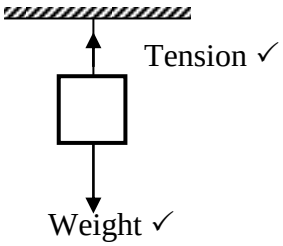
SCHOOL BASED FORM 4 EXAM JULY-AUGUST 2017

PHYSICS

PAPER 1

MARKING SCHEME

SECTION A

1. Time = 2 x 60 + 26 + 0.78 ✓
   = 146.78.75s ✓
2. $s = ut + ½t^2$
   $250 = 0 + ½x10xt^2$
   $t = \sqrt{50}$✓
   d = v x t✓
   = 450 x $\sqrt{50}$✓
   = 3181.98m✓
3. Lowering the temperature ✓
4. The height, h reduces✓
   Pressure reduces✓
5. Momentum before collision = Momentum after collision
   $M_1u_1 + m_2u_2 = M_2v_2 + m_2v_2$
   3 x 4 + 0 = 1.5 x 3.2 + $3v_2$
   $v_2 = \frac{12-4.8}{3} = \frac{7.2}{3}$
   v_2 = 2.4 m/s ✓
6. Impulse = Ft = mv – mu
   960 x 0.1 = 0.6v – 0 ✓
   $v = \frac{96}{0.6}$ = 160m/s ✓
7. R.d = $\frac{Weight\ in\ air}{Upthrust\ in\ water}$ ✓
   $2.4 = \frac{200}{Upthrust}$
   Upthrust = $\frac{200}{2.4}$
   = 83.33N✓
8. 
   Tension ✓
   Weight ✓
9. $W = \frac{\Delta\theta}{\Delta t}$
   $W = 2\pi f$
   $W = \frac{2\pi\ x\ 90}{60}$ ✓
   $= 3\pi\ rad/s$
   = 9.426 rad/s ✓
10. $n = \frac{M.A}{V.R}$ x 100
    $75 = \frac{M.a}{4}\ x\ 100$
    $M.A = \frac{75\ x\ 4}{100}$
    M.A = 3 ✓
11. Pt = mcΔθ
    50 x t = 0.2 x 4200 x (100 – 20) ✓
    $t = \frac{0.2\ x\ 4200\ x\ 80}{50}$
    t = 1344s✓
12. $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
    $\frac{4}{20+273} = \frac{V_2}{273+90}$ ✓
    $V_2 = \frac{4\ x\ 363}{293}$
    V_2 = 4.955 L ✓
13. The friction is reduced ✓

SECTION (55 mks)

14. (a) Cross-section area of the conductor✓
    Conductivity increases with increase in area of cross-section. ✓
    (b) (i) E – Ammeter ✓
    F – Voltimeter ✓
    (ii) Stopwatch ✓
    (c) VIt = mcθ ✓
    24 x 2 x 300 = 1.02 x c x (41-25)
    $c = \frac{24\ x\ 2\ x\ 300}{1.02\ x\ 16}$ ✓
    c = 882.35 $Jkg^{-1}k^{-1}$✓
    (d) Heat lost by hot water = heat gained by cold water ✓
    $m_hc\Delta\theta_h = m_cc\Delta\theta_c$ ✓
    mc (T – 20) = 3mc (20 – 10)
    T – 20 = 3 x 10 ✓
    T = 30 + 20 = 50^0C
15. (a) Place the meat and 0.5kg mass together and 1.5kg mass on the other side.
    (b) m_w = 80 x 1 = 80g
    M_x = 0.8 x 120 = 96g
    Total mass = 176g
    $\rho_{mix} = \frac{Total\ mass}{Total\ volume}$ ✓
    $= \frac{176}{200}$ = 0.88g/cm^3 ✓
    (c) (i) Mercury is much denser than water. Therefore the column supported by the atmospheric pressure is much shorter ✓

(ii) p = ρhg
= 1030 x 60 x 10 ✓
= 6.18 x 10^5 N/m^2 ✓

(d) (i) The layer is one molecule thick✓

(ii) size = $\frac{Volume\ of\ a\ drop}{Area\ of\ patch}$

Size = $\frac{2x\ 10^{-3}}{40}$
= 0.5 x 10^{-4} ✓
= 5.0 x 10^{-5}cm ✓

16. (a) A floating object displaces it own weight of the fluid in which it floats. ✓

(b) (i) w = weight of liquid displaced
w = ρvg ✓
= 1100 x 3 x 10^{-4} x 9 x 10^{-2} x 10 ✓
= 297 x 10^{-3}
= 0.297N✓

(ii) w = ρvg
w = ρAhg
0.297 = 800 x 3 x 10^{-4} x h x 10 ✓
h = $\frac{0.297}{800\ x\ 3\ x\ 10^{-4}\ x\ 10}$
h = 0.12375m
= 12.375cm

(c) (i) w = ρvg ✓
w = 0.7 x 1600 x 10 ✓
= 11200N

(ii) 11200 x 400 x 10
= 15200N✓

(iii) w = ρvg
= 1.3 x 1600 x 10 ✓
= 20800N✓

(iv) Tension = 20800 – 15200
= 5600N ✓

17. (a) Standard temperature and pressure taken as 0^0C and 76cmHg (one atmosphere) ✓

(b) $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ ✓
$\frac{300\ x\ 2}{273+\ 30} = \frac{2.3\ x\ 250}{T_2}$ ✓
T_2 = 17.375^{0}C

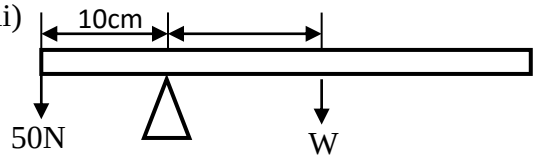
(c) (i) The rate of change of angular displacement with time ✓

(I) w = $2\pi f$
= $2\pi\ x\ 4$ ✓
= $8\pi\ rad/s$✓ or 25.14 rad/s

(II) V = wr
V = $8\pi\ x\ 1.5$✓
= 37.704 m/s ✓

18. (a) (i) Sum of clockwise moments is equal to sum of anticlockwise moments. ✓
- The forces acting on the system in all direction are equal. ✓

(ii)



Clockwise moment = Anticlockwise moment
15 x w = 50 x 10 ✓
w = $\frac{50\ x\ 10}{15}$ = 33.33N ✓

(b) (i) ρ= $\frac{mgh}{t}$ ✓
ρ = $\frac{60\ x\ 10\ x\ 50\ x\ 0.30}{150}$✓
= 60W✓

(ii) 14 – F = ma
14 – F = 2 x 6 ✓
F = 14 – 12 = 2N ✓

(c) V.R = $\frac{R}{r}$✓ = $\frac{12}{4}$ = 3✓