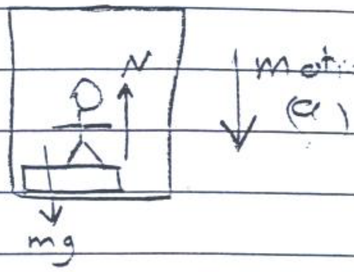
CH #(5 & 6)

Q.1

(N) represents the scale reading

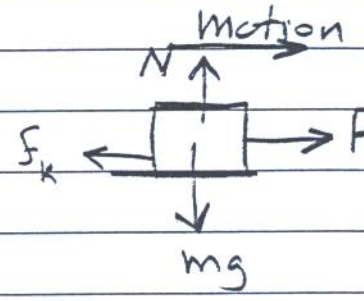


$F_{net} = ma$

$mg - N = ma$

$(70 \times 9.8) - N = 70 \times 2.8$

$\Rightarrow \boxed{N = 490N}$



Q.2 $F_{net} = ma$

$f_s = \mu_s N = 0.3 \times (50 \times 9.8)$

$f_s = 147N$,

$f_K = \mu_K N = 0.2 \times (50 \times 9.8) = 98\ N$

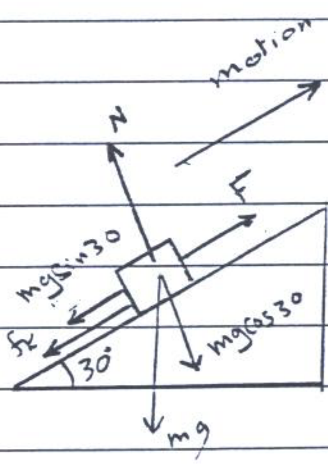
$F_{Person} > f_s \Rightarrow$ we have a motion

So Kinetic friction will work against $(F = 200N)$

$\Rightarrow$

$F_{Person} - F_K = ma \Rightarrow 200 - 98 = (70 \times a)$

$\{ \Rightarrow a = 2\ m/s^2 \}$



Q.3

$V = const \Rightarrow (a = 0)$

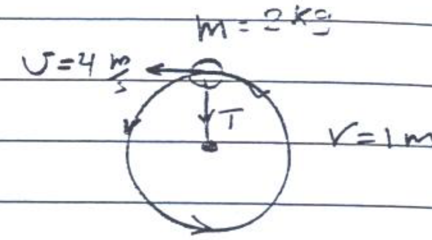
$\Rightarrow F_{net} = 0$

$F - (mg\sin\theta + f_K) = 0$

$f_K = \mu_K N = 0.2 \times 10 \times 9.8 \times \cos 30 = 17\ N$

$\therefore F - (10 \times 9.8 \times \sin 30 + 17) = 0 \Rightarrow (F = 66N)$

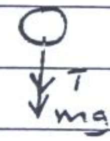
Q.4



T: is the tension.

centripetal Force

$$F = \frac{mv^2}{r}$$

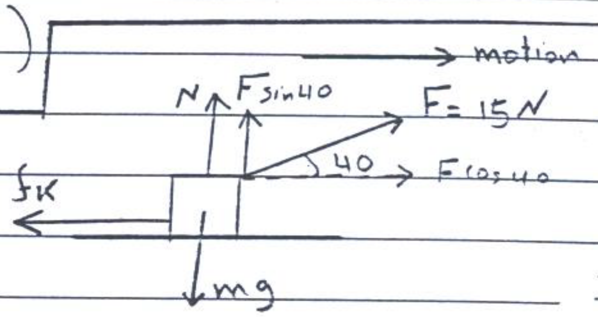


$$(T + mg) = \frac{mv^2}{r}$$

$$\Rightarrow T = \frac{mv^2}{r} - mg = \frac{2\times(4)^2}{1} - 2\times 9.8 = 12.4\ N$$

$$(T \approx 12\ N)$$

Q.5



$v = \text{const} \Rightarrow a = 0$

$F_{net} = 0 \Rightarrow (F\cos 40 - f_k = 0)$ ... (1)

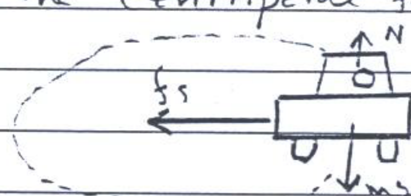
$\therefore F\cos 40 = f_k$

$15\cos 40 = f_k$

$\Rightarrow f_k = 11.4\ N \approx 11\ N$

Q.6 This static friction in the centripetal force

$$f_s = \frac{mv^2}{r}$$



$v = 60\ Km/h = \frac{60\times 1000}{3600}\ m/s = 16.6\ m/s$

$N = mg \Rightarrow (f_s = \mu_s mg)$

$$\Rightarrow f_s = \frac{mv^2}{r} \Rightarrow \mu_s mg = \frac{mv^2}{r} \Rightarrow \mu_s g = \frac{v^2}{r}$$

$$\mu_s = \frac{v^2}{rg} = \frac{(16.6)^2}{90\times 9.8} = 0.31$$

$$\mu_s = 0.31$$

cont CH # 5 & 6

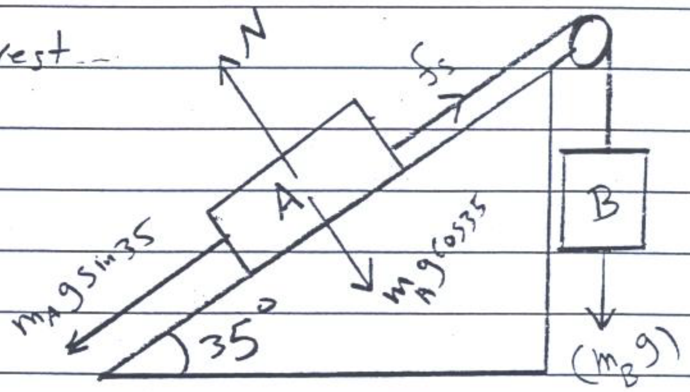
Q.7 $F_{net} = ma$

$(m_2 g) - (m_1 g) = (m_1 + m_2) a$

$(110 - 90) 9.8 = (110 + 90) a$

$\Rightarrow a = 0.98 \ \frac{m}{s^2}$

Q.8 to stay at rest...



$F_{net} = 0$

$\Rightarrow$

$m_A g \sin 35 - (f_s + m_B g) = 0$ ... ①

$f_s = \mu_s N = \mu_s m_A g \cos 35$

$= 0.4 \times 10 \times 9.8 \times \cos 35$

$f_s = 32 \ N$

$\Rightarrow$ eqn ①:

$10 \times 9.8 \times \sin 35 - (32 + m_B \, 9.8) = 0$

$\Rightarrow m_B = 2.47 \text{ kg} \approx \boxed{2.5 \text{ kg}}$