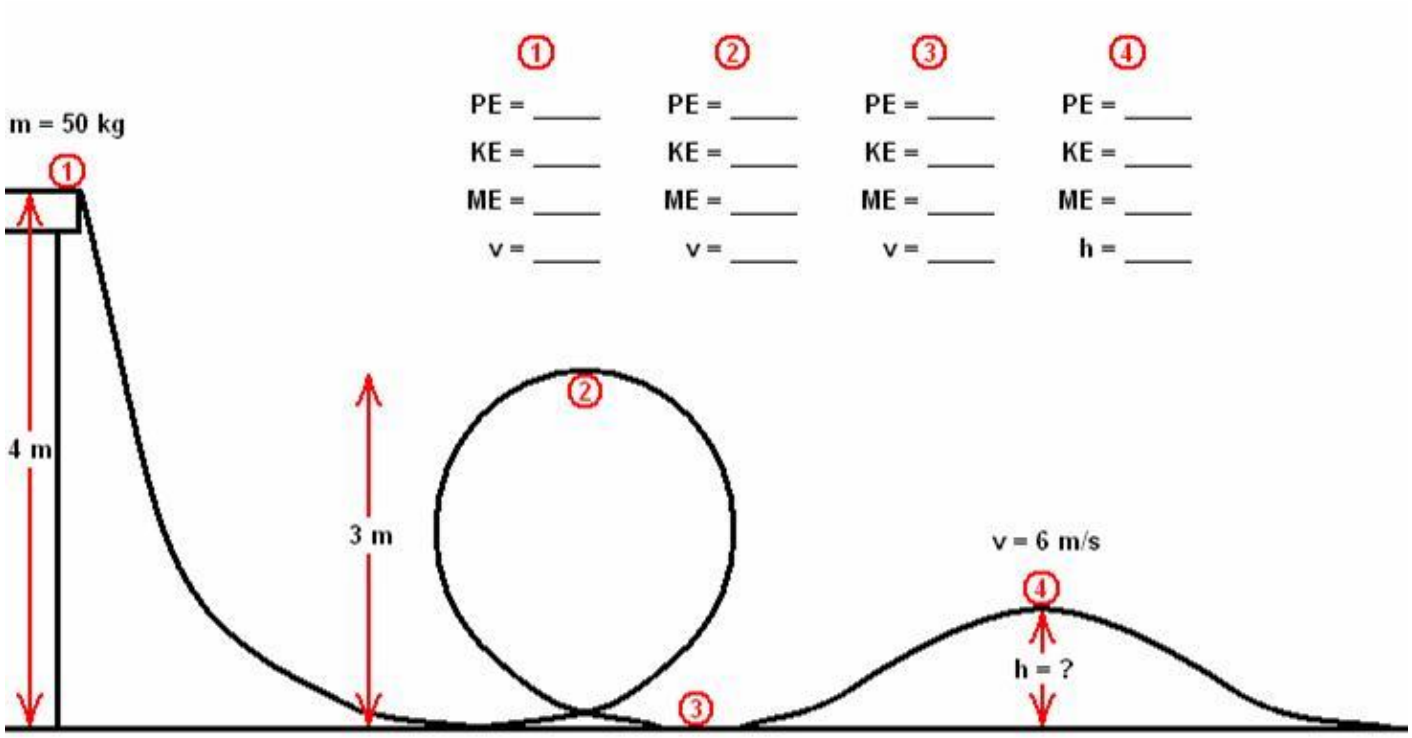
WARM UP *04.02.18*

1. Use conservation of energy to fill in the blanks for the diagram below. Show all of your work!



Point 1:

$$E_P = mgh = (50\text{ kg})\left(9.80\ {}^{\text{m}}/_{\text{s}^2}\right)(4\text{ m}) = \boxed{1960\text{ J}}$$

$$E_K = \frac{1}{2}mv^2 = \boxed{0\text{ J}} \rightsquigarrow \boxed{v = 0\ {}^{\text{m}}/_{\text{s}}}$$

$$ME = E_K + E_P = \boxed{1960\text{ J}}$$

Point 2:

$$\boxed{ME = constant = 1960\text{ J}}$$

$$E_P = mgh = (50\text{ kg})\left(9.80\ {}^{\text{m}}/_{\text{s}^2}\right)(3\text{ m}) = \boxed{1470\text{ J}}$$

$$ME = E_K + E_P \rightsquigarrow E_K = ME - E_P = 1960\text{ J} - 1470\text{ J} = \boxed{490\text{ J}} = \frac{1}{2}mv^2$$

$$v = \sqrt{\frac{2E_K}{m}} = \sqrt{\frac{2(490\text{ J})}{(50\text{ kg})}} = \boxed{4.4\ {}^{\text{m}}/_{\text{s}}}$$

Point 3:

$$\boxed{ME = constant = 1960\text{ J}}$$

$$E_P = mgh = (50\text{ kg})\left(9.80\ {}^{\text{m}}/_{\text{s}^2}\right)(0\text{ m}) = \boxed{0\text{ J}}$$

$$\boxed{E_K = 1960\text{ J}} = \frac{1}{2}mv^2$$

$$v = \sqrt{\frac{2E_K}{m}} = \sqrt{\frac{2(1960\text{ J})}{(50\text{ kg})}} = \boxed{8.9\ {}^{\text{m}}/_{\text{s}}}$$

Point 4:

$$\boxed{ME = constant = 1960\ \text{J}}$$

$$E_K = \frac{1}{2}mv^2 = \frac{1}{2}(50\ \text{kg})(6\ {}^{\text{m}}/_{\text{s}})^2 = \boxed{900\ \text{J}}$$

$$ME = E_K + E_P \rightsquigarrow E_P = ME - E_K = 1960\ \text{J} - 900\ \text{J} = \boxed{1060\ \text{J}} = mgh$$

$$h = \frac{E_P}{mg} = \frac{1060\ \text{J}}{(50\ \text{kg})\left(9.80\ {}^{\text{m}}/_{\text{s}^2}\right)} = \boxed{2.2\ \text{m}}$$