4.5 PHYSICS (232)

4.5.1 Physics Paper 1 (232/1)

SECTION A

1.

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

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

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

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

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 $\surd(1)$

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

5.

$\frac{F}{A} = p$ $\surd(1)$

F = 5 × 24 $\surd(1)$

F = 120 N

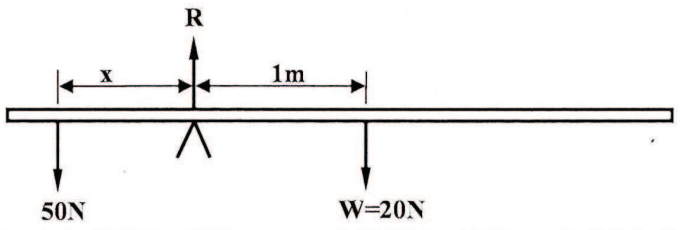
6. Volume of drop = Volume of patch $\surd(1)$

Ad = V $\surd(1)$

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

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

8.



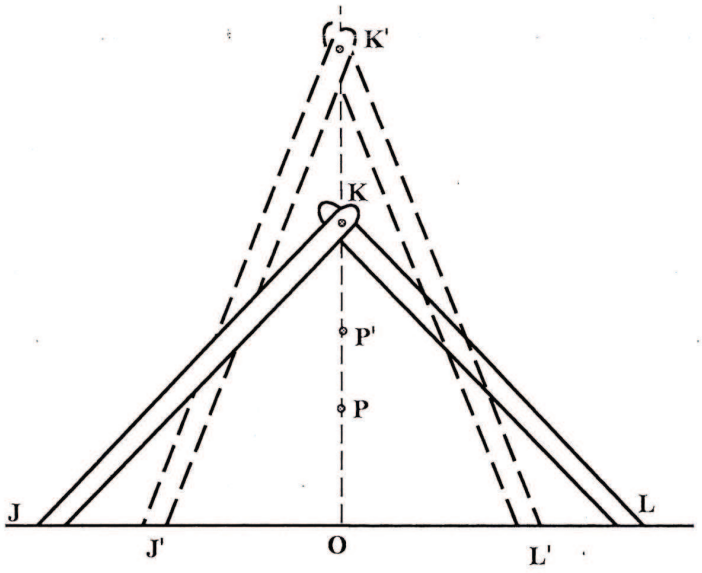
✓ (1)

50 x = 20 × 1 √(1)

x = $\frac{20}{50}$

= 0.4 m √(1)

9.



-raised K to K' ✓ (1)

-P also raised to P' ✓ (1)

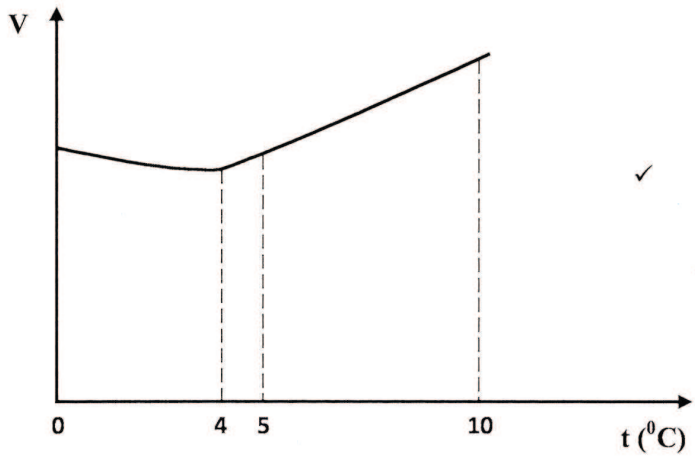
10. Extension = 4 mm + 4 mm √(1)

= 8 mm √(1)

11. $A_1V_1 = A_2V_2$ √(1)

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

12.



✓ (1)

13. (a) BC - Solid changes to liquid √(1)

(b) DE - Liquid changes to vapour √(1)

14. - Collisions / bombardment of particles with air molecules which are in random motion. √(1)

SECTION B

15. (a) (i) Displacement = Area under graph

= 20 × 8 m

= 160 m

(3 marks)

(ii) After point B,

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

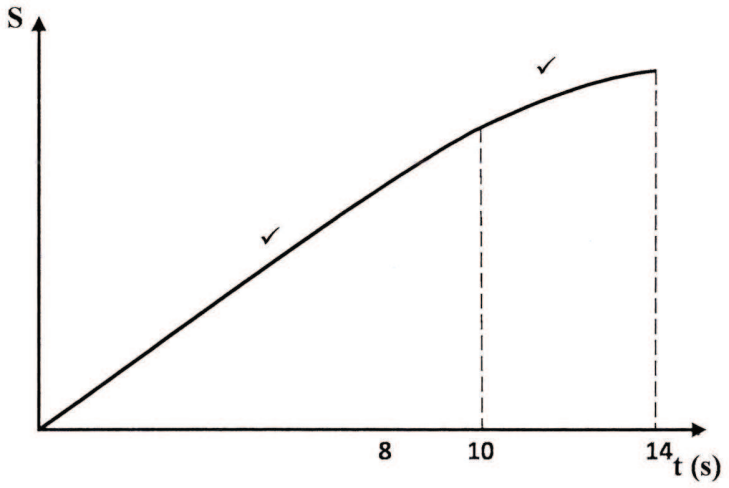
$= -5 \text{ ms}^{-2}$

(iii) F = ma = 2 × -5 N

= -10 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 = $\frac{load}{Effort} = \frac{20}{4}$ √(1) √(1)

= 5 √(1)

(ii) V. R = $\frac{Effort\ distance}{Load\ distance}$; √(1)

= $\frac{40}{5}$; √(1)

= 8 ;

(iii) Efficiency = $\frac{M.A}{V.R}$ x 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) √(1) √(1)

(c) (i) Heat lost = Heat gained

$mLv + M\Delta\theta C_{steam} = M\Delta\theta C_{water}$ √(1)

$0.01\,Lv + 0.01 \times 30 \times 4200 = 0.1 \times 4200 \times 50$ √(1)

$0.01\,Lv = 21000 - 1260$ √(1)

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

$= 1.974 \times 10^6\ J\,Kg^{-1}K^{-1}$ √(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. √(1)

(b) Increases the centripetal force acting on the bus. √(1)

(c) (i) - Weight √(1)
- Tension √(1)

(ii) (I) f = 2 revolutions / sec

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

$f = \frac{\omega}{2\pi} = 2$ √(1)

$\omega = 2 \times 2\pi$

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

$\simeq 13\ rad\ S^{-1}$ √(1)

(II) $T + mg = mr\omega^2$ √(1)

$T = mr\omega^2 - mg$

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

$= 10.63$

$= 10.6N$ √(1)

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

= $10\ cm^3$ √(1)

(II) Mass = Volume × density √(1)

= 10×1

= 0.01 kg √(1)

∴weight = 0.01×10 √(1)

= 0.1 N √(1)

(ii) Combined weight = upthrust

= 0.1 N √(1)

(iii) Weight of liquid displaced = 0.1N

Mass of liquid displaced = 0.01 kg = 10 g √(1)

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

= $12.5\ cm^3$ √(1)

∴ Length submerged = $2l$ = 12.5

(C.S A × l = volume)

$0.8l = 10$ √(1)

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

= 6.25 cm √(1)

(b) Use a narrower test tube. √(1)