NAME:…….....……..…….....… **Class** ……ADM NO.....

232/1; **PHYSICS** **Candidate's Signature**:……
PAPER 1
JULY 2025 **Date**…….
TIME: 2 HRS

MOKASA 2 JOINT EXAMINATION

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

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided.
- Mathematical tables and non-programmable calculators may be used.
- Attempt all the questions in the spaces provided.
- ALL working MUST be clearly shown.

For Examiners Use

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1 – 8	25	
B	9	10	
	10	08	
	11	09	
	12	07	
	13	11	
	14	10	
	TOTAL	**80**	

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.

SECTION A (25 MARKS)

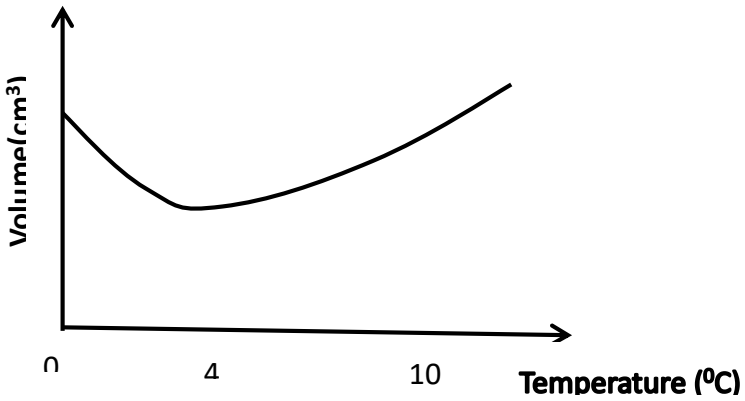
1. A cube of length 2.08 cm has a mass of 0.02 kg. Determine its density. (2marks)

$$VOLUME = 2.08^3 = 8.999cm^3$$

$$\rho = \frac{m}{v} = \frac{0.02 \times 1000}{8.999}$$

$$2.222g\ /\ cm^3$$

2. The graph below shows the volume against temperature of water between 0^0C and 10^0C



State two disadvantages of the behavior of water represented by the graph. (2marks)

leads to formation of icebergs

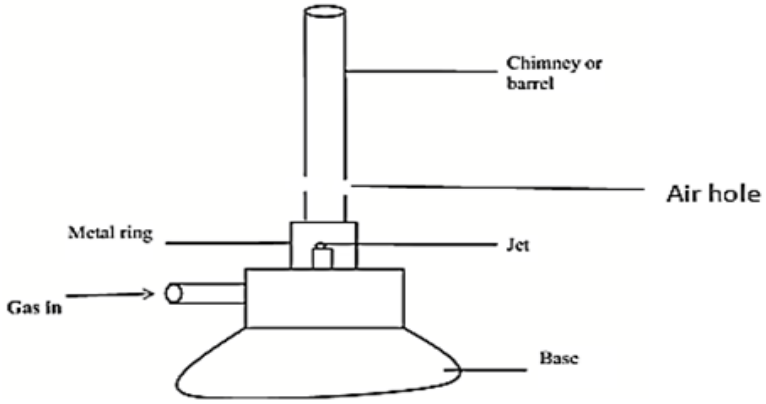
bursting of water pipes when water in them freeze

3. A drop of olive oil of volume **5 x 10^{-4} cm^3** spreads out on a clean water surface to a form a thin film of area **7.5 x 10^{-1} m^2.** Find the thickness of the film. (3marks)

$$t = \frac{V}{A} = \frac{5\times10^{-4}}{7.5\times10^{-1}\times10^{4}}$$

$$= 6.667 \times 10^{-8}\text{cm}$$

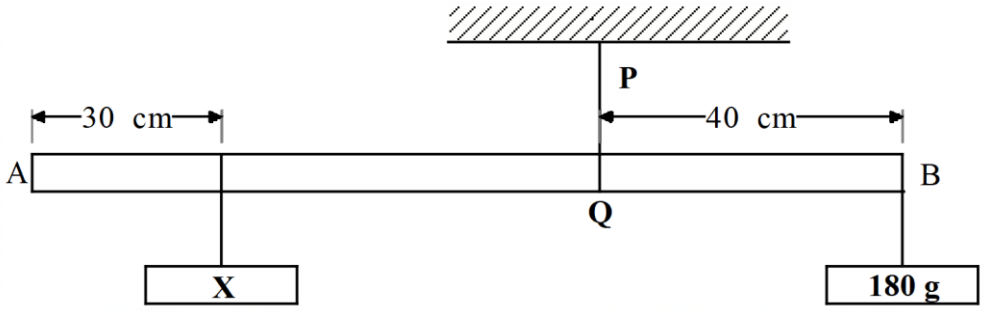
4. The figure below shows a Bunsen burner.



Explain how air is drawn into the Burner when the gas tap is opened. (3marks)

When gas is made to flow into the Bunsen burner, its velocity increases as it passes through the nozzle; this decreases the pressure above the nozzle. Because of higher atmospheric pressure outside the barrel, air is drawn in

5. a)The diagram shown in the figure below shows a system in equilibrium with the rule horizontal.



AB is a uniform rule of length 1.0m and weight 1.8N. Find the weight of the block X. (3marks)

$$1 \cdot 8 \times 40 = 30 \times x + 1 \cdot 8 \times 10$$

$$x = 1 \cdot 8N$$

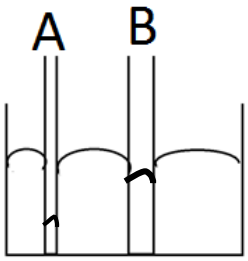
b) Explain one way a person walking up a flight of stairs increases stability. (1marks)

leaning foward to bring c.og in front and prevent falling backwards

6. (a) ***Explain*** how some small insects are able to walk on water. (1marks)

surface tension on water support the weight of the insects

(b) The figure below shows two tubes of different sizes dipped in a beaker containing mercury.



(i) Indicate on each tube the level of mercury (1mark)

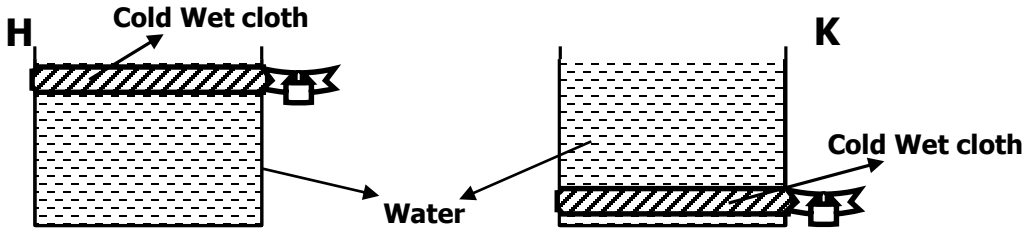
(ii) ***Explain*** your answer in (i) above (2marks)

in both, cohesive force is greater than adhesive force but the depression in A is greater beacuse it is narrrower

c)Explain why metals are good conductors of heat. (2marks)

Metals conduct by both atom vibration and free electrons

7. The figure below shows two identical beakers **H** and **K** full of water at **90°C**. Two similar cold wet clothes are wrapped, one around the top of **H** and the other around the bottom of **K**.

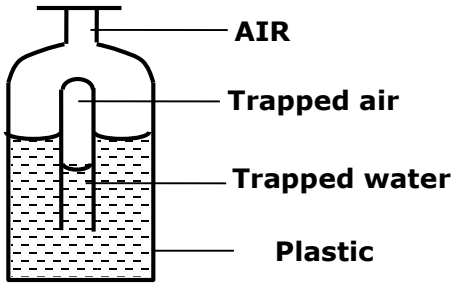


State with a ***reason***, the beaker in which the water cools faster (2 marks)

H − cooled water on top move down due to higher density and is replaced by hot ligher water. The currents set up increase rate of cooling.

The cold water remain at the bottom for K hence no currents are set up.

8. The figure shows an inverted test tube which floats in water enclosed in a plastic bottle.



The sides of the plastic bottle are squeezed. State and explain what would be observed. (3 Marks)

The tube sinks more. On squizing the plastic, more water get into the tube and hence increase its relative density. The tube thus sinks more.

SECTION B (55 MARKS)

9. (a) State the law of floatation. (1mark)

A floating object displaces its own weight of the fluid in which it floats

(b) A hydrometer of mass 12.8 g is immersed in liquid of density 800 kg/m^3. The hydrometer floats on the liquid. Determine the volume of liquid displaced. (2marks)

$$V = \frac{m}{\rho} = \frac{12.8}{0.8} = 16\ cm^3$$

(c) A body of mass 2.0 kg is suspended from a spring balance calibrate in newtons. It reads 17.0N when the body is completely submerged in water. Given the intensity of the earth's gravitational field is 10N/kg, find:

(i) the upthrust of the water on the body. (2marks)

$$U = W_A - W_W$$

$$U = 2 \times 10 - 17 = 3N$$

(ii) the mass of the water displaced by the body. (1mark)

$$w = U = 3N$$

$$\boldsymbol{m = \frac{w}{g} = \frac{3}{10} = 0.3\ kg}$$

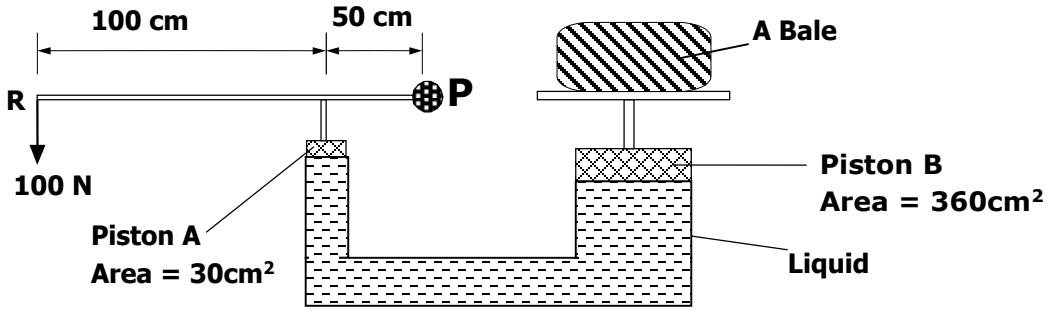
(iii) the volume of water displaced given the density of water is 1000kg/m^3. (2marked)

$$V = \frac{m}{\rho} = \frac{0.3X1000}{1} = 300cm^3$$

(iv) the density of the material the body is made of. (2marks)

$$\rho = \frac{m}{v} = \frac{2000g}{300cm^3} = 6.667g/cm^3$$

10. The figure below shows a hydraulic press system using a lever of negligible mass on the side of a small piston pivoted at point **P**. A force of **100N** is applied at **R**.



Determine;

(i) The **effort** exerted at the smaller piston **A.** (2 marks)

$$F_1 d_1 = F_2 d_2$$

$$150X100 = F_2 X50$$

$$F_2 = 300\ N$$

(ii) The **V.R** of the lift (2 marks)

$$V.R_T = V.R_L XV.R_H$$

$$= \frac{150}{50} X \frac{360}{30} = 36$$

(iii) The **M.A** of the system (2 marks)

$$\frac{F_1}{A_1} = \frac{F_2}{A_2}$$

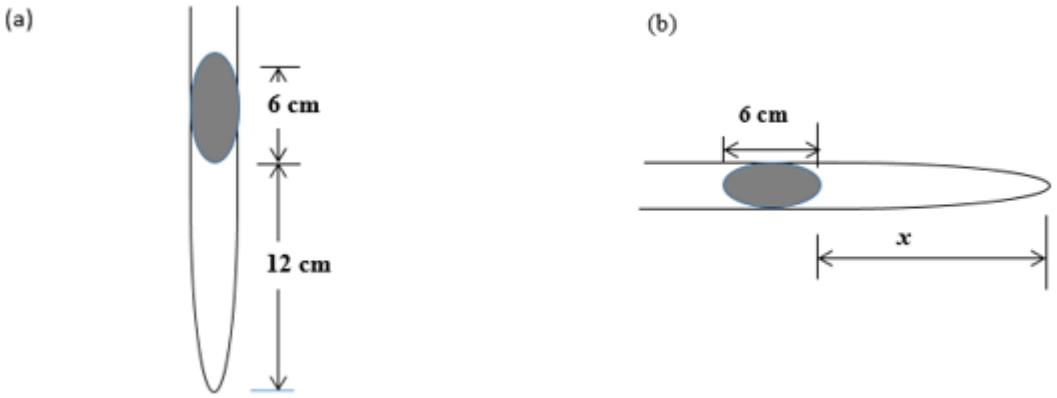
$$\frac{300}{30} = \frac{F_2}{360}; F_2 = 3600N$$

$$M.A = \frac{L}{E} = \frac{3600}{100} = 36$$

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

$$\text{Efficiency} = \frac{\text{m·A}}{\text{v·R}} \text{x}^{100} = \frac{36}{36} X\ 100 = 100\%$$

11. a) The diagrams below show mercury tubes with trapped air in vertical and horizontal positions.



i)Determine the length of the air column ***x*** in diagram (b) given that atmospheric pressure is 75cmHg. (3 mark)

$$p_1V_1 = p_2V_2$$

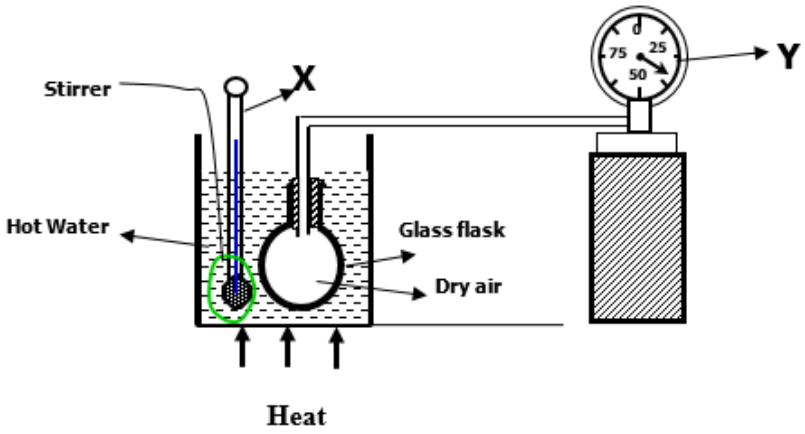
$$(75 + 6)X12 = 75x$$

$$x = 12.96\ cm$$

ii)Give reason for the differences in the lengths of the two air columns (a) and (b). (1 mark)

Length of the air column in (a)is compressed more because of additional pressure from trapped mercury thread.

The diagram below shows a set up that a student used to investigate the pressure law



(a) ***State*** the law which is being investigated (1 Marks)

Presssure law: The pressure of a fixed mass of a gas is directly propotional to its absolute temperature provided volume is kept constant.

(b) Describe how you would verify the law investigated above (3 Marks)

−Record the initial temperature and pressure.

−Raise the temperature gradually and record corresponding values of presssure at regular intervals of temperature.

−plot a graph of pressure against absolute temperature.

−the graph is a straight line through the origin with a positive gradient. This confirms the pressure law.

State one assumption made while performing the above investigation. (1 Mark).

the volume and mass of the gas remains constant.

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

The rate of change of momentum is directly propotional to theresultant external force producing it and takes place in the direction of the force.

(b) a block of mass 2 kg is pushed along a table with a constant velocity by a force of 5 N.

i. Determine the frictional force between the block and the table. (1 mark)

$5N - this\ is\ the\ kinetic\ friction$

ii. The force is then increased to 9.0 N. Find the acceleration of the block (2mark)

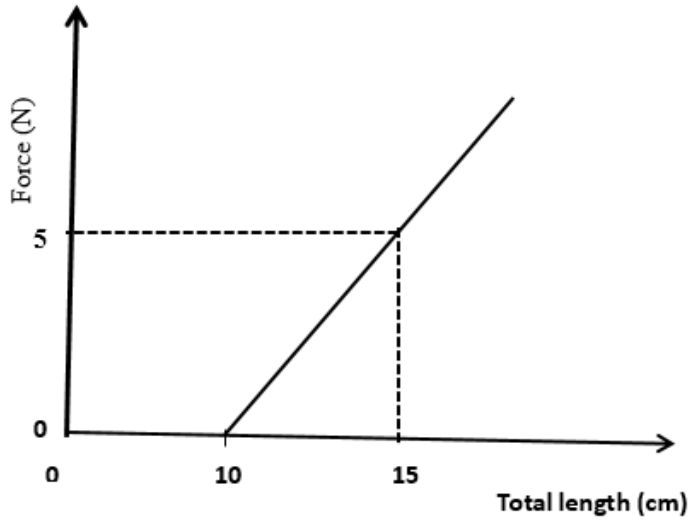
$$Resultant\ force = 9N - 5\ N = 4N$$

$$F = ma$$

$$4 = 2a$$

$$a = 2\ m/s^2$$

(c) The graph below represents stretching force against total length of the spring.



Form the graph determine

(i) the original length of the spring used. (1mark)

$$original\ length = x\ intercept(\ where\ F = 0\ N$$

$$= 10cm$$

(ii) the spring constant. (2marks)

$$k = slope = \frac{5-0}{15-10} = 1\text{N/cm}$$

13. (a)i State one factor which affects heating by an electric current. (1 mark)

the amount of current

the resistance of the heating element

the time the current flows through the heating element

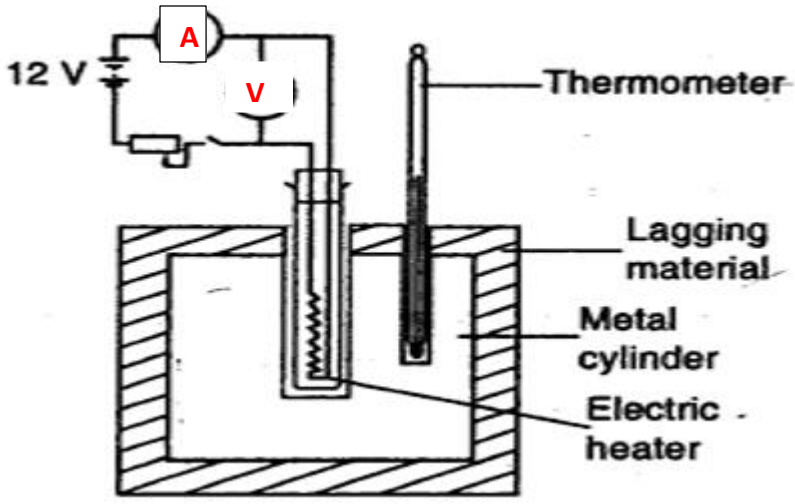
ii)State the property of a fuse wire that makes it suitable for controlling excessive current. (1mark)

it has low melting point hence it melts to cut off the current incase current is excessive

b). i. Define the term heat capacity. (1 mark)

Quantity of heat required to raise the temperature of a given mass of a material by one kelvin

c)In an experiment to determine the specific heat capacity of aluminiunm of mass m by electrical method, the set up below was used.



i) Complete the diagram by inserting labels of relevant devices used in the experiment. (1mark)

.....

ii) State the measurements to be taken in the experiment. (2 marks)

−current using the ammeter, voltage using the voltmeter, time using a stopwatch and temperature using the thermometer

iii) Explain how the measurements above are used to determine the specific latent heat capacity of the material of the block. (2 marks)

the switch is closed and timing started simultenously.

ammeter and voltmeter readings are recorded and thermometer reading after a given time t.

the specific heat capacity can then be determined as below:

$$c = \frac{VIt}{m\Delta\theta}$$

ii) State one precaution taken in the above experiment. (1 mark)

−the solid should be high polished to minimize heat loss by radiation

−the solid should be heavily lagged to minimize heat loss by conduction.

−the two holes should be filled with light oil to improve thermal contact between the solid and heater and thermometer

14.

a. A helicopter moving at 20m/s drops a parcel from a height of 100m above a flat ground. Determine:

i. The time it takes for the parcel to hit the ground. (2 marks)

$$h = \frac{1}{2}gt^2$$

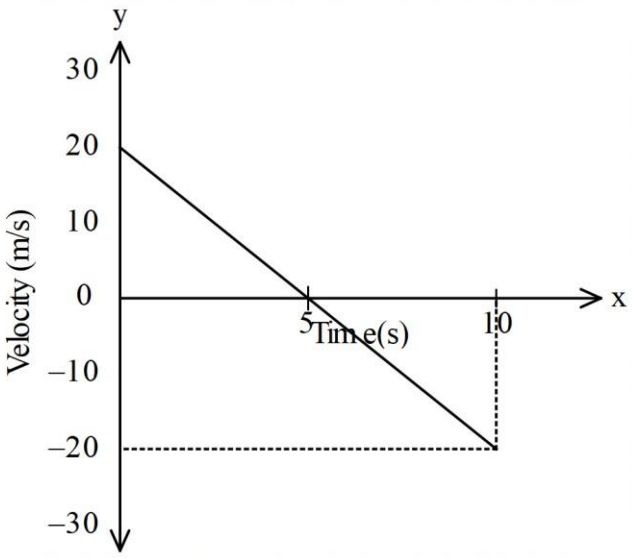
$$100 = \frac{1}{2}X10t^2$$

$$t = \sqrt{20} = 4.472\ s$$

ii. The horizontal distance the parcel was dropped from in order to land on the desired target. (2 marks)

$$R = ut = 20X4.472 = 89.44\ m$$

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



i. Describe the motion of the body during the 10 seconds. (2 marks)

uniform deceleration to rest followed by uniform acceleration acceleration in equal time interval

ii. Determine the displacement of the body for the entire motion. (2 marks)

$$S = \left(\frac{1}{2}\right)(20X5) + \left(\frac{1}{2}\right)(-20X5)$$

$$S = 0\ m$$

c) A body of mass 5.0 kg is attached to the end of a string of length 50 cm and whirled in a horizontal circle. If the tension of the string is 81 N, determine the velocity of the body. (3 marks)

$$T = \frac{mv^2}{r}$$

$$81 = \frac{5Xv^2}{0.5}$$

$$v = \sqrt{8.1} = 2.846\ ms^{-1}$$