

PROBLEM 1.12

The spring is known to deflect 0.14 inch for every 1 lbf of applied force. Thus, we begin by determining the weight of the object (F_{grav}) using the deflection (Δx) given as 1.8 inches.

$$\Delta x = 1.8 \text{ inches} = (0.14 \frac{\text{in}}{\text{lbf}})(F_{grav})$$

$$(F_{grav}) = \frac{1.8 \text{ inches}}{(0.14 \frac{\text{in}}{\text{lbf}})} = 12.86 \text{ lbf}$$

The mass can be solved from the expression $F_{grav} = mg$.

$$m = \frac{(F_{grav})}{g} = \frac{12.86 \text{ lbf}}{31 \frac{\text{ft}}{\text{s}^2}} \left| \frac{32.2 \text{ ft} \cdot \text{lb}}{\text{lbf}} \right| \frac{\text{s}^2}{\text{s}^2} = 13.36 \text{ lb}$$

(rounded)

$$m = 13.36 \text{ lb}$$

