

3.6 PHYSICS (232)

3.6.1 Physics Paper 1 (232/1)

SECTION A: (25 marks)

Answer ALL the questions in this section in the spaces provided.

- 1 **Figure 1** shows part of the main scale of a vernier callipers.

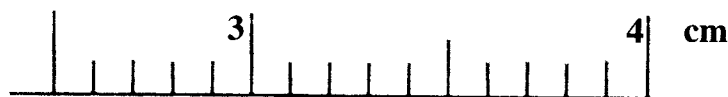


Figure 1

Insert the vernier scale to the main scale, to show a reading of 3.14 cm. (1 mark)

- 2 **Figure 2 (a)** shows the initial reading of a burette used to measure the volume of oil. After 50 drops of the oil were run out, the final reading was as shown in **Figure 2 (b)**

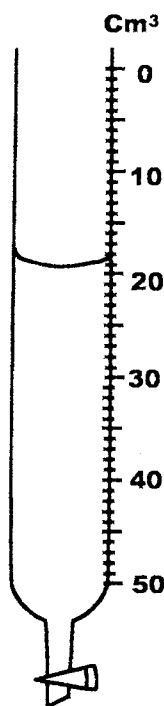


Figure 2 (a)

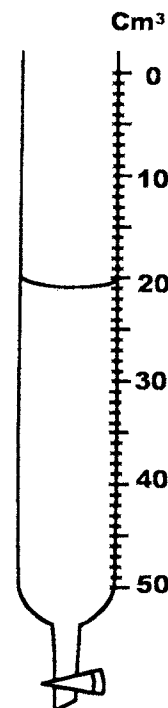


Figure 2 (b)

Determine the volume of one drop of oil. (2 marks)

- 3 A spring extends by 6 cm when supporting a mass of 0.06 kg on earth. When the spring is used to support the same mass on the moon, it extends by 1 cm. Determine the moon's gravitational strength. (Take gravitational field strength on earth as 10 Nkg^{-1}) (3 marks)

- 4 State two factors that determine the pressure at a point in a liquid. (2 marks)

5 A student wearing sharp pointed heeled shoes is likely to damage a soft wooden floor. Explain. (2 marks)

6 Figure 3 shows the arrangement of molecules in the three states of matter.

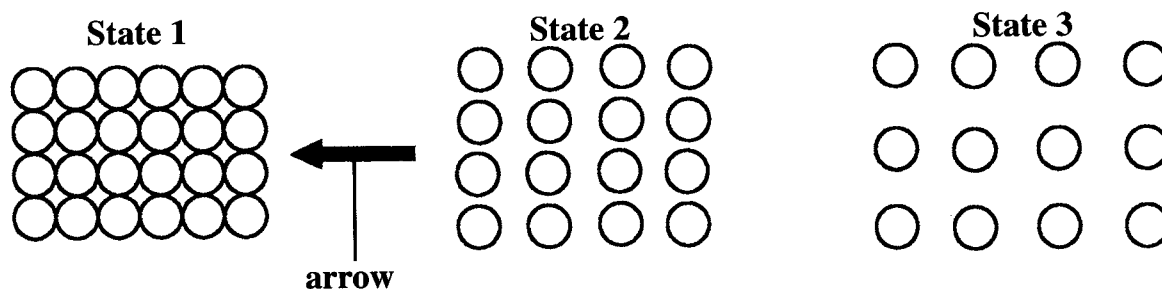


Figure 3

(a) Name the process represented by the arrow. (1 mark)

(b) State the reason for the arrangement of molecules in state 3. (1 mark)

7 Two containers A and B of equal dimensions but different metals are fitted with identical glass casings. The two containers initially at the same temperature are simultaneously filled with boiling water. It is observed that the glass casing on A breaks earlier than the one on B. Explain this observation. (2 marks)

8 Figure 4 shows a uniform metal rod balanced at its centre by different forces.

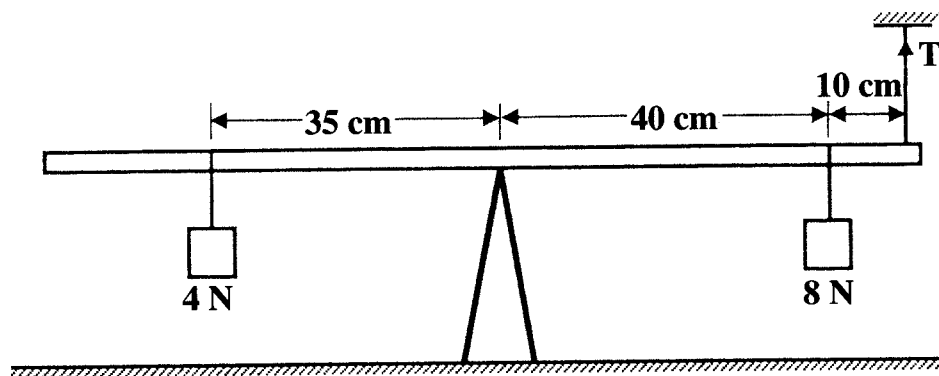


Figure 4

Determine the value of T.

(3 marks)

- 9 **Figure 5** shows air flowing through a pipe of different cross-sectional areas. Two pipes **A** and **B** are dipped into water.

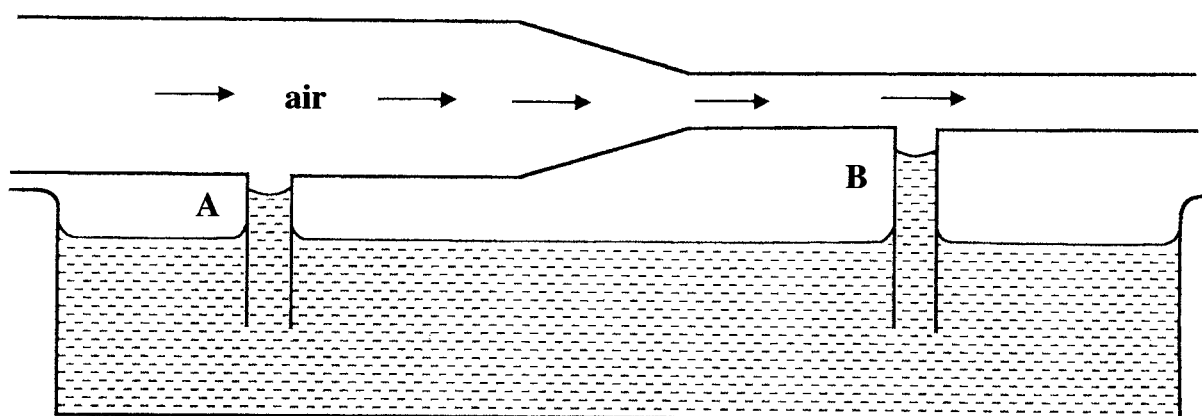


Figure 5

- Explain the cause of the difference in the levels of water in the pipes **A** and **B**. (2 marks)
- 10 A balloon is filled with hydrogen gas and then released into the air. It is observed that as it rises higher into the air it expands. Explain why it expands. (2 marks)
- 11 A person carrying a heavy luggage using one hand leans away from the luggage. State the reason for this. (1 mark)
- 12 **Figure 6** shows a glass tube with water fitted with two identical thermometers **A** and **B**. It is heated as shown.

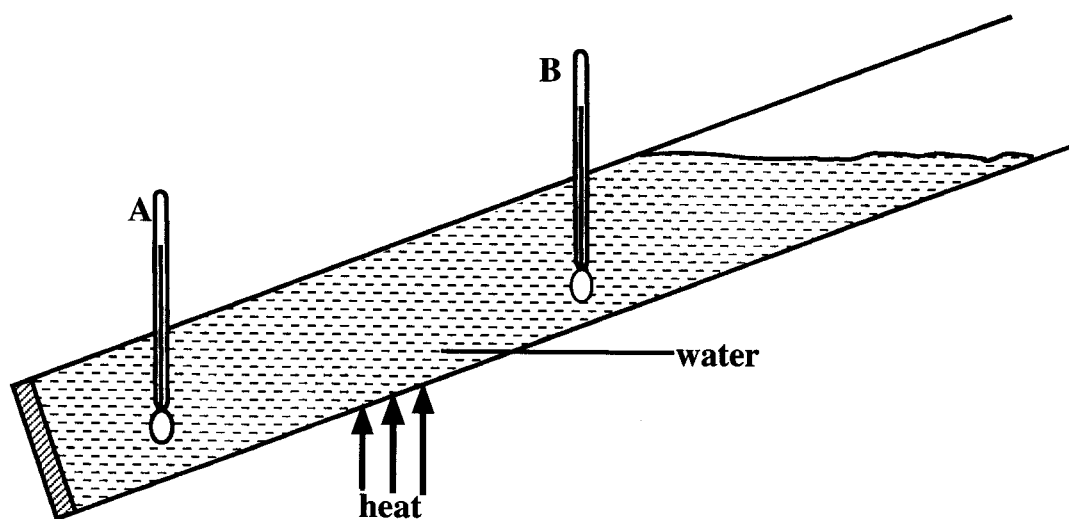


Figure 6

- State with a reason which one of the two thermometers shows a higher temperature. (2 marks)
- 13 Mechanics is one of the branches of physics. State what it deals with. (1 mark)

SECTION B: (55 marks)

Answer **ALL** the questions in this section in the spaces provided.

- 14 (a) **Figure 7** (drawn to scale) shows a section of tape after passing through a ticker timer operated at a frequency of 50 Hz. The tape is attached to a trolley moving in the direction shown.

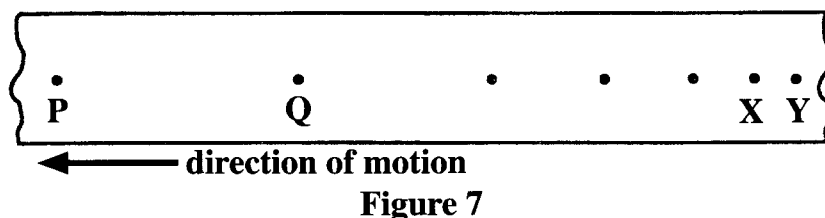


Figure 7

- (i) Determine the velocity between:
- (I) P and Q; (4 marks)
- (II) X and Y. (2 marks)
- (ii) Determine the acceleration of the trolley. (3 marks)
- (b) Two bodies of masses 5 kg and 8 kg moving in the same direction with velocities 20 ms^{-1} and 15 ms^{-1} respectively collide inelastically. Determine the velocity of the bodies after the collision. (4 marks)
- 15 (a) **Figure 8** shows a 200 g mass placed on a frictionless surface and attached to a spring.

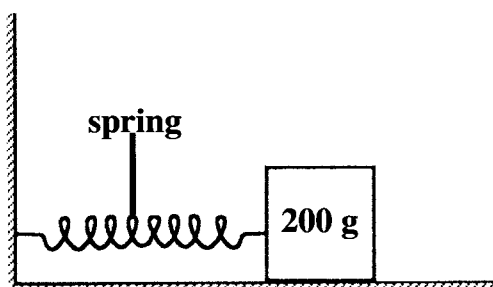


Figure 8

- The spring is compressed and released. Given that the elastic potential energy of the compressed spring is $2.7 \times 10^{-2} \text{ J}$, determine the maximum speed with which the block moves after it is released. (4 marks)
- (b) In a wheel and axle system, state the advantage of having a large wheel diameter compared to the axle diameter for a frictionless system. (1 mark)
- (c) A body is released from a height **h**. Sketch a graph of potential energy against kinetic energy as the body falls to the ground. (2 marks)

- (d) **Figure 9** shows a hydraulic lift system. The radius of the small piston is 3 cm while that of the larger piston is 9 cm. A force of 90 N is applied to the smaller piston.

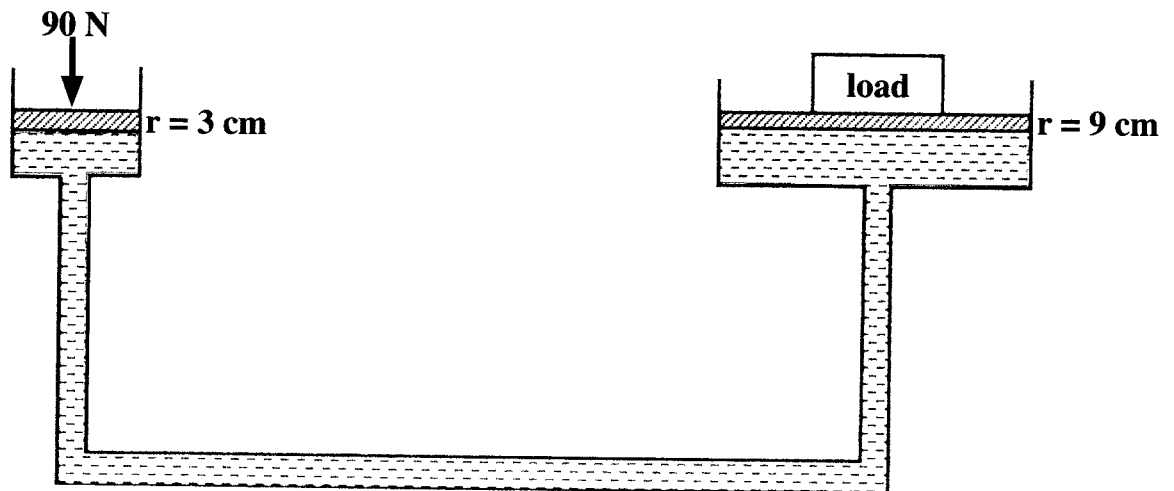


Figure 9

Determine the:

- (i) maximum load that can be lifted. (3 marks)
- (ii) efficiency of the system. (3 marks)

- 16 (a) **Figure 10** shows an **incomplete** set up that can be used in an experiment to determine the specific heat capacity of a solid of mass **m** by electrical method.

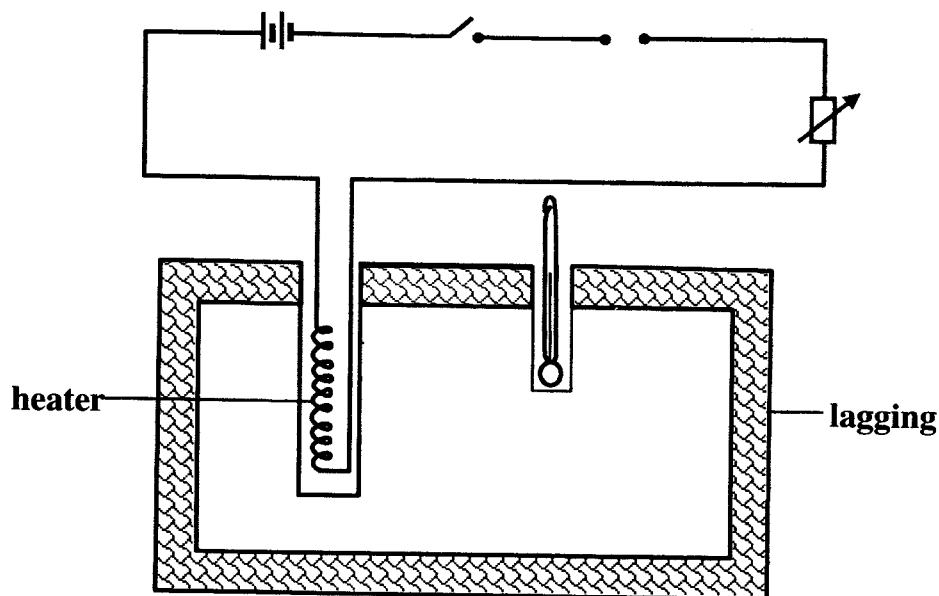


Figure 10

- (i) Complete the diagram by inserting the missing components for the experiment to work. (2 marks)
- (ii) Other than temperature, state **three** measurements that should be taken. (3 marks)

(iii) The final temperature was recorded as θ . Write an expression that can be used to determine the specific heat capacity of the solid. (2 marks)

(b) State **three** ways of increasing the sensitivity of a liquid-in-glass thermometer. (3 marks)

17 (a) **Figure 11** shows a graph of pressure (**p**) against volume (**v**) for a fixed mass of a gas at constant temperature.

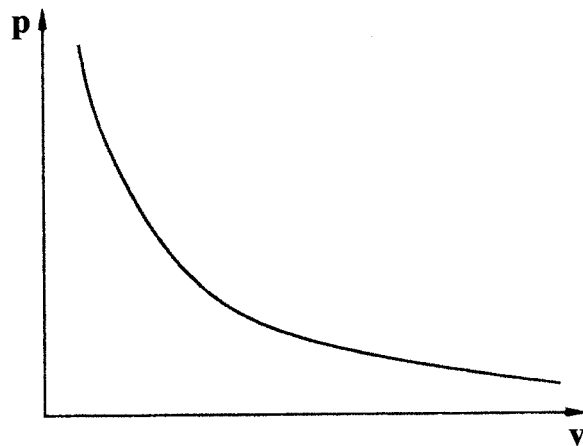


Figure 11

In the space provided, sketch the corresponding graph of **p** against $\frac{1}{v}$. (1 mark)

(b) Explain the pressure law using the kinetic theory of gases. (3 marks)

(c) 20 cm³ of a gas exerts a pressure of 760 mmHg at 25°C. Determine the temperature of the gas when the pressure increases to 900 mmHg and the volume reduces to 15 cm³. (4 marks)

(d) **Figure 12** shows the path of a light ball projected horizontally.

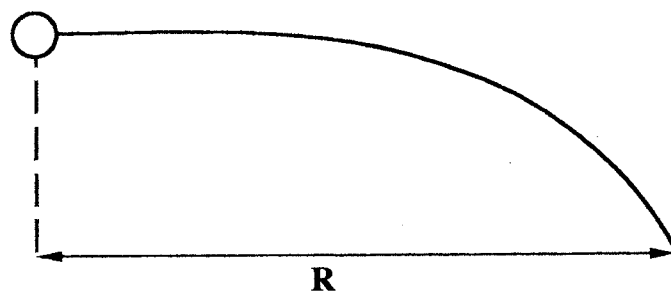


Figure 12

The ball is then made to spin in an anticlockwise direction as it moves:

(i) on the same axis, sketch the new path of the ball. (1 mark)

(ii) explain how the ball attains the new path. (2 marks)

- 18 (a) **Figure 13** shows a pendulum bob suspended by a thread moving in a horizontal circle.

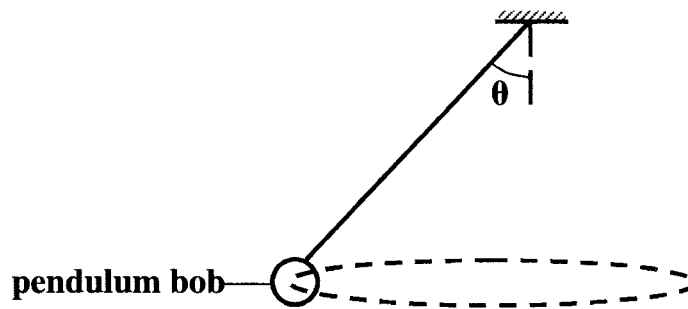


Figure 13

- (i) Name **two** forces acting on the pendulum bob as it moves. (2 marks)
- (ii) State what happens to each of the forces when the angular velocity of the pendulum bob is increased. (2 marks)
- (iii) State **two** applications of uniform circular motion in daily life. (2 marks)
- (b) **Figure 14** shows a block floating in water.

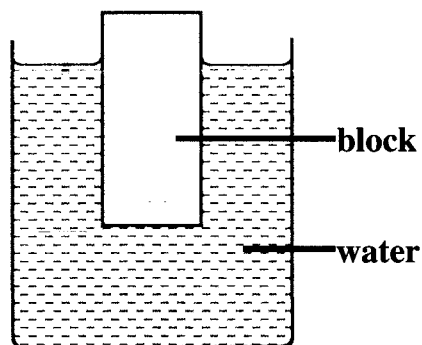


Figure 14

When the water is heated; it is observed that the block sinks further. Explain this observation. (2 marks)