## Mass and Weight

- Mass → property of an object
- Weight is a force!

$$F_g = mg$$

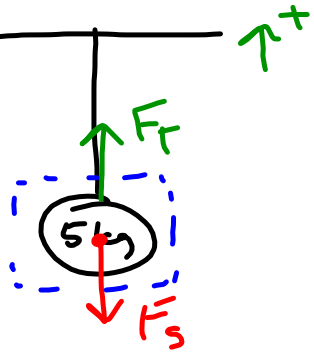
## UNITS OF FORCE:

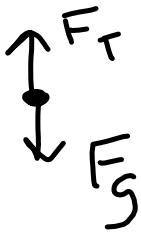
$$F = mg$$

$$(kg)\left(\frac{m}{s^2}\right) = \frac{kg \cdot m}{s^2} \equiv N \text{ (Newtons)}$$

# WORKSHEET 3

1)




$F_g = mg$

$\Sigma F_y = 0$

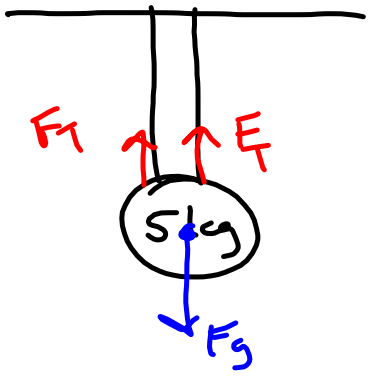
$F_T - F_g = 0$

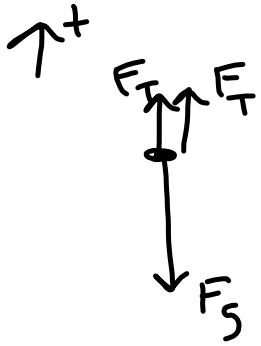
$F_T = F_g$

$F_T = mg$

$= (5kg)(9.8 m/s^2)$

$= 49N$




$$\sum F_y = \emptyset$$

$$F_T + F_T - F_g = \emptyset$$

$$2F_T = F_g$$

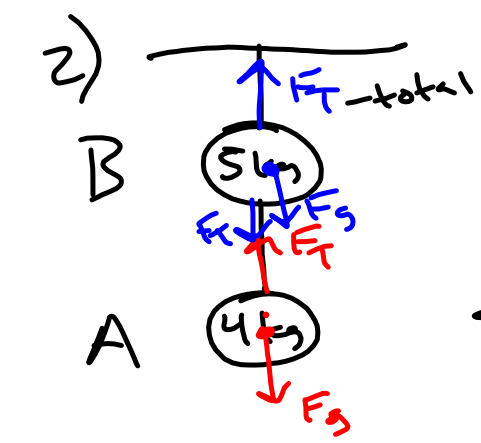
$$F_T = \frac{F_g}{2}$$

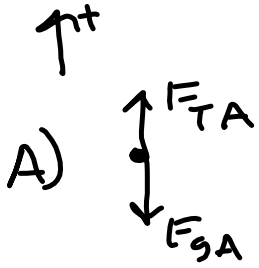
$$F_T = \frac{mg}{2}$$

$$= \frac{(5\,kg)(9.8\,m/s^2)}{2}$$

$$= 24.5\,N$$

2)



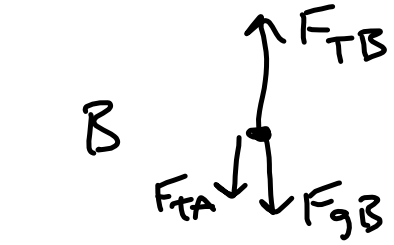

$\sum F_{yA} = \emptyset$

$F_{TA} - F_g = \emptyset$

$F_{TA} = F_g$

$= (4kg)(9.8 m/s^2)$

$= 39.2 N$




$\sum F_{yB} = \emptyset$

$F_{TB} - F_{TA} - F_{gB} = \emptyset$

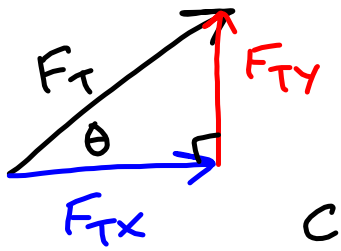
$F_{TB} = F_{TA} + F_{gB}$

$F_{gB} = m_B a_g$
$= (5kg)(9.8 m/s^2)$
$= 49 N$

$= 39.2N + 49N$

$= 88.2N$

3)




$\cos(55^\circ) = \frac{F_{TX}}{F_T}$

$\theta = 55^\circ$

$F_T = 38\,N$

$F_{TX} = F_T \cos(55^\circ)$

$= (38\,N)[\cos(55^\circ)]$

$= 21.8\,N$

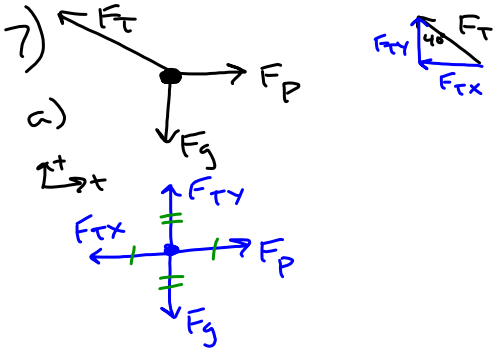
$\sin(55^\circ) = \frac{F_{TY}}{F_T}$

$F_{TY} = F_T \sin(55^\circ)$

$= (38N)[\sin(55^\circ)]$

$= 31.1\,N$

7)




a)




b) $\Sigma F_y = \emptyset$

$F_{TY} - F_g = \emptyset$

$F_{TY} = F_g$

c) $\Sigma F_x = \emptyset$

$-F_{TX} + F_P = \emptyset$

$F_P = F_{TX}$

d) $F_g = ma_g$

$= (75\text{kg})(9.5\text{m/s}^2)$

$= 735\text{ N}$

e) $F_{TY} = F_g$

$= 735\text{ N}$


$F_T(\cos(40°)) = \frac{F_{TY}}{F_T} F_T$

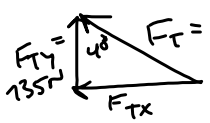
$F_T \frac{\cos(40°)}{\cos(40°)} = \frac{F_{TY}}{\cos(40°)}$

$F_T = \frac{F_{TY}}{\cos(40°)}$

$= \frac{735\text{N}}{\cos(40°)}$

$= 959\text{N}$

f) $F_{TX} = F_P$




$\tan(40°) = \frac{F_{TX}}{F_{TY}}$

$F_{TX} = F_{TY} \tan(40°)$

$= (735\text{N}) \tan(40°)$

$= 617\text{ N}$

$F_P = 617\text{N}$