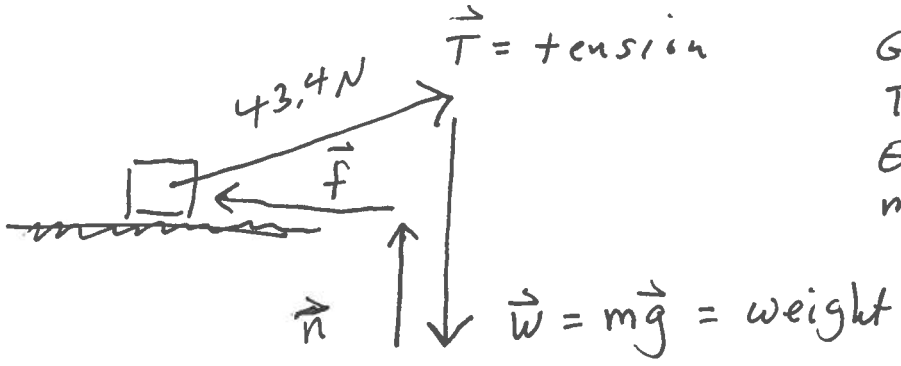
A1

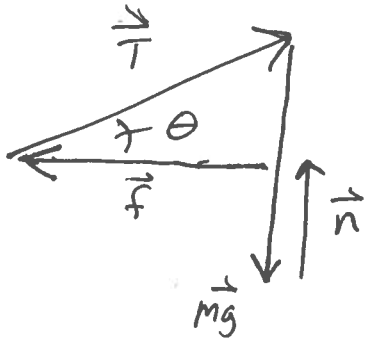
1)



Given:
$T = 43.4\ N$
$\theta = 31°$
$m = 5.4\ kg$

$\sum \vec{F} = m\vec{a} = 0$ (not accelerating)

Free-body-diagram



$|\vec{f}|$ = friction force

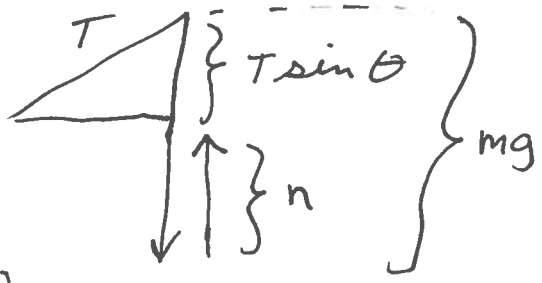
$f = T\cos\theta$

$= T\cos 31° =$

$= (43.4)\cos 31° = \boxed{37.2\ N}$ yes!

2) $m = 5.3\ kg$ $\theta = 57°$ $T =$ ~~40.8 N~~ 44.9

What is normal force?



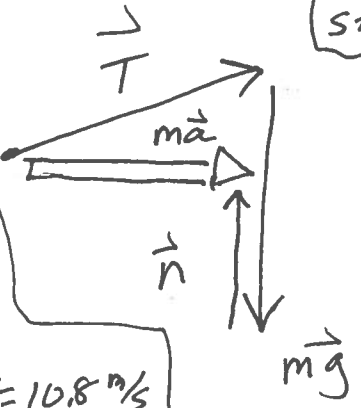
$n = mg - T\sin\theta$

$n =$ ~~n~~ $= (5.3)(9.8) -$ ~~47.3~~ $44.9 \sin 57°$

~~$n = 12.37\ N$~~ $\boxed{n = 14.25\ N}$

©224 Phy 240 sled forces easy

A3)



starts at rest

$m = 5.9\ kg$
$T = 47.3\ N$
$\theta = 48°$
want t @ $v = 10.8\ m/s$

$\vec{T} + m\vec{g} + \vec{n} = m\vec{a}$

$T = |\vec{T}|$ magnitude

$a = |\vec{a}|$

$$ma = T\cos\theta \rightarrow a = \frac{T\cos\theta}{m} = \frac{47.3\cos 48°}{5.9}$$

$$a = 5.364\ m/s^2$$

$v = v_0 + at$ or ~~$v = \Delta v$~~

v_0 ↑ zero

rest ↓

$$a = \frac{\Delta v}{\Delta t} = \frac{10.8 - 0}{\Delta t}$$

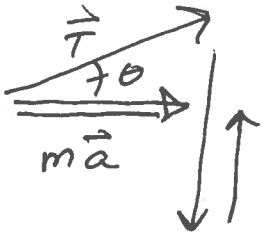
↖ ?

$v = at$

$$t = \frac{v}{a} = \frac{10.8\ m/s}{5.364\ m/s^2}$$

$$t = 2.01\ sec$$

A4)



$T\cos\theta = ma$

$\cos\theta = \frac{ma}{T}$

$m = 2.1\ kg$

$T = 17.5\ N$

$a = 2.8\ m/s^2$

$$\cos\theta = \frac{(2.1)(2.8)}{17.5} = 3.36 \times 10^{-1}$$

$$\cos^{-1}(\cos\theta) = \cos^{-1}(\underset{.336}{\cancel{3.36}}) = \theta = 70.37\ deg$$