PHYSICS

THE KENYA CERTIFICATE OF SECONDARY EDUCATION

KCSE 2023 EXAMINER SUPER PREDICTION

A KCSE 2023 PREDICTION WITH PRECISION

This PDF Comprises of Expected KCSE 2023 Questions prepared by a panel of top KNEC writers. All the KCSE 2023 Candidates are advised to take the prediction questions therein seriously!

For Marking Schemes Contact

0724333200/ 0795491185

Mr Machuki

Confidential!!!

Kenya Educators Consultancy Wishes all the KCSE 2023 Candidates the best of Luck ahead of the KCSE National Exams.

THE KENYA CERTIFICATE OF SECONDARY EDUCATION

KCSE 2023 EXAMINER SUPER PREDICTION

232/1 PHYSICS

PAPER 1 (THEORY)

Name: …… **Index No**: ……..

Class: …… **Candidate's Sign**: ……

Date: ……

PHYSICS PAPER 1

2 HOURS

INSTRUCTIONS TO CANDIDATES

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of the examination in the spaces provided above.
(c) This paper consists of sections: A and B.
(d) Answer all the questions in sections A and B in the spaces provided.
(e) All working must be clearly shown.
(f) Mathematical tables and electronic calculators may be used.

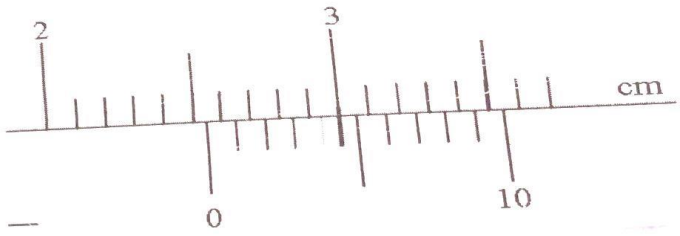
Take g = 10N/kg

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-11	25	
B	12	11	
	13	10	
	14	12	
	15	7	
	16	6	
	17	9	
TOTAL SCORE		80	

SECTION A – 25 MARKS (ANSWER ALL THE QUESTIONS)

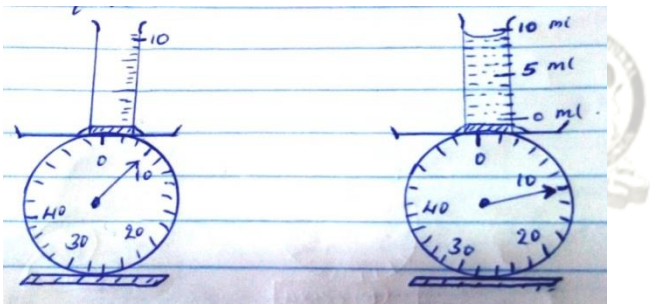
1. The vernier callipers in the figure below has a zero error of -0.05cm.



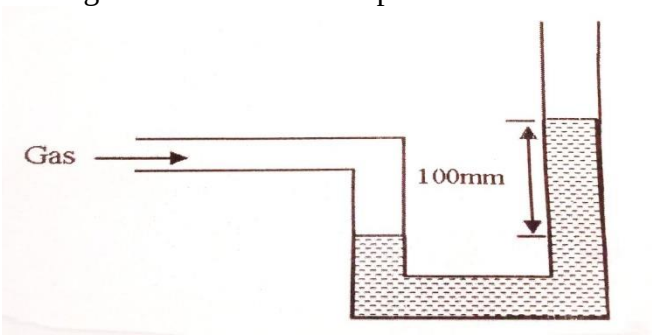
State the actual reading of the measuring instrument (2 marks)

2. Fig.1(a) and (b) shows a set – up to determine the density of a liquid. The balance is calibrated in grams.

Determine the density of the liquid. (3mks)



3. The figure below shows an open-ended monometer with water connected to a gas supply



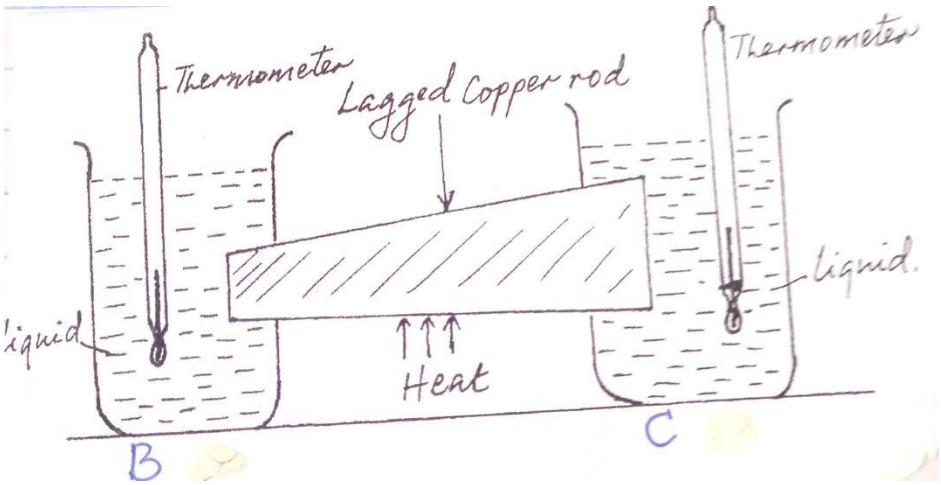
If a mercury barometer reads 760mm, calculate the pressure of gas (give your answer in N/m^2).

(Density water = 1 g/cm^3, density of mercury = 13.6 g/cm^3 (3 marks)

4.An object weighs 49N on earth where gravitational acceleration is 9.8N/Kg and 40.5N on another planet. Determine the gravitational acceleration on the planet (2 marks)

5.A measuring cylinder contains 20cm^3 of water. 10cm^3 of salt is added and stirred. Explain why the new volume is not 30cm^3 (2 marks)

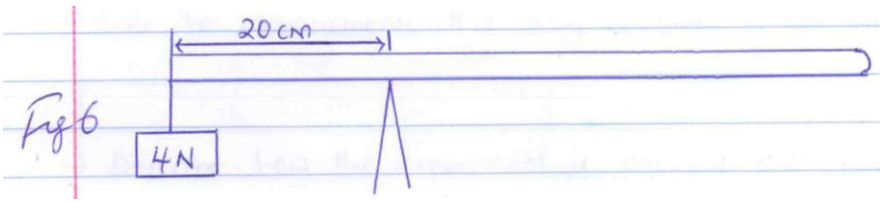
6.The figure below shows samples of same liquid B and C being heated through a well-lagged copper rod of non-uniform thickness. A thermometer is placed on each sample for some time.



If the rod is heated at the middle, state and explain which of thermometers records a higher temperature (2 marks)

7. Give one reason why boiling water cannot be used to sterilize a clinical thermometer (1mark)

8. The figure 6 below shows a uniform 50cm rod. It is balanced horizontally by a load of 4N on one end. Calculate the weight of the rod 2mks)



9. Explain why a car feels lighter as it travel at a higher velocity. (2mks)

10. Pure water at 0^0c is heated up to 10^0c. Sketch the graph of volume against temperature on the axes given below 2mks)

11. The figure 8 below shows a circuit diagram for a device for controlling the temperature in a room.

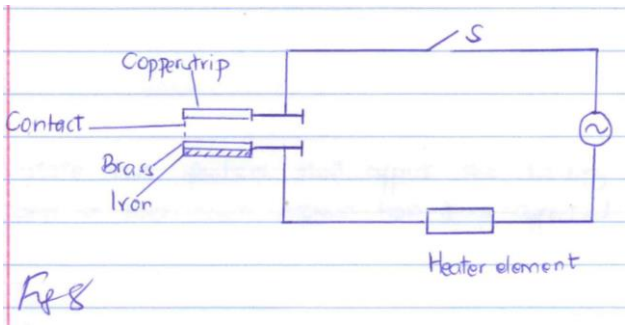


Fig 8

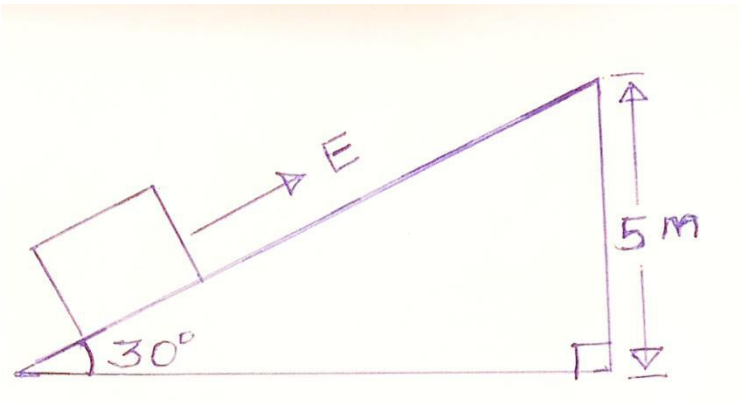
i) Explain the purpose of the metallic strip 2mks)

ii) Describe how the circuit controls the temperature when the switch S is closed 2mks)

SECTION B – 55 MARKS (ANSWER ALL THE QUESTIONS)

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

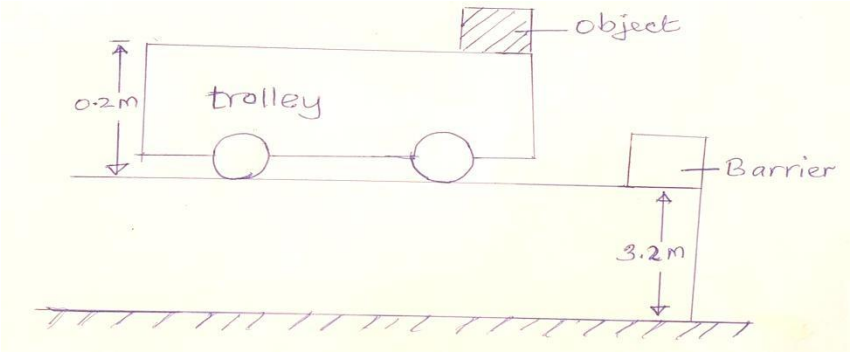
(b) A man pushes a load of mass 80kg up an inclined plane through a vertical height of 5m as shown below. The inclined plane makes and angle of 30^0 to the horizontal (take g to be $10m/s^2$)
(i) Determine the velocity ratio of the inclined plane. (2 marks)



(ii) If the efficiency of the plane is 75% determine:
(I) The mechanical advantage (2 marks)

(II) The effort E, needed to pull the load up the plane. (2 marks)

(c) A trolley of height 0.2m moving on a horizontal bench of height 3.2m strikes a barrier at the edge of the bench. The object on top of the trolley flies off on impact and lands on the ground 2.5m from the edge of the bench as shown below. Use this information to answer the questions that follow:



(i) Give a reason why the object on the trolley flies off on impact (2 marks)

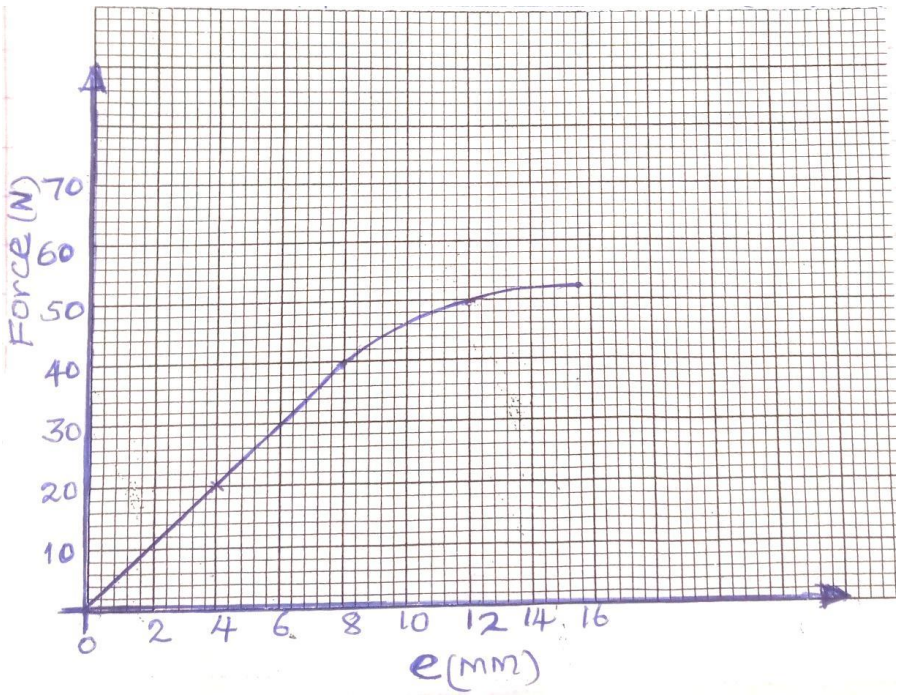
(ii) Determine the time taken by the object to land on the ground (2 marks)

13. (a) State Hooke's Law (1 Mark)

(b) (i) A vertical spring of unstretched length of 30cm is clamped at its upper end. When sand is placed in a pan attached to the lower end of the spring its length becomes 45cm. When 20g mass is placed on top of the sand the length increases to 55cm. Determine the mass of the sand (3 marks)

(ii) If the spring in (b)(i) above is compressed from its original length to a length of 24cm, calculate the work done in compressing the spring. (3 marks)

(c) The graph below shows the relationship between (F) against extension (e) of a spring.

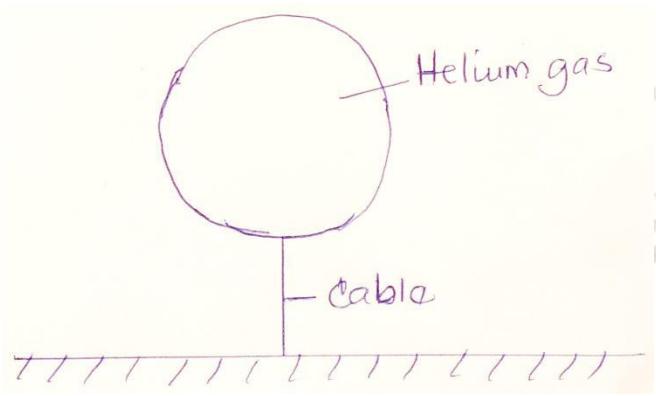


Determine the spring constant of the spring (3 marks)

14. (a) State Archimedes Principle (1 mark)

(b) Explain one application of Archimedes Principle in real life situation (2 marks)

(c) The mass of the fabric of a large balloon is 500g. The balloon is inflated with 2000m^3 of helium gas. The balloon is attached to a cable tied on the ground as shown. (Density of helium and air are 0.18g/cm^3 and 1.3g/cm^3 respectively.

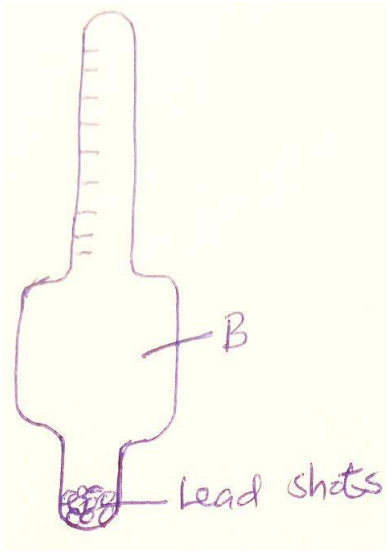


(i) State 3 forces acting on the set up. (3 marks)

(ii) Determine the tension in the cable (3 marks)

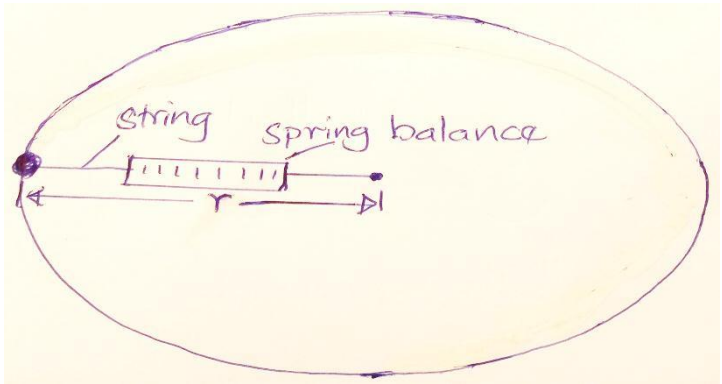
(iii) Calculate the acceleration of the balloon if the cable is cut. (2 marks)

(d) The diagram below shows a hydrometer.



Why is the part marked B wider? (1 mark)

15. The diagram below shows a spring balance tied to an object of mass M and rotated in a circular path of radius r.



(a) (i) State the force that keeps the object moving in a circular path. (1mark)

(ii) The speed of the object is constant but the body is accelerating on the circular path. Explain (1 mark)

(b) (i) If the object is whirled faster, what would happen to the spring balance reading? (1 mark)

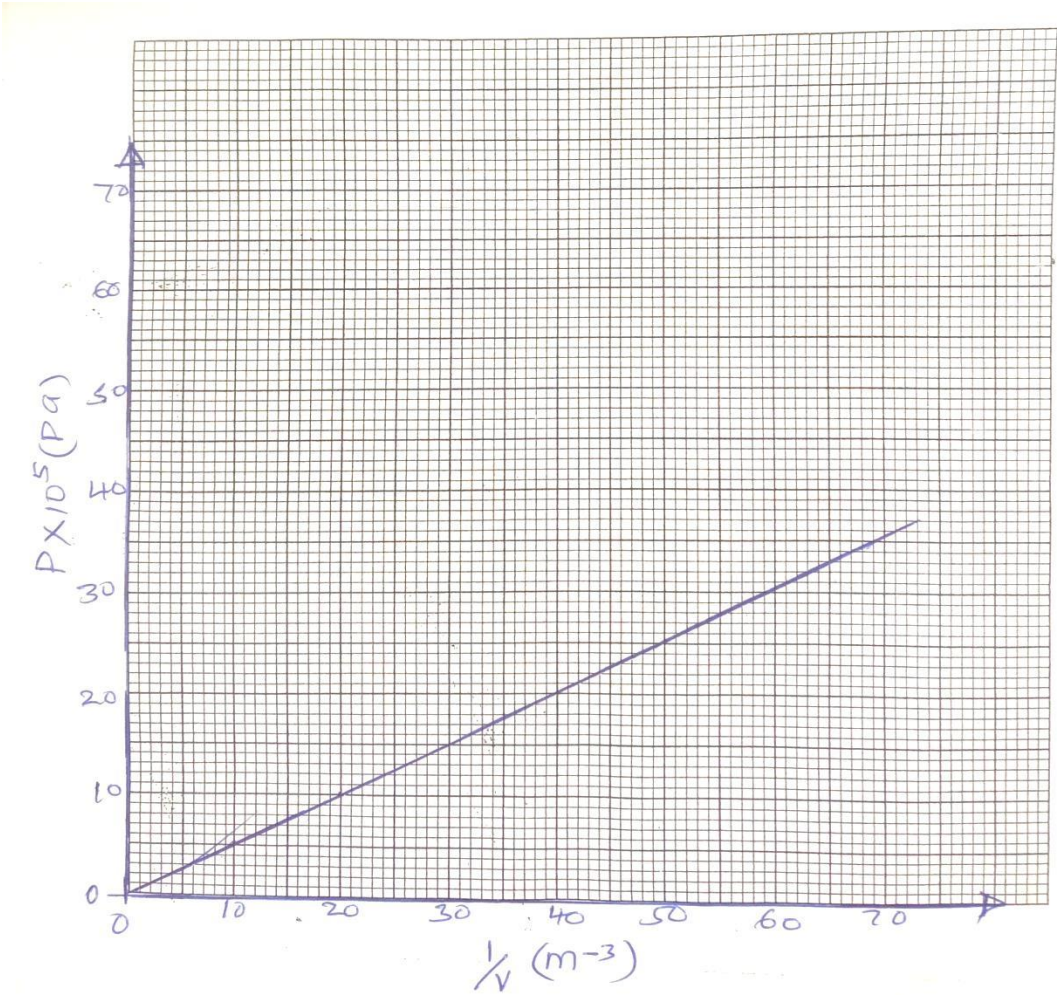
(ii) Give a reason for your answer in b (i) above (1mark)

(iii) As the object is whirled round, the sting snaps and cuts off. Describe the subsequent path of the object (1 mark)

(c) If the mass m of the object s 500g and radius r is 50cm. determine the velocity of the body if the spring balances reads 81N (3 marks)

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

(b) The pressure P of a fixed mass of gas at constant temperature of T = 200k is varied continuously and the values of corresponding volume recorded. A graph of P against $\frac{1}{v}$ is shown on the graph below.



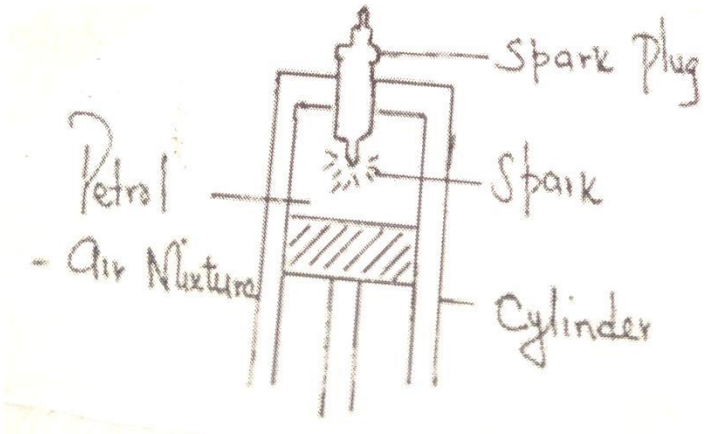
Use the graph to:

(i) Determine the volume of the gas when pressure reads 2.8 x 10^5 pa (2marks)

(d) The petrol air mixture in the cylinder of a car engine is ignited when the piston is in the position shown below.

317083

Turn over



Use kinetic theory of matter to explain why the piston moves down. (3 marks)

17.(a) Define the term specific heat capacity. (1mk)

(b) 100g of steam of 100^0C was passed into cold water at 27^oC. The temperature of the mixture became 500C. Taking specific heat capacity of water as 4200Jkg^{-1}K^{-1} and specific latent heat of vaporization of water as 2260kJkg^{-1} and that heat losses were negligible. Determine

(i) Quantity of heat lost by steam. (2mks)

(ii) Quantity of heat gained by water. (3mks)

(iii) Mass of the cold water. (3mks)

THE KENYA CERTIFICATE OF SECONDARY EDUCATION

KCSE 2023 EXAMINER SUPER PREDICTION

232/2 PHYSICS

PAPER 2 (THEORY)

Name: …… **Index No**: ……..

Class: ……**Candidate's Sign**: ……

Date: ……

INSTRUCTIONS TO CANDIDATES

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of the examination in the spaces provided above.
(c) This paper consists of sections: A and B.
(d) Answer all the questions in sections A and B in the spaces provided.
(e) All working must be clearly shown.
(f) Mathematical tables and electronic calculators may be used.

Take g = 10N/kg

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-11	25	
B	12	9	
	13	11	
	14	13	
	15	9	
	16	5	
	17	10	
TOTAL SCORE		80	

SECTION A – 25 MARKS *(ANSWER ALL THE QUESTIONS)*

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

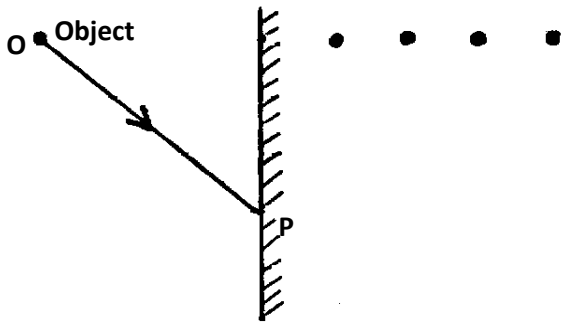


Fig. 1

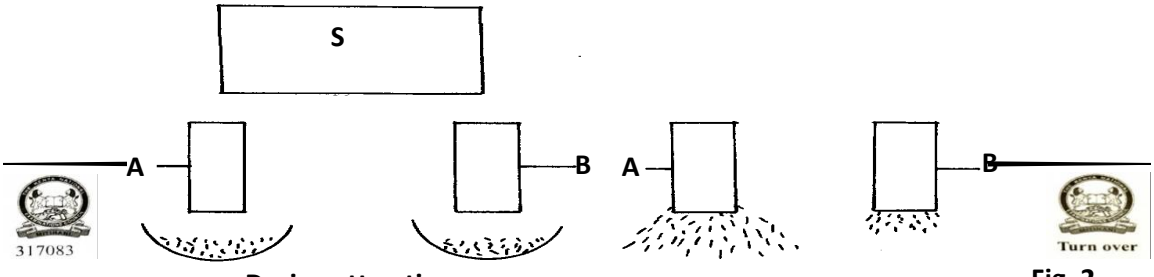
(i) Which of the four dots represent correct position of the image of **O**? Label this dot **Q** (1mk)

(ii) By drawing a line on the diagram above to represent the reflected ray at **P**, mark the angle of reflection and label it **r**. (1mk)

2. An echo sounder of a ship received the reflected waves from a sea bed after 0.20s. Determine the depth of the sea bed if the velocity of sound in water is 1450m/s (2mks)

3. Figure 2 below shows a simple experiment using a permanent magnet and two metal bars **A** and **B**

Put close to the iron filings.

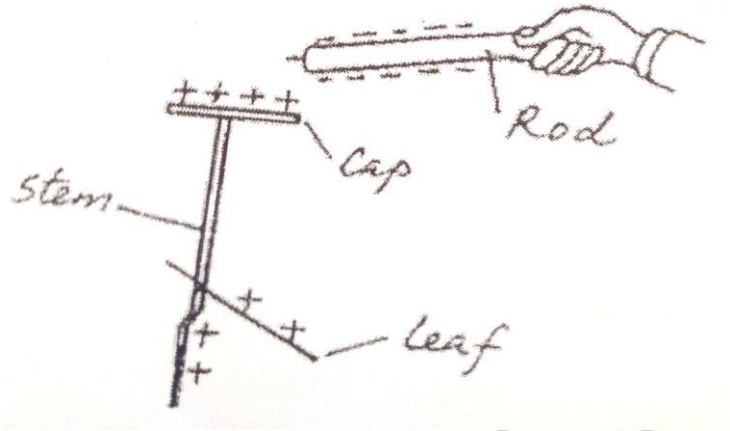


During attraction After

Fig. 2

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

4. The figure below shows a highly negatively charged rod being brought slowly near the cap of a positively charged leaf electroscope. It is observed that the leaf initially falls and then rises.

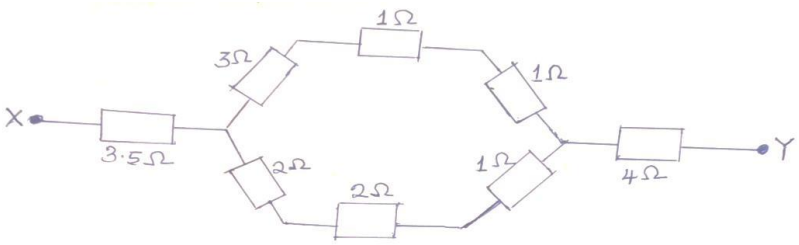


Explain this observation (2 marks)

5. (a) A generator capable of producing 100kw is connected to a factory by a cable with a total resistance of 5 ohms. If the generator produces the power at a potential difference of 5kv, what would be the maximum power available to the factory? (2 marks)

(b) State one cause of power loss in transmission of the main electricity (1 mark)

6. The figure below shows eight resistors forming a network in circuit between X and Y.



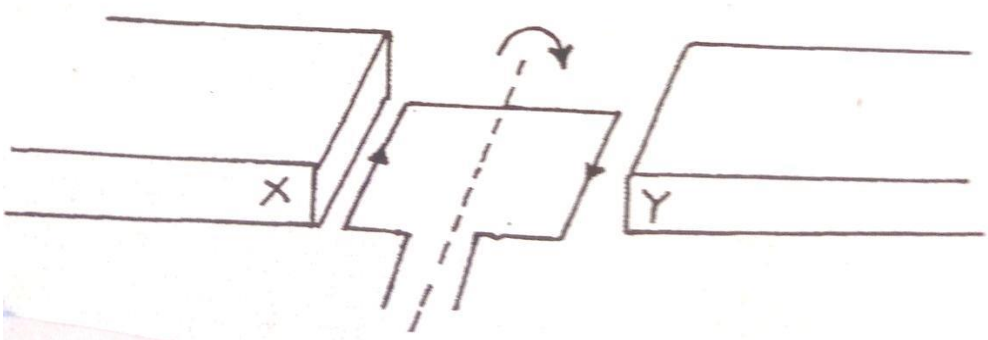
Calculate the effective resistance of the network. (3 marks)

7.State:

(a) One application of ultraviolet radiation (1 mark)

(b) One detector of the radiation in (a) above. (1 mark)

8. The figure below shows a rectangular coil in a magnetic fields rotating in a clockwise direction.



(i) Indicate the poles X and Y of the magnets. (1 mark)

(ii) Suggest one way of increasing the magnitude of the force in such a coil. (1 mark)

9. A battery is rated at 30Ah. For how long will it work if it steadily supplies a current of 3A.

(2 marks)

10. (b) An element **R** decays by giving off an alpha particle. Complete the equation below showing the values of **a** and **b** (2mk)

$$^{236}_{72}R = {}^{a}_{b}V + {}^{4}_{2}He$$

a = _____ b = _____

11.) The circuit diagram in figure13 below shows four capacitors connected between two points **A** and **B**

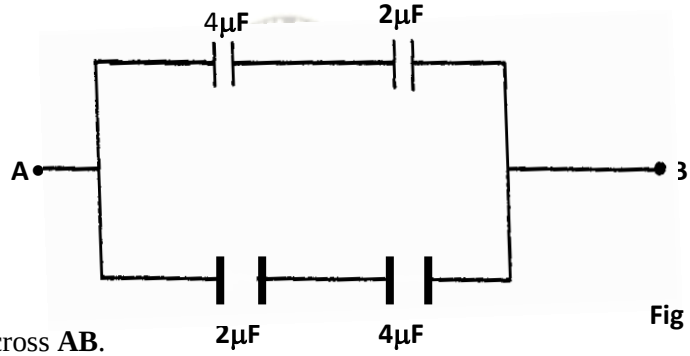


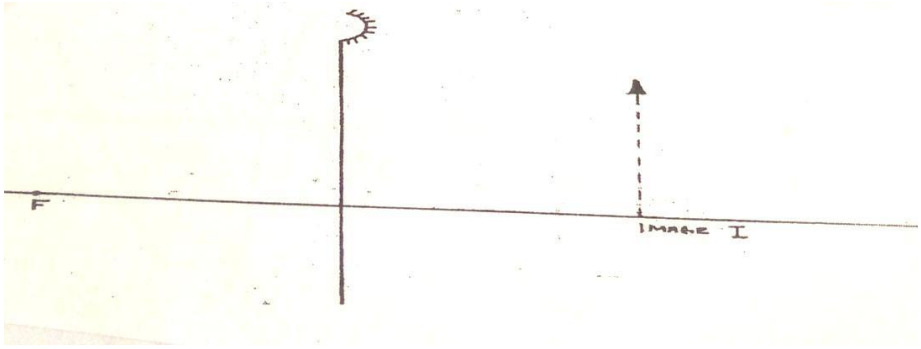
Fig 13

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

Section B (55 marks)

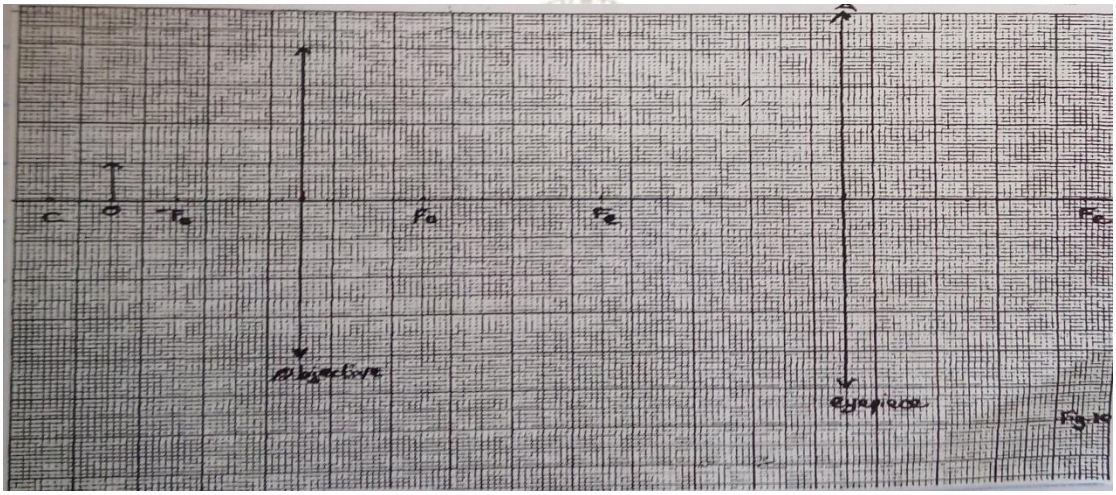
Answer all questions in the spaces provided

12a) The figure below shows and image I formed by a concave mirror



Determine its magnification M. (3 marks)

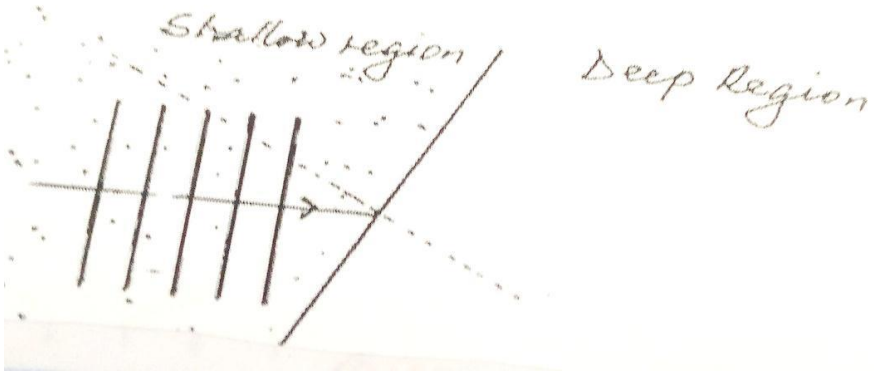
b) The figure below shows lenses of a compound microscope. The focal length of the objective lens is 2 cm and that of eyepiece lens is 4cm. The two lenses are 9cm apart. An object 1 cm high is placed 3cm from the objective lens.



(i) Construct rays to show the position of the final image seen by the eye. (4 marks)

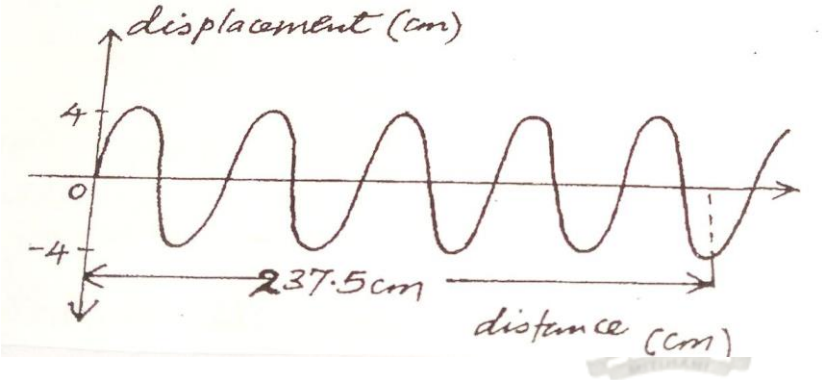
(ii) Find the magnification obtained by this arrangement (2 marks)

13. (a) The figure below shows water wave fronts approaching a boundary between a shallow and deep region. The speed of the waves in the shallow region is less than in the deep region.



On the same diagram complete the figure to show the wave fronts after crossing the boundary. (2 marks)

(b) A vibrator is used to generate water waves in a ripple tank. It is observed that the distance between the first crest and the midpoint to the fifth trough is 237.5cm. The waves travel 224.0cm in 6.0 seconds.



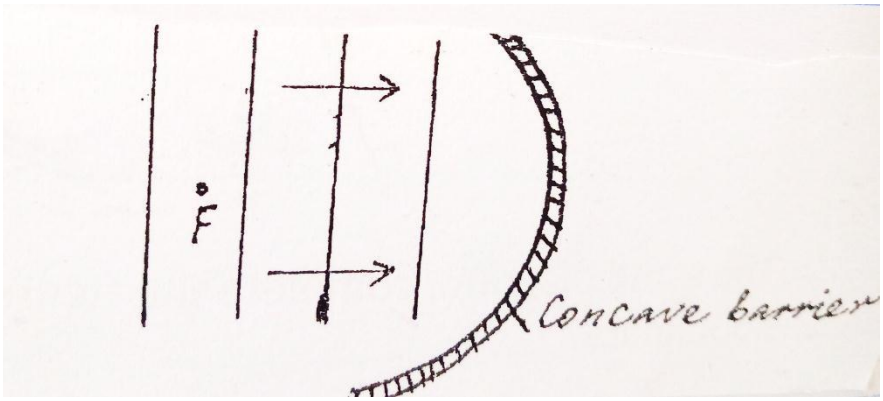
Determine:

(i) The wavelength of the waves (3 marks)

(ii) The speed of the waves (2 marks)

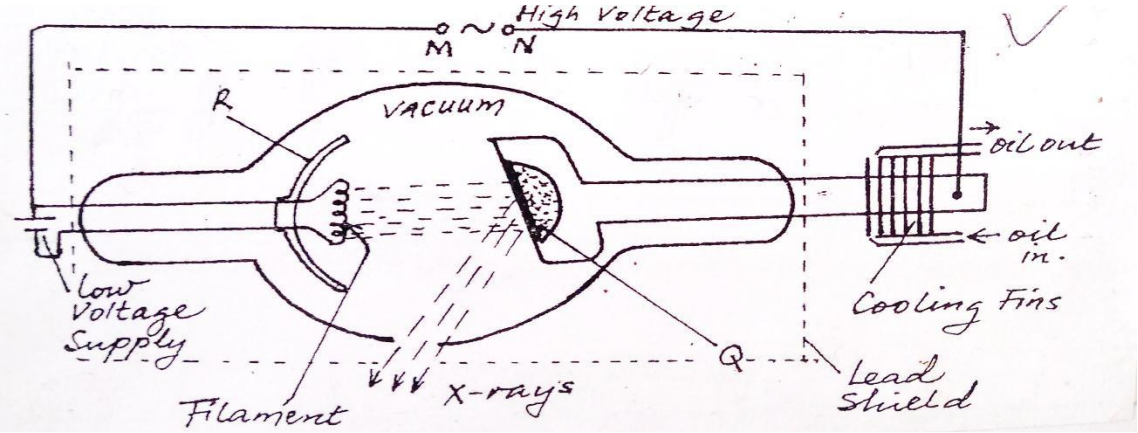
(iii) The frequency of the vibrator (2 marks)

(c) The plane water wave front are incident onto a concaved barrier as show in the figure below.



Show on the same diagram the nature of the reflected wave fronts. (2 marks)

14. The figure below shows the parts and circuit of a model X-ray tube.



(a) Name the parts labeled Q and R (2marks)

Q

R

(b) State the suitable material for use in Q and give a reason for your answer (2marks)

(c) State the function of part R (1 marks)

(d) Describe how electrons, hence X-rays, are produced in the tube (2 marks)

(e) Explain why the glass tube is evacuated (2 marks)

(f) What property of lead makes its suitable material for shielding (1 mark)

(g) State how the following changes affect the nature of X-rays produced

(I) Increasing in potential across MN (1mark)

(II) Increasing the filament current (1 mark)

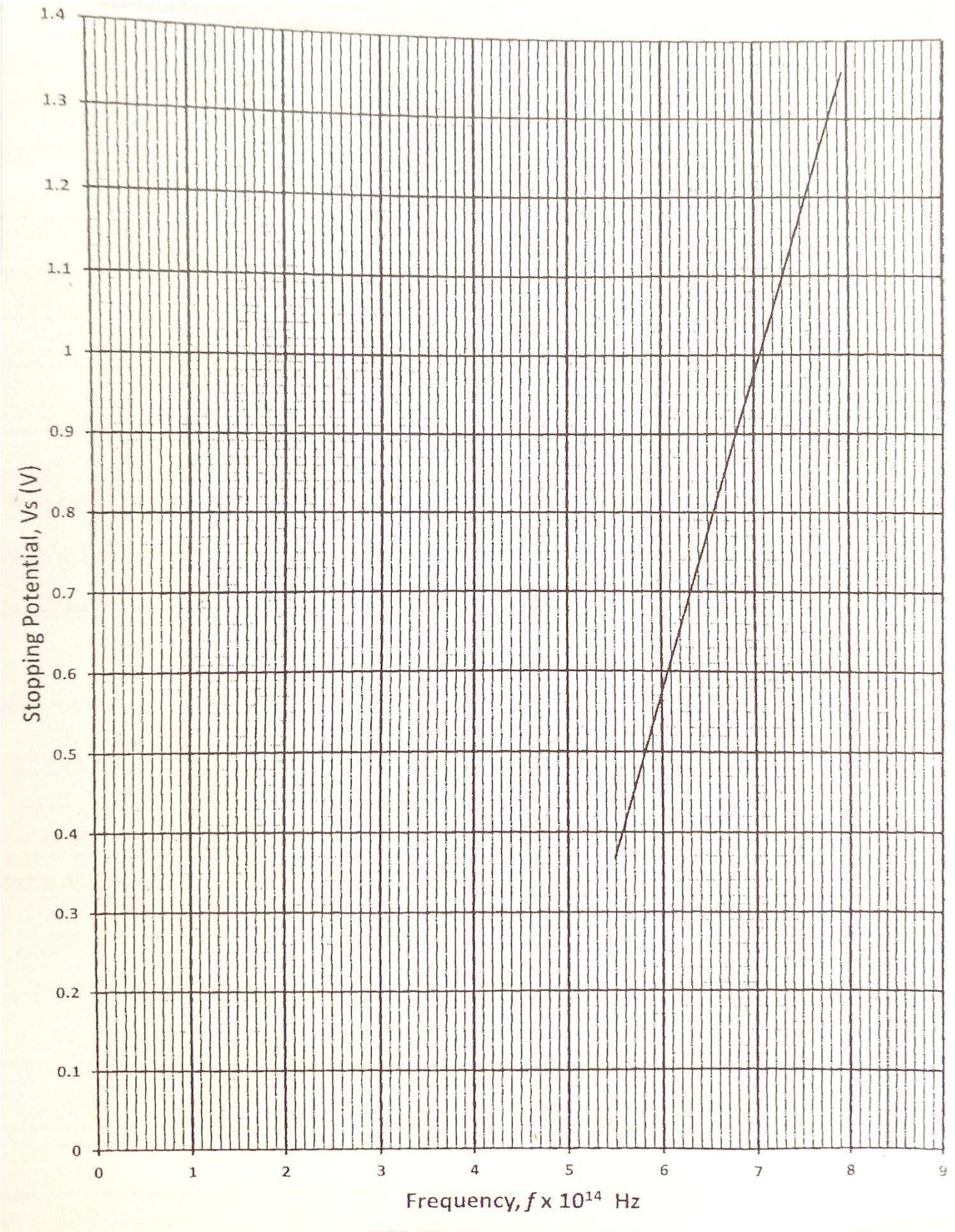
15 (a) What is photoelectric emission? (1 mark)

(c) A radiation falls on photosensitive material state how the following changes affect the emitted photoelectrons:

(i) Increase in intensity of incident radiation. (1 mark)

(ii) Increase in the frequency of incident radiation (1 mark)

(a) The figure below shows a graph of stopping potential (voltage) V, against frequency f, of a radiation falling on a photosensitive surface.
Given that $eV_s = hf - hf_o$ where h= plants constant, f_o = threshold frequency i.e frequency when $V_s = 0$ and e is the charge on an electron = 1.6×10^{-9}C. Use the graph to determine;



(I) The threshold frequency for the surface (1 mark)

(II) The gradient of the graph, hence the value of plank's constant h. (3 marks)

(III) The work function W_o of the surface given that $W_o = hf_o$ for the surface (2mrk)

16. A student connected a circuit as shown in figure 16 below hoping to produce a rectified out put

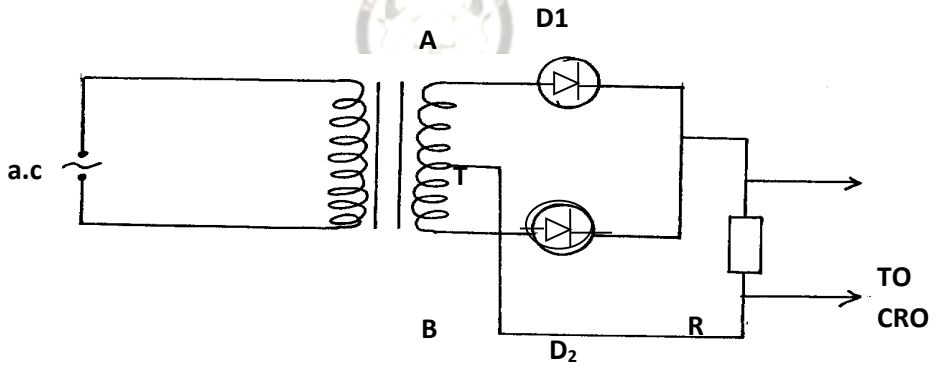


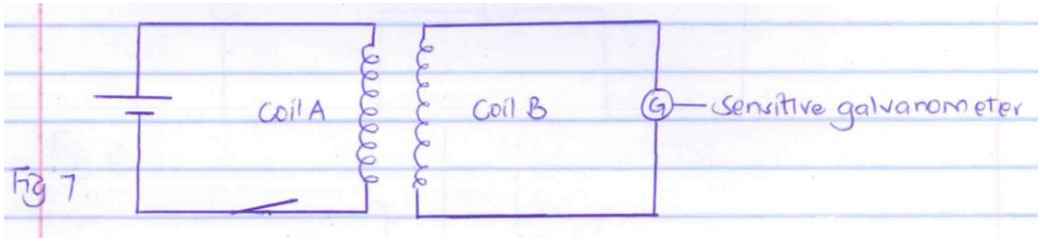
Fig 16.

(a) Sketch the graph of the output on the **CRO** screen (1mk)

(b) Explain how the output above is produced (2mks)

(c) Name other **two** uses of a junction diode (2mks)

17. Figure 7 shows two coils A and B placed close to each other. A is connected to a steady dc supply and a switch B is connected to a sensitive galvanometer.



i) The switch is now closed. State the observation made on the galvanometer 2mks)

ii) Explain what would be observed if the switch is then open 2mks)

b) The primary coil of a transformer has 1000 turns and secondary coil has 200 turns the primary coil is connected to a 240v ac supply

i) Determine the secondary voltage 3mks)

ii) Determine the efficiency of the transformer given that the current in the primary coil is 0.2A and in the secondary coil is 0.7A 3mks)

Each student will require the following :-

1. 2 new dry cells (size D)
2. A cell holder
3. A switch
4. An ammeter (0-2.5A)
5. A voltmeter (0 – 5v)
6. 6 connecting wires
7. 2 crocodile clips
8. A nichrome wire 1.0m long mounted on a scale (SWG 32) labeled X
9. A candle
10. A lens (f = 20 cm) and a lens holder
11. A screen
12. A metre rule
13. Rubber bung (hard).
14. Vernier calipers (shared).
15. Electronic beam balance (shared).

    (which records to 1 d.p.)
16. a retort stand, one boss, one clamp
17. One 500ml beaker ¾ full of water
18. One 100g mass
19. One 50g mass
20. 3 pieces of thread approximately 30cm long

THE KENYA CERTIFICATE OF SECONDARY EDUCATION

KCSE 2023 EXAMINER SUPER PREDICTION

232/3 PHYSICS

PAPER 3 (PRACTICAL)

Name: …… **Index No**: ……..

Class: …… **Candidate's Sign**: ……

Date: ……

PHYSICS PAPER 3

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of the examination in the spaces provided above.
(c) This paper consists of questions: 1 and 2.
(d) Answer all the questions 1 and 2 in the spaces provided.
(e) All working must be clearly shown.
(f) Mathematical tables and electronic calculators may be used.

Take g = 10N/kg

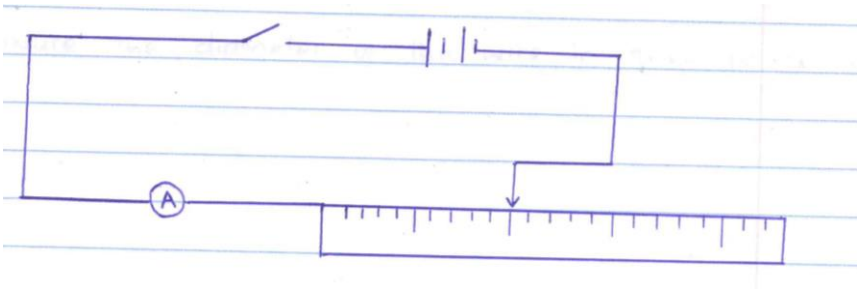
FOR EXAMINER'S USE ONLY

QUESTION	PART	MAXIMUM SCORE	CANDIDATE'S SCORE
1		20	
2	A	5	
	B	9	
	C	6	
TOTAL SCORE		40	

Question 1:
Each student will require the following

- 2 new dry cells (size D)
- A cell holder
- A switch
- An ammeter (0-2.5A)
- A voltmeter (0 – 5v)
- 6 connecting wires
- 2 crocodile clips
- A nichrome wire 1.0m long mounted on a scale (SWG 32) labeled X
- A micrometer screw gauge (can be shared)

Proceed as follows
a) Connect the circuit as shown in the figure below



b) Measure the voltage, E (across the cells) before closing the switch
E= …….. 1mk)

c) Adjust the length L of the wire 0.2, close the switch S and read the value of current and record the table below

Length L(m)	0.2	0.3	0.4	0.5	0.6	0.7
Current I (A)						
$\frac{1}{I}$ (A^{-1})						

d) Repeat the procedure in (c) above for the value of lengths given 6mks)

e) Calculate the values of $\frac{1}{I}$ and record in table above

f) On the grid provided, plot a graph of $\frac{1}{I}$ (y axis) against L 5mks)

g) Determine the gradient of the graph 3mks)

h) i) Measure the diameter of the wire in three points used
d_1 = d_2= d_3 =

Average d= 1mk)

ii) Determine the cross section area of the wire 2mks)

i) From the equation
$\frac{1}{I} = \frac{kL}{AE} + \frac{Q}{E}$ determine,

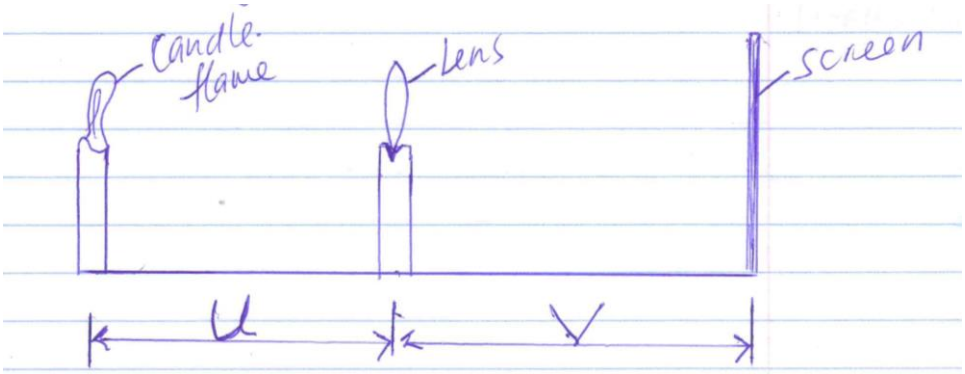
i) The value of k 2mks)

ii) The value of Q 1mk)

Question 2.
PART A
You are provided with the following

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

a) Set up the apparatus as shown in figure below (ensure that the candle flame and the lens are approximately the same height above the bench)



b) Set the position of the lens so that the 40cm from the candle (U=40). Adjust the position of the screen until a sharp image of the candle flame is obtained. Measure the distance, V between the lens and the screen. Record the value of V_1 V = …… cm) 1mk)

c) Repeat the procedures in b) above for other values of U in the table b below.
Table b)

U(cm)	45	50	55
V(cm)			
Magnification (m) $\frac{v}{u}$			

d) Given that f = $\frac{v}{m+1,}$ where f is the focal length of the lens, use the results in table above to determine the average values of f. 4mks)

PART B.

You are provided with the following:

- rubber bung.
- vernier calipers.
- beam balance.

Proceed as follows:

a) Using a vernier caliper, measure the lengths D, d, and h as shown in **figure 2.**

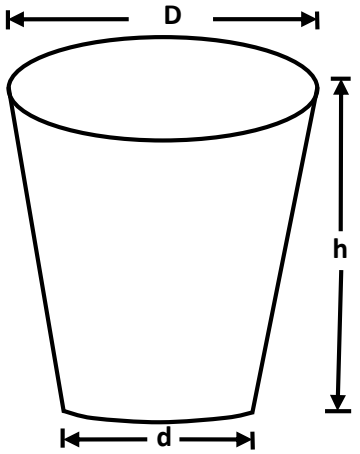


Figure 2

D = ... m (1 mark)

d = ... m (1 mark)

h = ... m (1 mark)

b) (i) Measure the mass, M of the rubber bung using the beam balance.

M = ... kg (1 mark)

(ii) Given that Q = $\left(\frac{d + D}{4}\right)$, determine the value of Q. (1 mark)

(iii) Determine the value of r given that $\pi rQ^2 = \frac{M}{h}$ (3mark)

(iv) What are the units of r (1 mrk)

(v) What is the significance of r (1 mrk)

PART: C

You are provided with the following

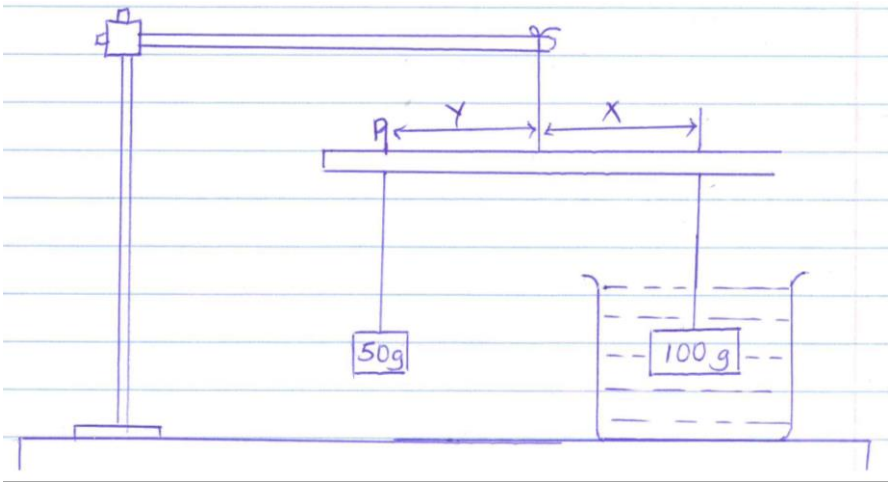
- a metre rule
- a retort stand, one boss, one clamp
- One 500ml beaker ¾ full of water
- One 100g mass
- One 50g mass
- 3 pieces of thread approximately 30cm long

Procedure

a) Balance the metre rule horizontally by suspending it from the stand and clamp with one of the threads. Record the balance point G

G = _____ cm 1mk)

b) suspend the 100g mass from the metre rule at a point such that x =5cm from point G, with the 100g mass completely immersed in water in the beaker hang the 50g mass from the metre rule.
Note the point of suspension (p) of the mass
P=_____1mk)



c) Calculate the apparent weight of the 100 g mass in water. 3mk)

d) Find the upthrust of 100g mass in water. 2mk)