PHYSICS PAPER 232/1 2007
MARKING SCHEME

1. $0.562 - 0.012 = 0.550$ cm or $5.62 - 0.12 = 5.50$ mm   *(1 mark)*

2. Density $= \dfrac{\text{Mass}}{\text{Volume}}$

   $= \dfrac{1.75\text{g}}{(0.550)^3 \text{cm}^3}$

   $= 10.5 \text{g cm}^3$ *(3 marks)*

3. V_2, V_4, V_3, V_1 *(1 mark)*

4. Sucking air reduces pressure inside the tube; so that atmospheric pressure forces the liquid up the tube. NB. Not increased atmospheric pressure.   *(1 mark)*

5. $P_A g h_A = P_B g h_b$
   $P_A g \times 24 = 1200\text{g} \times 6$
   $P_a = 800 \text{Kgm}^3$ *(3 marks)*

6. Radiation   *(1 mark)*

7. X_2 is made larger than X_1; or X_1 is made shorter/smaller than X_2. Since B receives radiation at a higher rate, it must be moved further from source for rates to b equal   *(2 marks)*

8. Taking moments and equating, principle of moments
   $0.6\text{N} \times 70\text{cm} = mg \text{ N} \times 30\text{cm}$;
   $W = mg = 1.4\text{N}$ *(3 marks)*

9. Distance = area under curve between 0 and 3.0 seconds:
   $= 120 \times 3 \times 0.2 = 72\text{m}$ *(2 marks)*

10. Acceleration = slope of graph at $t = 4.0$s;

    $= \dfrac{16 \times 3}{17 \times 0.2}$

    $= 1.4.11 \text{ m/s}^2$ *(2 marks)*

11. Pressure, impurities.   *(2 marks)*

12. Kelvin (K).   *(2 marks)*

13. The pressure of a fixed mass of a gas is directly proportional to its absolute (Kelvin) temperature provided the volume is kept constant.   *(1 mark)*

14. Since the quantity of water in A is smaller, heat produces **greater change of Temperature in A.** This causes greater expansion per unit volume causing the cork to sink further; /greater decrease in density/lower density in A   *(2 marks)*

15. (a) ■ **Smoke particles:** to show the movement/behaviour of air molecules. Smoke particles are larger, therefore visible enough and light enough to move when bombarded by air molecules   *(2 marks)*

    ■ **Lens:** concentrates/converts/focuses the light from the lamp on the smoke particle causing them to be observable.   *(2 marks)*

    ■ **Microscope:** magnifies/enlarges the smoke particles so that they are visible   *(2 marks)*

    (b) ■ Smoke particles move randomly
       ■ Air molecules bombard the smoke particles
       ■ Air molecules are in continuous random motion/haphazard zigzag/drunken motion   *(3 marks)*

    (c) The speed of motion of smoke particles will be observed to be higher/move faster/speed increases random motion increases/motion increases   *(1 mark)*

16. (a) A body at rest or in motion at uniform velocity tends to stay in that state unless acted on by an unbalanced force.   *(1 mark)*

    (b) (i) Slope $s = \dfrac{\Delta U^2}{\Delta d}$

       $s = \dfrac{98.75 - 0}{16 - 0}$

       $= 6.172$ *(3 marks)*

    (ii) $20k = s = 6.172$

       $k = \dfrac{6.172}{20}$

       $= 0.3085$ *(2 marks)*

    (iii) ■ Increase in roughness increase k and vice versa
         ■ Decrease in roughness decreases k   *(1 mark)*

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(c) Applying equation

$$v^2 - u^2 = 2as$$
$$v^2 - 0 = 2 \times 1.2 \times 400$$
$$v = \sqrt{2 \times 1.2 \times 400}$$

Momentum $p = mv$

$$= 800 \times \sqrt{2 \times 1.2 \times 400}$$
$$= 24800 Kgms^{-1}$$
$$= 24800 Kgms^{-1}$$

(4 marks)

17. (a) Quantity of heat required to change completely into vapour 1 kg of a substance at its normal boiling point without change of temperature / Quantity of heat needed to change unit mass of substance from liquid to vapour without change in temperature/ constant temperature. *(1 mark)*

(b) (i) So that it vaposises readily /evaporates easily *(1 mark)*

(ii) In the freezing compartment the pressure in the volatile liquid is lowered suddenly by increasing the diameter of the tube causing vaporization. In the cooling fins, the pressure is increased by the compressed pump and heat lost to the outside causing condensation *(2 marks)*

(iii) When the volatile liquid evaporates, it takes away heat of vaporization from the freezing compartment reducing the temperature of the later. This heat is carried away and distributed at the cooling fins where the vapour is compressed to condensation giving up heat of vaporization *(2 marks)*

(iv) Reduces rate of heat transfer to or from outside (insulates) *(1 mark)*

(c) (i) Heat lost by steam $= 0.003 \times 2.26 \times 10^6$

Heat lost by steam water $= 0.003 \times 4200 (100 - tT)$

Total $= 6780 + 12.6 (100 - T)$ *(3 marks)*

(ii) Heat gained by water $= MC\theta$;

$$= 0.4 \times 4200 (T - 10)$$ *(2 marks)*

(iii) Heat lost = heat gained

$$1680 (T - 10) = 6780 + 12.6 (100 - T);$$
$$1680T - 16800 = 6780 + 1260 - 12.6T$$
$$1692.6T = 24840$$
$$T = 14.7°C$$ *(2 marks)*

18. (a) Acceleration directed towards the centre of the orbit. *(1 mark)*

    (b) (i) ■ Roughness/smoothness of surface
        ■ Radius of path
        ■ Angular velocity /speed /linear velocity *(2 marks)*

    (ii) $\omega_A > \omega_B > \omega_C$ *(1 mark)*

    (c) $F = m\omega^2 r$
    For the thread to cut
    $F = 5.6$ N
    $5.6 = 0.20 \times \omega^2 \times 0.15$
    $\omega = 13.7$ radian per second *(4 marks)*

19. (a) A floating body displaces its own weight of the fluid on which it floats *(1 mark)*

    (b) (i) To enable the hydrometer float upright *(1 mark)*
        (ii) Making the stem thinner *(1 mark)*
        (iii) Float hydrometer on water and on liquid of known density in turn and mark
        Levels. Divide proportionally and extend on either side *(2 marks)*

    (c) (i) Tension, upthrust, weight *(3 marks)*

    (ii) As water is added, upthrust and tension increases; maximum when cork is covered
    and staying constant then after; weight remains unchanged as water is added

    (3 marks)

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