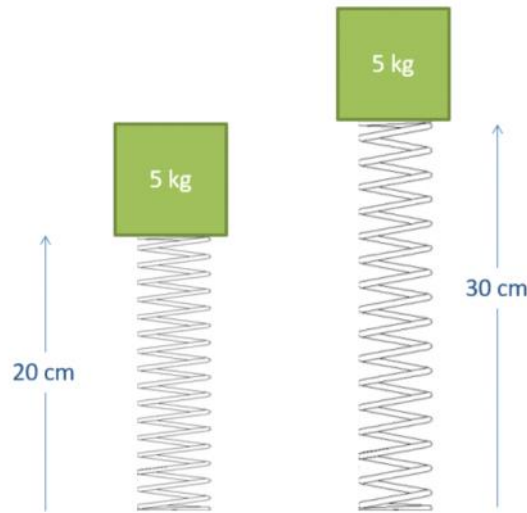


Problem 2

A spring with an unstretched length of 40 cm and a k value of 120 N/cm is used to lift a 5 kilogram box from a height of 20 cm to a height of 30 cm. If the box starts at rest, what would you expect the final velocity to be?



$$W = \Delta KE + \Delta PE$$

$$0 = \frac{1}{2} m v_f^2 - \cancel{\frac{1}{2} m v_i^2} + m g \Delta h + \frac{1}{2} k x_f^2 - \frac{1}{2} k x_i^2$$

$$-\frac{1}{2} (5 \text{ kg}) (v_f)^2 = (5 \text{ kg}) (9.81 \frac{\text{N}}{\text{kg}}) (.1 \text{ m}) + \frac{1}{2} (12,000 \frac{\text{N}}{\text{m}}) ((.1 \text{ m})^2 - (.2 \text{ m})^2)$$

$$-2.5 v_f^2 = 4.905 \text{ Nm} - 180 \text{ Nm}$$

$$\boxed{v_f = 8.37 \text{ m/s}}$$