

$$m = 50 \text{ kg}$$

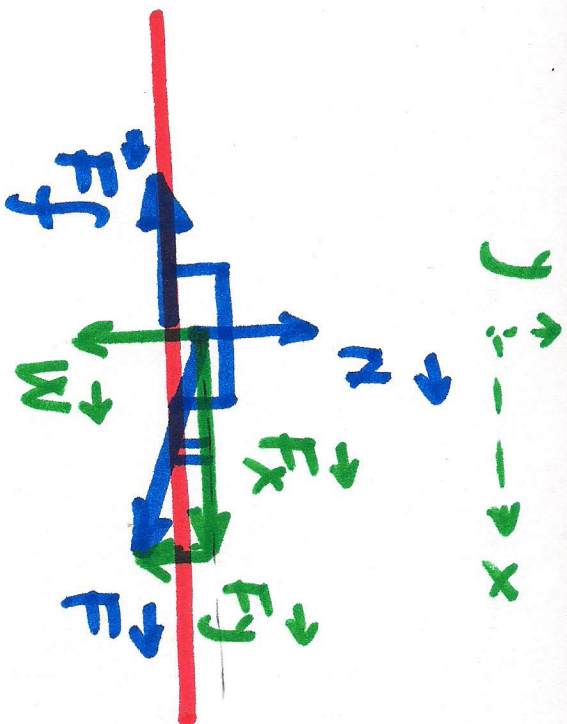
$v = \text{constant}$

$$\mu_s = 0.05$$

$$\mu_d = 0.03$$

$$a) \theta = 25^\circ$$

$$F = ?$$



a) On the horizontal direction  
 $v = \text{constant}$

$$F_x = F_f$$

$$F_x = F \cdot \cos \theta$$

$$F_f = \mu_d \cdot N$$

On the vertical direction:  
 $N = W + F_y = m \cdot g + F \cdot \sin \theta$

$$F_f = \mu_d \cdot (m \cdot g + F \cdot \sin \theta) \Rightarrow$$

$$F_f = F_x = F \cdot \cos \theta$$

$$\mu d \cdot (m \cdot g + \underline{F} \cdot \sin \theta) = \underline{F} \cdot \cos \theta$$

$$\mu d \cdot m \cdot g + \mu d \cdot F \cdot \sin \theta = F \cdot \cos \theta$$

$$\mu d \cdot m \cdot g = F \cdot \cos \theta - \mu d \cdot F \cdot \sin \theta$$

$$F (\cos \theta - \mu d \cdot \sin \theta) = \mu d \cdot m \cdot g$$

$$F = \frac{\mu d \cdot m \cdot g}{\cos \theta - \mu d \cdot \sin \theta}$$