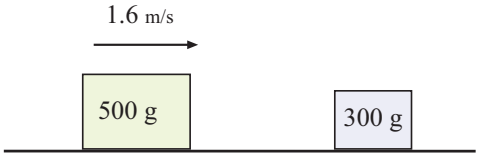
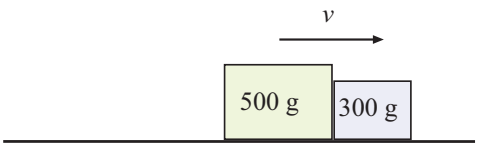
Name_____

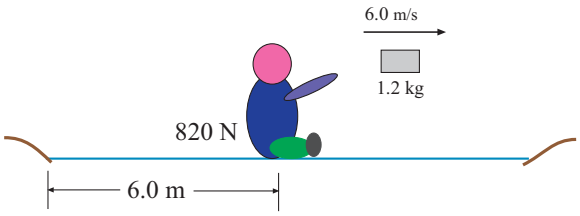
Phys 2010 (NSCC), Spring 2007
Problem Set #7

1. A 500 g cart moves to the right on a one-dimensional track with a speed of 1.6 $\frac{\text{m}}{\text{s}}$; it strikes and sticks to a 300 g cart which is at rest. What is the speed of (combined) mass after the collision?

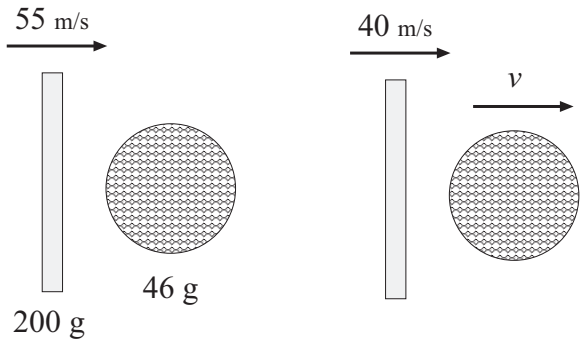




2. A 820-N man (that's his *weight*) sits in the middle of a frozen pond of radius 6.0 m. He is unable to get to the other side because of a lack of friction between his posterior and the ice. To overcome this difficulty, he throws his 1.2-kg physics textbook horizontally toward the north shore at a speed of 6.0 $\frac{\text{m}}{\text{s}}$. How long does it take him to reach the south shore?



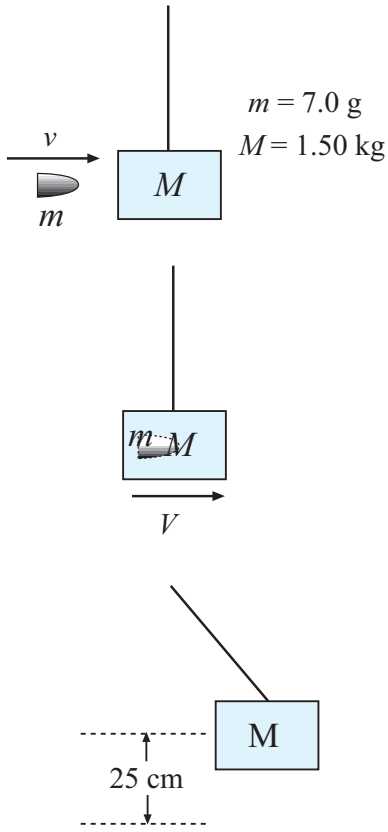
3. High-speed photographs show that the head of a 200-g golf club is traveling at $55\,\frac{\text{m}}{\text{s}}$ just before it strikes a 46-g golf ball at rest on a tee. After the collision, the club head travels (in the same direction) at $40\,\frac{\text{m}}{\text{s}}$. Find the speed of the golf ball just after impact.



4. Find the total kinetic energy of the objects before and after the collision in problem 3. How much kinetic energy was lost?

5. A 7.0-g bullet is fired into a 1.5-kg ballistic pendulum. The bullet sticks in the block and the block rises to a maximum height of 25 cm.

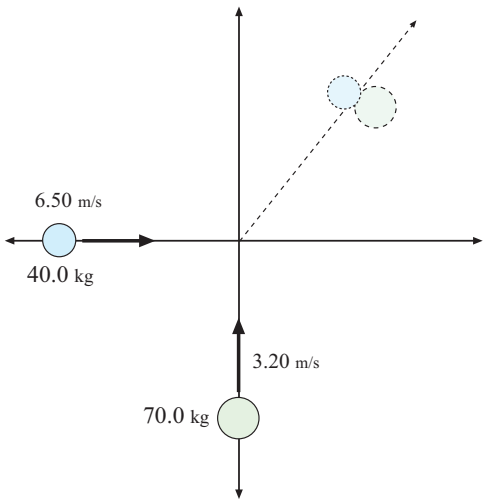
Using energy conservation, find the speed which the pendulum bob (and embedded bullet) must have had just after the collision.



6. In Problem 5, find the initial speed of the bullet.

7. On a frictionless surface, a 40.0 kg mass is moving in the $+x$ direction with a speed of 6.50 $\frac{\text{m}}{\text{s}}$ and a 70.0 kg mass is in the $+y$ direction with a speed of 3.20 $\frac{\text{m}}{\text{s}}$; they collide and stick together.

Find the velocity components (v_x and v_y) of the combined mass after the collision



8. In problem 7 find the speed and direction of motion of the combined mass after the collision.