PS150.01 **Physics I** **Exam #2**

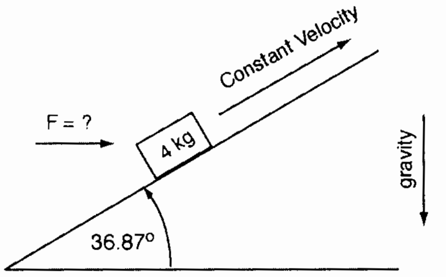
November 8, 2006

Show your work

____
Name

10 points

1. A 4-kg block is moving up a frictionless incline plane at constant velocity as shown in the figure. It does so with the assistance of an external force *F*.



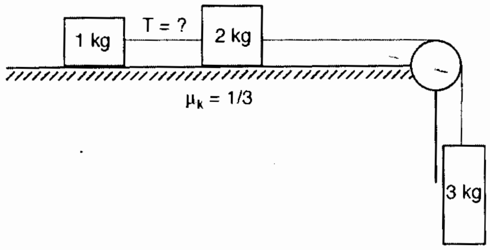
a. Draw a free-body diagram showing all the forces acting on the 4-kg block.

b. Calculate the force required to keep the block moving up the incline plane at constant velocity.

F = __________ N

15 points

2. Three masses are connected with massless strings as shown in the figure to the right. The 3-kg mass accelerates the other two masses across a horizontal surface with a kinetic coefficient of friction $\mu_k = 1/3$.



a. Calculate the acceleration of the 3-mass system.

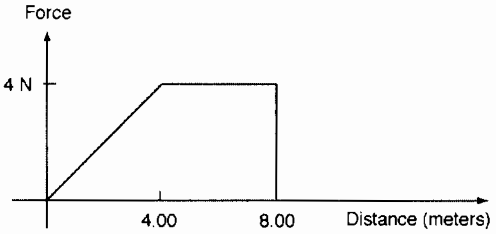
a = __________ m/s^2

b. Calculate the tension between blocks 1 and 2.

T = __________ N

10 points

3. A force is applied to a 2.0-kg mass on a horizontal frictionless surface according to the *force diagram* shown in the figure at the right. If the mass is initially at rest at $x = 0.0$ meters,



a. What is its velocity at $x = 4.0$ meters?

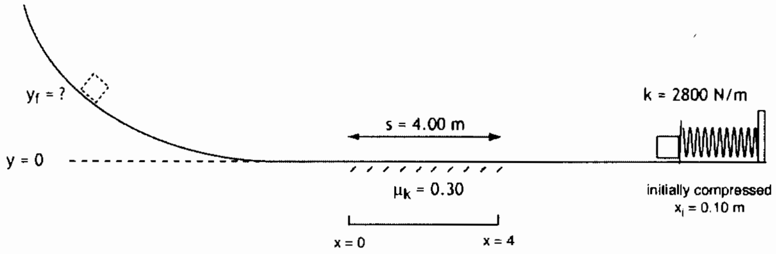
$v =$ __________ m/s

b. What is its velocity at $x = 8.0$ meters?

$v =$ __________ m/s

15 points

4. A 1.0-kg mass is initially at rest in a spring that is compressed a distance of 10.0 cm. The mass is released and moves to the left crossing a friction pad ($\mu_k = 0.30$) 4.0 meters long.



a. How high does the 1.0-kg mass rise up the frictionless ramp on the left-hand side of the figure?

y = __________ meters

b. The 1.0-kg mass oscillates back-and-forth across the friction-pad. Where along the friction-pad does it come to rest?

x = __________ meters