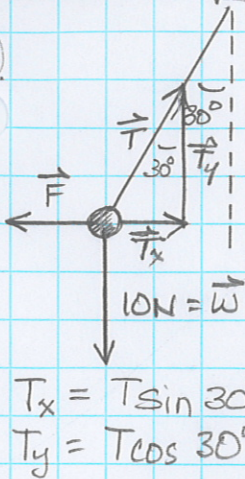


HAMPER: p. 35 #19-21

SOLUTIONS

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(a) Since in equilibrium,  $\Sigma \vec{F} = 0$ .  
Specifically:  $\Sigma \vec{F}_x = 0$

$$F = T_x = 0.5T \Rightarrow \boxed{F - 0.5T = 0}$$

(b)  $\Sigma \vec{F}_y = 0 \Rightarrow \boxed{W = 0.87T} = 10N$

$$\text{OR } T = \frac{10}{.87} \Rightarrow \boxed{T = 11.5N}$$

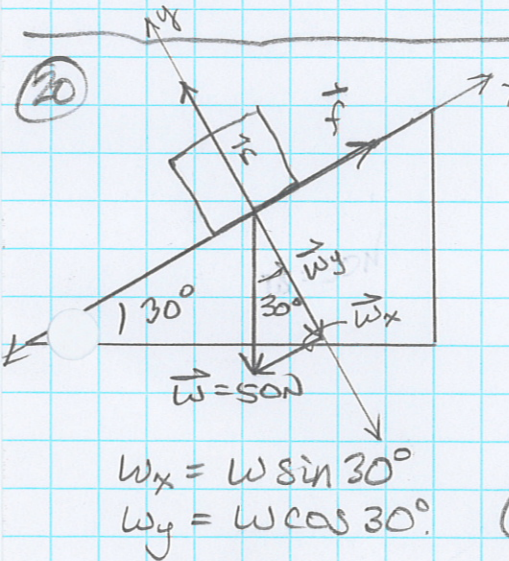
also part (c)  $\uparrow$

$$T_x = T \sin 30^\circ = 0.5T$$

$$T_y = T \cos 30^\circ = 0.87T$$

(d) From (a):  $F = 0.5T$   
 $= (0.5)(11.5) = \boxed{5.8N}$

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Tilt the axes as shown

(a) || to ramp = "HORIZONTAL" FORCES

$$\Sigma \vec{F}_x = 0 \Rightarrow f = W_x$$

$$\boxed{f = W \sin(30^\circ)}$$

$$= (50)(0.5) = \boxed{25N}$$

$$W_x = W \sin 30^\circ$$

$$W_y = W \cos 30^\circ$$

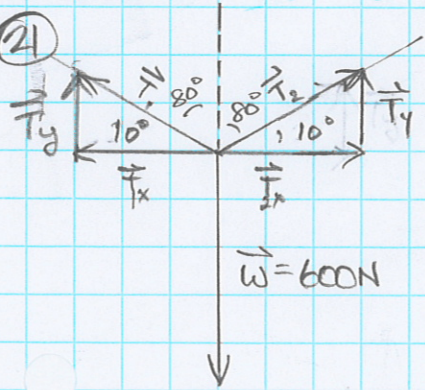
(b)  $\perp$  to ramp = "VERTICAL" FORCES (answer to part c)

$$\Sigma \vec{F}_y = 0 \Rightarrow n = W_y \Rightarrow \boxed{n = W \cos(30^\circ)}$$

$$= (50)(0.87)$$

$$\boxed{n = 43.5N} \quad (c)$$

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a) VERTICAL:  $\Sigma \vec{F}_y = 0$   
 $2T_y = W$  OR  $\boxed{2T \sin 10^\circ = 600}$

b) HORIZONTAL:  $\Sigma \vec{F}_x = 0$   
 $T_{1x} = T_{2x} = T \cos 10^\circ$

c) from (a):  $T = \frac{600}{2 \sin 10^\circ} = \boxed{1728N}$