Atika School

232/1 - PHYSICS PAPER 1 - MARKING SCHEME

NB: All numerical answers must have units. Award ½ mark if no units and award zero if wrong units are written.

1. 3.30cm✓1mk

2. The pressure of oil in the containers could rise to cause an explosion. ✓1

3. - Mercury can easily be seen because its opaque and silvery. Alcohol is colourless. ✓
   - Mercury can be used to measure high temperature because it has a much higher melting point than alcohol. ✓ (accept any other two answers) (2mks)

4. K.E = Work done against friction. ✓
   $\frac{1}{2} \times 5 \times 10^2 = 2.5 \times S$✓
   S = 100m✓

5. Pressure of gas supply = Atmospheric Pressure + Pressure due to the colour of water.
   = 10,000 + 1000 x 0.5 x 10✓
   = 15,000pa✓ (2mks)

6. Hot air is less dense than cold air and therefore rises. ✓

7. 30 x 0.30 = 0.2W✓
   W = 45N✓

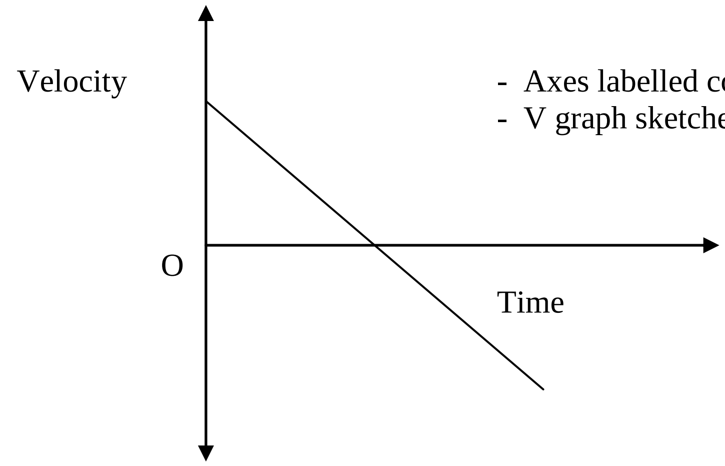
8. - The oil patch is circular.
   - The patch is one molecule thick. (accept any other two ✓answers)

9. Maximum tension = $mg + mw^2r$
   $= (8 \times 10) + 8 \times (2\pi \times 2.5)^2 \times 0.8$ } ✓ 1mk for formula or substitution
   = 277.6N ✓ (2mks)

10. To overcome inertia so that the passengers are safer should the state of motion of the bus be changed. ✓

11. Elastic potential energy = ½ Fe✓
    = ½ x 0.4 x 0.95✓ (3mks)
    = 0.01J✓

12.



- Axes labelled correct graph✓
- V graph sketched✓ (2mks)

13. $3.8 + T = 4$✓
$T = 0.2N$✓ (2mks)

14. The volume of the air bubble increases since its pressure decreases. ✓

SECTION B

15. (a) (i) Horizontal velocity x t = Horizontal range ✓

$$v \times (0.04 \times 7) = 0.48m ✓$$
$$v = \frac{0.48}{0.04 \times 7} \quad \text{(3mks)}$$
$$= \frac{0.48}{0.28}$$
$$= 1.714 m/s ✓$$

(ii) $S = ut + \frac{1}{2} gt^2$✓

$u = 0$

$S = {}^1/_2 gt^2$

$S = 0.42m$, $t = 0.04 \times 7$✓

$= 0.28$ seconds (3mks)

$0.42 = \frac{1}{2} \times g \times (0.28)^2$

$$g = \frac{0.42 \times 2}{0.28^2}$$
$$= 10.714 m/s^2 ✓$$

(b) (i) it moves with uniform velocity in a straight line (1mk)

(ii) K.E = Work done

$\frac{1}{2} MV^2 = Fd$✓

$\frac{1}{2} \times 2400 \times 50 = 60F$✓

$F = 50000N$✓

Therefore Retarding force = 50,000N

(c) Resultant force between N and F causes motion. ✓

N is greater than F hence overcomes frictional✓ force so trailer moves forward.

N doe not act on the trailer.

16. (a) Role of the compressor.

(i) It compresses the volatile vapour so that it changes back to liquid metal fins. (1mk)

(ii) The metal fins conducts heat given out to the surrounding air. (1mk)

(iii) The volatile liquid takes latent heat from the air around and evaporates causing cooling in the cabinet. (1mk)

(b) Volatile liquid – Readily evaporates causing cooling (accept any other answer).

(c) (i) Amount of heat to change from 5^0C to 0^0.

= $MC\Delta\theta$

= 2 x 2100 x 5

Q = $MC\Delta\theta + Ml_f$✓

Heat required = 2 x 2100 x 5 + 2 x 334000✓

= 21000 + 668000

= 689000J✓ (3mks)

(ii) Heat required to raise temperature of water to $100^0C = MC\Delta\theta$

Latent heat = Ml_V

Total heat required = $MC\Delta\theta + ML_V$✓

= 2 x 4200 x 100 + 2 x 2260000 ✓

= 840000 + 4520000

= 5360000J✓ (3mks)

(iii) Pt = 69000 + 5360000✓

$$t = \frac{6049000}{6000} \checkmark$$

= 11008.17

= 16.80min ✓

(iv) The time is minimum because of heat lost to the surrounding. ✓

17. (a) (i) A floating body displaces its own weight of the fluid in which it floats. ✓

(ii) A ship is hollow and has large airspaces which makes it to displace large volume of water while block of steel displaces less volume of water. ✓

Since upthrust is equal to the weight of water displaced, ship experiences a greater upward force hence floats. ✓

(b) (i) Purpose of the nail is to make hydrometer weighty or lower part hence stand upright. ✓

(ii) Sensitivity can be increased by making the stem more thinner. ✓

(iii) Float the hydrometer on water and on a liquid of known density in turns. ✓
Mark the levels and divide the interval proportionally. ✓

(c) (i) $$\text{Gradient} = \frac{4 \times 10^5 - 0}{5 \times 10^8 - 0} \checkmark$$

$= 8.0 \times 10^{-4}$

2RT = Gradient ✓

2 x R x 200 = 8.0×10^{-4}

R = $2.0 \times 10^{-6}\ Pam^3k^{-1}$ ✓ (3mks)

(ii) A straight line through the origin with a higher gradient. ✓

18. (a) (i) Valve Q opens due to high atmospheric pressure✓ on the water while valve P closes due to its weight and that of the water above it. ✓

(ii) Valve Q closes due to its weight and✓ pressure of water above the piston while valve P opens due to the✓ pressure of water below it.

(iii) Can raise water to height greater than 10m. ✓
Unlike the lift pump, the flow of water out of spout is continuous. ✓

(b) (i) Work done $= 108 \times 3.2$✓

$= 345.6J$✓

(ii) M.A. $= \frac{L}{E}$

$= \frac{108}{60}$✓

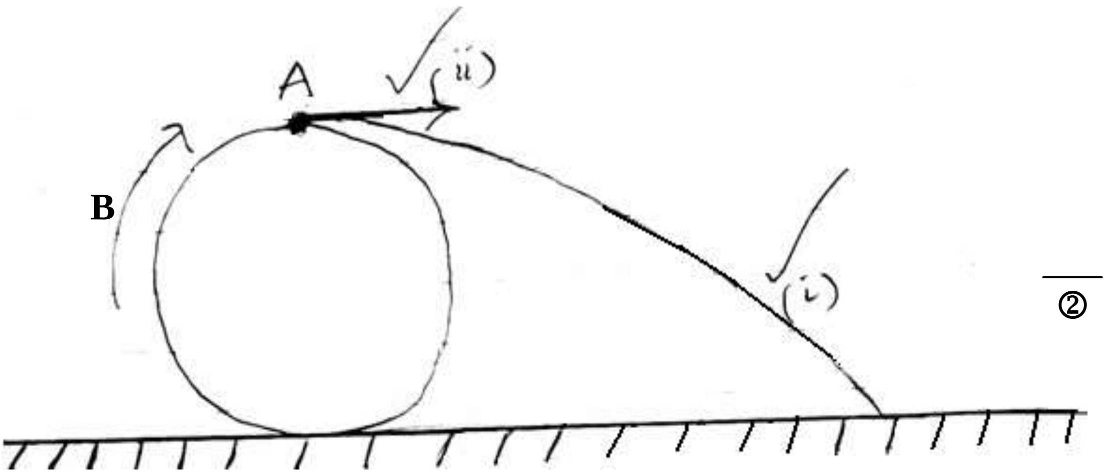
$= 1.8$✓

(iii) Due to:

(i) Friction between the moving parts of the machine or✓

(ii) Weight of the moving parts of the machine. ✓ (award 1mk for either)

19. (a) (i)



②

(iii) $V = wr$ ✓

$= 2\pi fr$

$= 2 \times \frac{22}{7} \times 7 \times 20 \times 10^{-2}$ ✓

$= 8.8ms^{-1}$✓ (3mks)

(b) The centripetal force acting in the vertical position is greater than the weight of water.

$\frac{MV^2}{r} > mg$. ✓

$mg + R = \frac{MV^2}{R}$. ✓ (3mks)