

# PHYSICS KCSE PREDICTION 2021

## Paper 1

Kenya Certificate of Secondary Education

232/1 PHYSICS (Theory)

PAPER ONE

TIME: 2HRS

**For marking schemes call Mr machuki**

**0795491185**

### Instruction to candidates

- This paper consist of two sections A and B
- Answer all questions in section A and B in the spaces provided
- All workings **must** be clearly shown, and Use the **CONSTANTS** given.

### FOR EXAMINERS USE ONLY

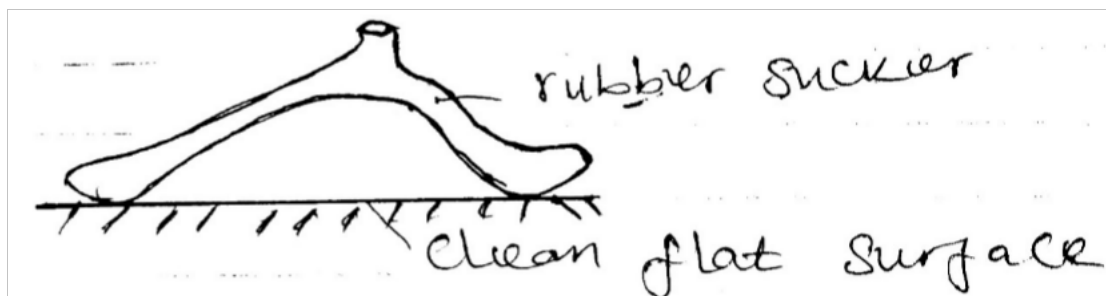
SECTION	QUESTION	MAXIMUM SCORE	CAND SCORE
A	1 – 13	35	
B	14	08	
	15	12	
	16	08	
	17	09	
	18	09	
TOTAL		80	

## SECTION A (35 Marks)

(Answer all questions in this section)

1. A micrometer screw gauge has a zero error of  $-0.03\text{mm}$ . It is used to measure the diameter of a wire. If the actual diameter of the wire is  $0.30\text{mm}$ , draw the micrometer screw gauge showing the measured diameter of the wire.  
(3 marks)

2. The figure (1) below shows a rubber sucker, explain why the sucker sticks on a clean flat  
Surface. (1 mark)



- .....
- .....
3. You are provided with a test – tube, thread and a meter ruler. Outline the steps you would use to measure the circumference and hence the diameter of the test – tube.  
(4marks)

4. A car weighs 12 000N.

- i. What is the force acting on one tyre if the weight is evenly distributed amongst the tyres? (1 mark)
- ii. If the area of contact of tyre is  $80\text{cm}^2$ . Calculate the pressure of the air in the tyre. (3 marks)

5. Why are gases easily compressible while liquids and solids are almost incompressible?(1 mark)

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6. Name three properties of a clinical thermometer that make it suitable for measuring body temperature  
(3 marks)

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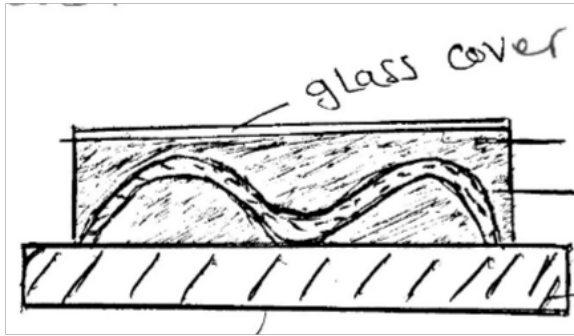
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7. How does the volume of a given mass of water change as;

- i) The water is cooled from  $10^{\circ}\text{C}$  to  $0^{\circ}\text{C}$ ? (1 mark)

- ii) The water is frozen to ice at  $0^{\circ}\text{C}$ ?  
(1mark)

8. The figure (2) below shows a section of a solar heater



Blackened copper collector  
Coiled copper pipe with water  
Insulator

Explain;

- i) Why the pipeline is fixed to a dark coloured collector plate (1 mark)

.....

.....

- ii) Why is pipe coloured several times (1 mark)

.....

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- iii) Why is pipe made of copper (1 mark)

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- iv) Why is the collector plate fixed to an insulator? (1 mark)

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- v) Why the panel front covered with glass (1 mark)

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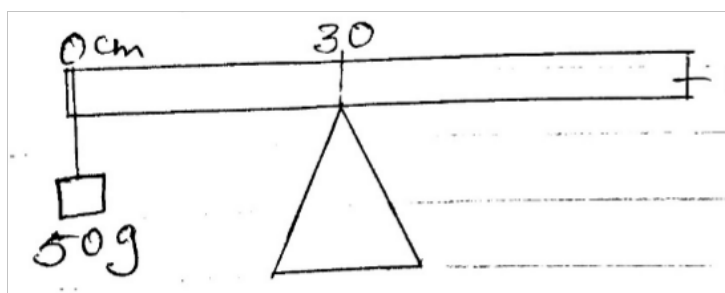
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9. (a) Define moments of a force (1 mark)

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- (b) The figure (3) below shows a uniform meter rule balanced at the 20 cm mark when a mass of 50g is hanging from its zero cm mark



- Calculate the weight of the rule (3 marks)

10. State two practical applications of stability (2

marks)

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11. Explain how loose clothing may affect safety in the laboratory (2 marks)

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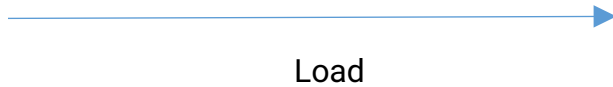
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12. Water flows steadily along a horizontal pipe at a volume rate of  $8.0 \times 10^{-3} \text{ m}^3/\text{s}$ . If the cross-section area of the pipe is  $20 \text{ cm}^2$ . Calculate the velocity of the fluid. (3 marks)

13. On the axis provided sketch a graph of mechanical advantage (MA) against load for a pulley system (1 mark)

M.A

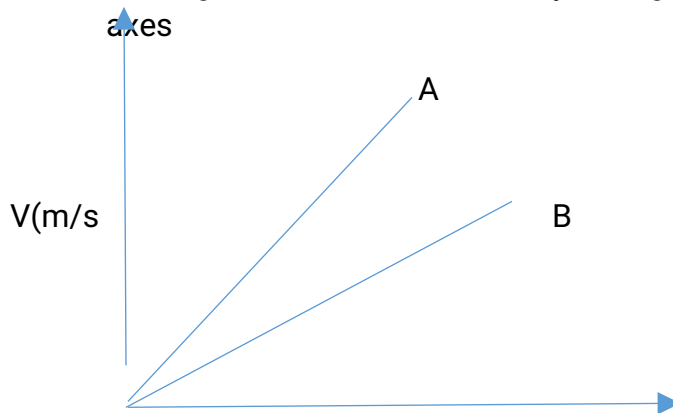




**SECTION B : ( 45 marks)**

**(Answer all the questions in this section)**

14. The figure below shows velocity-time graphs of two objects A and B drawn on same



The two objects are of equal masses. The same size of force is applied against each object. State with a reason which of the two objects stops in a shorter distance.

(2 marks)

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.....

(b) An object moving at 30 m/s starts to accelerate at  $5\text{m/s}^2$  so that its velocity becomes 50 m/s.

- i) Find the distance moved during this acceleration  
(3 marks)

(3



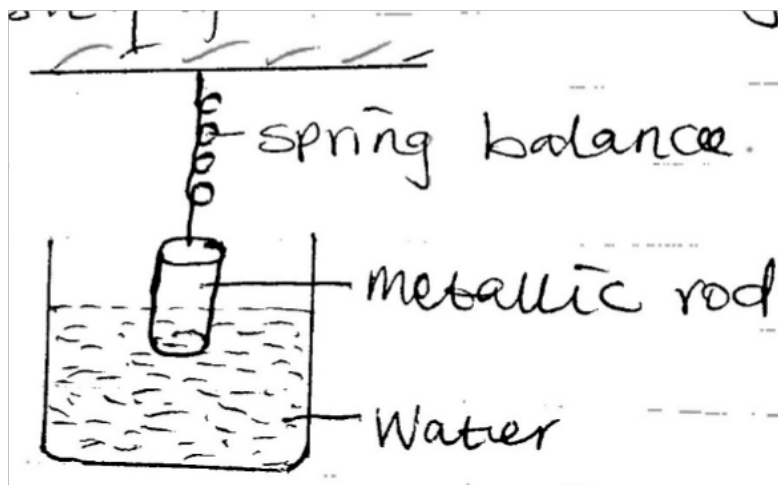
- ii) The object is now braked so that it comes to rest in a time of 5 seconds. Find the braking force if its mass was 2700g.  
(3 marks)

15. State the law of floatation  
(1 mark)

(1

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(b) The figure (5) below shows a metallic rod of length 10cm and uniform cross-sectional area  $4\text{cm}^2$  suspended from spring balance with 7.5 cm of its length immersed in water. The density of the material is  $1.5\text{g/cm}^3$ . The density of water is  $1\text{g/cm}^3$ .



Determine:

- i) The mass of the rod

(3marks)

ii) The upthrust acting on the rod (3marks)

iii) The reading of the spring balance (2marks)

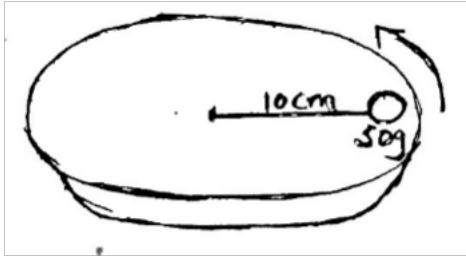
iv) The reading of the spring balance when the rod is wholly immersed in water (3marks)

16. (a) State what provides centripetal force for an electron moving round the nucleus (1mark)

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(b) The figure (6) below shows a turntable on which a mass of 50g is placed 10cm from the centre



Frictional force between the 50g mass and the turntable is 0.4 N. When the turntable is made to rotate with angular velocity of  $\omega$  rad/sec, the mass starts to slide off.

i) Determine the:

I. Angular velocity  $\omega$   
(3marks)

II. Time taken to make one complete revolution  
(3marks)

ii) On the figure, draw a path that would be taken by the 50g mass if the turntable suddenly came to stop

(1

mark)

17. (a) An object of the mass 150kg moving at 20m/s collides with a stationary object of mass 90kg. They couple after collision. Determine the :

(i) Total momentum before collision (2 marks)

(ii) Total momentum after collision (1 mark)

(iii) Their common velocity after collision (2 marks)

(b) A piece of wire of length 12m is stretched through 2.5cm by a mass of 5 kg. assuming that the wire obeys the Hooke's law, what force will stretch it through 4.0 cm. (2 marks)

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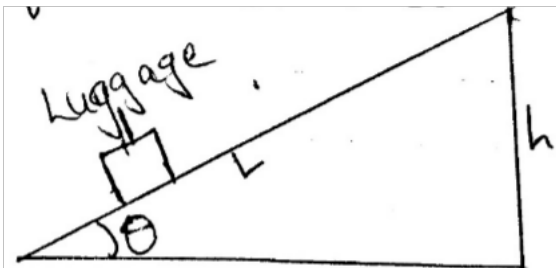
- .....
18. (a) Explain why an air bubble increase in volume as it rises from the bottom of a lake to the surface (2 marks)
- .....
- .....
- .....

(b) An immersion heater rated 2.5Kw is immersed into a plastic jug containing 21kg of water and switched on for four minutes .Determine:

- i) The quantity of heat gained by water (2 marks)

- ii) The temperature change for water.(specific heat capacity of water= $4.2 \times 10^3 \text{ Jkg}^{-1}\text{K}^{-1}$ ) (3 marks)

(c) The figure (7) below shows an inclined plane used to load heavy luggage's onto a lorry. The length of the plane is L metres and the height is h metres



Show that the velocity ratio is given by  $\frac{1}{\sin \theta}$



# Paper 2

## FORM FOUR

### Kenya Certificate of Secondary Education

#### 232/2 PHYSICS (Theory)

#### PAPER TWO

TIME: 2HRS

#### INSTRUCTIONS TO CANDIDATES

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

#### FOR EXAMINERS USE ONLY

PART	QUESTION	MAX SCORE	STUDENT'S SCORE
A	1 - 11	25	
B	12	11	
	13	07	
	14	10	
	15	11	
	16	11	
	TOTAL	80	



**SECTION A (25 MARKS)**

**ANSWER ALL THE QUESTIONS IN THE SPACES PROVIDED**

1. Figure 1 below shows two plane mirrors inclined at an angle  $x$  from each other. A viewer counts a total of seven images by looking directly from the object O.

Determine value of angle  $x$ .

(2mks)

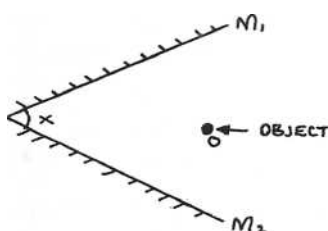
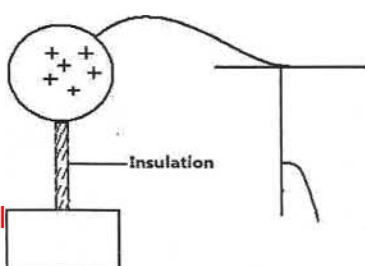


Figure 1

2. A charged metal sphere is connected to an uncharged electroscope as shown in the figure 2 below. State and explain the observations made. (2mks)



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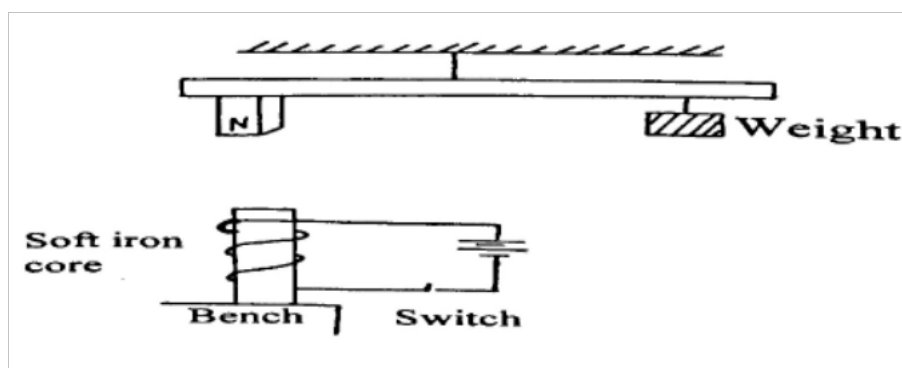
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3. A metre rule is suspended by a thread such that it is in equilibrium balanced by a permanent magnet attached to the metre rule and some weight as shown in figure 3 below.



If the soft iron is fixed to the bench, state and explain the effect on the metre rule when the switch is closed.

(2mks)

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4. a) Explain why convex mirrors are preferred to plane mirrors as vehicle side mirrors.

(1mk)

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b) A part from images being formed behind the mirror, state any other two similarities of images formed by a plane mirror and a convex mirror. (2mks)

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5. i) Differentiate between polarization and local action in a simple cell (2mks)

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.....

ii) State the use of manganese IV oxide in a dry cell (1mk)

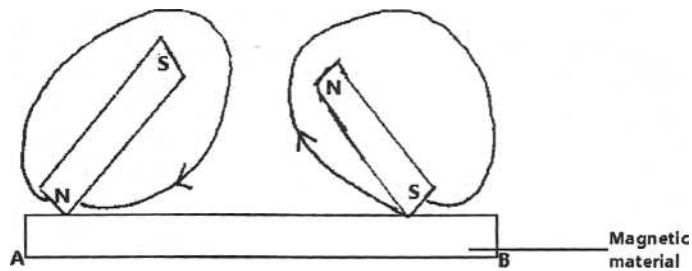
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6. Other than progressive waves travelling in opposite direction at the same speed, state any other two conditions necessary for the formation of stationary (2mks)

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7. A gun is fired and an echo heard at the same place 0.6s later. How far is the barrier, which reflected the sound from the gun? (Speed of sound in air= $330\text{ms}^{-1}$  (3mks)

8. In an attempt to make a magnet, a student used the double stroke method as figure 4 shown below. (2mks)

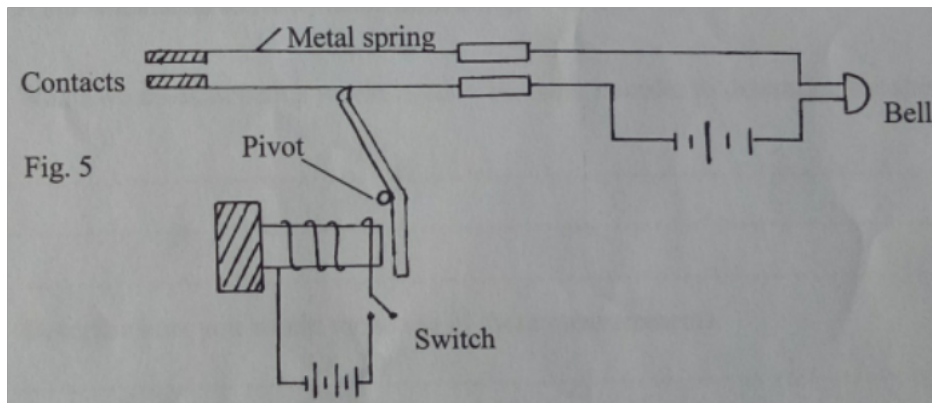


State the polarities at the ends A and B

A.....

B.....

9. a) The figure 5 below shows an electromagnetic relay.



Explain what happens when the switch is closed. (2mks)

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10. A current of 12A flows through a circuit for 2.5 minutes. How much charge passes through the circuit. (2mks)

11. a) Define term light (1mk)

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- b) Other than the image being real, state any other characteristics of the images formed by pin-hole camera

(1mk)

.....

**SECTION B(55MARKS)**

**ANSWER ALL THE QUESTIONS IN THIS SECTION IN THE SPACES PROVIDED**

12. a) A student stands some distance from a high wall and claps his hands

- i) What two measurements would need to be made in order to determine the speed of sound?

(2mks)

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.....

- ii) Describe how you would make use of these measurements

(2mks)

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- iii) The speed of sound in air is 330m/s. How far from the wall would you stand?  
Choose an answer from the following distances 10m, 200m,500m. Give reasons why you did not choose each of the other two distances.

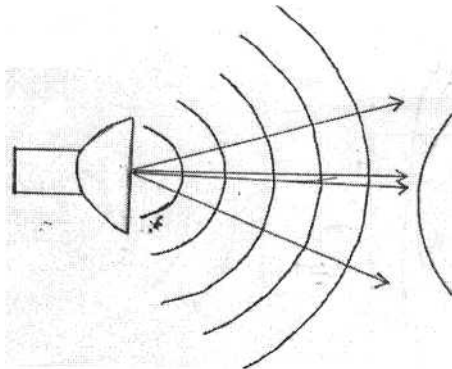
(2mks)

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- b) The balloon filled with carbon dioxide can act like a lens and focus sound from a loud speaker. On to the microphone, Figure 6 show waves produced by loud speaker moving toward the balloon.



- i) Complete the diagram to show what happens to the sound waves when they have passed through the balloon and moves towards the microphone.  
(2mks)
- ii) The loud speaker is now moved toward the balloon. This results in less sound at the microphone. Explain why there is less sound at the microphone  
(1mk)

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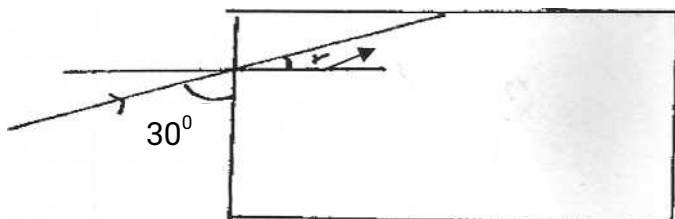
- iii) The frequency of the sound emitted by the loud speaker is 1020Hz. Calculate the wavelength of the sound wave in air where its velocity is 340m/s  
(2mks)

13. a) Define critical angle

(1mk)

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- b) Figure 7 below shows a ray of light incident on the face of a cube made of glass refractive index 1.50



Calculate

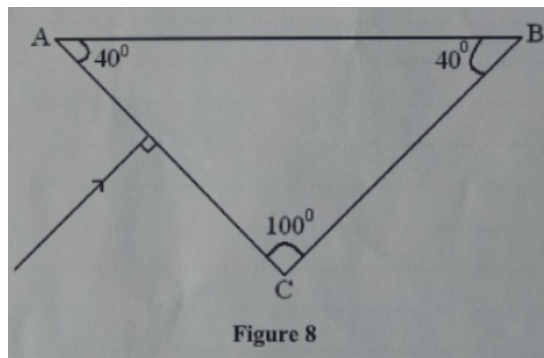
- i) The angle  $r$ :

(2mks)

- ii) The critical angle for the glass air interface (2mks)

c) The figure 8 below shows a ray of light incident on a glass prism. Given that the critical angle for the grass is  $39^\circ$ , sketch on the diagram the path of the ray through the prism.

(2mks)



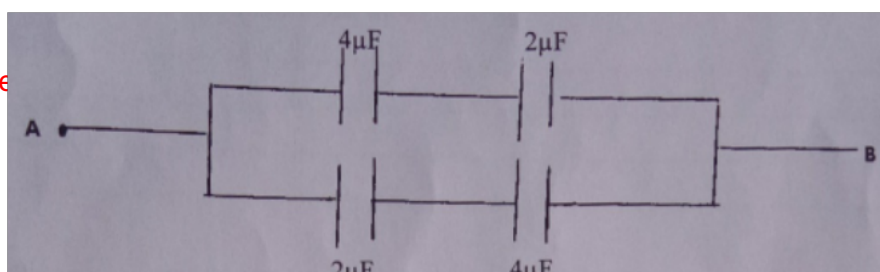
14. a) i) Define capacitance of a capacitor and state its S.I unit (2mks)

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 .....  
 .....

- ii) State any two factors that affect the capacitance of a capacitor

.....  
 .....

- iii) The figure 9 below shows three capacitors connected between two points A and B. (3mks)





Determine the capacitance across AB

- iv) Sketch a simple diagram that contains a capacitor, a two way switch, and a load resistor that can be used for charging and discharging a capacitor.  
(3mks)

15.a) State Ohm's law

(1mk)

.....  
.....

b) A wire was connected to a battery and was found that the energy converted to heat was 30J when 20C of charge flowed through the wire in 5 seconds. Calculate;

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

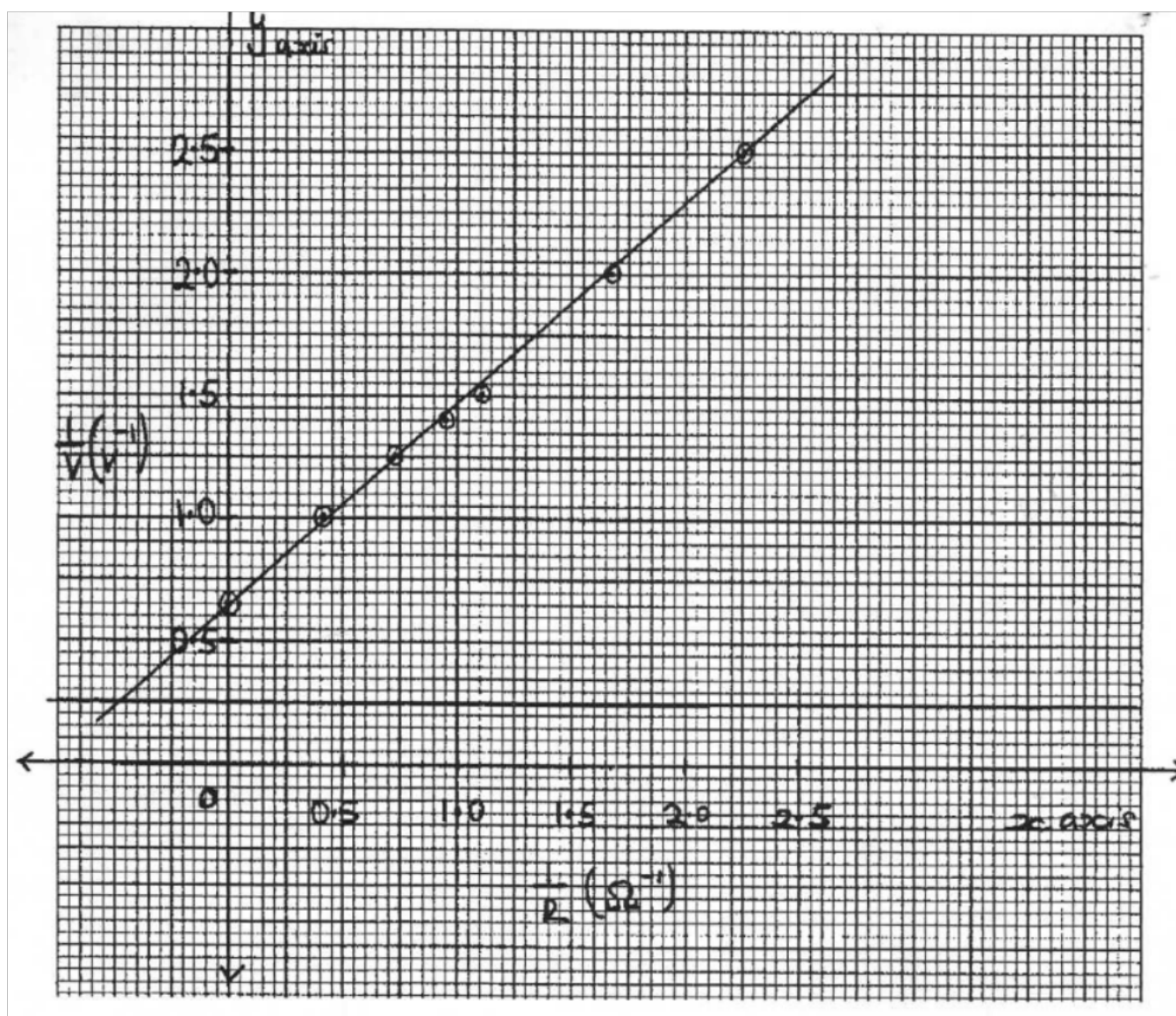
ii) The current flowing through the wire (1mk)

iii) The resistance of the wire (2mks)

iv) The average power development in the wire (2mks)

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c) The graph below shows results obtained in an experiment the emf ( $E$ ) and the internal resistance,  $r$ , of a cell. Given that the equation of the graph is  $E = r + 1$



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 (2mks)

(ii) R

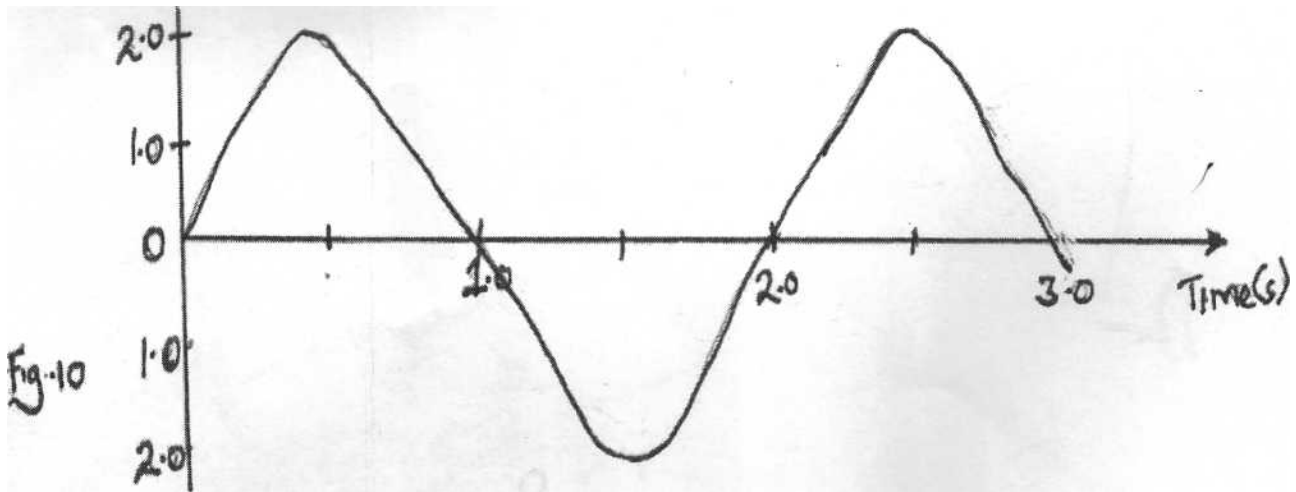
16. a) Distinguish between stationery waves and progressive waves. In terms of their propagation (2mks)

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.....

.....

b) The figure 10 represents an oscillation taking place at a particular point while a wave in a gas passes the point. The vertical axis is labeled displacement.



- i) Explain what is meant by displacement in this context. (1mk)

.....  
 .....

- ii) From the figure determine

- I) The period (1mk)

- II) The frequency (1mk)

c) Calculate the wavelength of the sound wave in the figure. Take the velocity of sound in the gas to be 340m/s

(3mks)

d) State two factors that can increase the speed of sound in solids (2mks)

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# Paper 3

## FORM FOUR

### Kenya Certificate of Secondary Education

#### 232/3 PHYSICS (Practicals)

#### PAPER THREE

TIME: 2½HRS

#### INSTRUCTIONS TO CANDIDATES

- This paper consist of two questions and Answer ALL questions in the spaces provided
- All workings MUST be clearly shown.

#### FOR EXAMINERS USE ONLY

PART	QUESTION	MAX SCORE	CAND SCORE
I	11	19	
II	A	16	
	B	5	
		40 MKS	

You are provided with the following

- Water in a beaker
- Complete retort stand
- Two clamps
- 100ml measuring cylinder

- Boiling tube
- Cotton thread
- Meter rule
- Beam balance(can be shared)
- Vernier calipers (can be shared)
- 

Proceed as follows

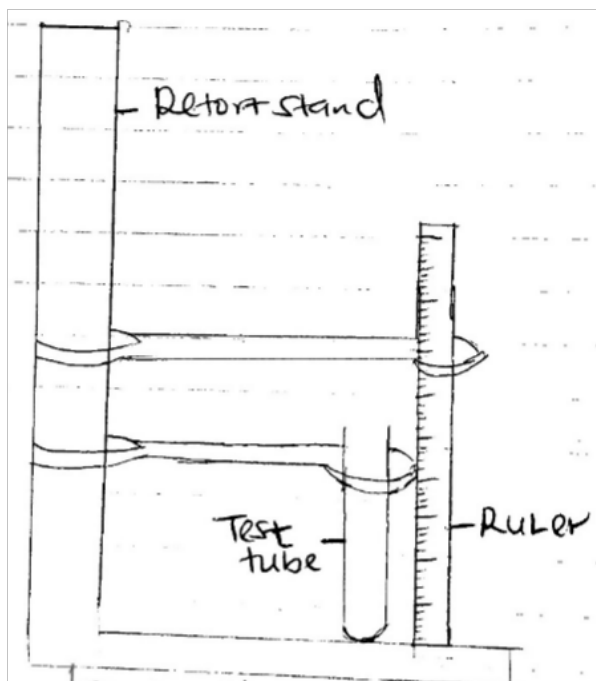
- i)      a) Using the vernier calipers, measure the internal diameter of the boiling tube  
D=..... (1mk)

- b) Measure the length H, of the boiling tube  
H=.....cm (1mk)

- ii)      Measure the mass of the boiling tube using the beam balance  
M=.....g (1mk)



- iii) Clamp the boiling tube vertically with its base resting on a flat surface as shown, Use the second clamp to clamp the meter rule beside the boiling tube.



- iv) Measure 10ml of water and pour into the boiling tube. Measure the height  $h$ , of the water. Keep adding water in small amounts in the boiling tube and complete the table below

VOLUME IN $\text{CM}^3/\text{ML}$	HEIGHT $H(\text{CM})$
10	
20	
35	
45	
50	
65	

(3MKS)

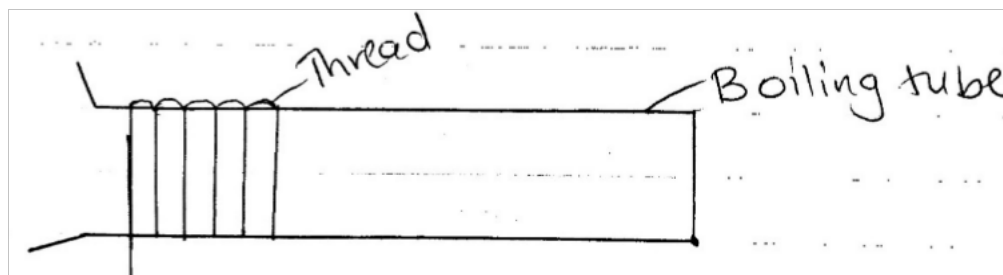
- v) On the grid provided, plot a graph of volume  $V(\text{cm}^3)$  of water (y-axis) against height  $h(\text{cm})$

(5mks)

- vi) From the graph determine the slope,

(3mks)

- vii) Wind the cotton thread ten times round the boiling tube, pushing the windings very close together, the turns should not overlap on each other.



Unwind the thread and measure the length  $L$  of the thread.

$L$ .....(cm)

(1mk)

- viii) Calculate the volume  $V$ , of the glass material which the boiling tube is made of, given that

$$V = h \left[ \frac{2L^2}{2500} - 5 \right]$$

$V =$  .....

(2mks)

- ix) Calculate the density  $d$ , of the glass material of the boiling tube

$d =$  .....

(2mks)

## QUESTION 2

### PART A

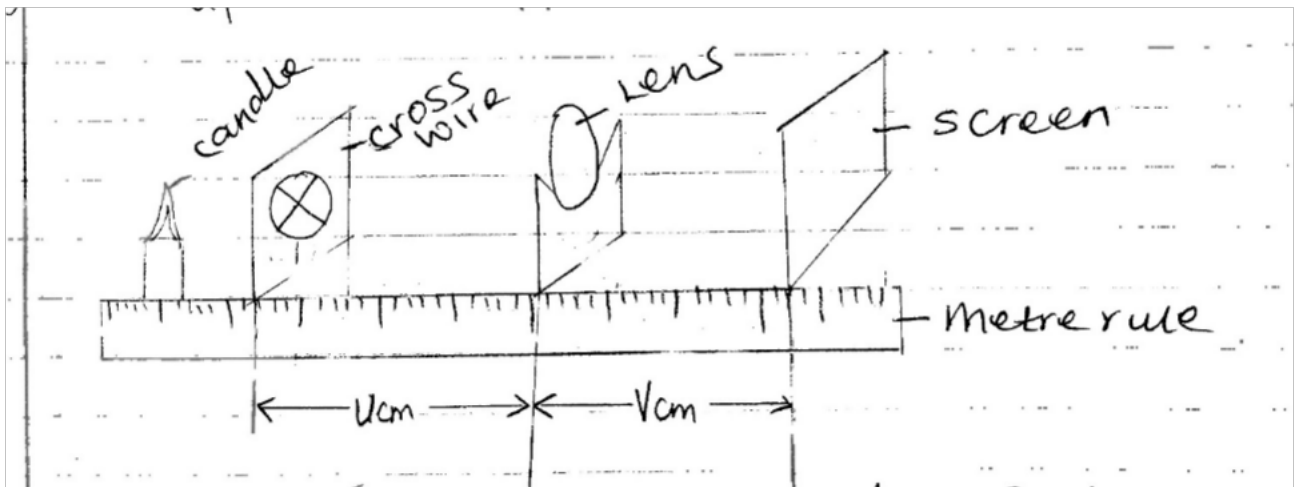
You are provided with the following

- A meter rule
- Convex lens
- A candle

- Len's holder
- Cross wither mounted on a cardboard
- A white screen

Proceed as follows:-

- Set up the apparatus as shown



- Starting with  $U=30\text{cm}$  vary the position of the screen S until a sharp image of the cross wire is observed on the screen. Measure and record the value of the image distance  $V$ .

- iii) Repeat the experiment above for other values of U, and complete the table below

(6mks)

U(cm)	30	35	40	45	50	55
V(cm)						
$M = \frac{V}{U}$						

- iv) Plot a graph of M against V (5mks)

- v) Determine the slope of the graph (3mk)

- vi) The equation of the graph is given by  $M = \frac{V}{f} - 1$  . Use your graph to obtain the value of f (2mks)

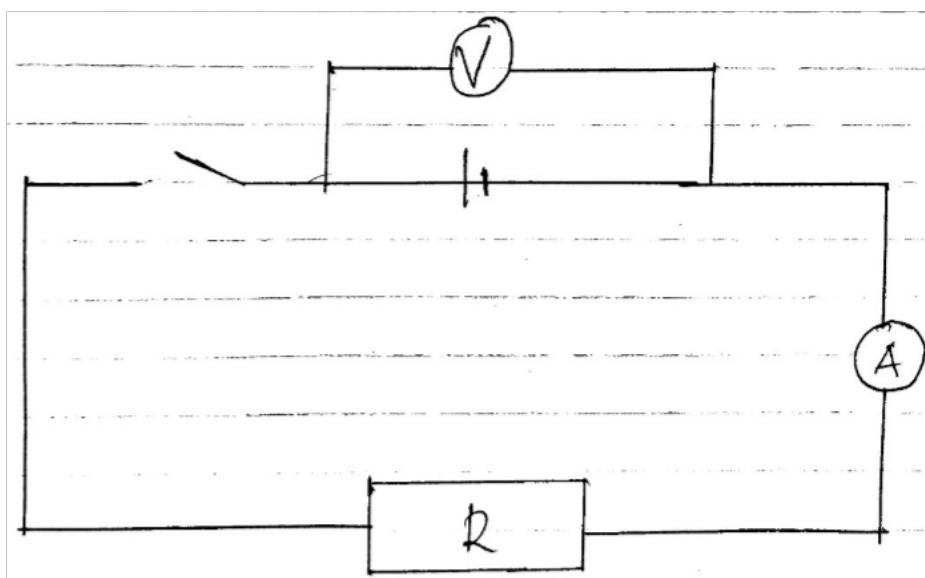
## PART B

You are provided with the following apparatus:

- One cell and a cell holder
- Six connecting wires, two with crocodile clips
- A switch
- A 10 carbon resistor labelled R
- An Ammeter
- A voltmeter

Proceed as follows

- Set up the apparatus as shown below.



Record the reading  $E$  of the voltmeter  $E$ ..... volts (1mk)

- ii) Close the switch and record the reading,  $V$ , of the voltmeter and  $I$  the reading of the ammeter

$V =$  .....volts (1mk)

$I =$  .....amperes (1mk)

- iii) Given that  $E = v + V + 1r$ , determine the value of  $r$

$r$ ..... volts (2mks)

kenyaeducators@gmail.com