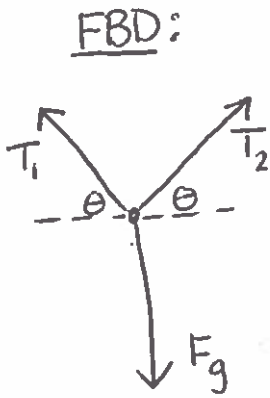


①



$$\theta = 35^\circ$$

$$m = 5.0 \text{ kg}$$

$$\sum F_x = T_2 \cos \theta - T_1 \cos \theta = 0$$

$$\therefore T_1 = T_2 = T$$

$$\sum F_y = T_1 \sin \theta + T_2 \sin \theta - F_g = 0$$

$$\therefore T_1 \sin \theta + T_2 \sin \theta = F_g$$

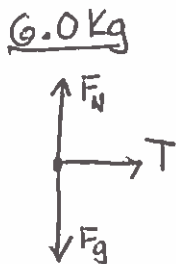
$$2T \sin \theta = mg$$

$$\therefore T = \frac{mg}{2 \sin \theta} = \frac{(5.0)(9.8)}{2 \sin(35^\circ)}$$

$$T = 42.7144$$

$$T = 43 \text{ N}$$

②

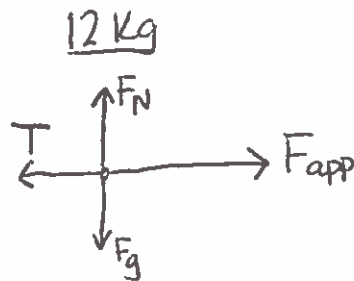


$$\sum F_x = T$$

$$m_1 a = T$$

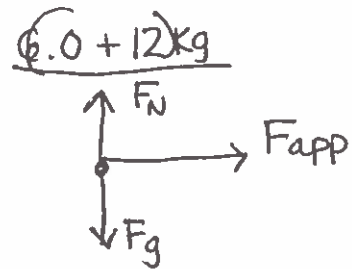
$$(6.0)(1.3889) = T$$

$$T = 8.3 \text{ N}$$



$$\sum F_x = F_{app} - T$$

$$m_2 a = F_{app} - T$$



$$\sum F_x = F_{app}$$

$$(m_1 + m_2) a = F_{app}$$

$$(6.0 + 12) a = 25 \text{ N}$$

$$\frac{18}{18} a = \frac{25}{18}$$

③

$$a = 1.3889 \text{ ms}^{-2}$$

$$a = 1.4 \text{ ms}^{-2}$$

$$(4) \quad (a) \quad F_c = F_g$$

$$m \frac{v^2}{r} = mg$$

$$\therefore v_{\min} = \sqrt{rg}$$

$$v_{\min} = \sqrt{(3.5)(9.8)}$$

at bottom
of circle

$$v_{\min} = 5.9 \text{ m/s}$$

$$(b) \quad a = \frac{v^2}{r} = \frac{(5.9)^2}{(3.5)} = 9.9 \text{ m/s}^2$$

~~at the top of circle~~
~~9.9 m/s^2~~

$$(5) \quad Q_T = (\# \text{ of electrons})(\text{charge of electron})$$
$$= (5000)(1.6 \times 10^{-19})$$

$$Q_T = 8 \times 10^{-16} \text{ C}$$

$$(6) \quad F = \frac{kq_1q_2}{r^2} = \frac{(8.99 \times 10^9)(-8 \times 10^{-6})(15 \times 10^{-6})}{(10 \times 10^{-3})^2}$$

$$* r = 10 \text{ mm}$$
$$= 10 \times 10^{-3} \text{ m}$$

$$= -1.2 \times 10^{-6} \text{ N}$$

$$\textcircled{7} R = \frac{\rho L}{A} = \frac{(2.3 \times 10^{-6})(5.0)}{(1.9625 \times 10^{-5})} = .585987$$

$$A = \pi r^2 = \pi \left(\frac{d}{2}\right)^2$$

$$A = \pi \left(\frac{5.0 \times 10^{-3}}{2}\right)^2$$

$$A = 1.9625 \times 10^{-5} \text{ m}^2$$

$$R = .59 \Omega$$

$$\textcircled{8} P = IV$$

$$\therefore I = \frac{P}{V} = \frac{60}{120}$$

$$I = 0.5 \text{ A}$$

$$\textcircled{9} P = IV \quad V = IR$$

$$P = \left(\frac{V}{R}\right)V$$

$$\therefore I = \frac{V}{R}$$

$$P = \frac{V^2}{R} = \frac{(120)^2}{(4.0)} = 3600 \text{ W}$$

$$P = \frac{\Delta E}{\Delta t}$$

$$\frac{5 \text{ min} / 60 \text{ s}}{1 \text{ min}}$$

$$\therefore E = Pt = (3600)(300)$$

$$E = 1080000 \text{ J}$$

$$E = 1.1 \times 10^6 \text{ J}$$

$\textcircled{10}$

$$\text{(i)} R_T = R_1 + R_2 + R_3 \\ = 5.0 + 3.0 + 1.0 \\ = 9.0 \Omega$$

$$\text{(ii)} I_T = I_1 = I_2 = I_3$$

$$I_T = \frac{V_T}{R_T} = \frac{15}{9.0} = 1.667$$

$$I = 1.7 \text{ A}$$

$$\text{(iii)} V_1 = I_1(R_1) = (1.7)(5.0) = \underline{8.5 \text{ V}}$$

$$V_2 = I_2(R_2) = (1.7)(3.0) = \underline{5.1 \text{ V}}$$

$$V_3 = I_3(R_3) = (1.7)(1.0) = \underline{1.7 \text{ V}}$$