KCSE 2021 PHYSICS JOINT MOCKS

NAME_____**ADMNO** _____

SIGNATURE_____**DATE**_____**CLASS**_____

232/1
PHYSICS
PAPER 1 (THEORY)
2 HOURS

PEAK EVALUATION EXAMINATIONS
TERM 3 – JANUARY 2021
FORM 4 – PHYSICS PAPER 1

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.
- This paper consists of11 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

For examiner's use only

SECTION	QUESTION	TOTAL MARKS	CANDIDATE'S SCORE
A	1-13	25	
B	14	12	
	15	10	
	16	12	
	17	10	
	18	11	
	GRAND TOTAL	80	

TOTAL CANDIDATE'S SCORE

Section A [ ] + section B [ ] = [ ]

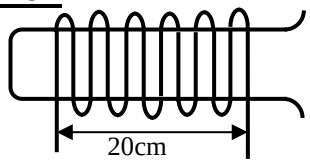
SECTION A (25 MARKS)

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

(Take g=10N/kg or 10m/s^2)

1. The figure1 below shows a wire wound on a test tube. The windings just touch each other. If the total number of complete loops was found to be 15, and the distance covered by the windings on the test tube is 20cm; find the radius of the wire. (2marks)

Figure 1



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2. A paratrooper flexes his legs when he lands. Explain (1mark)

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3. A needle may float on clean water but sinks when a detergent is added. Explain. (1 mark)

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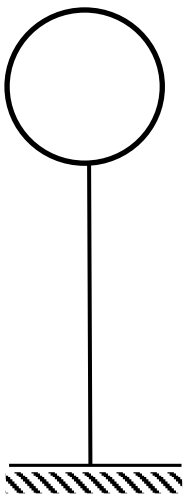
4. The mass of a fabric of a large balloon is 100kg. the balloon is filled with 200 m3 of helium and attached to a cable fixed to the ground as shown below.



Given that the densities of air and helium are 1.3 kg/m^3 and 0.018kg/m^3 respectively, determine the tension in the string. (3 marks)

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5. Water flows in a pipe of diameter 7cm at a speed of 5m/s. The water then gets to the perforated end which has 20 holes of diameter 0.7cm each.Determine the speed of water jets. (3 marks)

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6. For an enclosed system with a liquid, a force is applied at one point.
   a) Briefly explain how force is transmitted to other parts of the system. (2 marks)

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   b) State one application of such a system. (1 marks)

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7. A 150g mass tied on a string is whirled in a vertical circle of radius 30cm with a uniform speed. At the lowest position the tension in the string is 9.5N.Calculate the velocity of the mass. (3 marks)

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8. A spring of elastic constant K has its length increased from 4.00m when unloaded to 4.25m when loaded with a 75N weight. Assuming that the elastic limit is not exceeded, determine the value of K. (2 marks)

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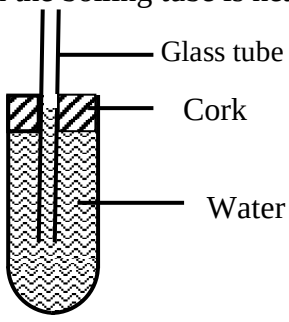
9. The figure 2 below shows a glass tube fitted on to a boiling tube filled with water. State and explain what is observed when the boiling tube is heated. (2marks)

Figure 2



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10. A bus that carries goods in the roof carrier is less stable than one that carries goods in the boot. Explain why this is so. (1 mark)

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11. A rod consists of glass on one part and copper on the other. The rod is wrapped with a piece of paper and then a flame passed below it. It is observed that the paper on the side with glass is charred while that on the side of copper is not. Explain this observation. (1 mark)

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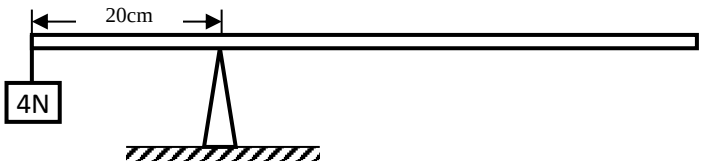
12. The figure 3 below shows a uniform 50cm rod. It is balanced horizontally by a load of 4N on one end. Calculate the weight of the rod. (2marks)

fig. 3



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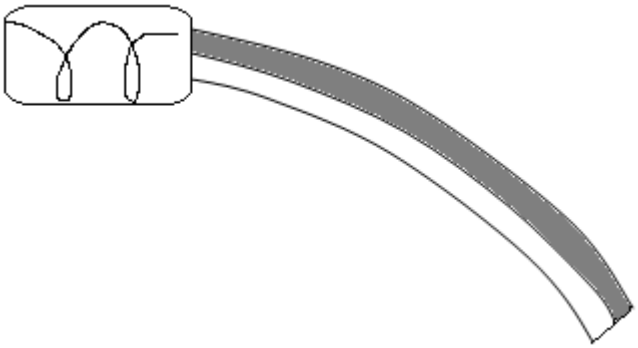
13. The figure 4 below shows a bimetallic strip cooled below room temperature. Sketch on the side the bimetallic strip at room temperature. (1Mark)

Figure 4.



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SECTION B (55 Marks)

Answer all questions in this section in the spaces provided.

14. a) Define "absolute zero temperature" for an ideal gas (1 Mark)

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b) Using kinetic theory, explain Boyle's law for an ideal gas. (2Marks)

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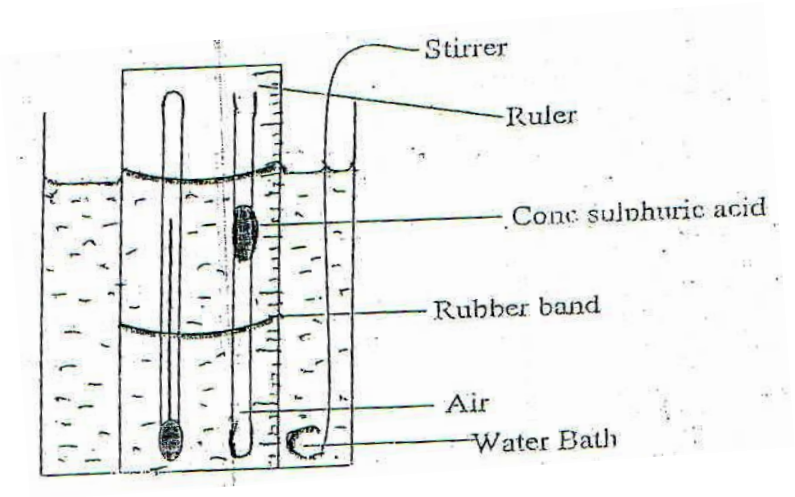
c) The diagram shows an experiment to investigate the relationship between volume and temperature of a fixed mass of gas at constant pressure.



i) Explain the function of;

(I) Concentrated sulphuric acid (1 Mark)

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(II) Stirrer (1 Mark)

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ii). Explain how the set up above can be used to verify Charles law for an ideal gas (3Marks)

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iii. On the grid below sketch a graph of volume (cm^3) against temperature (^0c). Mark with letterT the absolute zero temperature. (2 Marks)

(d)A column of air 20cm long is trapped by mercury thread 6cm long as shown in figure 7 (a) below.

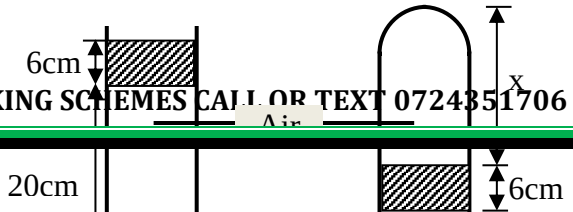

Fig 7

If the tubeis now inverted,determine column X in figure b).Take atmospheric pressure as 76cm of mercury. (2Marks)

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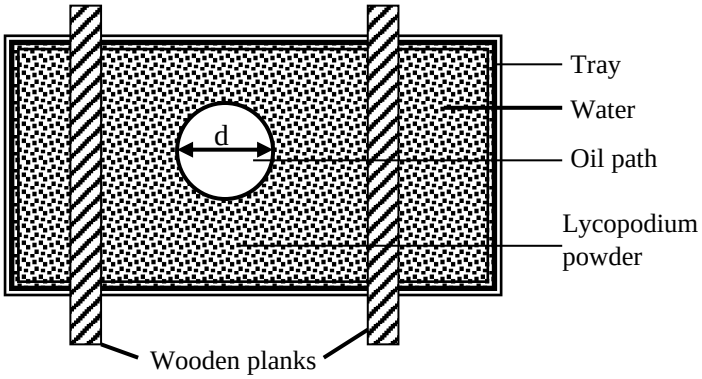
15. The figure 8 below shows an experimental set up for estimating the diameter of an oil molecule.

Figure 8



a) Describe how the oil patch is formed (2Marks)

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b) i)In this experiment the diameter 'd' of the oil patch was measured to be 21cm for an oil drop of radius 0.28mm. Determine the diameter of the oil molecule. (3Marks)

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ii)State any two assumptions made in calculating the diameter of the oil molecule. (2Marks)

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c) What is the role of the lycopodium powder in this experiment? (1Mark)

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d) Describe one method of determining the diameter of an oil drop. (2Marks)

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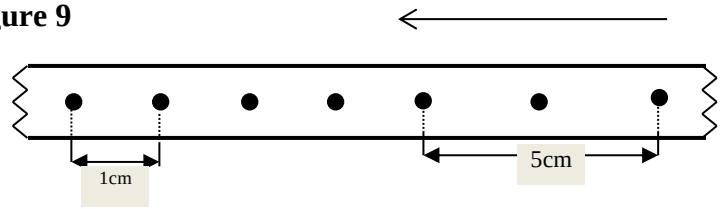
16. The figure 9 below shows the pattern formed on a tape in an experiment to determine the acceleration of a trolley.The frequency of the ticker tape used was 50Hz

Figure 9



Calculate

i) The initial velocity of the trolley (2Marks)

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ii) The final velocity of the trolley (2Marks)

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iii) The acceleration of the trolley (2Marks)

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b) A gun is fired vertically upwards from the top of an open truck moving horizontally at a uniform velocity of 50m/s. The bullet attains a maximum height of 45m.

Calculate

i) The time taken by the bullet to reach the maximum height (3Marks)

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ii) The distance covered by the truck just before the bullet reaches the level from which it was fired. (3Marks)

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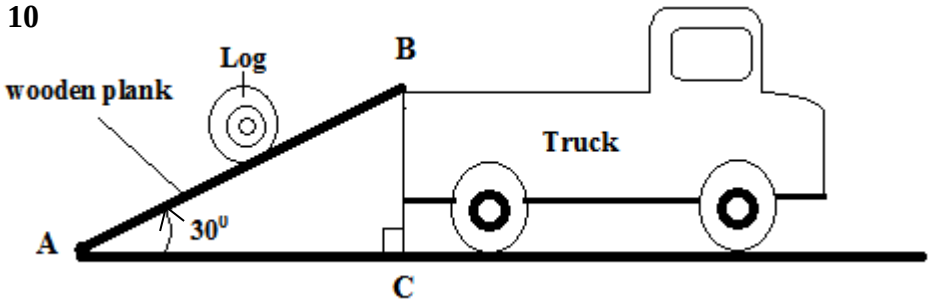
17. A man used a wooden plank to lift a wooden log from the ground to a stationary truck as shown in the figure. The wooden plank is inclined at an angle of 30^0 to the ground.

Figure 10



i) Show that the velocity ratio of the system is given as V.R=$\frac{1}{Sin\ 30^0}$ (3Marks)

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ii) Given that the system is 65% efficient, determine the Mechanical Advantage. (3 marks)

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iii) Explain why the efficiency of this system cannot be 100%.
(1Mark)

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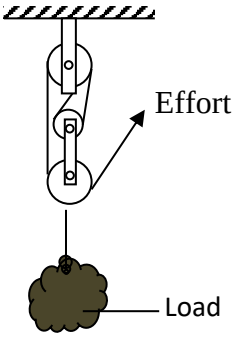
b) The figure 11 shows a pulley system.

Figure 11



i) State the velocity ratio of the machine.
(1Mark)

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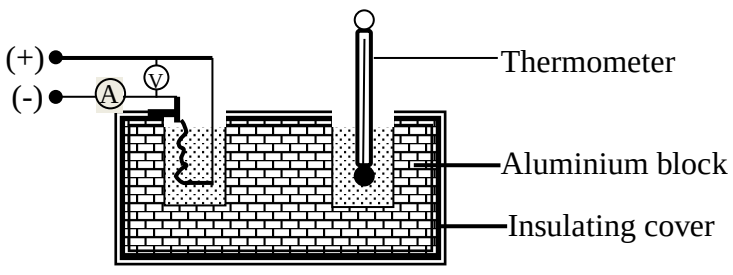
ii) Explain what happens to the Mechanical Advantage of the machine as the load is increased gradually.
(1Mark)

c) Water drops from a waterfall to the bottom. The temperature of the water is found to be higher at the bottom than at the top.State the energy transformations. (1Mark)

18. a) Define "specific heat capacity" of a substance
(1Mark)

b) In an experiment an aluminium block of mass 2kg was heated using an immersion heater as shown in figure 12 below

Figure 12



The temperature of the block was recorded every minute for exactly five minutes and then the heater was switched off. A graph of temperature in ^{0}c against time in minutes for the experiment is shown below.

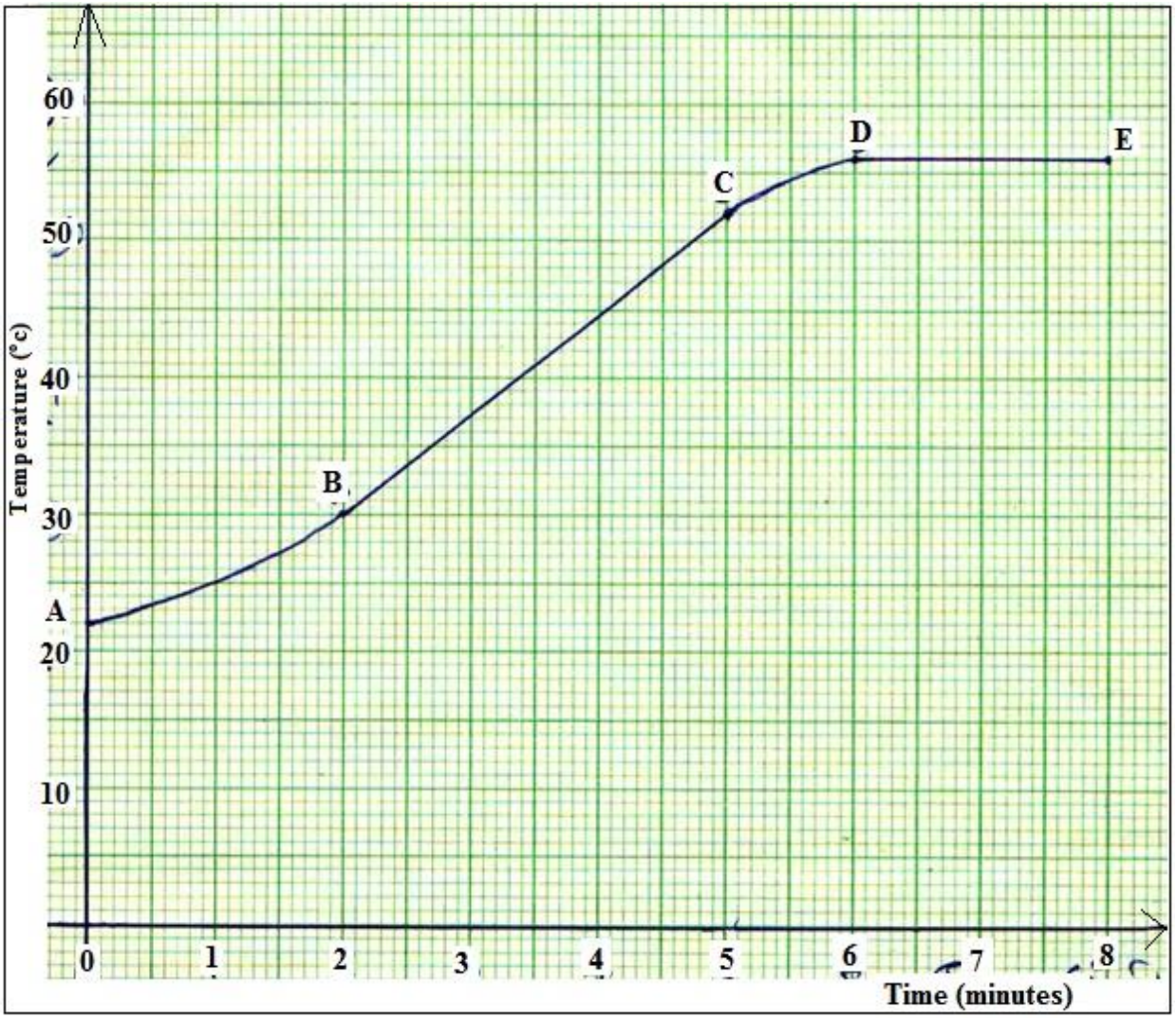


Figure 13

Study the graph above and answer the questions that follow.
Suggest why;

i) The reading in the thermometer rose relatively slowly between point A and B. (1Mark)

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ii) The temperature continued to rise after the heater was switched off (1Mark)

iii) Use the straight portion of the graph (Bto C)to calculate the specific heat capacity of the aluminium given that the voltmeter read 22.00V and ammeter 10A throughout the course of the experiment. (3Marks)

c) Explain the two reasons why the value calculated in b) iii) will not be accurate. (2Marks)

d) A temperature scale X has an ice point of 40^0 and a steam point of 240^0 .What is the temperature in X^0 when the Celsius temperature is 50^0C. (3Marks)

NAME_____**ADMNO** _____

SIGNATURE_____**DATE**_____**CLASS**_____

PEAK EVALUATION EXAMINATIONS
TERM 3 – JANUARY 2021
FORM 4 – PHYSICS PAPER 2

232/2
Physics
Paper 2
Time: 2 hours

Instructions

- ✓ Write your name, index number and name of your school in the spaces provided above.
- ✓ This paper consists of two sections, section I and II. Answer all the questions in both sections.
- ✓ Mathematical tables and silent non – programmable calculators may be used.
- ✓ This paper consist of 12 printed pages. Ensure all the pages are printed.

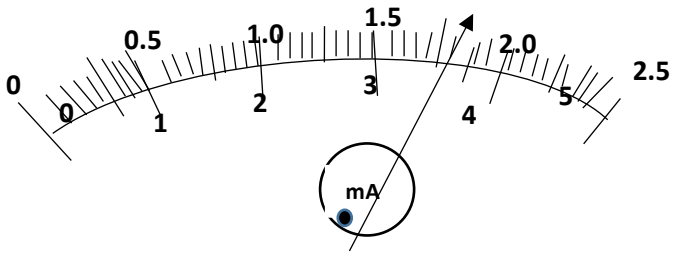
For examiners' use only

section	Question	Maximum score	Candidate's score
I	1 – 11	25	
II	12	11	
	13	11	
	14	11	
	15	12	
	16	10	
Total		80	

Section I (25 marks)

Answer all the questions in this section

1. What is the reading shown by the pointer in the figure below, if the full scale range is;



a) 0 - 2.5 (1 mark)

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b) 0 – 5 (1 mark)

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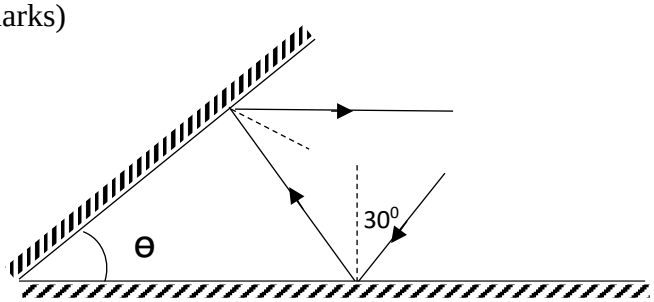
2. The following diagram shows two mirrors inclined at an angle θ to each other. A ray of light is incident on one of the mirrors and finally reflected from the second mirror parallel to the first mirror find the angle between the mirrors. (2 marks)



3. It is not possible to charge an electroscope by contact method using a metal rod. Explain (2 marks)

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4. A car battery is rated 40 Ah and it is expected to supply a constant current for 120 minutes.

a) What is the strength of the current delivered? (2 marks)

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b) Explain why eight dry cells in series cannot be used to start a car engine even though they have the same e.m.f. (1 mark)

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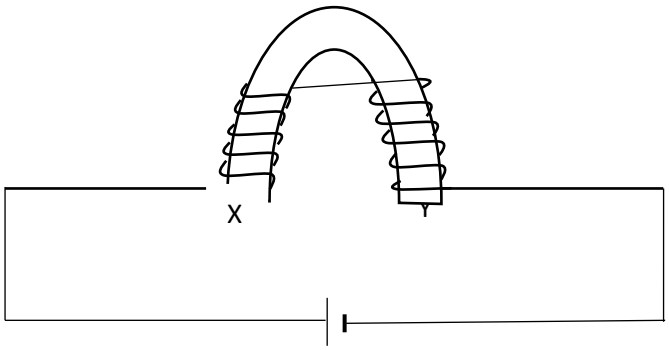
5. A coil of insulated wire is wound around a u – shaped soft iron core X Y and connected to a battery as shown below.

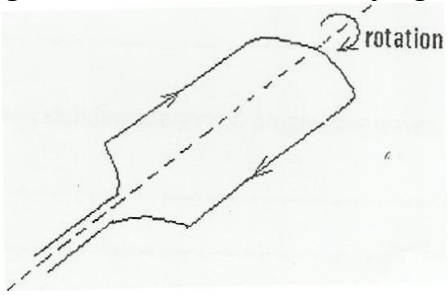


State the polarities of the ends X and Y. (2 marks)

X ……

Y……

6. The figure below shows a coil carrying a current flowing in the direction shown in a magnetic field.



On the same diagram draw the magnetic field lines across the coil. (1 mark)

7. An object of height 5 cm is placed 25 cm from a convex mirror of focal length 15 cm. determine the image distance and hence state the nature of the image formed. (3 marks)

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8. Loudspeaker placed between two wall A and B is sending out constant wave pulses. Determine how far the loudspeaker is from wall B if it is 100m from wall A, and the time between the two echoes received is o.2 seconds (speed of sound is 340m/s)
(3 marks)

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9. The following table shows part of the electromagnetic wave spectrum.

Ultraviolet rays	
Microwaves	
X-rays	
Visible light	

(a) On the right column of the table, arrange the waves in the order of decreasing energy. (1 marks)

(b) Give an application of each of the following electromagnetic waves. (2 marks)

i) Ultraviolet rays:

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ii) Microwaves:

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10. A 4Ω resistor is connected in series to a battery of e.m.f 6V and negligible internal resistance. Determine the power dissipated by the resistor. (2 marks)

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11. State any two laboratory safety rules that deal with electrical safety in the lab. (2 marks)

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Section II (55 marks)

Answer all the questions in this section.

12. a) Define term focal length as used in thin lenses (1 mark)

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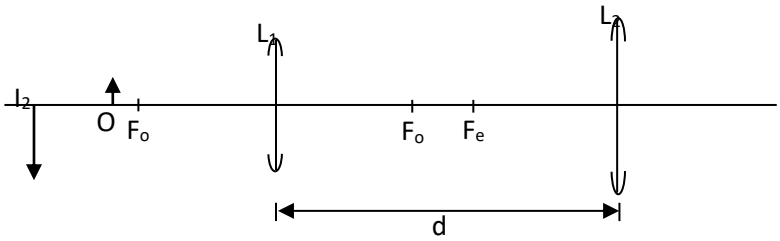
b) Give the functions of the following parts of a lens camera. (3 marks)

i. Shutter: ……...

ii. Film: ……

iii. Diaphragm: ……

c) A compound microscope with objective lens L_1 of focal length 0.8cm and an eyepiece lens L_2 of focal length 2.5cm is shown in figure below. An object O is placed in front of the objective lens at a distance u_1 of 1.2cm. The system forms a final image I_2 at a distance of 10cm from L_2. Determine the distance of separation of lenses L_1 and L_2.
(4 marks)



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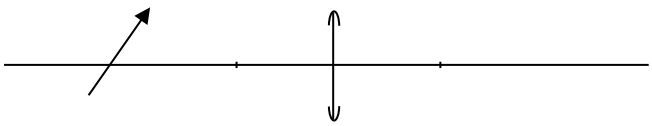
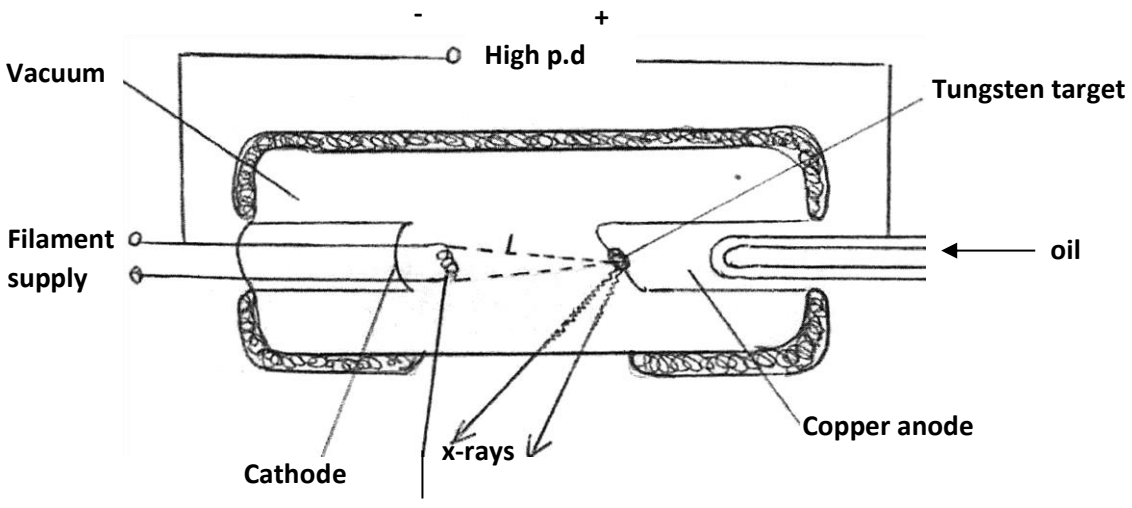
d) The figure below (figure 9) shows an object placed in front of a convex lens. Complete the ray diagram to show the position of the image. (3 marks)



13. The figure below shows the features of an X-ray tube



(a) (i) What is the purpose of the oil going in and out of the anode

(1mk)

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(ii) State the property of tungsten that makes it suitable as a target

(1mk)

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(b)An X-ray tube operates with a potential difference of 100kv and filament current is 20mA. Calculate;

I. The power transferred to the target of X-ray tube (2mks)

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II. The number of electrons hitting the target per second

(2mks)

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III. The maximum kinetic energy of emitted electrons (*Take charge of an electron=1.6x10^{-19}C, mass of an electron =9.1x10^{-31}kg*)

(2mks)

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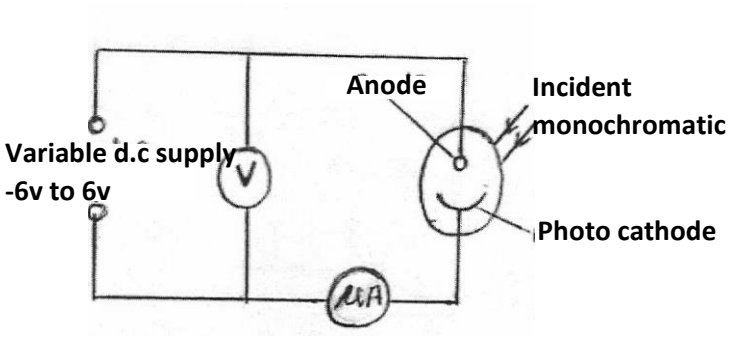
(c) The diagram shows monochromatic radiation falling on a photocell connected to a circuit



The incident radiation has a wavelength of 2.15×10^{-7}m. The metal surface of the photocell has a work function of 2.26 eV.

(i) Calculate the energy in eV of a photon of the incident radiation *(Take $c=3.0 \times 10^{8}$m/s, $h=6.63 \times 10^{-34}$Js and $e=1.6 \times 10^{-19}$C)* (3mks)

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(ii) What is the maximum kinetic energy of the emitted electrons (2mks)

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(iii)Write down the value of the stopping potential (1mk)

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14. a) State Snell's law (1 mark)

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b) A student prepares to swim to the bottom of a pool to pick a coin on the bed. It is only while under the water that she realizes the presence of a sharp object beside the coin that she had not seen. Explain a possible reason why it was not visible in clear swimming pool water. (1 mark)

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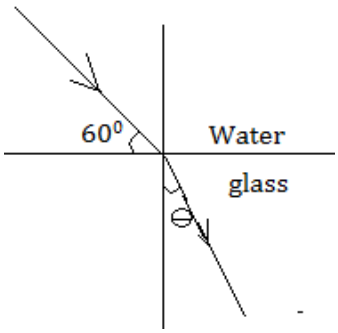
c) The figure below shows a ray of light travelling



i) Calculate the refractive index of water with respect to glass given the refractive index of glass and water are $^{3}/_{2}$ and $^{4}/_{3}$ respectively. (2 marks)

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ii) Calculate the angle Θ (2 marks)

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d) Using a well-labeled diagram, describe how optic fibers are used for communication. (3 marks)

15. a) Define the term capacitance. (1 mark)

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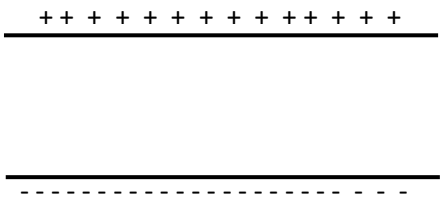
b) The figure below shows two charged plates close to each other



(i) Complete the diagram to show the electric field patterns between the plates (1 mark)

(ii) Without changing the area of overlap, suggest any two ways of increasing the capacitance of a parallel plate capacitor. (2 marks)

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c) You have been provided with **THREE** identical capacitors each of capacitance 12 μ F. State and show how you would combine them to get the following effective capacitance

(i) 36µF (2marks)

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(ii) 4µF (2marks)

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(iii)8μF (2marks)

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16. (a) (i) The following nuclear reaction is part of a radioactive series

$$^{210}_{82}A \xrightarrow{\beta} {}^{210}_{x}B \xrightarrow{r} {}^{210}_{84}C \xrightarrow{s} {}^{206}_{y}D$$

I. Name the radiation represented by **r** and **s** (1mk)

r ……

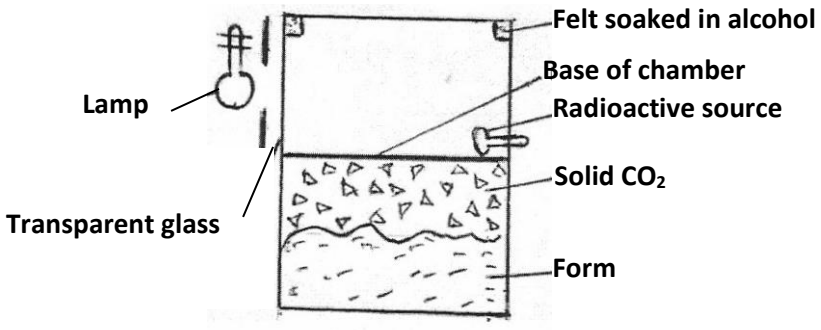
s ……..

II. Determine the number represented by **x** and **y** (1mk)

x …….

y ……

(ii) The figure below shows the features of diffusion cloud chamber used for detecting radiations from radioactive sources



I. State the property of alcohol that makes it suitable for use in the chamber (1mk)

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II. What is the purpose of the solid CO_2? (1mk)

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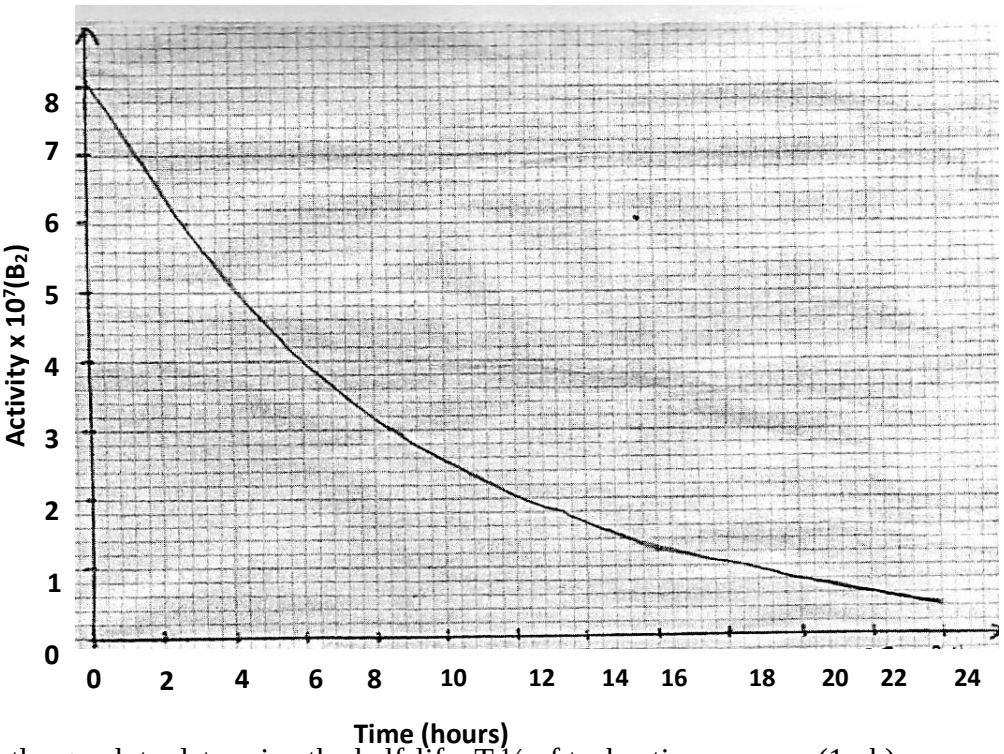
III. Explain how the radiation from the radioactive source is detected in the chamber. (2mks)

IV. State one advantage of the cold chamber over a charged gold leaf electroscope when used as detectors of radiation (1mk)

(b) The graph below shows how the activity of a sample of the radioisotope technetium which is used extensively in medicine, varies with time



I. Use the graph to determine the half-life. T ½ of technetium (1mk)

II. Hence calculate the decay constant for technetium given that $T_{1/2} = \frac{0.6931}{\lambda}$ where λ is the decay constant. (1mk)

III. Determine the number of technetium atoms remaining in the sample after 24 hours (1mk)

NAME: ……. **ADM NO: ..…...…….**

SCHOOL: …… **Signature: ……..**

Date: ……

232 / 3
PHYSICS
PAPER 3
PRACTICAL
2 ½ HOURS

PEAK EVALUATION EXAMINATIONS
TERM 3 – JANUARY 2021
FORM 4 – PHYSICS PAPER 3

INSTRUCTIONS TO CANDIDATES

- *Write your name and Admission number in the spaces provided above.*
- *Answer **ALL** the questions in the spaces provided in the question paper.*
- *You are supposed to spend the first 15 minutes of the 2 ½ 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, for their suitability and accuracy and the use made of them.*
- *Candidates are advised to record their observations as soon as they are made.*
- *Mathematical table and electronic calculators **may be** used.*

FOR EXAMINER'S USE ONLY

Question	Score
1	
2	
Total	

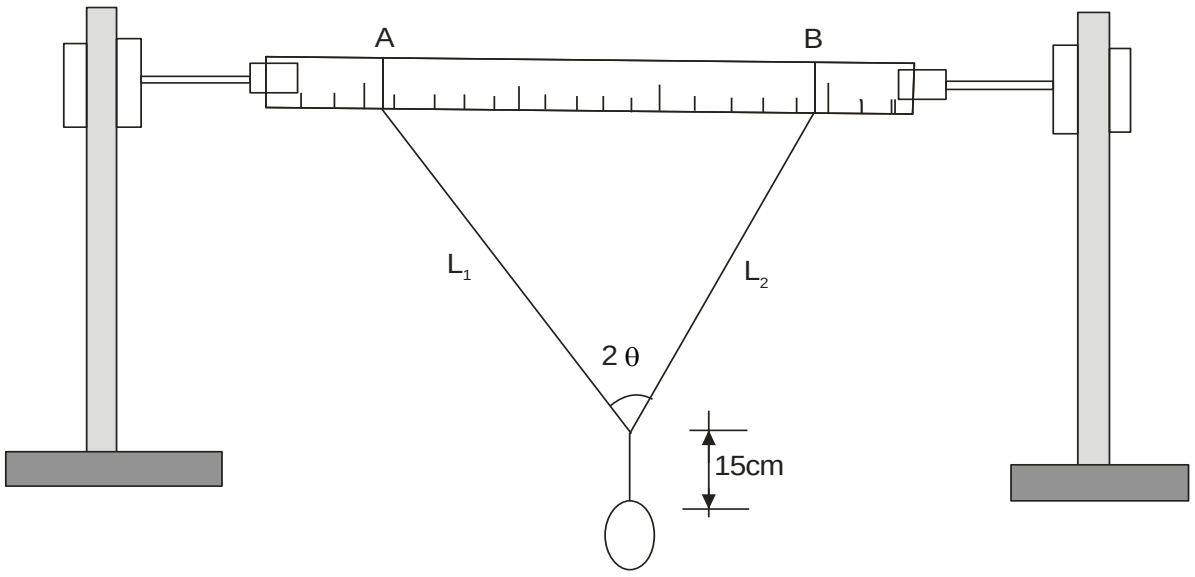
This paper consists of 6 printed pages.
Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing.

 Turn Over

1. You are provided with the following apparatus
   - A metre rule
   - Two stands
   - A pendulum bob
   - Some plasticine
   - Stop watch
   - Protractor
   - Two pieces of strings (long and short one)

   Proceed as follows:

   a) Attach one end of the length of string to the metre rule at 10cm mark. Mark by use of a sliding loop of string round the meter rule.
   b) Fix the string at this point with the small bob of plasticine.
   c) Tie the string in a second loop at 90cm mark so that the string is stretched taught between the two marks.
   d) Fix this loop with a small plasticine. Attach the pendulum bob to the centre of the string so that the centre of gravity is 15cm below the point of suspension.
   e) If the attachments of the pendulum bob to the pieces does not produce a V-shape squeeze the string at the knot between the thumb and the fore finger.



i) Measure the angle 2θ

ii) Pull the pendulum bob towards you through a small distance, release it; measure the time (t) of the motion by timing 10 oscillations.

iii) Remove the plasticine at B and slide the loop towards A by 4cm and repeat (ii) above for other distances AB as shown in the table below.

RESULTS (9 marks)

Length from A to B(cm)	80	76	72	68	64	60
Time for 10 oscillations(s)						
Periodic time T(s)						
$T^2(s^2)$						
2θ						
θ						
$\cos\theta$						

f) Plot a graph of T^2 against Cos θ (5 marks)

g) Find the slope S of the graph. (3 marks)

h) Given that $S = \frac{1.6\pi^2}{k}$, find k (3 marks)

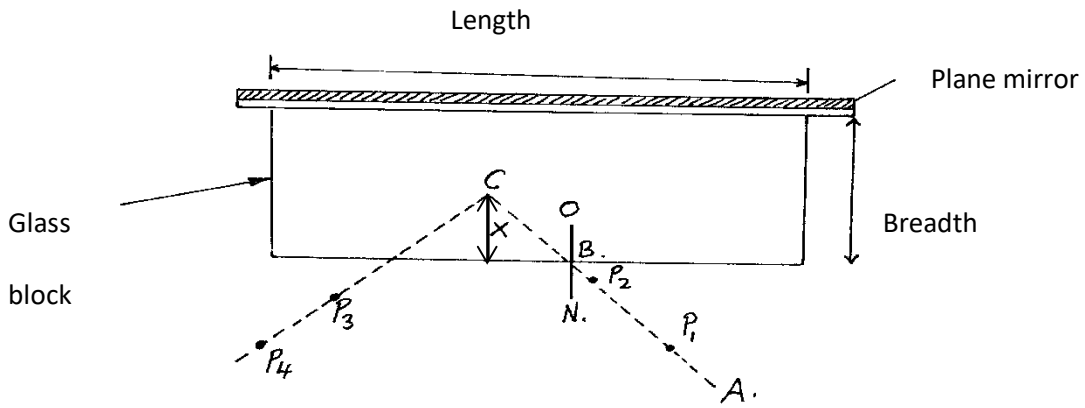
2. PART A

a) You are provided with the following apparatus

- a glass block
- a plane mirror
- 4 optical pins
- a soft board
- A cellotape (about 15cm long)
- 2 white – plain sheets of paper
- a ruler or half metre rule
- a protractor
- 4 office pins

Proceed as follows:-

(i) Using the cello tape provided fix the plane mirror to the glass block alongside as shown in the figure below. The reflecting surface to face the glass block.



(ii) With the use of the office pins, secure firmly a white plain paper on the board and place the block together with attached mirror.

(iii) Draw the outline of the glass block together with the mirror

(iv) Remove the block and the mirror and draw a normal at B somewhere a quarter- way the length of the outline you drew in (iii) above.

(v) Draw four(4) different rays AB incident at B and extended to C. The incident rays should make angles 10°, 20°, 30°,and 40°.

(vi) Replace the glass block together with the attached mirror so as exactly fit the outline in(iii)

(vii) Place two object pins P_1 and P_2 along the 10° line. Locate the images of pinsP_1 and P_2 as they appear by non-parallax (the images of the pins appear to be in a straight line when viewed through the glass block).

Place pins P_3 and P_4 so that the images of pins P_1 and P_2 are not seen.

(viii) Remove the glass block together with the attached mirror from the outline and produce the lines joining P_1 to P_2 and P_3 to P_4 so that the they intersect at C. Measure and record the distance x in the table 2 below. (4 marks)

NB. It may be necessary for you to draw another outline so as to avoid congestion of (construction) lines.

Angle i °	10	20	30	40
Distance x(cm)				

Table 2

(ix) Now measure the breadth b of the glass block.

b=_____(1mark)

(x) Calculate the average A_x of the values of x in table 3 above

A_x _____ (1mark)

(xi) Determine the refractive index of the glass block using the formula.

Refractive index n of glass $n = \frac{b}{A_x}$ (2 marks)

PART B

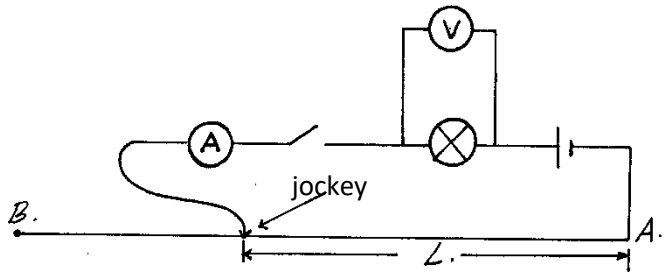
You are provided with the following

- A nichrome wire 1m long mounted on a scale
- A dry cell
- 1 ammeter (0 – 1A)
- A switch
- A bulb
- A voltmeter (0-5v or 0 – 3v)
- A one cell holder
- At least 6 connecting wires, one with a jockey

Proceed as follows

a) (i) Set up the circuit as shown in fig. 2

Fig 2



(ii) With the jockey / crocodile clip at B (L=100cm) note the voltmeter reading V and ammeter reading, I and record on the table III below.

(iii) Repeat the procedure in (ii) above for L=80cm, 60cm, 40cm, 20cm and 0cm and record. 5 marks

Table III

L(cm)	100	80	60	40	20	0
V(volts)						
I (A)						

iv) Plot the graph of V(y-axis) against I on the grid provided. 5marks

v) Calculate the slope of your graph when current is 0.15A. 2 marks

KASSU JET EXAMINATION - 2021
Kenya Certificate of Secondary Education

232/1
PHYSICS
PAPER ONE
Jan. 2021
2 hours

Name.....Index Number...../.....

Admission Number…….Class: ……...Candidate's Signature.....Date.....

INSTRUCTIONS TO CANDIDATES

i) *Write your name, admission number and index number in the spaces provided above.*
ii) *Sign and write the date of examination in the spaces provided above*
iii) *This paper consists of **TWO** sections **A** and **B.***
iv) *Answer **ALL** the questions in section **A** and **B** in the spaces provided.*
v) *All working **MUST** be clearly shown.*
vi) *Non programmable silent calculators may be used.*
vii) *ALL numerical answers must be expressed in decimal notation.*
viii) ***This paper has 14 pages. It is the responsibility of the candidate to ascertain that all the pages are printed as indicated and that no questions are missing.***
ix) ***Candidates should answer the questions in English.***

Constant: g=10N/kg or 10m/s^2

For Examiners Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 – 13	25	
B	14	13	
	15	15	
	16	08	
	17	09	
	18	10	
Total Score		**80**	

SECTION A: (25 marks**)**

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

1. **Figure 1** shows a magnified portion of the scale of a micrometer screw gauge used to measure the diameter of spherical object.

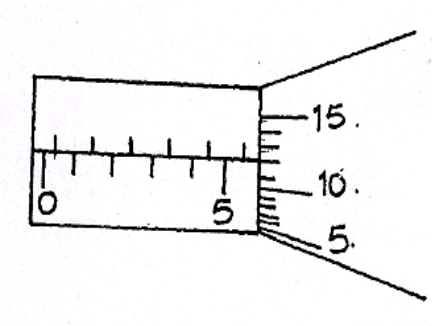


Figure 1

State the diameter of the object (1mark)

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2. **Figure 2** shows a flask fitted with a glass tube dipped into a beaker containing water at room temperature. The cork fixing the glass tube is air tight.

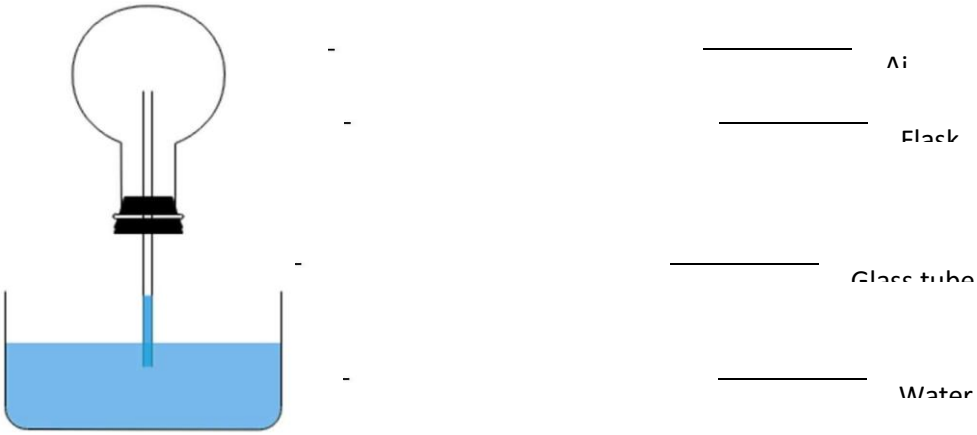

Figure 2

State with reason what is observed when the flask is held with warm hands. (2marks)

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3. 1800 cm^3 of fresh water of density 1g/cm^3 is mixed with 2200cm^3 of sea water of density 1.03g/cm^3. Determine the density of the mixture. (2marks)

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4. a) State the principle of moments. (1 mark)

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b) **Figure 3** shows a uniform meter rule balancing when a mass of 200g is hung at one end. Determine the tension T in the string (2marks)

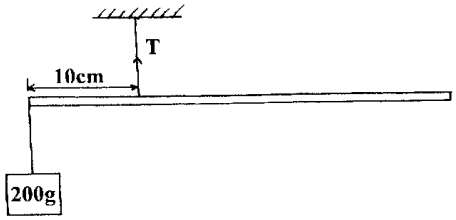

Figure 3

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5. Name two forces that determine the shape of liquid drop on a solid surface. (2marks)

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6. It was observed that when air is blown between two pieces of paper, both cling to each other. Explain. (1mark)

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7. a) State the Hooke's Law. (1mark)

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b) **Figure 4** shows identical spiral springs supporting a load of 90N. Each spring has a spring constant k = 200N/m

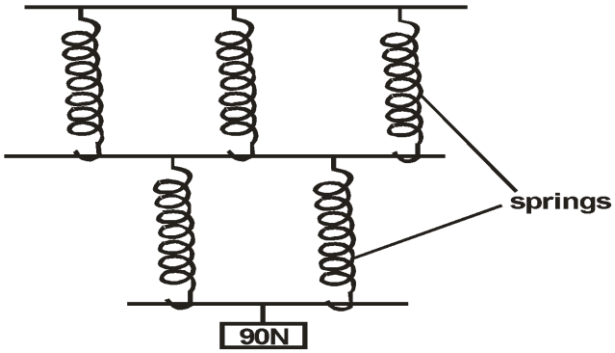

Figure 4

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

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8. In an experiment to estimate the diameter of an oil molecule, an oil drop of diameter 0.05cm spreads over a circular patch whose diameter is 20cm. Determine the diameter of the oil molecule.

(3marks)

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9. **Figure 5** shows a rectangular loop with two thin threads loosely tied and dipped into a soap solution.

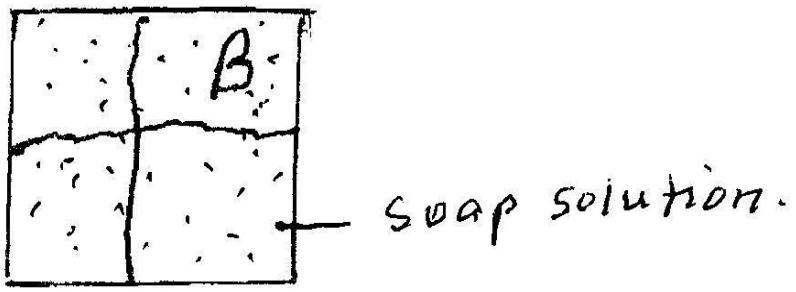

Figure 5

Draw on the side of **Figure 5** what is observed when point **B** is punctured. (1mark)

10 a)**Figure 6** shows a manometer used to measure the lung pressure of a student. Given that the atmospheric pressure is 103360Pa, determine the lung pressure of the student.
(2marks)

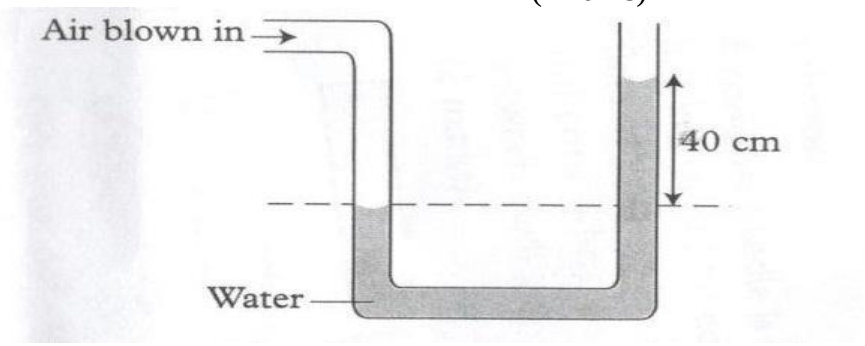

Figure 6

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b**)** State one factor affecting pressure in fluids. (1mark)

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11. Give a reason why mass of a body is constant everywhere. (1mark)

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12. A stop watch reads 08:12:84 and 09:10:72 before and after an experiment respectively. Determine the duration of the event in SI units. (2marks)

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13. Explain thermodynamics as a branch of physics. (1 mark)

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SECTION B: (55 m*arks*)

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

14.a)Define the term work done applied in physics. (1mark)

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b). **Figure 7** shows the cross – section of a wheel and axle of radius 6.0 cm and 1.5 cm respectively used to lift a load. Use it to answer the questions that follow.

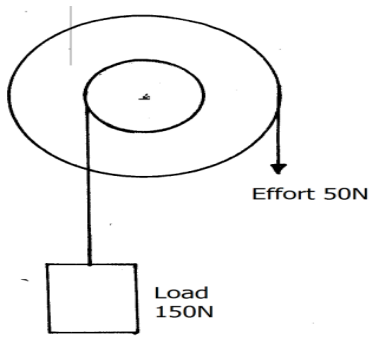

Figure 7

Determine the:

I)(i) mechanical advantage (M.A) of the system. (1mark)

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(ii) velocity ratio (V.R) of the system. (1mark)

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(iii) efficiency of the machine. (1mark)

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II) Give one reason why the above machine is not 100% efficient. (1mark)

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c) Define specific latent heat of vaporisation (1 mark)

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d) 1200g of a liquid at 10^0C is poured into a well-logged calorimeter. An electric heater rated 1.5 KW is used to heat the liquid. **Figure 8** shows the variation of temperature of the liquid with time.

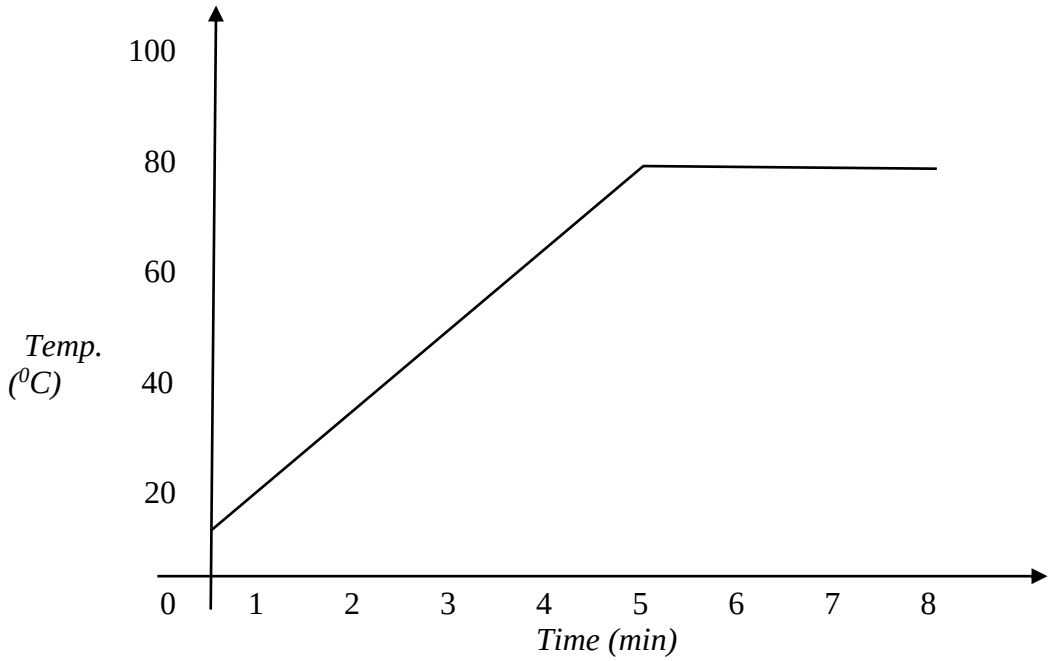

Figure 8

Use **figure 8** to answer the following questions:

(i)State the boiling point of the liquid (1 mark)

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(ii) Determine the amount of heat given out by the heater to heat the liquid to the boiling point.

(2 marks)

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(iii)Determine the specific heat capacity of the liquid. (2marks)

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iv) If 20g of the liquid vapour was collected by the end of the 8th minute, determine the specific latent heat of vaporization of the liquid. (2 marks)

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15.a) **Figure 9** shows a velocity –time graph for the motion of a certain body.

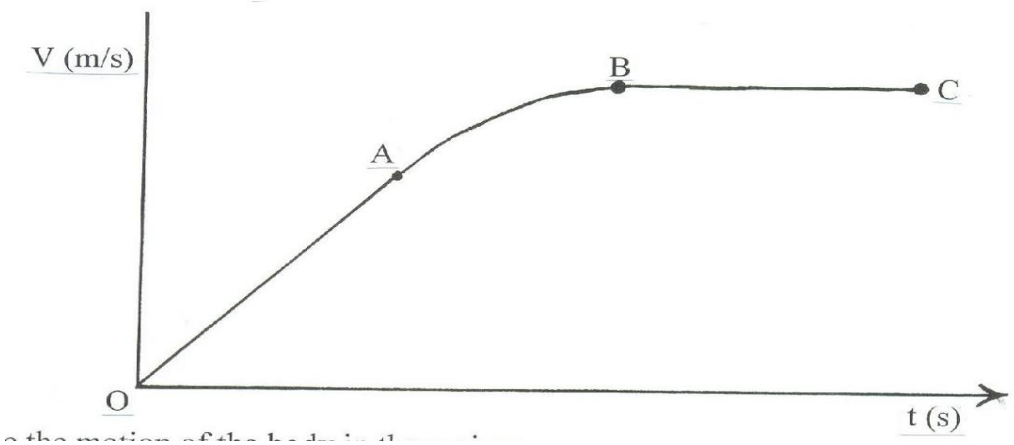

Figure 9

Describe the motion of the body in the region:

(i) OA: (1mark)

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(ii) AB: (1mark)

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(iii) BC: (1mark)

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(b) A car moving initially at 25m/s decelerates at 4 m/s^2.

(i) Determine the time taken for the car to stop (2marks)

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(ii) Sketch the velocity – time graph for the motion of the car up to the time the car stopped. (1mark)

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c) A ball is projected vertically upwards with initial velocity of 80m/s. Determine the time taken to reach maximum height. (2marks)

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d) A bullet of mass 80g moving with a velocity of 20m/s penetrates a sand bag and it's brought to rest in 0.05 seconds. Determine average retarding force of the sand. (2marks)

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e) (i) State the principle of conservation of linear momentum (1 mark)

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(ii) A bullet of mass 60g is fired horizontally with a velocity of 200 m/s into a suspended stationary wooden block of mass 2940g. Determine:

(a) Common velocity of both the bullet and the block, if the bullet embedded into the block. (2 marks)

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(b) Height to which the block rises. (2 marks)

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16. a) Explain why bodies in circular motion undergo acceleration even when their speed is constant. (1mark)

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b) A particle moving along a circular path of radius 5cm describes an arc of length 2cm every second. Determine:

(i)Its angular velocity. (1mark)

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(ii)Its periodic time. (2marks)

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c) A stone of mass 150g is tied to the end of a string 80cm long and whirled in a vertical circle at 2rev/s. Determine the maximum tension in the string. (3marks)

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(d) State **one** factor affecting centripetal force (1mark)

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

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b)The weight of a stone in air is 8.5N. When fully immersed in paraffin of density 0.8g/cm³ its weight is 7.3N. Determine the;

(i) up thrust in the paraffin. (1 mark)

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(ii) volume of the stone. (2 marks)

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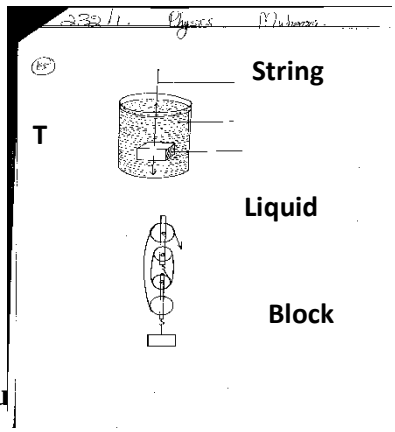
c**) Figure 10** shows rectangular metal block of density 12,500kgm^{-3} and dimensions 30cm x 20cm x 20cm suspended inside a liquid of density 1200kgm^{-3} by a string attached to appoint above the liquid. The three forces acting on the block are; the tension T, on the string, the weight W, of the block, and the up thrust, U, due to the liquid.



Figu

Figure 10

(i) Write an expression relating **T**, **W** and **U** when the block is in equilibrium inside the liquid. (1 mark)

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(ii) Determine the weight, **W**, of the block (1 mark)

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

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(iv) Hence determine the tension, T, in the string (1 mark)

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18.a) **Figure 11** shows a set-up that may be used to verify pressure law.

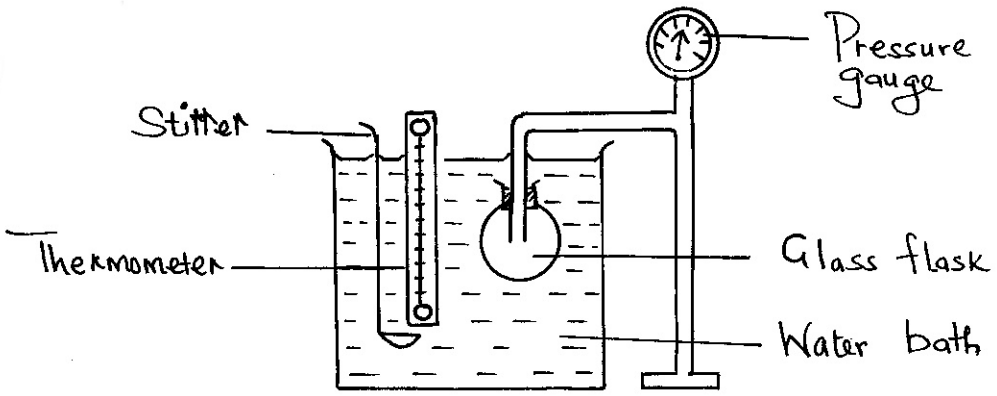

Figure 11

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

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ii)Explain how the measurements in (i) above may be used to verify pressure law. (2 marks)

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b)A column of air 26cm long is trapped by mercury thread 5.0cm long as shown in

figure11 (a) . When the tube is inverted as in **figure11 (b)** the air column becomes 30cm long. Determine the value of atmospheric pressure (2 marks)

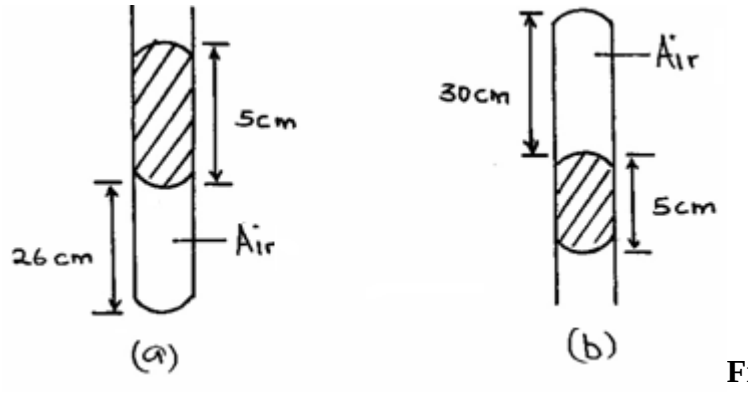

Figure11

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c)A steel cylinder of capacity 0.45m³ contains nitrogen at a pressure of 40,000Pa when the temperature is 17°C. Determine the pressure of nitrogen if it is allowed to flow into another cylinder of capacity 8.5m³ with the temperature reduced to -23°C. (2 marks)

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d) Using kinetic theory of gases, explain how a rise in the temperature of a gas causes a rise in its pressure if the volume is kept constant. (2 marks)

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1NAME: ……..…CLASS:…..…ADM NO:……

SIGNATURE:……INDEX NO:……

DATE:……..

232/2
PHYSICS
PAPER 2
TIME: 2 HOURS

KASSU JET EXAMINATION - 2021

Kenya Certificate of Secondary Education
Physics Paper 2

Instructions to candidates

- Write your name, admission number, class, signature and date in the spaces provided at the top of the page.
- 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. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A	1 – 11	25	
B	12	10	
	13	10	
	14	8	
	15	16	
	16	11	
TOTAL		80	

SECTION A: (25 MARKS)

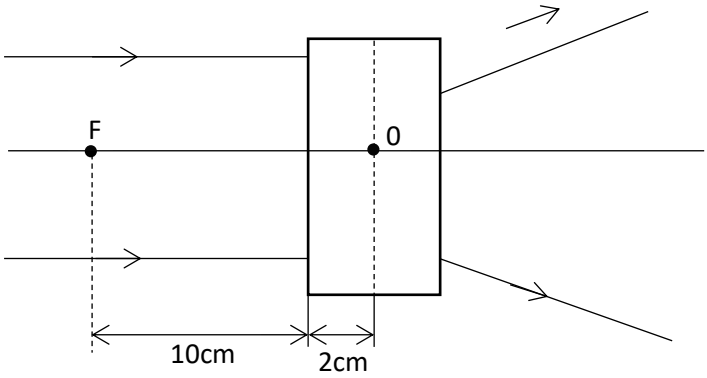
1. Explain why repulsion method is the best test for polarity of a magnet as opposed to attraction. (1 mark)

2. Define the following;

(i) the direction of an electric field. (1 mark

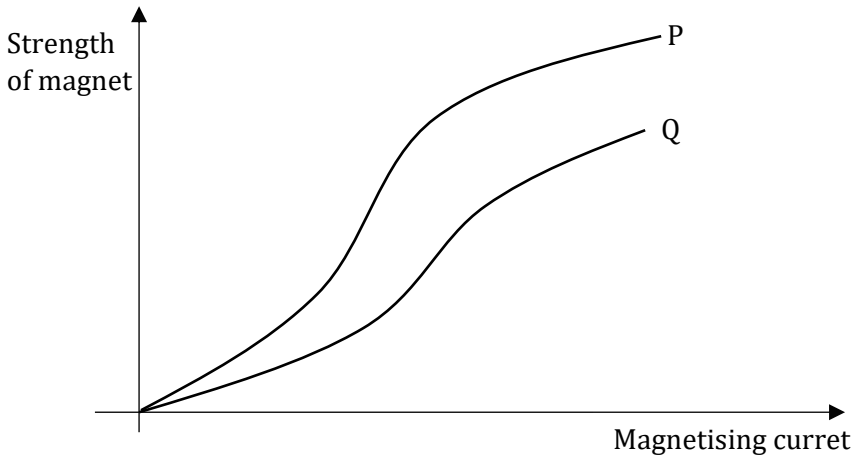
(ii) the capacitance of a capacitor. (1 mark)

3. The diagram below shows a set of parallel rays of light incident on a thin lens and emerging out from the lens. The lens is placed inside a blackbox with narrow opening on both sides.



(a) State the type of the lens in the box and explain your answer. (2 marks)

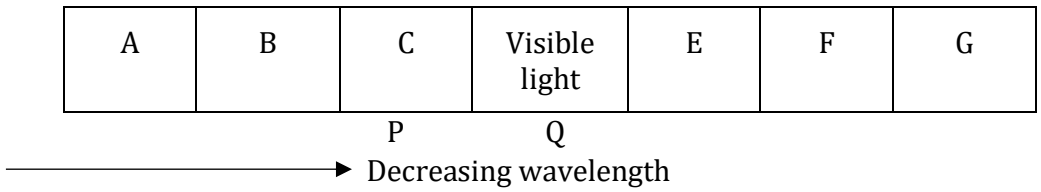
4. In an experiment to magnetize two substances P and Q using electric currents, two curves were obtained as shown below.



(i) Explain the difference between substances P and Q with reference to domain theory. (1 mark)

(ii) State and explain which of the two substances in (i) above would be suitable for use as a core of an electromagnet. (1 mark)

5. The letters in the figure below represents different types of radiations in the electromagnetic spectrum.



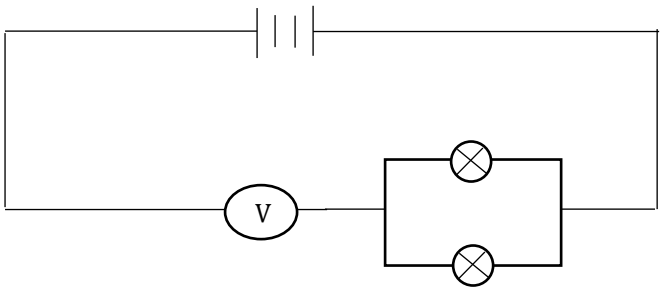
(i) Which colours of spectrum appears at P and Q?

P - ..... (1 mark)

Q - ..... (1 mark)

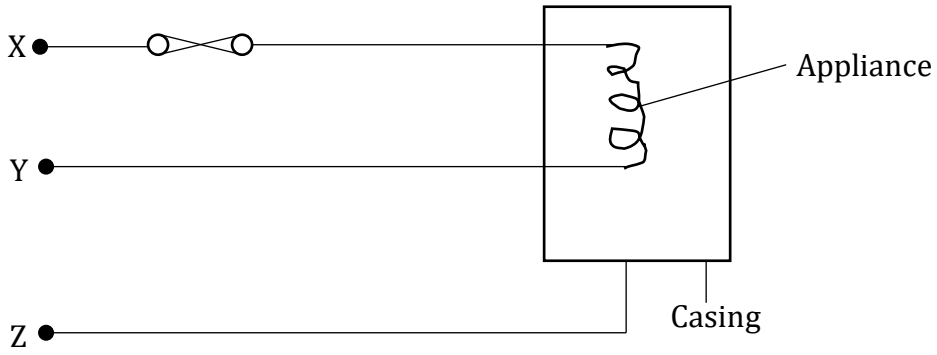
(ii) How is radiation marked C detected? (1 mark)

6. The diagram below shows a circuit that was connected by a form one student. Comment with a reason on the brightness of the bulbs. (2 marks)



7. A car battery requires topping up with distilled water occasionally. Explain why this is necessary and why distilled water is used. (2 marks)

8. The figure below shows the wiring in a modern mains appliance.



Identify the wires X, Y and Z. (2 marks)

X - ……

Y - ……

Z - ……

9. Three resistors of resistance 2.0Ω, 4.0Ω and 6.0Ω are connected together in a circuit. Draw a circuit diagram to show the arrangement to the resistors which gives;

(i) An effective resistance of 3.0Ω (2 marks)

(ii) A minimum resistance. (1 mark)

10. When rod X was rubbed with material Y, it was observed that the material acquired a negative charge.

(i) State the charge on the rod X. (1 mark)

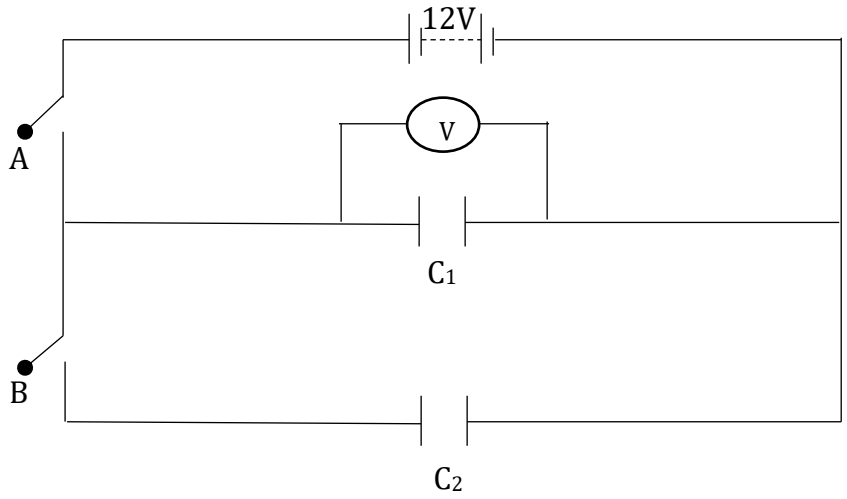
(ii) Explain how the rod X acquired the charge. (1 mark)

(iii) Explain briefly how you would test the nature of the charge on rod X using an electroscope. (2 marks)

11. Distinguish between intrinsic semi-conductor and extrinsic semiconductor.
(2 marks)

SECTION B: (55 MARKS)

12. The following figure shows a circuit where a battery of an e.m.f. 12v, switches A and B, two capacitors C_1 = 9.0μF and C_2 = 3.0μF and a voltmeter connected as shown below.



(i) Determine the charge on C_1 when the switch A is closed and B open. (2 marks)

(ii) What is the voltmeter reading when switch A is closed and switch B open? (Assume capacitor C_1 is fully charged). (1 mark)

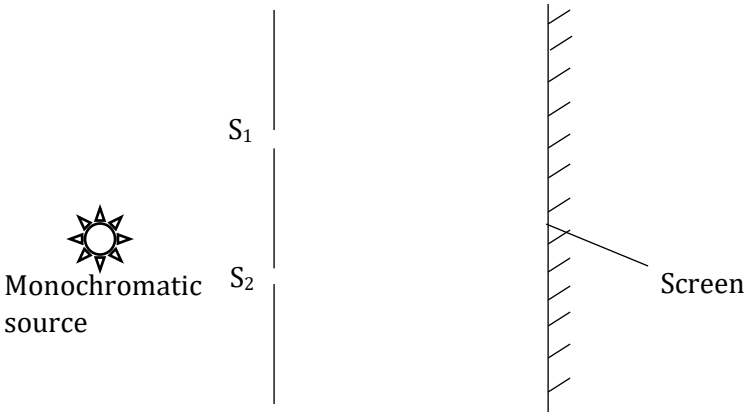
Switch A is now opened and switch B closed. Determine:

(iii) The effective capacitance of C_1 and C_2. (2 marks)

(iv) The voltmeter reacing V. (3 marks)

(v) The energy stored by C_1 (2 marks)

13. (a) In an experiment to study one of the properties of waves, a double slit was placed close to the source of monochromatic light as shown below.



(i) What property of waves is being investigated? (1 mark)

(ii) State the function of the double slit. (1 mark)

(iii) State and explain the observation made on the screen. (2 marks)

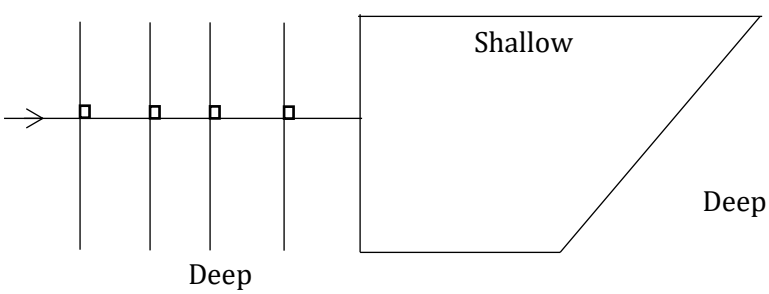
(iv) State what is observed on the screen when;

(I) the slit separation S_1 S_2 is decreased. (1 mark)

(II) White source of light is used in place of monochromatic source. (1 mark)

(III) S_1 and S_2 are made larger. (1 mark)

(b) The diagram below shows plane wave fronts in a ripple tank incident on a boundary between a deep to shallow region



On the same diagram, sketch the wave pattern in and beyond the shallow region. (2 marks)

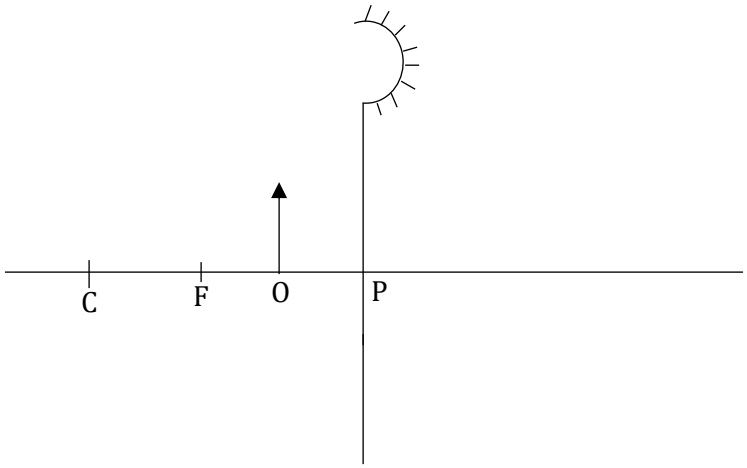
(c) The equation below represents a nuclear decay. (1 mark)

$$^{232}_{90}W \xrightarrow{A} {}^{228}_{88}X$$

Identify the radiation A.

A - ……

14. (a) The diagram below shows an object O placed infront of a concave mirror as shown.

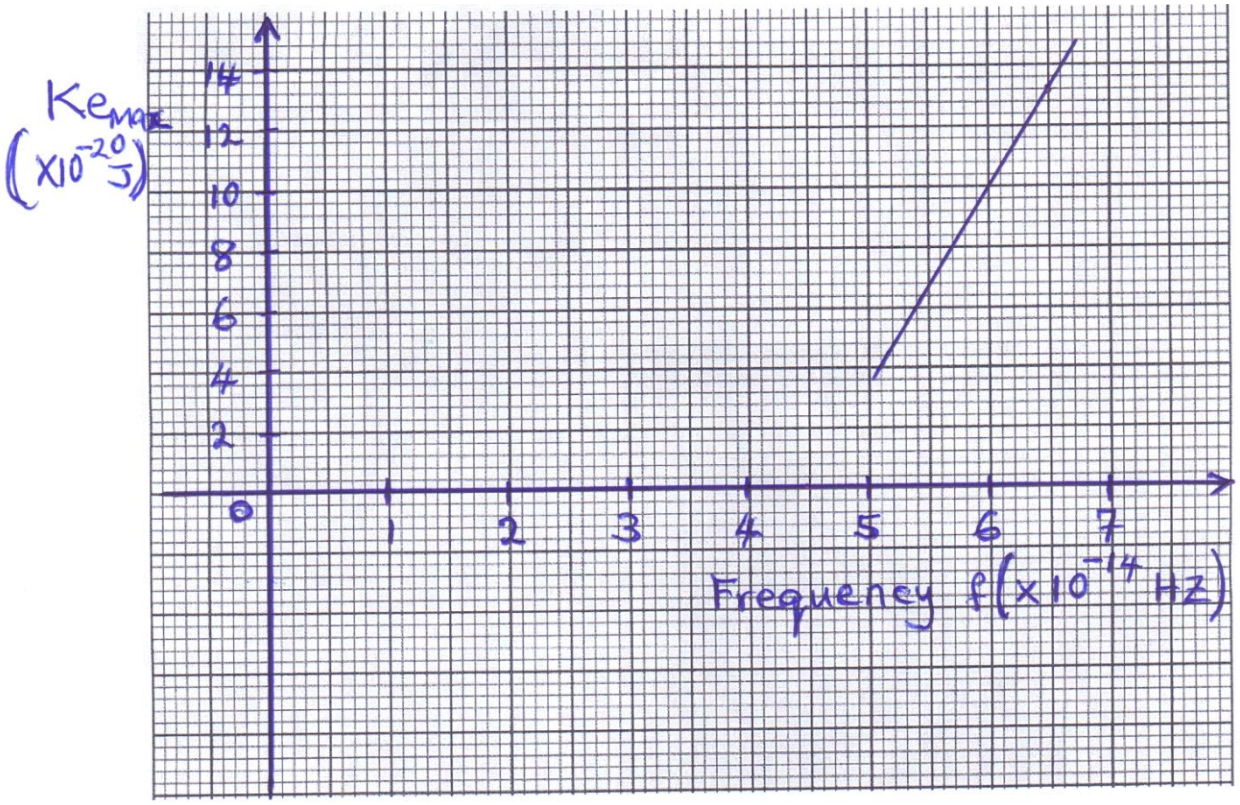


(i) Complete the diagram to show the image formed. (2 marks)

(ii) State two characteristics of the image formed. (1 mark)

(b) (i) State two factors that determine the speed by which electrons are emitted from metal surface by light falling on it. (2 marks)

(ii) In an experiment using a photocell, light of varying frequency but constant intensity was shone onto the surface of a metal. The maximum kinetic energy, $(Ke)_{max}$ emitted for each frequency, was determined. The graph below shows how Ke_{max} varies with frequency f.



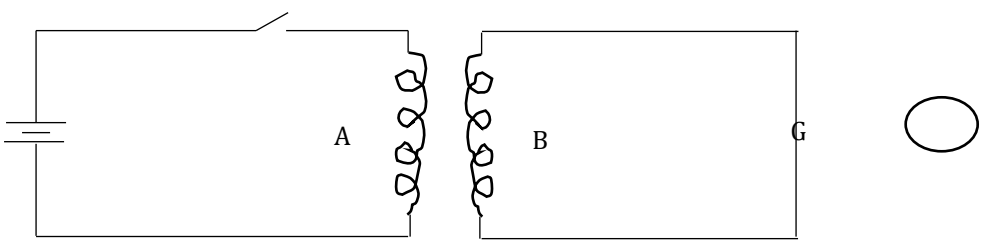
From Einstein's equation, $hf = \Theta + Ke_{max}$, where Θ is the work function. Determine.

(i) the threshold frequency, f_0 from the graph (1 mark)

(ii) the planks constant, h (2 marks)

15. (a) An electric cooker has an oven rated 3KW, a grill rated 2KW and two rings each rated at 500W. The cooker operates from 240V mains. What is the cost of operating all the parts for 30 minutes if electricity cost Ksh.6.50 per unit?
(3 marks)

(b) Fig. below shows identical copper coils A and B placed close to each other. Coil A is connected to a d.c. power supply while coil B is connected to a galvanometer.



(i) State and explain what is observed on the galvanometer when the switch is closed. (2 marks)

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

(iii) State what would be observed if the number of turns of coil B is doubled. (1 mark)

(c) A transformer with 2000 turns in the primary circuit and 150 turns in the secondary circuit has a primary circuit connected to a 800V ac source. It is found that when a heater is connected to the secondary circuit, it produces heat at the rate of 1000w. Assuming 90% efficiency, determine the;

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

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

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

(d) A cell drives a current of 5A through a 1.6Ω resistor. When connected to a 2.8Ω resistor, the current that flows is 3.2A. Determine the e.m.f. (E) and internal resistance (r) of the cell. (4 marks)

16. (a) State how each of the following can be increased in an x-ray tube.

(i) Intensity of x-rays. (1 mark)

(ii) penetrating power of x-rays. (1 mark)

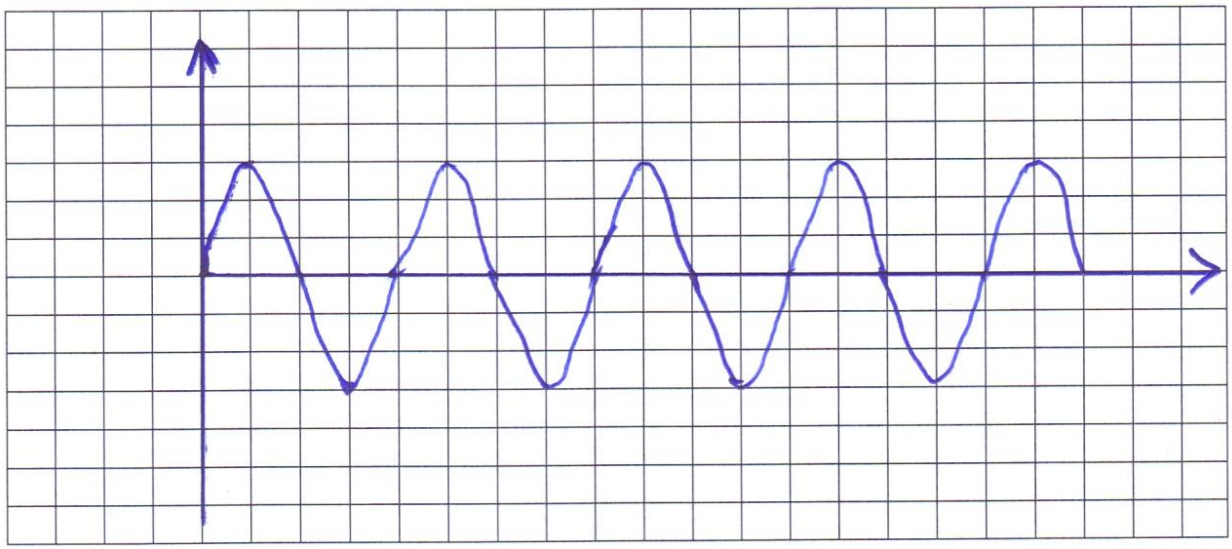
(b) An x-ray tube has an electron beam current of 10mA and is accelerated through a p.d of 60KV. The efficiency is 0.5%. Calculate;

(i) the input power (2 marks)

(ii) the quantity of heat produced per second. (1 mark)

(iii) the number of electrons hitting the target per second. (2 marks)

(c) The fig. below shows an a.c. signal on the C.R.O screen.



Determine:

(i) The frequency of the signal given that the time base is set at 10ms/div.
(2 marks)

(iii) The peak voltage of the signal given that the y-gain is set at 50v/div

(2 marks)

Name:……...…… **Index No**…….

232/3 **Candidate's Signature**:……
PHYSICS
PRACTICAL **Date**:……..……
PAPER 3
JAN 2021
TIME: $2\frac{1}{2}$ HRS

KASSU JET EXAMINATION.

Kenya Certificate of Secondary Education (K.C.S.E.)

232/3
PHYSICS
Paper 3

INSTRUCTIONS TO CANDIDATES

- **Write your name and index number in the spaces provided.**
- **Mathematical tables and non-programmable calculators may be used.**
- **This paper consists of three questions.**
- **Attempt all the questions in the spaces provided.**
- **ALLOW working MUST be clearly shown.**

For Examiners Use

QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
1	20	
2	20	
TOTAL	40	

This paper consists of 11 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing

QUESTION ONE

Apparatus

-stopwatch

-250ml beaker

-Rubber bung

-Thermometer

- Bunsen burner

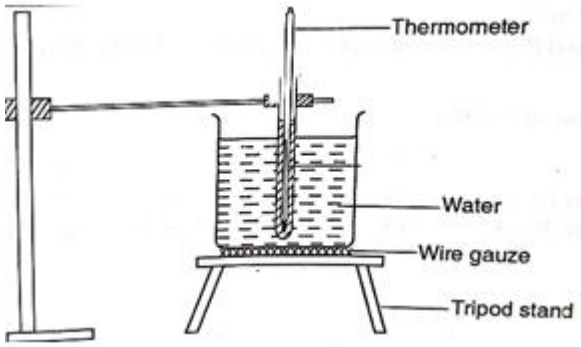
-Tripod

- Gauze

- Retort stand and clamp

- Hot water

Figure 2.



Procedure

(a) (i) Measure and record the ambient temperature, T_A =……^{0}C (1 mark)

(ii) Fill an empty beaker with exactly 150ml of hot water (check the side scale of the beaker)

(iii)Set up the apparatus as shown in **figure 2**. Ensure the thermometer is about 2cm above the bottom of the beaker.

(i) Record the initial highest temperature of water T_H=…….. ^{0}C (1 mark)

(b) Start the stopwatch and time for every 2.0 minutes the temperature T of water. Record the temperature in **Table 2** for 14 minutes

Time (t) in minutes	2	4	6	8	10	12	14
Temperature (T) in ^{0}C							
$(T-T_A)^0$C							
$Log_{10}(T-T_A)$ (2 d.p)							

(6 mark)

(c) Plot a graph of $Log_{10}(T-T_A)$ against time (Hint: $Log_{10}(T-T_A)$ should start at 1.0) (5 mark)

(d) From the graph determine:

(i) The Slope S (3marks)

……
……
……
……

(ii) The cooling constant , K of water given S=-0.4343K (2 mark)

……
……

(e) Given that the specific heat capacity of water is 4.2J/g/^{0}C determine the heat lost when the water cools to the temperature of the surrounding (2 mark)

……
……
……
……

2. PART A

You are provided with the following apparatus :

- One resistor labelled R = 4.0Ω
- A wire labelled W mounted on milliameter scale
- A wire labelled S mounted on a milliameter scale
- One dry cell and a cell holder
- One jockey
- one centre zero galvanometer
- Eight connecting wires, four with crocodile clips at both ends
- A micrometer screw gauge
- A switch

Proceed as follows

a) Determine the average diameter D, of the wire labelled W using the micrometer screws gauge provided.

D_1 = ... mm (½ mark)

D_2 = ... mm (½ mark)

$D = \frac{D_1 + D_2}{2}$ (in cm) (1 mark)

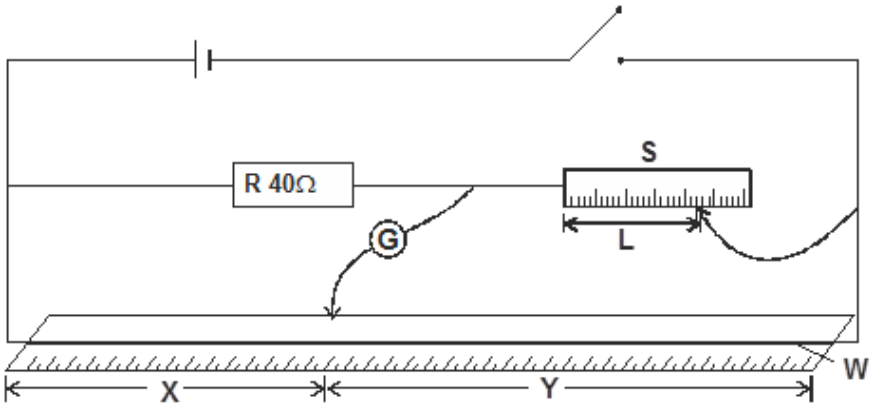
.....

.....

.....

b) Set up the apparatus as shown in the circuit diagram in **figure 3** below.

Use the crocodile clips to fix length L, of wire labelled S at 50cm from the end connected to the galvanometer G.



c) Close the switch and use the jockey to touch one end of the wire W, and then the other end. The deflections on the galvanometer should be in opposite directions, if not check the circuit. Adjust the positions of the jockey along the wire W until there is no deflection in the galvanometer. Record the value of x and y.

x = ... cm (½ mark)

y = ... cm (½ mark)

d) Record for other values of L in **table 3** below

L (cm)	45	40	35	30	25	20
X (cm)						
Y (cm)						

y/x (3 d.p)						

(4 marks)

e) i) Plot a graph of $^{y}/_{x}$ (y-axis) against L. (5 marks)

ii) Determine the slope, m of the graph. (2 marks)

iii) Given that $K = \underline{m}\pi D^2$, determine the value of K.

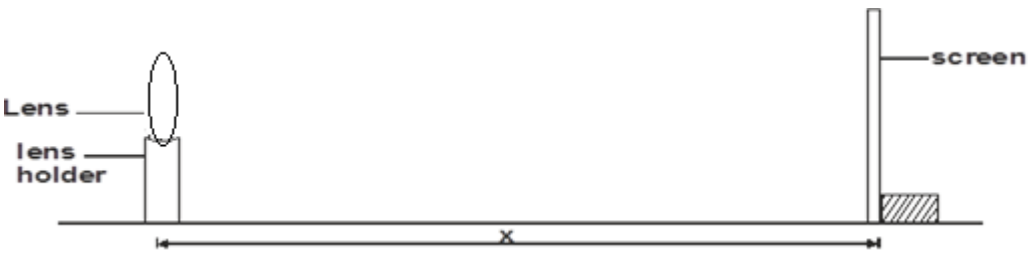
(2 marks)

PART B

b) You are provided with a lens P a lens holder a white screen and half metre rule.

Procedure

i) Set the apparatus as shown in **figure 4** below. Focus a sharp image of a distant object on the screen (e.g window frame). The object should be 10cm away. The object should be at least 10cm away.



a) Measure the distance x in cm between the lens and the screen at which a sharp image is obtained repeat this two times, using different objects and record your readings in **table 4** below.

Object	Distance X, (cm)
1	
2	

(2 marks)

ii) Calculate the average value of x (1 mark)

iii)What is the physical significance of the result obtained in (iii) above? (1 mark

NAME:…… INDEX NO:…….. ……

SCHOOL…… SIGNATURE:…….....

231/1
PHYSICS
PAPER 1 (THEORY)
JANUARY 2021
TIME: 2 HOURS

KENYA HIGH EXAMINTIONS 2021

POST MOCK EXAMS 2021

Kenya Certificate of Secondary Education (K.C.S.E)

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.

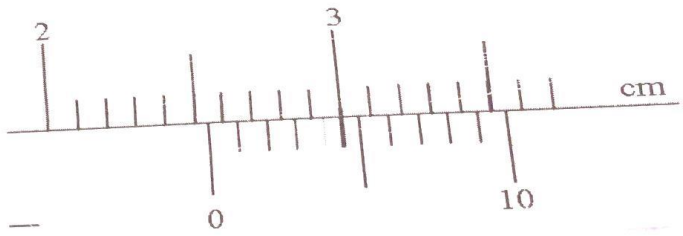
Take g = 10N/kg

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)

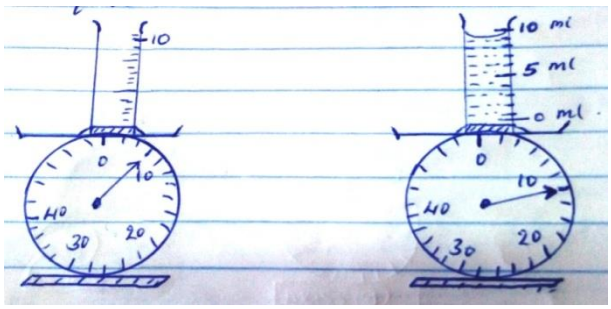
1. The vernier callipers in the figure below has a zero error of -0.05cm.



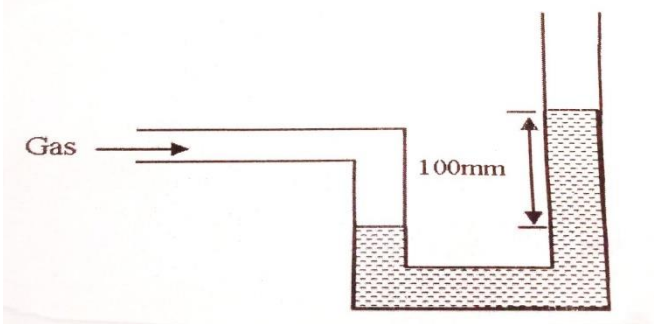
State the actual reading of the measuring instrument (2 marks)

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



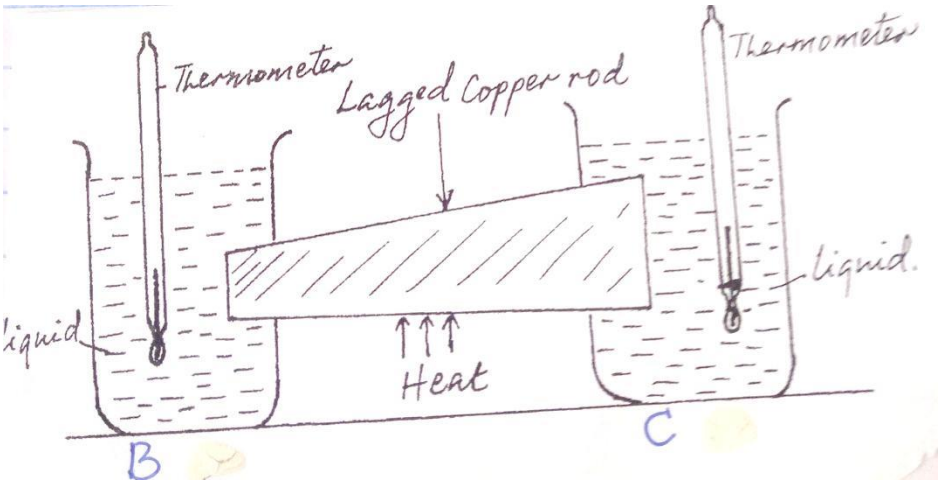
If a mercury barometer reads 760mm, calculate the pressure of gas (give your answer in N/m^2).

(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)

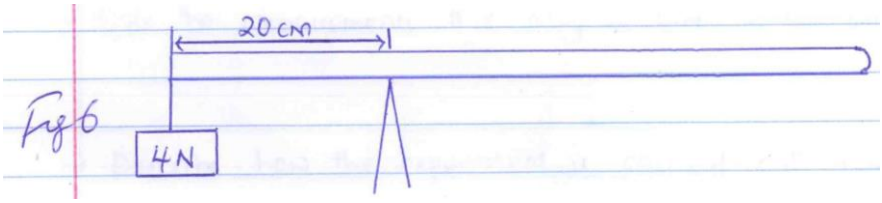
6.The figure below shows samples of same liquid B and C being heated through a well-lagged copper rod of non-uniform thickness. A thermometer is placed on each sample for some time.



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)

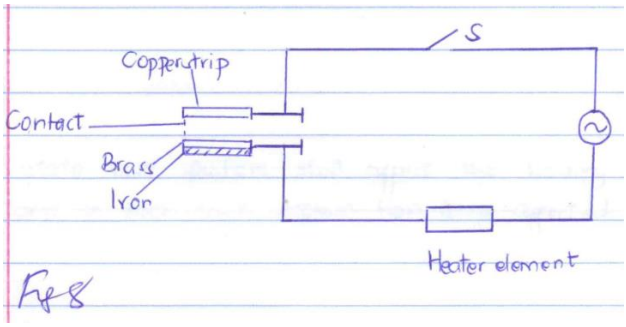
8. The figure 6 below shows a uniform 50cm rod. It is balanced horizontally by a load of 4N on one end. Calculate the weight of the rod 2mks)



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.



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

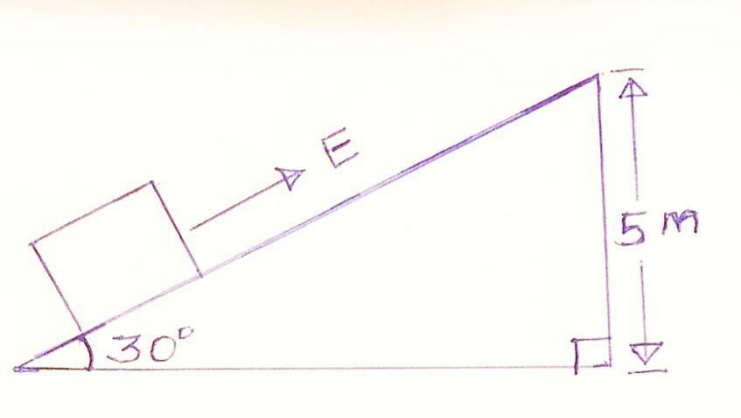
ii) Describe how the circuit controls the temperature when the switch S is closed 2mks)

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)

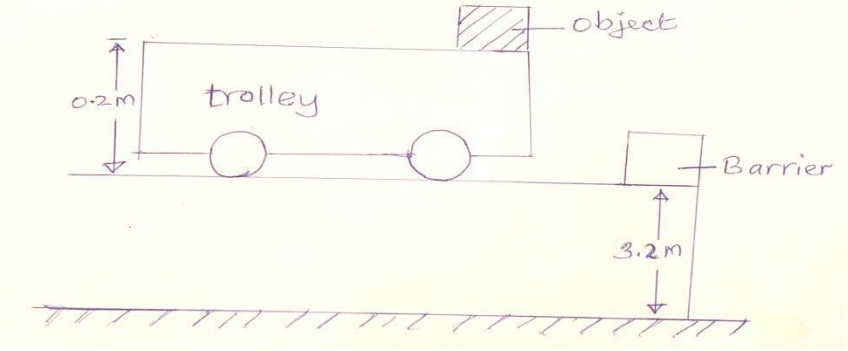


(ii) If the efficiency of the plane is 75% determine:

(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)

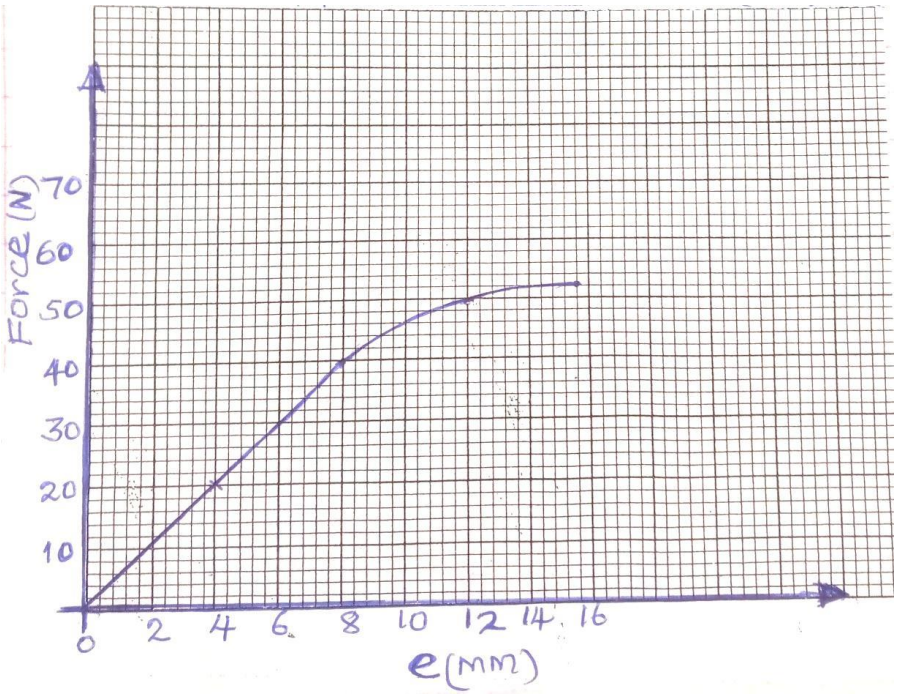
13. (a) State Hooke's Law (1 Mark)

(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.

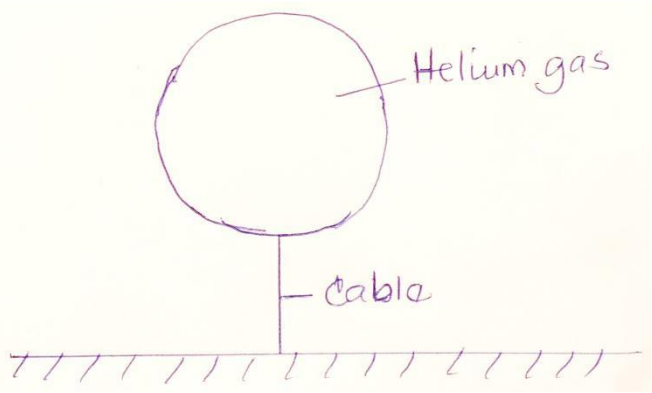


Determine the spring constant of the spring (3 marks)

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.

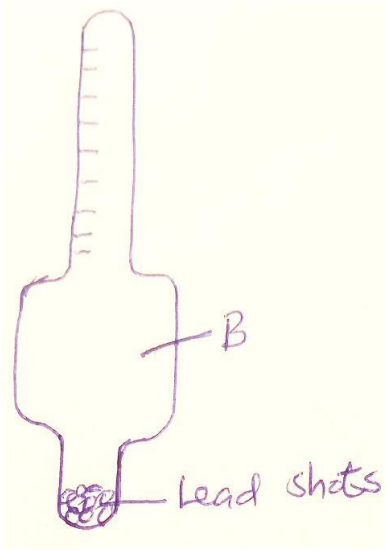


(i) State 3 forces acting on the set up. (3 marks)

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

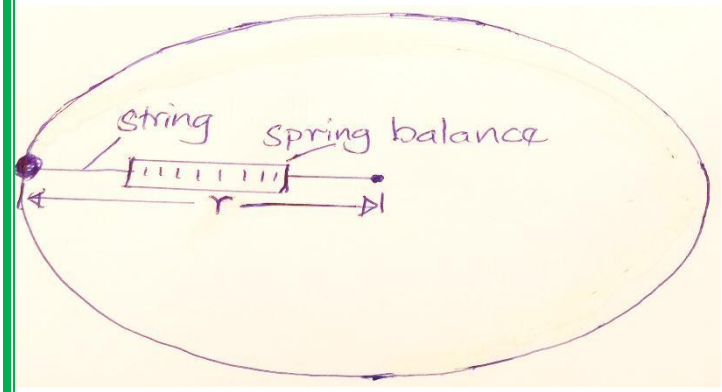
(iii) Calculate the acceleration of the balloon if the cable is cut. (2 marks)

(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)

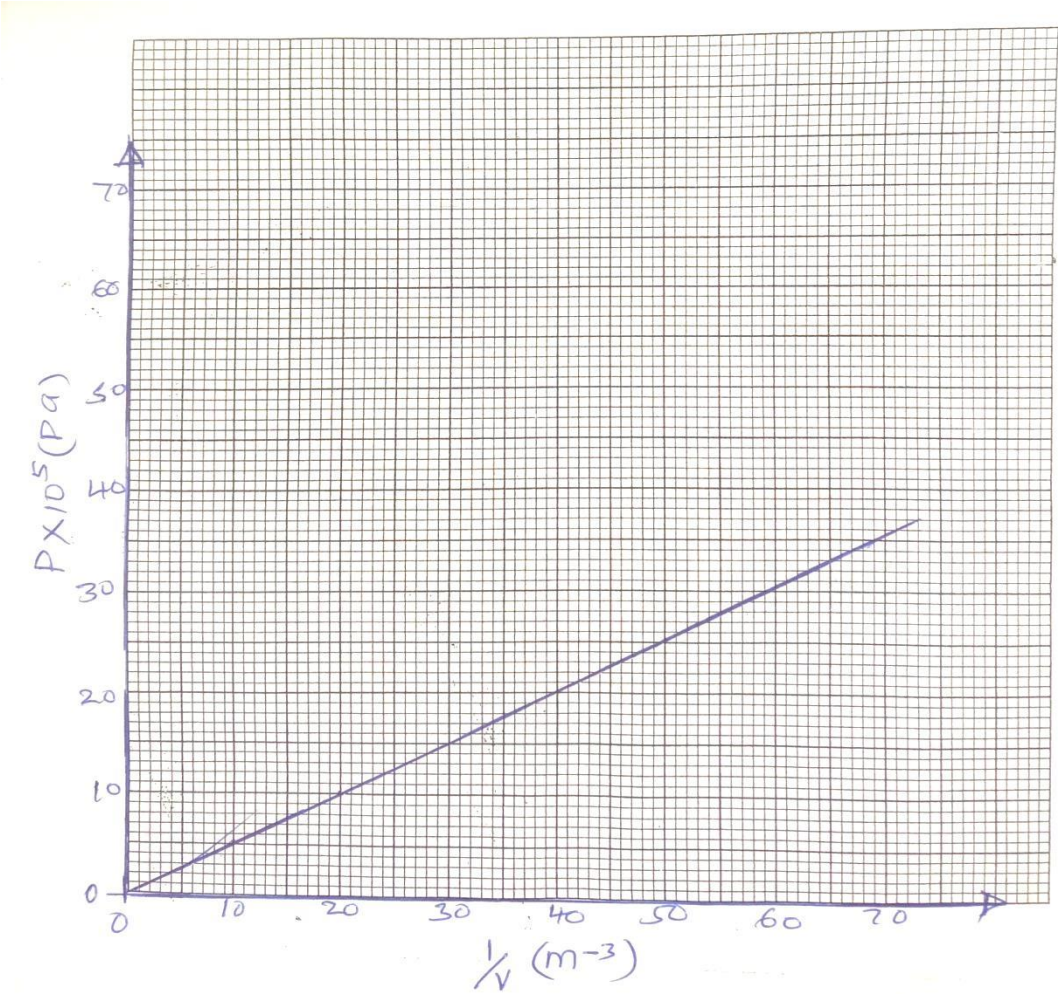
(ii) Give a reason for your answer in b (i) above (1mark)

(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)

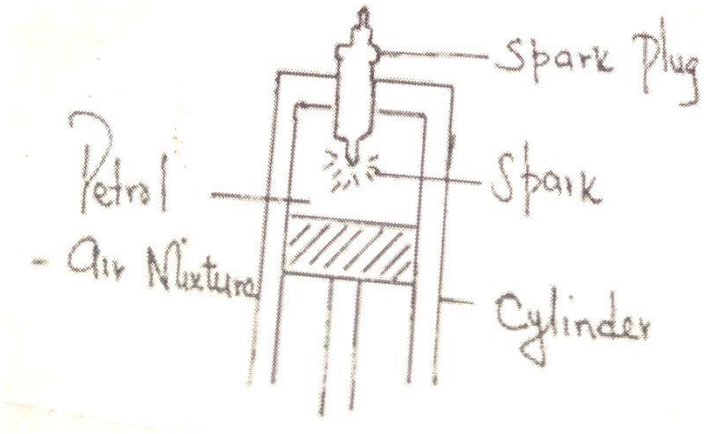
(b) The pressure P of a fixed mass of gas at constant temperature of T = 200k is varied continuously and the values of corresponding volume recorded. A graph of P against $\frac{1}{v}$ is shown on the graph below.



Use the graph to:

(i) Determine the volume of the gas when pressure reads 2.8×10^5 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.



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)

NAME:…… INDEX NO:…….. ……

SCHOOL…… SIGNATURE:…….....

231/2
PHYSICS
PAPER 2 (THEORY)
JANUARY 2021
TIME: 2 HOURS

POST MOCK EXAMS 2021

Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES

(g) Write your name and index number in the spaces provided above.
(h) Sign and write the date of the examination in the spaces provided above.
(i) This paper consists of sections: A and B.
(j) Answer all the questions in sections A and B in the spaces provided.
(k) All working must be clearly shown.
(l) 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.

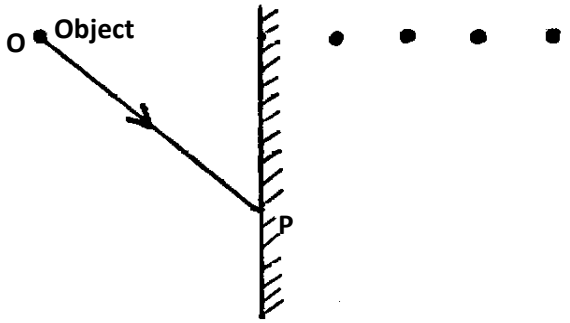


Fig. 1

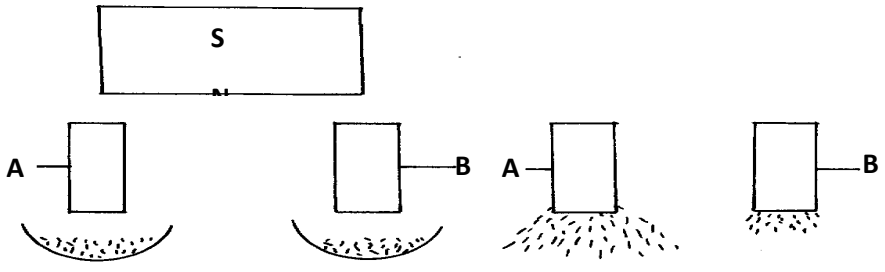
(i) Which of the four dots represent correct position of the image of **O**? Label this dot **Q** (1mk)

(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.

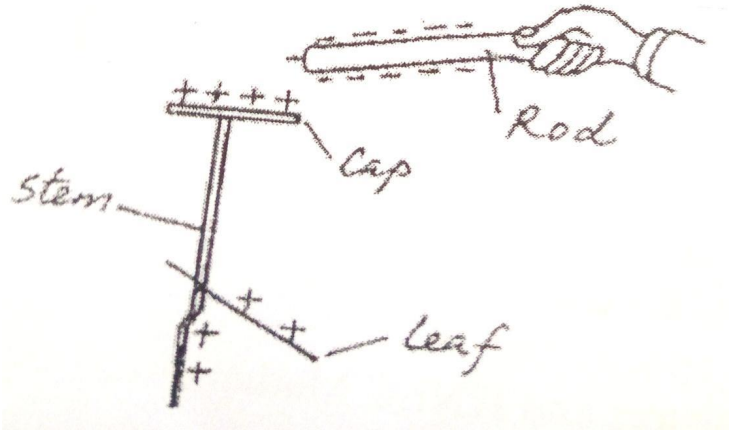


During attraction **After**

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.

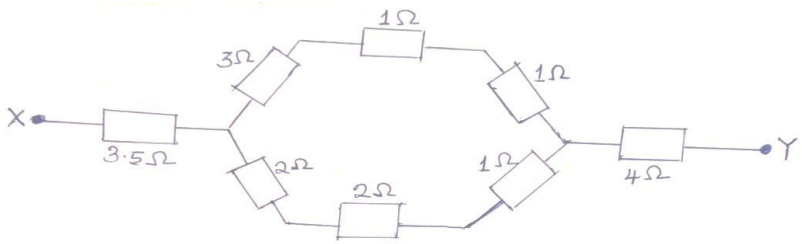


Explain this observation (2 marks)

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.



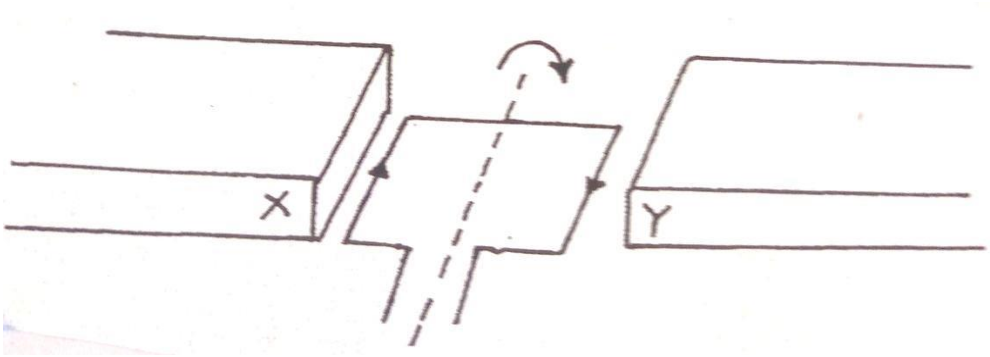
Calculate the effective resistance of the network. (3 marks)

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**

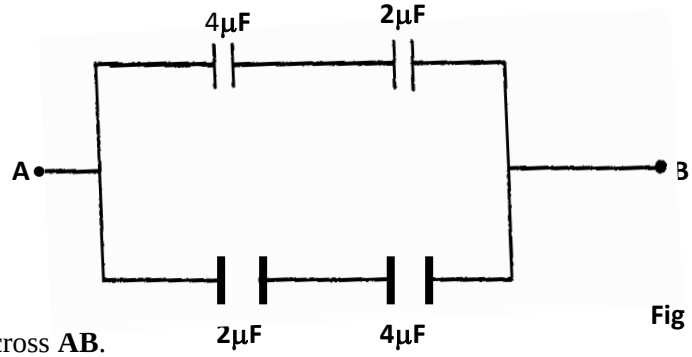


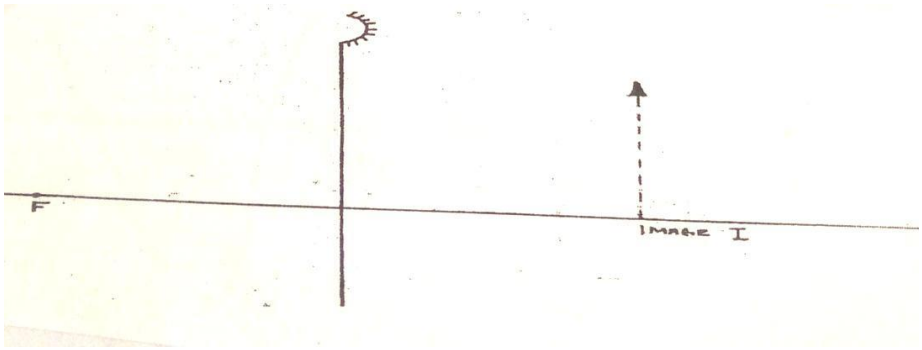
Fig 13

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

Section B (55 marks)

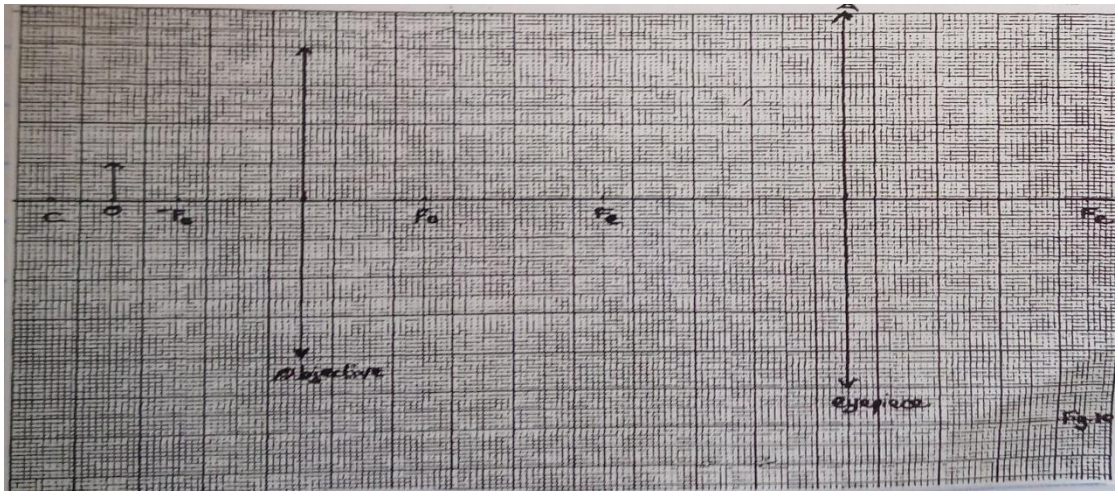
Answer all questions in the spaces provided

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



Determine its magnification M. (3 marks)

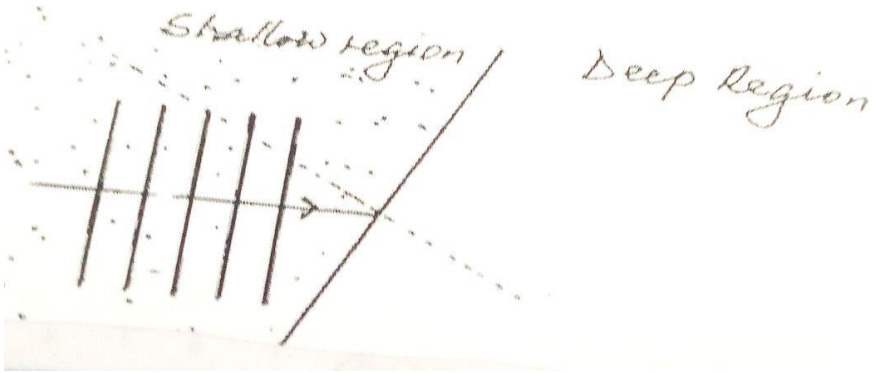
b) The figure below shows lenses of a compound microscope. The focal length of the objective lens is 2 cm and that of eyepiece lens is 4cm. The two lenses are 9cm apart. An object 1 cm high is placed 3cm from the objective lens.



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

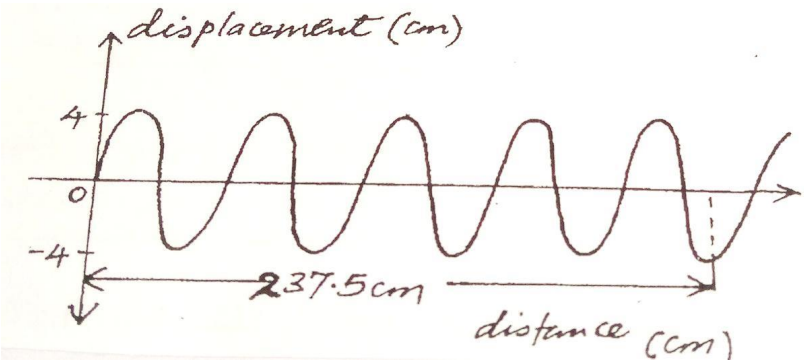
(ii) Find the magnification obtained by this arrangement (2 marks)

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.



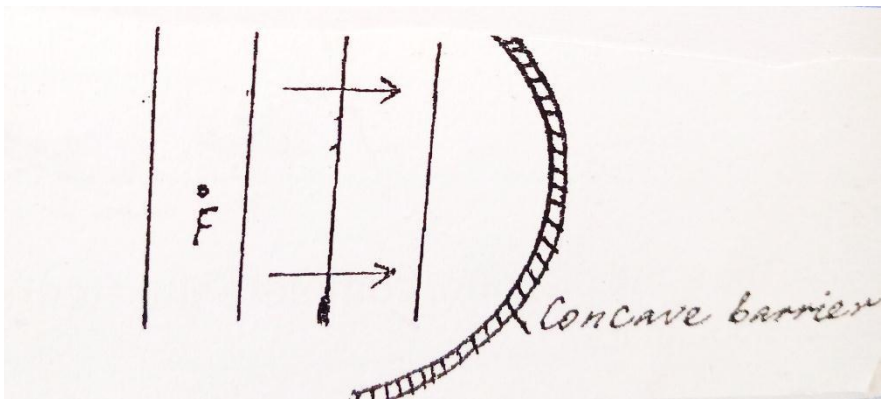
Determine:

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

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

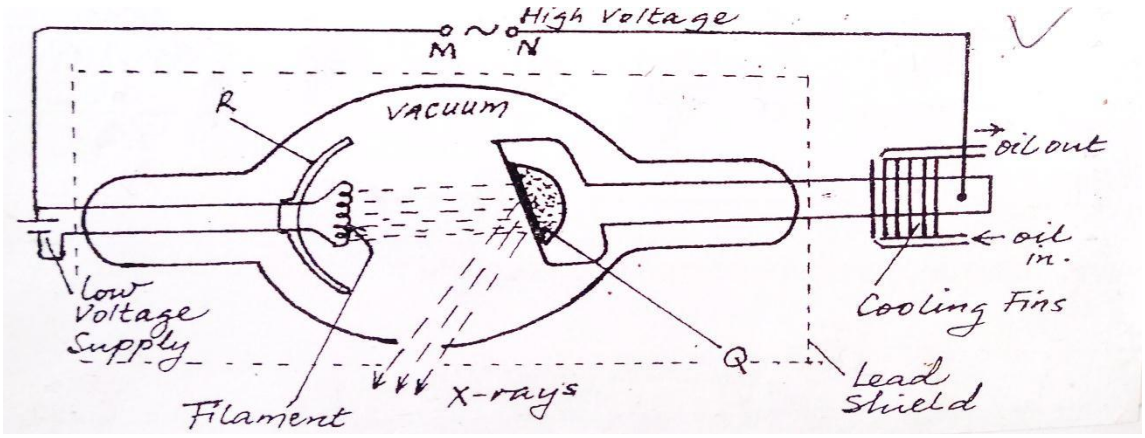
(iii) The frequency of the vibrator (2 marks

(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)

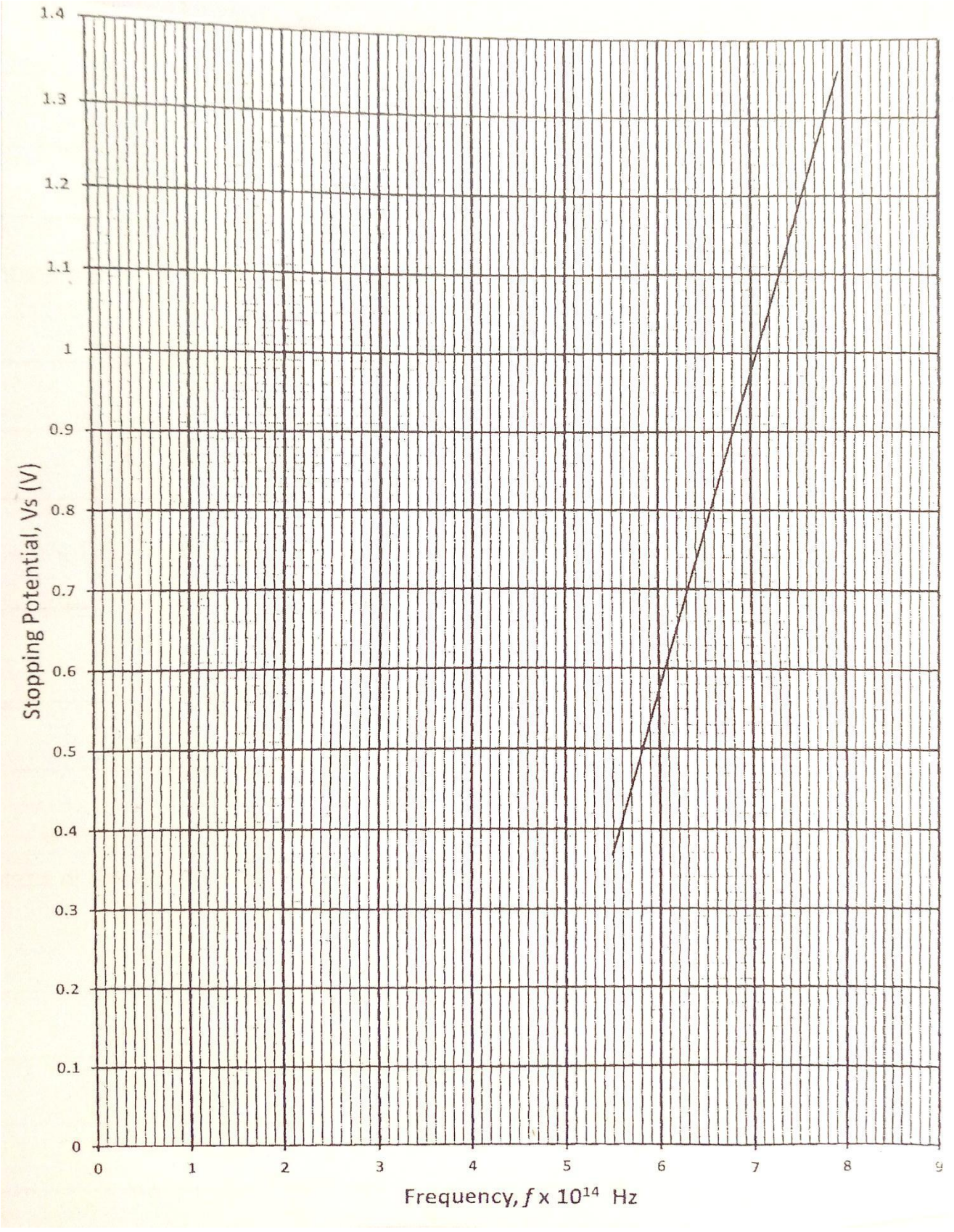
(c) A radiation falls on photosensitive material state how the following changes affect the emitted photoelectrons:

(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 x 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

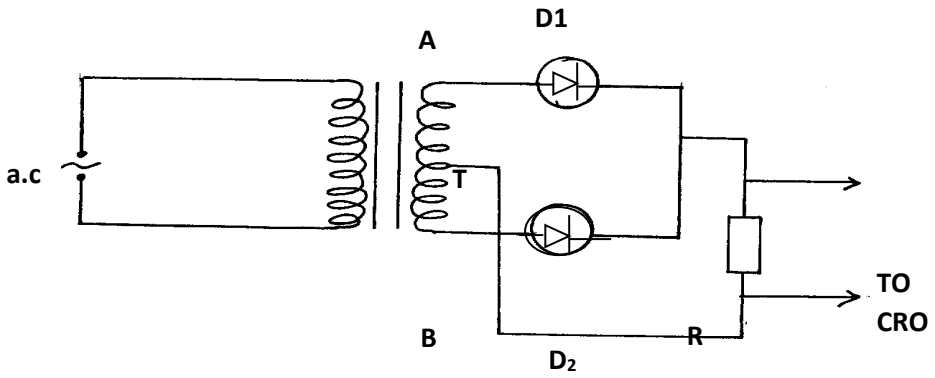


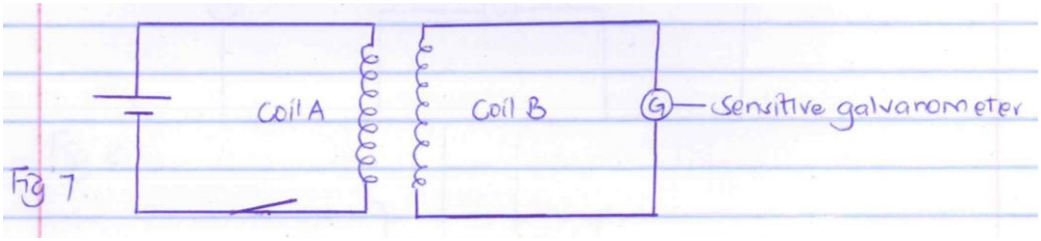
Fig 16.

(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)

NAME:…… INDEX NO:…….. ……

SCHOOL…… SIGNATURE:…….....

231/3
PHYSICS
PAPER 3 (PRACTICAL)
JANUARY 2021
TIME: 2 1/2HOURS

POST MOCK EXAMS 2021

Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES

(m) Write your name and index number in the spaces provided above.
(n) Sign and write the date of the examination in the spaces provided above.
(o) This paper consists of questions: 1 and 2.
(p) Answer all the questions 1 and 2 in the spaces provided.
(q) All working must be clearly shown.
(r) 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	

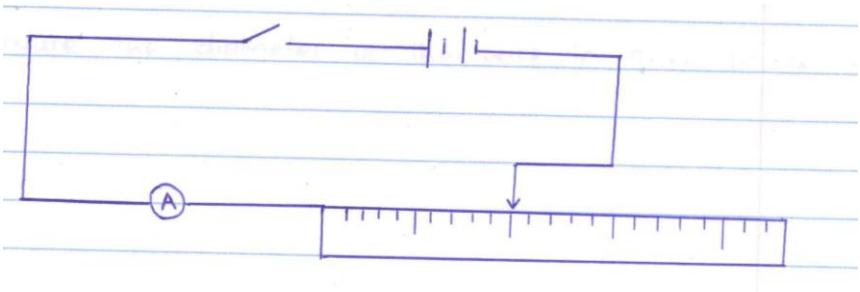
Question 1:

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

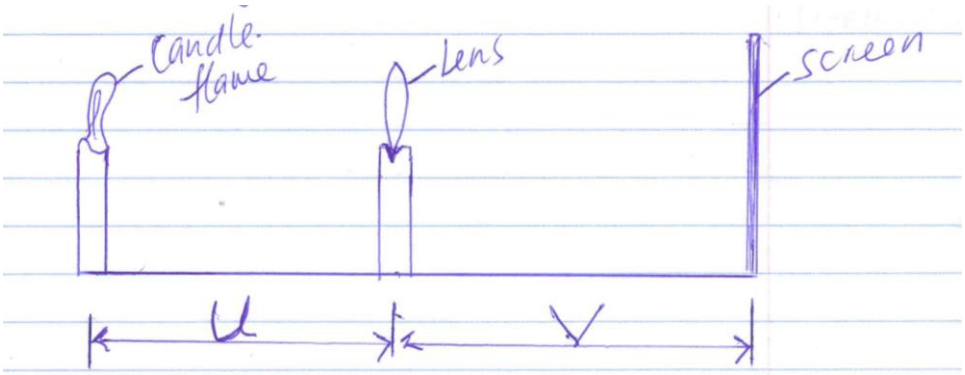
Question 2.

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.**

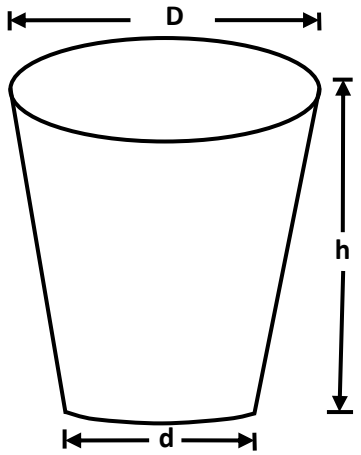


Figure 2

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 $\pi r Q^2 = \frac{M}{h}$ (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

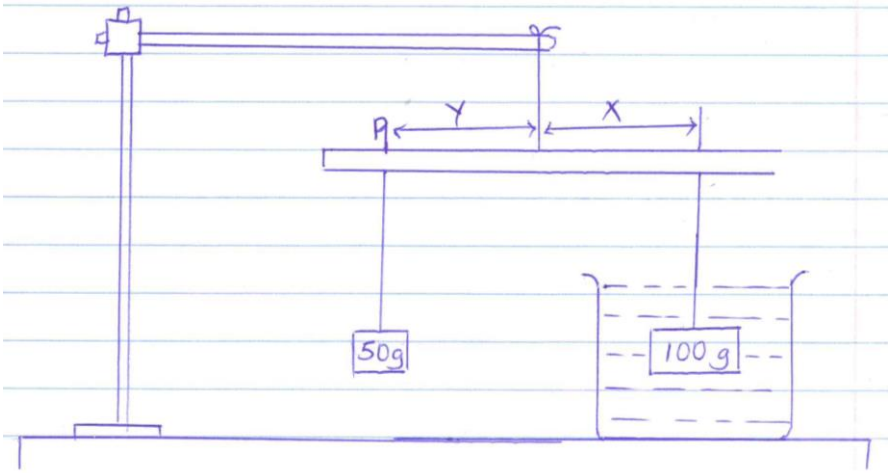
- a metre rule
- a retort stand, one boss, one clamp
- One 500ml beaker ¾ full of water
- One 100g mass
- One 50g mass
- 3 pieces of thread approximately 30cm long

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)

NAME:……..……..INDEX……..……
…
ADM…… SCHOOL:……..
SIGNATURE……..… ……
232/ 1
PHYSICS
PAPER 1/232
TIME 2hrs

SUNSHINE, KENYA HIGH, LIGHT ACADEMY, LENANA AND MOI GIRLS JOINT MOCKS

SUKELLEMO JOINT EXAMINATION

Kenya Certificate of Secondary Education 2020

INSTRUCTIONS TO CANDIDATES

- *write your name and your class in spaces provided*
- *This paper consists of two sections, **section A** and **section B***
- *Answer **ALL** the questions in each section in the spaces provided.*
- *Mathematical tables and Electronic calculators may be used*
- *All working must be clearly shown where necessary.*

For Examiner's Use Only

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
A	1-10	25	
B	11	12	
	12	11	
	13	15	
	14	17	
	TOTAL	**80**	

SECTION A (25 MARKS)

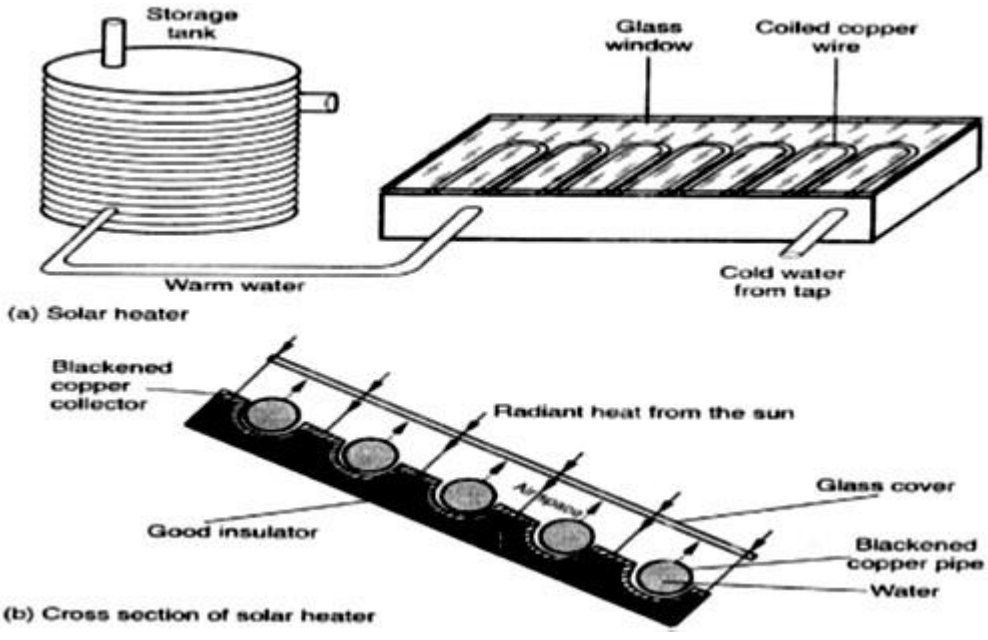
Answer <u>ALL</u> the questions in this section in the spaces provided

1. The level of water in a burette is at 30 cm^3. 400 drops of water each of volume 0.015 cm^3 was removed from the burette.
Determine the new level of water in the burette [3 mks]
2. Calculate the temperature change of water as it falls through a height of 20 m. (Take g = 10 N/kg and s.h.c of water =
4200 J/kg/K) [3 mks]
3. State the SI unit of density [1 mk]
4. Give a reason why heat transfer by radiation is faster than heat transfer by conduction [1 mk]
5. A railway truck of mass 4000 kg moving at 3 m/s collides with a stationary truck of mass 2000 kg. The couplings join and the trucks move off together. Calculate their common velocity after collision. [3 mks]
6. State the principle of moments [1 mk]
7. An air bubble with a volume of 1 cm^3 escapes from the helmet of a diver at a depth of 200 m below the water surface. What will be the volume of the bubble immediately it breaks the surface of water? (Take atmospheric pressure = 10 m of water) [4 mks]
8. Calculate the acceleration due to gravity on a planet where an object released from rest falls through a height of 54.2 m in 1.08 s. [3 mks]
9. State the three factors on which the rate of heat flow depends on. [3 mks]
10. Under a driving force of 3000 N, a car of mass 1200 kg has an acceleration of 1.3 m/s^2. Find the frictional resistance acting in the car. [3 mks]

<u>SECTION B (55 MARKS)</u>

Answer <u>ALL</u> the questions in this

section 11. a) Explain the following as regards the solar heater:



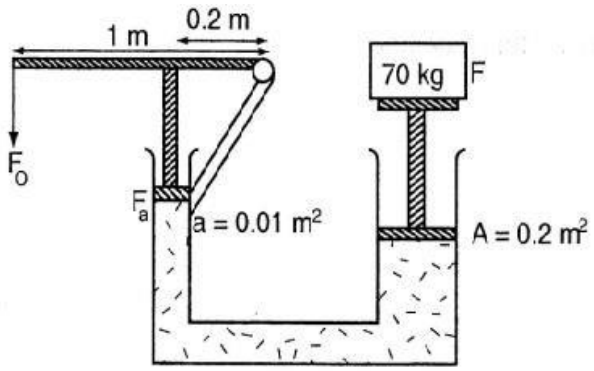
i) Why the pipe is fixed to a dark-coloured collector plate. [1 mk]
ii) Why the pipe is made of copper [1 mk]

iii) Why the pipe is coiled several times [1 mk]
iv) Why the collector plate is fixed to an insulator. [1 mk]
v) Why the panel front is covered with glass. [1 mk]

b). Liquids expand when heated and contract when cooled. However this is not always true for water.

i. What name is given to the behavior of water? [1 mk]
ii. States two importance of this behavior of water. [2 mks]
iii. State any two disadvantages of this behavior. [2 mk]
iv. A man wants to fit a brass ring onto a steel rod of diameter equal to the inner diameter of the ring. Explain how this can be achieved [

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



a) What properties of liquids make them suitable for use in hydraulic machines such as the one above? [2 mks]
b) If **A** and **a** are areas of cross-section of the pistons, and the lengths of the arm are as given, find:
i. The force F_o [3 mks]
ii. The mechanical advantage [1 mks]

iii. The efficiency of the machine [3 mks]
iv. State two reasons why the efficiency of a pulley system is always less than 100% [2 mks]

13. a) You are provided with the

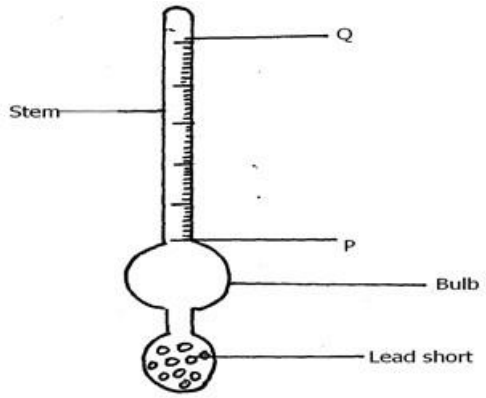
following:-

A block of wood

- A spring balance
- Thin thread
- Overflow can
- A small measuring cylinder
- Some liquid

With the aid of a labeled diagram describe an experiment to the law of floatation. [4 mks]

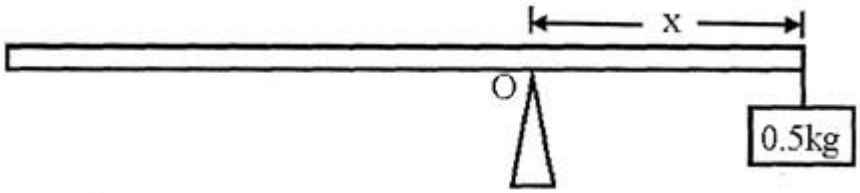
b) The diagram below shows a car acid hydrometer.



(i) Indicate on the diagram above the minimum and the maximum measurement to be taken. [2 mks]

(ii) State the reason why the bulb is wide. [2 mks]

c) (I) Figure below shows a uniform plank of weight 20N and length 1.0m balanced by a 0.5kg mass at a distance x from the pivot point O.



Determine the value of X [2 mks]

(II) When the block is completely immersed in water the pivot **O** must shift by 0.05 m to the left for the system to balance. The density of water is 1000 kgm^{-3}.Determine:

i) The upthrust U on the block. [3 mks]

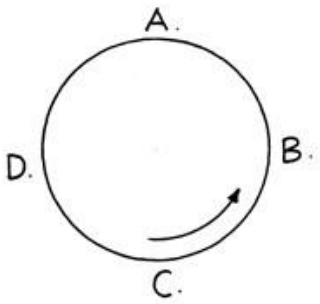
ii) The volume of the block. [2 mks]

14. a) i) Distinguish between elastic and inelastic collisions. [2 mks]

ii) A body of mass 5 kg is ejected vertically to a height of 7.2 m from the ground when a force acts on it for 0.1s. Calculate the force used to eject the body.

b) i) Explain why the moon is said to be accelerating when revolving around the earth at constant speed [2mks]

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



i) Calculate:

I. The angular velocity [3mks]

II. The tension on the string at position A [3 mks]

(ii) At C where the stone has acquired a constant angular speed, the string cuts. The stone takes 0.5 seconds to land on the ground. How high is point C above the ground. [2 mks]

iii) How far does it travel horizontally before hitting the ground. [2 mks]

NAME……..…… INDEX NO…….....……..…..

SCHOOL……. CANDIDATE'S SIGNATURE……..…..

DATE……..……..

232/2
PHYSICS
(THEORY)
PAPER 2
NOVEMBER 2020
TIME: 2 HOURS

SUKELEMO JOINT EXAMINATION-2020

Kenya Certificate of Secondary Education

INSTRUCTIONS TO CANDIDATES:

*(a) Write your **Name** and **Index Number** in the spaces provided **above**.*
*(b) **Sign** and write the **date** of examination in the spaces provided **above**.*
*(c) This paper consists of **two** Sections; **A** and **B**.*
*(d) Answer **ALL** the questions in sections **A** and **B** in the spaces provided.*
(e) All workings must be clearly shown.
*(f) Non-programmable silent electronic calculators and KNEC Mathematical tables **may be** used.*

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FOR EXAMINER'S USE ONLY:

Section	Question	Maximum Score	Candidate's Score
A	1 – 13	25	
B	14	10	
	15	13	
	16	12	
	17	08	
	18	12	
Total Score		80	

SECTION A: (25 MARKS)

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

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

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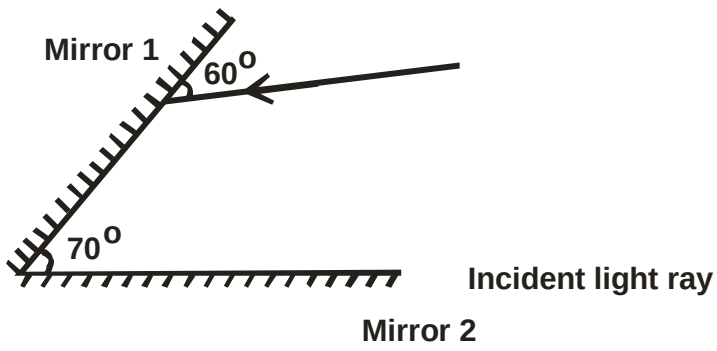
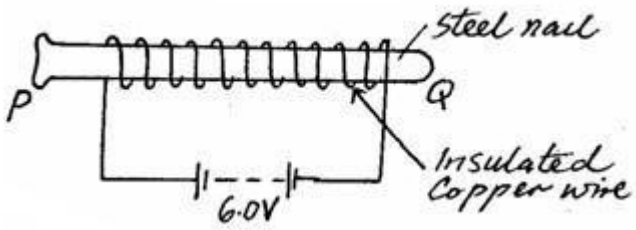
2. The figure below shows a ray of light incident on the surface of one plane mirror.



Sketch the path of the ray on the diagram after striking mirror 2 indicating all the angles. (2 marks)

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



P: _____

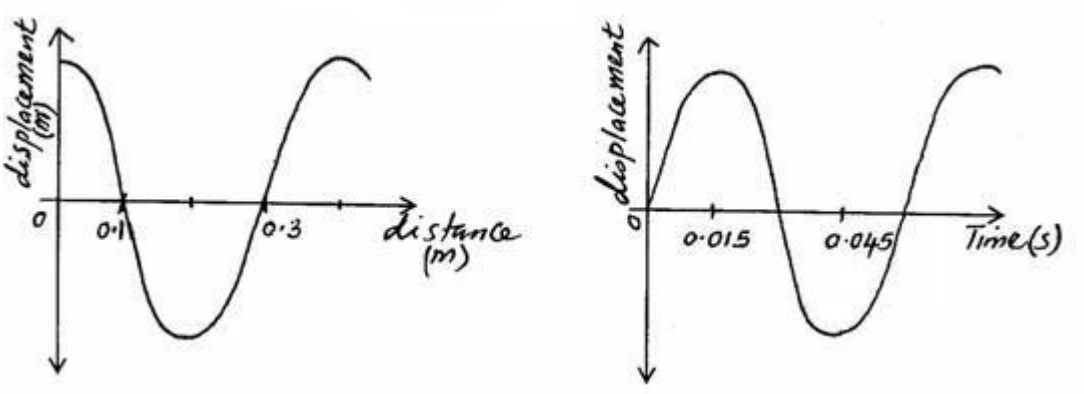
Q: _____

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

……
……

……
……
……..

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



Determine the velocity of the wave. (3mks)

……
……
……
……
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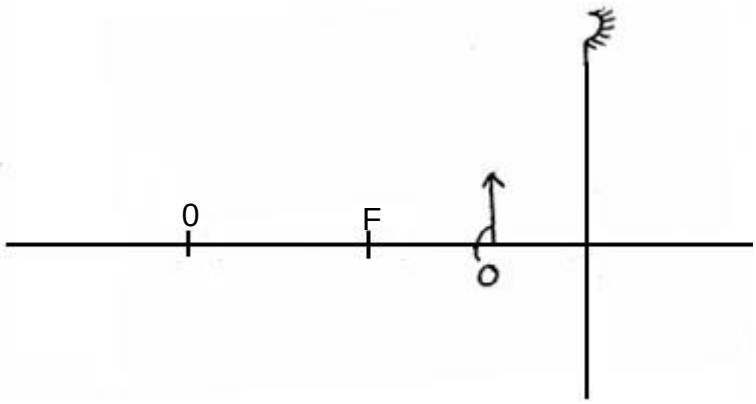
……
……

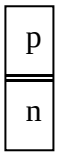
6. An object O is placed in front of a concave mirror and on the principal axis, as shown in the figure **below**. Complete the light ray diagram to locate the position of the image. (3mks)



7. Arrange the following radiations in order of increasing wavelengths. (1mk)
Infrared, blue light, ultraviolet, radiowaves, □-rays.

……

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



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

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

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

_____

_____

_____

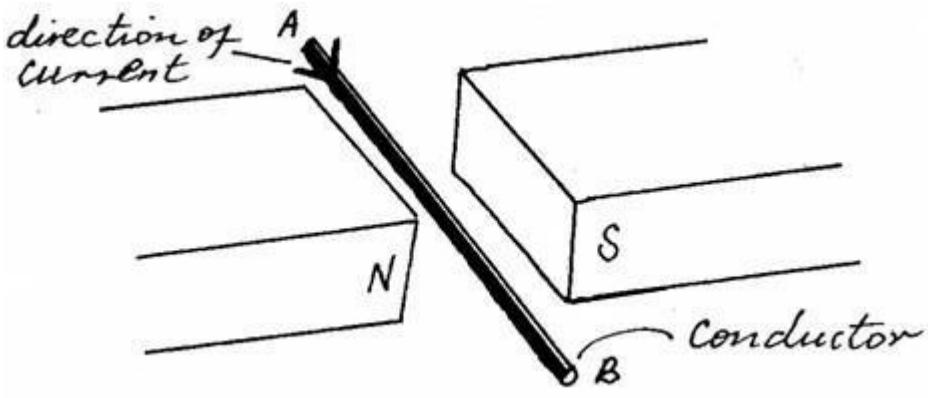
11. State how the defect mentioned in question 10 above is minimized in a simple cell. (1mk)

_____

_____

_____

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



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

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

_____

_____

_____

_____

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

(a) an effective resistance of 9.8Ω. (2mks)

(b) the least effective resistance. (2mks)

SECTION B: (55 MARKS)

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

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

_____

_____

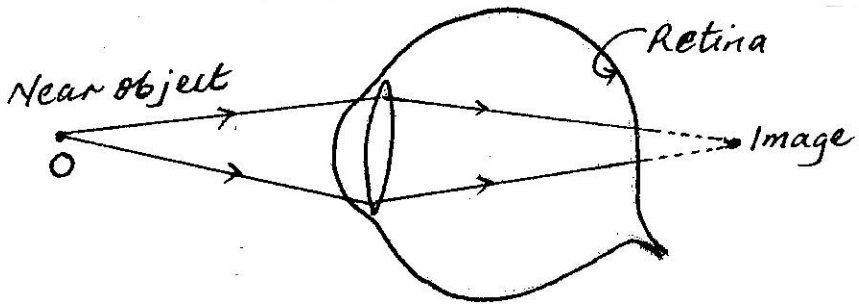
_____

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

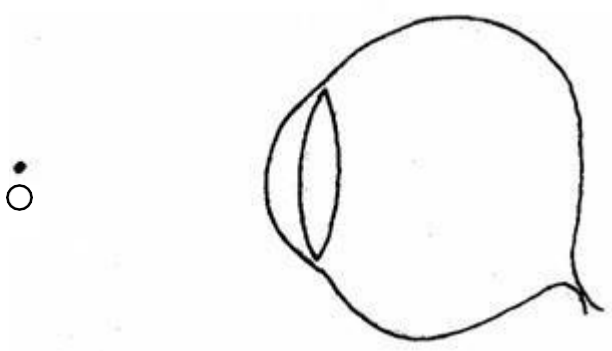
(c) (i) What do you understand by the term accommodation? (1mk

_____

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



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

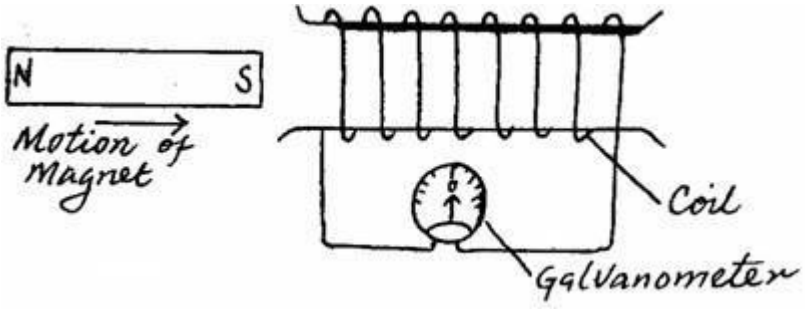


(d) An object is placed 40cm in front of a concave lens of focal length 20cm; determine the position of the image. (3mks)

---

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

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



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

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

(b) A transformer has 800 turns in the primary and 40 turns in the secondary winding. The alternating e.m.f connected to the primary is 240V and the current is 0.5A.

(i) Determine

I the secondary e.m.f (2mks)

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

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

I a soft-iron core. (2mks)

II a laminated core. (1mk)

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

State **one** factor which affects the rate of each of the above types of emissi ɔn.
Thermionic emission. (1mk)

(ii)

Photoelectric emission. (1mk)

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

(i) its threshold frequency. (2mks)

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

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

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

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

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

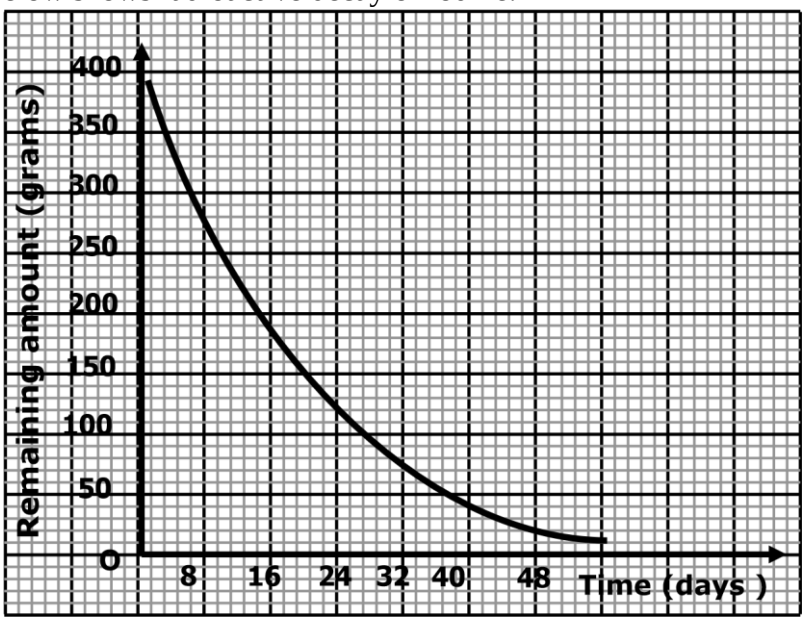
the number of electrons hitting the target per second. (2mks)

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

18. (a) A radioactive carbon-14 decays to nitrogen by beta particles as shown **below**. $^{14}_{6}C = \square\ ^{7}_{}N + 0\ ^{}_{y}e$

Determine the values of □ and y. (2mks)

b) The graph below shows radioactive decay of iodine.



Use the graph to determine the:-

(i) Fraction of the amount remaining after 16.2 days. (2mks)

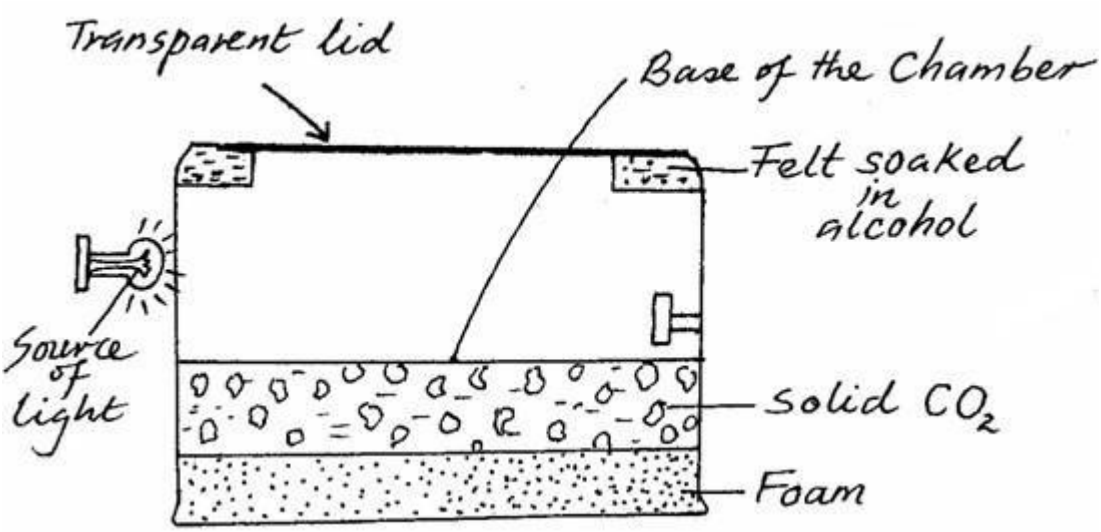
(iii) Determine the half – life of iodine.

(2mks)

(iv) Mass remaining after 17 days.

(1mk)

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



(i) State the function of the following:

I Alcohol. (1mk)

II Solid CO_2. (1mk)

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

Name…… Index No…….....

Candidate's signature.....

Date.....

232/3
PHYSICS PRACTICAL
Paper 3
Nov/Dec 2020
2 $\frac{1}{2}$ hours

SUKELEMO MOCK EXAMINATIONS

Kenya Certificate of Secondary Education (K.C.S.E)

PHYSICS

(PRACTICAL)

Paper 3

Instructions to Candidates

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of examination in the space provided above.
*(c) Answer **all** questions on the question paper.*
(d) You are supposed to spend the first 15 minutes allowed for this paper reading the whole paper carefully before commencing your work and confirming your apparatus.
(e) Marks are given for a clear record of the observations actually made, their suitability, accuracy and for the use made of them.)
(f) Candidates are advised to record observations as soon as they are made
(g) Mathematical tables and Electronic calculators may be used
(h) Candidates should answer the questions in English

For Examiner's Use Only

Question	Maximum	Candidates Score
1	20	
2	20	
Total		

QUESTION ONE

Part A

You are provided with the following apparatus.

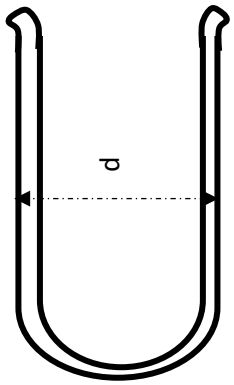
- meter rule.
- electronic beam balance (shared)
- vernier callipers (shared)

- measuring cylinder
- boiling tube.

Proceed as follows;

(a) Measure the length l of the boiling tube provided using a metre rule

l = ……..(1mark)



(b) Measure the external diameter d of the boiling tube at the middle using a Vernier callipers.

. d=…… (1mark)

(c) Calculate the external volume of the boiling tube. $V_1 = \frac{11d^2l}{14}$ (1mark)

……

……

……

……

(d) Completely fill the boiling tube with water. Pour the water into the measuring cylinder Read and record the volume V_2 of the water.

V_2 = …….. ……. (1mark)

(e) Calculate the volume V_3 of the glass used to make the boiling tube. (1mark)

……

(f) Using the electronic balance measure the mass of the boiling tube

Mass =……kg (1mark)

(e) Determine the density of the glass. (1mark)

……

……

……..

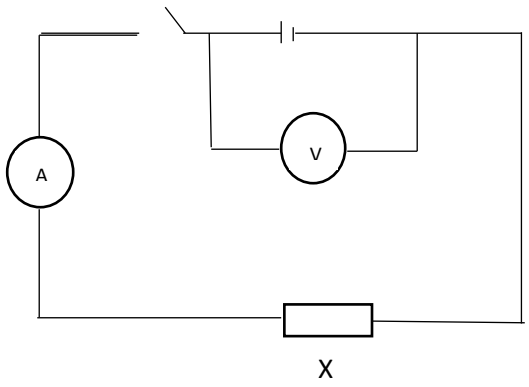
PART B

You are provide with the following

- A wire mounted on a millimetre scale labelled AB
- A galvanometer.
- Jockey
- A carbon resistor labelled X .
- 8 Connecting wires, 4 with crocodile clips at both ends.
- A resistance wire labelled R mounted on a half meter rule
- Ammeter
- Voltmeter
- One dry cell in a cell holder
- Micrometer screw gauge

Proceed as follows:

(a) Set up the circuit as shown below.



(i) Record the voltmeter reading when the switch is open.

E = …… (1mark)

(ii) Close the switch and record the voltmeter and ammeter readings V and I.

V = …… (1mark)

I = …… (1mark)

(iii) Explain why V is less than E . (1mark)

……
……
……

(iv) Now connect the voltmeter across the carbon resistor X and record voltmeter reading V_1 when the switch is on.

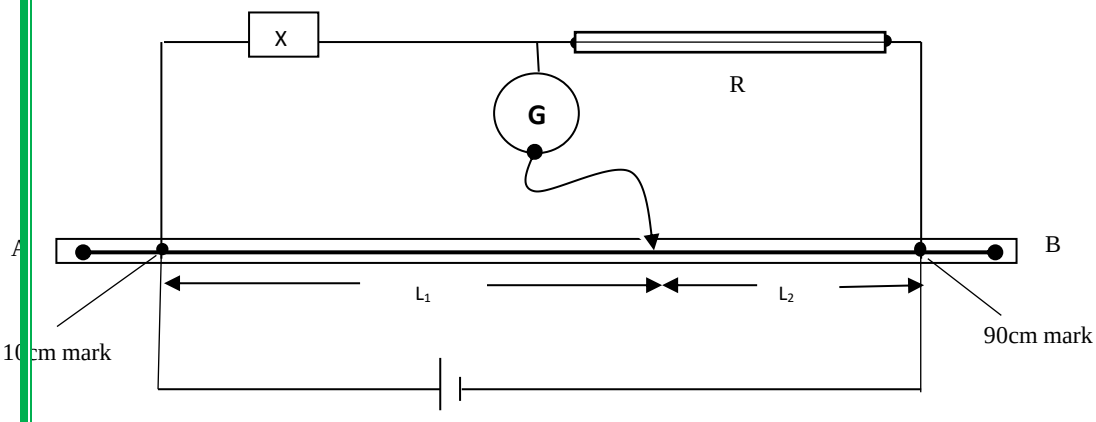
V_1 = ……. (1mark)

(v) Determine X given that $X = \frac{V_1}{I}$ (1mark)

……
……
……..(b) Using the micrometre screw gauge, measure and record the diameter D of the resistance wire R provided

D =……m (1mark)

(c) Now connect another circuit as shown in the figure below.



Touch the 10cm mark and the 90 cm mark and see that the galvanometer deflects in opposite direction in each case.
(i)Move the sliding jockey along the resistance wire AB and note the length L_1 and L_2 where the galvanometer pointer points at the zero mark. Record the values of L_1 and L_2.

L_1 =……m (1mark)

L_2 =…… m (1mark)

(ii) Determine the resistance of the resistance wire R using the relationship, (2marks)

$$\frac{R}{L_1} = \frac{X}{L_2}$$

……

……

……

(iii)Determine the resistance of the wire R per metre. (1 mark)

……

……

(iv)Given that, R = $\frac{0.1114S}{D^2}$ determine the value of S , where R is the resistance per metre. (1mark)

……

……

……

……..

QUESTION TWO
PART A

You are provided with the following;

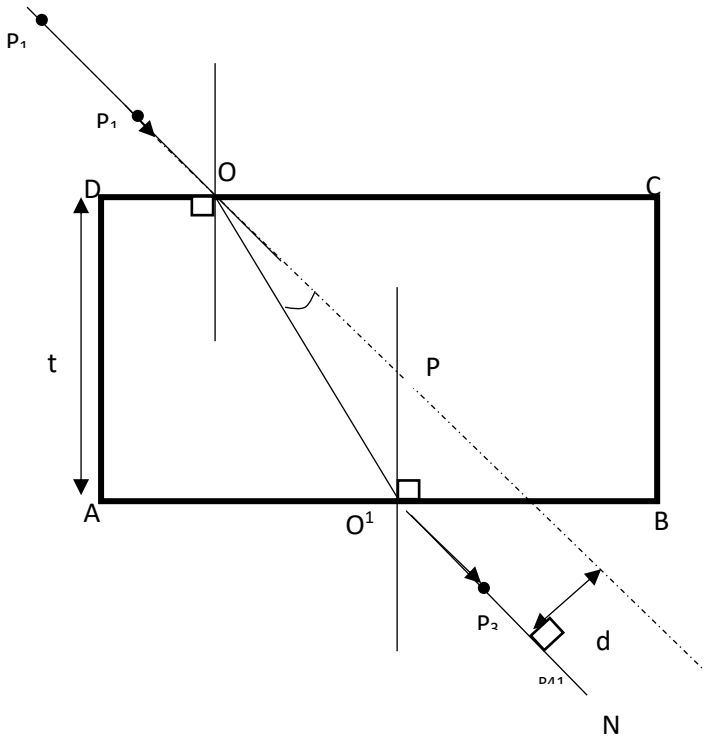
- Soft board
- Vernier calipers.
- Rectangular Glass block
- Four optical pins.
- Plain sheet of paper.
- Two thumb tacks
- Protractor

Procedure;

(a) Measure and record the width t of the glass block using the vernier calipers provided.

t = …… (m) (1 mark)

Fix the white plain paper on the soft board using the two thumb tacks.
Place the glass bock on the paper, trace its outline and label it ABCD ,as shown.
Remove the glass block and draw a normal, say at point O.
Draw a line making an angle of 30^0 with the normal to represent the incident ray.
Replace the glass block carefully to its original position.
Fix two pins P_1 and P_2 on the line in such a way that they are vertical and at least 4cm apart.
Looking through the glass block through face AB, fix two pins P_3 and P_4 so that they are exactly in line with the P_1 and P_2. Mark the positions of P_3 and P_4



Join P_3 and P_4 and produce the line to meet face AB of the block at O^1. Join O and O^1. Measure angle O^1OP. Also, Measure anlge OO^1P.

(b) O^1OP = …….
(1mark)

(c) OO^1P = ……...
(1mark)

Measure the perpendicular distance d from the line O^1N to OP produced.

(d) d = …… (m)
(1mark)

(e) Determine t_1 given that ,$t_1 = \frac{dcos\ angle(OO^1P)}{\sin angle(O^1OP)}$.

(2marks)

……

……

……

(f) How do the values of t and t_1 compare .

(1mark)

……

……

……

NB. The worksheet should be handed in with the question paper.

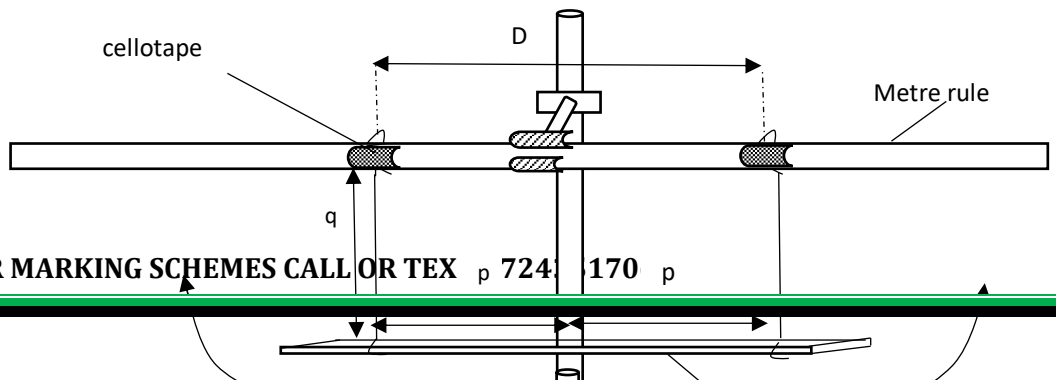
PART B

You are provided with the following:

- A metre rule
- Two Half metre rules
- Stop watch
- A complete retort stand
- Two pieces of thread.
- Some cellotape

Proceed as follows:

(a) Set up the apparatus as shown in figure below such that D = 2p = 20cm and q = 20cm.
Ensure that D is kept constant throughout the experiment. (use a piece of cellotape to fix the threads).
Make sure that the loops of thread on the half metre rule can slide along the half metre rule. This would enable easy adjustments of distance p later in the experiment. The scale of the half metre rule should be kept in a horizontal plane.



The distance p is measured from the centre of the half metre rule.

(b) Adjust the position of the loops on the half metre rule so that p = 21cm. (ie 2p = 42cm). You may use a cellotape to keep the loop in position. Measure and record in table 1 the value of q.

N.B q is the vertical distance between the half metre rule and the metre rule.

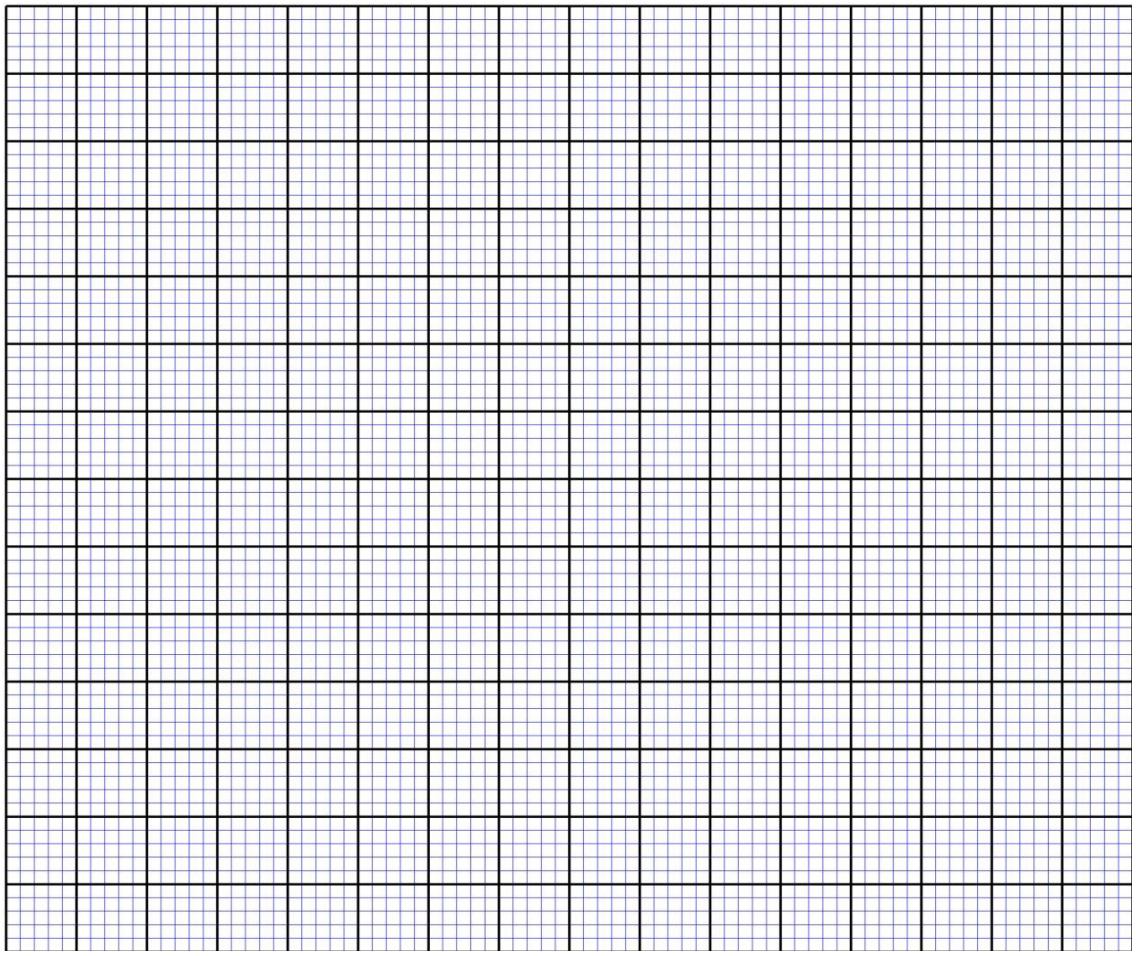
(d) Slightly displace one end of the half metre rule towards you and the other end away from you in a horizontal plane such that when released, it oscillates in the same plane. Measure time t for 10 oscillations. Repeat the procedures (c) and (d) for other values of p .

(e) Complete the table. (8marks)

p(cm)	21.0	19.0	17.0	15.0	13.0	10.0	8.0
q(cm)							
Time t for 10 oscillations (s)							
Periodic time T (s)							
$\frac{p}{q}$							

(g) (i) Plot a graph of T (y axis) against $\frac{p}{q}$

(4marks)



(ii) Determine the slope S of the graph when $\frac{p}{q} = 2.0$ (2marks)

……

……

……

(iii) Determine the constant k given that $k = \frac{s}{\pi}\sqrt{D\text{g}}$ where g = 10m/s^2 (2marks)

NAME: ……CLASS:…..…… ADM NO:……

SIGNATURE:…… DATE:……

232/2
PHYSICS
PAPER 2
MARCH 2020

MOMALICHE

MAGS 2 CYCLE 7 EXAMINATIONS - 2020

The Kenya Certificate of Secondary Education
Physics Paper 2

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
A	1 – 12	25	
B	13	10	
	14	10	
	15	09	
	16	16	
TOTAL		80	

SECTION A (25 Marks)

*Answer **ALL** questions in this section.*

1) Figure 1 shows the V-I characteristic curve of a torch bulb.

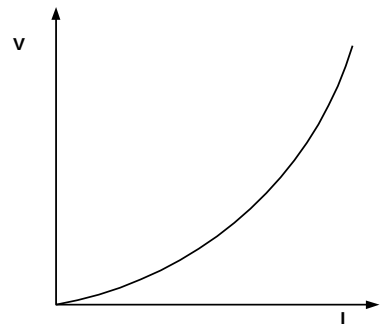


Fig.1

Explain the shape of the graph. (2 marks)

……

……..……..……..……..……

2) The size of the pinhole camera is increased. State and explain what happens to the image.

……(1 mark)

3) Define the term sensitivity (1 mark)

……

4) Why is concave mirrors used as a saloon mirror? (1 mark)

……

5) Figure 2 shows a graph of magnetisation against magnetising current for two materials A and B.

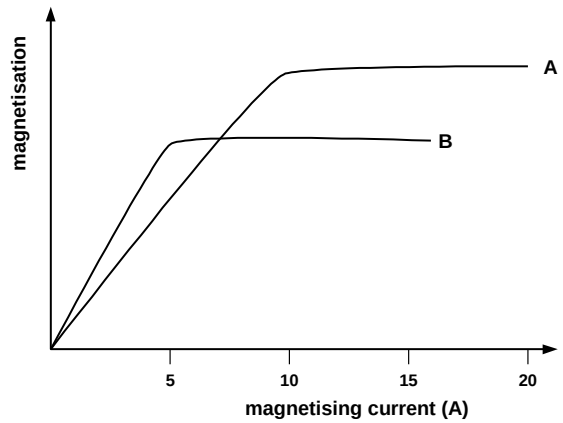


Fig. 2

a) State with a reason, the material which is more suitable for use in a transformer to concentrate the magnetic fields. (2 marks)

……

……..……..……..……..……

b) Determine the current required to obtain saturation for the material which is suitable for making a permanent magnet. (1 mark)

……

……..……..……..……..……

6) A beaker of height 10 cm is filled with water. An optical pin which is at the bottom of the beaker is then viewed from the top of the beaker. How far does the pin appear from the surface, if the refractive index of water is $\frac{4}{3}$) (2 marks)

……

……..……..……..……..……

7) An electric heater takes 4 minutes to heat some water to boiling point. How long would it take if the current flowing through it is doubled? (2 marks)

……

……..……..……..……..……

8) (a) **State** Ohm's law (1mark)

……

(b) The figure 3 below shows part of the scale of a voltmeter, which is being used in an experiment to measure potential difference across a resistor.

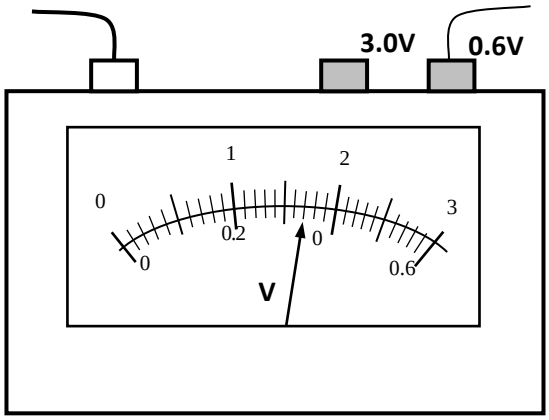


Fig.3

(i) State the accuracy of the upper and the lower scales of the voltmeter. (2 marks)

……

(ii) Record the reading shown by the lower scale of the voltmeter. (1 mark)

……

9) The figure 4 shows region of electromagnetic spectrum.

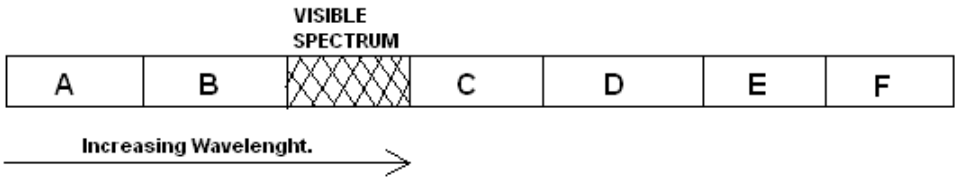


Fig.4

Name the region that representsand give one use of each. (4marks)

(a) Ultraviolet

(b) Infrared

(c) X- ray

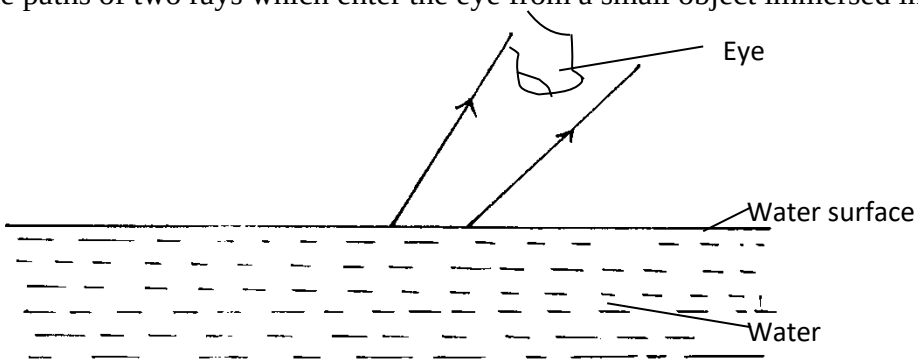
(d) Radio wave

10) State one advantage of optical fibre cable over conventional copper cables as used in telecommunication.
(1 mark)

……

11) Fig 5. below shows the paths of two rays which enter the eye from a small object immersed in water.

Fig. 5



Draw rayson the diagram to show a possible position of the object and itsactual position.
(2marks)

12) State two conditions necessary for total internal reflection to occur. (2marks)

……

……

SECTION B(55 Marks)

*Answer **ALL** questions in this section.*

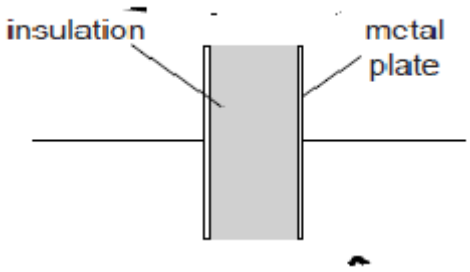
13) (a) (i) Define capacitance. (1 mark)

……

……

(ii) A capacitor is made of two metal plates, insulated from one another, as shown in the Fig 6.

Fig. 6



Explain why the capacitor is said to store energy but not charge. (2 marks)

……

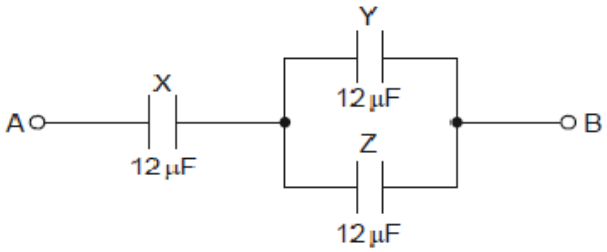
……

……

……

(b) Three uncharged capacitor X, Y and Z, each of the capacitance 12 microfarads, are connected as shown in Fig 7s below

Fig. 7



A potential difference of 9.0V is applied between points A and B. Calculate the combined capacitance of the capacitors X,Y and Z. (3 marks)

……

……

……

……

(c)Explain why, when the potential difference of 9.0V is applied, the charge on one plate of capacitor X is 72 microcoulombs. (2 marks)

……

……

……

……

(d) Determine ;

I . the potential difference across capacitor X, (2 marks)

……

……

……

……

II. the charge on one plate of capacitor Y. (2 marks)

……

……

……

……

14) A wire was connected to a battery and it was found that the energy converted to heat was 30J when 20 coulombs of charge flowed through the wire in 5 seconds.

Calculate;

(i) the p.d between the ends of the wire. (2marks)

……

……

(ii) the current flowing through the wire. (2marks)

……

……

(iii) the resistance of the wire. (2marks)

……

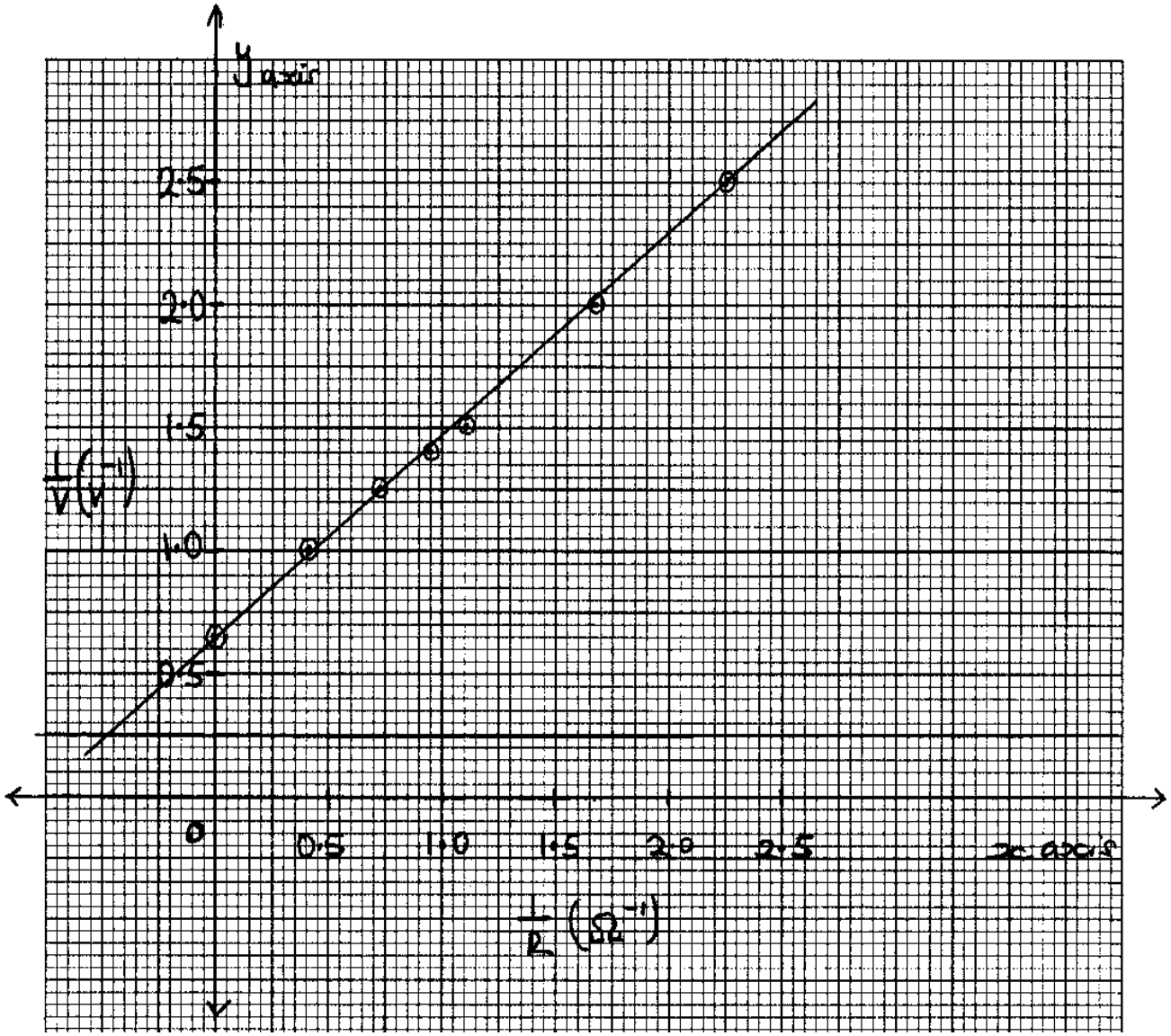
……

(iv) the average power development in the wire. (2marks)

……

……

The graph below shows results obtained in an experiment to determine the e.m.f.(E) and the internal resistance, r, of a cell.



Given that the equation of the graph is $\frac{E}{V} = \frac{r}{R} + 1$

Use the graph to determine the values of:-

(i) E (2marks)

……

……

ii) r (3marks)

……

……

15) Thefigure 8 below shows two graphs which refer to the same wave.

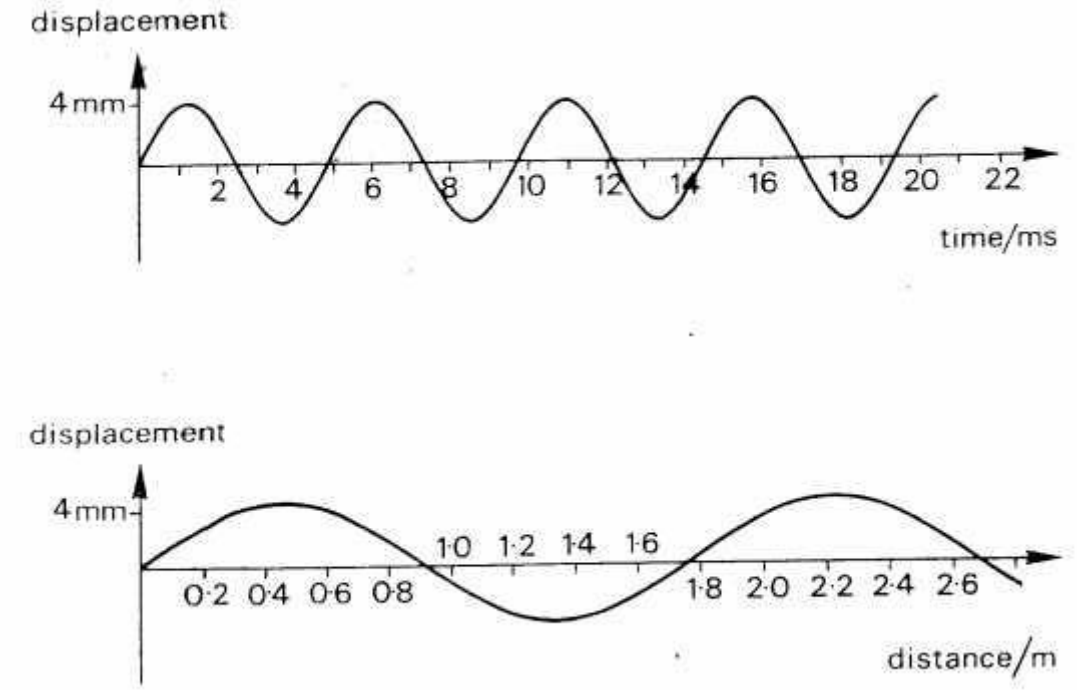


Fig. 8

i) Calculate the speed of the wave. (4marks)

ii) Distinguishbetweenprogressiveandstationarywaves. (2marks)

……

……

ii) Figure9 belowshowsastationarywaveon astringstretchedbetweentwopointsAandFwhich areadistance*L* apart.

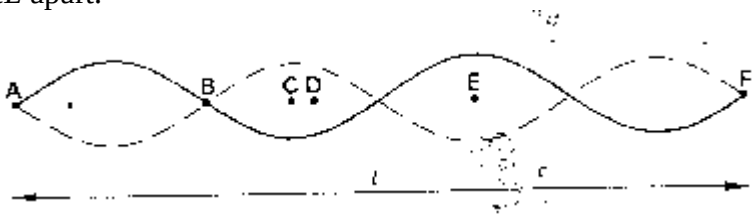


Fig. 9

Describetheoscillationsofthepoints B,C,Dand E.Comparetheseoscillationsintermsof theirrelativephasesand amplitudes. (3marks)

……

……

iii) Whatisthewavelengthintermsof*L*. (1mark)

……

16) **i)**Statethecharacteristicsofimagesformedbya pinholecamera. (2marks)

ii) Whatistheeffectsontheimage whenthecameraiselongated? (2mark)

The **figure 10** below shows how a white light behaves when it is incident on a equilateral glass prism.

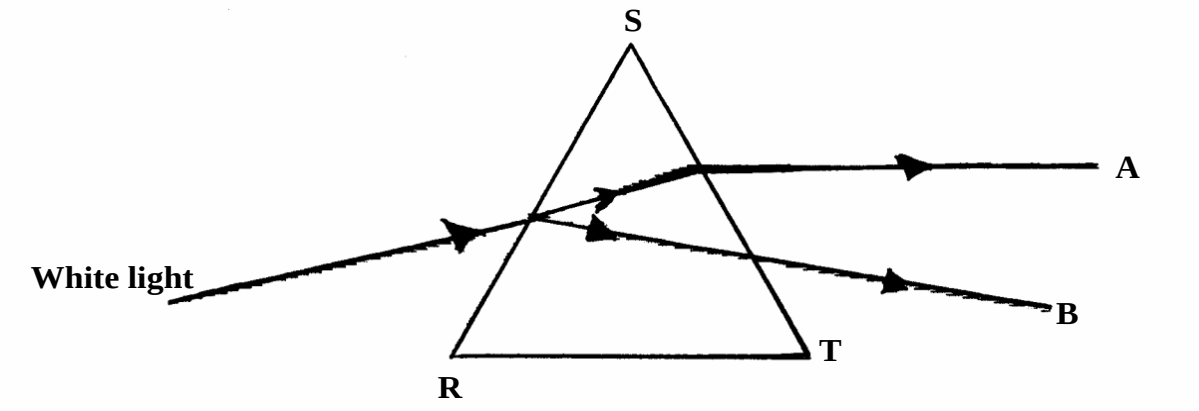


Fig. 10

iii) Explain why it split into different colours between A and B. (3 marks)

……

……

iv) Suppose the white light is incident on the face SR normally, **State** and **explain** the observation. (3 marks)

……

……

17) (a) **Define** the term principal focus in relation to a thin convex lens (2marks)

……

(b) **Distinguish** between a real and a virtual image. (2marks)

……

(c) The Fig.11 below shows an arrangement of lenses, L_o and L_e used in a compound microscope F_o and F_e are principal foci of L_o and L_e respectively.

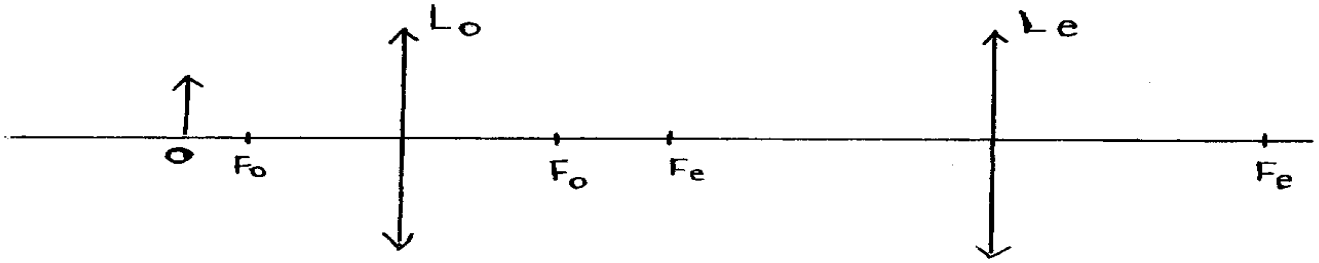


Figure 11

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

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

U (cm)	20	25	30	35	40	45
V (cm)	60.0	37.5	30.0	26.3	24.0	22.5
$\frac{1}{u}$ (cm^{-1})						
$\frac{1}{V}$ (cm^{-1})						

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

(ii) **Determine** the focallength of the lens. (2marks

Name: _____Index No. _____ /_____Adm No._____

Candidate's Signature _____

Date: _____

232/3

PHYSICS PAPER 3

(PRACTICAL)

TIME: 2 ½ hours

MAGS JOINT EXAMINATION

Kenya Certificate of Secondary Education

PHYSICS (PRACTICAL) Paper 3

TIME: 2 ½ HOURS

Instructions

- *Write your name, index number and admission number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *Answer ALL questions in the spaces provided in the 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 are given for a 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 except where stated otherwise.*
- *This paper consists of 8 printed pages.*
- *Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.*

For Examiner's Use Only

Question 1	c	d	g	h	i	(j)	(k)		**TOTAL**
Maximum Score	1	1	8	5	2	2	1		**20**
Candidate's Score									

Question 2		c	e	f	g	h	i	j	k	**TOTAL**
Maximum Score		1	6			5	3	3	2	**20**
Candidate's Score										**40**

GRAND TOTAL

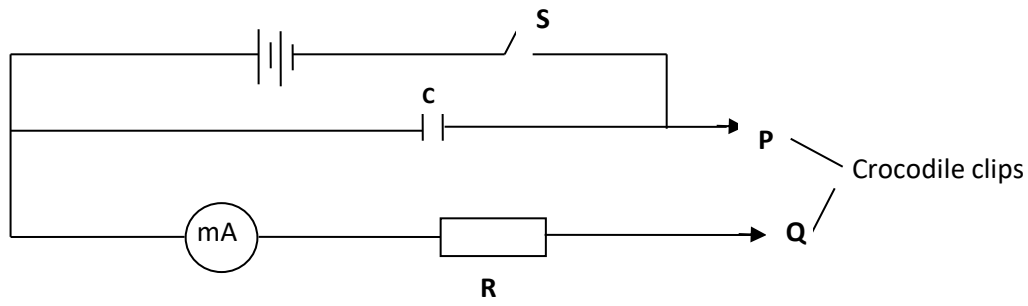
Question one

You are provided with the following:

- 2 new dry cells size D
- A cell holder
- A switch
- A milliammeter of range 0 to 1 mA
- A capacitor labeled C
- 8 connecting wires; at least four with crocodile clips on one end
- A stopwatch
- A carbon resistor labeled **R**

Proceed as follows

a. Connect the circuit as shown in the **figure 1**below, where **P** and **Q** are crocodile clips.



b. Close the switch **S**

c. Name the process which takes place when the switch **S** is closed

……. (1 mark)

d. Connect the crocodile clips P and Q. Observe and record the highest reading of the milliammeter **I_o (** This is the current at $t_{0=}0$)

I_o = ……. mA (1 mark)

e. While the milliammeter show the maximum value of current I_o, open the switch S and start the stop watch simultaneously. Stop the stop watch when the current has dropped from I_o to 0.5 mA. Read and record in the table below the time taken

f. Reset the stop watch and close the switch. Repeat the procedure in (e) to measure and record the time taken for the current to drop from **I_o** to each of the other values shown in the table below.

(5 marks)

Current **I** (mA)	**0.5**	**0.4**	**0.3**	**0.2**	**0.1**
Time **t** (s)					

g. Plot a graph of Current **I** (y – axis)(mA) against time **t** (s) (5 marks)

h. From your graph, find **W** the value of **I** when **t = 10s**. (3 marks)
i. Given that **A = 10W**, determine the value of **A.** (3 marks)

j. Determine the voltage across **R** at **t = 10s** given that R = 4.7kΩ (2 marks)

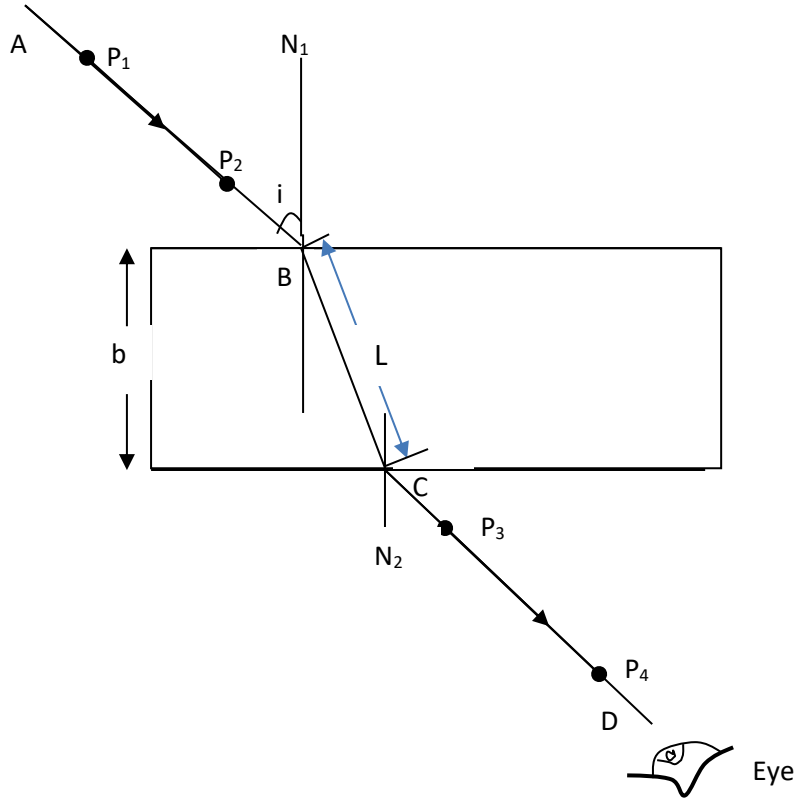
Question Two

You are provided with the following;

- a rectangular glass block
- 4 optical pins
- 2 thumb pins
- a soft board
- a plain paper

Proceed as follows:

(a) Place the glass block on the plain paper with one of the largest face upper most. Trace round the glass block using a pencil as shown below.



(b) Remove the glass block and construct a normal at B. Construct an incident ray AB of angle of incidence, i = 20^0.

(c) Measure the breadth **b** of the glass block

breadth **b** =…… (1 mark)

(c) Replace the glass block and trace the ray ABCD using the optical pins.

(d) Remove the glass block and draw the path of the ray ABCD using a pencil.

(e) Measure the length L and record it in the table below

Angle i^0	L (cm)	L^2 $(cm)^2$	$\frac{1}{L^2}$ (cm^{-2})	$Sin^2 i$
20				0.1170
30				0.25
40				0.4312
50				0.5868
60				0.75
70				0.8830

(6 marks)

(f) Repeat the procedure above for the angles of incidence given.

(g) Calculate the values of $\frac{1}{L^2}$ and record in the table above.

(h) Plot a graph of $\frac{1}{L^2}$ (y-axis) against $Sin^2 i$. **(5 marks)**

(i) Calculate the gradient **S** of the graph **(3 marks)**

Given that the equation of that graph is; $\frac{1}{L^2} = -\left(\frac{1}{n^2 b^2}\right) Sin^2 i + \frac{1}{b^2}$

(j) Determine the value of ***n*** (3 marks)

(k) Present your work sheet; attached to the exam paper (2 mark)

NAME: ……CLASS:……..…ADM NO:……..…

SIGNATURE: …… INDEX NO: ……

232/2
PHYSICS
PAPER 2
2020

MOKASA I EXAMINATION - 2020
Kenya Certificate of Secondary Education (KCSE)
Physics Paper 2

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.

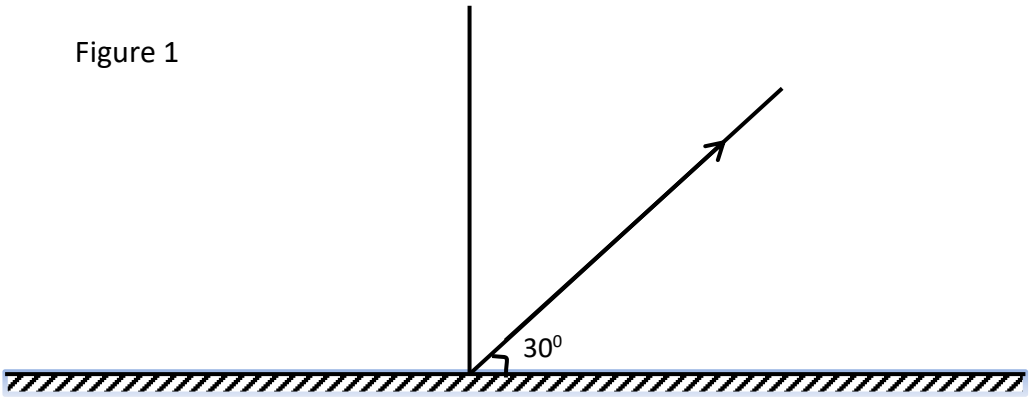
SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A	1 – 11	25	
B	12	10	
	13	13	
	14	11	
	15	11	
	16	10	
TOTAL		80	

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)

……

……

……

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)

……

……

……..

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

……

……

……

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)

……

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

……

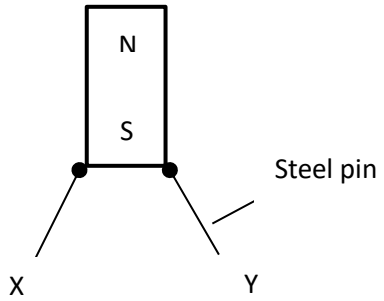
……

……

……

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)

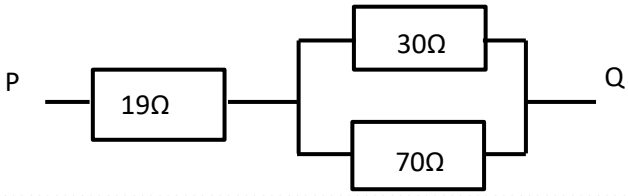
……

……

……

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

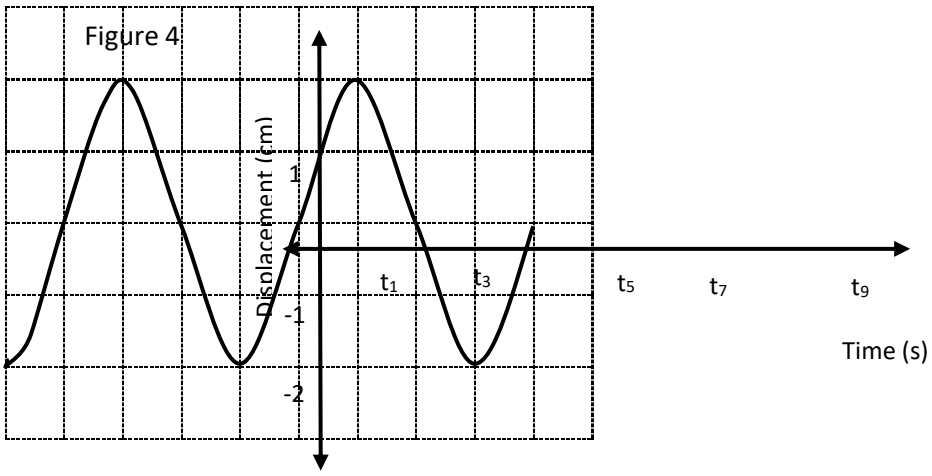
Figure 3



……

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

Figure 4



Determine the value of t_8. (2marks)

……

……

……

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)

……

(b) Calculate its frequency. (2marks)

……
……
……
……
……

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)

……
……
……

9. State **two** conditions necessary for total internal reflection to occur. (2marks)

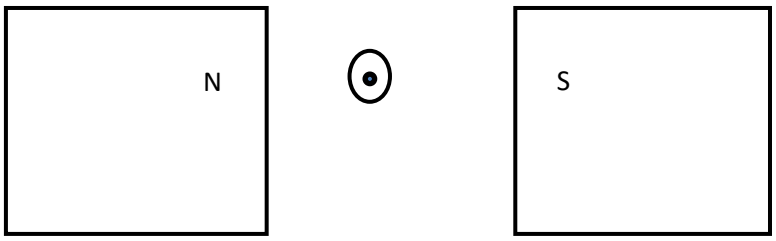
……
……
……

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

……
……
……

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)

……

……

……

(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

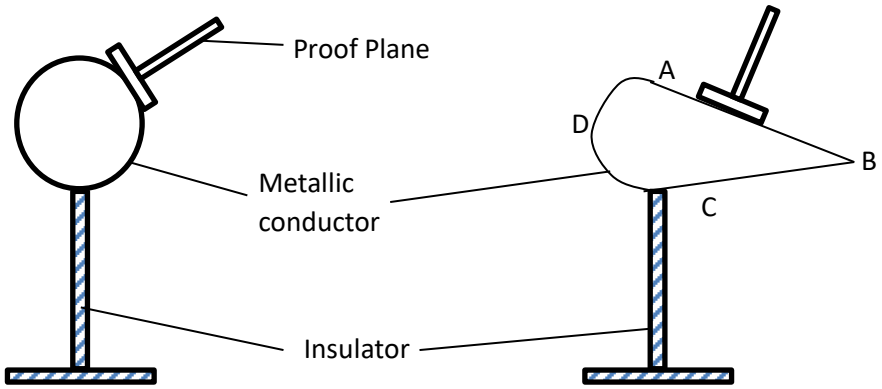


Fig. (i) Fig. (ii)

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)

……

……

……

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

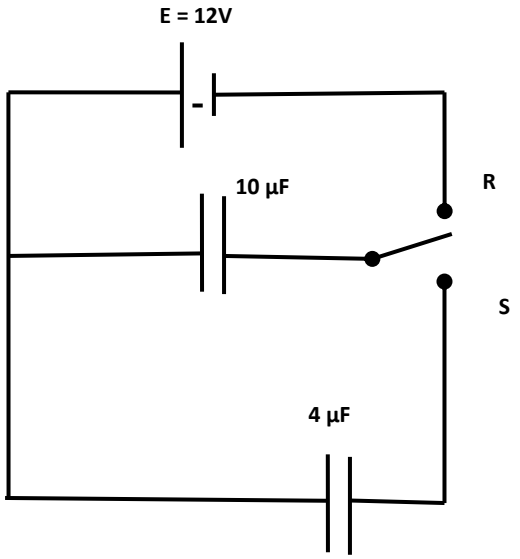
……

……

……

(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)

……
……
……
……
……

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

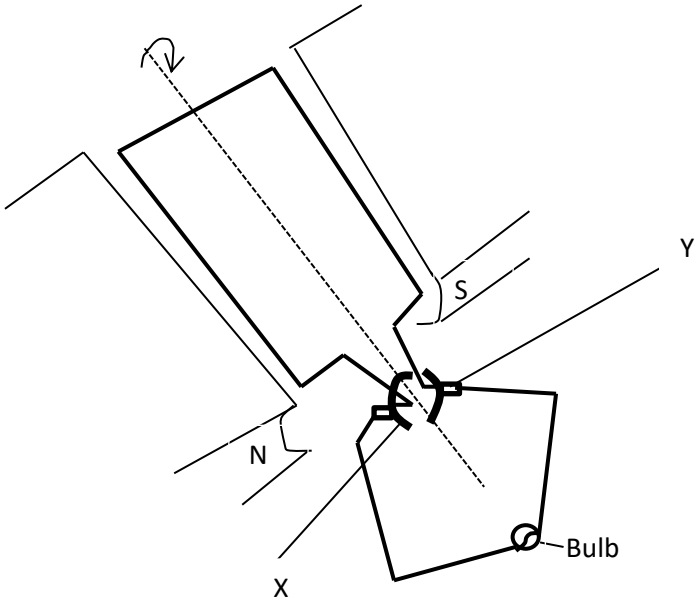
……
……
……

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

……
……
……

(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)

.....

.....

.....

(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)

.....

.....

.....

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

……
……
……

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

……
…

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

(i) Eddy currents

……
…

(ii) Hysteresis losses

……
…

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)

……
…

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

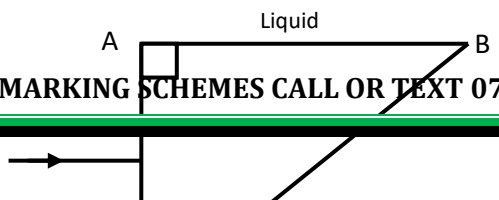
……
…

(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)

……
…

(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)

……

……

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

……

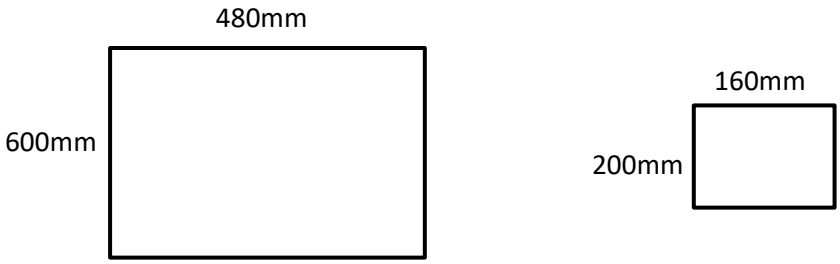
…

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

……

(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)

……

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

……

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

(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)

……

……

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

……

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

……

NAME: …….. INDEX.NO: ……..……..

SCHOOL: ……..CANDIDATES SIGN: ……..…..…

DATE: ……

232/1
PHYSICS
PAPER 1
DECEMBER 2020

MERU CENTRAL SUB-COUNTY CLUSTER EXAMINATION

KENYA CERTIFICATE OF SECONDARY EDUCATION (KCSE)

TIME: 2 HOURS.

Instructions to candidates

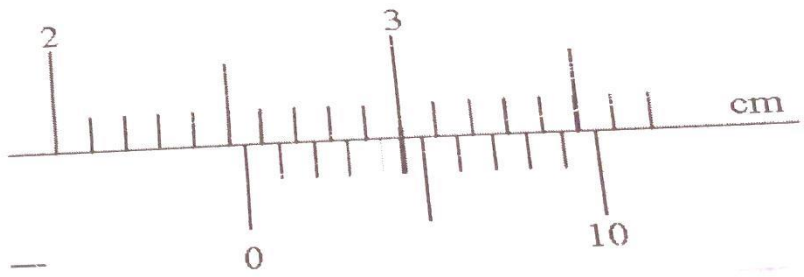
1. *Write your name, index number and school in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above.*
3. *This paper consist of **TWO** sections; **A** and **B**.*
4. *Answer **ALL** the questions in section **A** and **B** in the spaces provided.*
5. ***ALL** working **MUST** be clearly shown.*

FOR EXAMINERS USE ONLY

MAXIMUM SCORE	**80 MARKS**
CANDIDATE'S SCORE	

SECTION A – 25 MARKS (ANSWER ALL THE QUESTIONS)

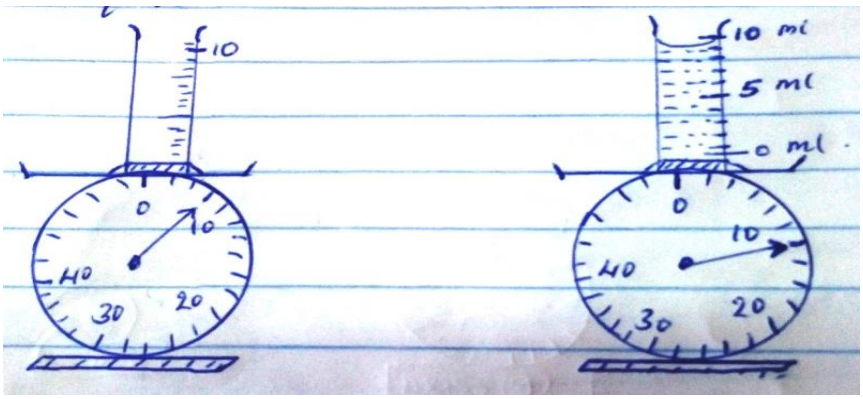
2. The verneir calipers in the figure below has a zero error of -0.05cm.



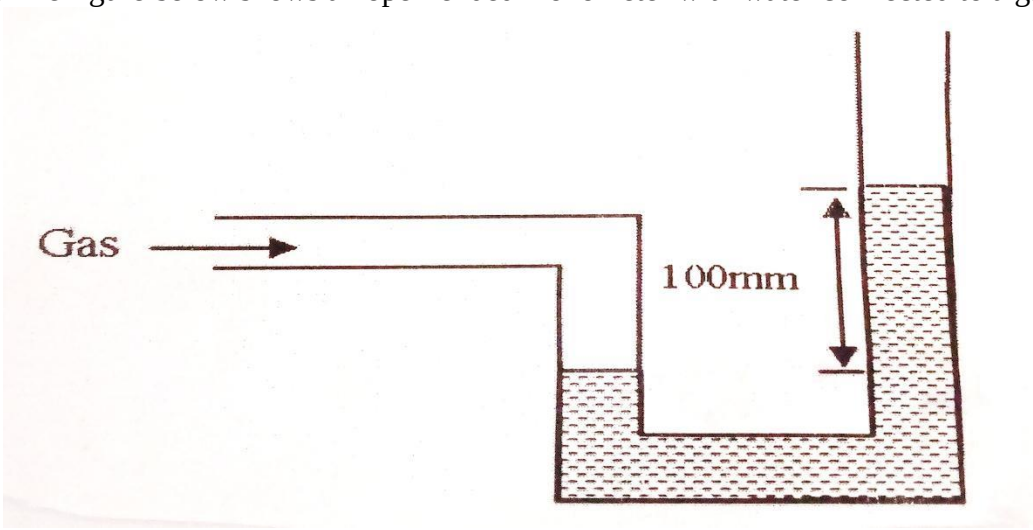
State the actual reading of the measuring instrument (2 marks)

2.Fig.1(a) and (b) shows a set – up to determine the density of a liquid.

Determining the density of the liquid. (3mks)



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



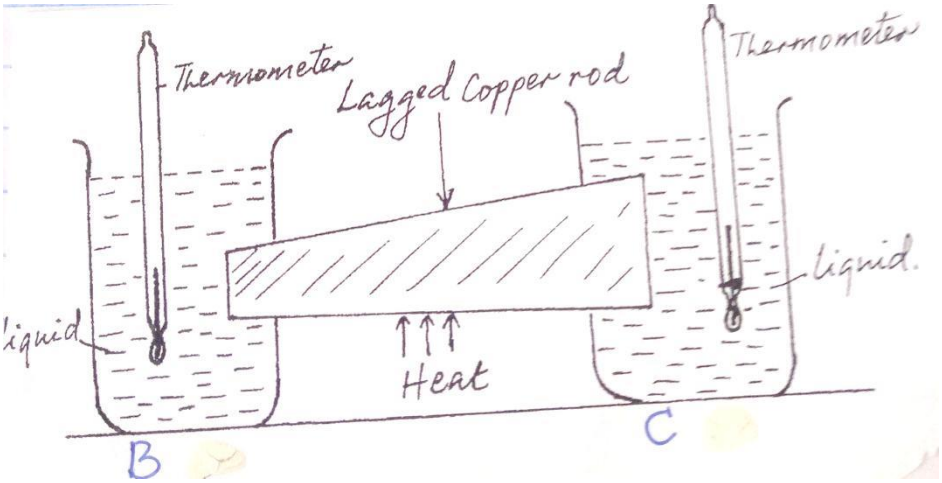
If a mercury barometer reads 760mm, calculate the pressure of gas (give your answer in N/m^3).

(Density water = 1g/cm3, 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)

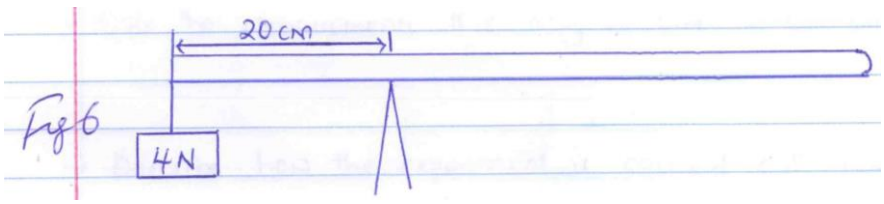
6.The figure below shows samples of same liquid B and C being heated through a well-lagged copper rod of non-uniform thickness. A thermometer is placed on each sample for some time.



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)

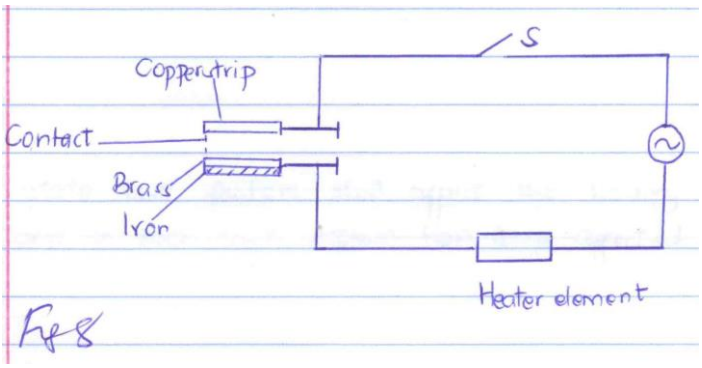
8. The figure 6 below shows a uniform 50cm rod. It is balanced horizontally by a load of 4N on one end. Calculate the weight of the rod 2mks)



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.



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

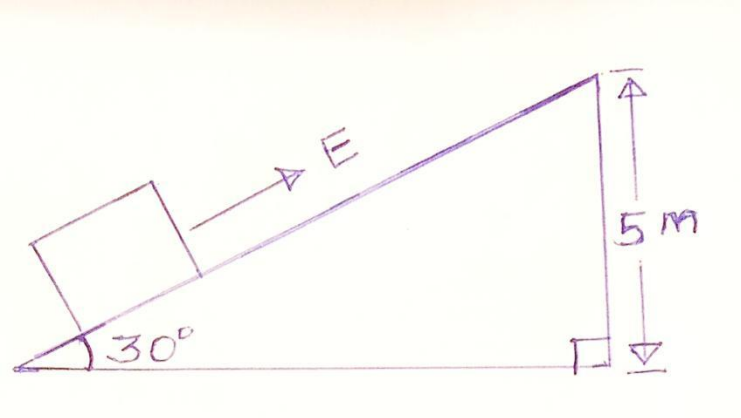
ii) Describe how the circuit controls the temperature when the switch S is closed 2mks)

SECTION B – 55 MARKS (ANSWER ALL THE QUESTIONS)

17. (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 300 to the horizontal (take g to be $10m/s^2$)

(i) Determine the velocity ratio of the velocity ratio of the inclined plane. (2 marks)

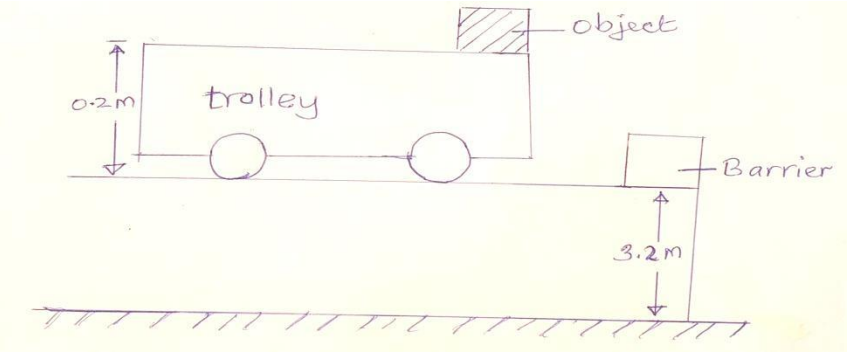


(ii) If the efficiency of the plane is 75% determine:

(III) The mechanical advantage (2 marks)

(IV) 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:



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

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

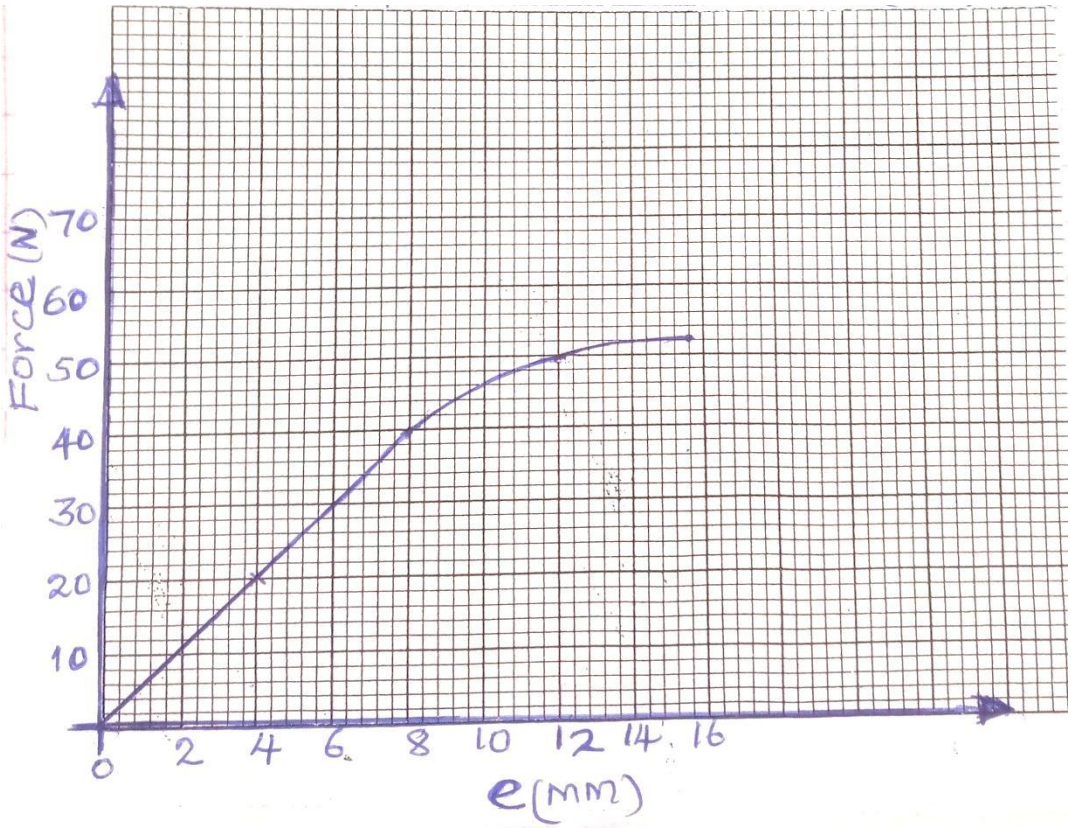
18. (a) state Hooke's Law (1 Mark)

(b) (i) A vertical spring of un streched 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 (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.

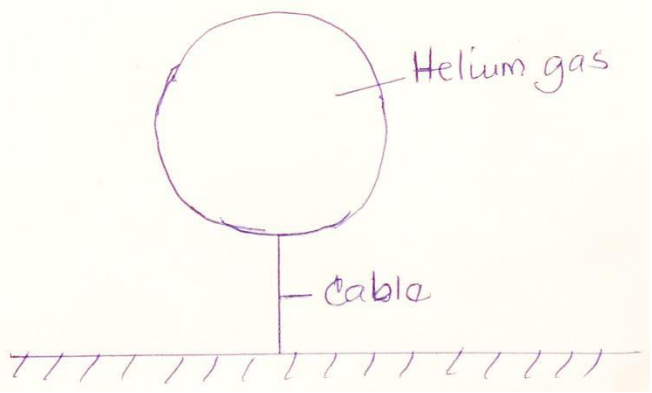


Determine the spring constant of the spring (3 marks)

19. (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.

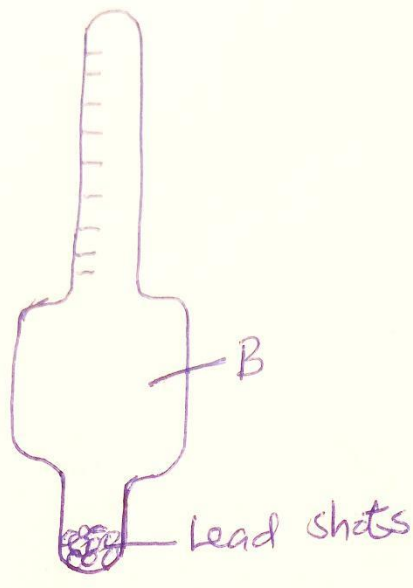


(iv) State 3 forces acting on the set up. (3 marks)

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

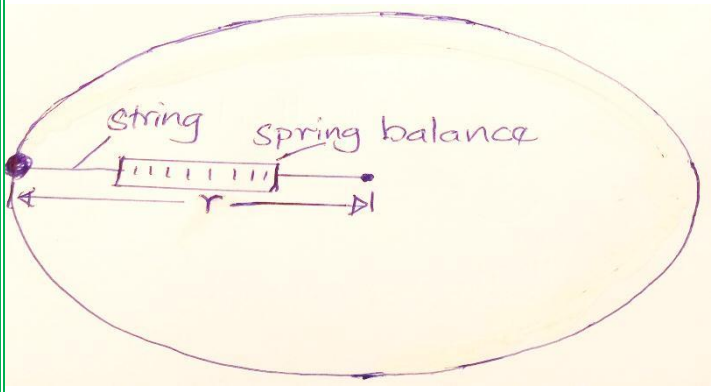
(vi) Calculate the acceleration of the balloon if the cable is cut. (2 marks)

(d) The diagram below shows a hydrometer.



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

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



(d) (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 acceleration on the circular path. Explain (1 mark)

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

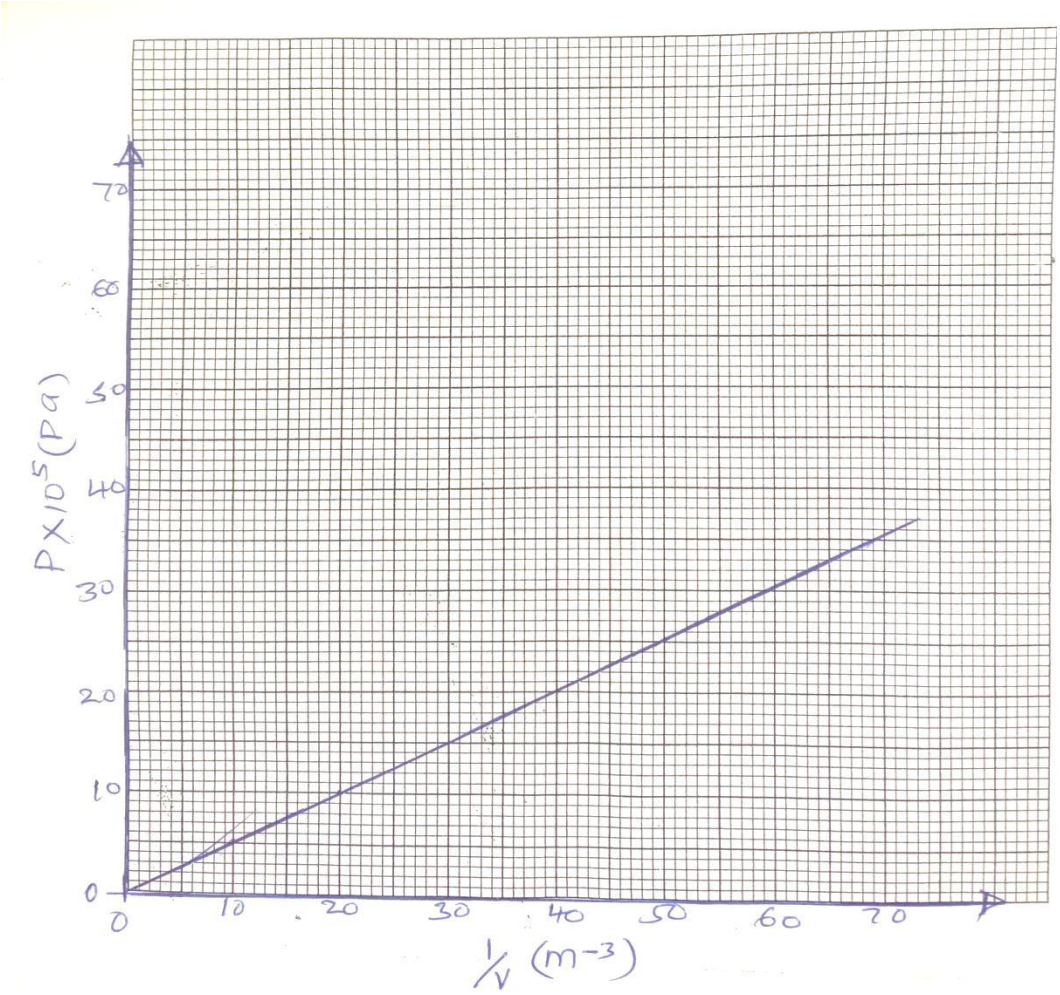
(ii) Give a reason for your answer in b (i) above (1mark)

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

(f) 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)

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

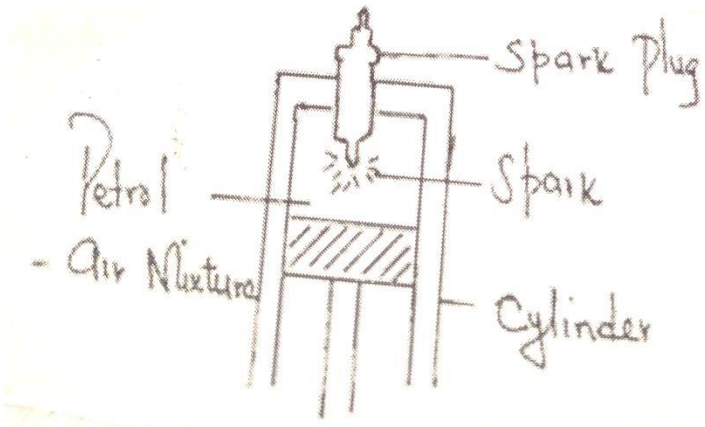
(b) The pressure P of a fixed mass of gas at constant temperature of T = 200k is varied continuously and the values of corresponding volume recorded. A graph of P against $\frac{1}{v}$ is shown on the graph below.



Use the graph to:

(ii) Determine the volume of the gas when pressure reads 2.8×10^5 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.



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

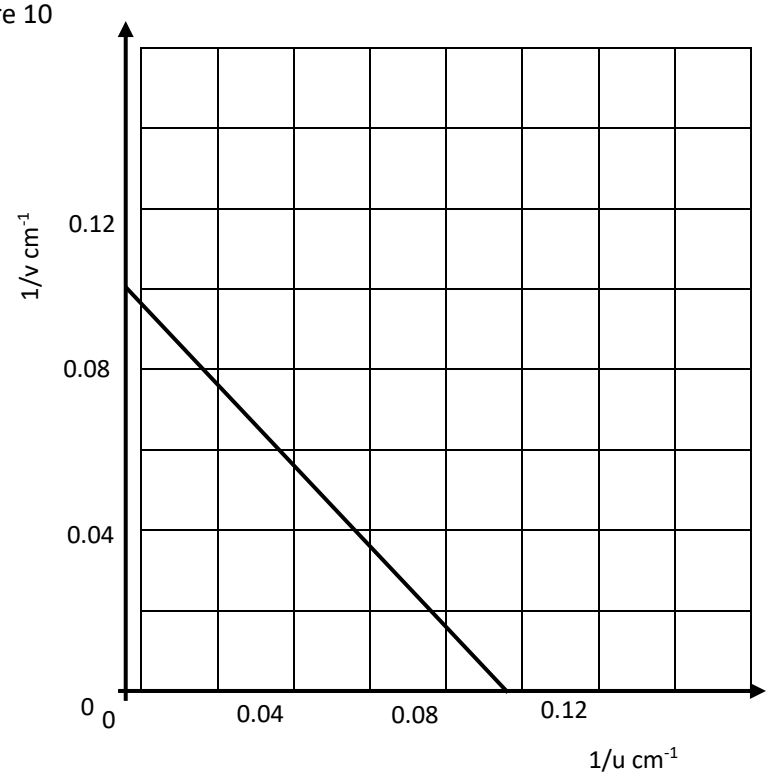
(i) quantity of heat lost by steam. (2mks)

(iv) quantity of heat gained by water. (3mks)

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

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



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

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

(i) Convex mirror. (1mark)

(ii) Parabolic mirror. (1mark)

(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)

NAME: …….. INDEX.NO: ……..…….

SCHOOL: …….CANDIDATES SIGN: ……..…..…

DATE: ……

232/2
PHYSICS
PAPER 2
DECEMBER 2020

MERU CENTRAL SUB-COUNTY CLUSTER EXAMINATION

KENYA CERTIFICATE OF SECONDARY EDUCATION (KCSE)

TIME: 2 HOURS.

Instructions to candidates

1. *Write your name, index number and school in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above.*
3. *This paper consist of **TWO** sections; **A** and **B**.*
4. *Answer **ALL** the questions in section **A** and **B** in the spaces provided.*
5. ***ALL** working **MUST** be clearly shown.*

FOR EXAMINERS USE ONLY

MAXIMUM SCORE	**80 MARKS**
CANDIDATE'S SCORE	

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.

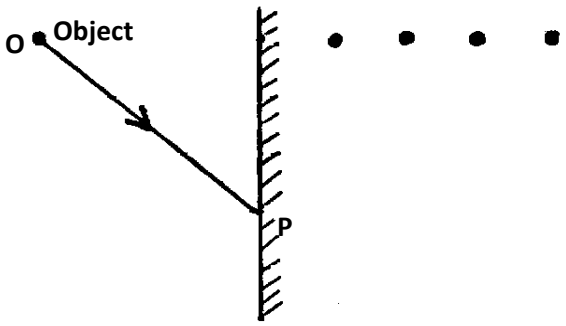


Fig. 1

(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.

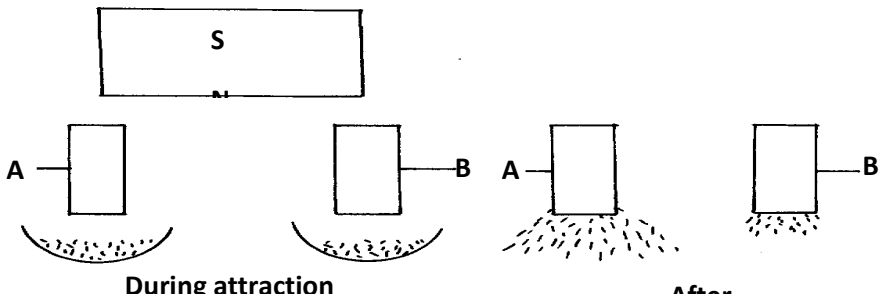
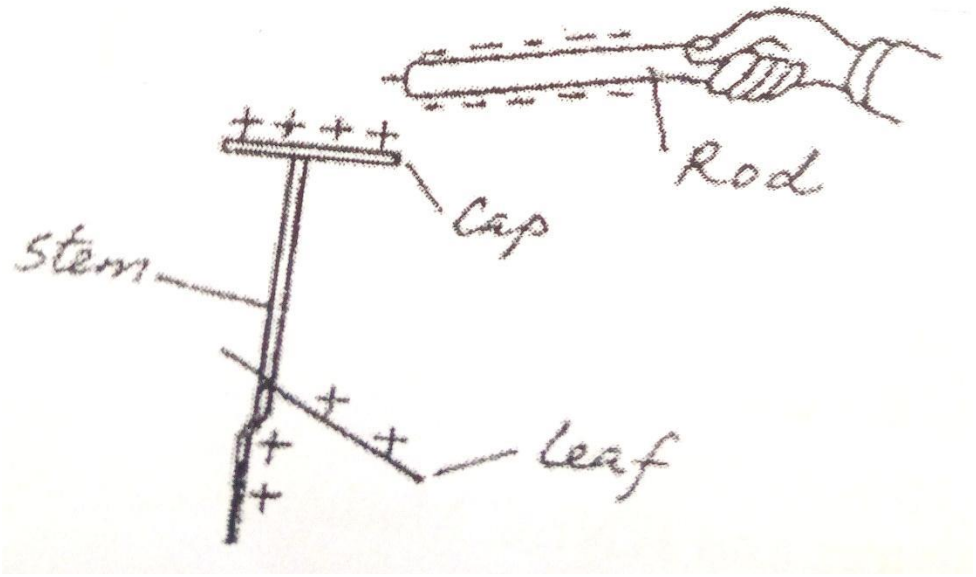


Fig. 2

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

5. 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.

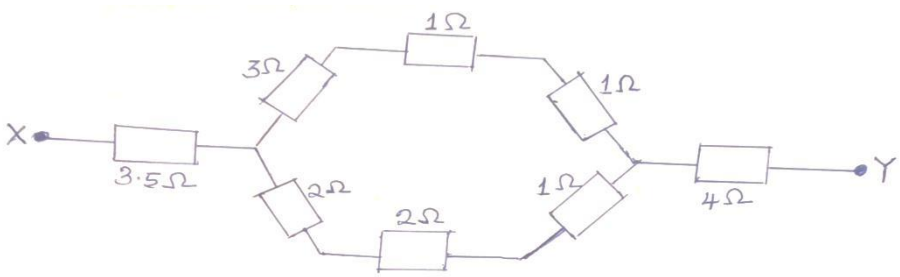


Explain this observation (2 marks)

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.



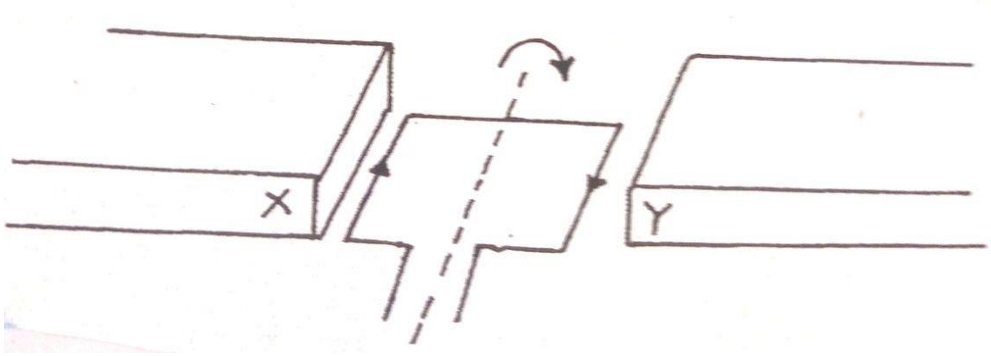
Calculate the effective resistance of the network. (3 marks)

7.State:

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

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

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



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

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

12. A battery is rated at 30Ah. For how long will it work if it steadily supplies a current of 3A. (2 marks)

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

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

a = _____ b = _____

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

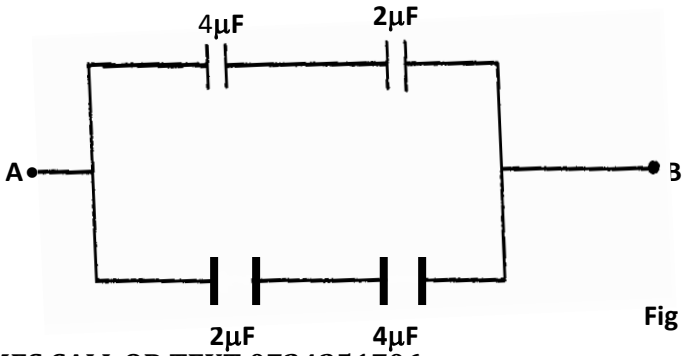


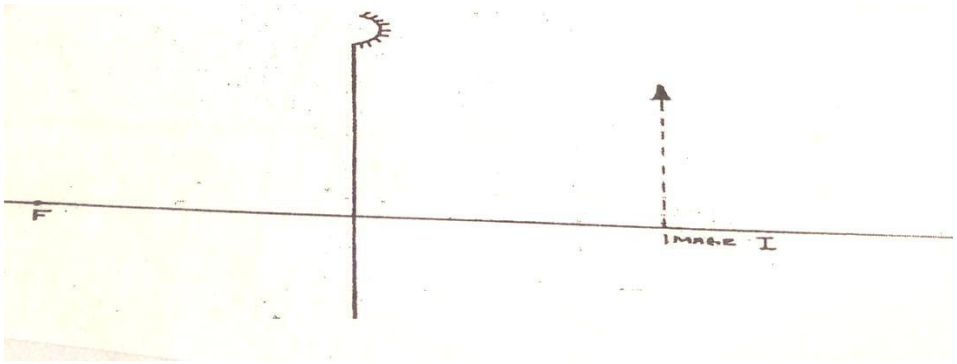
Fig 13

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

Section B (55 marks)

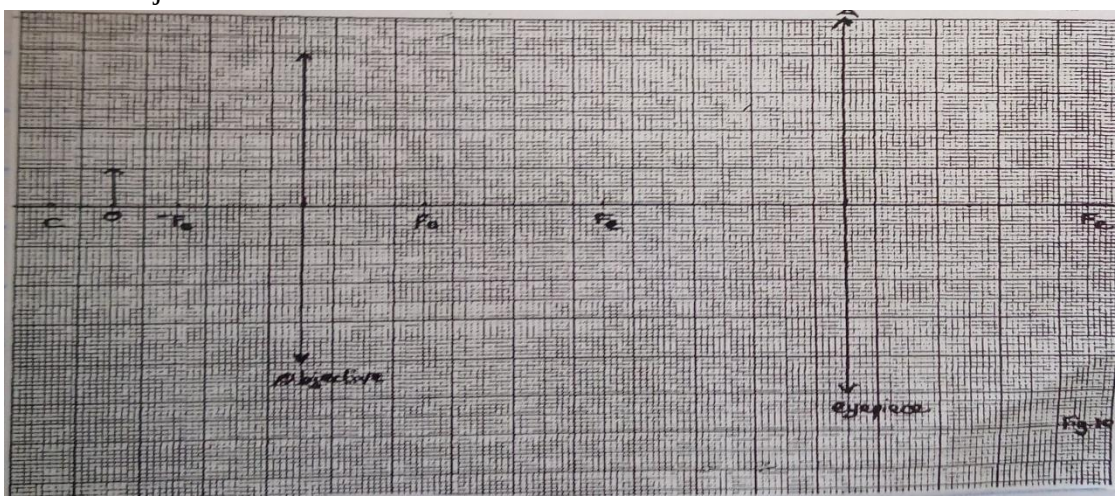
Answer all questions

13a)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 is 2 cm and that of eyepiece is 4cm. The two lenses are 9cm apart. An object 1 cm high is placed 3cm from the objective lens.

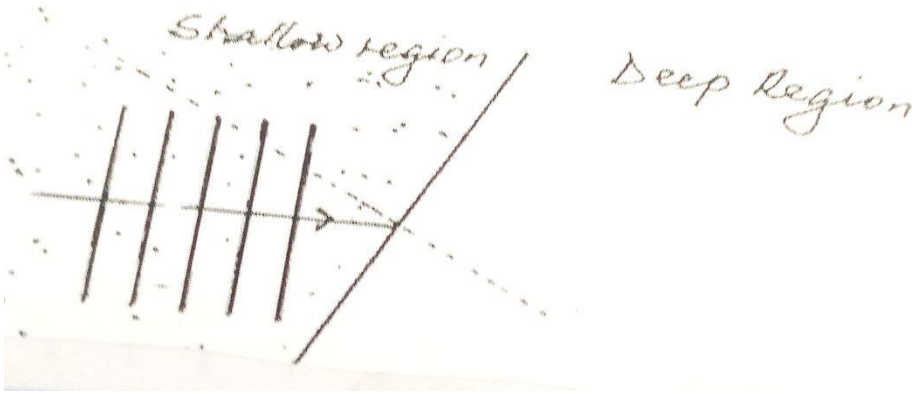


(iii) Construct rays to show the position of the final image seen by the eye. (4 marks)

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

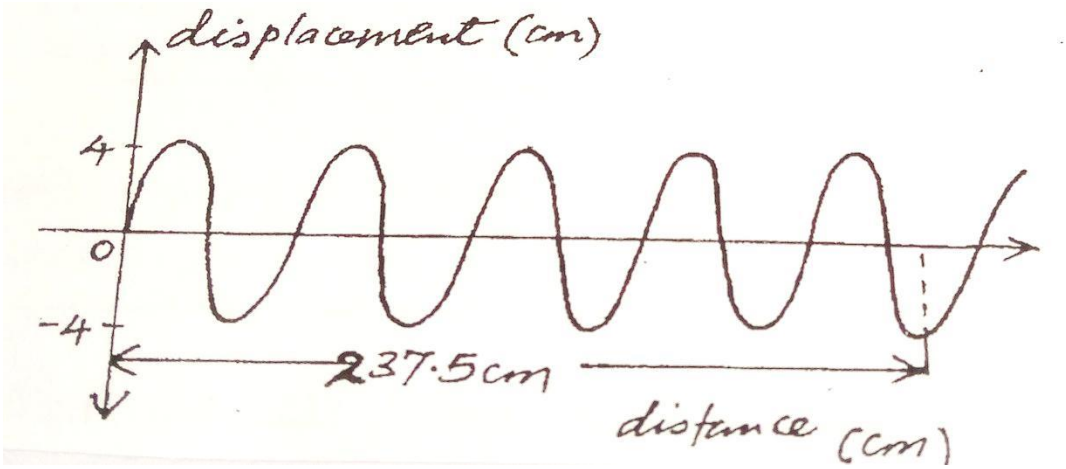
14.The figure below shows water wave fronts

(b) 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 fare to show the wave fronts after crossing the boundary.
(2 marks)

(c) 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.



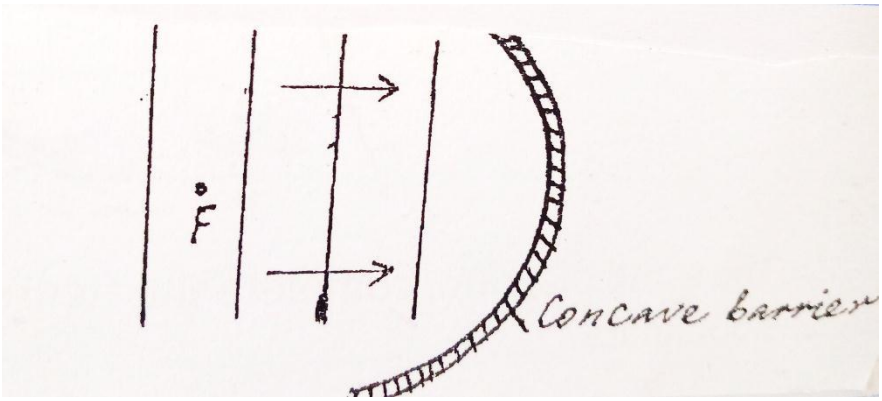
Determine:

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

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

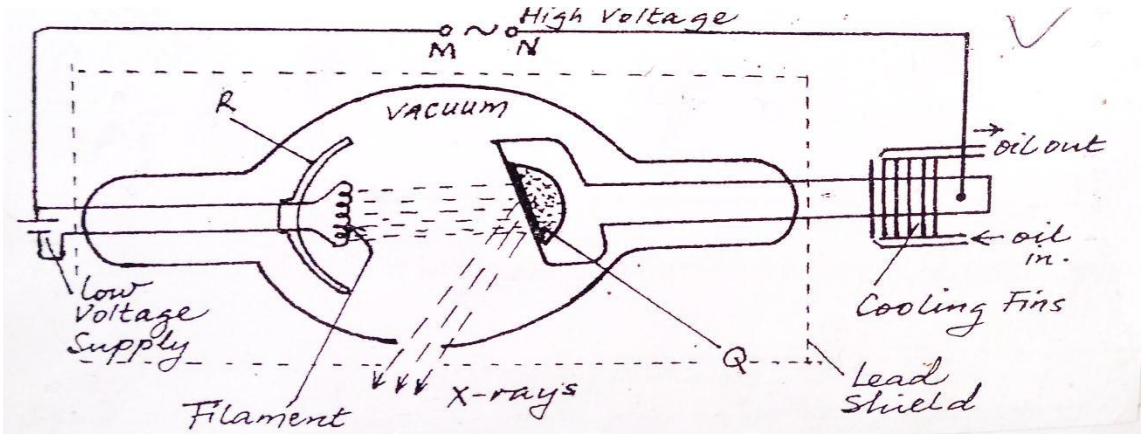
(vi) The frequency of the vibrator (2 marks)

(d) 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)

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



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

Q

R

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

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

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

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

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

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

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

(IV) Increasing the filament current (1 mark)

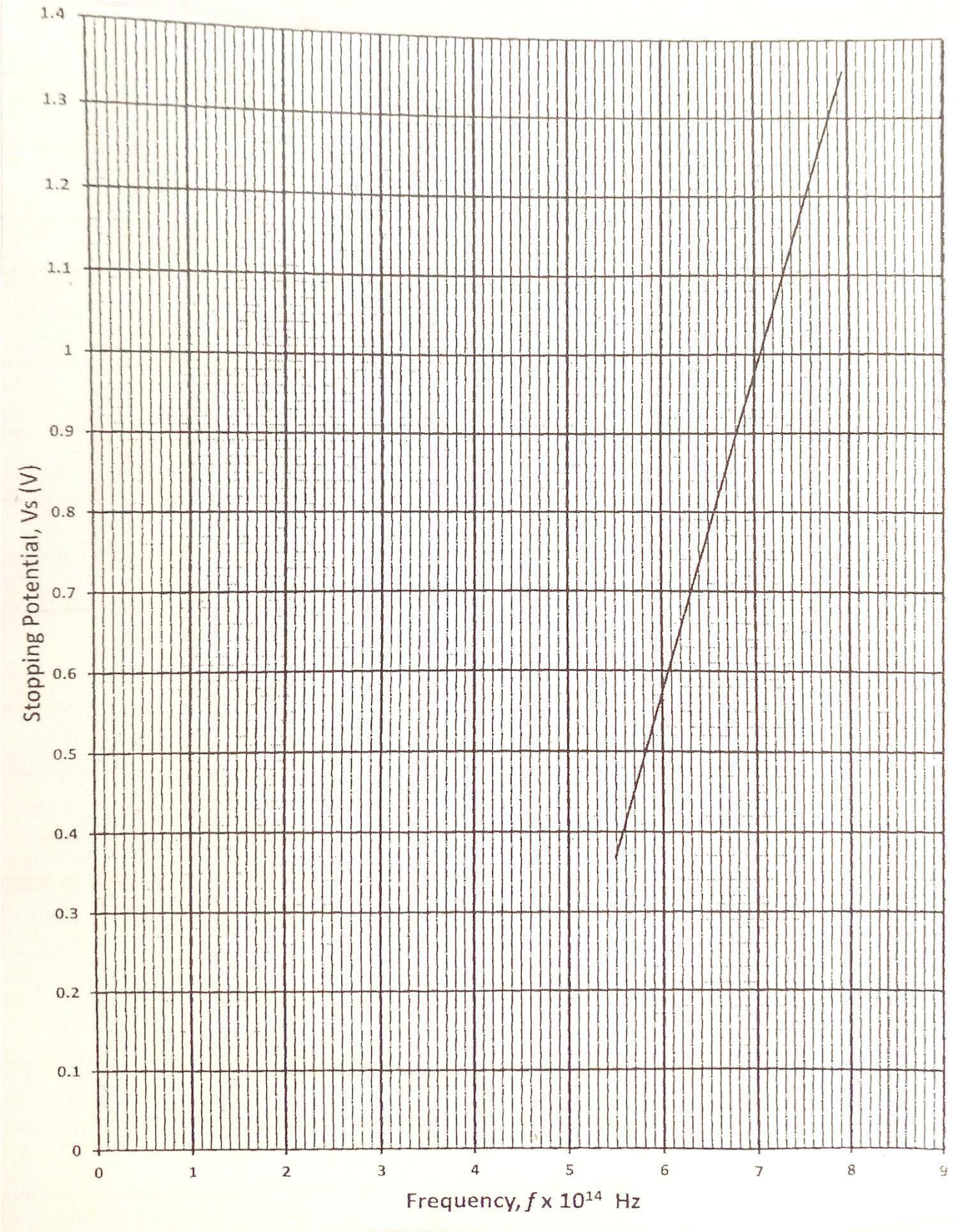
16(a) What is photoelectric emission? (1 mark)

(f) 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)

(e) The figure below shows a graph of stopping potential (voltage)V, against frequency f, of a radiation falling on a photosensitive surface.
Given that eVs = hf – hfo 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 x 10-^{9}C. Use the graph to determine;



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

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

(VI) The work function Wo of the surface given that Wo = Hfo for the surface (2mrk)

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

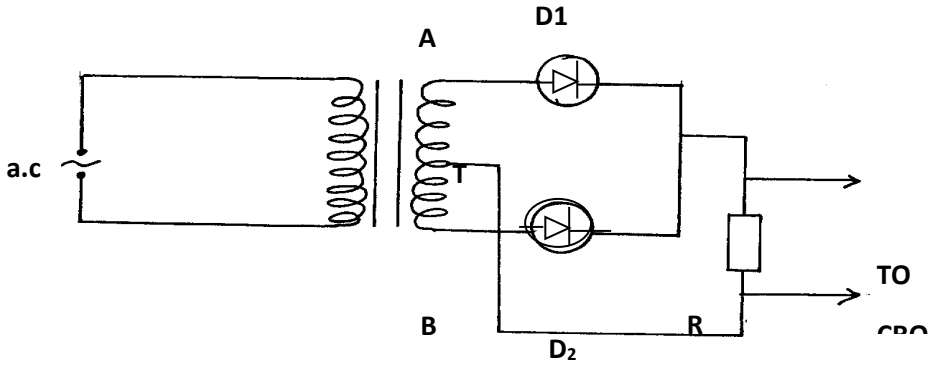


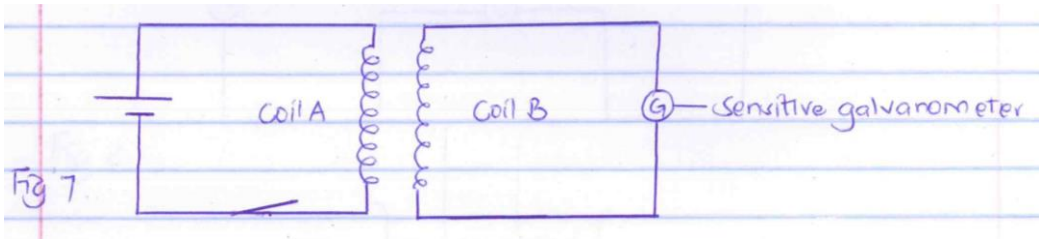
Fig 16.

(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)

20. 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

ii) Determine the secondary voltage 3mks)

iii) 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)

(a)

NAME……..…….. DATE ……

INDEX NO. …….…….……... SIGNATURE:……..……

232/1
PHYSICS
PAPER 1
DECEMBER, 2020
TIME: 2 HOURS.

LANJET JOINT EXAMINATION 2020

Kenya Certificate of Secondary Education.

232/1
PHYSICS
PAPER 1
TIME: 2HOURS.

INSTRUCTIONS TO CANDIDATES

- Write your name and your index number in the spaces provided above.
- This paper consists of **two** sections **A** and **B**
- Answer **all** questions in section **A** and **B** in the space provided
- All working **must** be shown in the spaces provided in this booklet.
- Mathematical tables and silent electronic calculators may be used
- This paper consists of 10 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

FOR OFFICIAL USE

SECTION	QUESTION	MAX. SCORE	CANDIDATE'S SCORE
A	1-12	25	
B	13	09	
	14	15	
	15	10	
	16	11	
	17	10	
TOTAL SCORE		**80**	

This paper consists of 10 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no pages are missing.

SECTION A 25 MARKS
ANSWER ALL QUESTIONS IN THIS SECTION

1. A micrometer screw gauge is used to measure the thickness of a stuck of 10 microscope slide cover slips. The reading with the cover slips in position is as shown in figure 1.

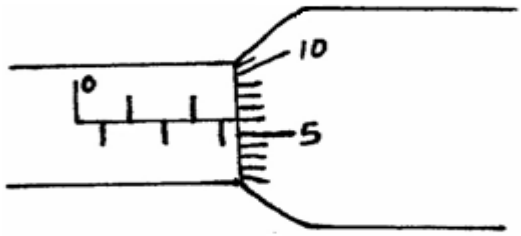


Figure 1

If the micrometer screw gauge has a negative zero error of 0.01mm, determine the thickness of each cover slip. (2mks)

2. Explain whyammonia gas released at the back of a laboratory spreads faster on a hot day than on a cold day. (1mk)

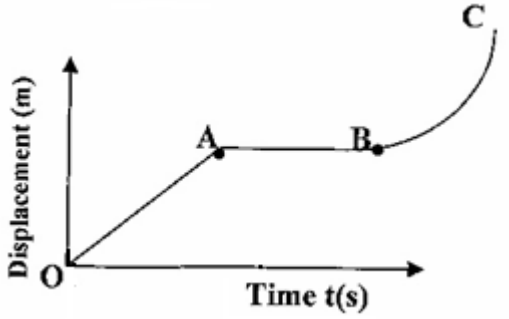
3. A piece of paper is held in front of the mouth and air blown horizontally over the paper, it is observed that the paper get lifted up. Give reason for the observation. (1mk)

4. (a) Estimate the size of an oil molecule if a drop of oil of volume 6.0×10^{-10} m^3 forms a patch of radius 32 cm on a water surface. (2mks)

   (b) Other than oil patch being monolayer, state any **one** other assumption in the oil drop experiment. (1mk)

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

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



Describe the motion of the particle in the region. (3mks)

i. OA

ii. AB

iii. BC

7. A 60 litre giant density bottle weighs 100N when empty. What will be its mass when filled with liquid W whose density is 0.72g/cm^3? *(g=10N/kg)* (3mks)

8. Figure 3 shows a uniform wooden plank which weighs 10N. The plank is balanced at 0.8m from one end by a mass of 2.5Kg.

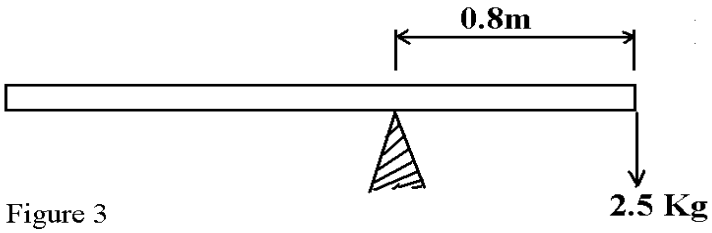
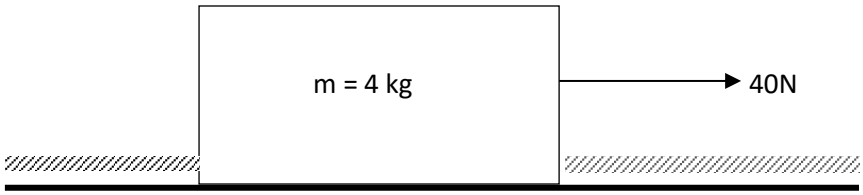


Figure 3

What is the length of the wooden plank in metres. (2mks)

9. The figure below shows a force of 40N acting on a body of mass 4kg. The coefficient of friction between the surfaces is 0.05.



Determine the acceleration of the body. (3mks)

10. State onefactor that affect the spring constant of a spring. (1mk)

11. A girl in a school in Nakuru plans to make a barometer using a liquid of density $1.25gcm^{-3}$. If the atmospheric pressure in the school is $93750Nm^{-2}$. Determine the minimum length of the tube that she will require? (3mks)

12. A form one girl observed that when mercury is put into a glass it does not wet the glass. Explain the observations made by the girl. (1mk)

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

13. (i) Define Archimedes' Principle. (1mk)

(ii) An object weighs 1.04N in air, 0.64N when fully immersed in water and 0.72N when fully immersed in a liquid. If the density of water is 1000 kg m^{-3}, find:

a. The density of the liquid. (2mks)

b. Calculate the density of the metal block. (2mks)

(iii) Calculate the upthrust on the metal and the apparent weight of the metal when completely submerged in salt solution of density $1.2g/cm^3$. (3mks)

(iv) A blockof metal of volume $80cm^3$ weighs 3.80N in air. Determine its weight when fully sub merged in a liquid of density $1200kgm^{-3}$. (3mks)

14. The following readings were obtained in an experiment to verify Hooke's law using a spring.

Mass (g)	0	25	50	75	100	125
Reading (cm)	10.5	11.5	12.5	13.5	14.4	16.0
Force (N)						
Extension (mm)						

a) Complete the table (2mks)

b) Plot the graph of extension against force. (5mks)

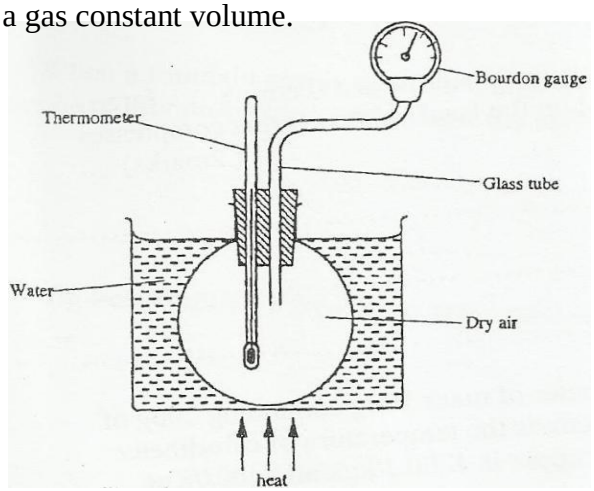
c) From the graph determine the:

(i) Elastic limit (1mk)

(ii) Spring constant. (2mks)

15. (a) State the pressure law for an ideal gas (1mk)

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

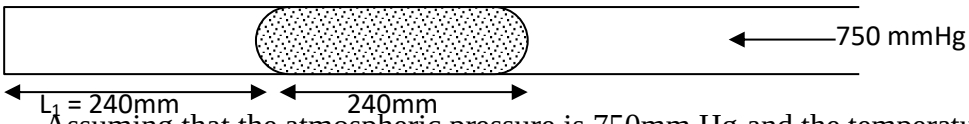


Explain how the result form the experiment can be used to determine the relationship between temperature and pressure. (2mks)

(c) A bicycle tyre is pumped to a pressure of 2.2×10^5pa at23^0C. After a race the pressure is found to be 2.6×10^0 pa. Assuming the volume of the tyre did not change, what is the temperature of the air in the tyre. (3mks)

(d) Air is trapped inside a glass tube by a thread of mercury 240 mm long. When the

tube is held horizontally the length of the air column is 240mm.



Assuming that the atmospheric pressure is 750mm Hg and the temperature is constant; calculate the length of the air column when the tube is vertical with open end down. (3mks)

16. a) A body of mass 20Kg hangs 4m and swings through a vertical height of 0.9m as shown inthe figure 11.

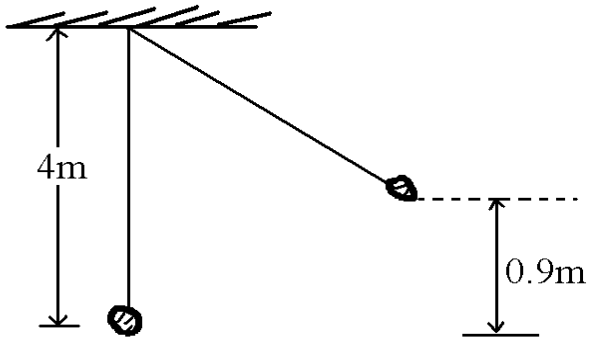


Figure 11

Determine;

i) The potential energy at its position. (2mks)

ii) The speed of the body when passing through the lowest point. (2mks)

b) A crane lifts a load of 2000Kg through a vertical distance of 3.0m in 6 seconds. Determine the;

i) Work done by the crane. (2mks)

ii) Power developed by the crane. (2mks)

iii) Efficiency of the crane given that it is operated by an electric motor rated 12.5kW. (2mks)

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

b) A block of metal of mass 150g at a 100^0C is dropped into a well lagged calorimeter of mass 215g and specific heat capacity $400JKg^{-1}K^{-1}$ containing 100g of water at 25^0C. The temperature of the resulting mixture is 34^0C. (Specific heat capacity of water = $4200JKg^{-1}\ K^{-1}$). Determine;

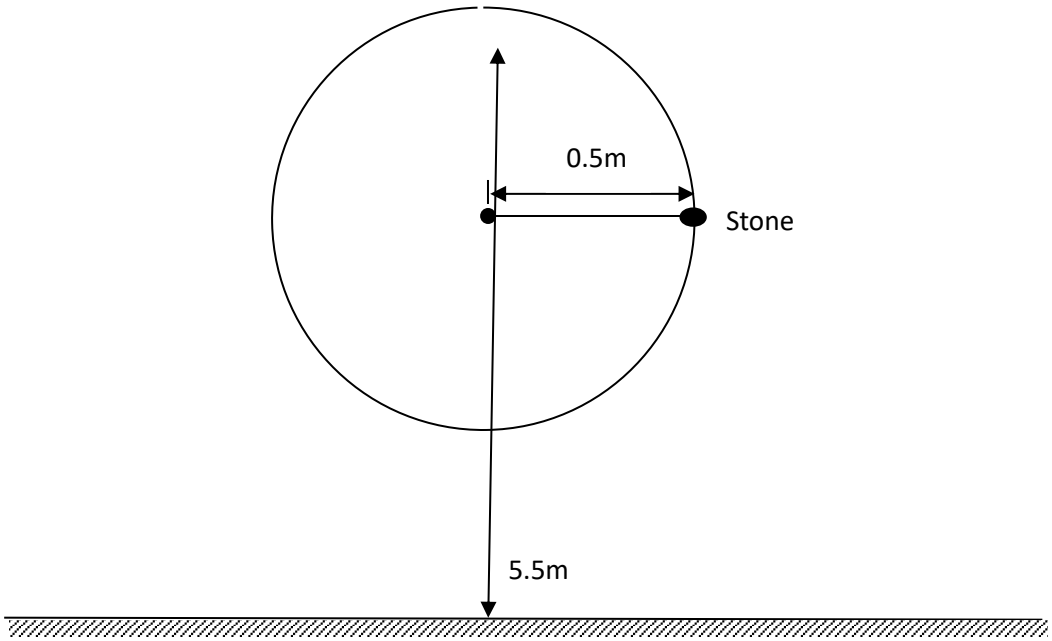
i) Heat gained by calorimeter. (2mks)

ii) Heat gained by water. (2mks)

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

18. (a) State two factors affecting centripetal force (2mks)

(b) A stone of mass 0.5kg is attached to a string of length 0.5m which will break if the tension exceeds 20N. The stone is whirled in a vertical plane, the axis of rotation being above the ground, as shown in the Figure 10 below.



The angular velocity is gradually increased until the string breaks. At what angular velocity, ***w***, will the string break? (3mks)

NAME……..…DATE……..……

INDEX NO. ……..……..SIGNATURE……

232/2
PHYSICS
PAPER 2
THEORY
DECEMBER, 2020
TIME: 2HOURS

LANJET JOINT EVALUATION EXAM

KENYA CERTIFICATE OF SECONDARY EDUCATION 2020

232/ 2
PHYSICS
PAPER 2
DECEMBER 2020
TIME: 2HOURS

INSTRUCTIONS TO CANDIDATES:

This paper consists of TWO sections. Sections A and B
Answer ALL the questions in section A and B
All working MUST be clearly shown.
Mathematical tables and Electronic calculators may be used.

Take acceleration due to gravity, g = 10ms^{-2}

FOR EXAMINER'S USE ONLY

SECTION	QUESTIONS	MAX SCORE	CANDIDATES SCORE
A	1-13	25	
B	14	12	
	15	10	
	16	12	
	17	12	
	18	09	
TOTAL SCORE		80	

This paper consists of 10 printed pages.
Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing

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

1. State one reason why in the construction of car head lamps parabolic reflectors are preferred to spherical reflectors. (1mk)

2. It is common practice that once an accumulator is recharged the terminals are connected using a wire to assess its state of charge. How is this dangerous to the life of the accumulator? (1mk)

3. Two identical spheres A and B each standing on an insulating base are in contact. A negatively charged rod is brought near sphere A as shown in figure 1

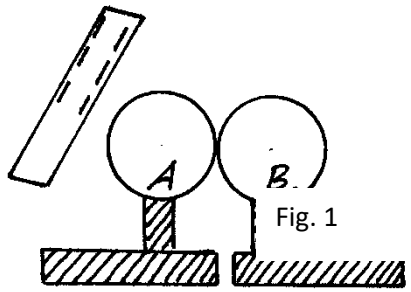


Fig. 1

In what way will A differ from B if separated while the rod is near? Explain. (2mks)

4. The ammeter in the circuit in figure 2 has negligible internal resistance. The cell has an internal resistance of 0.5Ω and an electromotive force of 3.0v.

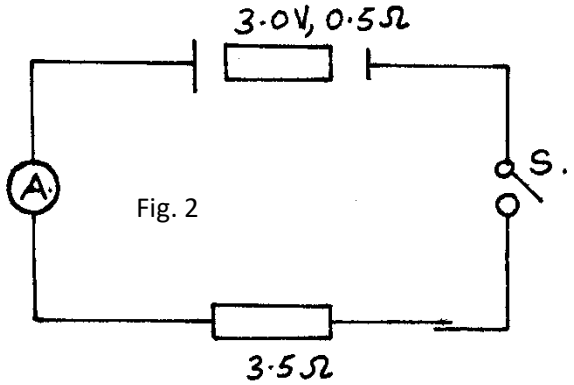


Fig. 2

Determine the value of current the ammeter registers when switch S is closed. (2mks)

5. Figure 3 represents a step down transformer of ratio 10:1. The turns are wound uniformly on the core and the primary coil is connected to a 250va.c supply. The lengths KL and MN are as indicated.

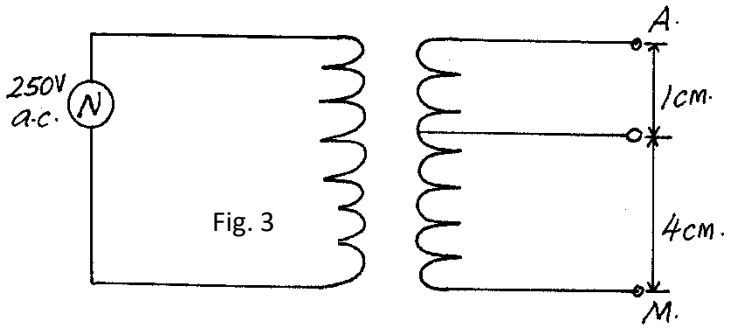


Fig. 3

K

L

Determine the p.d across LM. (4mks)

6. The diagram in figure 4 below shows a wire placed between the poles of two bar magnets.

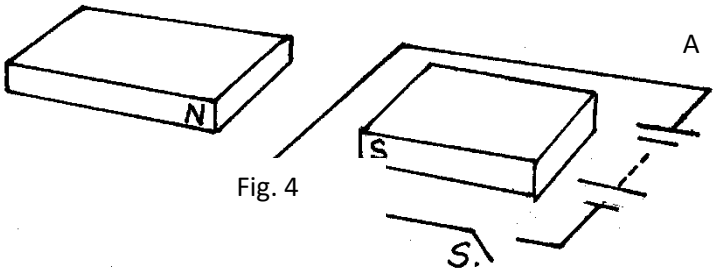


Fig. 4

Indicate with an arrow the force that acts on the section AB of the wire. (1mk)

7. An electric heater 480Ω is connected to a 240v main supply. Determine the energy dissipated in 4 minutes. (3mks)

8. A pin at the bottom of a beaker containing glycerine appears to be 6.8cm below the surface of glycerine. Determine the height of the column of glycerine in the beaker. (*take the refractive index of glycerine as 1.47*) (3mks)

9. A girl shouts and ears an echo after 0.6 seconds later from a cliff. If velocity of sound is 330m/s, calculate the distance between her and the cliff. (3mks)

10. What do you understand by 'doping' as applied with semiconductors? (1mk)

11. Arrange the following in order of decreasing wavelength Gamma radiation, Radio waves, Infrared and x-rays. (1mk)

12. Explain why soft iron keepers are suitable for storing magnets (2mks)

13. Figure 7shows a trace obtained on a cathode ray oscilloscope screen when an a.c is applied to the Y-plates and time base switched on.

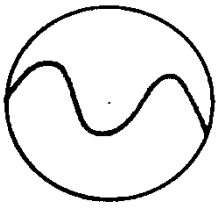


Fig. 7

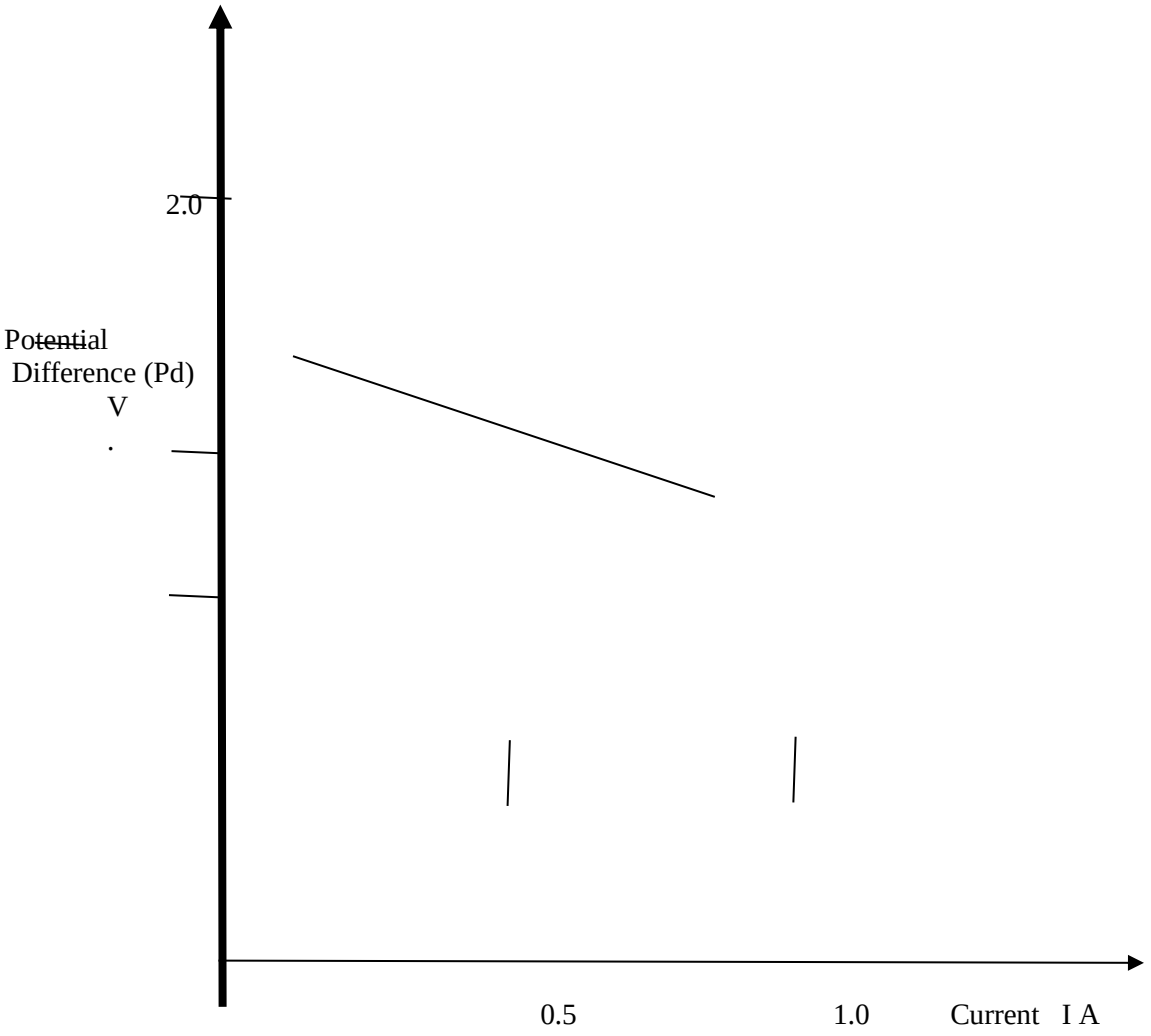
On the same figure draw a waveform showing what would be observed if the time base is doubled. (1m

SECTION B (55 MARKS)

Answer ALL the questions in this section in the spaces provided

14.(a) What is meant by an open circuit? (1mk)

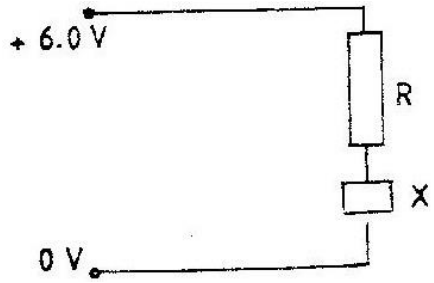
b) The graph in figure 5 shows the terminal voltage, V, of a certain battery varies with the current, I, being drawn from the battery.



(i) Write an expression relating the e.m.f. E, terminal voltage, V, current, I and the internal resistance, r, of the battery for the circuit drawn in (i) above. (1mk)

(ii) From the graph determine the; I internal resistance, r, of the battery. (2mks)

(b) When the device, X is connected in the circuit below, the voltage across it is 0.70 V.



Calculate the value of the resistance R. (3mks)

(c) The cell in figure 10 has an e.m.f of 2.1 V and negligible internal resistance.

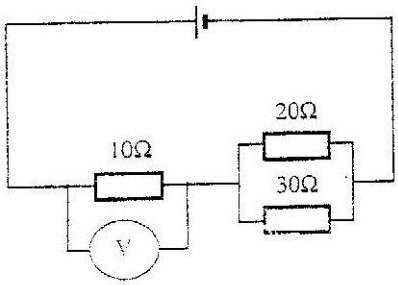


Figure 10

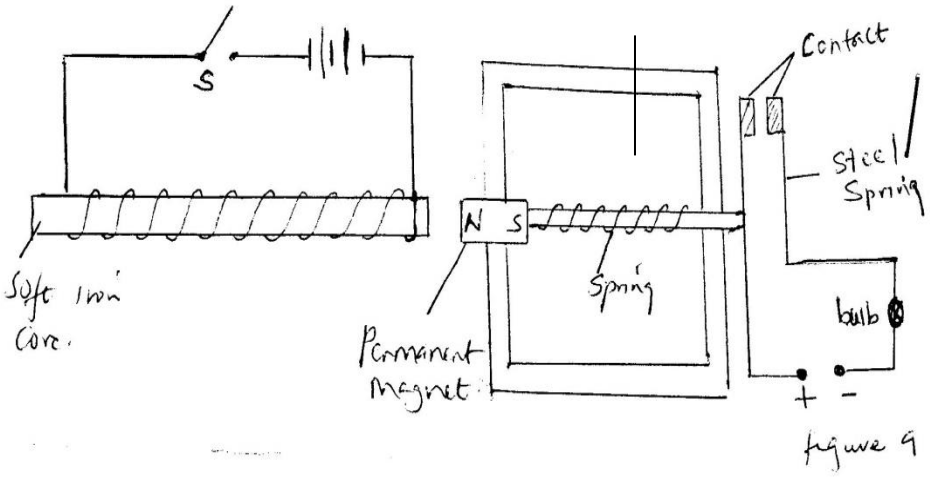
Determine the

(i) Total resistance in the circuit (2 marks)

(ii) Current in the circuit (1 mark)

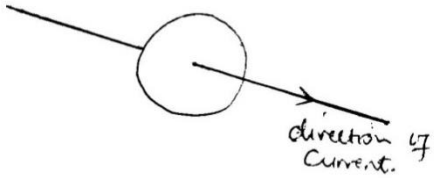
(iii) Reading of the voltmeter (2 marks)

15. a) The figure 9 below shows magnetic relay circuit



Explain what will be observed when the switch is closed (4mks)

(b) The figure 10 below shows a current carrying conductor

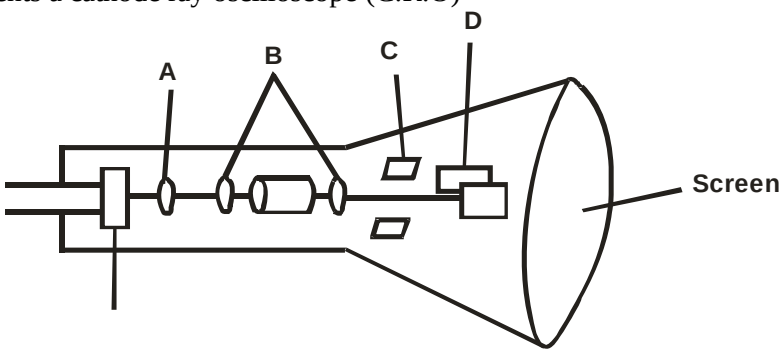


On the same diagram draw, the magnetic field pattern produced. (2mks)

(c) State two possible rules that can be used to predict the field direction produced in the above diagram. (2mks)

(d) List two applications of magnetic effect of electric current. (2mks)

16. a) The figure below represents a cathode ray oscilloscope (C.R.O)



b) Name the parts labelled A and B. (2mks)

c) What are the functions of parts labelled C and D? (2mks)

d) Explain how electrons are produced . (1mk)

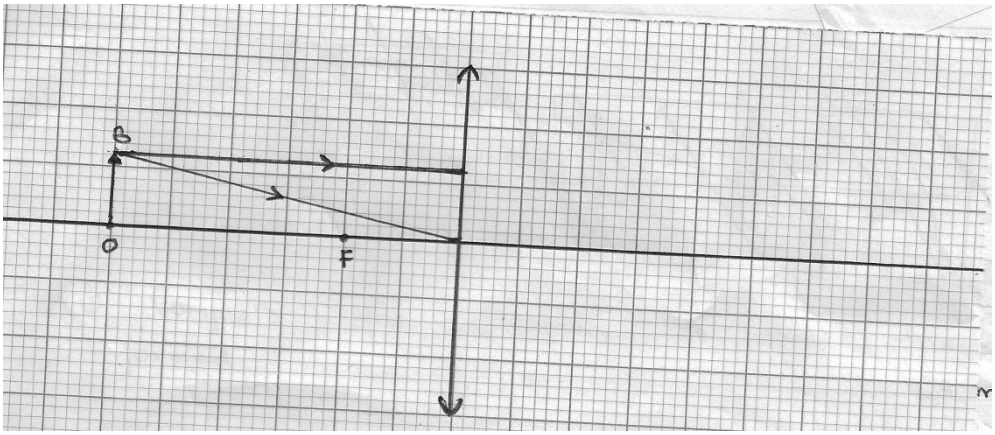
e) Give a reason why the tube is evacuated. (1mk)

f) The potential between the anode and the cathode of an X-ray tube is 80kv. Calculate;

i. The energy of an electron accelerated in the tube. (Electronic charge e = 1.6×10^{-19} C) (3mks)

ii. The velocity of electrons in the tube. (Mass of an electron = 9.11×10^{-31}kg) (3mks)

17 (a) The figure 12 below shows two rays starting from the top of an object OB incident on a converging lens of focal length 2cm.

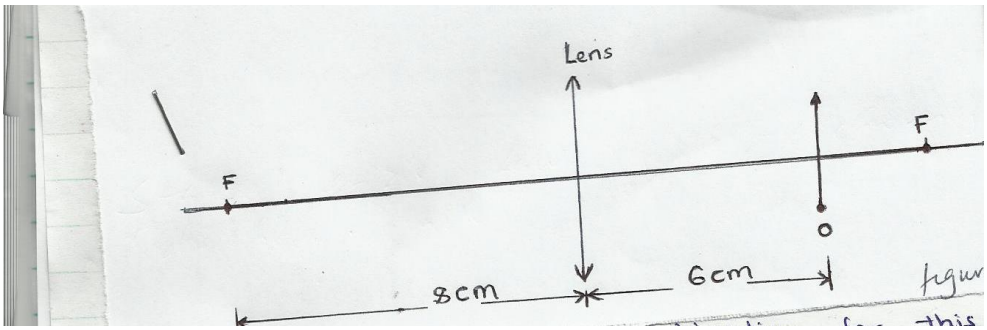


Complete the diagram to show the image formed (3mks)

(b) Add one or more incident ray from B and draw the corresponding refracted ray (1mk)

(c) Calculate the magnification produced by the lens (2mks)

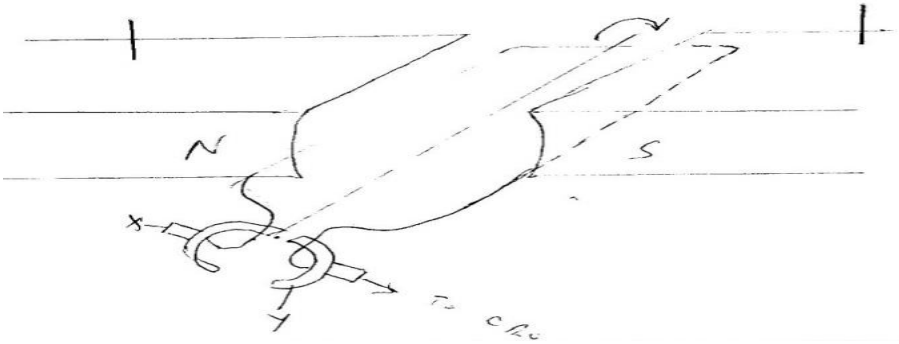
(d) The figure 13 below shows an object placed at right angles to the principal axis of a thin converging lens.



i. Calculate the position of image formed (3mks)
ii. Give an application for this arrangement of a lens. (1mk)
iii. Describe the nature of the image formed (2mks)

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

(b) The figure 14 below shows a diagram of a simple electric generator



State three factors that would affect the value of the voltage output (3mks).

(c) A transformer supplies a current of 13.5A at a voltage of 48v to a device from an AC main supply 240V. Given that the transformer is 80% efficient, calculate;

i. Power supplied to the transformer (3mks)

ii. Current in the primary coil (2mks)

Name: …… Index No. ……

School: ……. Candidate's Sign. ……

232/3

PHYSICS

PAPER 3

DECEMBER 2020

TIME: 2 ½ HOURS

LANJET JOINT EXAMINATION 2020

Kenya Certificate of Secondary Education.

232/3

PHYSICS

PAPER 3

TIME: 2½ HOURS.

INSTRUCTIONS TO CANDIDATES:

- *Write your **name** and **index number** in the spaces provided above.*
- *Sign and write the **date** of the examination in the spaces provided above.*
- *You are supposed to spend the first **15** minutes of the **2 ½** hours allowed for this paper reading the whole paper carefully before commencing your work.*
- *Marks are given for a clear record of the observation 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 **may be** used.*
- *Candidates should check the question paper to ascertain that all the pages are printed andthat no questions are missing.*

FOR EXAMINER'S USE ONLY.

Question	Maximum score	Candidate's score
1	20	
2	20	
TOTAL	40	

This paper consists of 8 printed pages candidates should check the questions to ascertain that all pages are printed as indicated and that no questions are missing

QUESTION 1 (PART A)

You are provided with the following:

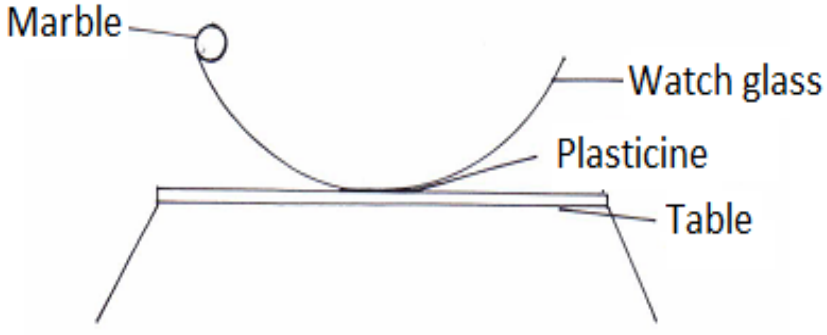
- A watch glass.
- A small piece of plasticine.
- A marble.
- A stopwatch.
- Vernier calipers.
- An electronic balance (to be shared).

(a) Measure the mass M of the marble.

M = ……g (½mk)

(b) Place the watch glass flat on the table with a small piece of plasticine to fix it firmly to the table at the place it touches.

(c) Release the marble from one end of the watch glass and time 10 complete oscillations with a stop watch. Repeat this three times.



(d) Record your values in table 1 below

Table 1

	Time for 10 oscillations	**Periodic time T(s)**
1		
2		
3		

(2mks)

Find the average periodic time T.

T = ……. S. (½mk)

(e) Measure the diameter of the marble with the verniercallipers and hence find its radius.

Diameter d = …….. m (½mk)

Radius r = …… m (½mk)

(f) Determine the volume (V) of the marble given that:

$V = \frac{4}{3}\pi r^3$ (1mk)

(g) Calculate the radius of curvature of the watch glass R from the formula.

$$R - r = \frac{5gT^2}{7(2\pi)^2}$$ (2mks)

Where g = 9.8m/s² and π = 3.142.

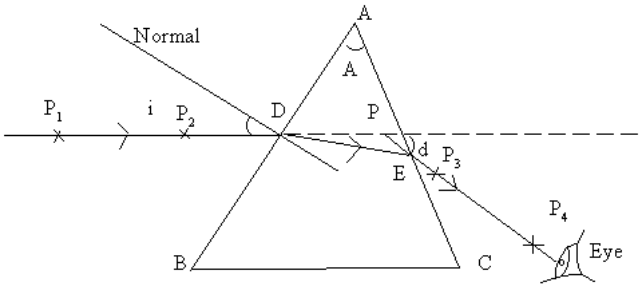
PART B

You are provided with the following

- ✓ A triangular prism of 60^0.
- ✓ Four optical pins
- ✓ A soft board
- ✓ A plain piece of paper

Proceed as follows

(a) Place the plain sheet of paper on the soft board
(b) Place the prism with one face on the plain paper and trace its outline.
(c) Remove the prism from the plain sheet of paper.



(d) Mark angle A and record its value.
A = ...(1mk)

(e) Draw a normal as shown and draw a ray of incident on the normal at an angle of incidence of 30^0.

(f) Replace the prism on the outline on the sheet.

(g) Stick two pins P_1 and P_2 along the path of the incident ray as shown in the diagram.

(h) View the images of P_1 and P_2 through the glass prism through face AC as shown on the diagram.

(i) Stick two pins P_3 and P_4 so that they appear to be in line with P_1 and P_2 as seen through the glass prism.

(j) Remove the pins and prism from the sheet. Trace the path of the ray until it emerges from the glasses shown in the diagram.

(k) Extend the incident ray and the emergent ray until they meet at P. Measure and record the angle of deviation d.

(l) Repeat the experiment for other angles of incidence shown in the table.

Angle of incidence $(i)^0$	30	35	40	45	50	55	60
Angle of deviation $(d)^0$							

(3 marks)

(m) Plot a graph of angle of deviation $(d)^0$ against angle of incidence $(i)^0$. (5 marks)

(l) Present your working.

(n) From the graph determine the minimum angle of deviation D. (1 marks)

(p) Find the refractive index of the prism material using (3 marks)

$$n = \frac{\text{Sin}\,\frac{(A+D)}{2}}{\text{Sin}\left(\frac{A}{2}\right)}$$

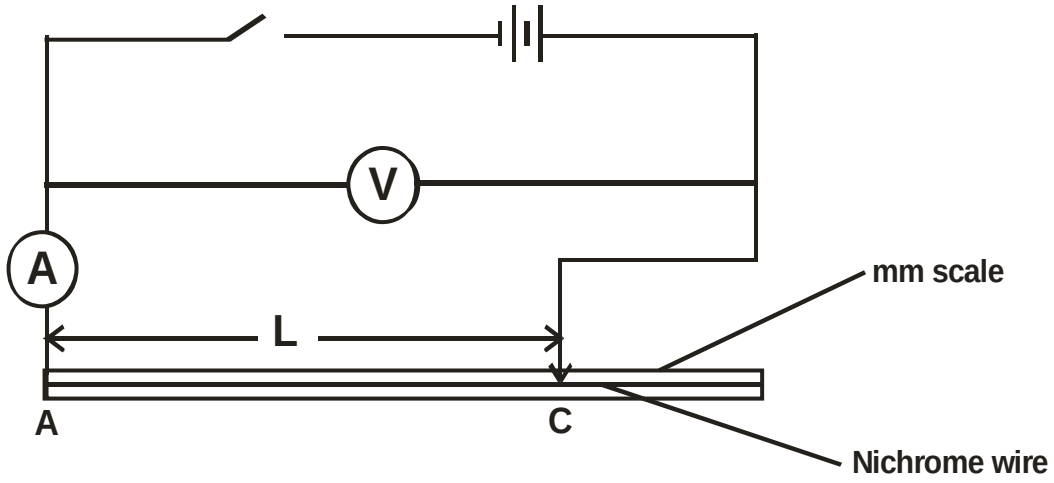
QUESTION 2

PART A

1. You are provided with the following apparatus.
   - Two dry cells.
   - Nichrome wire 100cm on a mm scale.
   - An ammeter.
   - Cell holder.
   - Voltmeter.
   - Connecting wires with crocodile clips.
   - Switch.

Proceed as follows;

a) Connect the circuit as shown in the diagram.



b) Connect the ends A and C where AC is the length L of the Nichrome wire across the terminals as shown. Close the switch and measure both current I and potential difference (P.d) across the wire AC when L = 100cm.

Current I = …… (1 mark)

P.d, V = …… (1 mark)

c) Measure the E.m.f of the cells, E.

E = …… (1 mark)

d) Reduce the length L (AC) to the lengths shown in the table below. In each case record the current, I, and the corresponding P.d.

Length L (cm)	100	70	60	50	40	20
I (A)						
P.d (V)						
E – V (v)						

(6 marks)

e) Plot a graph of E – V against I(A) on x-axis in the grid provided. (5 marks)

f) Given that E = V + Ir, determine the internal resistance, r, of each cell. (3 marks)

NAME: ……..… INDEX NUMBER: ……/…….

SIGNATURE: ……..…… DATE……..…….

232/1

PHYSICS

Paper 1

2 hours

MOI GIRLS' ELDORET

FORM 4

Instruction to Candidates

(a) *Write your name, index number in the spaces provided above.*
(b) *Sign and write the date of examination in the spaces provided above.*
(c) *This paper consists of* **two** *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) *Silent non programmable electronic calculators may be used.*
(g) *Candidates should answer the questions in English.*

For Examiners Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 – 10	25	
B	11	15	
	12	8	
	13	11	
	14	9	
	15	11	
Total Score		**80**	

This paper consists of 11 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing

SECTION A (25 Marks)

Answer all the questions in this section in the spaces provided

1. Name two main factors that should be put into consideration when choosing a measuring instrument for a given task. **(2 marks)**

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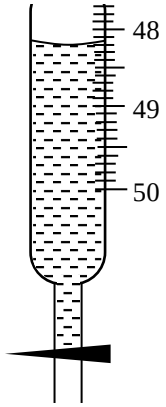
2. The figure below shows a section of a burette containing water to the level indicated.



The tap of the burette is opened to release 20 drops each of volume 15 mm^3. On the same diagram, show the new water level. **(3 marks)**

3. A form one student was doing an experiment to investigate surface tension. She poured some water on a trough and allowed it to settle. She then took a razor blade and tried to make it float/rest on water surface but never succeeded. Give two possible reasons why her experiment failed. **(2 marks)**

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4. Why do solids particles have a knit structure? **(1 mark)**

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5. (a) Give a reason why metals are good heat conductors compared to other solids. **(1 mark)**

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(b) Apart from nature of the material, give twoother factors that determine thermal conductivity of a material. **(2 marks)**

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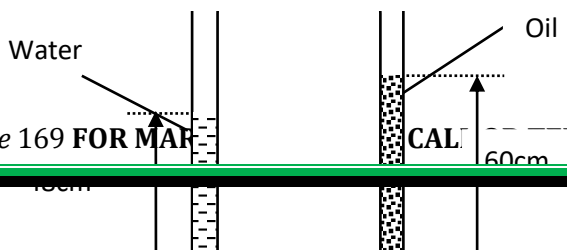
6. A U-tube contains some mercury. Water is poured into one arm of the U-tube and oil is poured into the other arm, as shown below.



The amounts of oil and water are adjusted until the surface of the mercury in the two arms is at the same horizontal level. The column of water, density 1000kg/m^3 is 48cm high. The column of oil is 60cm high. Calculate the value of density of oil. **(3 marks)**

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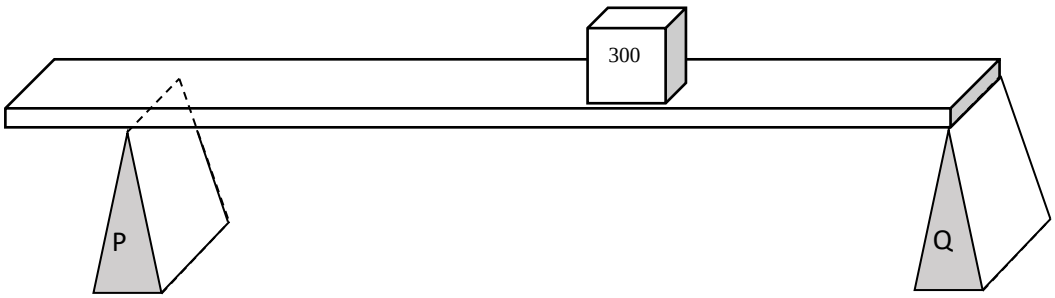
7. A uniform metre rule of mass 200g is placed on two knife edges P and Q as shown in the figure below. P is at 10 cm mark while Q is at 100 cm mark



A mass of 300g is paced at 65 cm mark as indicated. Calculate the reactions given by supports P and Q. **(4 marks)**

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8. In terms of the change in the position of the centre of gravity, show the difference inthe three states of equilibrium. **(3 marks)**

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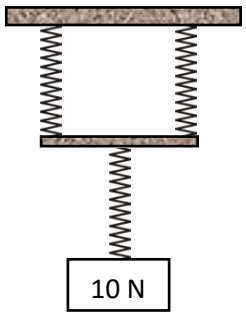
9. The figure below shows a system of three identical springs of springs constant 200 N/m.



Neglecting the weight of the springs and their connectors, calculate the work done by the force of 10N to stretch the system. **(3 marks)**

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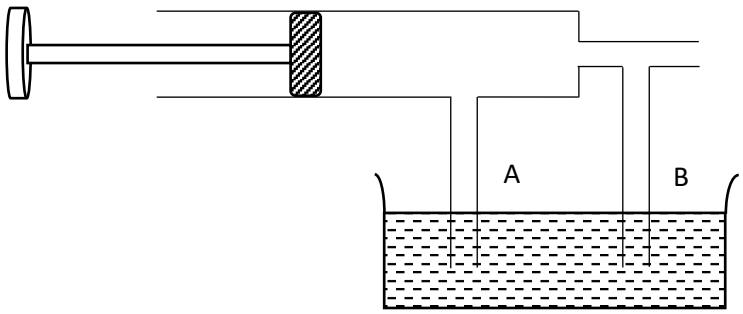
10. The figure below shows two pipes with different cross-sections areas each having a pipe dipped into walls. The pipes A and B are equal cross sectional areas.



Show the new level of water in column A and B as the piston is pushed on. **(1mark)**

SECTION B (55 Marks)

Answer all the questions in this section in the spaces provided

11. (a) Differentiate the following terms, **(3 marks)**

(i) Distance and displacement

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(ii) Speed and velocity

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(iii)Acceleration and deceleration.

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(b) A ball on a snooker table is hit by another ball and travels a distance of 50 cm due south. It is then hit again and travels a distance of 25 cm due west. What is its displacement from its initial position?

(2 marks)

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(c) The world record for men's 100 m sprint stood at 9.58 s as set by Usain Bolt in 2009.

(i) What average speed does this represent? **(2 marks)**

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(ii) If the athlete accelerates to a steady speed in the first 1.5 seconds and the runs at this speed to the finish line, at what steady speed does he run? **(3 marks)**

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(d) An object is released from a helicopter which is hovering (stationary) 180 m above the ground. Ignoring the effect of air resistance

(i) Calculate how long it takes the object to reach to the ground? **(2 marks)**

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(ii) The helicopter then sets off horizontally at a speed of 40 m/s as it drops a second object from the same position and height. Calculate the horizontal distance on the ground between the two objects.

(3 marks)

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

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(b) Define momentum and give its SI unit **(2 mark)**

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

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

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

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13. (a) Define the following

(i) Velocity ratio **(1 mark)**

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(ii) Mechanical advantage **(1 mark)**

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(iii) Efficiency **(1 mark)**

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(b)A small pump develops an average power of 80W. It raises water from a borehole to a point 15m above the water level. Calculate the mass of water delivered in one hour. **(3 marks)**

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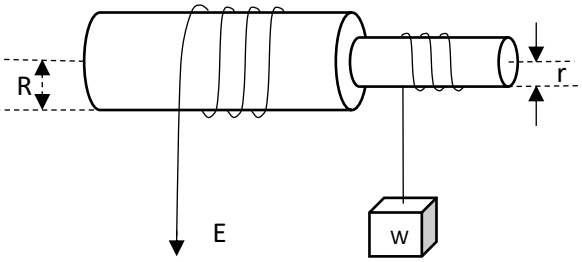
(c) The figure shows a wheel and axle being used to raise a load W by applying an effort 'E'. The radius of a large wheel is 'R' and that of a small wheel is 'r'.



(i) Show that the velocity ratio (V.R) of this machine is given by R/r. **(2marks)**

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(ii) If $r = 5cm$ and $R = 8cm$, determine the effort 'E' required to raise a load of $40N$, given the efficiency of the machine is 85%. **(3marks)**

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

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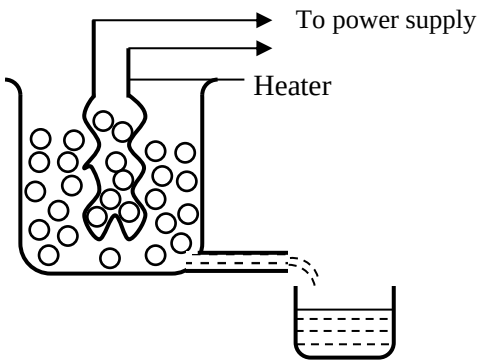
(b) In an experiment to determine the power of an electric heater, melting ice was placed in a container with an outlet and the heater placed in the ice as shown below. The melted ice was collected.



(i) Other than the current and voltage, state the measurement that would be taken to determine the quantity of heat absorbed by the melted ice in unit time. **(1 mark)**

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(ii) If the latent heat of fusion of ice is L_f, show how measurement in (i) above would be used in determining the power P of the heater. **(2 marks)**

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(iii) It is found that the power determined in this experiment is lower than the manufacturer's value indicated on the heater. Explain. **(1 mark)**

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(c) 200 g of ice at 0°C is added to 400g water in a well lagged calorimeter of mass 40g.The initial temperature of the water was 40°C. If the final temperature of the mixture is X°C,
(Specific latent of fusion of ice L = 3.36 x 10^5 Jkg^{-1}, specific heat capacity of water, c = 4200$Jkg^{-1}K^{-1}$, specific heat capacity of copper = 400 $Jkg^{-1}K^{-1}$.)

(i) Derive an expression for the amount of heat gained by ice to melt it and raise its temperature to X°C **(2 marks)**

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(ii) Derive an expression for the amount of heat lost by the calorimeter and its content when their temperature falls to X°C. **(2 marks)**

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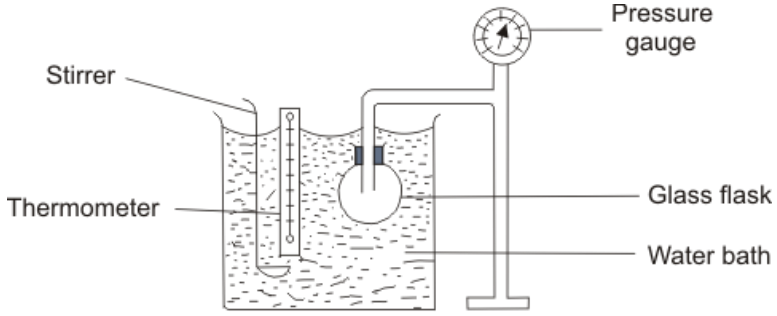
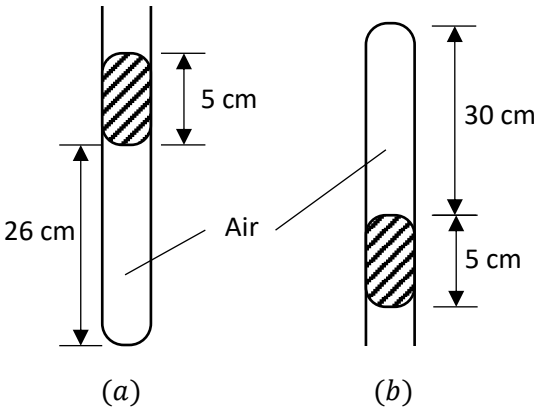
15. (a) The figure below shows a set-up that may be used to verify pressure law.



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

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

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



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

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(d) State the difference between the temperature measured in Kelvin scale and Celsius scale.

(1 mark)

NAME: ……..…. INDEX NUMBER: ……/…….

SIGNATURE: ……..……. DATE…….……

232/2

PHYSICS

PAPER 2

2 HOURS

MOI GIRLS' ELDORET

FORM 4

Instruction to Candidates

(h) Write your name, index number in the spaces provided above.
(i) Sign and write the date of examination in the spaces provided above.
(j) This paper consists of **two** sections: **A** and **B**.
(k) Answer **all** the questions in sections **A** and **B** in the spaces provided.
(l) **All** working **must** be clearly shown.
(m) Silent non programmable electronic calculators may be used.
(n) Candidates should answer the questions in English.

For Examiners Use Only

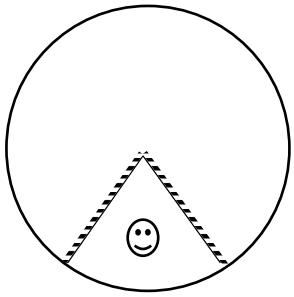
Section	Question	Maximum Score	Candidate's Score
A	1 – 11	25	
B	12	15	
	13	10	
	14	12	
	15	14	
	16	4	
Total Score		**80**	

This paper consists of 12 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing

SECTION A (25 marks)

Answer all the questions in this section in the spaces provided

16. The figure below showsthe two mirrors of a kaleidoscope. Use the diagram to show how the instrument form a beautiful pattern of images of the bead placed between the two mirrors. **(2 marks)**



17. Repulsion is the only sure way of testing polarity of magnets. Explain? **(1 mark)**

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18. State the basic law of electrostatics, **(1 mark)**

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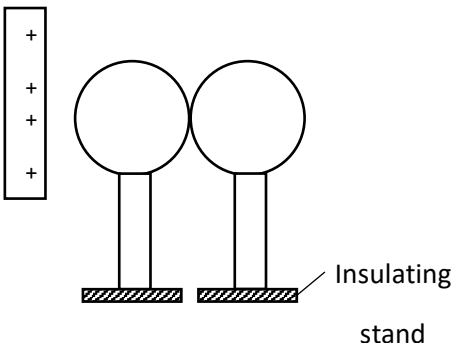
19. The figure below shows two spheres in contact placed close to a positively charged rod.



(a) Show the distribution of charges in the two spheres. **(1 mark)**

(b) In two more steps, use diagrams to show how the two spheres can be charged. **(2 marks)**

20. State two reasons why prism periscopes are preferred to mirror periscope. **(2 marks)**

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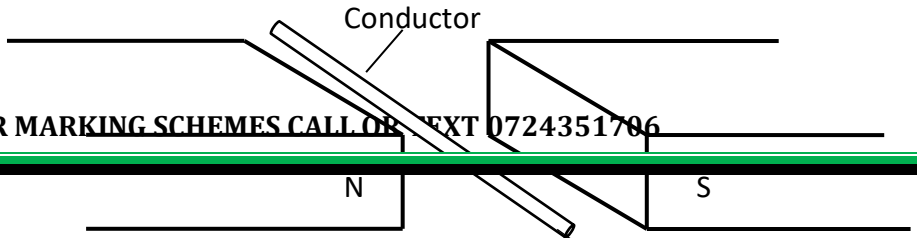
21. A current carrying conductor AB is in a magnetic field as shown in figure 1 below.



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

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

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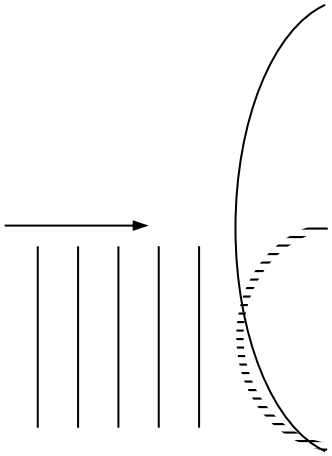
22. The diagram below shows a series of plane waves incident on a convex reflector.



Complete the diagram to show how the waves move after reflection. **(2 marks)**

23. Five successive wave fronts in a ripple tank are observed to spread over a distance of **6.4 cm**. If the vibrator has a frequency of **8 Hz**, determine the speed of the wave. **(3 marks)**

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24. In a certain pinhole camera, the screen is **10 cm** from the pinhole. When the camera is placed **6 m** away from a tree, a sharp image of the tree **16 cm** high is formed on the screen. Determine the height of the tree.

(3 marks)

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25. Draw a diagram to illustrate how dispersion of white light can be achieved using a prism by drawing only the red and violet rays **(2 marks)**

26. A small object lies at the bottom of a water pond at a depth of 1.2m. given that the refractive index of water is 1.3, determine the apparent depth of the object.*(Give your answer to one decimal place)*

(3 marks)

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SECTION B (55 marks)

Answer all the questions in this section in the spaces provided

27. (a) State Ohm's law. **(1 mark)**

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(b) State **three** conditions which must be satisfied for Ohm's law to be obeyed by a conductor.
(3 marks)

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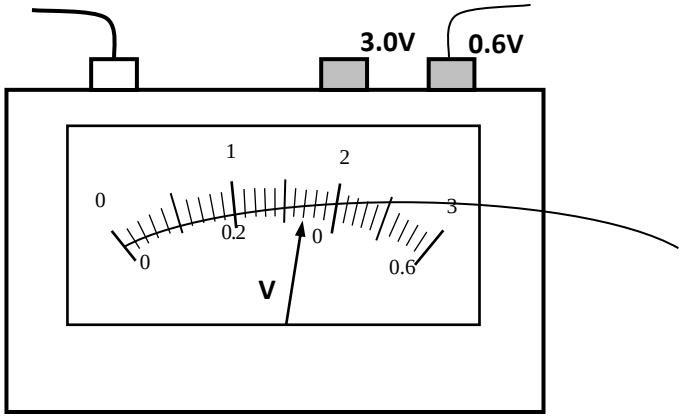
(c) The figure below shows part of the scale of a voltmeter, which is being used in an experiment to measure potential difference across a resistor.



(iii) State the accuracy of the upper and the lower scales of the voltmeter. **(2 marks)**

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(iv) Record the reading shown by the scale of the voltmeter. **(1 mark)**

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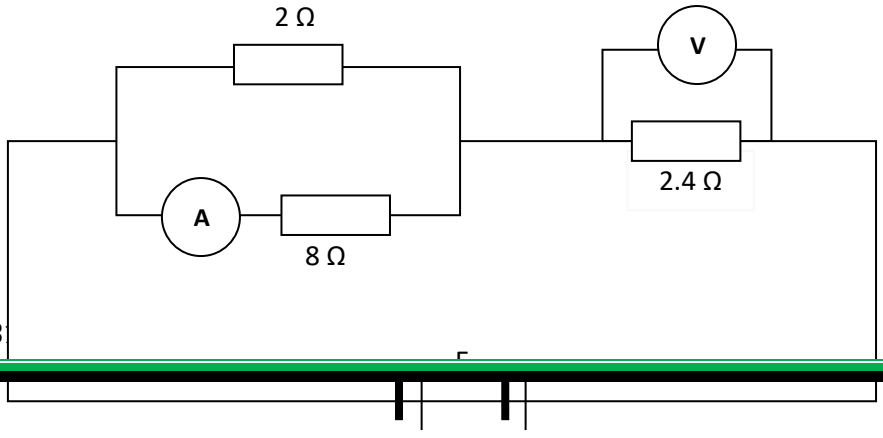
(d) The figure below shows an electrical circuit with three resistors connected across a battery of negligible internal resistance and of electromotive force, E.



If the ammeter reads **0.5 A**, determine the:

(i) Current through the 2 **Ω** resistor. **(3 marks)**

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(ii) Voltmeter reading. **(2 marks)**

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(iii)The electromotive force, E, of the battery **(2 marks)**

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28. (a) Define the terms. **(2 marks)**

(i) Wavelength.

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(ii) speed as used in waves.

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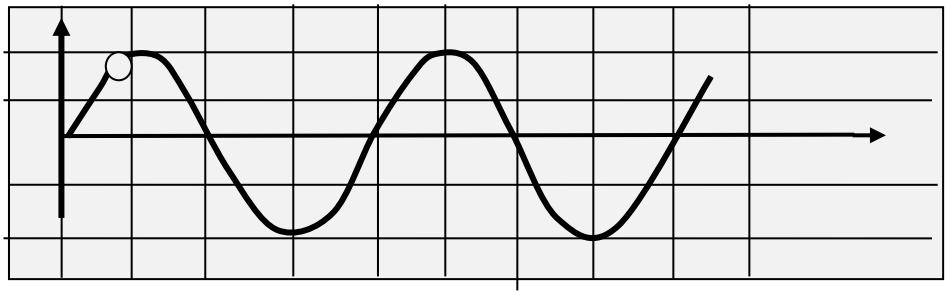
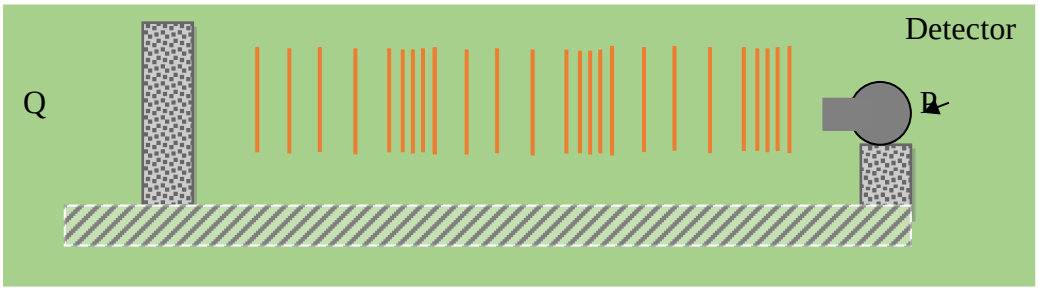
b) Below is a wave traveling to the right side. Indicate the direction in which the particle at point Q is going to move.

Q



(c) Name and briefly explain three properties of electromagnetic waves. **(3 marks)**

(d) Sound waves are generated at point P. They hit a reflecting surface at Q and come back. A detector is put at point P. If it takes a time of 3 seconds to detect the echo,



(i) How far is Q from P.? Take speed of sound as 340m/s **(3 marks)**

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(ii) What will be the effect of increased humidity of the surrounding air

a. Decreasing the amplitude on loudness of sound? **(1 mark)**

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b. Increasing the frequency? **(1 mark)**

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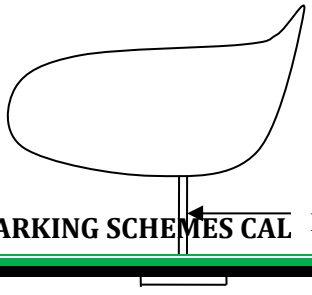
29. (a) Show the charge distribution on the hollow conductor shown below if it is positively charged.

(1mark)



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

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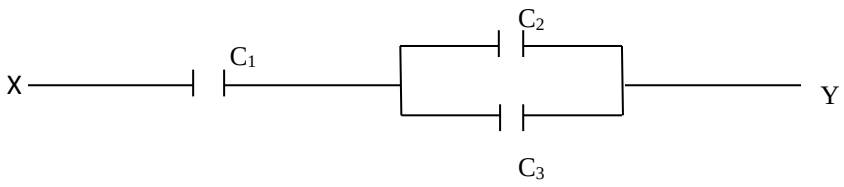
(c) The diagram below shows a circuit containing three capacitors.



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

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

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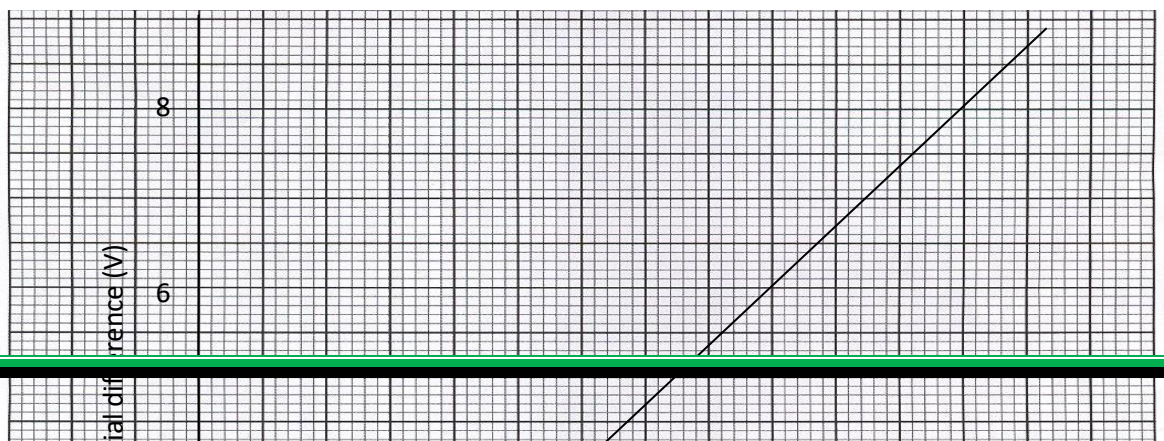
d) The graph below shows the relationship between the voltage drop across a certain capacitor and the charge stored in the capacitor.



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

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30. (a) State **two** conditions which must be satisfied for total internal reflection to occur. **(2 marks)**

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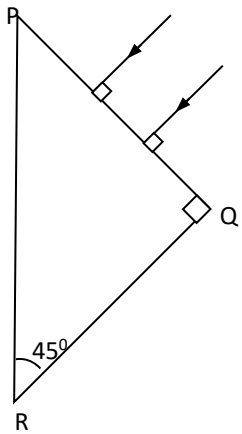
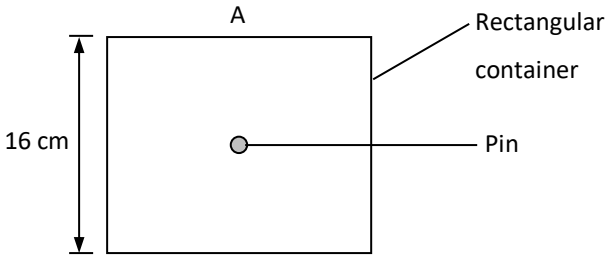
(b) The diagram below shows two rays of light incident normally on face **PQ** of a glass prism, whose critical angle is $\mathbf{42^0}$.



Complete the diagram to show the paths of the two rays as they pass through the prism.

(3 marks)

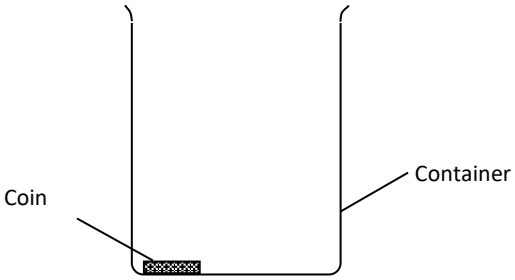
(c) A pin is fixed horizontally at the centre of a rectangular container with thin transparent walls as shown below.



A transparent liquid is then poured into the container. When viewed from side **A**, the distance of the pin is **6 cm** from the surface of the liquid. Determine the refractive index of the liquid.

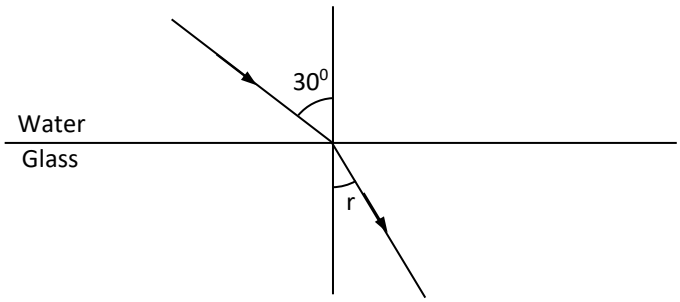
(3 marks)

(d) The figure below shows a coin placed in a large empty beaker. An observer looking into the beaker from the position shown is unable to see the coin.



Sketch two rays from a point on the coin to show how the observer is able to see the image of the coin after the container if filled with water. **(3 marks)**

(e) A ray of light is incident on a water-glass interface as shown in the diagram below.



Calculate the value of angle, **r**, given that the refractive index of glass and water are **1.5** and **1.33** respectively. **(3 marks)**

31. (a) Define principal focus **(1 mark)**

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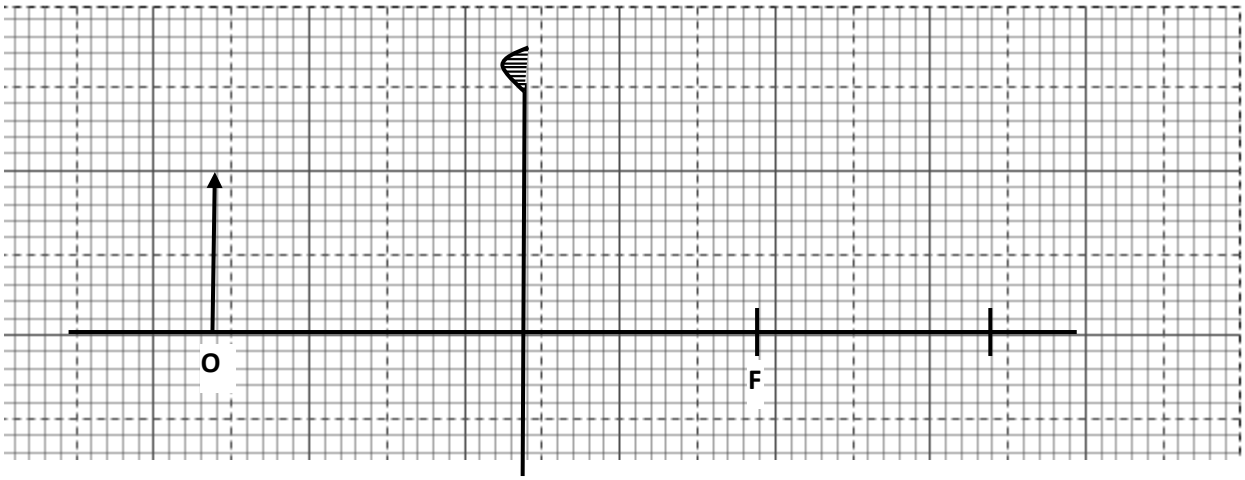
(b) Figure 3 show an object placed in front of a convex mirror.



On the same diagram draw the appropriate rays and locate the image formed. **(3marks)**