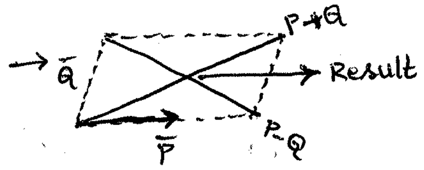
51) → $K.E = \frac{1}{2}mv^2$ → Dimensions $[M^1 L^2 T^{-2}]$ [2]

54) → 1 mole gas volume $V = 22.4$ litre [1]

$1m^3 = 1000$ litre → $V = \frac{22.4}{1000}\ m^3$

$V = 2.24 \times 10^{-2}\ m^3$

56) →




The result is parallel to $\bar{P}$ ⟹ Angle $0°$ [4]

57) → $|\bar{A} \cdot \bar{B}| = 6$ → $AB\cos\theta = 6$ [3]

$|\bar{A} \times \bar{B}| = 6\sqrt{3}$ → $AB\sin\theta = 6\sqrt{3}$

$\Rightarrow \frac{\sin\theta}{\cos\theta} = \tan\theta = \frac{\cancel{6}\sqrt{3}}{\cancel{6}} \to \theta = \tan^{-1}(\sqrt{3}) = 60°$

58) → $P = Q = F$ [3]

$\theta = 120°$

Result $R = \sqrt{P^2 + Q^2 + 2PQ\cos\theta}$

$= \sqrt{F^2 + F^2 + 2FF\cos 120°}$

$= \sqrt{F^2 + F^2 + 2F^2\left(-\frac{1}{2}\right)}$

$R = \sqrt{2F^2 - F^2} = \sqrt{F^2} = F$

60) → $\theta = 45°$ [4]

$R = \_\ H$

$R = \frac{U^2 \sin 2\theta}{g} = \frac{U^2 \sin 90°}{g} = \frac{U^2}{g}$

$H = \frac{U^2 \sin^2\theta}{2g} = \frac{U^2 \sin^2 45°}{2g} = \frac{U^2}{4g}$

$H = \frac{R}{4}$ → $R = 4H$

61) → $U = 10\ m/s$ [4]

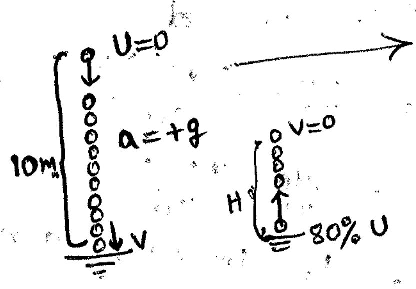
$\theta = 60°$

$V_x = ?$

$V_x = U\cos\theta$ is same in projectile.

$= 10\cos 60° = 5\ m/s.$

63)




$V^2 - U^2 = 2as$ [2]

$V^2 - 0 = 2g \times 10$

$V^2 = 200$

$V^2 - U^2 = 2as$

$0 - 80\%\ U^2 = -2gH$

$H = \frac{80\%\ U^2}{2g}$

$H = \frac{\frac{80}{100} \times 200}{2 \times 10} = 8$ metre.

64) → ~~m = ko~~ $m = 10\ kg.$ $v = 5\ m/s.$ $K.E = \frac{1}{2}mv^2 = \frac{1}{2} \times 10 \times 5^2 = 125\ J$ [2]

66) → $T = 2\pi\sqrt{\frac{l}{g}} \rightarrow l = \frac{gT^2}{4\pi^2}$ [2]

$T = 2$ sec for second's pendulum → constant

$l \propto g$ $\quad g\downarrow$ on moon $\Rightarrow l\downarrow$

67) $a = \omega^2 r = 31.4\ m/s^2$ $\quad \frac{\omega^2 r}{r\omega} = \frac{31.4}{10}$ [3]

$V = r\omega = 10\ m/s$

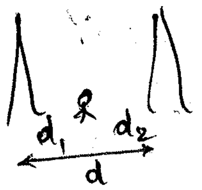
$T = ?$

$\omega = 3.14$

$\frac{2\pi}{T} = 3.14$

$T = \frac{2 \times 3.14}{3.14} = 2$ sec.

68)




$d = d_1 + d_2$, $\quad c = \frac{2d}{t_1}$; c = constant [3]

$= \frac{ct_1}{2} + \frac{ct_2}{2}$

$= \frac{340 \times 1}{2} + \frac{340 \times 2}{2}$

$= 170 + 340 = 510\ m$

69) $n_1 = 256\ Hz$ [2]

$n_2 = 258\ Hz$

$T = ?$

Beat frequency $\Delta n = |n_1 \sim n_2|$

$= 258 - 256$

$\Delta n = 2\ Hz$

$T = \frac{1}{\Delta n} = \frac{1}{2} = 0.5$ seconds.

72) $m_1 \rightarrow 2m_1$ [2]

$m_2 \rightarrow 2m_2$

$d \rightarrow 2d$

$F \rightarrow ?$

initial force $F_1 = \frac{\mu_0}{4\pi}\frac{m_1 m_2}{d^2}$

Now $F_2 = \frac{\mu_0}{4\pi} \times \frac{2m_1 \times 2m_2}{(2d)^2}$

$= \frac{\mu_0}{4\pi} \times \frac{\cancel{4} m_1 m_2}{\cancel{4} d^2}$

$F_2 = F_1$ Unchange (same)

73) ~~R = ρl~~

73) $\rightarrow R = \frac{\rho L}{A} = \frac{\rho L}{\pi r^2} = \frac{4\rho L}{\pi D^2}$ [3]

Now diameter is $\frac{D}{2} \rightarrow$ New Resistance is

$\rightarrow \frac{4\rho L}{\pi \left(\frac{D}{2}\right)^2} \rightarrow 4 \times \frac{4\rho L}{\pi D^2} \rightarrow 4R$

74) Under Bridge balancing condition [1]

$\frac{P}{Q} = \frac{R}{S} \longrightarrow \frac{5}{15} = \frac{R+12}{60}$

$\rightarrow \frac{1}{3} = \frac{R+12}{60}$

$\rightarrow \frac{60}{3} = R+12 \rightarrow 20 = R+12$

$\rightarrow R = \underline{8\,\Omega}.$