MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education

PRE-MOCK EXAMINATIONS 2023

232/1 **PHYSICS** **Paper 1**

April 2023 – 2 Hours

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

  For Examiner's Use Only

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

SECTION A: 25 MARKS

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

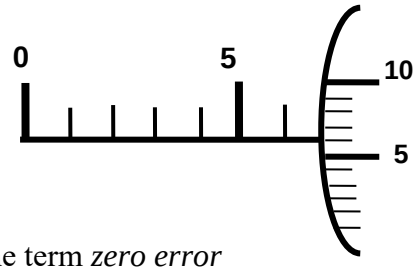

Figure 1

(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.

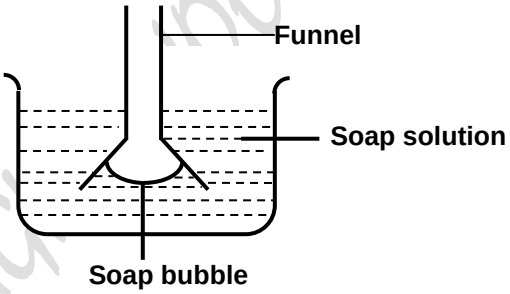

Figure 2

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 $1m/s^2$ for 10 seconds from an initial velocity of 4m/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.

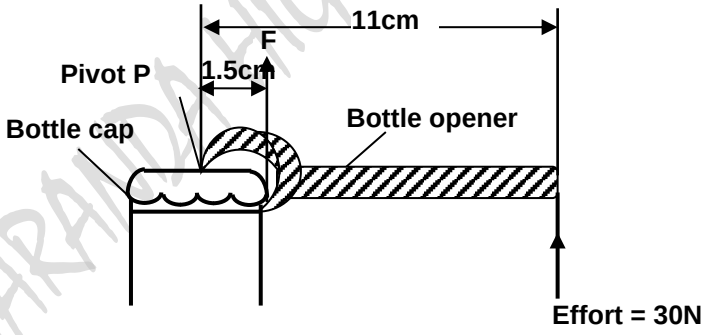

Figure 3

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.

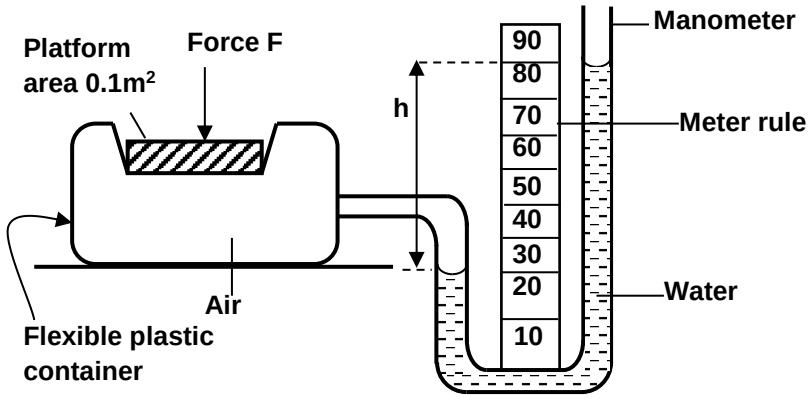

Figure 4

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 2.7×10^5 pa and volume $3800cm^3$ at temperature of 25^0C. It is then taken to another place where the temperature is 15^0C and the pressure is 2.5×10^5 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.

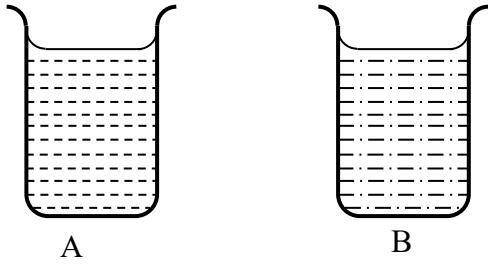

Figure 5

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.

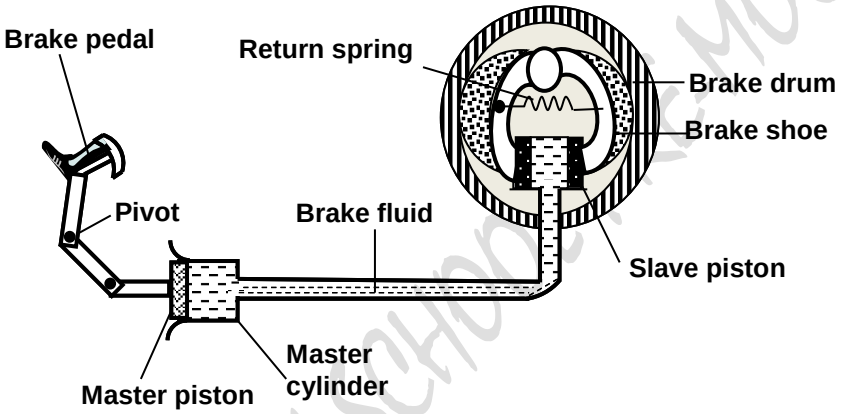

Figure 6

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 cm^2. A force of 140N 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 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.

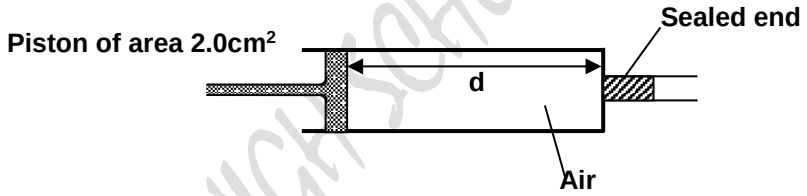

Figure 7

When a force is applied to the piston, the length d changes from 6.0 cm to 4.0 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 1.0×10^5 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.

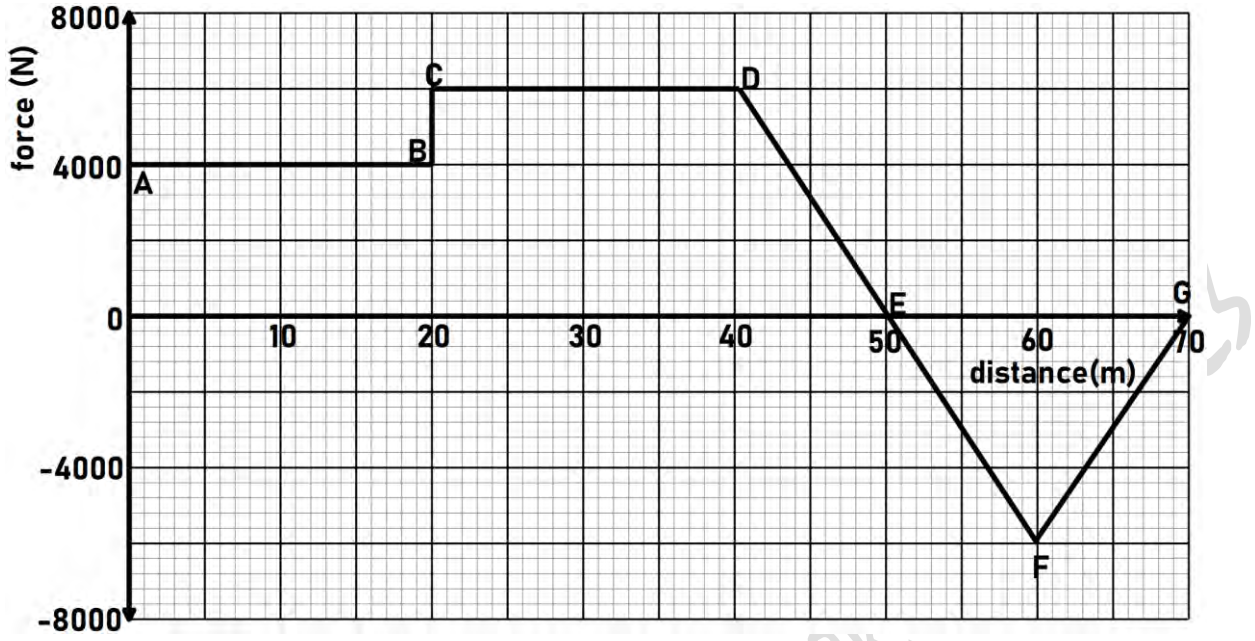

Figure 8

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.

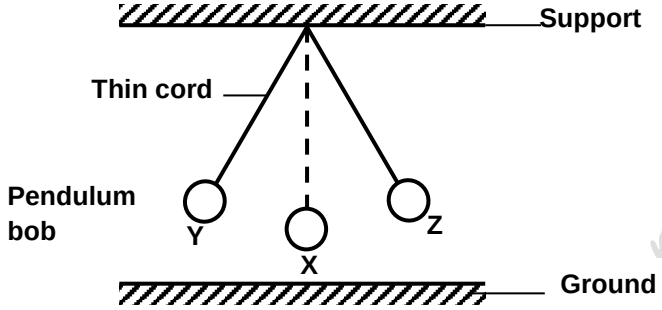

Figure 10

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.

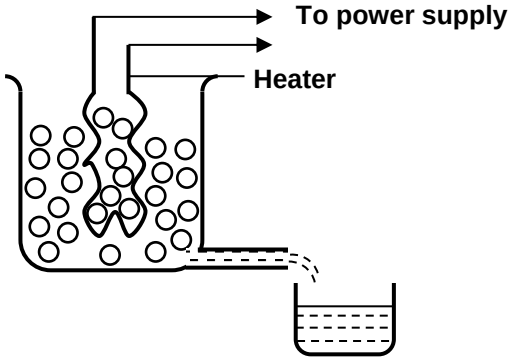

Figure 11

(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.

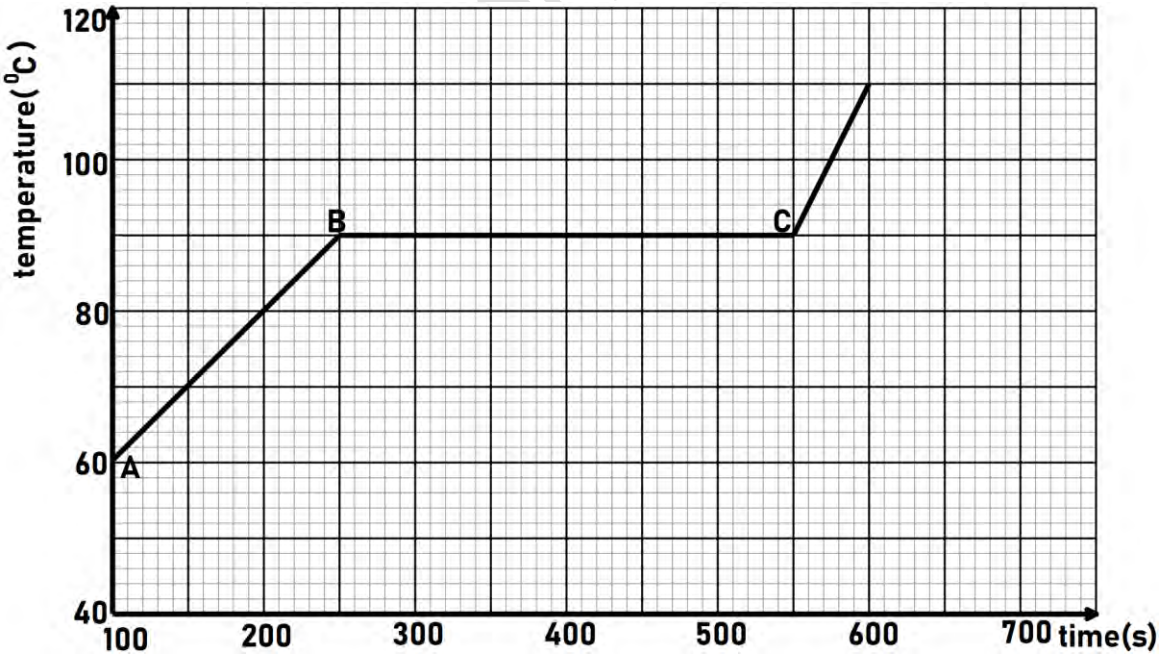

Figure 12

(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**.

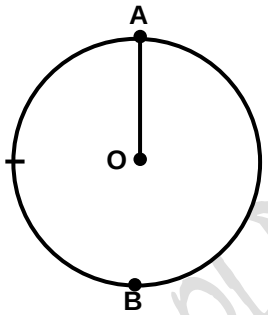

Figure 13

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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