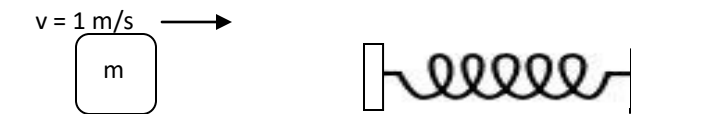# Spring Energy Questions

Show all work for your solutions.

$$F = k\Delta x \qquad E_s = \frac{1}{2}k\Delta x^2 \qquad E_T = E_g + E_k + E_s$$

$$W = \Delta E_k \qquad W = \Delta E_k \qquad W = \Delta E_s \qquad f_g = mg$$

1. A 3 kg mass, moving on a horizontal frictionless surface, collides with a spring bumper that has a spring constant of 100 N/m.

    v = 1 m/s ⟶

    m

    a) Calculate the spring potential energy stored in the spring when it is compressed 0.10 m the mass?
    b) Calculate the kinetic energy of the mass at 0.10 m compression. Also, calculate its velocity at this point.
    c) Calculate the maximum compression of the spring

2. A spring having a force constant of 20 N/m is compressed 1.0 m. A 2.0 kg mass is then placed against the end and released. (frictionless).

    ⟵ v

    k = 20 N/m

    m

    x_o 1.0 m x_{max}
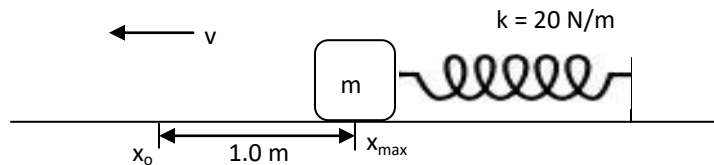
    a) Calculate the velocity of the mass at 0.6 m compression from x_o.
    b) Calculate the velocity that the mass will leave the spring?

3. The 2.0 kg mass shown collides with the horizontal spring. Using the data given in the diagram, calculate:

    x_o

    v =1.5 m/s   k = 50 N/m

    m
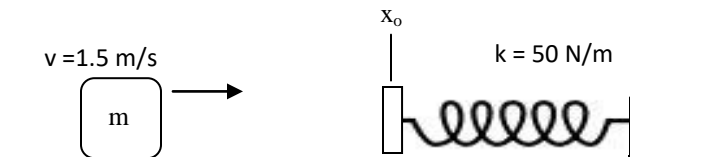
    a) the maximum compression in the spring.
    b) the velocity of the mass at a compression of 0.20 m.