

Law of Conservation of Energy

$$E_{total} = E'_{total}$$

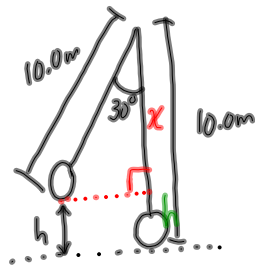
$$E_g + E_e + E_k = E'_g + E'_e + E'_k$$

Recall:

$$E_k = \frac{1}{2}mv^2$$

$$E_g = mgh$$

$$E_e = \frac{1}{2}kx^2$$



To find x:

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\cos 30^\circ = \frac{x}{10.0m}$$

$$x = (10.0m) \cos 30^\circ$$

$$x = 8.7m$$

To find the height:

$$h = 10.0m - 8.7m$$

$$h = 1.3m$$

top bottom

$$E_{total} = E'_{total}$$

$$E_g + \cancel{E_k} = \cancel{E_g} + E'_k$$

$$\cancel{mgh} = \frac{1}{2}mv^2 \leftarrow \text{solve for } v$$

a) $E_g \text{ (at top)} = (315 \text{ kg})(9.81 \text{ m/s}^2)(1.3 \text{ m}) = 4.1 \times 10^3 \text{ J}$

b) $E_k \text{ (bottom)} = 4.1 \times 10^3 \text{ J}$ (ALL the PE is converted into KE)

c) find v: $E_k = \frac{1}{2}mv^2$

$$v^2 = \frac{2E_k}{m}$$

$$v^2 = \frac{2(4.1 \times 10^3 \text{ J})}{(315 \text{ kg})}$$

$$v = 5.1 \text{ m/s}$$

For HW: PP/287/finish!