

4.5 PHYSICS (232)

4.5.1 Physics Paper 1 (232/1)

1. 5.32 cm (1 mark)
2.
 - magnitude of the force
 - The perpendicular distance between the force and the pivot. (1 mark)
3. Patmosphere = Pmercury + pair enclosed;

Pair = 760 - 600;
= 160 mm Hg; (3 marks)
4. (a) $F = Ke$;
 $20 = 0.5 K$;
 $K = 40 \text{ Ncm}^{-1}$ (2 marks)

(b) $F = 40 \times 0.86 =$
 $= 34.4 \text{ N};$ (1 mark)
5.
 - Weight of object in air
 - Weight of object when fully immersed in fluids (2 marks)
6. Upthrust = weight in air - weight of object in fluid. (1 mark)
7. Wood is a poor conductor of heat; hence heat is used to burn paper, while most heat is conducted away by copper; hence paper takes long to burn. (2 marks)
8. Clockwise moments = anticlockwise moments;
 $0.18x = 1(50 - x) + 0.12(100 - x)$
 $0.18x = 50 - x + 12 - 12x$
 $0.18x = 62 - 1.12x$
 $7.30x = 62$
 $x = 47.69 \text{ cm};$ (3 marks)
9. Air is compressible; so the transmitted pressure is reduced; (2 marks)
10. The high velocity of the gas causes a low pressure region;
Atmospheric pressure is higher;
Pressure difference draws air into the region; (3 marks)
11. Water molecules have a high adhesion forces; With glass molecules and hence rise up the tube while mercury molecules have greater cohesion;
Forces within than adhesion with glass hence do not rise up. (2 marks)

12. Allow for expansion;
Water expands on cooling between 4° C and 0° C; (1 marks)
13. Diffusion of the ink molecules; (1 mark)

SECTION B

14. (a) - increasing the angular velocity;
- Reducing the radius of the path; (2 marks)
- (b) (i) Tension in the string; (1 mark)
- (ii) Arrow to centre of circle; (1 mark)
- (iii) Direction of motion of object changes and causes the velocity to change with time; (1 mark)
- (iv) $F = \frac{MV^2}{r};$
 $= \frac{0.5 \times 8^2}{2}$
 $= 16\text{N};$ (3 marks)
- (c) (i) $V^2 = u^2 + 2as;$
 $0 = u^2 - 2 \times 10 \times 100$
 $u = \sqrt{2000}$
 $44.72 \text{ ms}^{-1};$ (2 marks)
- (ii) $V = u + at ;$
 $0 = 44.72 - 10 \times t$
 $t = 4.472$
Total time = 2×4.472
 $= 8.94\text{s} ;$ (2 marks)
15. (a) Quantity of heat required to convert 1 kg of ice at 0° C to water without change in temperature; (1 mark)
- (b) (i) $E = Pt;$
 $= 60 \times 5 \times 60;$
 $= 18000 \text{ J};$ (3 marks)
- (ii) Mass of water = $190 - 130 = 60\text{g};$
 $ml_f = Pt.$
 $\frac{60}{1000} l_f = 60 \times 60 \times 5 ;$
 $l_f = 3 \times 10^5 \text{ J/Kg};$ (4 marks)

(iii) Heat from the surrounding melts the ice; (1 mark)

16. (a) $F = Ma$;
 $F = 2 \times 5$
 $= 10\text{N}$;
friction force $= 12 - 10$
 $= 2\text{N}$; (3 marks)

(b) (i) OA - the ball bearing decelerates; as the upthrust increases to a maximum; (2 marks)

AB - ball attains terminal velocity; when upthrust = weight; (2 marks)

(c) (i) $VR = 2$ (1 mark)

(ii) To change direction of effort; (1 mark)

(iii) Efficiency $= \frac{MA}{VR} \times 100$;

$$80 = \frac{MA}{2} \times 100\%$$

$$MA = 1.6;$$

$$\therefore 1.6 = \frac{L}{500}$$

$$L = 500 \times 1.6$$

$$= 800 \text{ N};$$

(3 marks)

17. (a) (i) $F = mg$
 $= 10 \times 10$
 $= 100 \text{ N}$;
Additional pressure $= \frac{100\text{N}}{100 \text{ cm}^2} = 1 \text{ Ncm}^{-2}$;
new reading $= 10 + 1 = 11 \text{ N}$; (4 marks)

(ii) Pressure has increased; because, when the volume reduces, the collisions between the gas molecules and walls of the container increases; (2 marks)

(b) (i) Pressure $= 11 \text{ Ncm}^{-2}$ (1 mark)

(ii) $\frac{P_1}{T_1} = \frac{P_2}{T_2}$;
 $\frac{1}{300} = \frac{11}{T_2}$;
 $T_2 = \frac{300 \times 11}{10} = 330\text{k}$;
 $T_2 = 57^\circ \text{C}$

(4 marks)

18. (a) (i) (I) - Reading decreases on spring balance;
(II) - Reading on weighing balance increases.
- (ii) As the block is lowered, upthrust increases;
and hence it apparently weighs less; (4 marks)
- (b) (i) Upthrust - weight in air - weight in water

$$= 2.7 - 2.46$$

$$= 0.24 \text{ N};$$
Reading in weighing balance = $2.8 + 0.24$

$$= 3.04 \text{ N};$$
 (2 marks)
- (ii) Relative density = $\frac{\text{weight in air}}{\text{upthrust}}$

$$= \frac{2.7}{0.24}$$

$$= 11.25 ;$$
- Density = R.d \times density of water

$$= 11.25 \times 1000$$

$$= 11250 \text{ kgm}^{-3};$$
 (3 marks)
- (c) The hydrometer sinks more;
The density of the water is reduced; (2 marks)