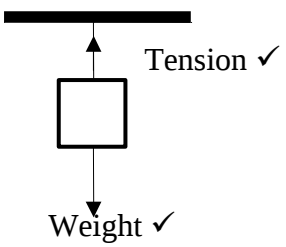
SCHOOL BASED FORM 4 EXAM JULY-AUGUST 2017

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✓
   $= 450 \times \sqrt{50}$✓
   = 3181.98m✓
3. Lowering the temperature ✓
4. The height, h reduces✓
   Pressure reduces✓
5. Momentum before collision = Momentum after collision
   $M_1u_1 + m_2u_2 = M_2v_2 + m_2v_2$
   $3 \times 4 + 0 = 1.5 \times 3.2 + 3v_2$
   $v_2 = \frac{12-4.8}{3} = \frac{7.2}{3}$
   $v_2 = 2.4$ m/s ✓
6. Impulse = Ft = mv – mu
   960 x 0.1 = 0.6v – 0 ✓
   $v = \frac{96}{0.6} = 160$m/s ✓
7. $R.d = \frac{Weight \in air}{Upthrust \in water}$✓
   $2.4 = \frac{200}{Upthrust}$
   $Upthrust = \frac{200}{2.4}$
   = 83.33N✓
8. 

9. $W = \frac{❑}{t}$
   $W = 2\pi f$
   $W = \frac{2\pi x 90}{60}$ ✓
   $= 3\pi\ rad/s$
   = 9.426 rad/s ✓
10. $n = \frac{M.A}{V.R} \times 100$
    $75 = \frac{M.a}{4} x\ 100$
    $M.A = \frac{75x4}{100}$
    M.A = 3 ✓
11. $Pt = mc\Delta\theta$
    50 x t = 0.2 x 4200 x (100 – 20) ✓
    $t = \frac{0.2x4200x80}{50}$
    t = 1344s✓
12. $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
    $\frac{4}{20+273} = \frac{V_2}{273+90}$ ✓
    $V_2 = \frac{4x363}{293}$
    $V_2 = 4.955$ 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) $VIt = mc\theta$ ✓
    24 x 2 x 300 = 1.02 x c x (41-25)
    $c = \frac{24x2x300}{1.02x16}$ ✓
    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) $m_w = 80 \times 1 = 80g$

$M_x = 0.8 \times 120 = 96g$

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) $p = \rho hg$

$= 1030 \times 60 \times 10$ ✓

$= 6.18 \times 10^5\ N/m^2$ ✓

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

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

Size = $\frac{2x10^{-3}}{40}$

$= 0.5 \times 10^{-4}$ ✓

$= 5.0 \times 10^{-5}cm$ ✓

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

(b) (i) w = weight of liquid displaced

$w = \rho vg$ ✓

$= 1100 \times 3 \times 10^{-4} \times 9 \times 10^{-2} \times 10$ ✓

$= 297 \times 10^{-3}$

$= 0.297N$✓

(ii) $w = \rho vg$

$w = \rho Ahg$

$0.297 = 800 \times 3 \times 10^{-4} \times h \times 10$ ✓

$h = \frac{0.297}{800x3x10^{-4}x10}$

$h = 0.12375m$

$= 12.375cm$

(c) (i) $w = \rho vg$ ✓

$w = 0.7 \times 1600 \times 10$ ✓

$= 11200N$

(ii) $11200 \times 400 \times 10$

$= 15200N$✓

(iii) $w = \rho vg$

$= 1.3 \times 1600 \times 10$ ✓

$= 20800N$✓

(iv) Tension = 20800 – 15200

$= 5600N$ ✓

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

(b) $\frac{P_{1V_1}}{T_1} = \frac{P_{2V_2}}{T_2}$ ✓

$\frac{300x2}{273+30} = \frac{2.3x250}{T_2}$ ✓

$T_2 = 17.375^0C$

(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

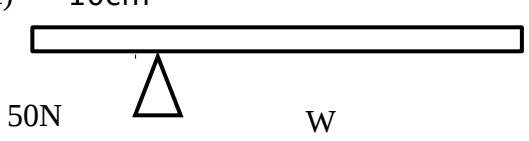
$V = 8\pi x 1.5$✓

= 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

$15 \times w = 50 \times 10$ ✓

$w = \frac{50x10}{15} = 33.33N$ ✓

(b) (i) $\rho = \frac{mgh}{t}$ ✓

$\rho = \frac{60x10x50x0.30}{150}$✓

$= 60W$✓

(ii) $14 - F = ma$

$14 - F = 2 \times 6$ ✓

$F = 14 - 12 = 2N$ ✓

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