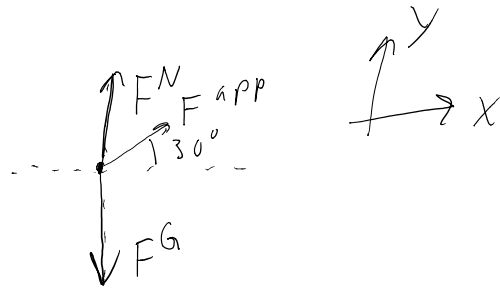
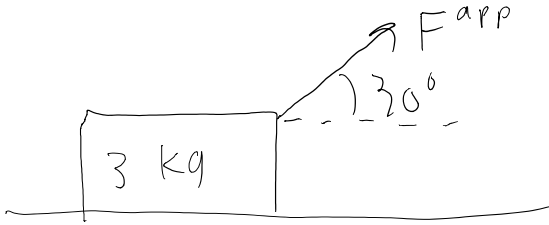


A 3 kg block is on a level surface with an external force of 15 N is applied to the right, at 30 degrees above the horizontal. What is the acceleration?



$$\sum F_x = m a_x$$

$$F_x^{app} = m a_x$$

$$13 = 3 \cdot a_x$$

$$4.33 \frac{m}{s^2} = a_x$$

$$\sum F_y = m a_y$$

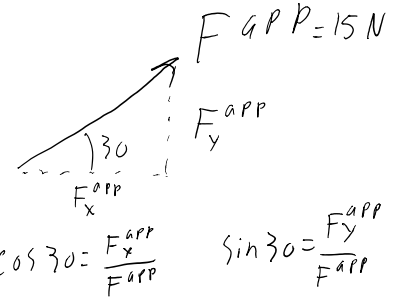
$$F_N - F_G + F_y^{app} = m a_y$$

The Box will only leave the table if the normal force is 0. Check by setting the normal force to 0.

$$0 - m g + 7.5 = 3 \cdot a_y$$

$$\frac{-3 \cdot 9.8 + 7.5}{3} = a_y$$

$$-7.3 \frac{m}{s^2} = a_y$$



$$F_x^{app} = F_{app} \cos 30$$

$$= 13 N$$

$$F_y^{app} = F_{app} \sin 30$$

$$= 7.5 N$$

Since the acceleration in the  $y$  direction is in the negative direction when the normal force is 0 there must be a normal force supporting the box, so the acceleration in the  $y$  is zero.