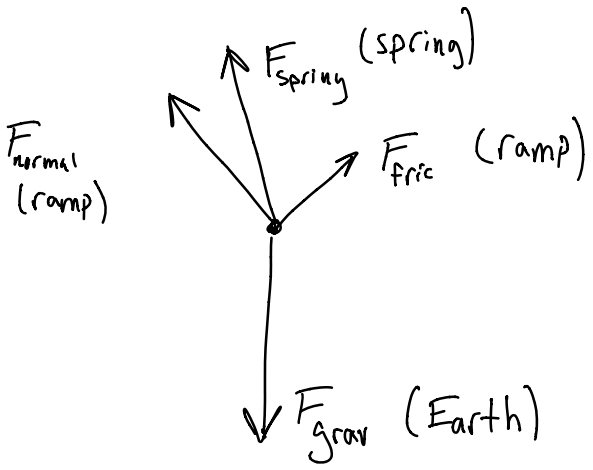
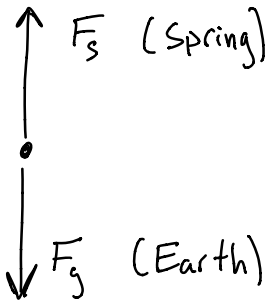
1)



2)

a)



a)

① System: hanging mass
Surr: Spring Earth

② F.B.D → see (a)

③

④ $\frac{d\vec{p}}{dt} = \vec{F}_{net}$

$$\frac{dp_x}{dt} = 0 = F_{net,x} = 0$$

$$\frac{dp_y}{dt} = F_{net,y}$$

$$F_{net,y} = F_s - F_g$$

$$\frac{dp_y}{dt} = m\frac{dv_y}{dt} = ma_y$$

$$ma_y = F_s - mg$$

$$F_s = m(a_y + g)$$

$$F_s = kS$$

$$s = \frac{F_s}{k} = \frac{m(a_y + g)}{k}$$

$$s = \frac{6\,kg}{600\,\frac{N}{m}} \left(4\,\frac{m}{s^2} + 9.8\,\frac{m}{s^2}\right) = 0.138\ m$$