

$$x^2 = 33^2 + 44^2 - 2(33)(44)\cos 150$$

$$x = 74.4 \text{ N}$$

$$\frac{\sin \theta}{33} = \frac{\sin 150}{74.4}$$

$$\theta = \sin^{-1} \left(\frac{33 \sin 150}{74.4} \right)$$

$$\theta = 12.8^\circ$$

$$\therefore \vec{F}_j = 74 \text{ N } [17^\circ \text{ W of S}]$$

2.

$$F_{1x} = 0$$

$$F_{2x} = +40 \text{ N}$$

$$F_{3x} = 0$$

$$F_{4x} = -40 \text{ N}$$

$$F_{5x} = 50 \cdot \sin 30 = +25 \text{ N}$$

$$F_{1y} = +60 \text{ N}$$

$$F_{2y} = 0$$

$$F_{3y} = -80 \text{ N}$$

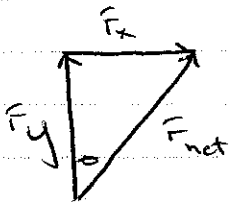
$$F_{4y} = 0$$

$$F_{5y} = 50 \cdot \cos 30 = +43.3 \text{ N}$$



$$F_x = +25 \text{ N}$$

$$F_y = +23.3 \text{ N}$$



$$F = \sqrt{25^2 + 23.3^2}$$

$$\theta = \tan^{-1} \frac{25}{23.3}$$

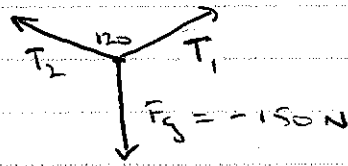
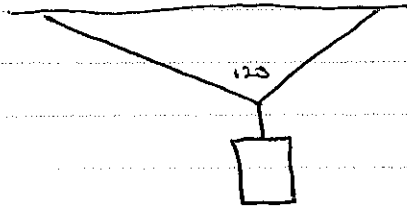
$$F_{\text{net}} = 34.2 \text{ N}$$

$$\theta = 47^\circ$$

$$F_{\text{net}} = 34.2 \text{ N } [47^\circ \text{ N of E}]$$

$$\therefore \vec{F}_c = 34.2 \text{ N } [47^\circ \text{ S of W}]$$

8.



a.

$$T_{1y} = T_1 \cdot \cos 60$$

$$T_{2y} = T_2 \cdot \cos 60$$

$$\vec{T}_{1y} + \vec{T}_{2y} = -\vec{F}_g$$

$$T_1 \cos 60 + T_2 \cos 60 = 150 \text{ N}$$

$$T_1 \cos 60 + T_1 \cos 60 = 150 \text{ N}$$

$$2T_1 \cos 60 = 150$$

$$T_1 = \frac{150}{2 \cos 60}$$

$$T_1 = 150 \text{ N}$$

$$T_2 = 150 \text{ N}$$



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

$$T_1 \sin 60 = T_2 \sin 60$$

$$\therefore T_1 = T_2$$

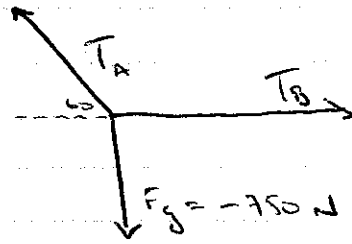
b.

$$T_1 = \frac{150}{2 \cos 45}$$

$$T_1 = 106 \text{ N}$$

c. DECREASÉS.

4.



$$T_{Ax} = T_A \cos 60$$

$$T_{Bx} = T_B$$

$$F_{gx} = 0$$

$$T_{Ay} = T_A \sin 60$$

$$T_{By} = 0$$

$$F_{gy} = -750$$

$$\vec{T}_x = \vec{T}_A \cos 60 + \vec{T}_B$$

$$\vec{T}_y = \vec{T}_A \sin 60 - 750$$

$$0 = \vec{T}_A \cos 60 + \vec{T}_B$$

$$0 = T_A \sin 60 - 750$$

$$T_A \sin 60 = 750$$

$$= -(866) \cos 60 + T_B$$

$$T_A = \frac{750}{\sin 60}$$

$$T_B = 866 \cos 60 = 433 \text{ N}$$

$$T_A = 866 \text{ N}$$

$$\boxed{T_B = 433 \text{ N}}$$

5.

$$a. \vec{T}_1 + \vec{T}_2 = -\vec{T}_g$$

$$= -mg$$

$$= -(52.6)(-9.8)$$

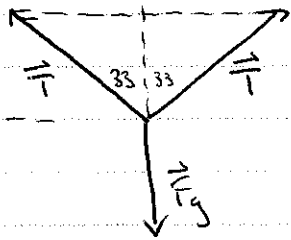
$$T_1 + T_2 = 515.48$$

$$2T_1 = 515.48$$

$$T_1 = 257.74$$

$$\therefore \boxed{T_1 = T_2 = 258 \text{ N}}$$

5. b.



HORIZONTAL

$$T_x = T \sin 33$$

VERTICAL

$$T_y = T \cos 33$$

$$\sum \vec{T}_y = 2\vec{T}_y + \vec{T}_g$$

$$0 = 2\vec{T}_y - 515.48$$

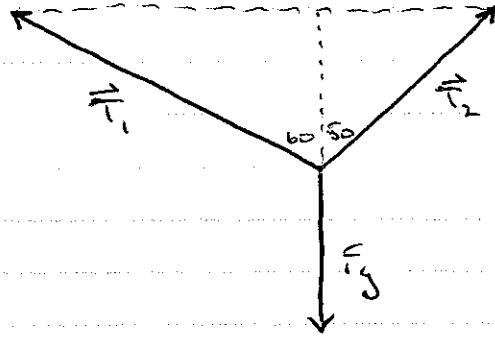
$$2\vec{T}_y = 515.48$$

$$\vec{T}_y = 258 \text{ N}$$

$$T = \frac{T_y}{\cos 33}$$

$$T = 307 \text{ N}$$

6

HORIZONTAL

$$T_{1x} = T_1 \sin 60$$

$$T_{2x} = T_2 \sin 50$$

$$\sum \vec{F}_x = \vec{T}_{1x} + \vec{T}_{2x}$$

$$0 = -T_1 \sin 60 + T_2 \sin 50$$

$$T_1 \sin 60 = T_2 \sin 50$$

$$T_1 = \frac{T_2 \sin 50}{\sin 60}$$

$$= \frac{18.4 \sin 50}{\sin 60}$$

$$T_1 = 16.3 \text{ N}$$

VERTICAL

$$T_{1y} = T_1 \cos 60$$

$$T_{2y} = T_2 \cos 50$$

$$\sum \vec{F}_y = \vec{T}_{1y} + \vec{T}_{2y} + \vec{T}_y$$

$$0 = T_1 \cos 60 + T_2 \cos 50 - 20$$

$$0 = \frac{T_2 \sin 50 \cos 60}{\sin 60} + T_2 \cos 50 - 20$$

$$20 = T_2 \left[\frac{\sin 50 \cos 60}{\sin 60} + \cos 50 \right]$$

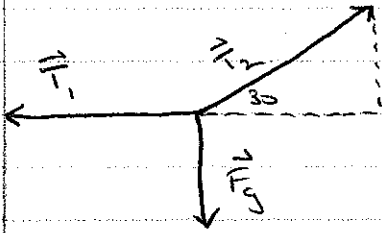
$$20 = T_2 (1.09)$$

$$T_2 = 18.4 \text{ N}$$

$$T_1 = 16.3 \text{ N}$$

$$T_2 = 18.4 \text{ N}$$

7.

HORIZONTAL

$$\vec{T}_1 = -22 \text{ N}$$

$$\vec{T}_{2x} = +T_2 \cos 30$$

$$\sum \vec{T}_x = \vec{T}_1 + \vec{T}_{2x}$$

$$0 = \vec{T}_1 + \vec{T}_{2x}$$

$$-\vec{T}_1 = \vec{T}_{2x}$$

$$-(-22) = +T_2 \cos 30$$

$$\frac{22}{\cos 30} = T_2$$

$$T_2 = 25.4 \text{ N}$$

VERTICAL

$$\vec{T}_{2y} = +T_2 \sin 30$$

$$= 25.4 \cdot \sin 30$$

$$\vec{T}_{2y} = +12.7 \text{ N}$$

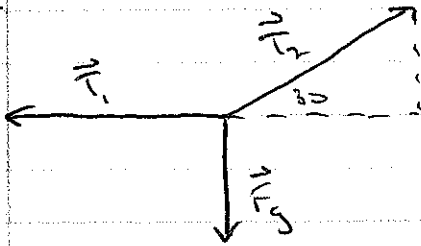
$$\sum \vec{T}_y = \vec{T}_{2y} + \vec{T}_g$$

$$0 = +12.7 + m(-9.8)$$

$$-12.7 = -9.8m$$

$$m = 1.30 \text{ kg}$$

8.



HORIZONTAL

$$\begin{aligned}\vec{T}_{2x} &= +T_2 \cos 30 \\ &= +6.86 \cos 30 \\ &= +5.94 \text{ N}\end{aligned}$$

$$\sum \vec{T}_x = \vec{T}_1 + \vec{T}_{2x}$$

$$0 = \vec{T}_1 + 5.94$$

$$\boxed{\vec{T}_1 = -5.94 \text{ N}}$$

VERTICAL

$$\begin{aligned}\vec{T}_{2y} &= +T_2 \sin 30 \\ \vec{T}_y &= -(6.86)(\frac{1}{2}) \\ &= -3.43 \text{ N}\end{aligned}$$

$$\sum \vec{T}_y = T_2 \sin 30 - 3.43$$

$$0 = T_2 \sin 30 - 3.43$$

$$3.43 = T_2 \left(\frac{1}{2}\right)$$

$$T_2 = 6.86 \text{ N}$$

FORCE EXERTED BY STRING ON WALL IS
+5.94 N.