Worksheet 4: Elastic Potential Energy

1. Solve for each unknown.
    A) A spring with $k = 450$ N/m is compressed by 0.13 m. How much energy is stored?
    B) A spring with $k = 520$ N/m stores 7.04 J. How far is it extended from the equilibrium position?
    C) A spring, when compressed 0.20 m from the equilibrium position, stores 26 J. What is the value of the spring constant?

2. The coil springs on a car's suspension have a value of $k = 6.4$ x 10^4 N/m. When the car strikes a bump the springs briefly compress by 4.0 cm. How much energy is momentarily stored in each spring?

3. A spring attached to a ceiling has a mass of 500.0 g suspended from it such that the spring stretches 4.0 cm. Calculate the spring constant.

4. How much work must be done to
    A) compress a spring 4.0 cm if the spring constant is 55 N/m?
    B) stretch a spring 8.0 cm if the spring constant is 85 N/m?

5. Below is a graph of F versus x for an elastic spring. Determine:

    A) the spring constant.
    B) the spring's maximum amount of elastic potential energy.
    C) the change in elastic potential energy when the spring extends from 3 cm to 4 cm.
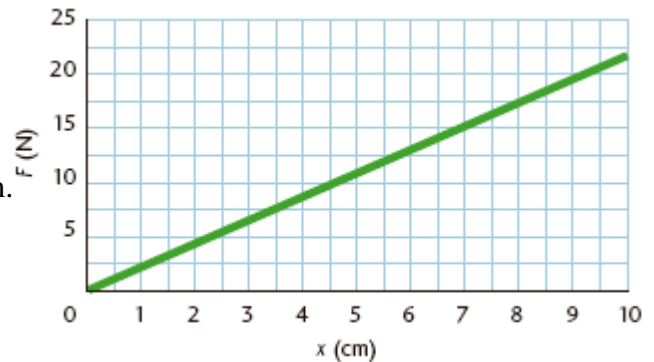
6. A spring that obeys Hooke's law has the following F-versus-x graph. How much work is required to stretch the spring
    A) 5.0 cm?
    B) 7.0 cm?
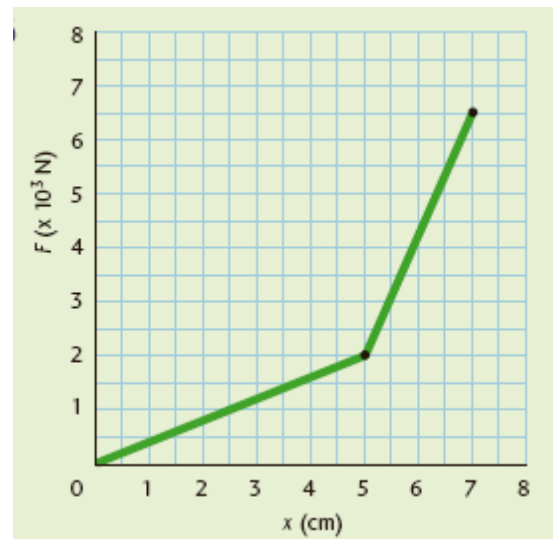
7. A bungee cord needs to transfer 2.0×10^6 J of energy. A 10-kg mass extends the bungee cord 1.3 m. What is the maximum extension of the bungee cord?