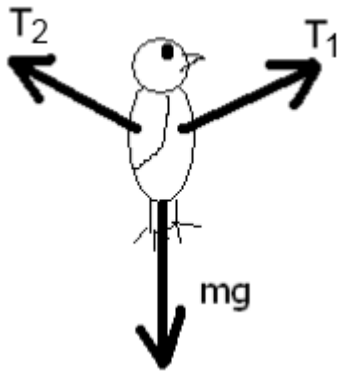
A bird alights on a stretched telegraph wire. Does this change the tension in the wire? If so, by an amount less than, equal to, or greater than the weight of the bird?

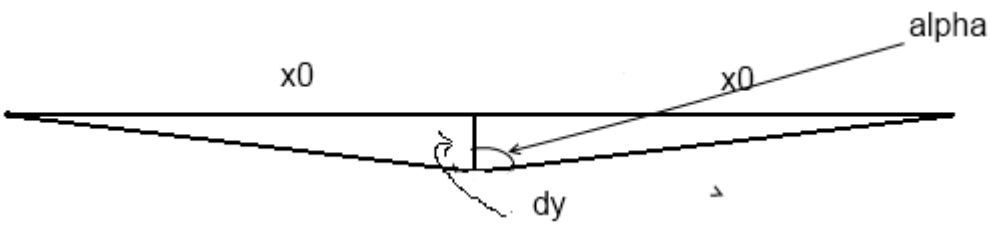
Solution:

Real life photo ;)

Schematic sketch.



Wire deflects under birds weight:



According to the second Newton's law:

$$m\vec{g} + \overrightarrow{T_1} + \overrightarrow{T_2} = m * \vec{a}$$

As there is only one wire:

$$\left|\overrightarrow{T_1}\right| = \left|\overrightarrow{T_2}\right| = T$$

Bird doesn't move:

$$a = 0;$$

Thus:

$$m * g = T * \cos\alpha + T * \cos\alpha$$

$$T = \frac{mg}{2\cos\alpha}$$

As α is small thus:

$$\alpha \to 0 \ => \cos\alpha \to 1$$

So:

$$\boxed{T \approx \frac{mg}{2}}$$

Answer: The tension in the wire changes by an amount less than the weight of the bird.