



# MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education  
PRE-MOCK EXAMINATIONS 2023

232/1

PHYSICS  
April 2023 – 2 Hours

Paper 1

Name: .....Adm No: .....

Class: .....Candidate's Signature: ..... Date: 12/4/2023.

Instructions to candidates

- This paper consist of TWO sections; A and B. Answer ALL the questions in section A and B in the spaces provided.
- ALL working MUST be clearly shown. Mathematical tables, electronic calculators and slide rules may be used.
- Candidates should check the question paper to ensure that all the 11 pages are printed as indicated and that no questions are missing.

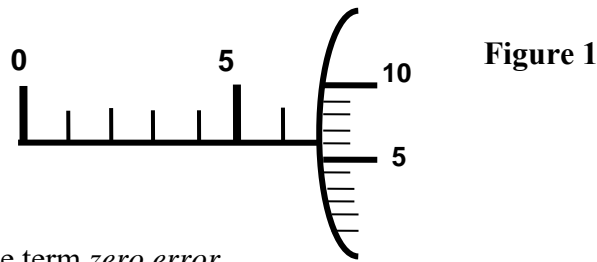
Take: *density of water* =  $1\text{gcm}^{-3}$  ,  $g = 10\text{N} / \text{kg}$

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SECTION	Question	Maximum Score	Candidate's Score
A	1-10	25	
B	11	15	
	12	10	
	13	09	
	14	12	
	15	09	
<b>TOTAL</b>		<b>80</b>	

**SECTION A: 25 MARKS**

1. The micrometer screw gauge shown in **figure 1** was found to have an error of + 0.04 mm



(a) Define the term *zero error* (1 mark)

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(b) Give the correct reading of the micrometer (1 mark)

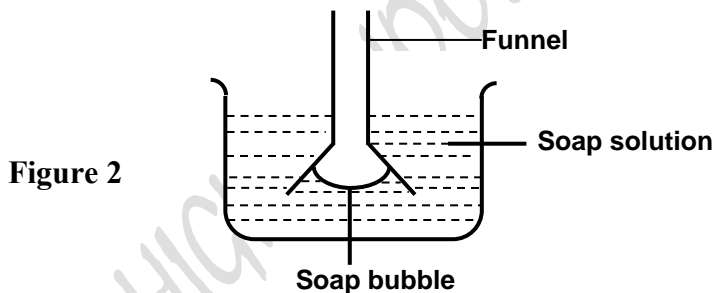
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2. (a) What is surface tension? (1 mark)

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(b) **Figure 2** shows a funnel dipped into a liquid soap solution.



Explain what happens to the soap bubble when the funnel is removed. (2 marks)

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3. A boy on a bicycle accelerated uniformly at  $1\text{m/s}^2$  for 10 seconds from an initial velocity of  $4\text{m/s}$ . Calculate the distance travelled in this time. (3 marks)

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4. An object is attached to a spring balance and its weight determined in air. It is then gently lowered into a beaker containing water.

(a) State what happens to the reading. (1 mark)

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(b) Explain the force that causes observation in (a) above. (1 mark)

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5. A metal cube weighs 1.0N in air and 0.8N when totally immersed in water. Calculate:

(a) Volume of water it displaces. (2 marks)

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(b) the density of the cube (2 marks)

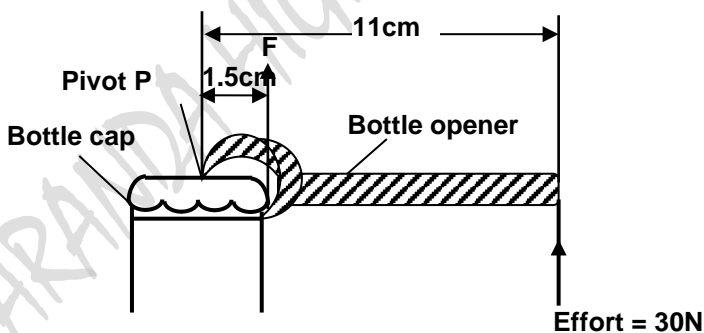
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6. State how the velocity of a moving fluid varies with pressure. (1 mark)

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7. **Figure 3** shows a bottle opener.



**Figure 3**

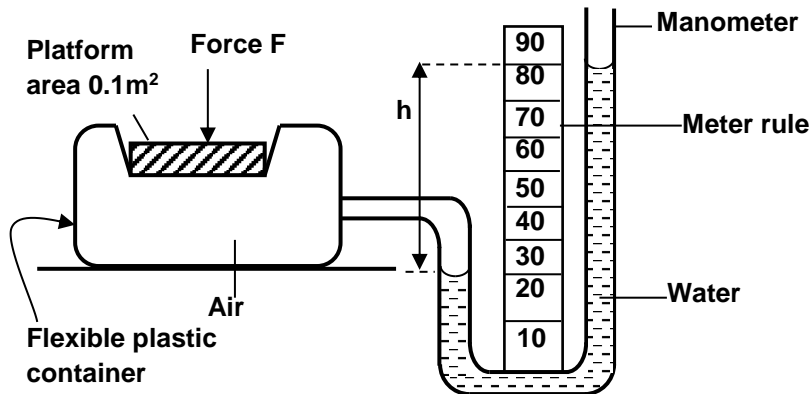
A force of 30N is applied at a distance of 11cm from the pivot P. A force F acts at the edge at a distance 1.5cm from P. Calculate the force F on the edge of the cap. (2 marks)

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8. **Figure 4** shows a manometer used to measure the pressure difference between the air inside a plastic container and the atmosphere outside.



**Figure 4**

Calculate the force  $F$  exerted on the container.

(3 marks)

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9. A student observes that in the morning an overhead electrical cable is straight and taut. At midday the student observes that the same cable has sagged. Explain these observations. (2 marks)

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

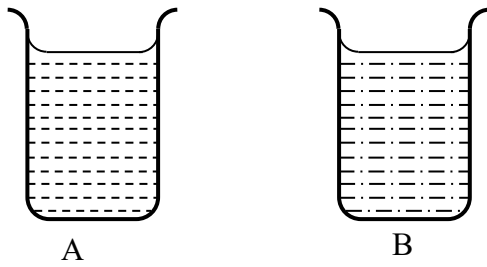
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## SECTION B: 55 MARKS

11. (a) **Figure 5** shows two containers filled with two different liquids to the same height.



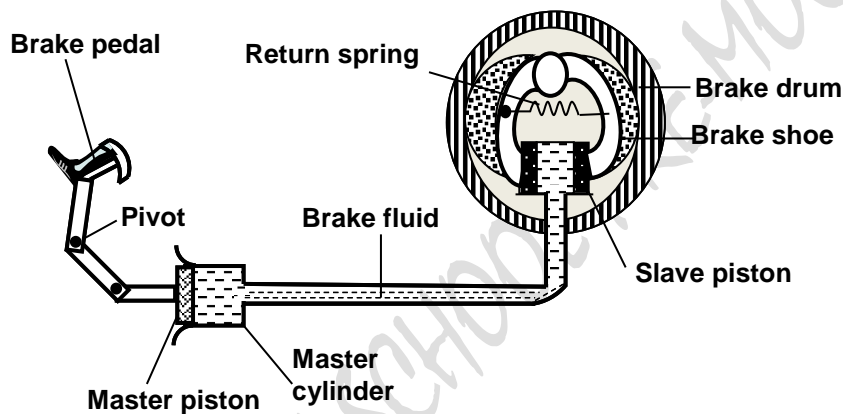
**Figure 5**

It was found that the pressure at the bottom of A is greater than that at B. Explain (1 mark)

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(b) **Figure 6** shows a car braking system. The brake fluid is an oily liquid.



**Figure 6**

The brake drum rotates with the wheel of the car.

(i) Explain how pushing the brake pedal makes the brake rub against the drum. (4 marks)

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(ii) The cross-sectional area of the master piston is  $2.0 \text{ cm}^2$ . A force of  $140\text{N}$  is applied to the master piston.

(I) Calculate the pressure created in the brake fluid by the master piston. (2 marks)

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(II) The cross-sectional area of each slave piston is  $2.8 \text{ cm}^2$ . Calculate the force exerted on each slave piston by the brake fluid. (2 marks)

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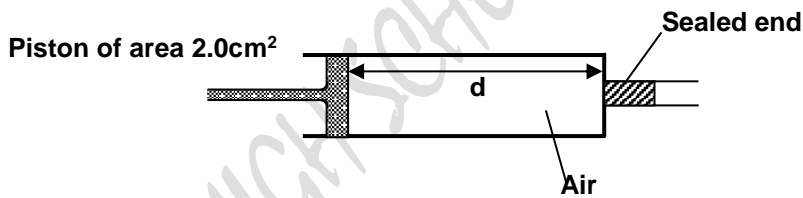
(III) The force exerted on the master piston is greater than the force applied by the foot on the brake pedal. Using the principle of moments, explain this (2 marks)

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(c) **Figure 7** shows a master cylinder sealed at one end. Instead of brake fluid, the cylinder contains air.



**Figure 7**

When a force is applied to the piston, the length  $d$  changes from  $6.0 \text{ cm}$  to  $4.0 \text{ cm}$ . The pressure of the air increases but the temperature stays constant.

(i) Describe how the molecules of air exert a pressure. (1 mark)

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(ii) Explain why the pressure increases even though the temperature stays constant. (1 mark)

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- (iii) The initial pressure of the air inside the cylinder is  $1.0 \times 10^5$  pa. Calculate the final pressure of the air. (2 marks)

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12. .

- (a) What is a machine? (1 mark)

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- (b) Two gear wheel have an 80 teeth (driven) and 20 teeth (driving) and lock with each other. They are fastened on axles of equal diameters such that a weight of 150N attached to a string round one axle will just raise 450N on the other axle.

Calculate:

- (i) M.A (2 marks)

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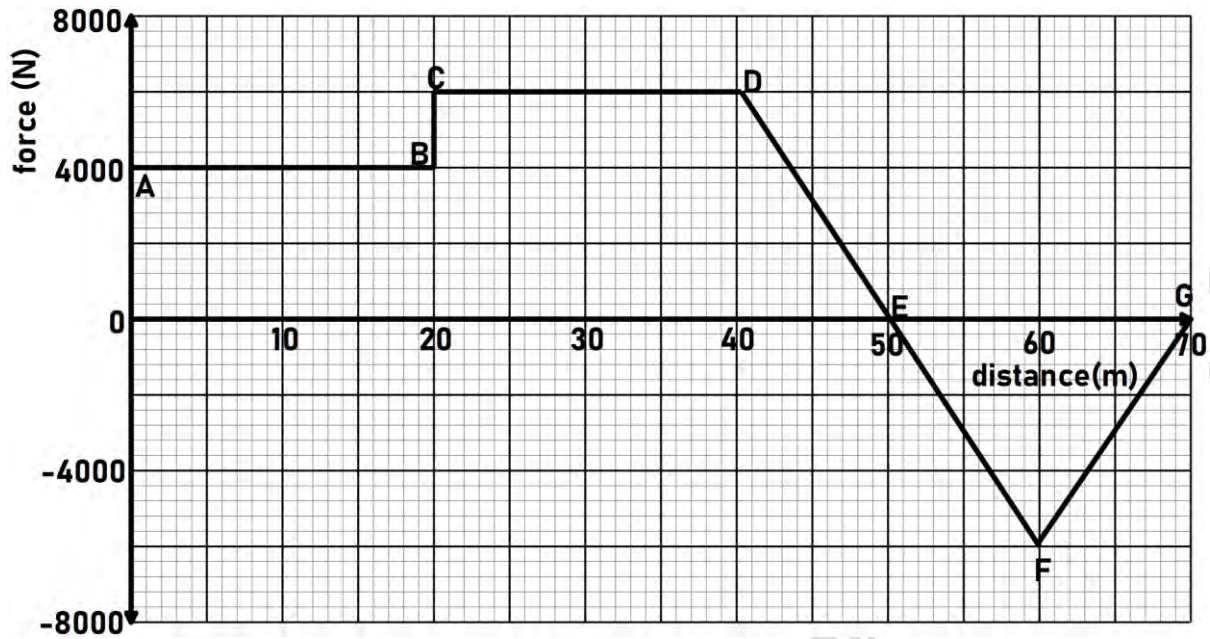
- (ii) V.R (2 marks)

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- (iii) Efficiency of the machine. (2 marks)

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- (c) The graph in **figure 8** shows the variation of force with distance for a body being towed.



**Figure 8**

Calculate the total work done on the body.

(3 marks)

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13..

- (a) Distinguish between distance and displacement.

(2 marks)

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- (b) A jet fighter moving horizontally at a speed of 200m/s at a height of 2 km above the ground is to drop a bomb to hit a target on the ground. How long does the bomb stay in air after release before it hit the target?

(3 marks)

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- (c) Two equal masses travel towards each other on a frictionless air track at speeds of 60cm/s and 40cm /s as shown in **figure 9**.



Figure 9

If they stick together on impact, what is the velocity of the masses after impact? (2 marks)

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- (d) **Figure 10** shows a simple pendulum oscillating between Y and Z.

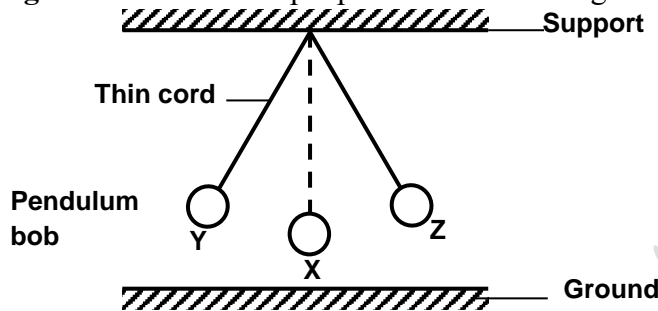


Figure 10

State the type of energy the body possesses at:

- (i) Position Y (1 mark)

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- (ii) Position X (1 mark)

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14. .

- (a) Define the term *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 in **figure 11**. The melted ice was collected.

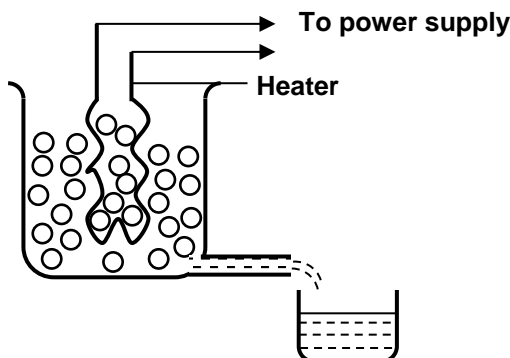


Figure 11

- (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) A mass of wax of 1kg was heated uniformly by a 100W heating element until it melted. The graph in **figure 12** shows how the temperature of the wax varies with time.

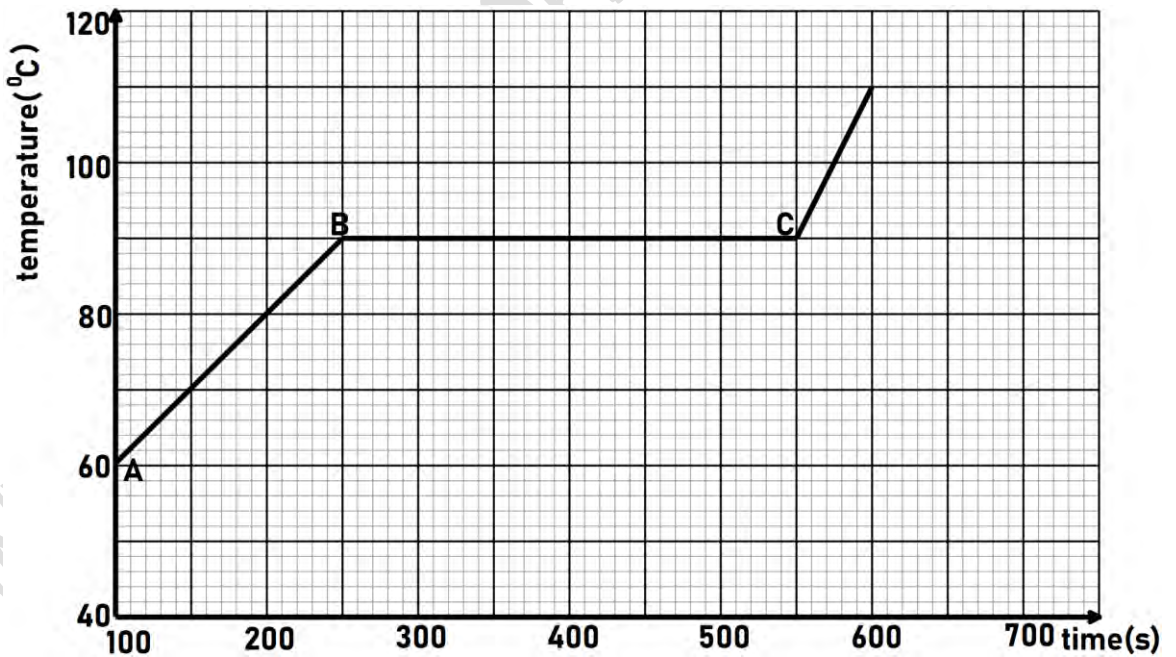


Figure 12

- (i) Explain what is happening in the region AB (2 marks)

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(ii) Calculate the specific heat capacity of the wax. (2 marks)

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(iii) Calculate the specific latent heat of fusion of wax. (3 marks)

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15. .

(a) A stone of mass 450g is rotated in a vertical circle at 3 revolutions per second as shown in figure 13.

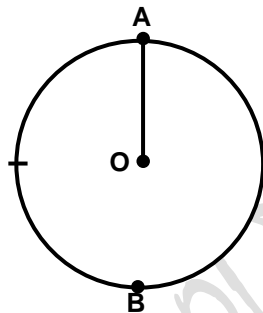


Figure 13

If the string has a length of 1.5m, determine:

(i) the linear velocity (3 marks)

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(ii) The tension of the string at positions A and B. (4 marks)

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(b) State two factors affecting centripetal force. (2 marks)

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