PHYSICS PAPER 232/1 2008

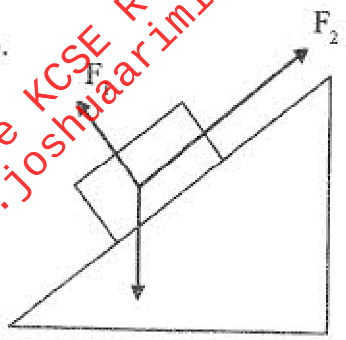
MARKING SCHEME

1. 5×10^{-6}kg (if working shown it must be correct)

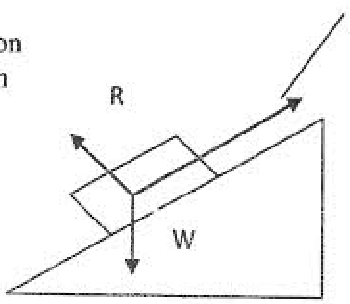
2. For water $V = \frac{M_w}{1}$ or $W = \frac{M_L}{P}$ $RD = \frac{M_L}{M_L} = P$

For liquid $V = \frac{M_L}{P}$ $P = \frac{M_L}{M_W}$ $P = \frac{M_L}{M_W}$

3. a).



F_1 - Reaction
F_2 - Friction



R - reaction force
Hr to surface
F - Friction force
Parallel to surface

b). R – increases Or R – approaches W
f - reduces F - Reduces

4. Atmospheric pressure is higher than normal/ standard or boiling was below Pressure of impunities

5. When flask is cooled it contracts /its volume reduces but due to poor conductivity of the glass/ materials of the flask water falls as its contraction is greater than that of glass
(3 marks independent unless there is contradiction)

6. Heat conductivity / rates of conduction/ thermal conductivity
(NB: if heat conduction no mark)

7. X sectional area/ diameter/ thickness / radius

8. P_1 = pgh
$= 1200 \times 10 \times 15 \times 10^{-2}$
$= 1800$pa
$= 8.58 \times 10^4$pa
(85800pa)

or Pr = PA + heg
$= 8 \times 10^{-4} + 15 \times 1200 \times 10^{-2} \times 10$
$= 8.58 \times 10^4$ pa

9. Intermolecular distances are longer/bigger/larger/ in gas than in liquids
Forces of attraction in liquids are stronger/ higher/ greater/bigger/ than in gases

10. (In the diagram)

11. Stable equilibrium
When it is tilted slightly Q rises/ c.o.g is raised when released it turns to its original position

12. This reduces air pressure inside the tube, pressure from outside is greater than inside/ hence pressure difference between inside a outside causes it to collape

13. Diameter coils different/ wires have different thickness/ no of turns per unit length different / length of spring different.
(X – larger diameter than Y)
Or in one coils are closer than in the other

14. Heated water has lower density, hence lower up thrust

15. a). Rate of change of momentum of a body is proportional to the applied force and takes in the direction of force

b). i). $S = ut + \frac{1}{2}at^2$
$49 = 0 + \frac{1}{2} \times a \times 7^2$
$a = 2M/S^2$

ii). $V = u + at$
$= 0 + 2 \times 7 = 14m/s$

or $V^2 = u^2 + 2as$
$V^2 = 02 + 2 + 2 \times 2 \times 49$
$V^2 = 14m/s$

c). i). $S = ut + \frac{1}{2}gt^2$
$1.2 = 0 + \frac{1}{2} \times 10 \times t^2$
$t = \sqrt{\frac{1.2}{5}}$
$= 0.49s$

either $V^2 = u^2 + 2gs$
$V = u + gt$
$V^2 = o^2 + 2 \times 10 \times 1.2$
$V = \sqrt{24} = 4.899$
$4.899 = 0 + 10t$
$T = 0.4899s$

ii). $s = ut$
$u = \frac{8}{t} = \frac{2.5}{0.49} = 5.102/5.103\ m/s$

16. a). Heat energy required to raise the temperature of a body by 1 degree Celsius/ centigrade or Kelvin

b). measurements
initial mass of water and calorimeter M_1
final mass of water & calorimeter, M_2
Time taken to evaporate($M_1 - M_2$), t
Heat given out by heater = heat of Evaporation = M_L

or (if this method is used)
initial mass of water + calorimeter + m_1
Initial mass of water + calorimeter + M_2
Time taken to heat = t
Heat given = heat gained by water, out by heat + heat gained by calo + eat of evaporation

c). i). =CDT
= 40 × (34 – 25) = 40 × 9 = 360J

ii). MWCWDT
100 × 10^{-2} × 4.2 × 10^3 (34 – 25) = 3780J

iii). MmCMDT
=150 × 103 × cm × 66
= 9.9CmJ

or

Sum of (i) and (ii)
360 + 3780
= 4140J

iv). 150 × 10^{-3} × cm × 66 = 4140 heat lost = heat gained + heat gained by water
9.9cm = 360 + 3780

$$cm = \frac{4140}{150 \times 10^{-3} \times 60}$$

= 418J/Kgk

$$cm = \frac{4140}{0.15 \times 60}$$

= 418J/Kgk

17. a). lowest temperature theoretically possible or temperature at which / volume of a gas/ pressure of gas/ K.E (Velocity) of a gas is assumed to be zero

b). Mass / mass of a gas
pressure / pressure of a gas/ pressure of surrounding

c). i). 4 × $10^{-5}m^3$ / 40 × $10^{-6}m^3$ / $40cm^3$

ii). -275°C – 280°C

iii). a real gas liquefies /solidifies

d). $\frac{P_1 V_1}{T_1} = \frac{P_2 P_2}{T_2}$ but $V_1 = V_2$

$P_2 = \frac{P_1 T_2}{T_1} = 9.5 \times 104 \times \frac{283}{298}$

$= 9.02 \times 10^4$ pa

= (90200pa)

(90.2 × 10^3 pa)

If $\frac{P}{T_1} = \frac{P_2}{T_2}$ is used max marks 3

$P_2 = \frac{P_1 P_2}{T_1}$

$= 9.5 \times 104 \times \frac{283}{298}$

= (90200 pa)

(90.2 × 10^3pa)

18. a). $VR = \frac{\text{Effort distance}}{\text{Local distance}}$

b). i). Pressure in liquid is transmitted equally through out the liquid if term fluid is used term in compressive must be staled

ii). P × A × d = P × a × d a × d = A × D

A × D = a × d

$\frac{d}{D} = \frac{A}{a}$

$VR = \frac{A}{a}$

$\frac{d}{D} = \frac{A}{a}$

$VR = \frac{A}{a}$

c). i). $MA = \frac{\text{Load}}{\text{Effort}}$

$= \frac{4.5 \times 10^3}{135}$

$= 33.3 \left(33\tfrac{1}{3}\right)$

ii). $\text{Efficiency} = \frac{MA}{VR} \times 100\%$

$= \frac{33.3}{45} \times 100\%$

$= 74\%$

$\text{Efficiency} = \frac{MA}{VR} = 33.3$

$= 0.74$

iii). % work wasted = 100% – 74%

= 26%

19. a). When an object is in equilibrium, sum of anticlockwise moments about any point is equal to the sum of clockwise moments about that point

b). i). $V = 100 \times 3 \times 0.6 = 180cm^3$

$M = VP$

$180 \times 2.7 = 486g$

$W = Mg$

$= \frac{486}{1000} \times 10$

$= 4.86N$

$W = Mg$

$= Pvg$

$= \frac{2.7 \times 3 \times 0.6 \times 100 \times 10}{1000}$

$= 4.86N$

ii). Taking moments pivot ; $20F = 15 \times 4.86$

$$F = \frac{15 \times 4.86}{20} = 3.645$$

F = taking moments about W; $15R = 35F$ - (i)

$F + W = F = R - 4.86$ – (ii)

Taking moments about $F = 20R = 4.86 \times 35$

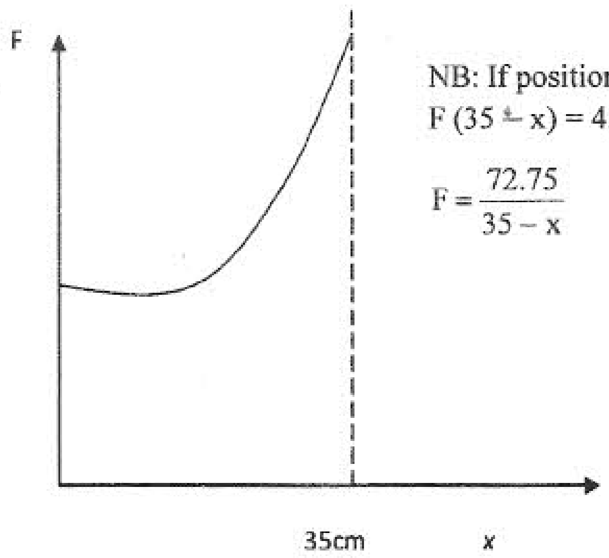
$R = 8.51$ and $F = R \quad W$

$R = F = 8.51 - 4.86 = 3.645N$

$R = F + W = 3.65 + 4.86$

$= 8.51N$

iii.



NB: If position of W is constant

$F(35 - x) = 4.86 \times 15$

$$F = \frac{72.75}{35 - x}$$

iv). As *x* increase / anticlockwise moments reduces/ moments to the left reduces/ distance between F and pivot reduces

F has to increase to maintain equilibrium.