PHYS101.13
QUIZ#7- CHAPTER 8
DATE: 5/5/09

Name: Key Id#:

A 3.0 kg block is released from a compressed spring (k=120 N/m). It travels over a horizontal surface (μ_k =0.20) and comes to rest after traveling a distance of 2.0 m. How far was the spring compressed before being released?

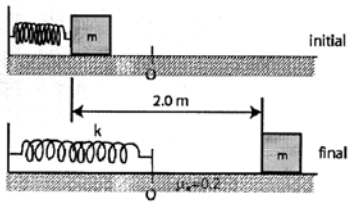

Figure 1

$$\Delta K^{\nearrow 0} + \Delta U_s = W_{f_k} = -\mu_k mg\,d$$

$$-\frac{1}{2}kx^2 = -\mu_k mg\,d$$

$$x = \sqrt{\frac{2\mu_k mg\,d}{k}} = 0.4\ m$$

$$= \boxed{40\ cm}$$

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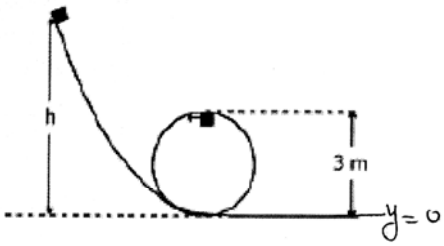
A block is released from rest at a height h = 6.0 m along a frictionless loop-the-loop with a diameter of 3.0 m. Calculate the speed at
(a) the bottom of the loop.
(b) the top of the loop.



a) $\Delta K + \Delta U_g = 0$

$\frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2 + mg(y_f - y_i) = 0$

$\frac{1}{2} m v_f^2 - mgh = 0$

$v_f = \sqrt{2gh} = \boxed{10.8 \text{ m/s}}$

b) $\frac{1}{2} m v_f^2 - mg(y_f - y_i) = 0$

$y_f = (h - 2R)$, $y_i = h$

$\frac{1}{2} m v_f^2 + 2mgR = 0$

$v_f = \sqrt{4gR} = \boxed{7.7 \text{ m/s}}$

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QUIZ#7- CHAPTER 8
DATE: 3/5/09

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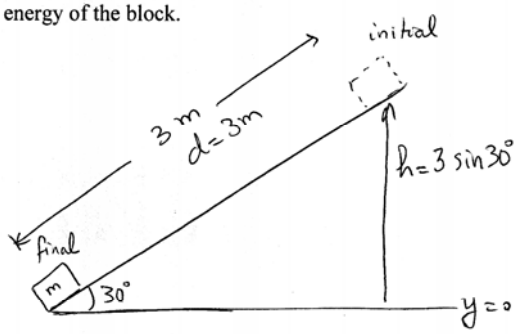
A 2.0 kg block starts from rest on a rough inclined plane that makes an angle of 30° above the horizontal. The coefficient of kinetic friction between the incline and the block is 0.25. As the block moves 3.0 m down the plane, calculate the change in the mechanical energy of the block.



$\Delta E = \Delta K + \Delta U_g = W_f = -\mu_k F_N d$

$\Delta E = -\mu_k (mg \cos 30^\circ) d = \boxed{-10.2\ J}$

Energy is lost due friction ⇒ mechanical energy decreases!