

3. A vertical spring is displaced 27 cm when a 5 g mass is attached to it. What is the maximum velocity of the mass on the spring?

$v = A \sqrt{k/m}$  where A is the max displacement (27 cm), m is the mass (5 g), and k is the spring constant. We can find k by remembering

$$F = k \cdot x, \text{ or } k = \frac{F}{x}, \frac{(5 \text{ g})(1 \text{ kg}/1000 \text{ g})(9.8 \text{ m/s}^2)}{27 \text{ cm } (1 \text{ m}/100 \text{ cm})}$$

$$k = 0.18 \text{ N/m}$$

$$v = (27 \text{ cm} * 1 \text{ m}/100 \text{ cm}) \sqrt{0.18 \text{ N/m} / (5 \text{ g} * 1 \text{ kg}/1000 \text{ g})}$$

$$v = 1.62 \text{ m/s}$$