

28. We make use of Eq. 7-25 and Eq. 7-28 since the block is stationary before and after the displacement. The work done by the applied force can be written as

$$W_a = -W_s = \frac{1}{2}k(x_f^2 - x_i^2).$$

The spring constant is $k = (80 \text{ N}) / (2.0 \text{ cm}) = 4.0 \times 10^3 \text{ N/m}$. With $W_a = 4.0 \text{ J}$, and $x_i = -2.0 \text{ cm}$, we have

$$x_f = \pm \sqrt{\frac{2W_a}{k} + x_i^2} = \pm \sqrt{\frac{2(4.0 \text{ J})}{(4.0 \times 10^3 \text{ N/m})} + (-0.020 \text{ m})^2} = \pm 0.049 \text{ m} = \pm 4.9 \text{ cm}.$$