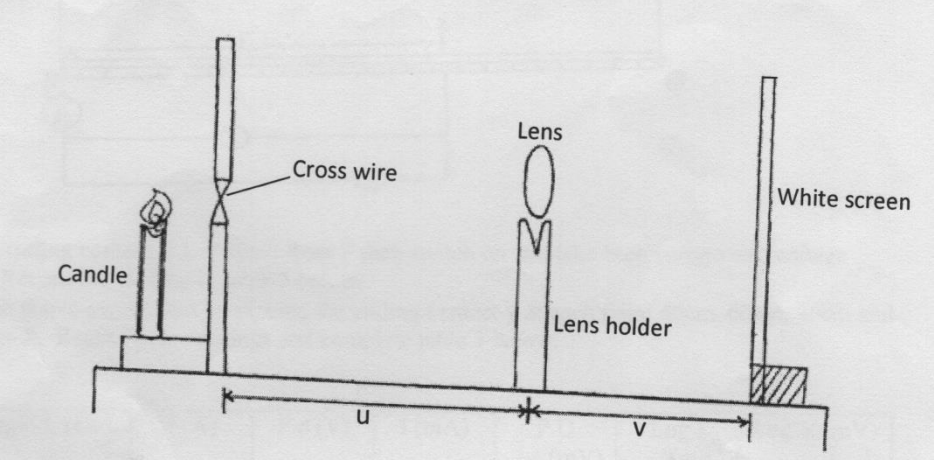


Fig 2

ii. Place the cross-wire before the lens so that U=28cm. The lit candle should be placed close to the cross-wire.

iii. Adjust the position of the screen until a sharp image is cast on the screen.

iv. Measure and record the value distance, V, in the table

v. Repeat the same procedure for the other values in the table.

U(cm)	**V(cm)**	$M=\frac{V}{U}$
30		
36		

(3 mks)

Table 2

vi. Given that the focal length f of the lens satisfies the equation $f=\frac{V}{1+M}$, determine the average value of the focal length, f. (2 mks)

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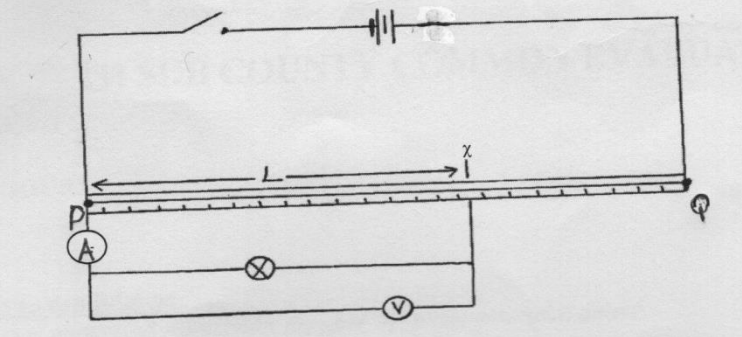
2. You are provided with the following.
   - A switch
   - A 100cm nichrome wire mounted on a metre rule.
   - An ammeter
   - 2 dry cells
   - A cell holder
   - A bulb of 2.5V mounted on a holder.
   - Eight connecting wires (four with crocodile clips at one end)
   - Voltmeter (0-3 or 0-5V)

PROCEED AS FOLLOWS.

(a) Connect the apparatus provided as shown in the circuit in ***figure 3*** below.

Fig 3



(b) Place the sliding contact x at L=20cm from P then switch on and take both current and voltage reading. Record the reading in ***table 3*** above.

(c) Repeat the above experiment by placing the sliding contact x at each point 40cm, 60cm, 70cm and 80cm from P. Record your readings and complete table 3.

Length L (cm)	*I (A)*	*P.d (V)*	*1(mA)*	*P.D (mV)*	*Log I (mA)*	*LogV(mV)*
20						
40						
60						
70						
80						

Table 3
(8mks)

(d) Plot a graph of Log ***I*** against Log ***V***.
(5mks)

(e) Determine the slope of the graph.
(3mks)

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(f) The relationship between I and P.D is given by the equation.
Log I= n Log V+ Log K where K and n are constants. Determine using the graph the value of:

i) K (2mks)

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ii) n (2mks)

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MINISTRY OF EDUCATION (KNEC COMPLIANT)

NAME _____ ADM NO. _____

DATE _____

232/1
PHYSICS
PAPER 1
CLASS OF KCSE 2023
TIME: 2 HOURS

THE NYANZA & WESTERN REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

Instructions to candidates

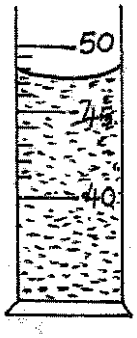
(a) Write your name and Admission number in the spaces provided above.
(b) Sign and write the date of examination in the spaces provided above.
*(c) This paper consist of **two** section **A** and **B.***
*(d) Answer **all** the questions in section **A** and **B** in the spaces provided.*
*(e) All working **must** be clearly shown.*
(f) Mathematical tables and electronic calculators may be used.
(g) This paper consists of 10 printed pages.
(h) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

For examiners use only.

Question	*Maximum score*	*Candidate's score*
1-11	*25*	
12-15	*55*	
Total	*80*	

SECTION A (25 MARKS)

1. The figure below shows part of a measuring cylinder containing a certain liquid.



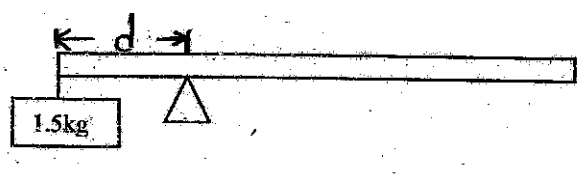
Use this information to answer question 1 and 2

State the accuracy of the measuring cylinder (1mk)

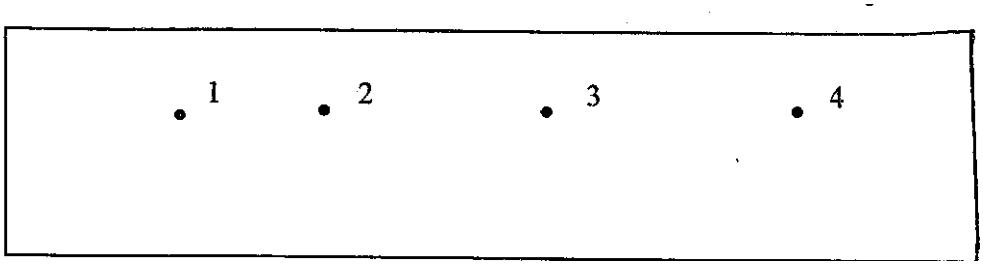
2. What is the volume of the liquid in the measuring cylinder? (1mk)

3. An oil drop of radius 1mm forms an oil patch of radius 1.33m on a clean water surface. If the oil spreads to make one molecule thick, estimate the size of the oil molecule. (3mks)

4. The figure below shows a uniform wooden plank of length 2m and weight 5N. The plank is balanced at a distance d from one end by a mass of 1.5kg. Determine the distance d. (2mks)



5. Oil is leaking from a car as it travels along a straight road. One drop falls on the ground every two seconds. The figure below shows the pattern of the drop on the ground (the figure is drawn to scale)

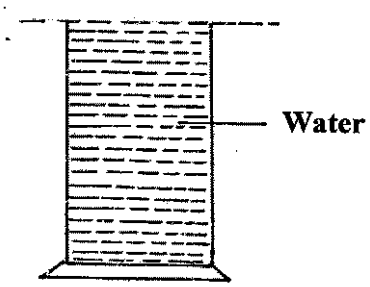


i. Describe the motion of the car.
(1mk)

ii. Determine the acceleration of the car.
(2mks)

6. A ball is thrown from the top of a cliff 20m high with a horizontal velocity of $10ms^{-1}$. Calculate the distance from the foot of the cliff to where the ball strikes the ground. (2mks)

7. The figure below is a gas jar completely filled with water and covered with a wire gauze.



a) State the observation when the set-up is suddenly invented.
(1mk)

_____

_____

b) Explain the observation made in (a) above.
(2mks)

_____

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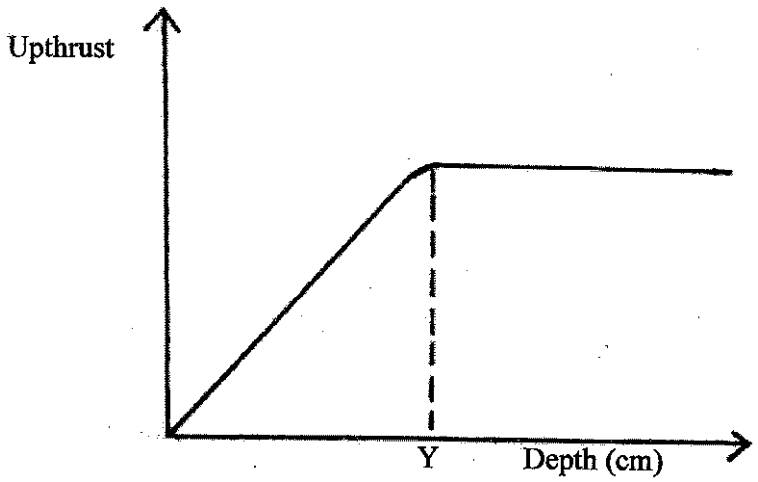
8. A glass block is suspended from a spring balance and held inside a beaker without touching the beaker. Water is added gradually into the beaker. The figure below shows the variation of the upthrust on the block with depth of water in the beaker.



State the reasons for the observation at Y
(2mks)

_____

_____

9. What force is needed to stop a 500kg car moving at 180km/h in 12.5 seconds?
(3mks)

10. A hole of diameter 1.0mm is made in the side of a water pipe. If the pressure of the flow is maintained at $3.0X10^{6}Nm^{-2}$, calculate the force with which the water jets out of the hole. (3mks)

11. Explain why a glass container with thick glass walls is more likely to crack than one with a thin wall when a very hot liquid is poured into them. (2mks)

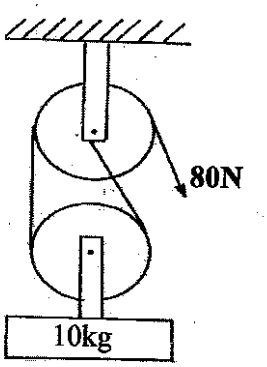
_____

_____

_____

SECTION B (55 MARKS)

12. (a) Using the pulley system shown a mass of 10kg is raised 2m by an effort of 80N



i. How much potential energy does the load gain.
(2mks)

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

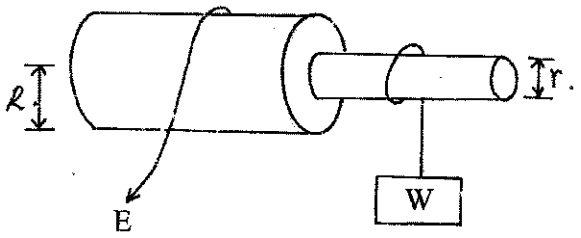
iii. How much work is done by the effort?
(2mks)

iv. What is the efficiency of these pulleys?
(2mks)

v. If all the wasted energy is used to lift the bottom pulley, how much does the pulley weigh?

(2mks)

(b) The figure below shows a wheel and axle being used to raise a load W by applying an effort E. the radius of the large wheel is R and that of small wheel is r as shown



i. Show that the velocity ratio (VR) of this machine is given by R/r

ii. Given that r=5cm and R=8cm, determine the effort required to raise a load of 20N if the efficiency of the machine is 80% (3mks)

13. (a) A litre of gas at a temperature of 0^0C and pressure $1.0X10^5$ Nm^{-2} is suddenly compressed of half its volume and its temperature rises to 273^0C. Calculate the new pressure of the gas

(3mks)

(b) Give two differences between boiling and evaporation
(2mks)

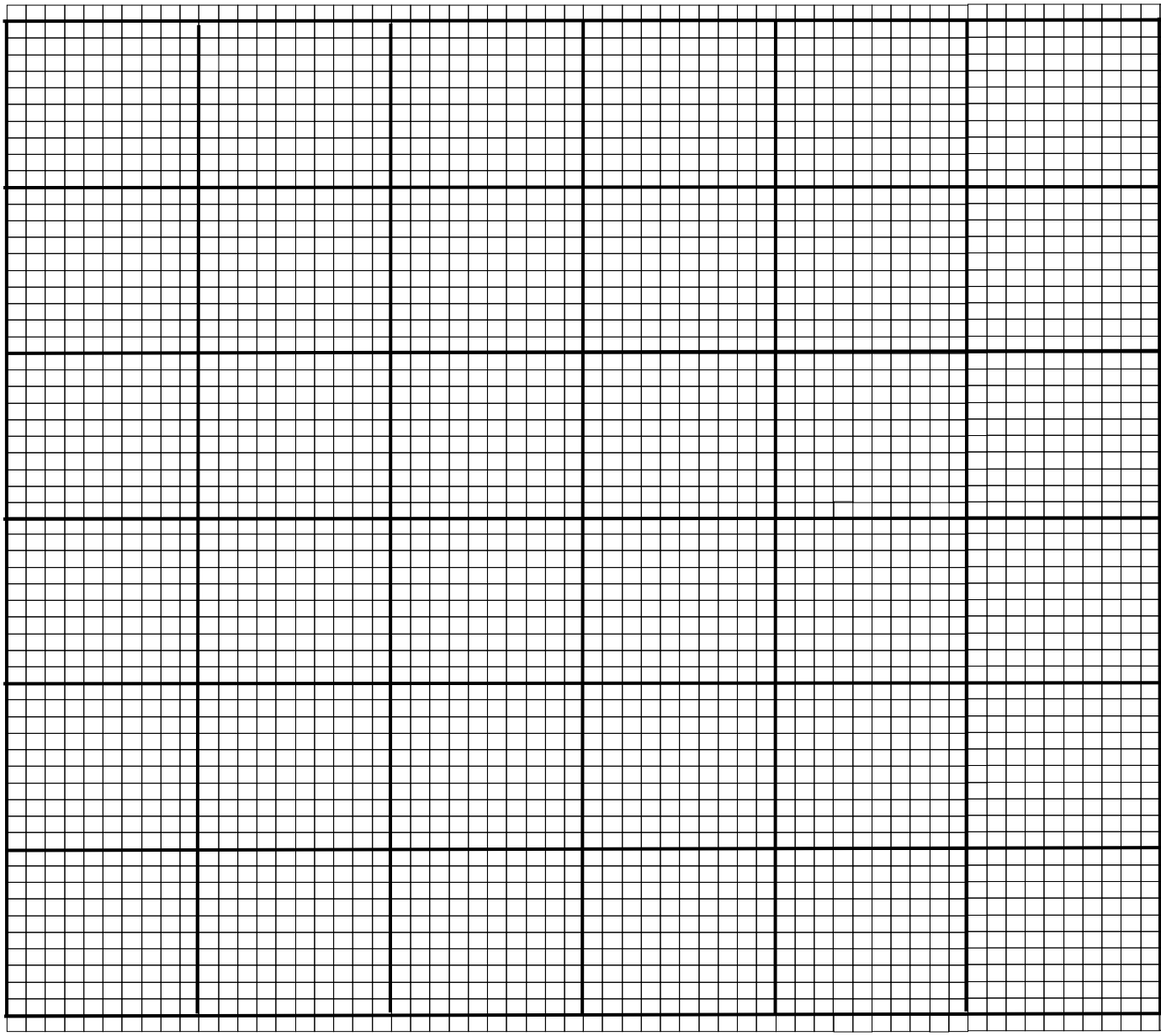
_____

_____

(c) A 1800 watts heater and a thermometer were immersed in a 1.0kg of a liquid in a copper calorimeter. Temperature was recorded after every one minute. The results obtained are in the table below.

Temperature ^{o}C	30	36	40	45	49	54	57
Time (in min)	3	4	5	6	7	8	9

i. Plot a graph of temperature against time.
(5mks



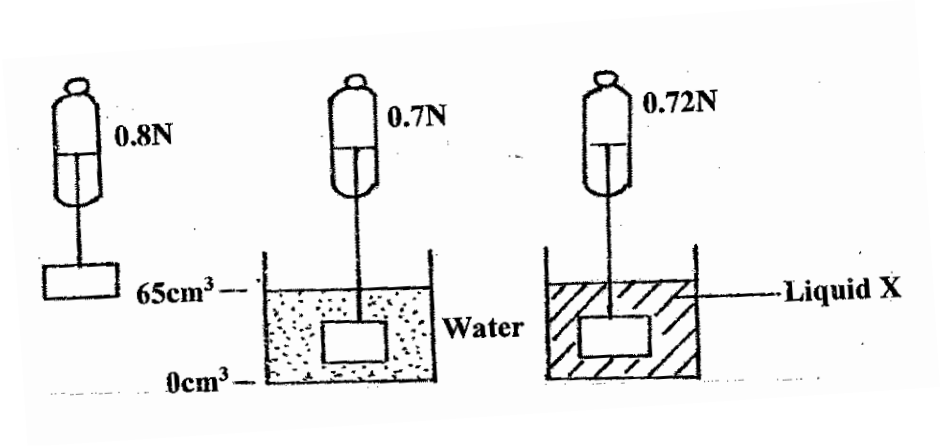
ii. Use the graph to determine.
I. The room temperature
(1mk)

II. The specific heat capacity of the liquid take:
Specific heat capacity of copper = 400Jkg^{-1}k^{-1} (4mks)
Mass of copper calorimeter = 100g

14. (i) State the law of floatation (1mk)

(ii) A balloon made up of a fabric weighing 80N has a volume of 1X10^{7}cm^{3}. The balloon is filled with hydrogen of density 0.09kgm^{-3}. Calculate the greatest weight in addition to that of the hydrogen and its fabric which the balloon can carry in air of average density 1.25kgm^{-3} (4mks)

(b) The diagram below shows the same metal block weighted in air, water and liquid X.



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

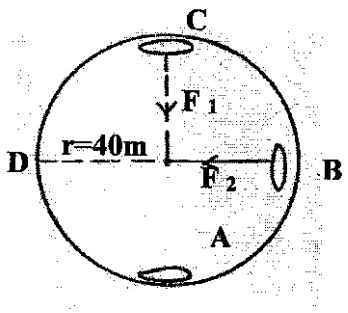
(ii) Water level before the solid was immersed.
(2mks)

(iii) Density of the liquid X
(3mks)

15. (a)(i) Differentiate between centripetal and centrifugal forces. (1mk)

(iii) What provides the centrifugal force needed to make a car travel round in a bend of unbanked road.
(1mk)

(b) Below is a diagram of an aircraft of mass 2000kg together with the pilot performing some air maneuvers in a vertical plane?



If the radius of the circular path is 40m and the aircraft is moving at a velocity of 200ms^{-1}. Calculate

(i) The external force F_1 provided by the air at point C. (3mks)

(ii) The external force F_2 provided by the air at point B. (3mks)

MINISTRY OF EDUCATION (KNEC COMPLIANT)

NAME _____ ADM NO. _____

DATE _____

232/2
PHYSICS
PAPER 2
CLASS OF KCSE 2023
TIME: 2 HOURS

THE NYANZA & WESTERN REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

Instructions to candidates

1. *Write your name and Admission number in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above.*
3. *This paper consist of **two** section **A** and **B.***
4. *Answer **all** the questions in section **A** and **B** in the spaces provided.*
5. *All working **must** be clearly shown.*
6. *Mathematical tables and electronic calculators may be used.*
7. ***This paper consists of 13 printed pages.***
8. ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***

For examiners use only.

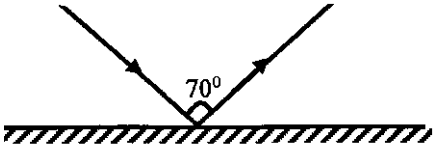
Question	*Maximum score*	*Candidate's score*
1-12	*25*	
13-17	*55*	
Total	*80*	

SECTION A (25 MARKS)

ANSWER ALL QUESTIONS IN THIS SECTION IN THE SPACES PROVIDED.

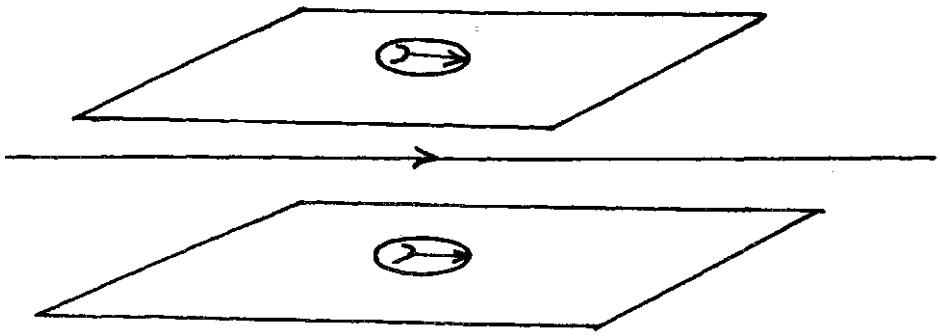
1. Figure 1 shows a ray of a light incident on a plane mirror.

Figure 1

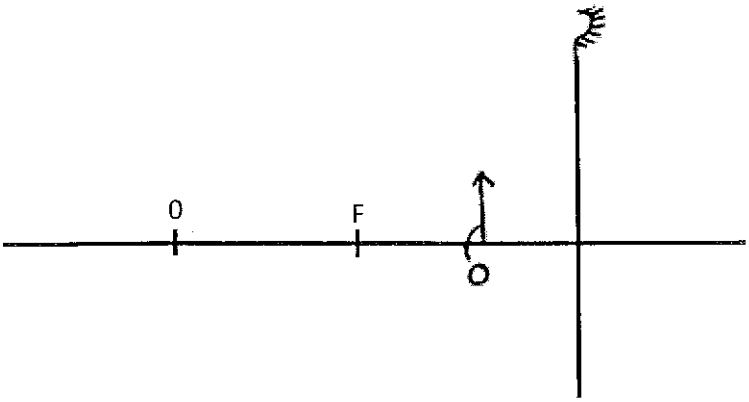


The plane mirror is then rotated clockwise through an angle of 200 keeping the incident ray fixed. Determine the new angle of reflection by drawing. (2mks)

2. The figure below shows a current carrying conductor passing between two cardboards. Show the direction of the deflection on each compass on the cardboard. (2mks)



3. 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)



4. Give a reason why lecture theatre halls are covered with soft perforated materials. (1mk)

_____

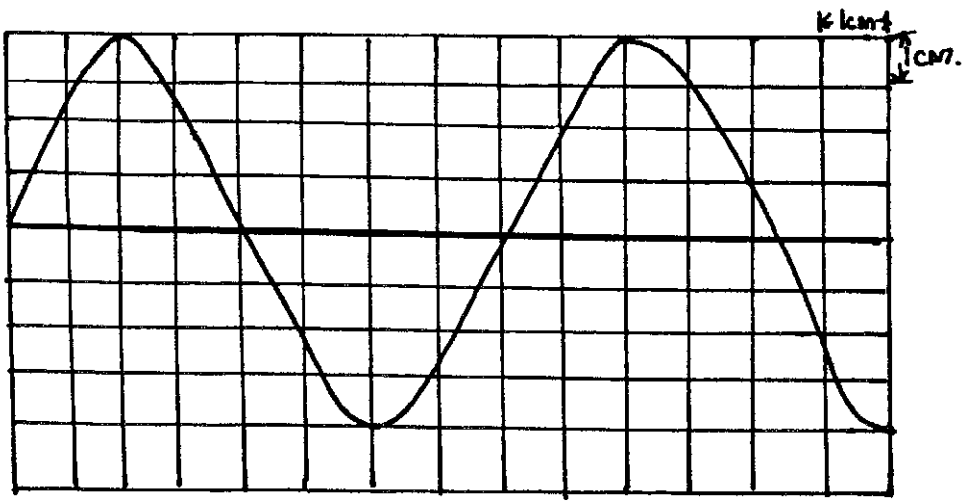
_____

5. State one factor which does not change as water waves move from shallow deep end. (1mk)

_____

_____

6. The figure below show a CRO screen display trace when the Y-amplification control and time base settings are 100mV and 0.8ms/cm respectively.

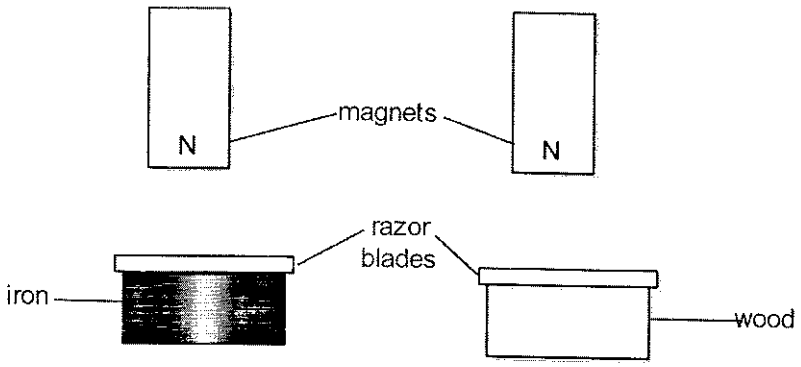


Calculate:

a. The peak potential difference. (2mks)

b. The frequency of the signal. (2mks)

7. Two similar razor blades were placed on a wooden block and the other on an iron block as in figure 7.
Figure 7.



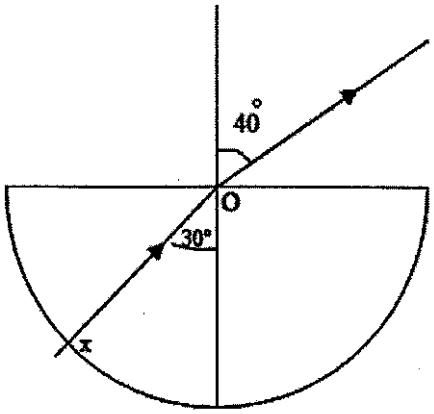
It was observed that the razor blade on the wooden block is attracted by the magnet while that on the iron block was not. Explain. (2mks)

_____

_____

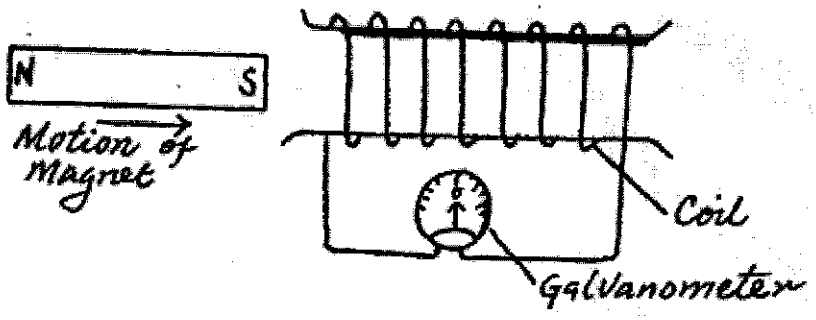
_____

8. The figure below represents a ray of light falling normally on the curved surface of a semi-circular plastic block at X, meeting the opposite face at an angle of incidence of 30^0 and emerging into the air at an angle of 40^0.



Calculate refractive index of the plastic.
(3mks)

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



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

10. Determine the cost of using an electric heater rated 3kW for 12 hours given that the cost of electricity per kilowatt hour is sh 8.00. (2mks)

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

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

Radio	A	Infrared	Visible	B	X-Rays	Gamma Rays

State one use of the radiation represented by B.
(1mk)

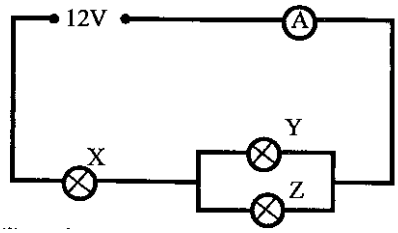
_____

_____

_____

SECTION B (55MARKS)

13. (a) The figure below shows how a student set up a circuit using 3 identical bulbs X, Y and Z each rated "12V, 2.0A"



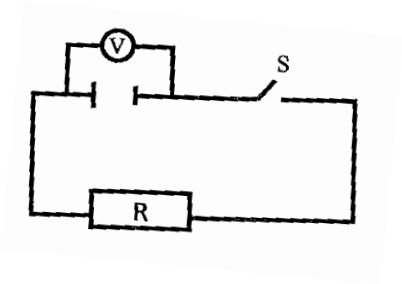
iii. When operating normally, calculate the resistance of one of the bulbs.
(2mks)

iv. Calculate the effective resistance of the three bulbs.
(2mks)

v. What will be reading of the ammeter?
(2mks)

vi. Draw a circuit diagram showing the three bulbs connected in such a way that they would all work at the same brightness especially if they are not identical. (2mks)

(b) When the switch S is kept open in the circuit shown below the voltmeter reads 1.5V. When the switch is closed, the readings drops to 21.3V and the current through the resistor is 0.5A.



vi. What is the e.m.f of the cell?
(1mk)

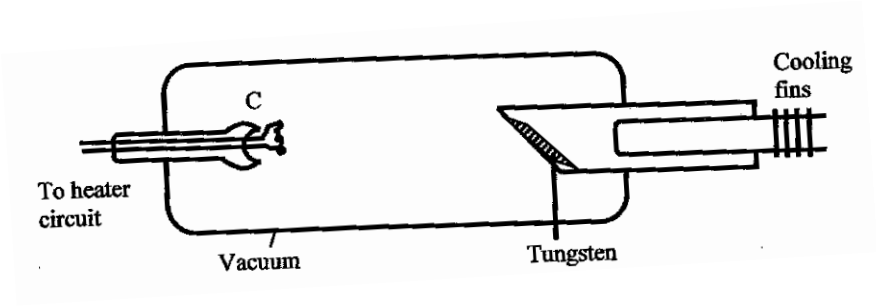
_____

vii. What is the terminal voltage of the cell?
(1mk)

_____

viii. Calculate the value of R
(2mks)

14. The Figure below is of an x-ray tube



iii. Explain how x-rays are produced by the tube.
(4mks)

_____

_____

_____

_____

iv. Explain briefly the energy changes that take place when the x-ray tube is operating. (3mks)

_____

_____

_____

_____

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

_____

_____

_____

vi. The accelerating voltage of an x-ray tube is 12V. Calculate the speed of the electron on reading the anode. (Charge to mass ratio of an electron $\frac{e}{me}$ = $1.76X10^{11}$ (3mks)

15. (a) A strong positive charged rod is brought close to the cap of a charged electroscope from a high position. It is observed

i. State the charge on the electroscope.

(1mk)

_____

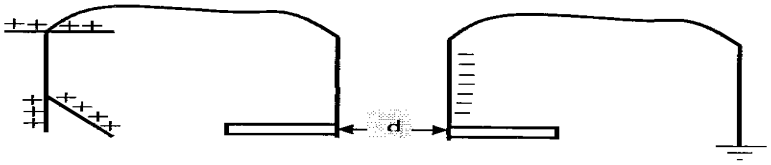
ii. Explain this observation.

(2mks)

_____

(b) A parallel- plate capacitor is connected to an electroscope as shown in fig 7. Below

Figure 7



State and explain the behavior of the leaf when the distance (d) between the plates is increased

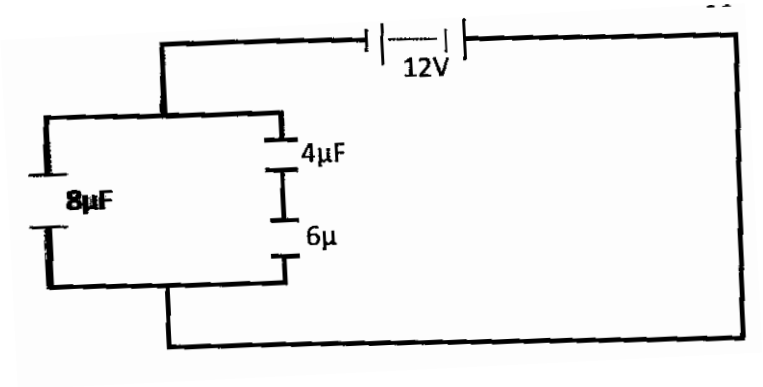
(2mks)

_____

_____

_____

(c) Figure 8 shows an arrangement of capacitors to a 12V d.c. supply



Determine

i. Effective capacitance

(3mks)

ii. Charge across the 8μF capacitor.

(3mks)

16. (a) **Define the term** monochromatic light

(1mk)

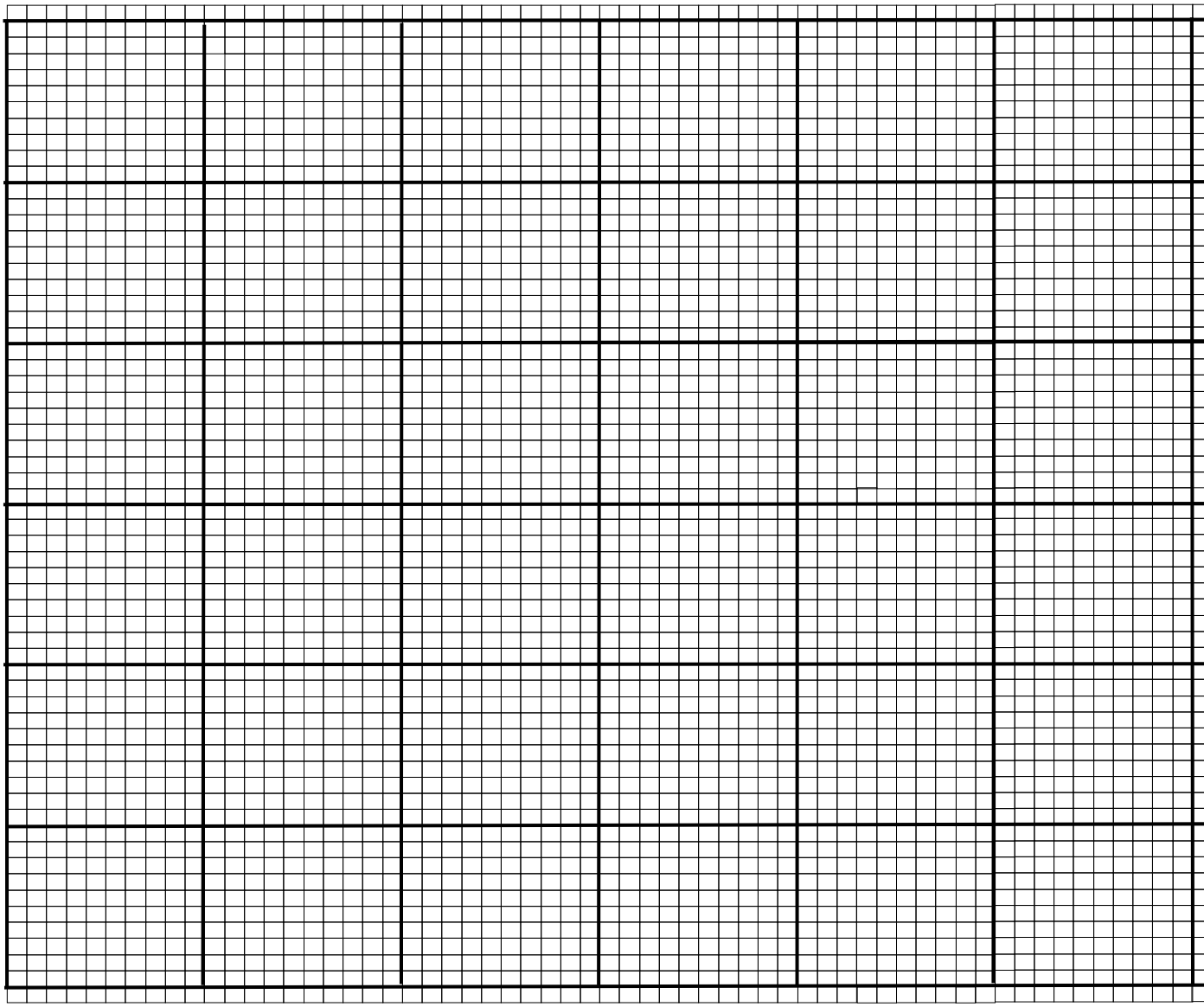
_____

_____

(b) The table below shows values of stopping potentials, V_2 and their curves pending frequencies for a metal surface monochromatic light is shone on it.

Stopping potentials, Vs	1.2	0.88	0.60		0.78
0.12Frequency (xx 10^{14}Hz)	7.5	6.7	6.0	5.2	4.8

III. Plot a graph of stopping potentials. Vs against frequency.
(4mks)



From the graph **determine**

IV. Thresh hold frequency
(1mk)

V. The Planck's constant, h (take $=1.6^{-19}$ x10C)
(2mks)

VI. The work function
(2mks)

17. (a) Study **figure 8** and answer the following questions.

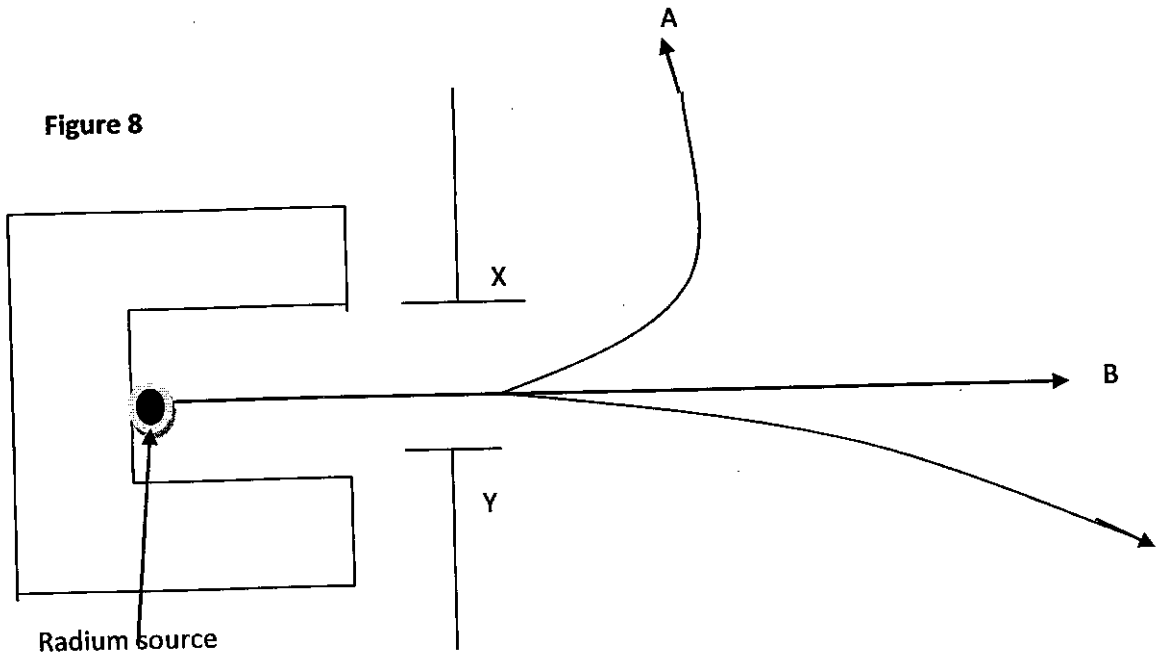


Figure 8

(i) State the charge on plate X
(1mk)

_____

(j) Identify the radiation A and B
(1mk)

A_____

B_____

(k) A nuclear reaction is represented by the following equation.

$_{92}^{a}x \longrightarrow {}_{b}^{234}y$ + Alpa particle

Determine the value of a and b.
(2mks)

iv. •

A radioactive source has an activity of 810c/s and after 63 hours the count rate falls to 110c/s. If the background count is 10c/s, determine the half –life of the source. (3mks)

(b)(i) Draw using appropriate symbols the circuit diagram of a junction diode in reverse bias.
(1mk)

(ii) Extrinsic semiconductors are made through a process called doping. Explain how doping produces an n-type semi-conductor.
(2mks)

_____

_____

_____

(iii) Distinguish between a semiconductor and a conductors.
(2mks)

_____

MINISTRY OF EDUCATION (KNEC COMPLIANT)

NAME _____ ADM NO. _____

DATE _____

232/3
PHYSICS
PAPER 3 (PRACTICAL)
CLASS OF KCSE 2023
TIME: 2 HOURS 30 MINUTES

THE NYANZA & WESTERN REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

CONFIDENTIAL

QUESTION ONE

- A biconvex lens of focal length 15cm
- A lens holder
- A metre rule
- A white screen
- A candle illuminating crosswires mounted on a circular hole
- A matchbox

QUESTION TWO

- A voltmeter (0-5V range)
- a 25V, 2200 μf capacitor (Terminals should be labeled for candidates)
- A switch
- Five connecting wires, two with crocodile clips
- Two new size D dry cells with a cell holder
- Some cotton thread – 1m long (1 piece), 0.5m long (2 pieces)
- Triangular prism(approximately 3.8 cm x 3.8 cm equilateral 60^o,60^o,60^o)
- A metallic 50g mass
- Hot water (provide a pool of boiling water to be shared)
- Cold water (tap water)
- Plastic Beaker (at least 250 ml)
- Thermometer -10^oC to 110^oC
- A stopwatch
- A metre rule
- A stand, boss and clamp

MINISTRY OF EDUCATION (KNEC COMPLIANT)

NAME _____ ADM NO. _____

DATE _____

232/3
PHYSICS
PAPER 3 (PRACTICAL)
CLASS OF KCSE 2023
TIME: 2 HOURS 30 MINUTES

THE NYANZA & WESTERN REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

INSTRUCTIONS TO CANDIDATES

(a) Write your name and admission number in the spaces provided above.
(b) Sign and write the date of examination in the spaces provided above.
(c) Answer ALL the questions in the spaces provided in the question paper.
(d) You are supposed to spend the first 15 minutes of the 2½ hours allowed for this paper reading in the whole paper carefully before commencing your work.
(e) Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use made of them.
(f) Candidates are advised to record their observations as soon as they are made.
(g) Non-programmable silent electronic calculators may be used.
(h) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
(i) Candidates should answer the questions in English.

For Examiner's Use Only

Question 1

	I	**ii**	**iii**	**iv**	**v**	**vi**
Maximum Score	8	5	3	2	1	1
Candidate's Score						

Question 2

	b	d	e	f	h	I	j	k	l
Maximum Score	1	3	5	1	2	2	1	3	2
Candidate's Score									

Total ☐

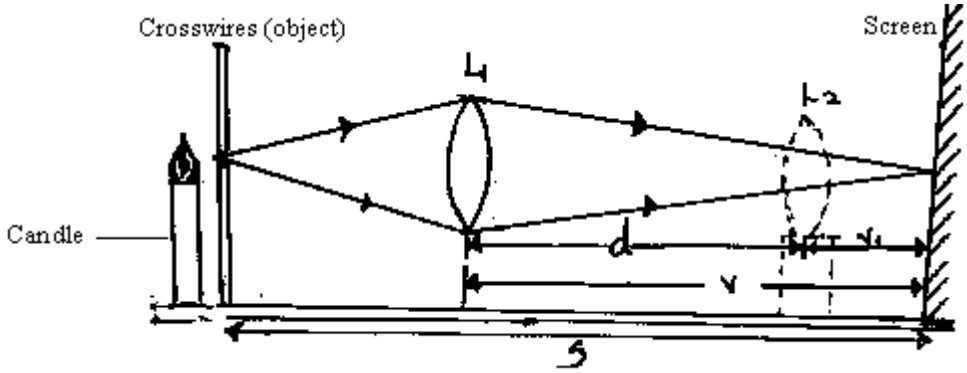
GRAND TOTAL ☐

Question One

. 1 You are provided with the following apparatus;

- A candle (source of light illuminating cross wires mounted on a circular hole)
- A convex lens
- A lens holder
- One meter rule
- A whole screen

Set the apparatus as shown in the diagram below



Illuminate the object cross wires using the candle provided when the distance between crosswires and screen S = 60cm.

By moving the lens away from the crosswires obtain a focused clear image of the object (crosswires) on the screen. Measure and record the distance V, between the lens position L_1 and the clear image on the screen.

Keeping the distance S fixed i.e. S = 60cm move the lens further away from the object until another sharp image but diminished image of the cross wires is obtained on the screen. Measure and record the distance between the new lens position L_2 and the sharp diminished image. Record this as V_1. Repeat the procedure for other values of S shown in the table.

i) Complete the table (8marks)

S (cm)	60	65	70	75	80	85	90
V (cm)							
V_1 (cm)							
d = V - V1(cm)							
S^2 (cm^2)							
d^2 (cm^2)							
$S^2 - d^2$(cm^2)							

ii) Plot a graph of $s^2 - d^2$ against S (5marks)

iiii) Determine the gradient (k) of the graph (3marks)

iv) Given that K =4f where f is the focal length of the lens used, determine the value for f

(2marks)

v) State the advantage the method used above to determine the focal length of a lens has over the other methods.

(1mark)

vi) Focus the window frame or any distant object and obtain a rough estimate of the focal length of the lens.

(1mark)

Question 2

This question consists of two parts, A and B. Attempt both parts.

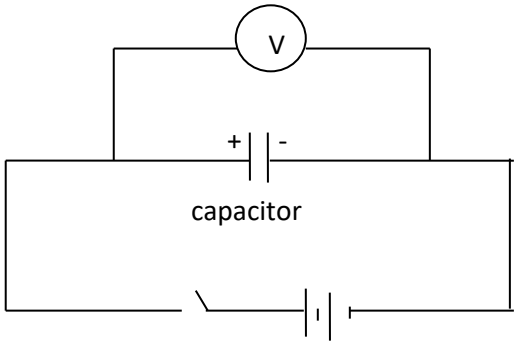
Part A

You are provided with the following

- ✓ A voltmeter
- ✓ A capacitor
- ✓ A switch
- ✓ A stopwatch
- ✓ Five connecting wires
- ✓ Two cells and a cell holder

Proceed as follows;

a) Connect the circuit as shown in the figure below.



Ensure the terminals of the capacitor and those of the battery are correctly connected. (*Positive to positive and negative to negative)*

b) Close the switch, read and record the maximum voltage V_o across the capacitor.
V_o = _____ volts.
[1 mark]

c) While the voltmeter shows the maximum voltage V_o open the switch and start the stopwatch simultaneously. Stop the stopwatch when the voltage has dropped from V_o to 2.5V. Read and record in the table 2 the time taken.

d) Reset the stopwatch and close the switch. Repeat the procedure in (c) to measure and record the time taken for the voltage to drop from V_o to each of the other values shown in table 2.

(3marks)

Table 2

Voltage (V)	2.5	2.25	2.0	1.75	1.50	1.25
Time, t(s)						

e)i)On the grid provided, plot a graph of voltage, V (y-axis) against time, t. [4 marks]

ii) Use the graph to determine the time, t at which V = $^{Vo}/_{2}$

t= _____ seconds
[1 mark]

f) Determine the resistance R of the voltmeter given that t = 0.693 CR where C is the capacitance of the capacitor.
[1 mark]

Part B

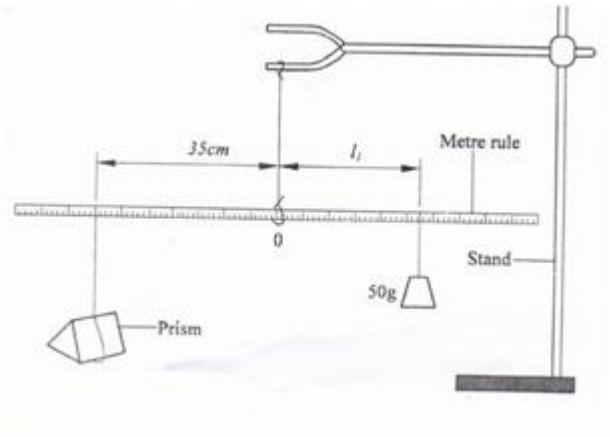
You are provided with the following;

- ✓ A triangular glass prism
- ✓ A metre rule
- ✓ A 50g mass
- ✓ Some hot water
- ✓ Some cold water
- ✓ Some thread
- ✓ A thermometer
- ✓ One stand, one boss and one clamp
- ✓ A beaker

Proceed as follows;

g) Using a piece of thread suspend the metre rule from the clamp on the stand and adjust the position of the thread until the metre rule balances horizontally. Note this position, O of the thread. (*This position of the thread must be maintained throughout the experiment*).

h) Using another piece of thread suspend the glass prism from the metre rule at a point 35cm from O. Suspend the 50g mass on the opposite side of O using another piece of thread. Adjust the position of the thread attached to the 50g mass until the metre rule balances once more.

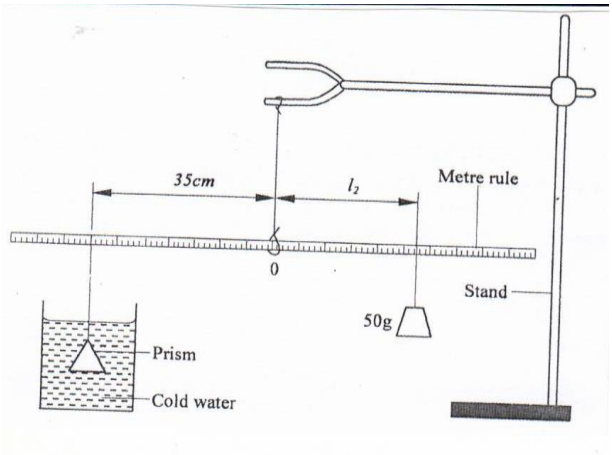


i) Determine the distance L_1, between O and the point of support of the 50g mass.

L_1 = _____ cm [1 mark]

ii) Use the principle of moments to determine the weight W_1 of the prism in air. (Take g = 10N/kg) [1 mark]

iii) Put cold water into the beaker (approximately $^3/_4$). With the prism at 35 cm from O, determine the distance L_2 of the 50g mass at which the rule balances when the prism is fully submerged in cold water.



(I) L_2 = _____ cm [1 mark]

(II) Determine the weight W_2 of the prism in cold water. [1 mark]

j) Measure and record the temperature T, of the cold water when the system is balanced.

T_1 = _____ ^oC. [1 mark]

k) Now pour out the cold water and replace with hot water. Balance the metre rule with the prism fully submerged in hot water. (*Ensure that the prism is still supported at 35 cm from O)*

i) Determine the distance L_3 of the point of support of the 50g mass when the prism is submerged in hot water.

L_3= _____ cm [1 mark]

ii) Measure and record the temperature of the hot water.

T_2 = _____ ^oC. [1 mark]

iii) Determine the weight W_3 of the prism in hot water. [1 mark]

l) Determine the constant k for the water given that [2 marks]

$$K = \frac{(W_1 - W_2) - (W_1 - W_3)}{(W_1 - W_3)(T_2 - T_1)}$$

MINISTRY OF EDUCATION (KNEC COMPLIANT)

Name ..... Index No. .....

Adm. No. ..... Candidate's Signature.....

PHYSICS

Paper 1

(THEORY)

CLASS OF KCSE 2023

2 hours

THE COASTAL & EASTERN REGION KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

INSTRUCTIONS

Write your name and admission number in the space provided

Sign and write the date of the examination in the space provided above

This paper consists of two sections A and B.

Answer all the questions in the spaces provided.

All workings must be clearly shown.

Mathematical tables and silent electronic calculators may be used.

For examiner's use only

SECTION	QUESTION	TOTAL MARKS	CANDIDATE'S SCORE
A	1-13	25	
B	14	14	
	15	10	
	16	11	
	17	10	
	18	10	
		GRAND TOTAL	80 MARKS

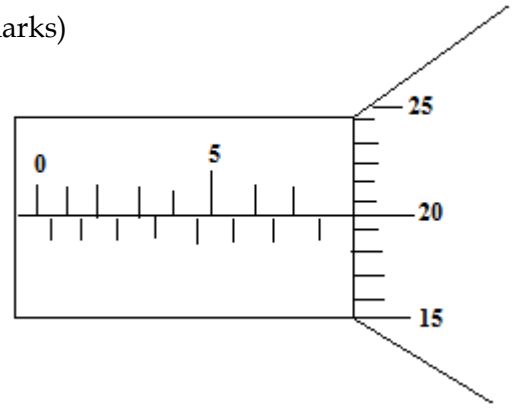
TOTAL CANDIDATE'S SCORE

Section A ☐ + section B ☐ = ☐

This paper consists of 10printed pages

SECTION A (25 MARKS)

1. The figure below shows a micrometer screw gauge. What is the reading shown on the figure. (2 marks)



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2. State pressure law.

(1 mark)

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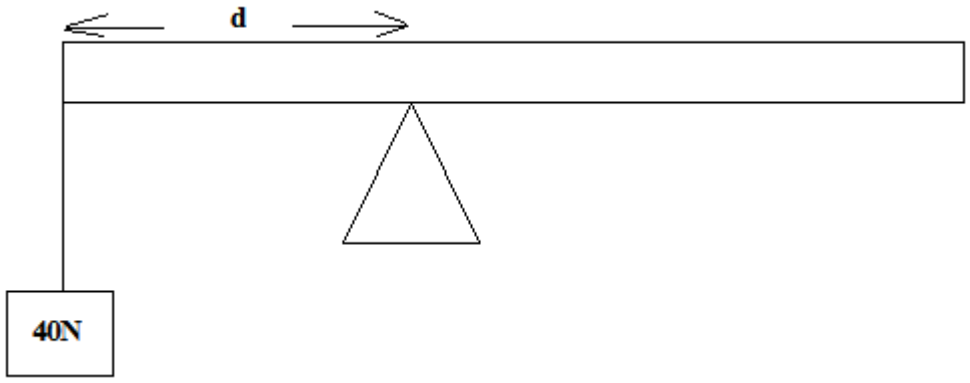
3. State two factors that affect stability of a body.

(2 marks)

i)

ii)

4. The diagram below shows a uniform wooden plank of length 4m and weight 10N. The plank is held at equilibrium by a weight of 40N placed at one end as shown below.



Determine the distance d.

(3 marks)

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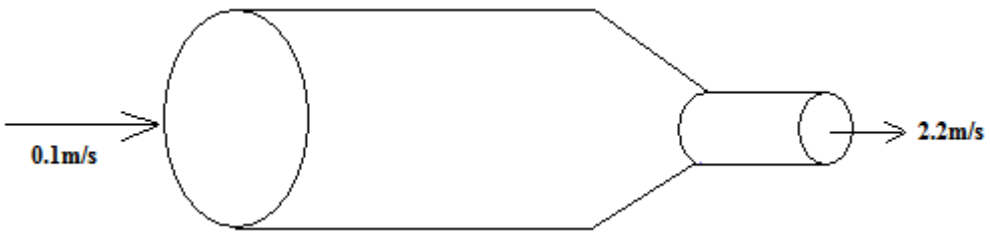
5. Figure below shows a non-viscous fluid that is not compressible moving through a pipe of varied cross-sectional area.



If the area of the narrow region is $0.05m^2$, calculate diameter of the wider region.
(3 marks)

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6. State one use of thermal expansion.
(1 mark)

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7. State two factors that affect melting point of a substance.
(2 marks)

i)

ii)

8. A body is projected vertically upwards from the top of a building. If it lands on the base of the building. Sketch the velocity-time graph for motion.
(2 marks)

9. State a reason why transfer by radiation is faster than by conduction.
(1 mark)

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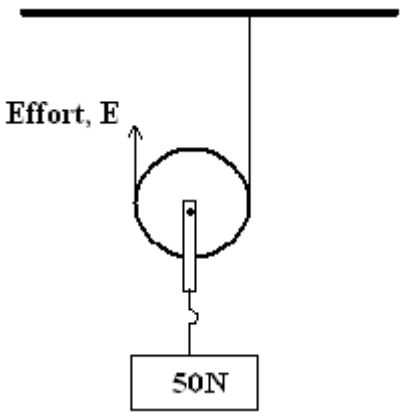
10. The pulley system in the figure below supports a load of 50N.



Given that the efficiency of the system is 80% calculate the effort, E.
(3 marks)

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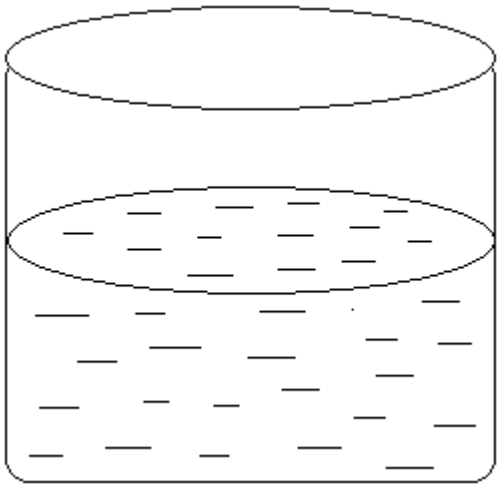
11. The figure below shows a glass container with cross-section area of $50cm^2$.



When a wooden block of mass 120g is immersed into the water it floats while fully submerged and the water level rises by 4cm, determine the density of the water.
(3 marks)

12. Define the term momentum.
(1 mark)

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13. What is a pitch of a screw.
(1 mark)

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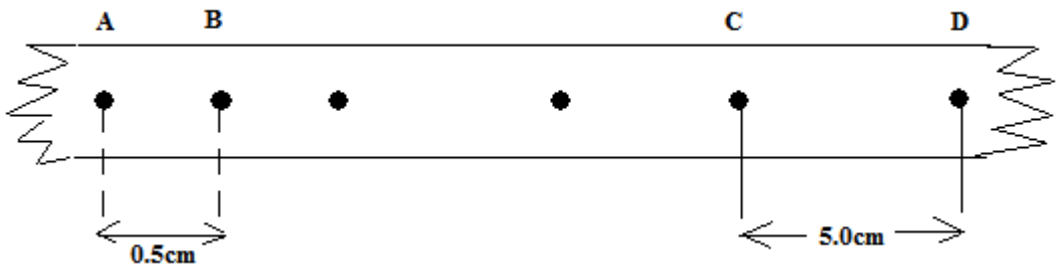
SECTION B

14. The figure below shows the motion of a trolley on ticker timer. The ticker has a frequency of 100Hz.



a) i) Calculate the initial velocity between A and B.
(3 marks)

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ii) Calculate the final velocity between C and D.
(3 marks)

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iii) Calculate the acceleration of the trolley during the motion.
(3 marks)

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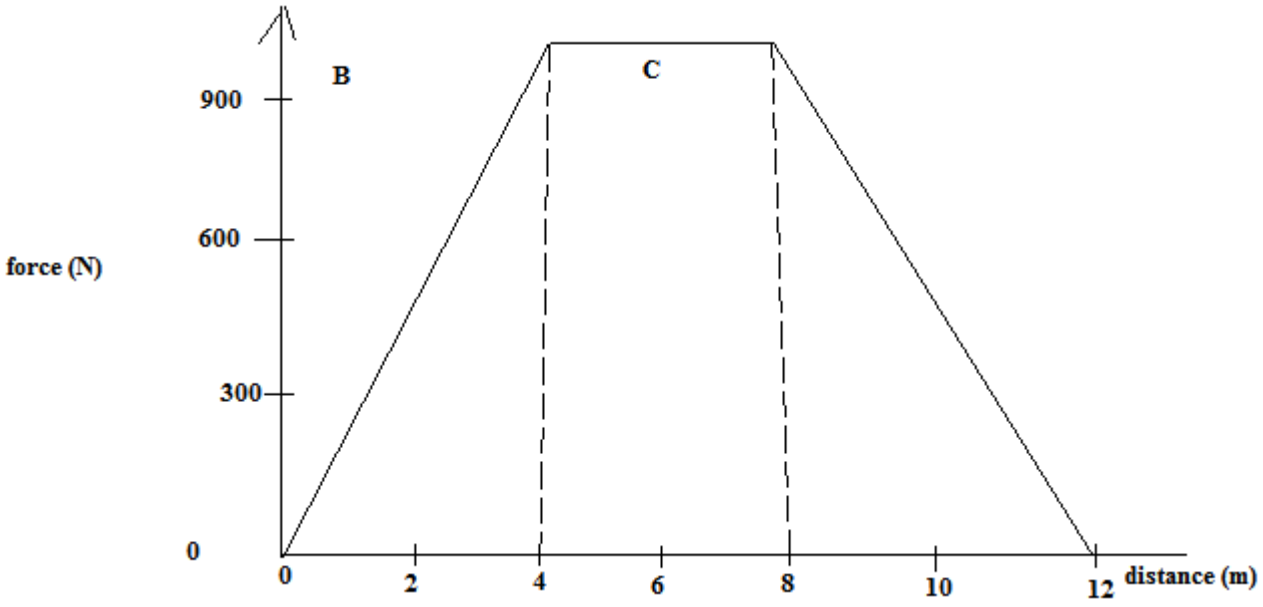
b) Figure below shows a force-distance graph for a car being towed on a level ground.



i) Calculate the total work done.
(3 marks)

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ii) If the velocity just before reaching point C is 0.6m/s. Calculate the power developed by the engine

at this point.
(2 marks)

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15. a) A metal ball of mass 100g is dipped into boiling water at 100^0C and then placed in a calorimeter containing 80g of water at 20^0C. After stirring, the temperature of the mixture stabilizes at 23.4^0C. Ignoring the heat gained by the calorimeter, determine the specific heat capacity of the metal. (Specific heat capacity of water = 4200j/Kg K).
(4 marks)

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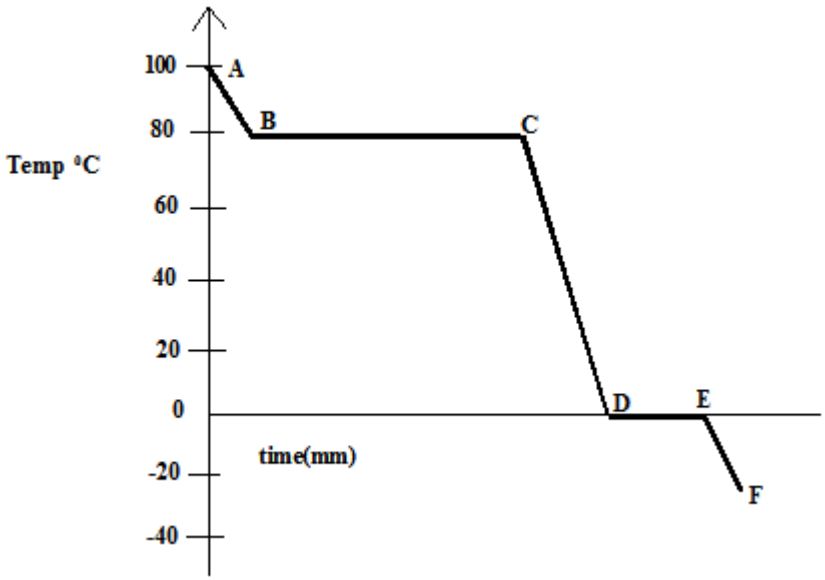
b) The cooling curve below is for a pure substance.



i) What is the melting point of the substance.
(1 mark)

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ii) State two factors that affect boiling point of a substance.

i)

ii)

iii) At what part of the curve is the substance.

Solid only?

Liquid only?

Solid and Liquid? (3 marks)

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

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b) The legal speed limit on motorways is approximately 30m/s. In an incident on a motorway, a car of mass 900kg leaves a skid mark 75m long when stopping. The maximum deceleration of the car when skidding is approximately $10m/s^2$.

i) Show that before the incidence, the car must have been travelling above the legal speed limit. (3 marks)

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ii) Calculate for this skid, the maximum average braking force between each of the four tyres and the road.
(3 marks)

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iii) When the motorway is wet, the braking force provided by each wheel is reduced to 50% of the calculated in (ii) above. What is the effect of this reduced breaking force on stopping distance, explain your answer. Assume that the speed of the car before breaking is the same in both cases. (2 marks)

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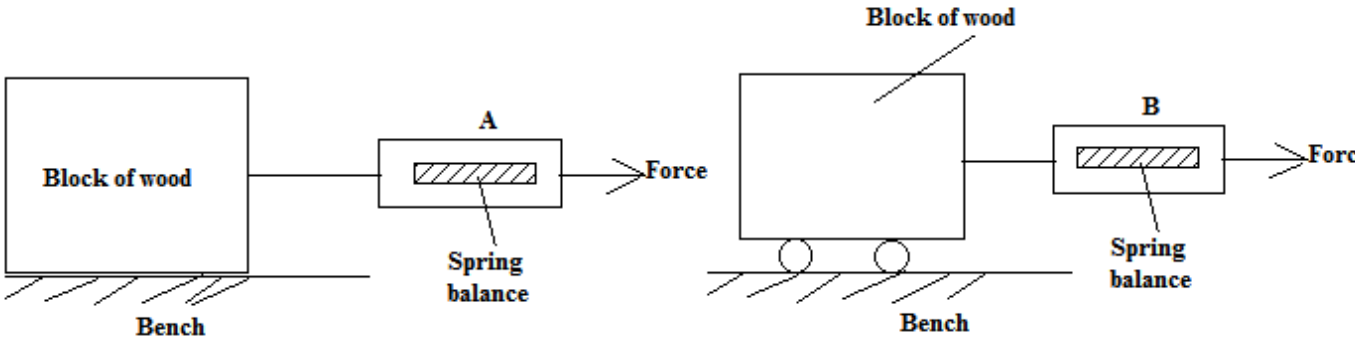
c) A student carried out an experiment to measure static friction using identical wooden blocks arranged as shown in the figure.



State and explain which spring balance will indicate a smaller reading when the block just starts to move. (2 marks)

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17. a) Give a reason why people experience nose bleeding when they climb tall mountains. (1 mark)

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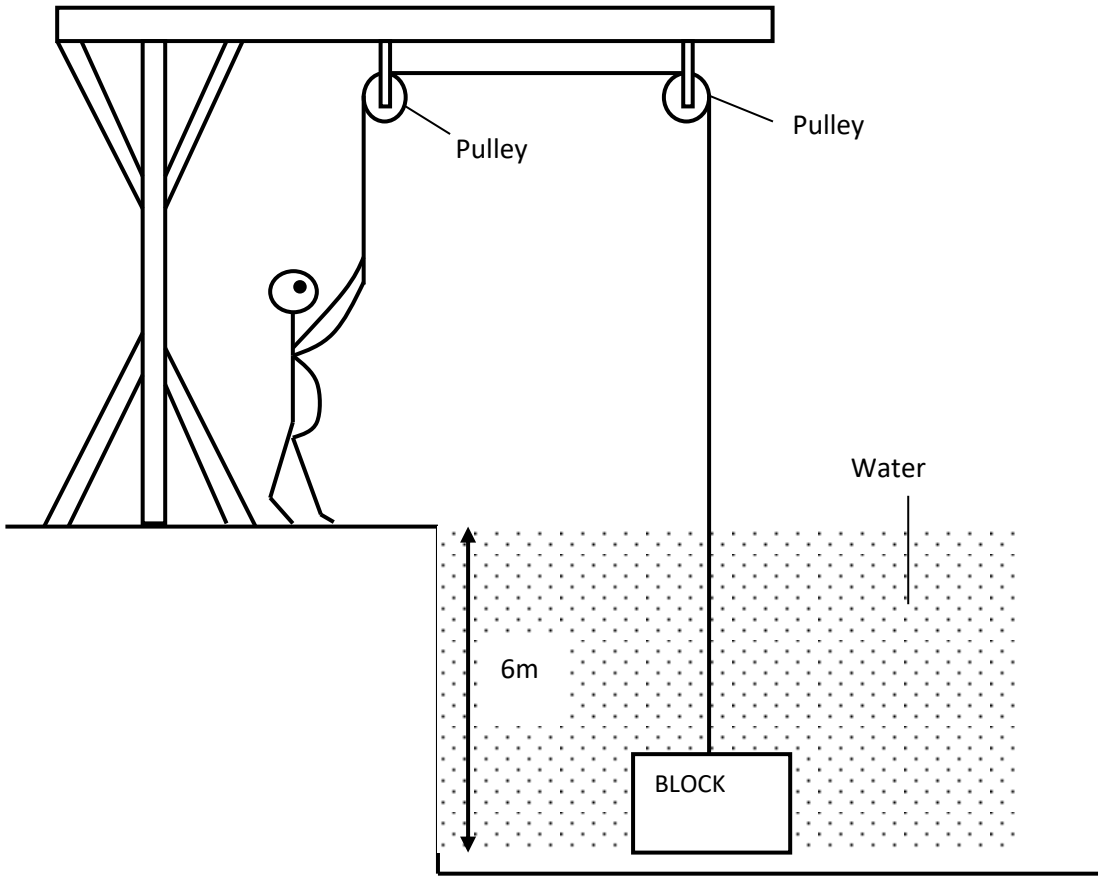
b) The diagram shows a person raising a concrete block from a river bed by using two pulleys.

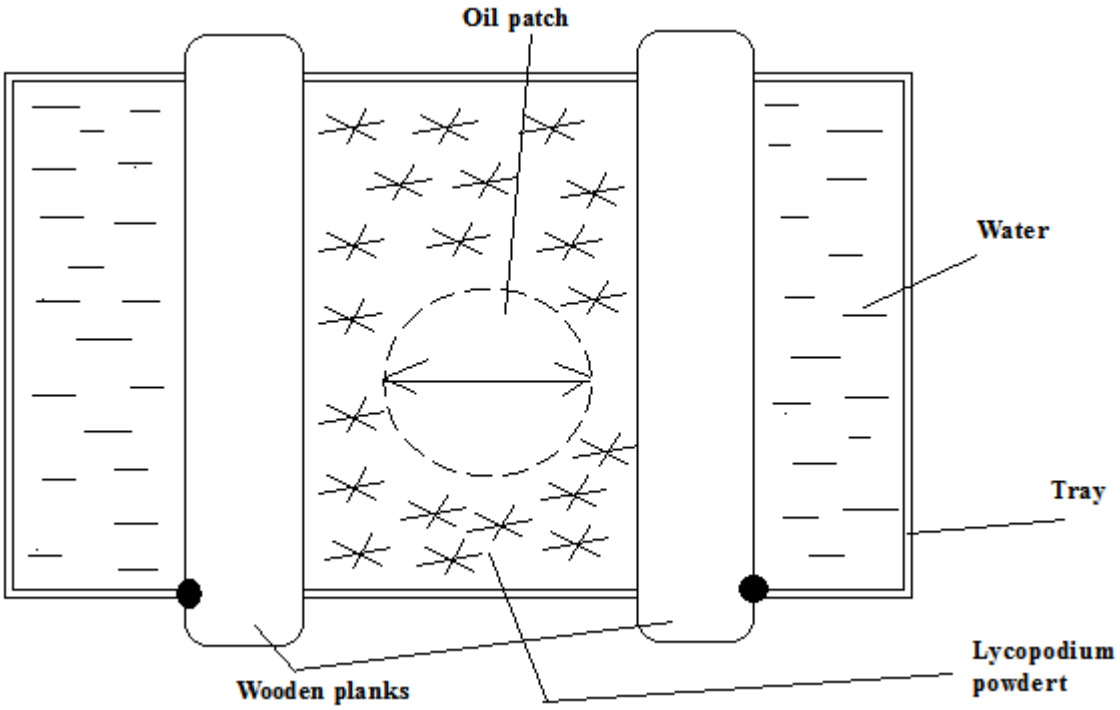


As shown in the diagram, the top of the block is 6.0m below the water surface. The density of water is 1000kg/m^3 and the acceleration of free fall is 10m/s^2. Calculate the water pressure acting on the top of the block.
(3 marks)

c) The block is raised through water. At one part, the water pressure acting on the top of the block 4.5 x 10^4 pa. The area of the top of the block is 0.015m^2. Calculate the downward force exerted by the water on top of the block
(3 marks)

d) When the block is clear of the water, it is raised a further 4.0m. The weight of the block is 550N. Calculate the work on the block as it is raised the 4.0m through air.
(3 marks)

18. The figure below shows part of an experiment set up to estimate the diameter of an oil molecule.



i) Describe how the oil patch is formed. (2 marks)

ii) What is the role of the Lycopodiumpowder. (1 mark)

c) An oil drop of average diameter 0.7mm spreads out into a roughly circular patch of diameter 73.5cm on the surface of water in a trough.

i) Calculate volume of the drop in mm^3. Take ($\pi = {}^{22}/_{7}$) (3 marks)

ii) Calculate the area of the patch in mm^3. (2 marks)

ii) Calculate the thickness of the oil molecule and express your answer in standard form. (2 marks)

MINISTRY OF EDUCATION (KNEC COMPLIANT)

Name ..... Index No. .....

Adm. No. ..... Candidate's Signature.....

PHYSICS

Paper 2

(THEORY)

CLASS OF KCSE 2023

2 hours

THE COASTAL & EASTERN REGION KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

Instructions to candidates

- This paper consists of two sections A and B.
- Answer **all** the questions in the two sections in the spaces provided after each question
- All working must be clearly shown.
- Electronic calculators, mathematical tables may be used.
- All numerical answers should be expressed in the decimal notations.
- This paper consists of 14 printed pages and check to ensure all the pages are there.

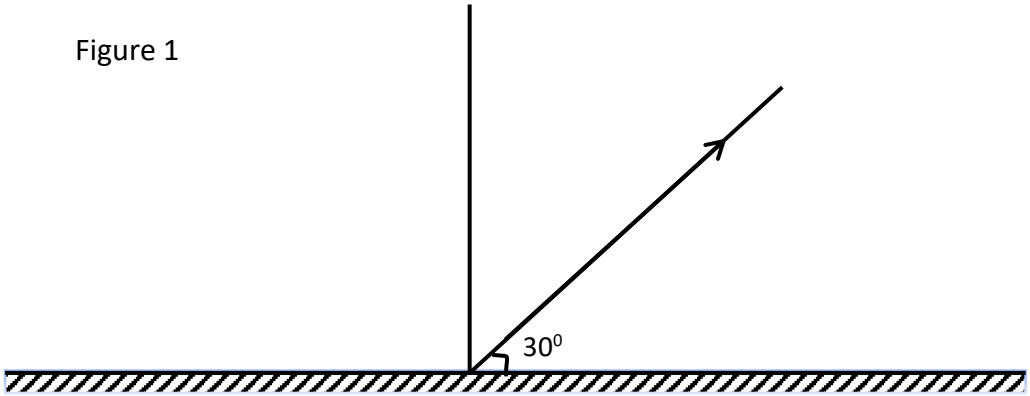
SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A	1 – 11	25	
B	12	10	
	13	13	
	14	11	
	15	11	
	16	10	
TOTAL		80	

SECTION A (25 MARKS)

Answer all the questions in the space provided

1. **Figure 1** below shows a ray of light reflected from a mirror.

Figure 1



Complete the ray diagram and find the new angle of reflection after it is rotated 10^0 anticlockwise with the incident ray fixed.
(2marks)

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2. Three electric bulbs are connected in series with a battery of two dry cells and a switch. At first the bulbs light brightly.
   (a) State a reason why they gradually light dim.
   (2marks)

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   (b) The switch is put off for sometimes. Explain why the bulbs again shine brightly.
   (1mark)

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3. A positively charged rod is brought near the cap of a lightly charged electroscope. The leaf first collapses and as the rod comes nearer, the leaf diverges.
   (i) What is the charge on the electroscope? (1mark)

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   (ii) Explain the behavior of the leaf.
   (2marks)

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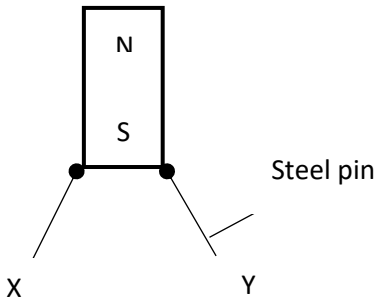
4. Figure 2 below shows a bar magnet attracting steel pin as shown

Figure 2



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.
(2marks)

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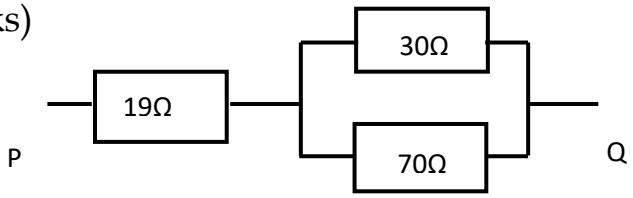
5. Determine the equivalent resistance between P and Q for the following resistors shown in Figure 3. (2marks)

Figure 3



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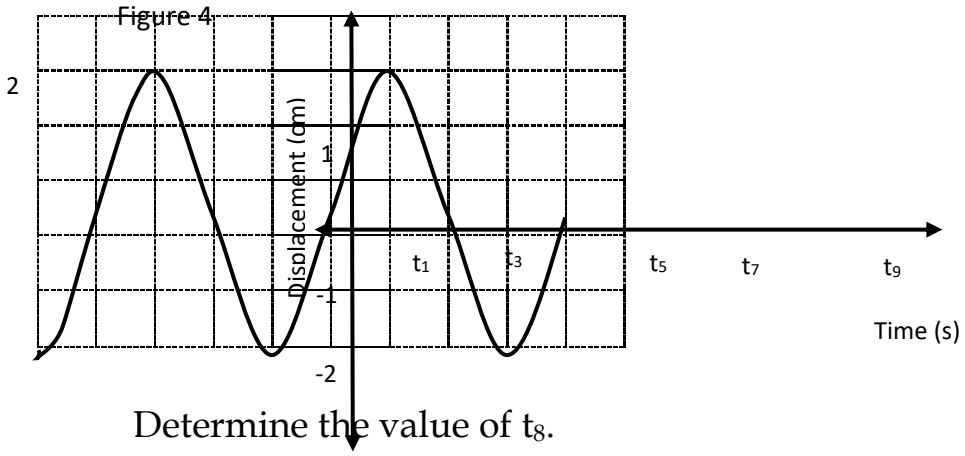
6. Figure 4 below shows a wave profile for a wave whose frequency is 5Hz.

Figure 4



Determine the value of t_8. (2marks)

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7. An electromagnetic radiation whose wavelength is greater than that of microwaves has a wavelength of 306.1224 m. Take speed of light in air, c = 3 x10^8 m/s.

(a) Identify the radiation.
(1mark)

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(b) Calculate its frequency. (2marks)

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8. Two heating coils A and B connected in parallel in a circuit produces power of 36W and 54W respectively. What is the ratio of their resistance?(2marks)

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9. State **two** conditions necessary for total internal reflection to occur.

   (2marks)

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10. Define coherent source of a wave.
    (1mark)

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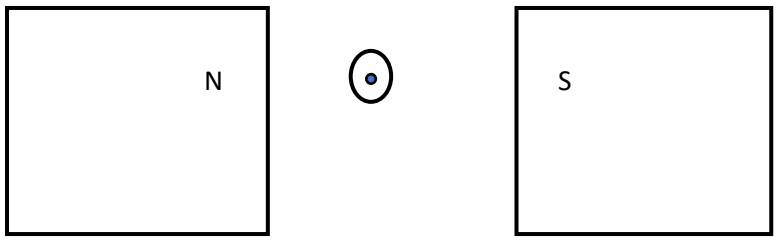
11. Figure 5 below show a conductor carrying electric current place between two magnetic poles.

Figure 5



Complete the diagram by sketching the magnetic field and also show the direction of the force on the conductor. (3 marks)

Section B (55 marks)

Answer ALL the questions in the spaces provided

12. (a) State **one** factor that affects the force between two charged bodies. (1mark)

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(b) To investigate charge distribution on metallic surfaces, electric charges were collected from different parts of the surfaces using a proof plane as shown in figure 6 below:

Figure 6

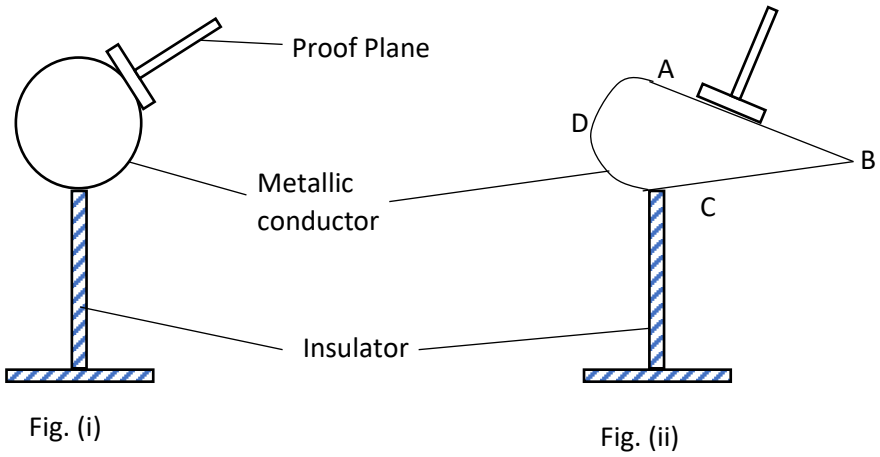

Fig. (i) Fig. (ii)

The proof plane was then placed on the cap of a neutral electroscope.

(i) State and explain the leave divergence of the electroscope as the proof plane is placed at various points round the spherical surface in figure (i) above. (2marks)

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(ii) State with reason which part of the conductor in figure (ii) gave the greatest deflection of the electroscope.
(2marks)

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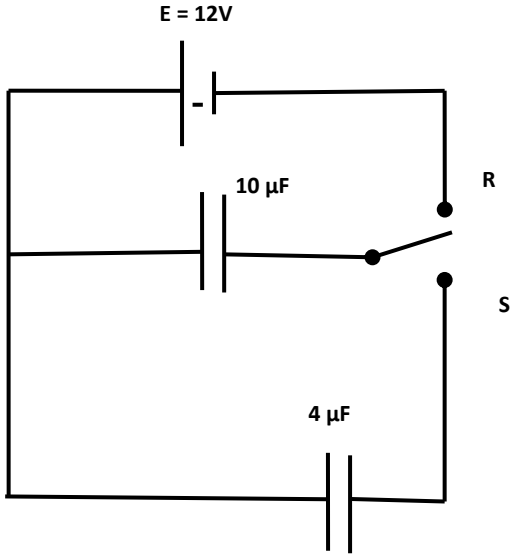
(c) Figure 7 shows a 10μF capacitor being charged from a 12V battery by connecting the switch terminal on R. The switch is then connected to S to discharge the 4μF capacitor.

Figure 7



Determine the resultant potential difference between the two capacitors. (3marks)

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(c) State two uses of capacitors. (2marks)

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13.(a) State Faradays law of electromagnetic induction. (1mark)

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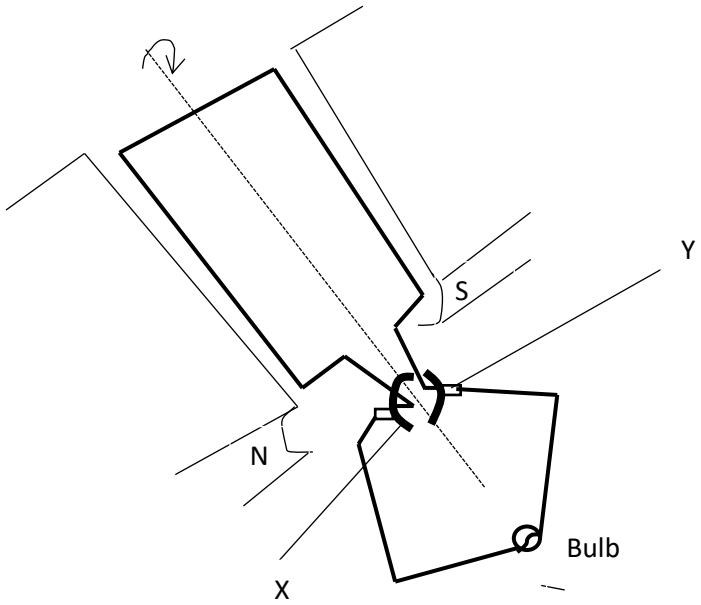
(b) Figure 8 below shows a simplified circuit of a generator.

Figure 8



(i) Identify parts X and Y. (2marks)

X: ……

Y: ……

(ii) State **two** ways of making the bulb light brighter. (2marks)

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(c) An a.c generator produces an e.m.f of 50.0V which is used to operate a circuit that requires a minimum of 250.0V. If the power of the generator is 200W, determine the:

(i) Current generated by the a.c source. (2marks)

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(ii) Current supplied to the circuit by the transformer assuming 100% efficiency. (2marks)

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(iii) Ratio of turns in the coils of the transformer, primary: secondary. (2marks)

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(d)Explain how power loses in a transformer are minimized. (2marks)

(i) Eddy currents

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(ii) Hysteresis losses

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14.(a) A disc of a siren with 100 holes is rotated at constant speed making 0.5 revolutions per second. If air is blown towards the holes, calculate:

(i) The frequency of the sound produced. (2marks)

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(ii) The wavelength of the sound produced, if the velocity of sound is 340 m/s. (2marks)

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(b) A ship sends out an ultrasound whose echo is received after 5 seconds. If the wavelength of the ultrasound in water is 0.05 m and the frequency of the transmitter is 50 KHz, calculate the depth of the ocean. (3marks)

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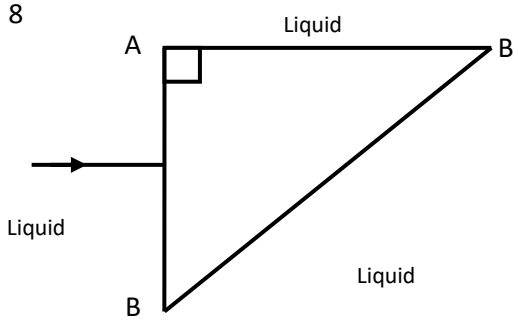
(c) A ray of light is incident at right angles to the face AB, of a right angled isosceles prism of refractive index 1.6 as shown in Figure 8 below.

Figure 8



If the prism is surrounded by a liquid of refractive index 1.40, determine:

(i) The angle of incidence on the face BC. (1mark)

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(ii) The angle of refraction on the face BC. (3marks)

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15.(a) Distinguish between principal focus and focal length of a concave lens. (1mark)

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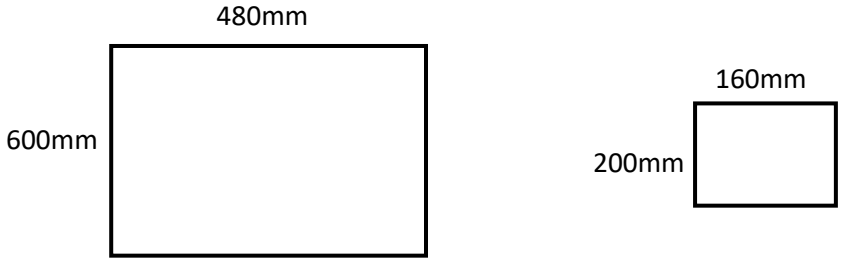
(b) Figure 9 below shows sketches of a window frame and its image formed on a screen by a convex lens.

Figure 9



(i) State the nature of the image formed. (2marks)

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(ii) Calculate the linear magnification of the imaged formed. (2marks)

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(iii) The imaged of the frame was produced 500mm from the lens. Calculate the focal length of the lens. (3 marks)

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(c) A student finds that at a distance of 25 cm, the words in a book looked blurred.

(i) What eye defect does the student suffering from? (1mark)

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(ii) In which direction does he/she move the book to be able to see the words clearly from the distance?
(1mark)

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……
……

(iii) Which lens can be used to correct the eye defect?
(1mark)

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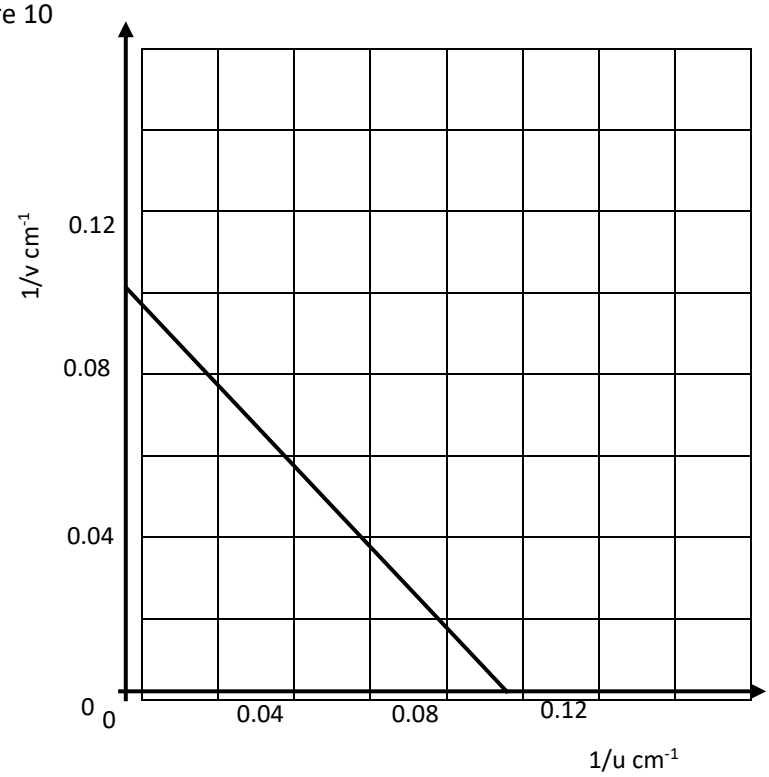
16.(a) (i) Figure 10 shows a graph of 1/v against 1/u for a concave mirror. Use your graph to determine the focal length of the mirror. (2marks)

Figure 10



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(ii) Determine the image distance when the magnification is m = 2 for the concave mirror above. (3 marks)

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(b) State **one** application of each of the following

(i) Convex mirror. (1mark)

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……

(ii) Parabolic mirror. (1mark)

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(c) A small object is placed 15 cm in front of a convex mirror of focal length 10 cm. Determine the position of the image.
(3marks)

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MINISTRY OF EDUCATION (KNEC COMPLIANT)

PHYSICS

Paper 3

(PRACTICAL)

CLASS OF KCSE 2023

2 hours

THE COASTAL & EASTERN REGION KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

CONFIDENTIAL

Question 1.

- 2 dry cells
- Voltmeter
- Switch
- Ammeter
- Resistance wire(S.W.G 28) mounted on a mm scale
- Six connecting wires
- Convex lens (f=10cm) and lens holder
- A candle
- White screen
- A metre rule

Question 2

- Metre rule
- Knife edge
- One 50g mass and a 100g mass
- Three pieces of thread about 50cm
- Some water in 100ml beaker
- Paraffin(liquid L) in 100ml beaker
- Tissue paper
- Rectangular glass block(n=1.5)
- Four optical pins
- A piece of soft board
- A plain sheet of paper
- 4 thumb pins

MINISTRY OF EDUCATION (KNEC COMPLIANT)

Name ..... Index No. .....

Adm. No. ..... Candidate's Signature.....

PHYSICS

Paper 3

(THEORY)

CLASS OF KCSE 2023

2 hours 30 minutes

THE COASTAL & EASTERN REGION KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

Instructions to candidates

- ✓ *Answer All the questions in the spaces provided in the questions paper.*
- ✓ *You are supposed to spend the first 15 minutes of the 2½ hours allowed for this paper reading the whole paper carefully before commencing your work.*
- ✓ *Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use of them.*
- ✓ *Non-programmable silent electronic calculators and KNEC mathematical tables may be used.*

For examiners use only

Questions 1	
Question 2	
Grand total	

Question 1

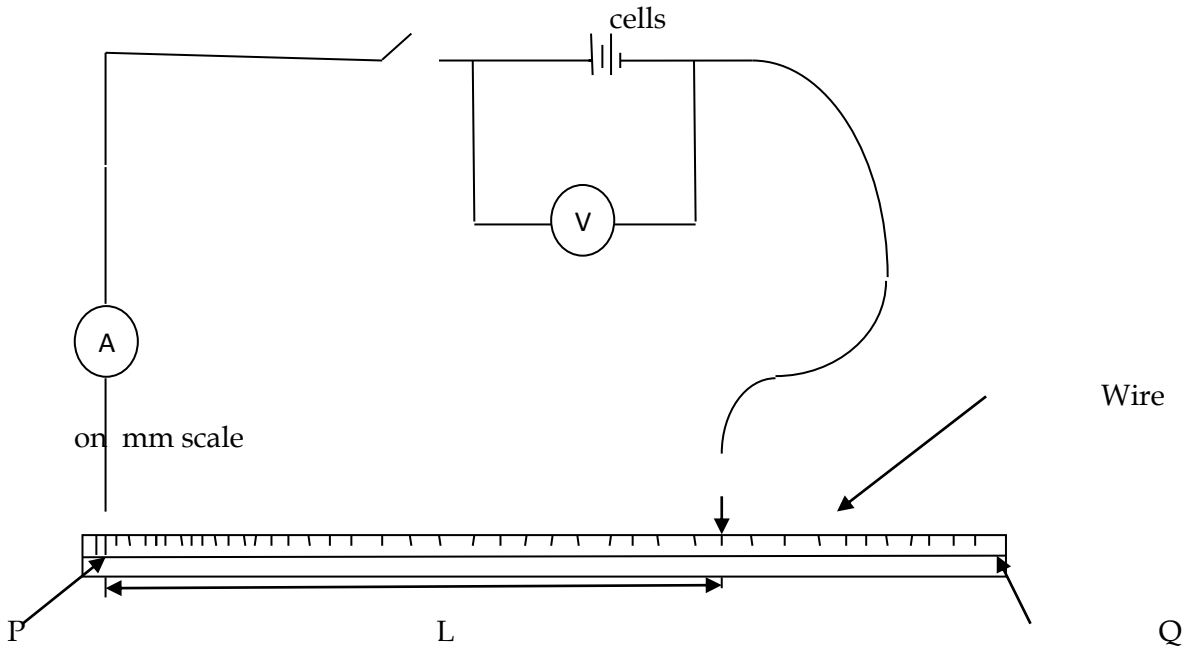
PART A

You are provided with the following.

- A resistance wire PQ mounted on a mm scale
- An ammeter
- A voltmeter
- A switch
- Two new dry cells and cell holder
- Seven connecting wires at least two with crocodile clips

Proceed as follows:

(a) Set up the circuit as shown in figure 1 below.



(b) Open the switch and record the voltmeter readings

E=.....volts
(1mk)

(c) (i) Starting with L =70cm, read and record the readings of voltmeter in table 1 provided.

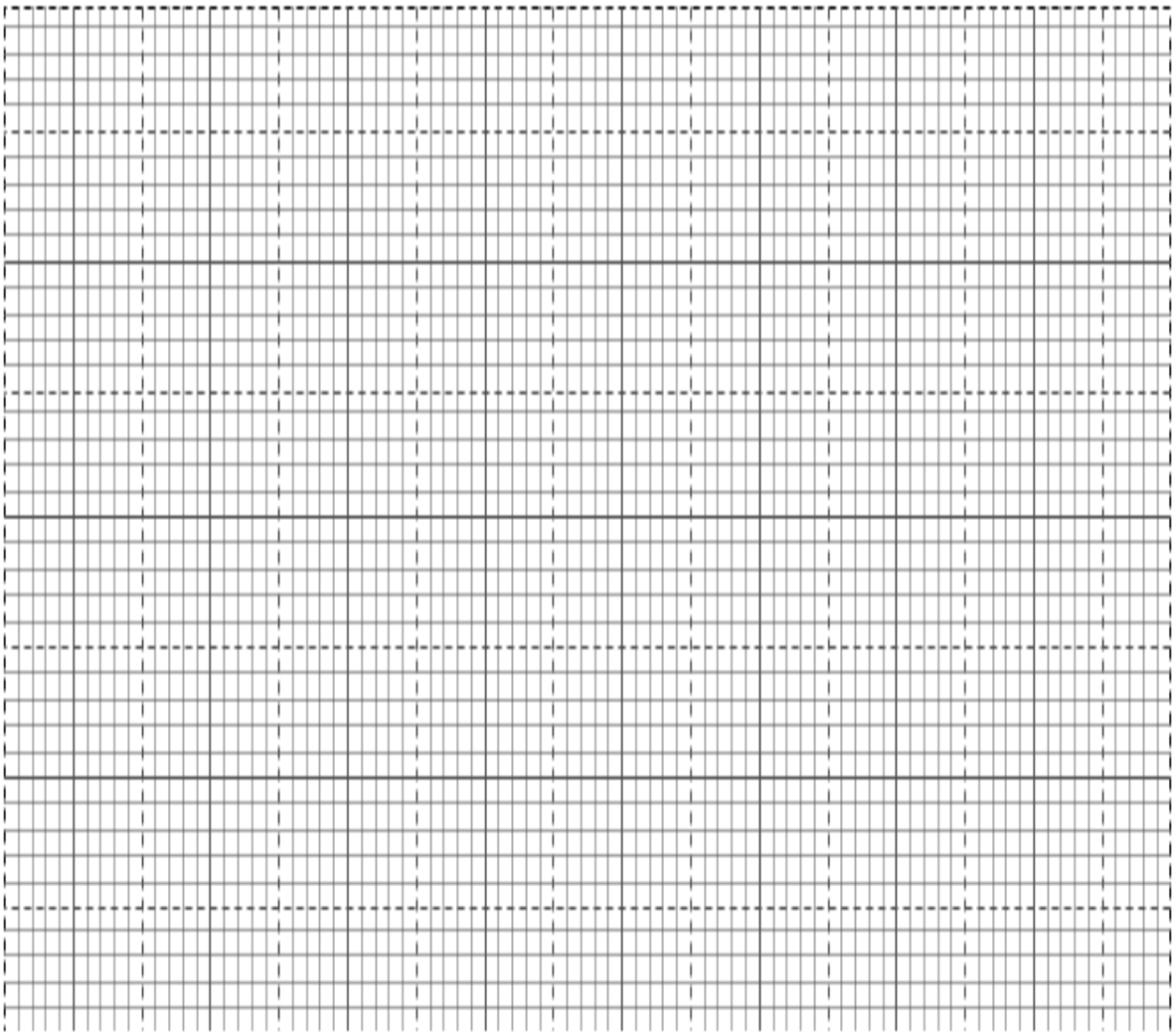
Table 1

Length L (cm)	70	50	40	30	20	10
Current I(A)						

P.d V(volts)						

(ii) Repeat step c (i) above for other values of L given in the table 1 above
(5marks)

(d) Plot a graph of p.d (y-axis) against I
(5marks)



(e) Given that the graph is govern by the equation E=V+Ir,determine
(i) The e.m.f of the two cells in series
(2marks)

(ii) The internal resistance of the two cells
(2marks)

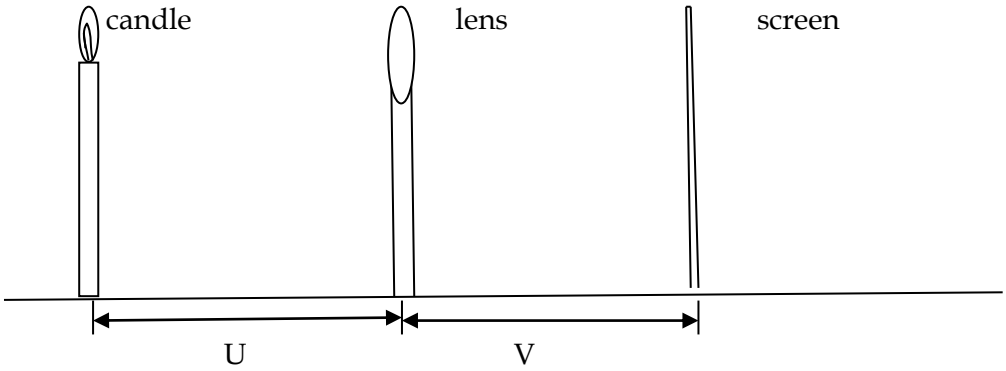
PART B

You are provided with the following

- A lens and lens holder
- A candle
- A screen
- A metre rule

Proceed as follows:

Set up the apparatus as shown in figure 2



(f) Starting with U =30cm,adjust the position of the screen to obtain a sharp image of the candle. Record the value of V in table 2

(g) Repeat the procedure in (f) for U=40cm.Complete the table.
(2marks)

U(cm)	V(cm)	m=V/U
30		
40		

Table 2 tfbvg

(h) Given that the focal length of the lens satisfies the equation $f = \frac{V}{1+m}$ determine the average value of focal length f.

(3marks)

Question 2

PART A

You are provided with the following :

- A metre rule
- A knife edge
- One 50g mass and a 100g mass
- Some thread
- Liquid L in a beaker
- Tissue paper

Proceed as follows:

(a) Balance the metre rule on the knife edge and record the reading at this point

Balance point.....cm (1mk)

For the rest of this experiment the knife edge must be placed at this position

(b) Set up the apparatus as shown in the figure 1. Use the thread provided to hang the masses such that the positions of the support can be adjusted.

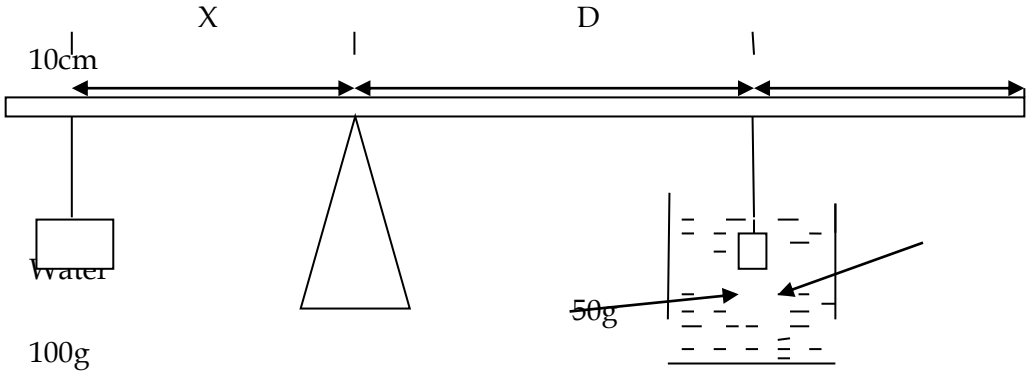


Figure 1

The balance is attained by adjusting the position of the 100g mass. Note that the distance X and D are measured from the knife edge and the 50g mass is fully immersed in water. Record the values of X and D

X=.....cm (1mark)

D=.....cm (1mark)

Apply the principle of moments to determine the weight W_1 of the 50g mass in water and hence determine the uphrust U_w in water

W_1 =..... (2marks)

U_w=..... (1mark)

Remove the 50g mass from water and dry it using tissue paper.

(c) (i) now balance the metre rule when the 50g mass is fully immersed in the liquid L. Record the value of distance X

X=.....(1mark)

(iii) Apply the principle of moments to determine the weight W_2 of the 50g mass in the liquid L and hence determine the uphrust U_L in the liquid.

W_2=..... (1mark)

U_L=..... (1mark)

(d) Determine the relative density R.D of the liquid L given that:

$$R.D = \frac{U_L}{U_L}$$ (1mark)

(e) Find the density of liquid X in kg/m^3.(given that density of water is 1000kg/m^3) (1mark)

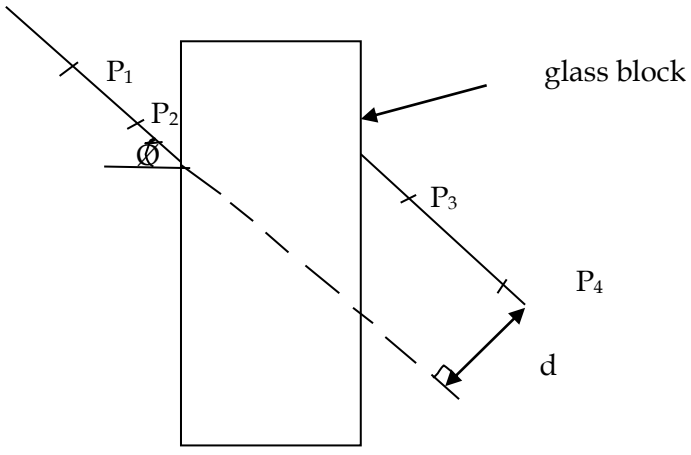
PART B

You are provided with the following

- A rectangular glass block
- Four optical pins
- A piece of soft board
- A plain sheet of paper
- 4 thumb pins

Proceed as follows

(f) Place the plain sheet of paper on the soft board and fix it using the thumb pins provided .
Place the glass block at the centre of the sheet, draw its outline. Remove the glass block .



(g) Draw a normal at a point 2cm from the end of the longer side of the block outline. This normal line will be used for the rest of the experiment. Draw a line at an angle of angle Ø=25^0 from the normal .Stick two pins p_1 and p_2 vertically on this line.

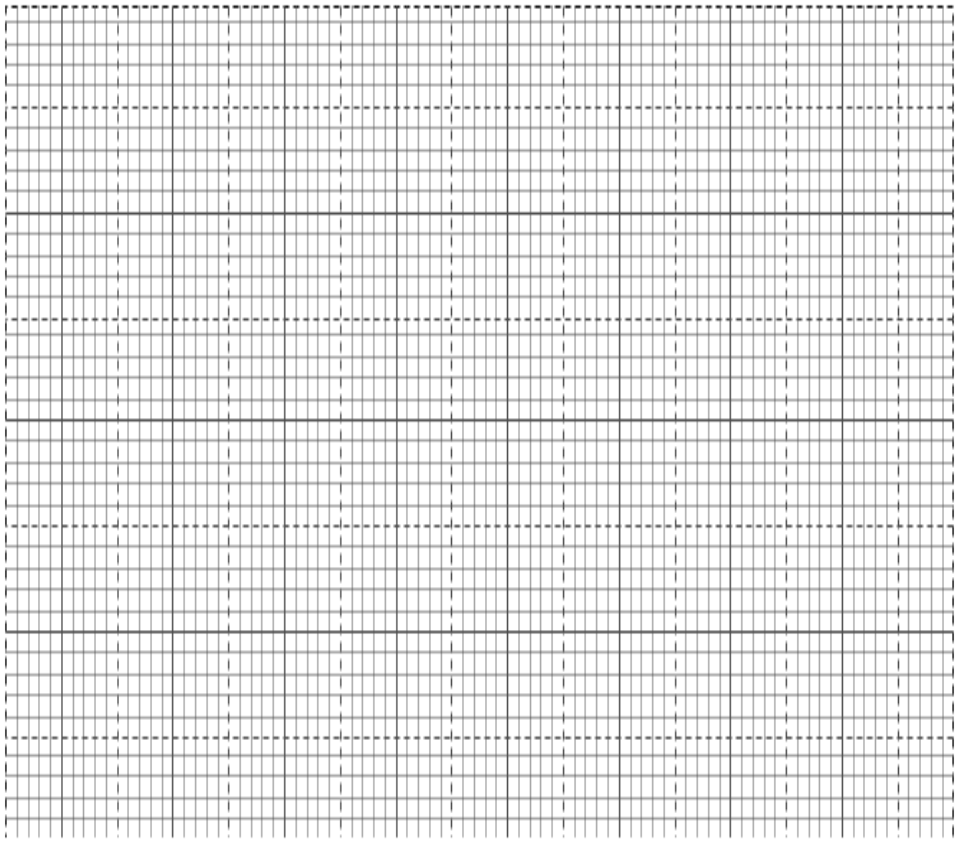
(h) By viewing through the glass from the opposite side, stick two other pins p_3 and p_4 vertically such that they are in line with the images of the first two pins. Draw a line through the marks made by p_3 and p_4 to touch the outline. Extend the line p_1p_2 through the outline (dotted line) .Measure and record in the table the perpendicular distance d between the extended line and the line p_3 and p_4 Record this value in the table.

(i) Repeat the procedure in (g) and (h) for other values of θ shown in the table.

θ (deg)	25	35	40	45	55	60	65
d(cm)							

(3marks)

(j) (i) plot a graph of d against θ
(5mark)



(ii) Use the graph to estimate the value of d when θ =0 (1mark)

MINISTRY OF EDUCATION (KNEC COMPLIANT)

Name ..... Index No. .....

Adm. No. ..... Candidate's Signature.....

PHYSICS

Paper 1

(THEORY)

CLASS OF KCSE 2023

2 hours

THE RIFT VALLEY & NORTH EASTERN REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

Instructions to candidates

- *This paper consists of two sections A and B.*
- *Answer all the questions in the two sections in the spaces provided after each question*
- *All working must be clearly shown.*
- *Electronic calculators, mathematical tables may be used.*
- *All numerical answers should be expressed in the decimal notations.*

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
I	1 – 12	25	
II	12	12	
	13	12	
	14	11	
	15	09	
	16	11	
TOTAL		80	

SECTION A (25 MARKS)

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

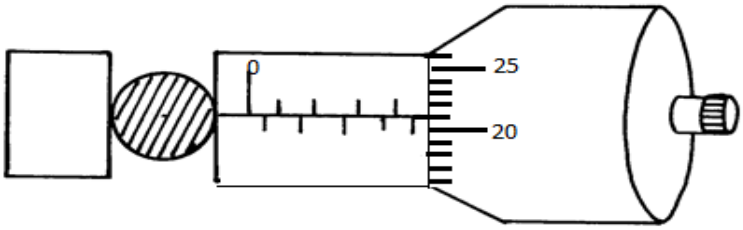


fig 1

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

……
……
……

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

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

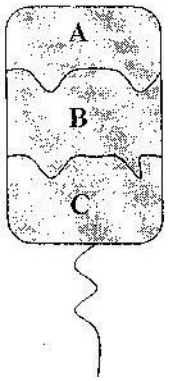

Fig 2

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

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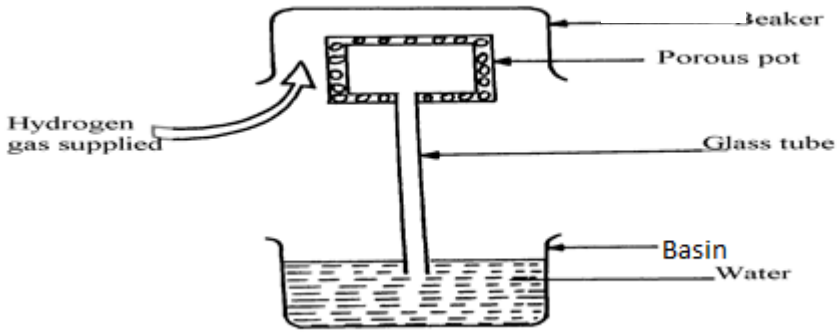
3. The **figure 3** below shows an arrangement to demonstrate diffusion through solids:-



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

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

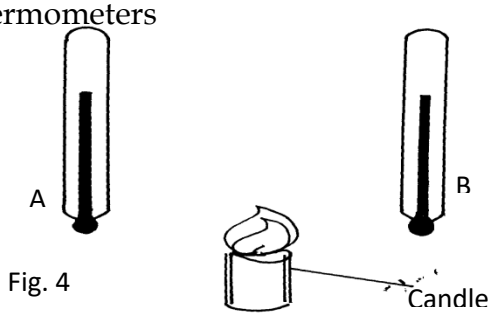

Fig. 4

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

……

……

……

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

……

……

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

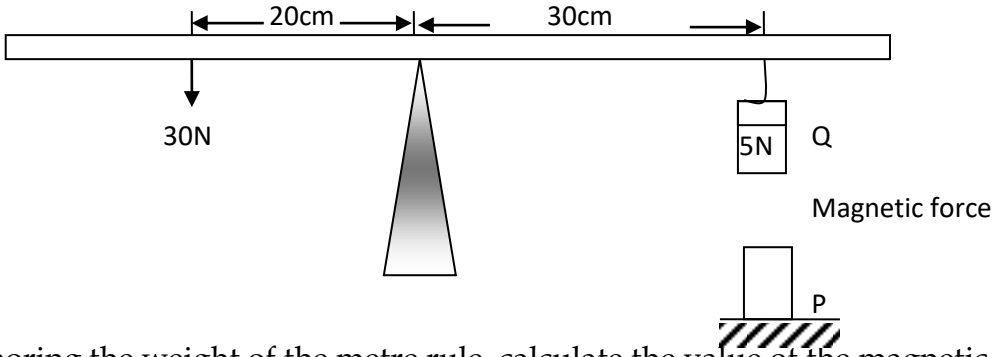

Fig 5

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

……

……

……

……

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

(1 mk)

……

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

……

……

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

……

……

8. The diagram below shows a mass of 12g hanged on a set of 6 identical springs.

When a mass of 12g was hanged on spring A alone, its extension was 5cm. Find the extension of the combination shown if each spring and each rod has negligible mass (2 mks)

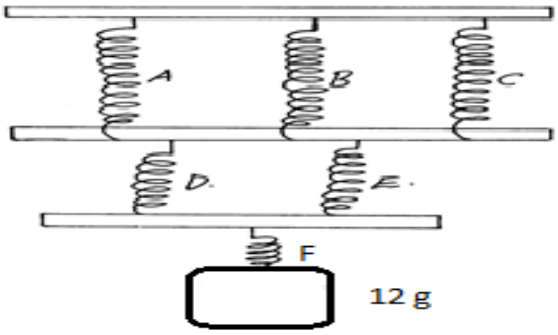

fig 6

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

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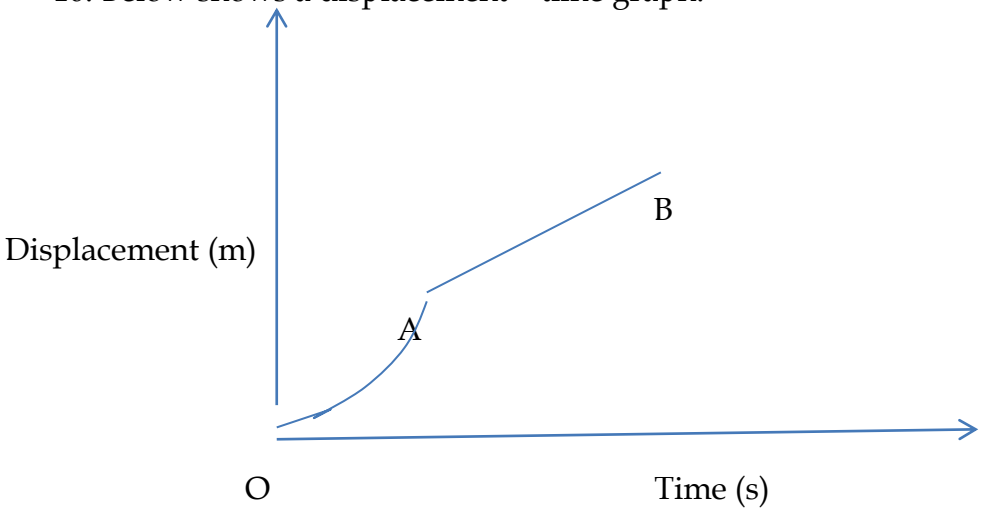
10. Below shows a displacement – time graph.



Describe the motion of the body between points:

OA…… (1 mk)

AB……..(1 mk)

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

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SECTION B (55 MARKS)

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

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

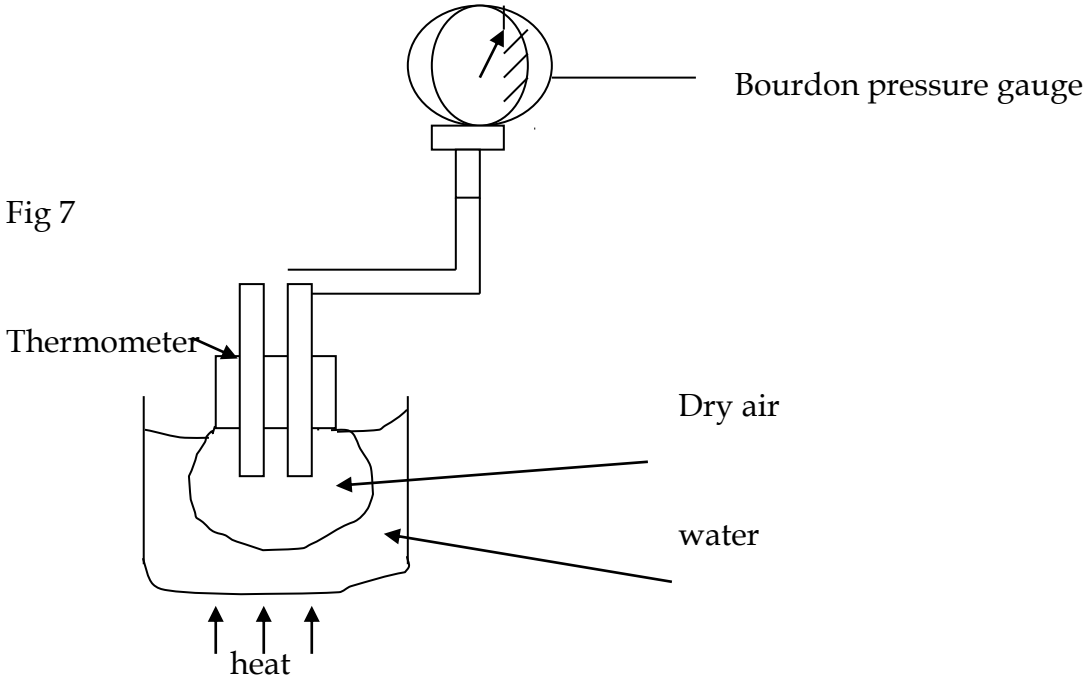


Fig 7

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

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

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

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

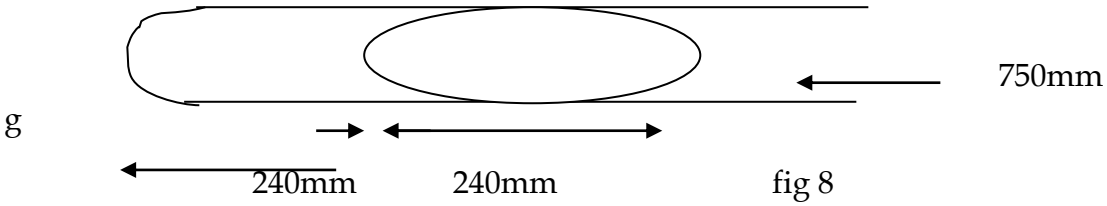


fig 8

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

(3 marks)

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

(i) Calculate the time taken before the objects meet

(3mks)

……

……

……

……

……

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

……

……

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

(i) The angular velocity (2mk)

……

……

……

(ii) The angular acceleration (2mks)

……

……

……

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

……

……

……

(iv) The linear velocity (1mk)

……

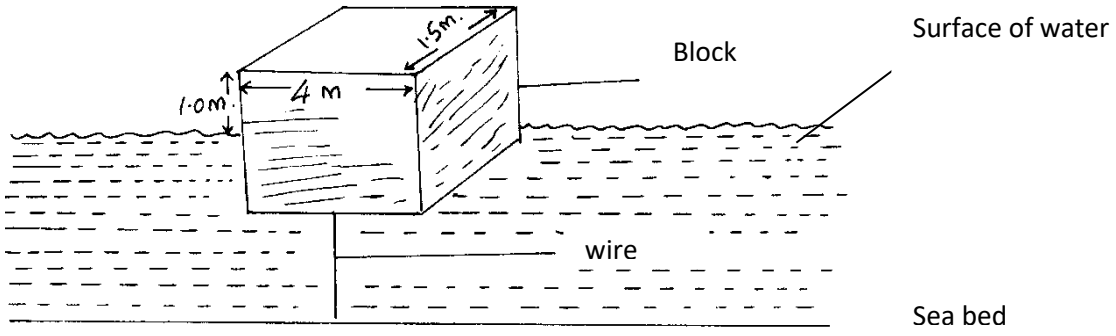
……

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

……

……

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



Calculate the :-

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

(3 mks)

……

……

……

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

……

(iii) Tension in the wire (2mks)

……

……

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

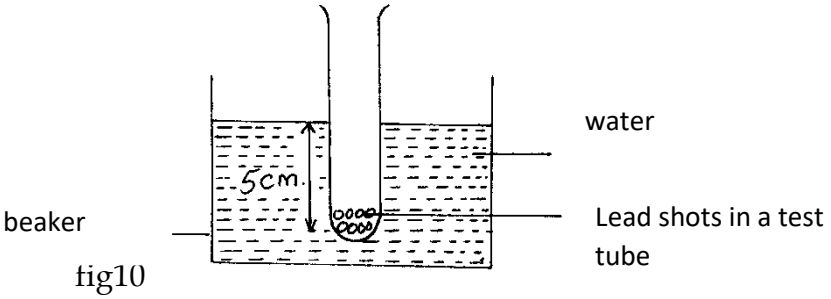


fig10

Find the:-

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

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……

……

……

(ii) Length of the test tube that would be submerged in a liquid of density $0.75g/cm^3$. (2mks)

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……

……

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

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

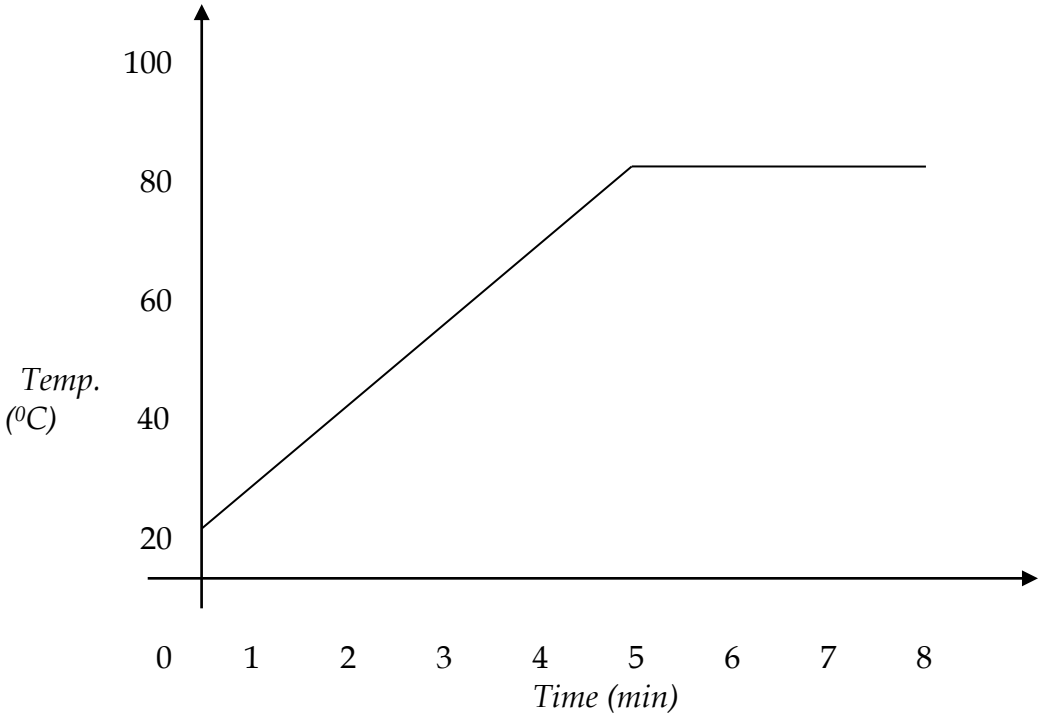

Fig. 4

Use the graph to answer the following questions:

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

……

……

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

……

……

……

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

(2 mks)

……

……

……

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

……

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

……

……

……

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

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……

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

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

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

……

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

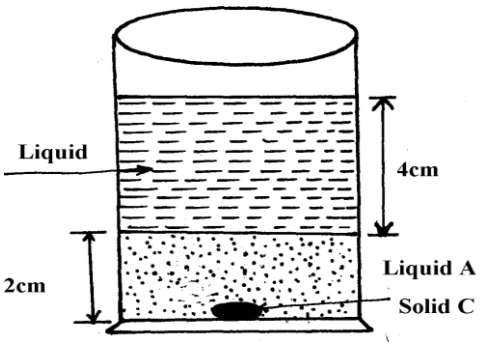

Figure 11

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

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**End **

MINISTRY OF EDUCATION (KNEC COMPLIANT)

Name ..... Index No. .....

Adm. No. ..... Candidate's Signature.....

PHYSICS

Paper 2

(THEORY)

CLASS OF KCSE 2023

2 hours

THE RIFT VALLEY & NORTH EASTERN REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

INSTRUCTIONS TO CANDIDATES.

1) Write your name and index number in the spaces provided above.
2) Sign and write the date of examination in the spaces provided above.
3) This paper consists of section A and B.
4) Answer **ALL** questions in section A and B.
5) All your workings must be clearly shown as must be awarded for correct working even if the answer is wrong.
6) Non programmable silent scientific calculators and KNEC mathematical tables may be used.

FOR EXAMINERS' USE ONLY.

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATES SCORE
A	1 - 12	25	
B	13	13	
	14	12	
	15	09	
	16	09	
	17	12	
		80	

This paper consists of 12 printed pages.

Candidates should check the question paper to ascertain that all pages are printed as indicated and no questions are missing

SECTION A (25MARKS)

Answer all the questions in this section

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

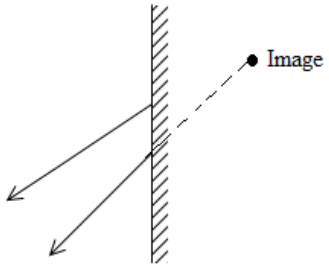

Fig 1.

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

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

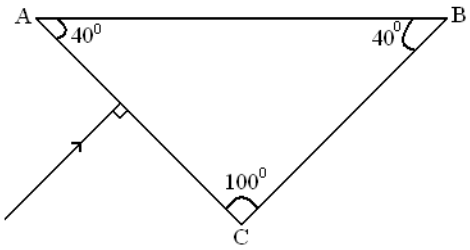

Fig2

Given that the critical angle for the grass is 39⁰, **sketch** on the diagram the path of the ray through the prism. (2 marks)

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

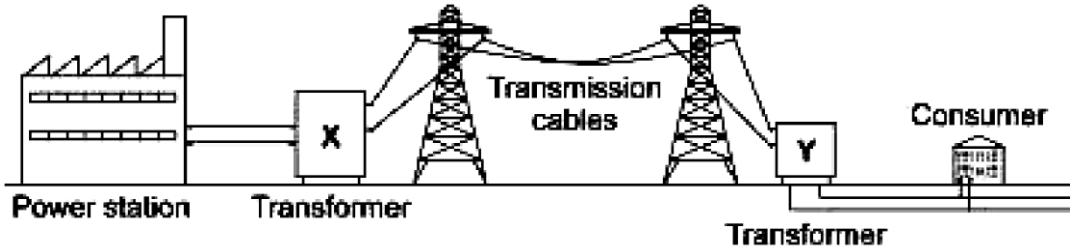

Fig3.

(a) What type of transformer is;

X…… (1mark)

Y…… (1mark)

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

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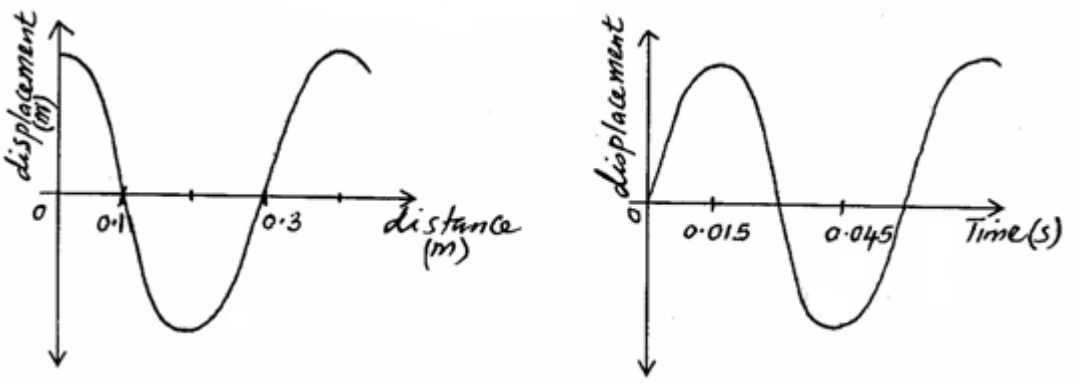
5. The figures**below** shows two waveforms representing the same wave motion.



Determine the velocity of the wave.
(3mks)

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

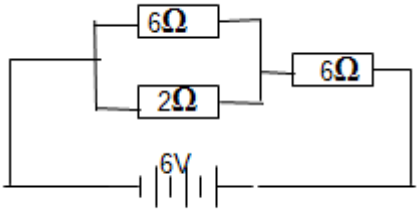


Fig 6.

7. The figure 7 below shows the electromagnetic spectrum.

dio waves	fra-red	A	ultraviolet	B	mma rays

Fig 7.

(a)Identify A (1 mark)

.....

(b)State one industrial use of B (1 mark)

……..

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

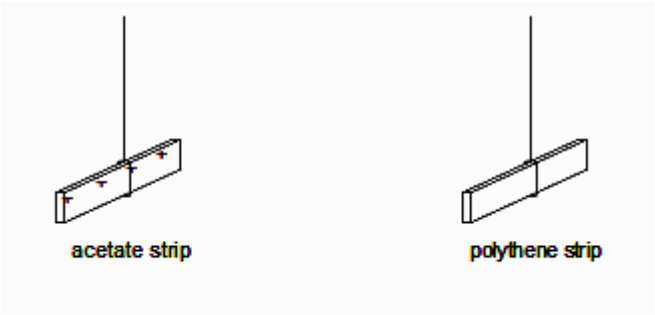


Fig8.

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

9. State **two** advantages of an alkaline accumulator over lead acid accumulator.
(2mks)
……
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10. Figure 9 below show a **concave** lens and object.

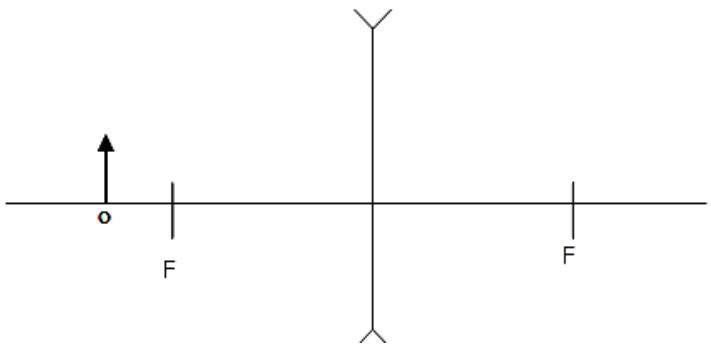

Fig 9.

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

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

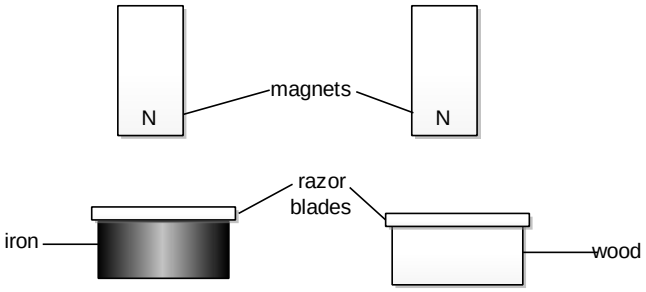

Fig 10.
It was observed that the razor blade on the wooden block is attracted by the magnet while that on the iron block was not. Explain.
(2 marks)
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12. The **figure 11** below shows water waves about to pass through a gap. One wave front is shown after it has passed through the gap.

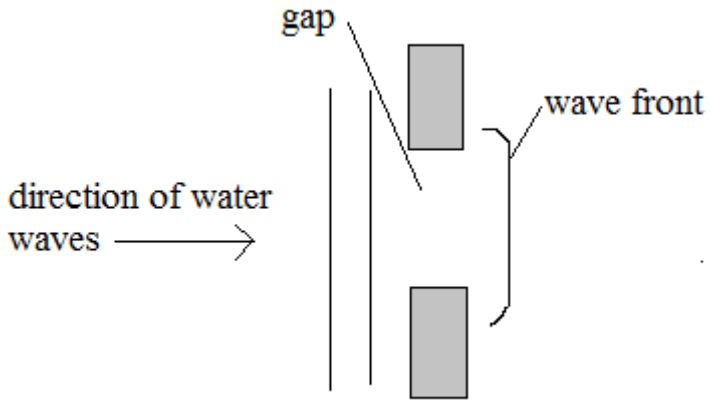

Fig 11

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

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

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

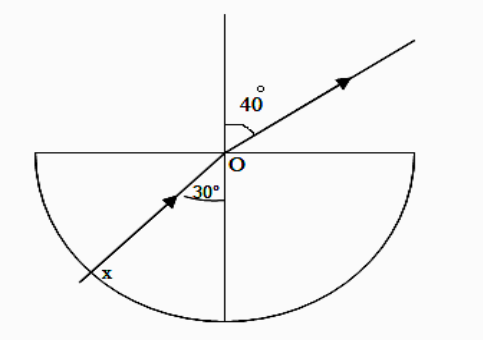
13.(a) State what is meant by refractive index of a material. (1 mark)

……

……

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

Fig 12



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

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

……

……

……

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

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

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

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

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

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

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

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

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

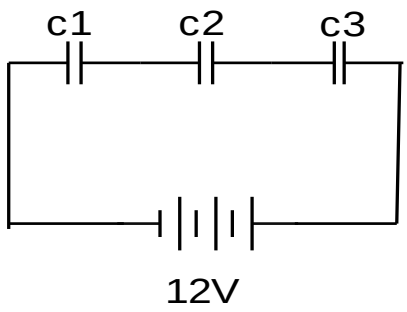

Fig 10.

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

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(ii) Given that C_1=10.5μF, C_2 =2μF and C_3= 3μF.
Calculate effective capacitance $C_E$in (2) above and hence
Determine the charge stored on each capacitor. (3marks)

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

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

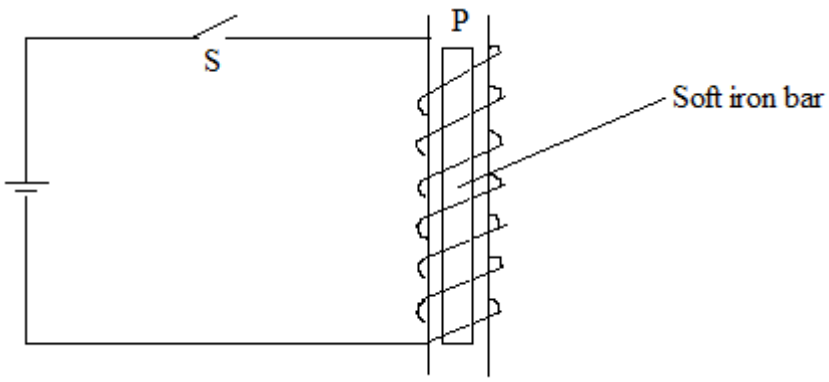

Fig.11

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

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

……

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

……

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

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

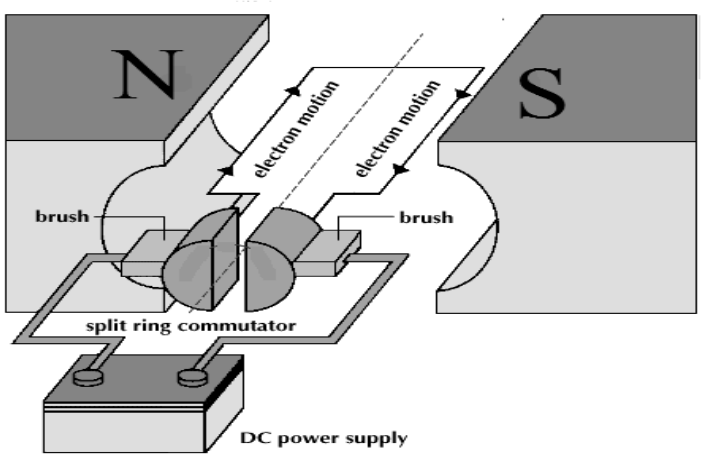

Fig 12.

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

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

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

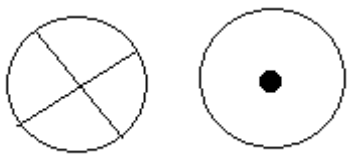

Fig 13. **Fig 14**

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

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

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

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……

(ii) Determine the object distance (2mks)

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

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

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……

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

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

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

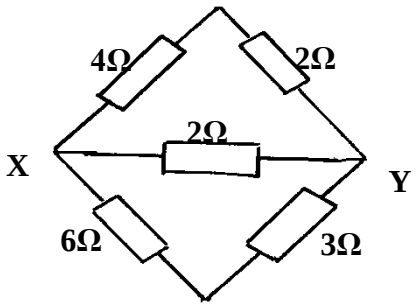

Fig 15

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

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……

(ii)The p.d of the source.
(2mks)

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(iii)Current through the 3Ω resistor
(2mks)

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

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MINISTRY OF EDUCATION (KNEC COMPLIANT)

Name ..... Index No. .....

Adm. No. ..... Candidate's Signature.....

PHYSICS

Paper 3

(PRACTICAL)

CLASS OF KCSE 2023

2 hours 30 minutes

THE RIFT VALLEY & NORTH EASTERN REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

CONFIDENTIAL

QUESTION 1

Each candidate will require the following.

- A milliammeter.
- A voltmeter (0 – 3V) or (0 – 5V).
- A wire mounted on a mm scale (Nichrome wire SWG 32)
- A switch.
- A long wire with a crocodile clip at one end (crocodile clip to be used as a slider or jockey).
- A micrometer screw gauge (may be shared).
- 5 connecting wires, two with crocodile clips at the end.
- One new dry cell size D.
- Cell holder.

QUESTION 2

EACH STUDENT REQUIRES

- ✓ Micrometer screw gauge (shared between 4 students)
- ✓ Vernier callipers
- ✓ Masses
  - ♦ 10g
  - ♦ 2 – 20g
  - ♦ 50g
  - ♦ 100g
- ✓ Helical spring (K = 0.08N/cm)
- ✓ Metre rule or half metre rule
- ✓ Complete retort stand

MINISTRY OF EDUCATION (KNEC COMPLIANT)

Name .....Index No. .....

Adm. No. ..... Candidate's Signature.....

PHYSICS
Paper 3
(PRACTICAL)
CLASS OF KCSE 2023
2 hours

THE RIFT VALLEY & NORTH EASTERN REGIONS KCSE JOINT NATIONAL MOCK 2023

Kenya Certificate of Secondary Education (KCSE)

INSTRUCTIONS TO CANDIDATES

Answer all the questions in the spaces provided in this question paper.
You are supposed to spend the first 15 minutes of the 2 ½ hrs allowed for this paper reading the whole paper carefully before commencing your work.
Marks will be given for clear record of the observations actually made, their suitability, accuracy and the use made of them.
Candidates are advised to record their observations as soon as they are made.
Non-programmable silent electronic calculators and KNEC mathematical tables may be used.

FOR EXAMINERS USE ONLY.

QUESTION 1

NO.	a, b	c	TOTAL
MAXIMUM SCORE	14	6	20
CANDIDATES SCORE			

QUESTION 2

	a	b	c	d	f	g	h	I
maxmum score	1	1	1	2	6	4	2	3
Candidate's scores								

GRAND TOTAL	

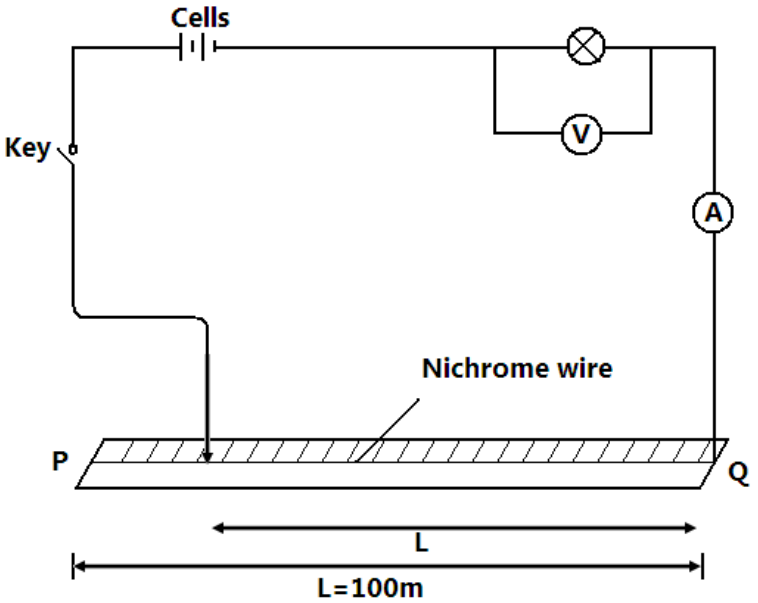
Question 1 (20 marks)

You are provided with the following

-Two dry cell
-One bulb
-Voltmeter (0 – 3V)
-Ammeter (0 – 1A)
-Amounted nicrome wire mounted on a millimeter scale
-Switch
-Seven connecting wire at least two with crocodile clips
-Micrometer screw gauge

Proceed as follows:

a) i). Set up the circuit as shown in the figure 1 below.



ii) With the crocodile clip at p, take the voltmeter reading and ammeter reading. Record v and 1 repeat the readings for L=80, 60, 40, 20 and 0cm respectively and complete the table below. (5mks)

Length, L(cm)	100	80	60	40	20	0
Voltage, V(V)						
Current, I (A)						

iii). What changes do you observe on the bulb as L decreases from p? (1mrk)

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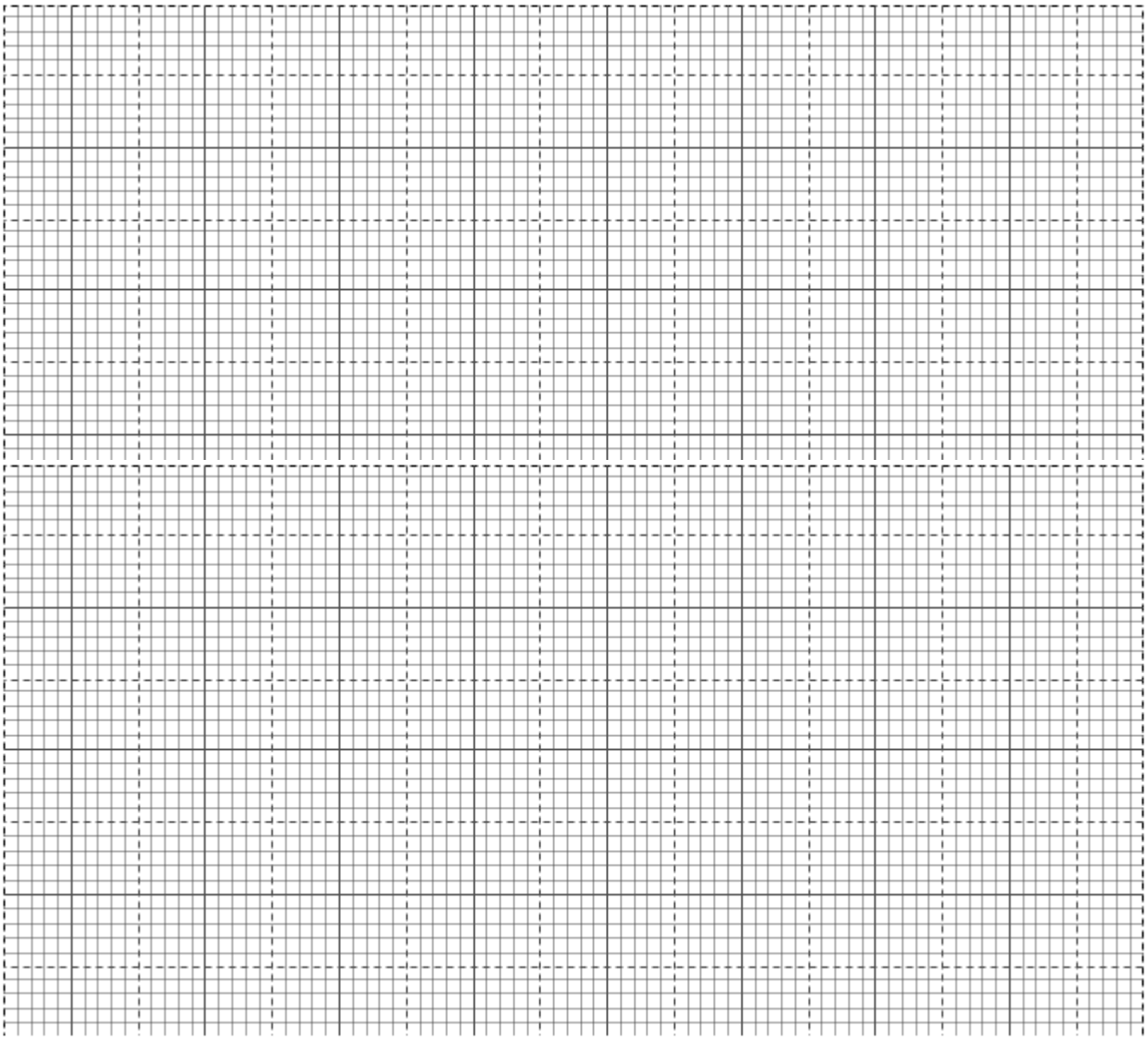
……

iv).Plot a graph of ammeter reading (y=axis) against voltmeter readings. (5mrks)

v). Determine the slope of the graph at V=1 volt.
(2mrks)

vi). What physical quantity is represented by the slope of the graph at any given point? (1mrk)



b. (i) Given the apparatus in a (i) above, draw a diagram of the circuit you would use to determine the current through the resistant wire and the potential difference across. (1mrk)

ii).Set up the circuit you have drawn. Record the ammeter reading I and the wire reading V when L=100cm
(2mks)

V=…… I=……..

iii). Using a micrometer screw gauge, measure the diameter of the wire.
(1mrk)

d=……m

iv). Calculate the quantity:

$p = 0.785 \frac{(V)}{I} \frac{d^2}{L}$ and give its units, where L is one meter.
(2mrks)

Question 2

You are provided with the following:-

- Vernier callipers
- Micrometer screw gauge
- Masses; 10g, 20g, 50g and 100g
- A helical spring
- Metre rule or half metre rule

Proceed as follows

(a) Determine the number of complete turns of the helical spring.
N = _____ (1 Mark)

(b) Measure the external diameter of the spring using the vernier callipers
D = _____ m (1 Mark)

(c) Use the micrometer screw gauge to determine the diameter of the wire of the spring.

d = _____ m (1 Mark)

(d) Determine the value of m

(2 Marks)

N = $\frac{0.4D}{dm}$

……

……

……

(e) Suspend the helical spring vertically alongside the clamped half metre rule as shown in figure 1 below. Determine the length L_0, of the spring before loading it.

L_0 = _____ cm

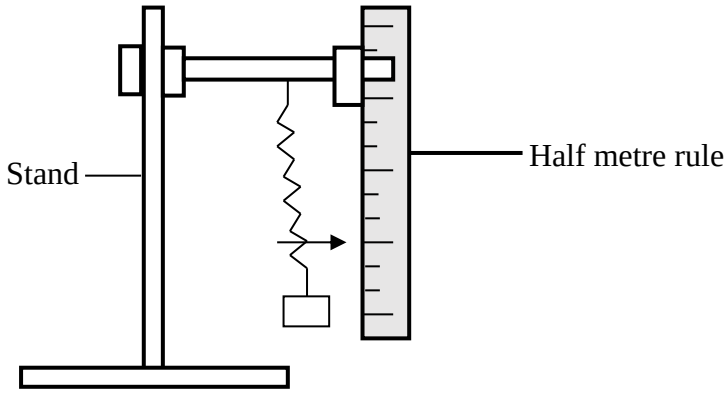


Figure 2

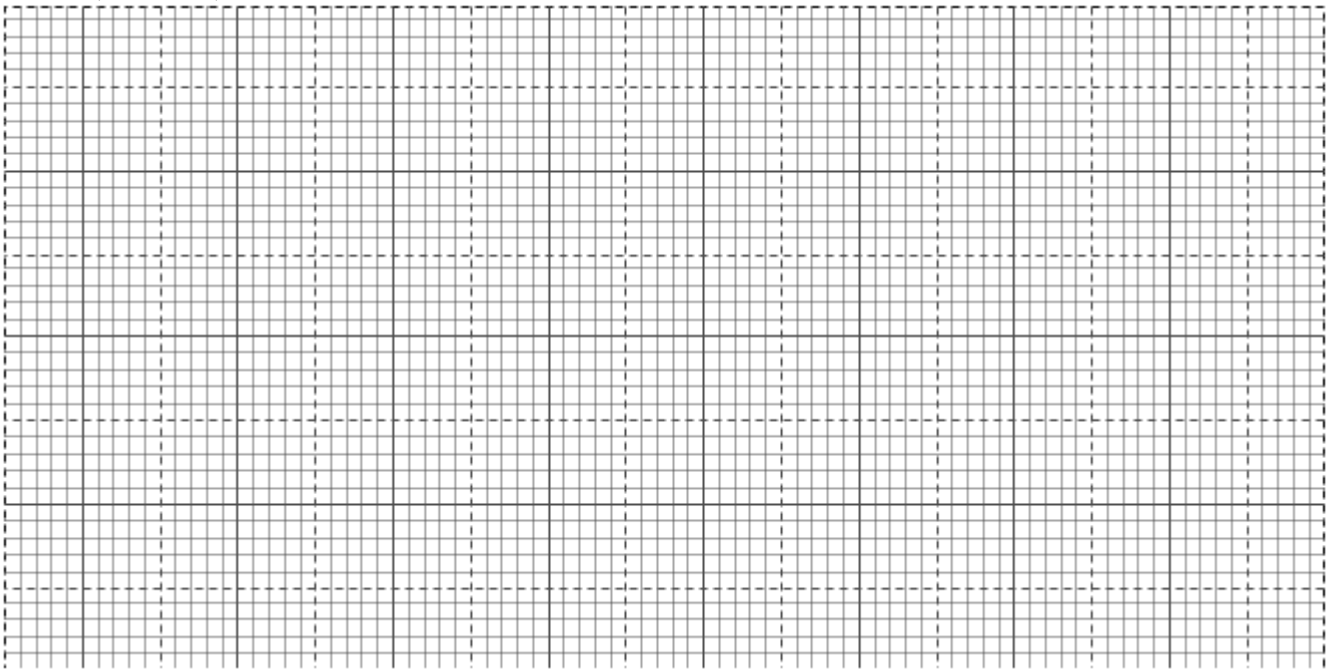
(f) Load the spring with a mass of 20g and determine the new reading on the metre rule. (L) Record this in the table below.

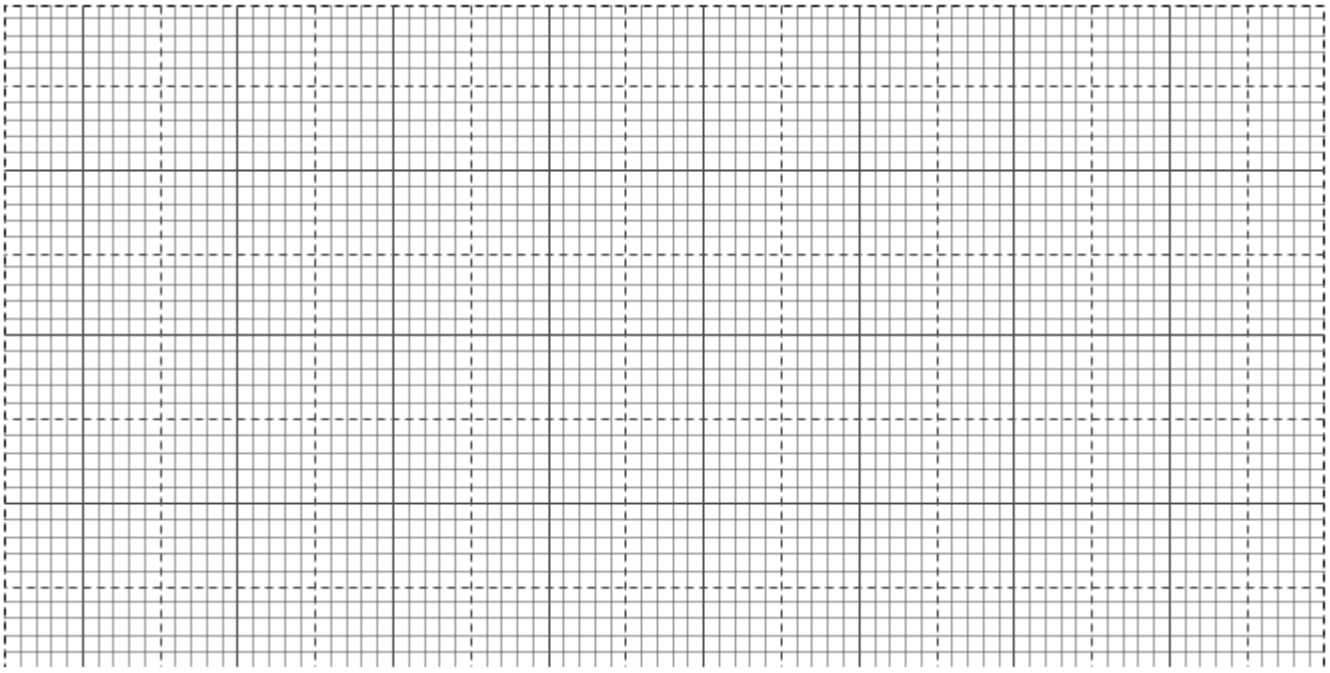
(g) Calculate the extension e = L – L_0 due to the mass of 20g and record the value in the table given below. Repeat step f for other masses and complete the table.

Mass (g)	0	10	20	30	40	50	60	70	80	90	100
Weight (N)											
Reading (L) (cm)											
Extension e (cm)											
$\frac{1}{e}$ (cm^{-1})											

(6 Marks)

(h) Plot a graph of weight (N) against $\frac{1}{e}$ (cm^{-1})
(4 Marks)





(i) Determine the slope (s) of the graph at a mass of 45g (2 Marks)

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(j) Given that m = $\frac{-255T}{(S+60)^2}$

Determine the value of T where (S) is the slope at 45g (3 Marks)

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