

Warm-up:

- A large bird, $m = 7.25 \text{ kg}$, is sitting on the center of a wire so that each side of the wire dips to an angle 11.2° below the horizontal.
- Draw a free-body diagram showing the forces acting on the bird to keep it in equilibrium
- Determine the tension that is acting in each side of the wire.

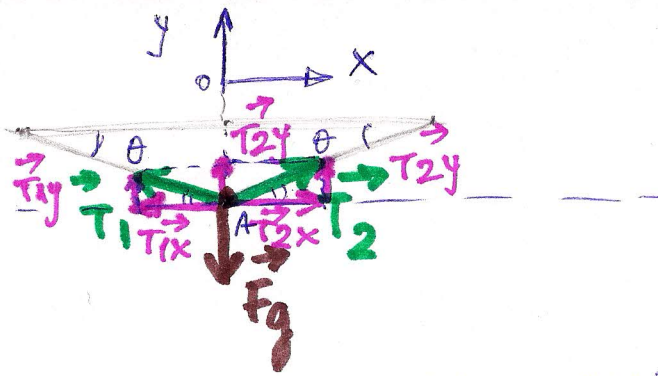
$$m = 7.25 \text{ Kg}$$

$$\theta = 11.2^\circ$$

FBD

$$T_1 = ?$$

$$T_2 = ?$$



Point A (the entire system) is at equilibrium $\Rightarrow F_{NET} = 0$

$$F_{NETX} = 0 \text{ N}$$

$$F_{NETY} = 0 \text{ N}$$

Horizontal direction: $T_{1x} = T_{2x}$

$$T_1 \cdot \cos \theta = T_2 \cdot \cos \theta$$

$$\boxed{T_1 = T_2}$$

Vertical direction: $F_g = T_{1y} + T_{2y}$

$$T_{1y} = T_1 \cdot \sin \theta$$

$$T_{2y} = T_2 \cdot \sin \theta$$

$$m \cdot g = 2 T_1 \cdot \sin \theta \Rightarrow T_1 = \frac{m \cdot g}{2 \cdot \sin \theta} = T_2$$