

NAME:..... ADMISSION NO. ....

CLASS: ..... SIGN.....

232/1  
PHYSICS  
PAPER 1  
MARCH/APRIL 2023

TIME: 2 HOURS.

**FORM 4 SUKELLEMO JOINT PRE – MOCK EXAMS 2023**  
*Kenya Certificate of Secondary Education (K.C.S.E)*

INSTRUCTION TO CANDIDATES

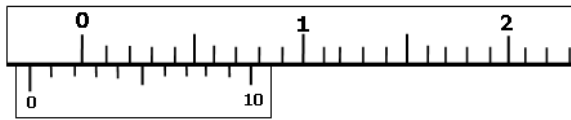
- a) Write your name and index number in the spaces provided above
- b) This paper consist of TWO sections A &B
- c) Answer ALL the questions in section A and B in the space provided.
- d) ALL working MUST be clearly shown.
- e) Mathematical tables and silent electronic calculators may be used  
Take Acceleration due to gravity  $g=10\text{m/s}^2$

**FOR EXAMINERS USE ONLY**

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

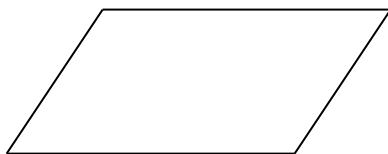
**SECTION A (25 MARKS)**

1. The figure below shows parts of a vernier callipers when the jaws are closed without an object between the jaws.



- a) State the error of the vernier callipers. (1mark)
- b) A student used the vernier callipers to measure the diameter of a test tube whose actual diameter was 2.13 cm. What was the reading of the vernier callipers? (2marks)
2. Explain why a hole in a ship near the surface is less dangerous than one near the bottom. (2mks)
3. A block measuring 20cm by 10cm by 4cm rests on a flat surface. The block has a weight of 6N. Determine the density of the block in  $\text{kg/m}^3$  (2marks)

4. The figure below shows a uniform cardboard in the shape of a parallelogram.



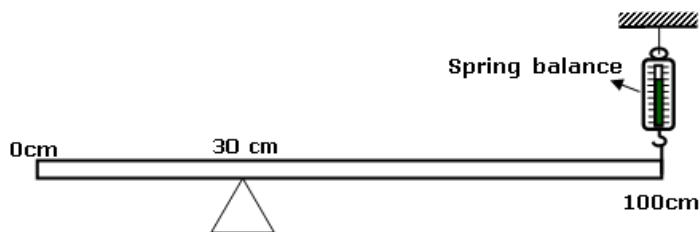
- Locate the centre of gravity of the cardboard. (1 mark)

5. A boulder is sliding down a slope, with a uniform acceleration of  $3\text{ms}^{-2}$ ; calculate its velocity after it has slid 10m down the slope. (2marks)

6. Suggest a possible reason why Brownian motion is more evident in gas particles than in liquid molecules. (1mark)

7. The barometer reading at the foot of a cliff of height 500m is 764mmHg. If the average density of air is  $1.25\text{kgm}^{-3}$  and that of mercury is  $13600\text{kgm}^{-3}$ , determine the reading of the barometer at the top of the cliff. (3 marks)

8. The figure below shows a uniform metre rule which is pivoted at 30.0cm mark. The spring balance is fastened at the 100cm mark and it is at equilibrium when the spring balance records 1.2N. Determine the weight of the metre rule. (3 marks)



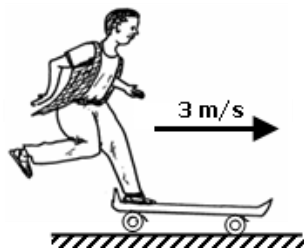
9. Explain why a Bunsen burner has a wide heavy base (2marks)

10. State the SI units of elastic constant of a spring (1mark)

11. Two samples of bromine vapour are allowed to diffuse separately under different conditions, one in a vacuum and the other in air. State with reasons the conditions in which bromine diffuse slower. (2 marks)

12. State what is meant by absolute zero temperature. (1 mark)

13. A boy of mass 58kg jumps with a horizontal velocity of  $3\text{ms}^{-1}$  onto a skateboard of mass 2kg as shown below. What is his velocity as he moves off on the skateboard? (2marks)



**SECTION B (55 MARKS)**

14. (a) Define the term work as used in physics.

(1 mark)

(b) A pulley system has two pulleys on the lower block and one pulley on the upper block. In order to raise the load of 6N, an effort of 2N is applied.

(i) Draw a sketch to show the pulley system.

(2 marks)

(ii) Calculate the efficiency of the pulley system

(3 marks)

iii) In the space provided below, sketch a graph of efficiency against load for the system

(2 marks)

c) A workshop has a wheel and axle for lifting heavy loads; The wheel has a diameter of 30cm while the axle has a diameter of 3cm. Assuming that the machine is perfect, calculate its mechanical advantage

(3 marks)

15. (a) What is meant by specific latent heat of vaporization? (1mark)

b) In an experiment to determine the specific latent heat of vaporization of water, steam at  $100^{\circ}\text{C}$  was passed into water contained in a well lagged copper calorimeter.

The following measurements were made:

Mass of calorimeter = 50g

Initial mass of water = 70g

Initial temperature of water =  $5^{\circ}\text{C}$

Final mass of water + Calorimeter + condensed steam = 123g

Final temperature of mixture =  $30^{\circ}\text{C}$

Specific heat capacity of water =  $4200\text{Jkg}^{-1}\text{k}^{-1}$

Specific heat capacity of copper =  $390\text{Jkg}^{-1}\text{k}^{-1}$

(i) Determine the  
(I) Mass of condensed steam (1 mark)

(II) Total heat gained by water and calorimeter (3 marks)

(ii) Given that  $L$  is the specific latent heat of vaporization of steam  
(I) Write an expression for the heat given out by steam (1 mark)

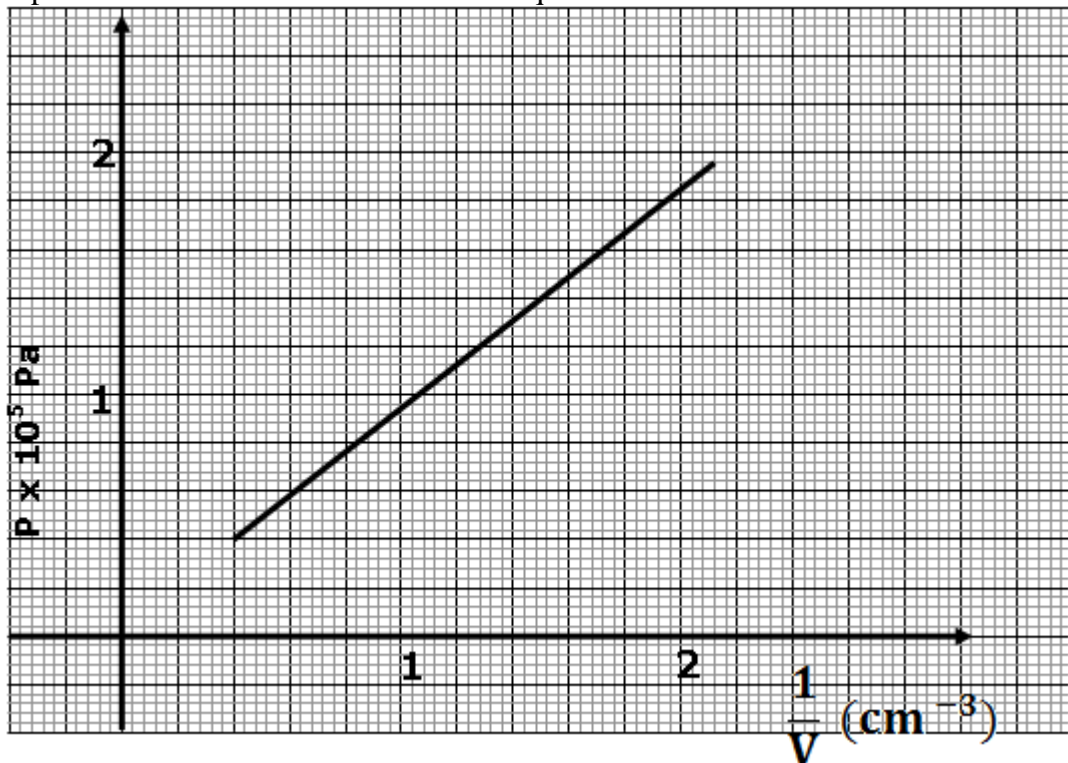
(II) Determine the value of  $L$  (2 marks)

c) 500g of water at  $20^{\circ}\text{C}$  is mixed with 200g of water at  $55^{\circ}\text{C}$ . Find the final temperature of the mixture. (3 marks)

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

(1 mark)

b) An air bubble is released at the bottom of a tall jar containing a liquid. The height of the liquid column is 80cm. The volume of the bubble increase from  $0.5\text{cm}^3$  at the bottom of the liquid to  $1.15\text{cm}^3$  at the top. The figure below shows the variation of pressure  $p$ , on the bubble with the reciprocal of volume  $1/v$  as it rises in the liquid



i) From the graph, determine the pressure on the bubble

(I) At the bottom of the liquid column;

(2marks)

(II) At the top of the liquid column.

(2marks)

(i) Hence determine the density of the liquid in  $\text{kgm}^{-3}$  (3 marks)

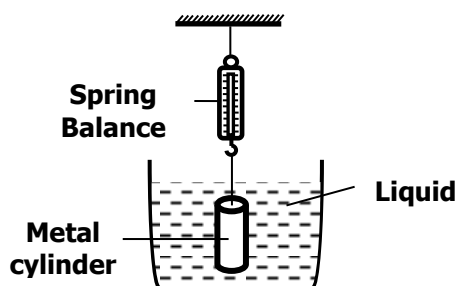
(ii) What is the value of the atmospheric pressure of the surrounding? (1 mark)

b) A rubber tube is inflated to a pressure of  $2.7 \times 10^5 \text{ pa}$  and volume  $3800\text{cm}^3$  at a temperature of  $25^\circ\text{C}$ . It is then taken to another place where the temperature is  $15^\circ\text{C}$  and the pressure  $2.5 \times 10^5 \text{ pa}$ . Determine the new volume. (3 marks)



17. a) The mass of a density bottle is 20g when empty 70g when full of water and 695g when full of liquid L. Calculate the density of the liquid L (take density of water as  $1\text{g/cm}^3$ ) (3 marks)

b) In an experiment to determine the density of a liquid a uniform metal cylinder of cross-sectional area  $6\text{cm}^2$  and length  $4\text{cm}$  was hung from a spring balance and lowered gradually into the liquid as shown below.



The up thrust was calculated from the spring balance and it was found to be  $0.6\text{N}$  when the cylinder was fully submerged. **Determine:**

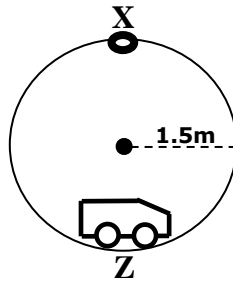
(i) Volume of the metal cylinder. (3marks)

(ii) Mass of the liquid displaced by the cylinder. (2marks)

(iii) Density of the liquid (3marks)

18. a) A wet umbrella gets dried faster when its handle is rotated at high speed. Explain. (2marks)

b) Figure below shows a trolley moving on a circular rail in a vertical plane. Given that the mass of the trolley is 250g and the radius of the rail is 1.5m



(i) Determine the minimum velocity at which trolley passes point X. (3marks)

(ii) If the trolley moves with a velocity of 4m/s as it passes point Z, Find

(I) angular velocity at this point. (3marks)

(II) The force exerted on the rails at this point. (2marks)