



If the unstretched length of spring AC is x_0 cm, find the magnitude of the force necessary for the spring to have an equilibrium length of x_f cm.

Draw a FBD to simplify the system.

Find the elastic tension in the spring.

$$T_{AC} = k(x_f - x_0)$$

Find the magnitude of the force F .

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

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

$$\rightarrow F = \frac{5k(x_f - x_0)}{3 \tan(\theta) + 4}$$