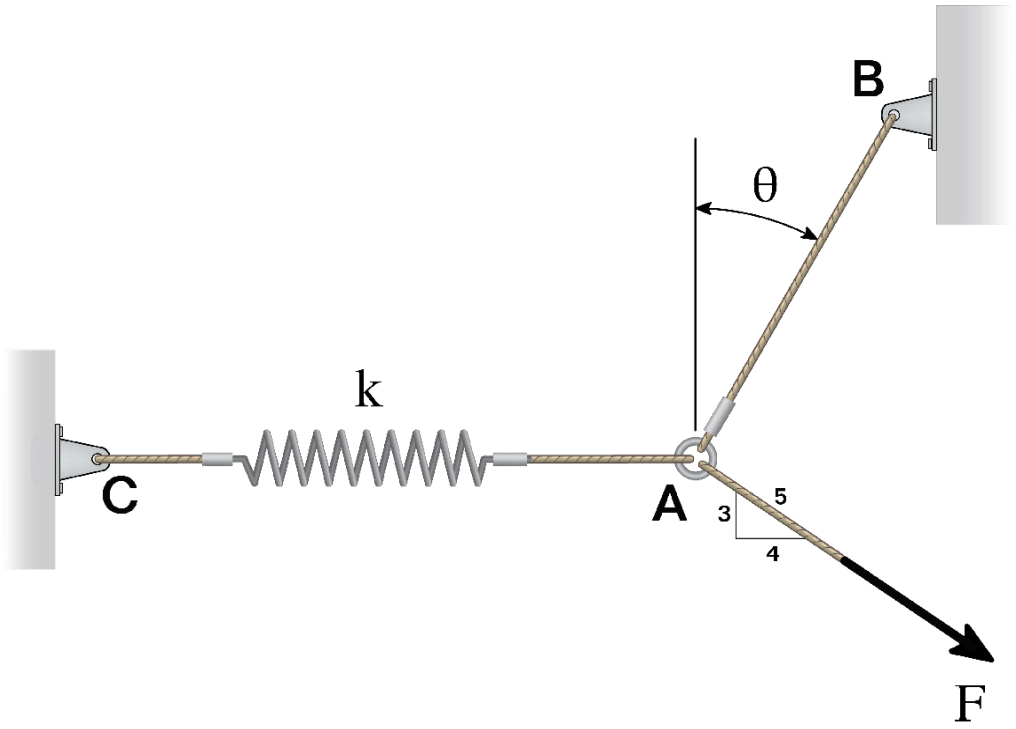

In the 2D equilibrium system above, find the stretch of the spring Δx given a force F.

Draw a FBD to simplify the system.

Find the tension in the spring.

$$\Sigma F_y = 0 \rightarrow F_{AB}\cos(\theta) - \frac{3}{5}F = 0 \rightarrow F_{AB} = \frac{3}{5\cos(\theta)}F$$

$$\Sigma F_x = 0 \rightarrow \frac{4}{5}F + F_{AB}\sin(\theta) - F_{AC} = 0 \rightarrow F_{AC} = \frac{4 + 3\tan(\theta)}{5}F$$

Find the stretch of the spring.

$$\Delta x = \frac{F_{AC}}{k} = \frac{4 + 3\tan(\theta)}{5k}F$$