

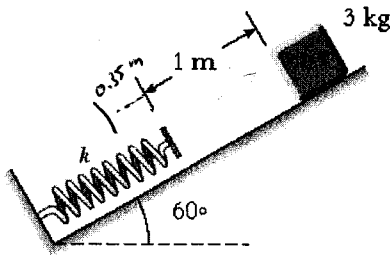
Phys101 Quiz # 5 (Ch.8) sec # 39

Name: \_\_\_\_\_

key

ID # \_\_\_\_\_

A 3-kg mass starts from rest and slides a distance  $d = 1$  m down a rough  $60^\circ$  incline (coefficient of kinetic friction  $\mu_k = 0.1$ ), where it contacts an unstressed spring as shown in the figure. The mass slides an additional 35 cm as it is brought to rest by compressing the spring. Find the spring constant of the spring.



$$F_N = mg \cos 60$$

$$\cancel{\Delta K} + \Delta U_g + \Delta U_s + \Delta E_{th.} = \cancel{W_{ext}}$$

$$mg(y_f - y_i) + \frac{1}{2}k(x_f^2 - x_i^2) + f_k d = 0$$

$$-mg(1.35 \sin 60) + \frac{1}{2}k(0.35^2) + \mu_k F_N d = 0$$

$$-3(9.8)(1.35 \sin 60) + \frac{1}{2}k(0.35^2) + 0.1(3)(9.8) \cos 60 (1.35) = 0$$

solve for  $k$  to get:

$$k = 529 \frac{N}{m}$$