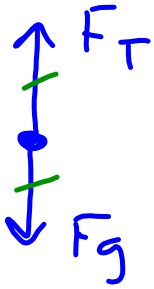
A person holds a 3-kg grocery bag still.

a) Draw an FBD.

b) Calculate the tension in the handles of the grocery bag.

a)



b)

$$\sum \vec{F} = \emptyset$$

$$F_T - F_g = \emptyset$$

$$F_T = F_g$$

$$= ma_g$$

$$= (3\,kg)(9.8\,m/s^2)$$

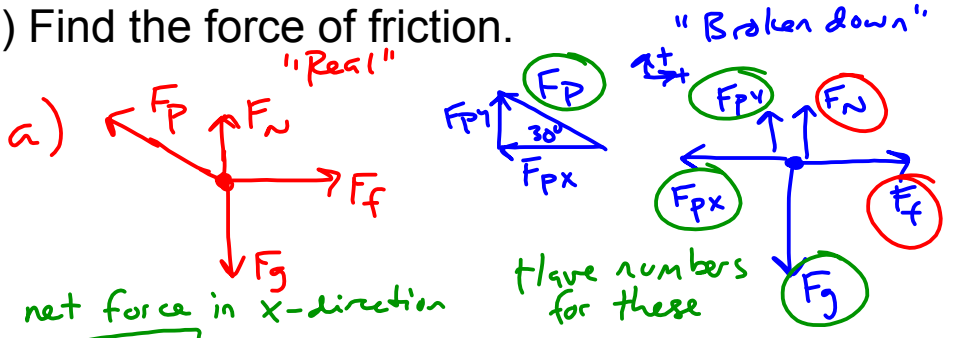
$$= 29.4\,N$$

A person pulls a 5-kg box at a constant velocity with 20 N of force at an angle of 30 degrees above the horizontal.

a) Draw an FBD.

b) Find the normal force.

c) Find the force of friction.



net force in x-direction

c) $\boxed{\Sigma F_x = \emptyset}$

$F_f - F_{px} = \emptyset$

$F_f = F_{px}$

$= 17.32\ N$

Solve for these

net force in y-direction

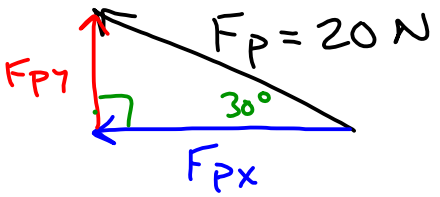
b.) $\boxed{\Sigma F_y = \emptyset}$

$F_{py} + F_N - F_g = \emptyset$

$F_N = F_g - F_{py}$

$F_g = mg$ $= (5kg)(9.8 m/s^2) - 10N$

$= 39\ N$



$\cos(30°) = \frac{F_{px}}{F_p}$

$F_{px} = F_p \cos(30°)$

$= (20N)\cos(30°)$

$= 17.32\ N$

$\sin(30°) = \frac{F_{py}}{F_p}$

$F_{py} = F_p \sin(30°)$

$= (20N)\sin(30°)$

$= 10\ N$

Summary of Steps:

1) Draw "real" FBD, then "broken down" FBD if any vector is not horizontal/vertical

2) Write net force ($\Sigma \vec{F}$) equation for one direction (either x or y)

3) Use FBD to expand net force

4) Solve for unknown variable in equation