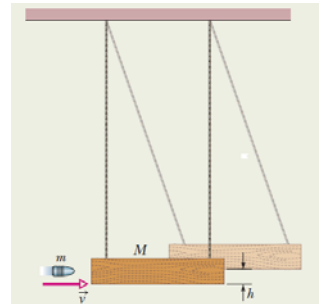


## Chapter 8

### Example Problems

1. A block of mass 2.0 kg is sitting at the origin of a coordinate system. Another block of mass 5.0 kg is moving in the positive  $x$ -direction towards the first block at a speed of 10.0 m/s. After the two blocks collide, the velocity of the first block is measured to be 5.0 m/s. What is the speed of the second block after the collision? What is the impulse for the first and second block during the collision?

2. The ballistic pendulum was used to measure the speeds of bullets before electronic timing devices were developed. The one shown in the figure consists of a large block of wood of mass  $M = 5.4$  kg, hanging from two long cords. A bullet of mass  $m = 9.5$  g is fired into the block, coming quickly to rest. The block and bullet when swing upward, their center of mass rising a vertical distance  $h = 6.3$  cm before the pendulum comes momentarily to rest at the end of its arc. What is the speed of the bullet before the collision?



3. In the figure, particle 1 is an alpha particle and particle 2 is an oxygen nucleus. The alpha particle is scattered at angle  $\theta_1 = 64.0^\circ$  and oxygen nucleus recoils with speed  $1.20 \times 10^5$  m/s and at an angle of  $\theta_2 = 51.0^\circ$ . In atomic mass units, the mass of alpha particle is 4.00u and the mass of the oxygen nucleus is 16.0u. What is the final speed of the alpha particle?

