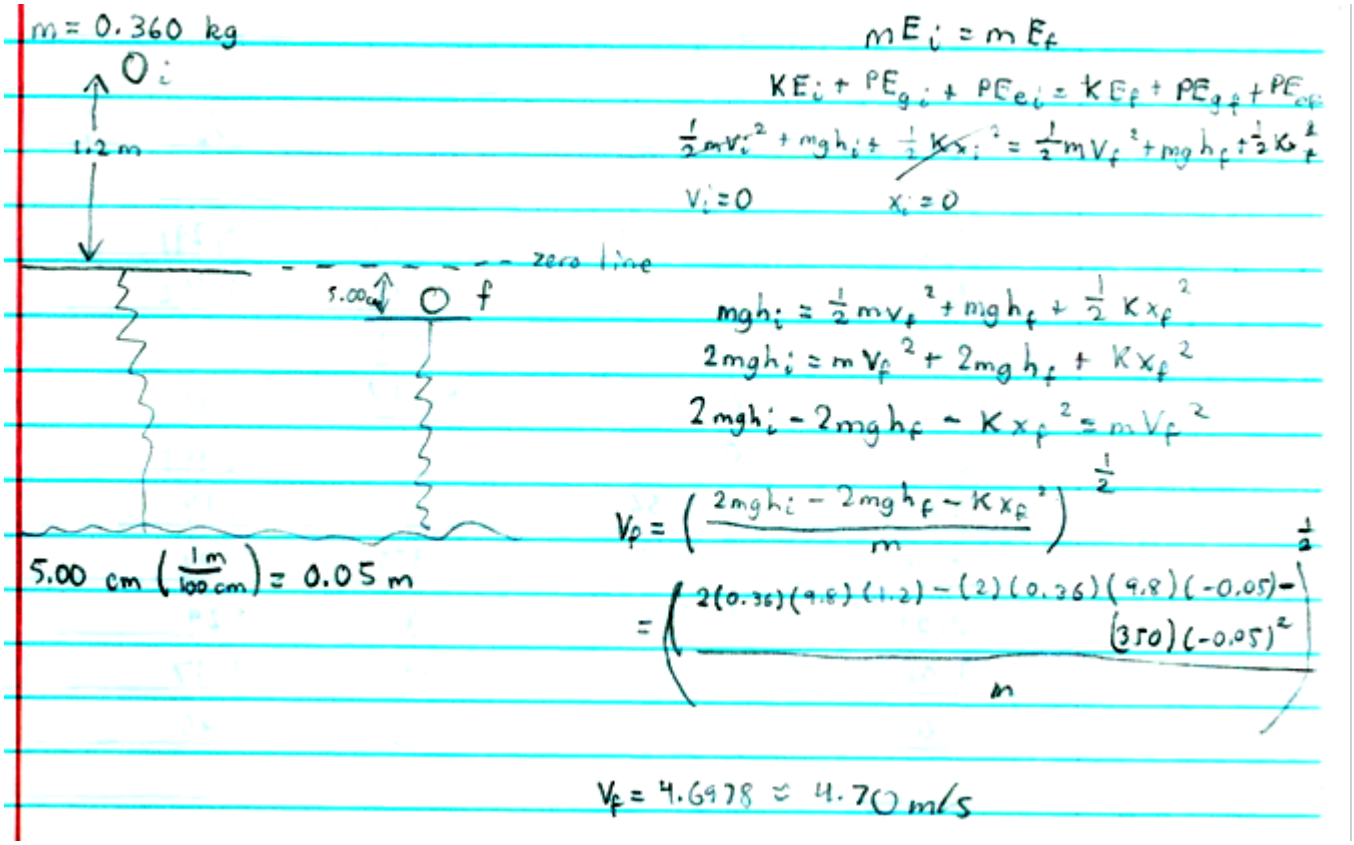
Video Lecture FOS4
A Basic Conservation of Energy Problem including a Spring
Thank You, Sangini Tolia, for these notes.



$$mE_i = mE_f$$

$$KE_i + PE_{g_i} + PE_{e_i} = KE_f + PE_{g_f} + PE_{e_f}$$

$$\frac{1}{2}mv_i^2 + mgh_i + \frac{1}{2}kx_i^2 = \frac{1}{2}mv_f^2 + mgh_f + \frac{1}{2}kx_f^2$$

$v_i = 0$ $\quad x_i = 0$

$$mgh_i = \frac{1}{2}mv_f^2 + mgh_f + \frac{1}{2}kx_f^2$$

$$2mgh_i = mv_f^2 + 2mgh_f + kx_f^2$$

$$2mgh_i - 2mgh_f - kx_f^2 = mv_f^2$$

$$v_f = \left(\frac{2mgh_i - 2mgh_f - kx_f^2}{m}\right)^{\frac{1}{2}}$$

$$= \left(\frac{2(0.36)(9.8)(1.2) - (2)(0.36)(9.8)(-0.05) - (350)(-0.05)^2}{m}\right)^{\frac{1}{2}}$$

$$v_f = 4.6978 \approx 4.70 \text{ m/s}$$