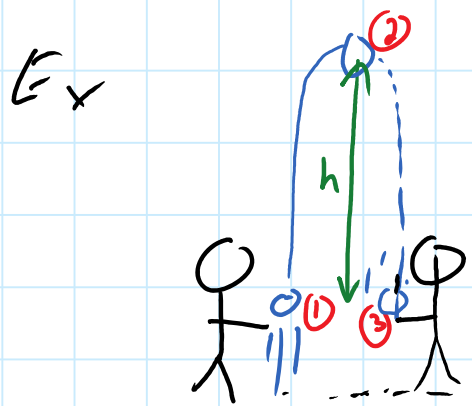


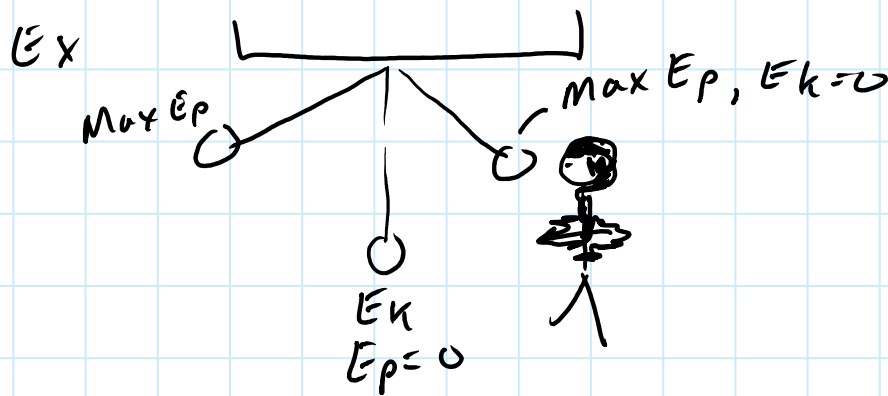
Conservation of Energy

Wednesday, December 14, 2016 8:59 AM



- ① E_k due to velocity, $E_p = 0$ relative to hand
- ② $v = 0$ so $E_k = 0$, $E_p = mgh$
- ③ $E_p = 0$, E_k cause it's moving

$E_k \rightarrow E_p \rightarrow E_k$



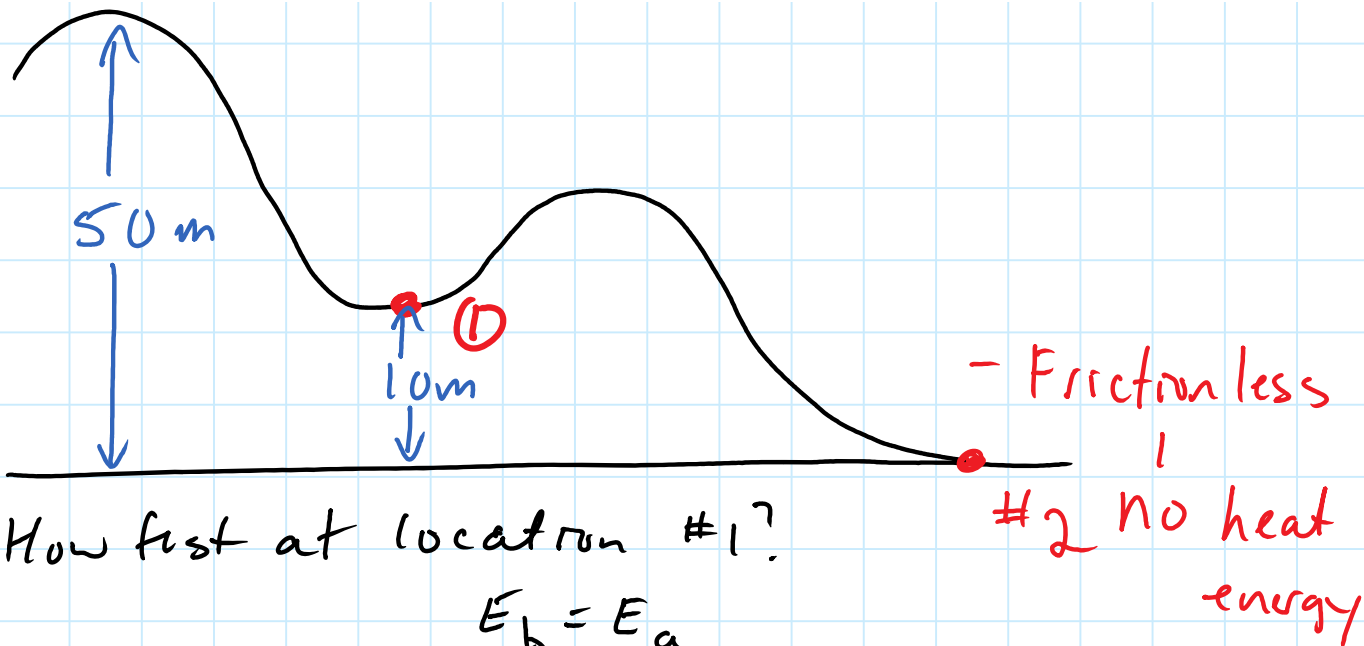
$E_p \rightarrow E_k \rightarrow E_p$

Energy of object has been transferred from one form (type) to another.

Energy can not be created or destroyed
 It can only change form: Conservation of Energy

$E_b = E_a$

$m = 100 \text{ kg}$
 $v = 10 \text{ m/s}$



How fast at location #1?

$$E_b = E_a$$

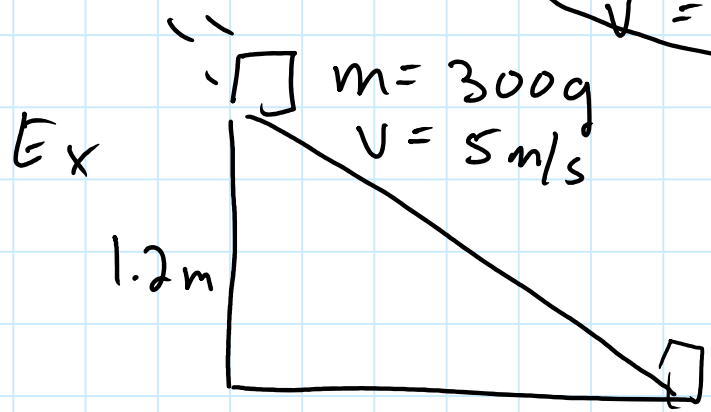
$$\underbrace{\frac{1}{2}(100)(10)^2}_{\text{red}} + \underbrace{(100)(9.8)(50)}_{\text{green}} = \underbrace{\frac{1}{2}(100)v^2}_{\text{red}} + \underbrace{(100)(9.8)(10)}_{\text{green}}$$

$$\underbrace{5000 \text{ J} + 49000 \text{ J}}_{-9800} = 50v^2 + \underbrace{9800 \text{ J}}_{-9800}$$

$$\frac{44200 \text{ J}}{50} = \frac{50v^2}{50}$$

$$884 = v^2$$

$$v = 30 \text{ m/s}$$



Find the velocity of the box at the bottom of the ramp if 4 J of heat energy is produced by friction

$$E_b = E_a$$

$$E_p + E_k = \cancel{E_p} + E_k + E_H$$

$$(.3 \text{ kg})(9.8)(1.2) + \frac{1}{2}(.3)(5)^2 = \frac{1}{2}(.3)v^2 + 4 \text{ J}$$

$$3.5 \text{ J} + 3.75 \text{ J} = .15v^2 + 4 \text{ J}$$

$$\frac{3.25 \text{ J}}{.15} = \frac{.15v^2}{.15}$$

$$21.6 = v^2, \quad v = 4.7 \text{ m/s}$$