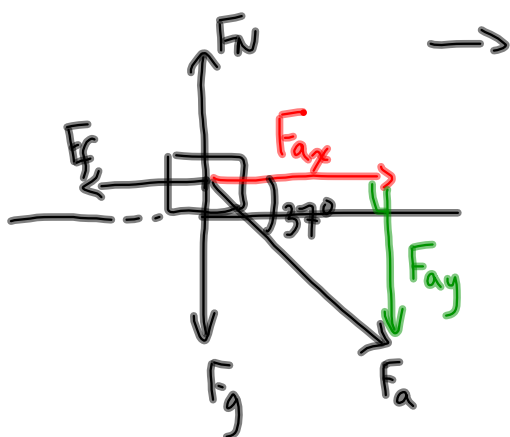


## Forces at Angles



Vertically

$$F_{\text{net}} = 0$$

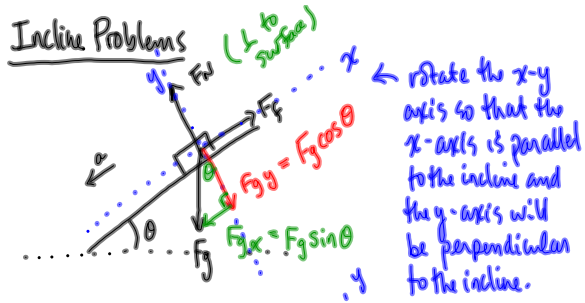
$$F_N = F_g + F_{ay}$$

Horizontally:

$$\vec{F}_{\text{net}} = m\vec{a}$$

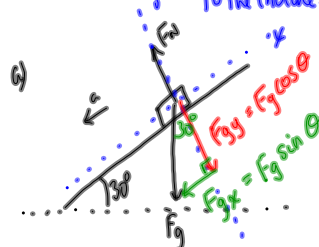
$$F_{ax} - F_f = ma$$

Incline Problems



← state the x-y axis so that the x-axis is parallel to the incline and the y-axis will be perpendicular to the incline.

SP  
 $m = 50 \text{ kg}$   
 $\theta = 30^\circ$   
 a)  $a = ?$ , no friction  
 b)  $a = ?$ ,  $\mu_k = 0.15$



$$\vec{F}_{\text{net}} = m\vec{a}$$

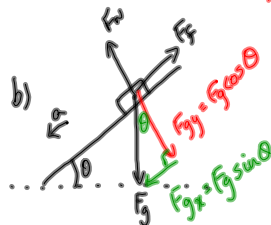
$$F_{gx} = ma$$

$$F_g \sin \theta = ma$$
~~$$mg \sin \theta = ma$$~~

$$a = g \sin \theta$$

$$a = (9.81 \text{ m/s}^2)(\sin 30^\circ)$$

$$a = 4.9 \text{ m/s}^2$$



$$\vec{F}_{\text{net}} = m\vec{a}$$

$$F_{gx} - F_f = ma$$

$$F_g \sin \theta - \mu F_n = ma$$

$$F_g \sin \theta - \mu F_{gy} = ma$$

$$F_g \sin \theta - \mu F_g \cos \theta = ma$$
~~$$mg \sin \theta - \mu mg \cos \theta = ma$$~~

$$a = g \sin \theta - \mu g \cos \theta$$

$$a = (9.81 \text{ m/s}^2) \sin 30^\circ - (0.15)(9.81 \text{ m/s}^2) \cos 30^\circ$$

frictionless arc

$$a = 3.6 \text{ m/s}^2$$

TO DO

- ① Incline PP
- ② Be sure that forces at Angles PP are done
- ③ Be sure that those PP from book are done:
  - PP | 457 (1+2)
  - PP | 463 (4+5)
  - PP | 467
- ④ Quiz - WED
  - components of vectors
  - relative motion