

4.5 PHYSICS (232)

4.5.1 Physics Paper 1 (232/1)

SECTION A

1.
$$L = \frac{18.6 + 18.5 + 18.6 + 18.5}{4} \quad \checkmark(1)$$

$$L = \frac{74.2}{4} = 18.55$$

students should record 18.6 cm $\checkmark(1)$

2. 3.46 mm read from photograph. $\checkmark(1)$

3. Weight = Mass x gravity

OR (kilograms is the unit of measuring the mass and does not depict the force of gravity)

4. (a) BC = Constant $\checkmark(1)$

(b) CD - decreasing $\checkmark(1)$

5.
$$\frac{F}{A} = p \quad \checkmark(1)$$

$$F = 5 \times 24 \quad \checkmark(1)$$

$$F = 120 \text{ N}$$

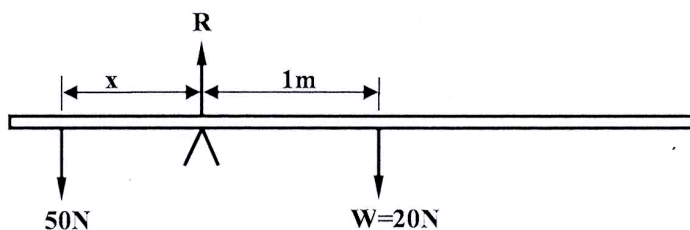
6. Volume of drop = Volume of patch $\checkmark(1)$

$$Ad = V \quad \checkmark(1)$$

$$d = \frac{V}{A}$$

7. Flask painted black absorbs more heat;
causing more expansion of air above S than above T; $\checkmark(1)$
hence S is pushed downwards and T upwards; $\checkmark(1)$

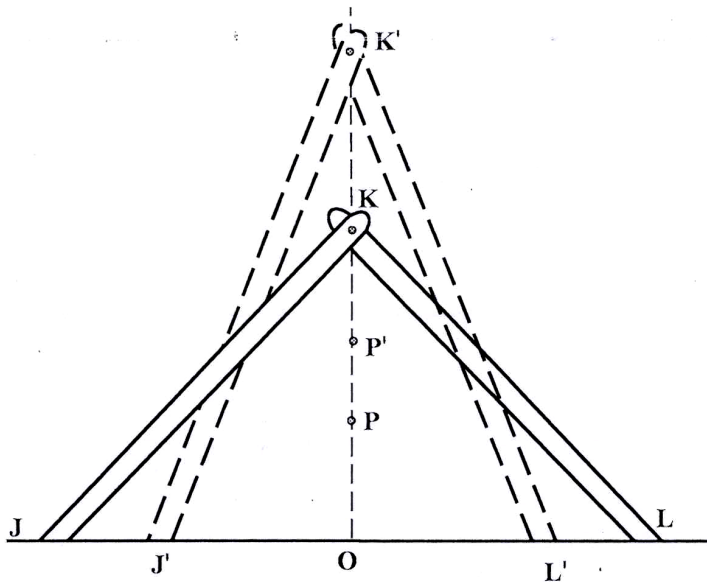
8.



\checkmark (1)

$$\begin{aligned}
 50x &= 20 \times 1 && \checkmark(1) \\
 x &= \frac{20}{50} \\
 &= 0.4 \text{ m} && \checkmark(1)
 \end{aligned}$$

9.



-raised K to K' ✓ (1)

-P also raised to P' ✓ (1)

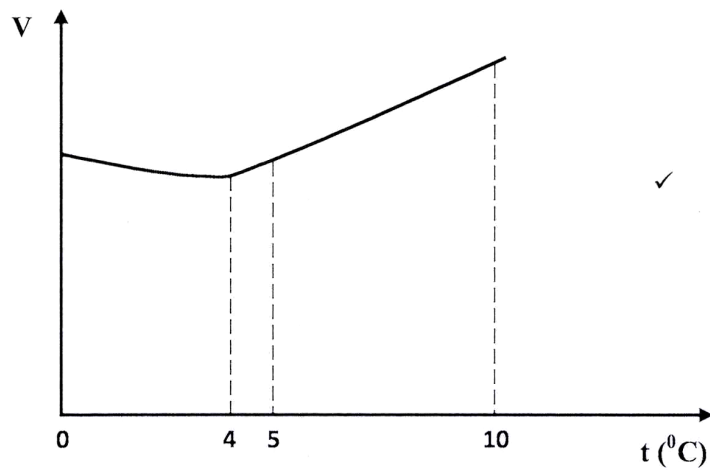
10. Extension = 4 mm + 4 mm ✓(1)

= 8 mm ✓(1)

11. $A_1V_1 = A_2V_2$ ✓(1)

$$\frac{V_2}{V_1} = \frac{A_1}{A_2} \quad \checkmark(1)$$

12.



✓ (1)

13. (a) BC - Solid changes to liquid $\checkmark(1)$
 (b) DE - Liquid changes to vapour $\checkmark(1)$
14. - Collisions / bombardment of particles with air molecules which are in random motion. $\checkmark(1)$

SECTION B

15. (a) (i) Displacement = Area under graph
 $= 20 \times 8 \text{ m}$
 $= 160 \text{ m}$

(3 marks)

- (ii) After point B,

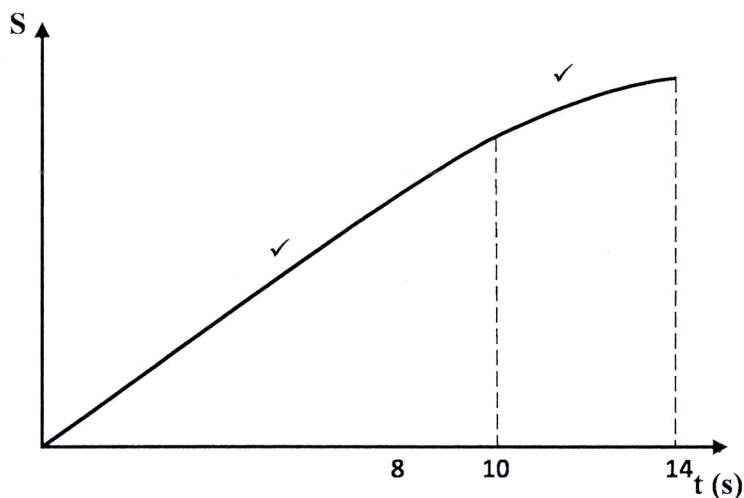
$$a = \frac{0 - 20}{4} \text{ ms}^{-2}$$

$$= -5 \text{ ms}^{-2}$$

- (iii) $F = ma = 2 \times -5 \text{ N}$
 $= -10 \text{ N}$

(3 marks)

- (b)



(2)

16. (a) (i) Force = 4 N ✓(1)
- (ii) Since velocity is constant. (uniform speed) ✓(1)
- Resultant force is zero = Force downwards is equal to force upwards
- = 4N ✓(1)
- (b) (i) M. A = $\frac{\text{load}}{\text{Effort}} = \frac{20}{4}$ ✓(1)
- = 5 ✓(1)
- (ii) V. R = $\frac{\text{Effort distance}}{\text{Load distance}}$; ✓(1)
- = $\frac{40}{5}$; ✓(1)
- = 8 ;
- (iii) Efficiency = $\frac{M. A}{V. R} \times 100\%$ ✓(1)
- = $\frac{5}{8} \times 100$ ✓(1)
- = 62.5% ✓(1)
17. (a) $l_1 = 142$, $T_1 = 290$ K, $T_2 = 298$ K, $l_2 = ?$
- $\frac{l_1}{T_1} = \frac{l_2}{T_2}$ or $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ ✓(1)
- $l_2 = 142 \times \frac{298}{290}$ ✓(1)
- = 145.9 mm ✓(1)
- (b) In the hot sun the temperature of the air increases; therefore the speed of the air molecules increases hence the rate of collisions between the molecules and tyre increases; The rate of change of momentum (pressure) of the molecules also increases. ✓(1)

(c) (i) Heat lost = Heat gained

$$mL_v + M \Delta\theta C_{\text{steam}} = M \Delta\theta C_{\text{water}} \quad \checkmark(1)$$

$$0.01 L_v + 0.01 \times 30 \times 4200 = 0.1 \times 4200 \times 50 \quad \checkmark(1)$$

$$0.01 L_v = 21000 - 1260 \quad \checkmark(1)$$

$$L_v = \frac{19740}{0.01}$$

$$= 1.974 \times 10^6 \text{ J Kg}^{-1}\text{K}^{-1} \quad \checkmark(1)$$

- (ii) - All the heat lost by the steam is not absorbed by the water alone.
 - Reading the thermometer at wrong meniscus resulting in wrong temperatures.

18. (a) Friction between road and tyre. $\checkmark(1)$

(b) Increases the centripetal force acting on the bus. $\checkmark(1)$

(c) (i) - Weight $\checkmark(1)$
 - Tension $\checkmark(1)$

(ii) (I) $f = 2 \text{ revolutions / sec}$

$$T = \frac{2\pi}{\omega} = \frac{1}{f} \quad \checkmark(1)$$

$$f = \frac{\omega}{2\pi} = 2 \quad \checkmark(1)$$

$$\omega = 2 \times 2\pi$$

$$= 4\pi \text{ rad S}^{-1} = 12.56$$

$$\simeq 13 \text{ rad S}^{-1} \quad \checkmark(1)$$

(II) $T + mg = m\omega^2 \quad \checkmark(1)$

$$T = m\omega^2 - mg$$

$$= 0.2 \times 0.4 (16\pi^2) - 0.2 \times 10 \quad \checkmark(1)$$

$$= 10.63$$

$$= 10.6\text{N} \quad \checkmark(1)$$

19. (a) (i) (I) Volume of water displaced = 2×5 $\checkmark(1)$

= 10 cm^3 $\checkmark(1)$

(II) Mass = Volume \times density $\checkmark(1)$

= 10×1

= 0.01 kg $\checkmark(1)$

\therefore weight = 0.01×10 $\checkmark(1)$

= 0.1 N $\checkmark(1)$

(ii) Combined weight = upthrust

= 0.1 N $\checkmark(1)$

(iii) Weight of liquid displaced = 0.1 N

Mass of liquid displaced = 0.01 kg = 10 g $\checkmark(1)$

Volume of liquid displaced = $\frac{\text{mass}}{\text{density}}$ = $\frac{10}{0.8}$

= 12.5 cm^3 $\checkmark(1)$

\therefore Length submerged = $2 l$ = 12.5

(C.S $A \times l$ = volume)

$0.8 l = 10$ $\checkmark(1)$

$l = \frac{10}{0.8}$

= 6.25 cm $\checkmark(1)$

(b) Use a narrower test tube. $\checkmark(1)$