# Practice Problem Set #7

1. Ropes used in rock climbing are "springy" so that they cushion a fall. A particular rope exerts a force $F = -kx + bx^2$, where $k = 322$ N/m, $b = 2.10$ N/m^2, and x is the stretch. Find the potential energy stored in this rope when it's been stretch 2.32 m, taking $U = 0$ at $x = 0$.

2. A spring with $k = 120$ N/m is at the base of a curved ramp. A block with $m = 40$g is placed against the spring, which is compressed 10cm. When the block is released, how high up the ramp does it rise? Neglect friction.
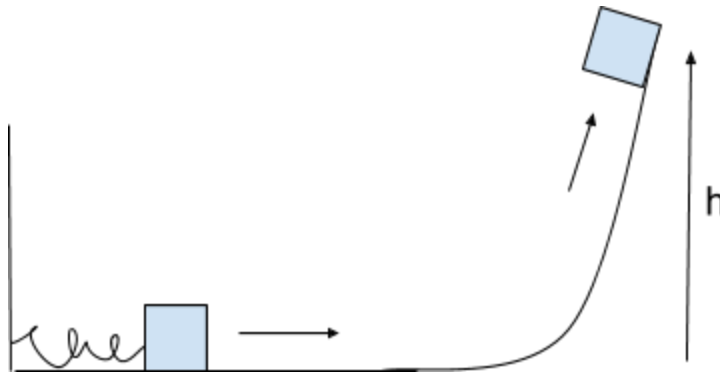
3. A firefighter directs a stream of water against the window of a burning building, hoping to break the window so that water can get to the fire. The hose delivers water at a rate of 40 kg/s, and the water hits the window moving horizontally at 25 m/s. After hitting the window, the water drops vertically. What horizontal force does the water exert on the window?