

44. To support a load of $W = mg = (670)(9.8) = 6566$ N, the steel cable must stretch an amount proportional to its “free” length:

$$\Delta L = \left(\frac{W}{AY} \right) L \quad \text{where } A = \pi r^2$$

and $r = 0.0125$ m.

- (a) If $L = 12$ m, then

$$\Delta L = \left(\frac{6566}{\pi(0.0125)^2 (2.0 \times 10^{11})} \right) (12) = 8.0 \times 10^{-4} \text{ m} .$$

- (b) Similarly, when $L = 350$ m, we find $\Delta L = 0.023$ m.