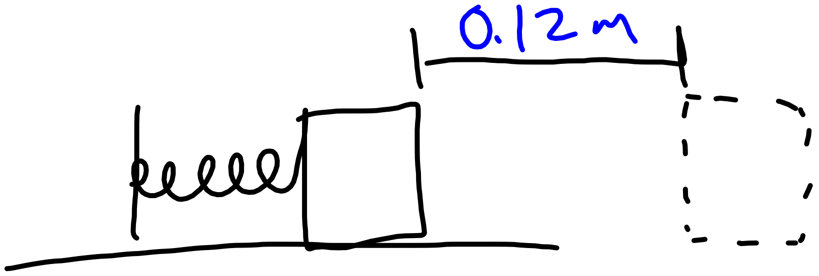
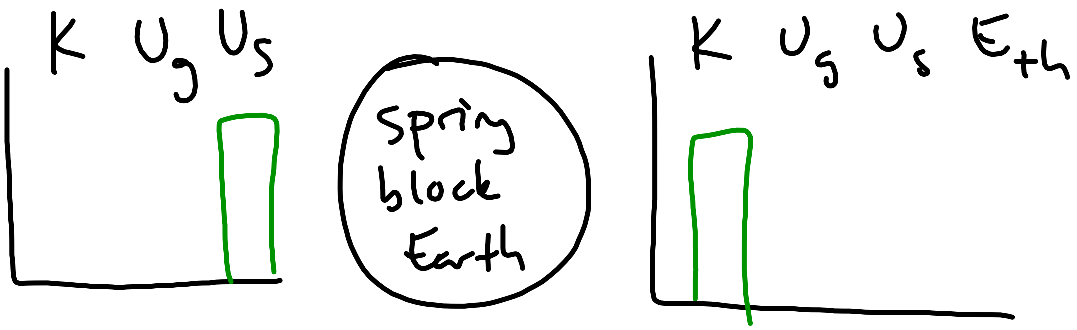
Practice - Energy and Work

4)





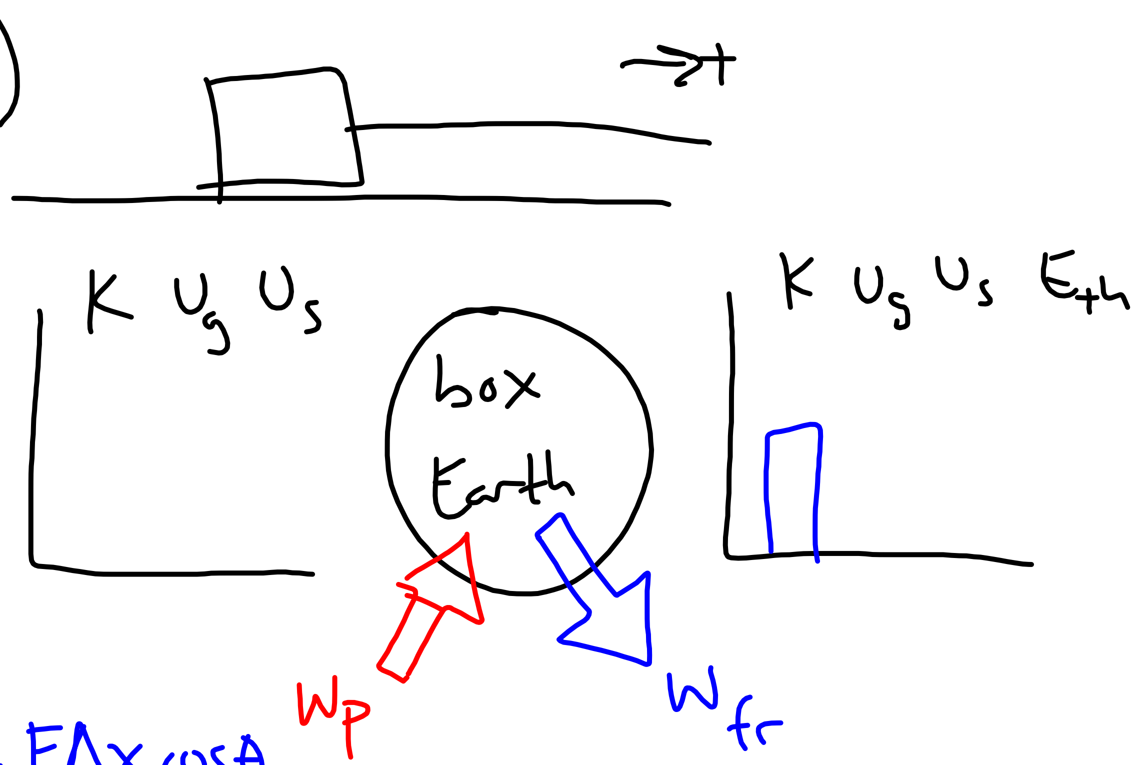
$$U_{s_i} = K_f$$

$$\frac{1}{2} k (\Delta x)^2 = \frac{1}{2} m v_f^2$$

$$v_f = \sqrt{\frac{k}{m} (\Delta x)^2}$$

$$= 3.1 \text{ m/s}$$

5)



$W_{fr} = F_f \Delta x \cos\theta$

$= \mu m a_g \Delta x \cos\theta$

$= (0.2)(10\,kg)(9.8\,m/s^2)\cos(180°)(3\,m)$

$= -59\,J$

$W_p = W_{fr} + K_f$

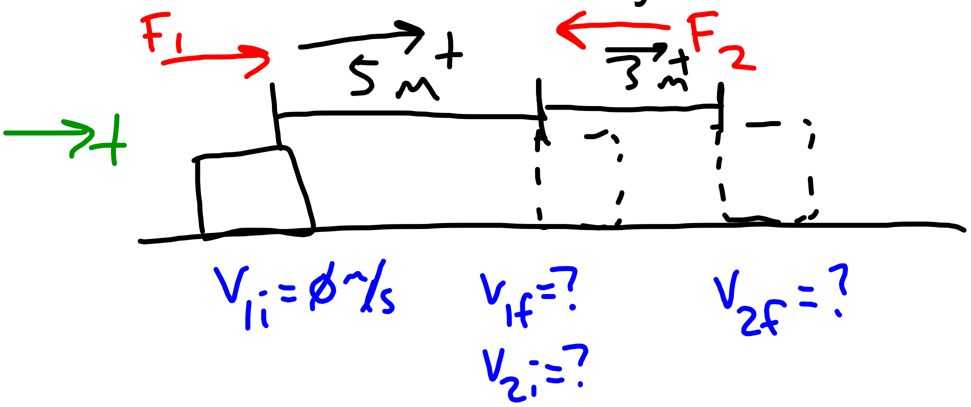
$F_p \Delta x = F_f \Delta x + \frac{1}{2} m v_f^2$

$F_p \Delta x - F_f \Delta x = \frac{1}{2} m v_f^2$

$v_f = \sqrt{\frac{2}{m}(F_p \Delta x - F_f \Delta x)}$

$= 2.5\,m/s$

A 1 kg block at rest on a frictionless surface is pushed with a force of 20 N for a displacement of +5 m. The block is then pushed in the opposite direction with a force of 10 N for 3 m. What is the final velocity of the block?

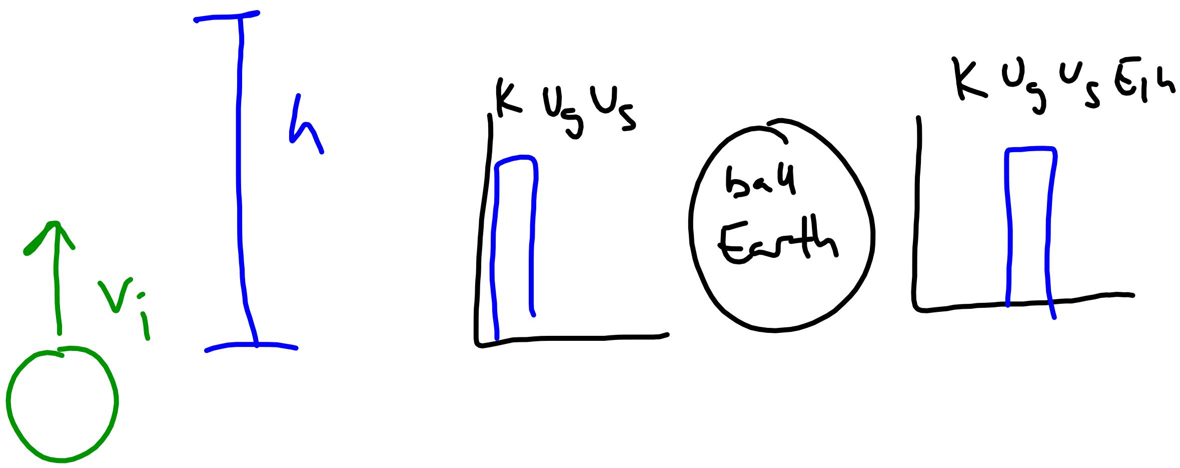


$$W_1 - W_2 = K_f$$

$$F_1 \Delta x_1 - F_2 \Delta x_2 = \frac{1}{2} m v_f^2$$

$$v_f = \sqrt{\frac{2}{m}\left(F_1 \Delta x_1 - F_2 \Delta x_2\right)}$$

$$= 11.83 \text{ m/s}$$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