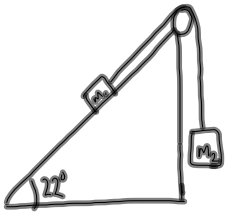
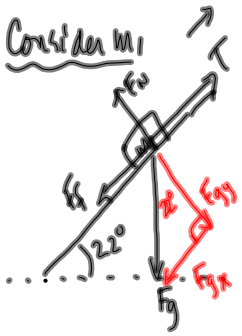
PP|489

21.





$m_1 = 145\,g$ $a = ?$

$m_2 = 85\,g$ $T = ?$

$\mu_k = 0.18$ $v = ?$ (after 2.5s)

Test: If $F_{g_2} > F_{g_x} + F_f$ then the motion of m_1 is uphill

$$F_{g_2} = (0.085\,kg)(9.81\,m/s^2) = 0.83385\,N$$

$$F_{g_1 x} = F_{g_1}\sin\theta = (0.145\,kg)(9.81\,m/s^2)\sin 22^\circ \doteq 0.532859\,N$$

$$F_f = \mu F_N = \mu F_{g_{y_1}} = \mu mg\cos\theta = (0.18)(0.145\,kg)(9.81\,m/s^2)\cos 22^\circ \doteq 0.237397\,N$$

Since $F_{g_1 x} + F_f < F_{g_2}$, m_1 goes uphill

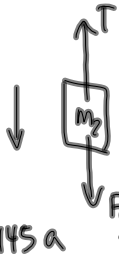
m_1: $\vec{F}_{net} = m\vec{a}$

$$T - (F_f + F_{g_x}) = ma$$

$$T - (0.237397\,N + 0.532859\,N) = (0.145\,kg)a$$

$$\boxed{T - 0.770256\,N = (0.145\,kg)a}$$

Consider m_2:



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

$$F_{g_2} - T = m_2 a$$

$$\boxed{0.83385\,N - T = (0.085\,kg)a}$$

$$T - 0.770256 = 0.145\,a$$

$$+(0.83385 - T = 0.085\,a)$$

$$0.06359\,N = 0.23\,a$$

$$a = 0.28\,m/s^2$$

HW Probe => Monday PP|485 a PP|488-489

1. $F \propto v^2$

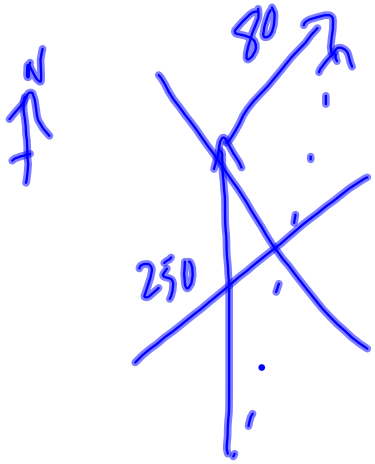
$F = kv^2$

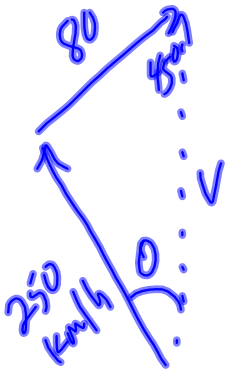
$k = \frac{F}{v^2}$ $\quad \frac{N}{m^2/s^2} = \frac{N \cdot s^2}{m^2}$ ✓

$= \frac{kg \cdot m \, s^2}{s^2 \, m^2}$

$= kg/m$

2.





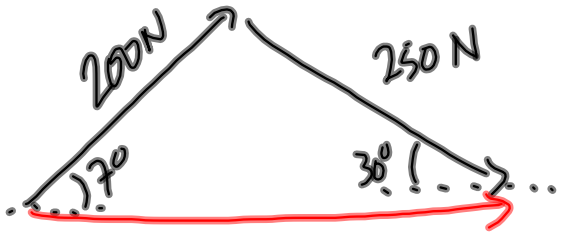
a) [N 13° W]

b) 300 km/h

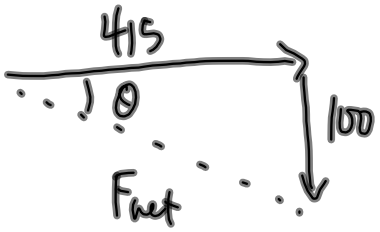
c) 4.0 h

3.

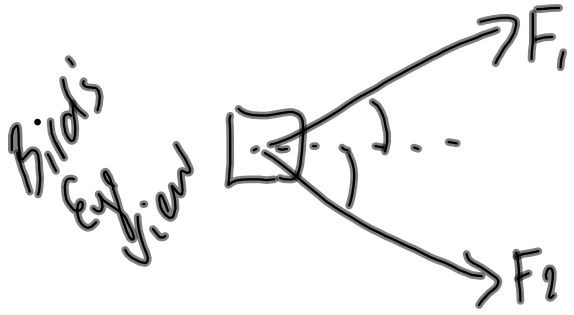
	X	Y
F_1		
F_2		
F_{net}	415.0N	-100.6N



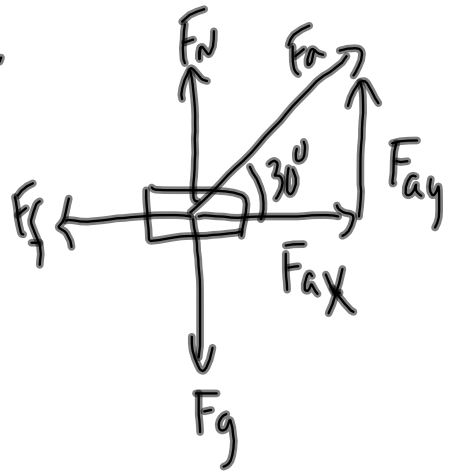
vector addition diagram



$\Rightarrow$ $7.73 m/s^2$ [E 13.6° S]



4.



$F_{ax} = F_f$ (since $a = 0$)

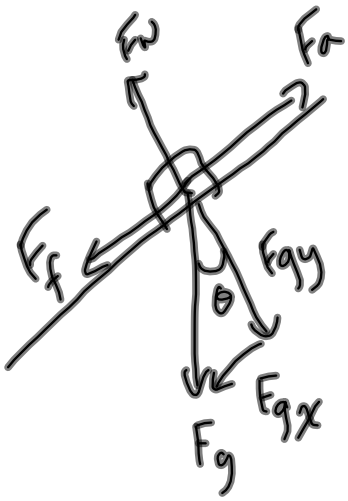
$F_a \cos\theta = \mu F_N$

$F_a \cos\theta = \mu (F_g - F_{ay})$

$F_a \cos\theta = \mu (F_g - F_a \sin\theta)$

$$\mu = \frac{F_a \cos\theta}{F_g - F_a \sin\theta} = 0.25$$

6.



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

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

forgot one or the other.

$F_a = 185\,N$