Spring Practice Problem

1. a) $x = 0.4\,m$

$$F_{spring} = kx = 600\,N/m\,(0.4\,m) = 240\,N$$

b) $$PE_{spring} = \frac{1}{2}kx^2 = \frac{1}{2}(600\,N/m)(0.4\,m)^2 = 4.8\,J$$

2. a) $x = 2.15\,m - 1.8\,m = 0.35\,m$

$$F_{spring} = kx = 50\,N/m\,(0.35\,m) = 175\,N$$

b) $$PE_{spring} = \frac{1}{2}kx^2 = \frac{1}{2}(50\,N/m)(0.35\,m)^2 = 3.06\,J$$

3. a) Energy was not conserved. The system had less energy (3.06 J vs 4.8 J) at the end.

b) Left edge started at 0 m and stopped at 1.8 m. Distance = 1.8 m

c) $$PE_0 + KE_0 + W_{NC} = PE_f + KE_f$$

$$4.8\,J + 0 + F_{Frict}(1.8\,m) = 3.06\,J + 0$$

$$1.74\,J = -F_{Frict}(1.8\,m)$$

$$F_{Frict} = 0.967\,N$$

4.

a)

$$PE_A + KE_A + W_{NC} = PE_B + KE_B$$

$$4.8J + 0 + F_f \cdot d = 0 + KE_B$$

$F_f = 0.98N$; $d = 1.3m$ (Room 0m to 1.3m)

$$4.8J + (0.98N)(1.3m) = KE_B$$

$$KE_B = 3.54J$$

b) $KE_B = \frac{1}{2}mv^2$

$$3.54J = \frac{1}{2}(4kg)v^2$$

$$v = 1.33\ m/s$$