MARANDA HIGH SCHOOL
Kenya Certificate of Secondary Education
PREMOCK EXAMINATIONS 2022

232/1 **PHYSICS** **Form 4**
June 2022 – 2 Hours

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

Class: ....Candidate's Signature: ....Date: 23/6/2022.

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 **12** pages are printed as indicated and that no questions are missing.

Take: $g = 10m/s^2$, density of mercury $= 13,600 kgm^{-3}$, density of air $= 1.25 kgm^{-3}$, density of water $= 1000 kgm^{-3}$

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SECTION	Question	Maximum Score	Candidate's Score
A	1-11	25	
B	12	10	
	13	13	
	14	13	
	15	13	
	16	06	
TOTAL		**80**	

SECTION A: 25 MARKS

1. **Figure 1** shows a ball bearing of mass 0.0025 kg is held between the anvil and spindle of a micrometer screw gauge. The reading on the gauge when the jaws are closed without anything in between is 0.011cm. Use this information and the position of the scale in the figure below to answer the questions **(a)** and **(b)** below:
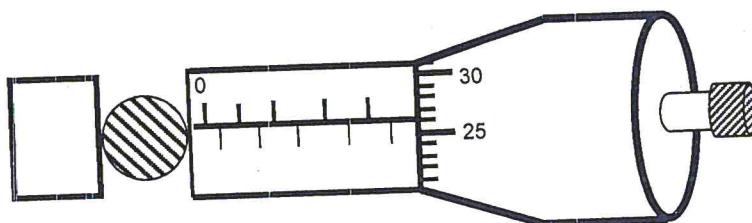
Figure 1

    (a) What is the diameter of the ball bearing?   (1 mark)

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    (b) Find the density of the ball bearing correct to 3 three significant figures   (2 marks)

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

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3. The barometric height at sea level is 76 cm of mercury while at a point on a highland it is 72 cm of mercury. What is the altitude of the point?   (3 marks)

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4. **Figure 2** shows an arrangement of identical springs A, B, C and D.
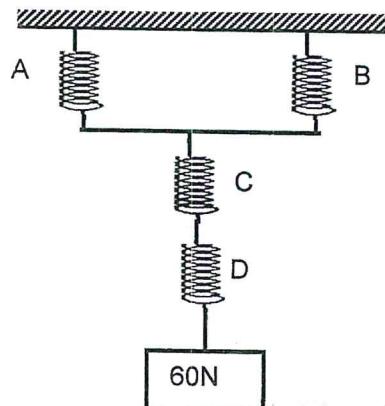
**Figure 2**

Each spring extends by 2 cm when a force of 5N it. Determine the extension of the system. (3 marks)

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5. A bathroom shower has 200 holes each 2.5 mm^2 in area. Water flows from a pipe of cross-section area of 15 cm^2 at 5m/s to the shower. Determine the speed of the spray. (2 marks)

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6. Explain how a ball and ring apparatus can be used to demonstrate contraction in solids (2 marks)

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7. Smoke particles are observed through the eye piece of a microscope. They are seen to move randomly. Explain what causes this motion. (2 marks)

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8. Explain how a cyclist maintains the stability of a moving bicycle. (2 marks)

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9. **Figure 3** shows a U – tube manometer open at one end and the other end connected to the gas supply.
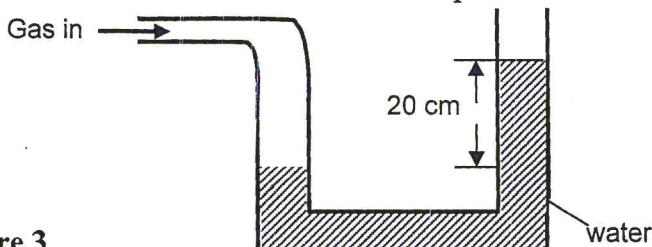
Figure 3

Given that the atmospheric pressure is $1.0 \times 10^5 \, pa$, determine the pressure of the gas (3 marks)

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10. State one advantage of alcohol-in-glass thermometer over mercury-in glass thermometer. (1 mark)

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11. In the crushing can experiment, it is observed that the can crushes on cooling. Explain this observation. (2 marks)

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SECTION B (55 MARKS)

12.

(a) Explain why it is important to wipe yourself with a towel after bathing.　　　　　(2 marks)

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(b) 200g of a solid was uniformly heated by a 0.2kW heater for some time. The graph in **figure 4** shows how the temperature of the solid changed with time.

Figure 4
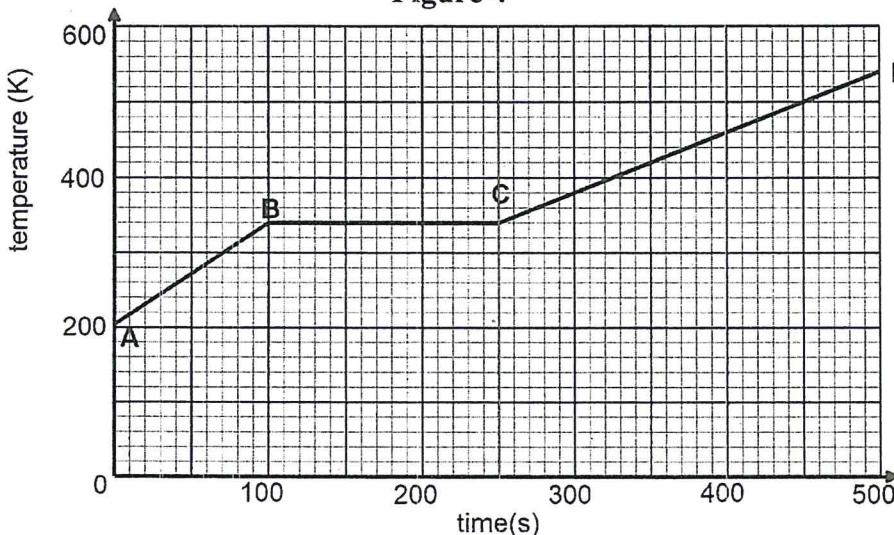
(i) Explain what is happening between BC and CD.　　　　　(2 marks)

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(ii) Calculate the specific heat capacity of the solid.　　　　　(3 marks)

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

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13. .

(a) **Figure 5** shows a simple set up for pressure law apparatus
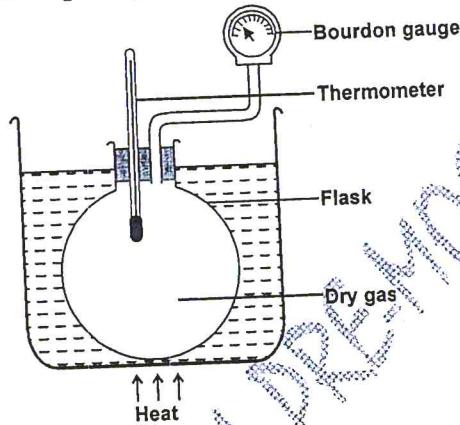
Figure 5

(i) State the measurements to be taken (2 marks)

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(ii) State the physical quantities that are kept constant (2 marks)

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(iii)Explain how the measurements taken in (a) above can be used to verify the law. (3 mark)

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(b) The graph in **figure 6** shows the relationship between the pressure and temperature for a fixed mass of an ideal gas at constant volume.

Figure 6

pressure X 10^4

$(Nm - 2)$
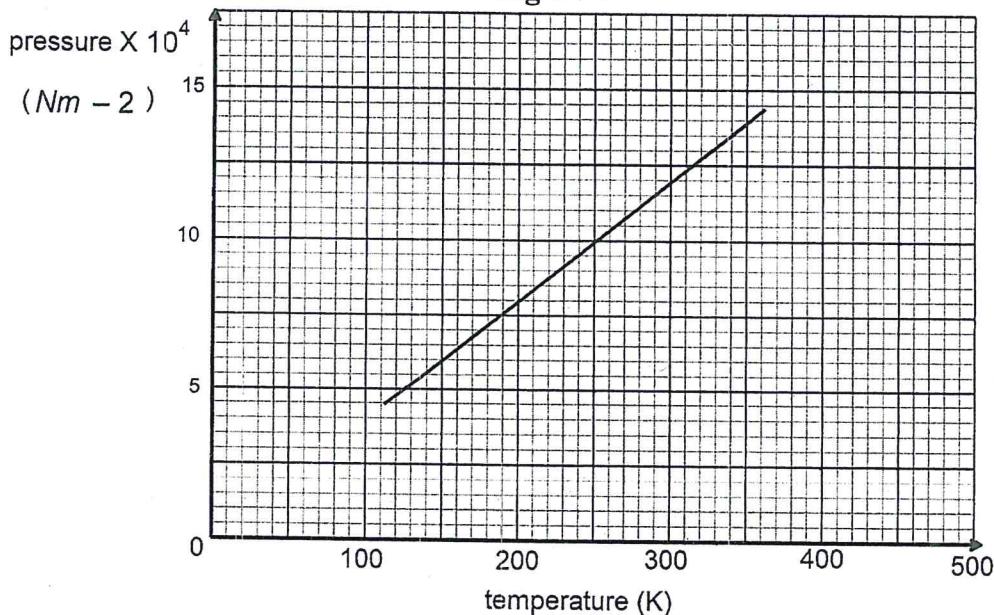
temperature (K)

(i) Given that the relationship between pressure, P and temperature, T in Kelvin is of the form $P = kT + C$ where k and C are constants, determine from the graph, the value of:

I. k (2 marks)

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II. C (1 mark)

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(ii) Explain why it would be impossible for the pressure of the gas to be reduced to zero in practice. (1 mark)

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(c) A gas is put into a container of fixed volume at a pressure of $2.1 \times 10^5 \ Nm^{-2}$ and temperature 27^0C. The gas is then heated to a temperature of 327^0C. Determine the new pressure. (2 marks)

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14. .

(a) **Figure 7(a) and (b)** shows a set up used by a student to determine upthrust in paraffin
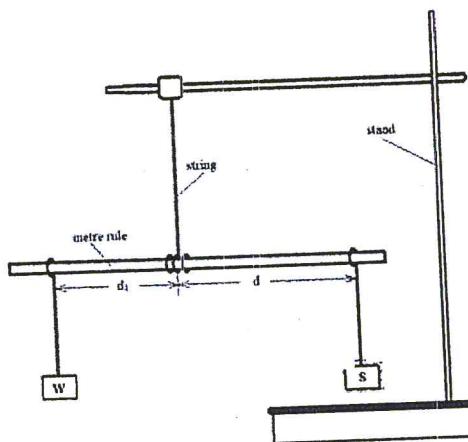
Figure 7(a)
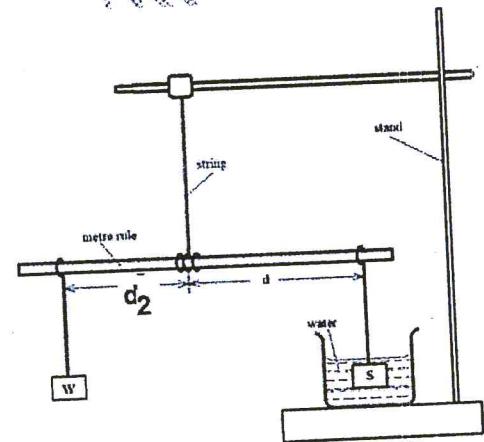
**Figure 7(b)**

Given that:

- Weight of solid W in air that balances with solid S of weight $W_1 \ N$ when in equilibrium in air = $W \ N$

- Perpendicular distance of solid W from the pivot = $d_1 \ cm$

- Perpendicular distance of solid S from the pivot = $d \ cm$

- Apparent weight of solid S in water = $W_2 \ N$

- Apparent weight of solid S in paraffin = $W_3 \ N$

- Perpendicular distance between solid W and pivot when solid S is immersed in water = $d_2 \ cm$

- Perpendicular distance between solid W and pivot when solid S is immersed in paraffin = $d_3 \ cm$

Show that:

(i) Relative density of solid S is given by $\dfrac{d_1}{d_1 - d_2}$ (3 marks)

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(ii) Relative density of paraffin is given by $\dfrac{d_1 - d_3}{d_1 - d_2}$ (3 marks)

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(b) **Figure 8** shows a block of wood of dimensions $14\,cm \times 7\,cm \times 2\,cm$ floating with $\frac{1}{3}$ of its size submerged in a liquid.
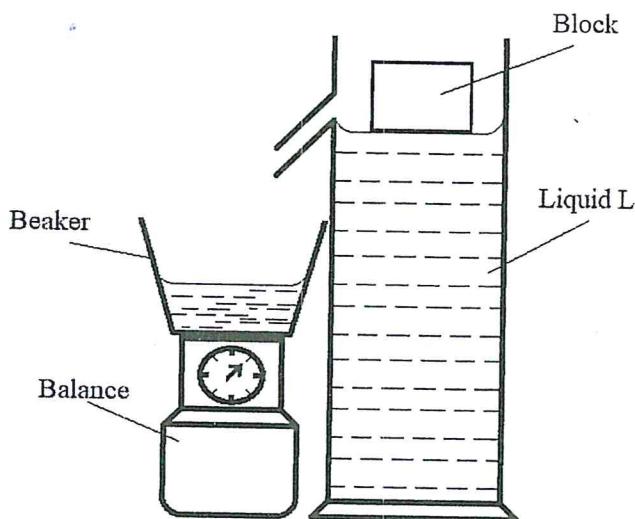

Figure 8

During an experiment with the set-up, the following results were obtained:

- Initial reading of the top pan balance with empty beaker = 32 g

- Final reading of the top pan balance = 186 g

Use the above results to determine: (3 marks)

(i) the density of the block.

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(3 marks)

(ii) the density of the liquid.

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(1 mark)

(c) Explain the purpose of the wide bulb of a hydrometer.

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15..

(a) Explain why a body moving in a uniform circular path with constant speed accelerates. (1 mark)

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(b) A wooden block of mass 150 g is placed at various distances from the centre of a turntable which is rotating at constant angular velocity. It is found that at a distance of 8.0 cm from the centre, the block just starts to slide off the table. If the force of friction between the block and the table is 0.5 N

Calculate:

(2 marks)

(i) The angular velocity of the table

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(ii) The force required to hold the block at a distance of 14.0 cm from the centre of the table

(3 marks)

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(iii) A similar block of mass 300 g is now placed at distance of 8.0 cm from the centre of the turntable in (i) above and the turntable rotated at the same angular velocity. State with a reason whether or not the ball will slide off. (2 marks)

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(c) A funfair ride of diameter 12 m makes 0.5 revolutions per second.

(i) Determine the angular velocity of the funfair. (2 marks)

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(ii) If the mass of the child is 30 kg, find the centripetal force that keeps the child in the motion.

(3 marks)

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16. A student performed an experiment using a pulley as shown in **figure 9**
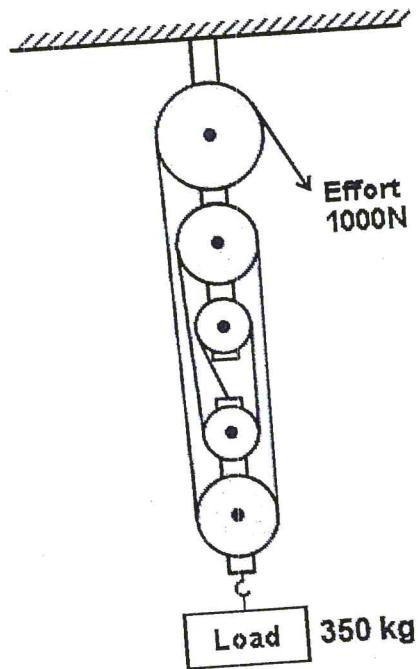
Figure 9

(a) State the V.R. of the system (1 mark)

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(b) Determine the M.A. of the system (2 marks)

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(c) Calculate the efficiency of the system. (3 marks)

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