

Incline Problems

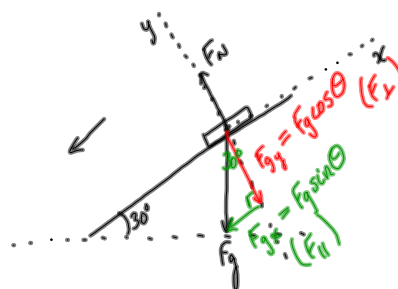
SP

$m = 50 \text{ kg}$

$\theta = 30^\circ$

a)  $a = ?$  (no friction)

b)  $a = ?$  ( $\mu_k = 0.15$ )



Along the y-axis,  $F_{net} = 0$ :

$F_N = F_{gy}$

Along the x-axis,  $F_{net} = ma$

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$F_{gx} = ma$

$F_g \sin \theta = ma$

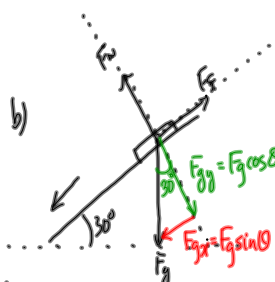
$mg \sin \theta = ma$

$a = g \sin \theta$

$a = (9.8 \frac{m}{s^2}) \sin 30^\circ$

$a = 4.9 \frac{m}{s^2}$

← The acceleration with no friction.



Along x-axis:

$F_{net} = ma$

$F_{gx} - F_f = ma$

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

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

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

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

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

$a = 4.9 \text{ m/s}^2 - 0.15(9.8 \text{ m/s}^2) \cos 30^\circ$

from part (a)

$a = 4.9 \text{ m/s}^2 - 1.27 \text{ m/s}^2$

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

TO DO:

- ① PP / Incline Problem Sheet
- ② PP from Feb 27