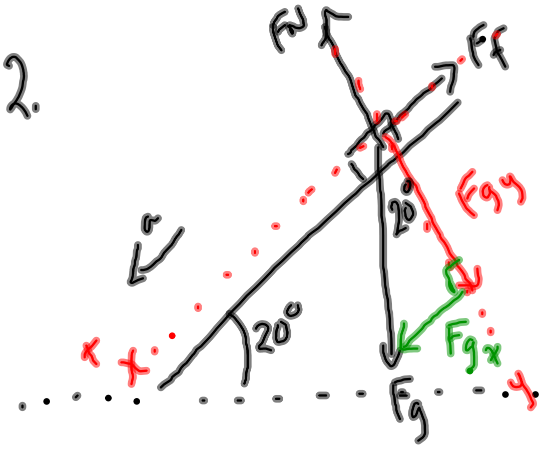
From the Incline Sheet (HW)

2.



$\mu_k = 0.10$

a) $a = ?$

b) $v_2 = ?$ after 8.0s

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

$F_{gx} - F_f = ma$

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

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

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

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

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

$a = (9.8 m/s^2)\sin 20° - (0.10)(9.81 m/s^2)\cos 20°$

$a = 3.36 m/s^2 - 0.92 m/s^2$

acceleration no friction

$a = 2.4 m/s^2$

b) $a = \frac{\Delta v}{\Delta t}$

$a = \frac{v_2 - v_1}{\Delta t}$

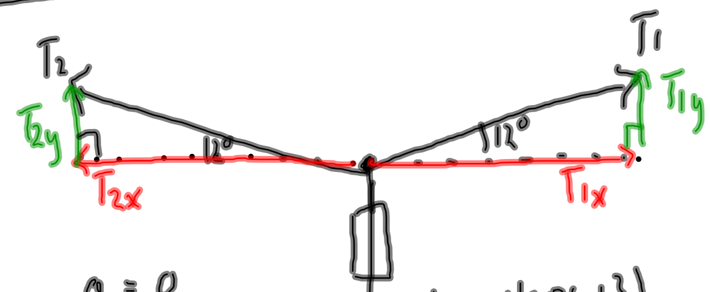
$v_2 = v_1 + a\Delta t$ ($v_1 = 0$)

$v_2 = (2.4 m/s^2)(8.0 s)$

$v_2 = 19 m/s$

from pp/467

9.



$\vec{a} = 0$

$\therefore \vec{F}_{net} = 0$

$F_g = (65\,kg)(9.81\,m/s^2)$

$F_g = 637.65\,N$

Horizontally:

$T_{1x} = T_{2x}$

$T_1 \cos\theta_1 = T_2 \cos\theta_2$

$T_1 \cos 12° = T_2 \cos 12°$

$T_1 = T_2$ ← due to symmetry

Vertically:

$T_{1y} + T_{2y} = F_g$

$T_1 \sin 12° + T_2 \sin 12° = 637.65\,N$

$T_1 \sin 12° + T_1 \sin 12° = 637.65\,N$

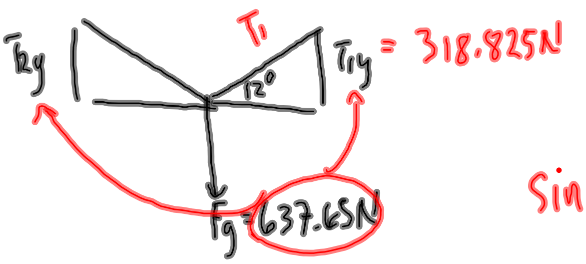
$2T_1 \sin 12° = 637.65\,N$

$T_1 = \frac{637.65\,N}{2(\sin 12°)}$

$T_1 \doteq 1.5 \times 10^3\,N$

$T_2 \doteq 1.5 \times 10^3\,N$

A Short Cut (if there is symmetry)



F_g is equally distributed b/w T_{1y} and T_{2y}

$\sin\theta = \frac{opp}{hyp}$

$\sin 12° = \frac{318.825\,N}{T_1}$

$T_1 = \frac{318.825\,N}{\sin 12°} = 1.5 \times 10^3\,N$

Oct 7-10:33 AM

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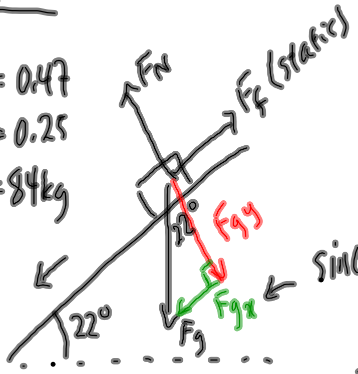
$\mu_s = 0.47$
$\mu_k = 0.25$
$m = 84kg$



$\sin\theta = \frac{opp}{hyp}$

a) will the crate slide down?
b) If so, a = ?
c) What is Fa to start moving up?
d) If continued with Fa, what is acc?

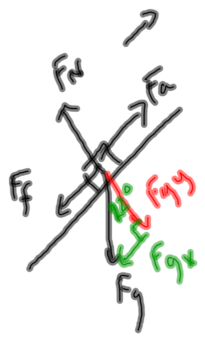
a) The crate will slide down hill IF $F_{gx} \geq F_f$

$F_{gx} = F_g \sin\theta$
$F_{gx} = mg\sin\theta$
$F_{gx} = (84kg)(9.81 m/s^2)\sin 22°$
$F_{gx} \doteq 308.7N$

$F_f = \mu F_N$
$F_f = \mu F_{gy}$
$F_f = \mu F_g \cos\theta$
$F_f = \mu mg\cos\theta$
$F_f = (0.47)(84kg)(9.81 m/s^2)\cos 22°$
$F_f \doteq 359.1N$

Since $F_{gx} < F_f$
The crate does not slide downhill

c)



To just start the crate moving:

$F_a = F_{gx} + F_f$
$F_a \doteq 308.7N + 359.1N$
$F_a \doteq 667.8N$
$6.7 \times 10^2 N$

d) $\vec{F}_{net} = m\vec{a}$

$F_a - (F_f + F_{gx}) = ma$

↑ kinetic F_f

F_f(kinetic) $= \mu mg\cos\theta$
$= (0.25)(84kg)(9.81 m/s^2)\cos 22°$
$\doteq 191.0N$

$667.8N - (191.0N + 308.7N) = (84kg)a$
$667.8N - 499.1N = (84kg)a$
$168.7N = (84kg)a$
$a \doteq 2.0 m/s^2$

DO:

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