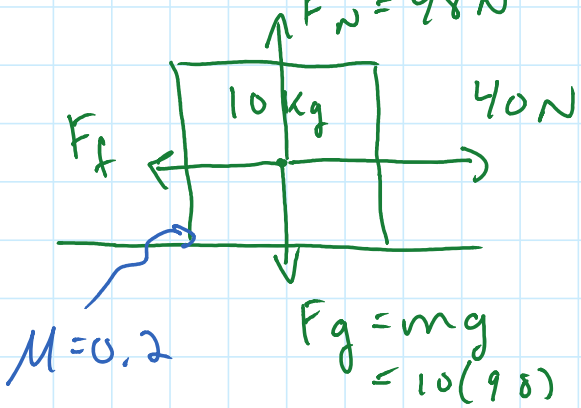
Friction

Tuesday, February 23, 2016 12:43 PM

$F_f = \mu F_N$ — opposes motion

F_N: Normal ⊥ to surface

μ: no units, $0 < \mu < 1$



$F_g = mg$
$= 10(9.8)$
$= 98N$

$F_f = \mu F_N$
$= (.2)(98N)$
$= 19.6N$

y-dir - no acc
- forces are balanced
- $F_{up} = F_{down}$

$F_N = F_g$

x-dir

F_{net} = unbalanced

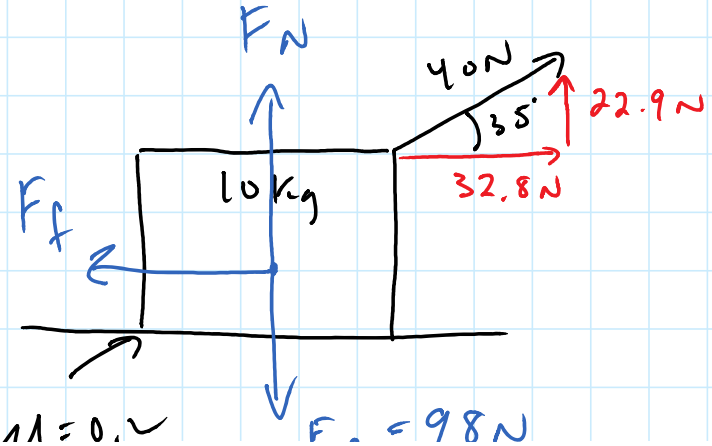
$ma = F_{app} - F_f$

$10a = 40N - 19.6N$

$10a = 20.4N$

$a = 2.04 m/s^2$

Ex



$F_f = \mu F_N$
$= (.2)(75.1)$
$= 15N$

$\mu = 0.2$ $\quad F_g = 98\,N$

Y-dir $\rightarrow F_{up} = F_{down}$

$F_N + 22.9\,N = F_g$

$F_N + 22.9\,N = 98$

$F_N = 75.1\,N$

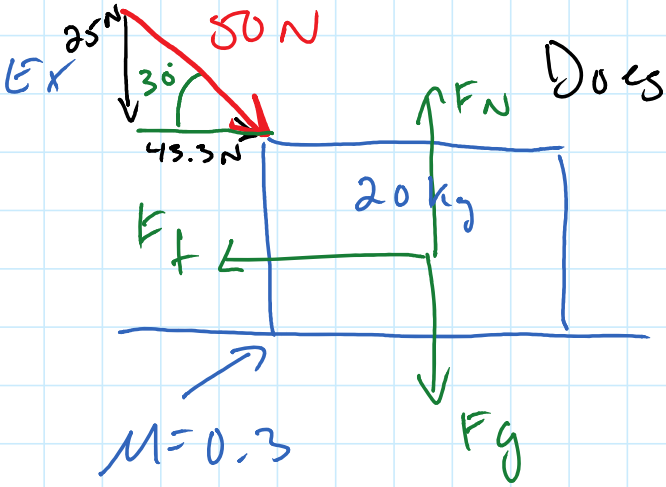
X-dir

$F_{net} = 32.8\,N - F_f$

$ma = 32.8\,N - 15\,N$

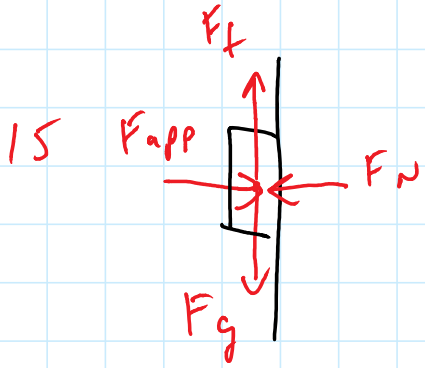
$10a = 17.8\,N$

$a = 1.78\,m/s^2$



Does the box accelerate.

Y-dir	X-dir
$F_{up} = F_{down}$	$F_{net} = 43.3 - F_f$
$F_N = F_g + 25\,N$	$ma = 43.3 - 66.3$
$= 196 + 25$	$20a =$
$F_N = 221\,N$	
$F_f = \mu F_N$	
$= (.3)(221)$	
$= 66.3\,N$	



Y-dir $F_{up} = F_{down}$

$F_f = F_g$

X-dir $F_L = F_R$

$F_{app} = F_N$

$F_f = 49\,N$

$F_f = \mu F_N$

$49\,N = (.65) F_N$