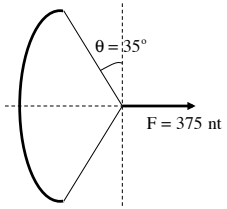
Problem 13.6

A force of 375 nts is applied to a bow as shown.

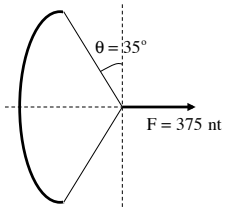
a.) What is the tension in the string?



b.) If a spring replaced the force and the string was pulled a distance of .3 meters to duplicate the original situation, what would the spring's spring constant?

a.) What is the tension in the string?

This is a rigid body problem. Summing the forces in the x-direction:



$$\sum F_x:$$

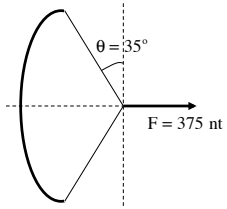
$$-T\sin 35^\circ - T\sin 35^\circ + F = ma$$

$$\Rightarrow \quad T = \frac{F}{2\sin 35^\circ}$$

$$\Rightarrow \quad T = \frac{375 \text{ nt}}{2\sin 35^\circ}$$

$$\Rightarrow \quad T = 327 \text{ nt}$$

b.) If a spring replaced the force and the string was pulled a distance of .3 meters to duplicate the original situation, what would the spring's spring constant?



$$k = \frac{\text{amount of force required to elongate spring}}{\text{distance elongated}}$$

$$= \frac{375 \text{ nts}}{.3 \text{ m}}$$

$$= 1250 \text{ nt/m}$$