v

2.00 m/s

3M

M

M

3M

Before

After

Two blocks of mass M and $3M$ are on a horizontal frictionless surface. A light spring is attached to one of the masses and the blocks are pushed together and connected with a cord. If the rope is severed, the $3M$ block moves to the right with a speed of 2 m/s. What is the speed of the block of mass M? What was the original elastic energy stored in the spring if $M = 0.350$ kg?
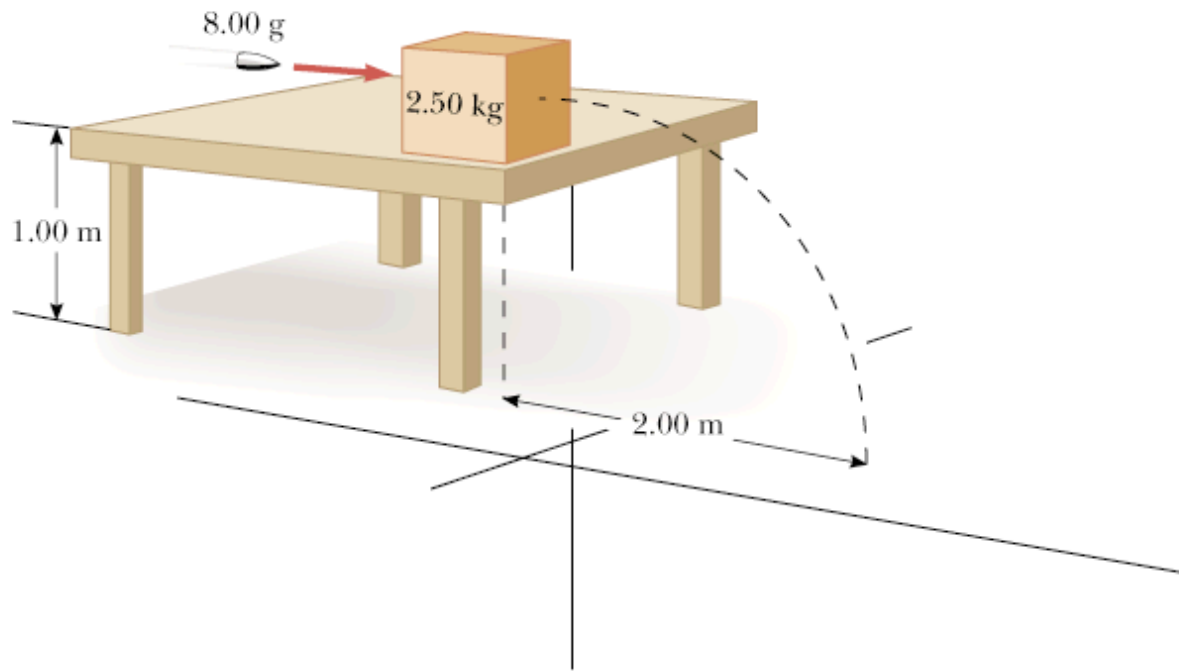
An 8 g bullet is fired into a 2.5 kg block that is initially at rest on the edge of a frictionless table. The bullet remains in the block after the impact and the block lands 2 m from the end of the table as shown. What is the initial speed of the bullet?

A 30g tennis ball strikes a wall at an angle of 60° with respect to the surface with an initial speed of 10 m/s. If the ball bounces off of the wall with the same speed and the same angle, what is the change in momentum of the ball? If the ball is in contact with the wall for 0.2 s, what is the force exerted on the ball by the wall? On the wall by the ball?
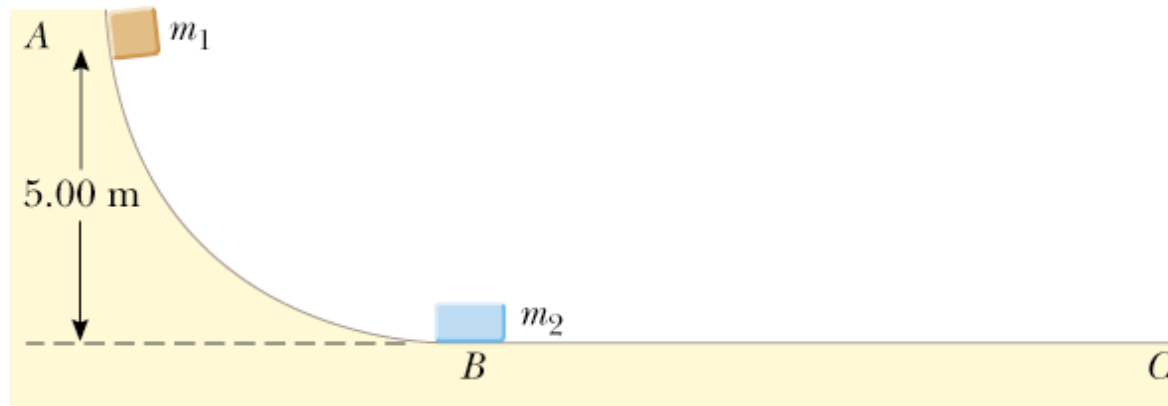
Consider the frictionless track ABC as shown above. A block of mass m_1 = 5kg is released from rest at A. It makes a head-on collision at B with a block of mass m_2 = 10 kg which is at rest. After the collision, how high does m_1 rise back up the ramp?
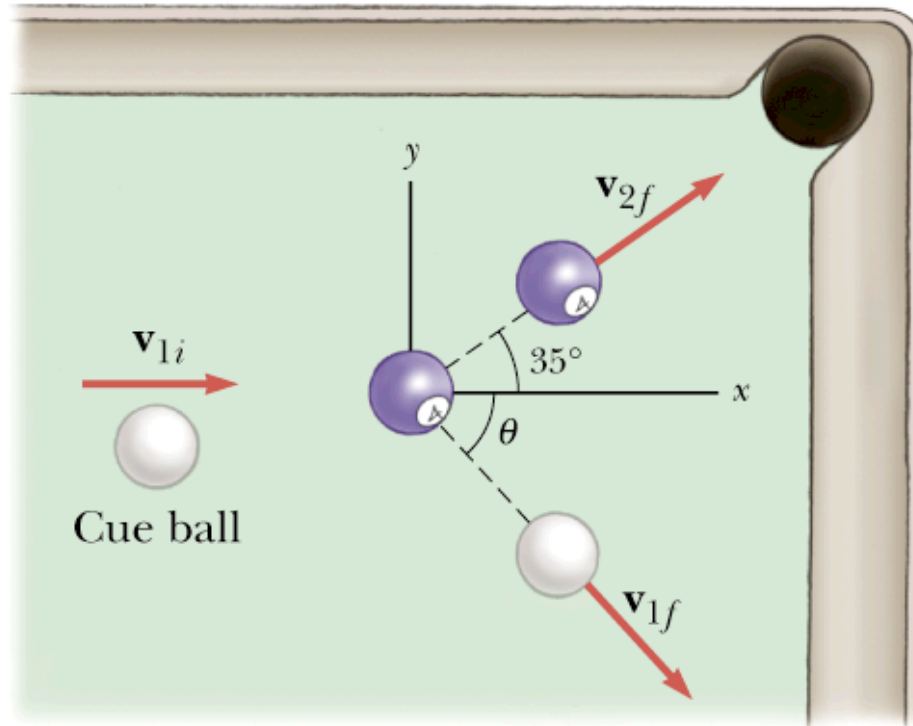
In the game of pool, a player wishes to sink a target ball in the corner pocket as shown. If the angle to the corner pocket is 35º, at what angle θ is the cue ball deflected? Assume that friction and the rotational motion of the ball are unimportant and the collision is elastic.

(25.0i) m/s

(20.0j) m/s
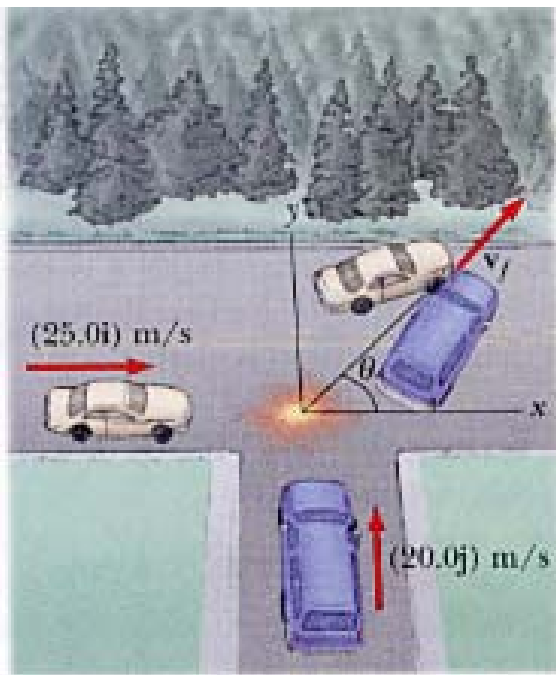
An 1800 kg car traveling with a speed of 25 m/s due east collides at an intersection with a 2500 kg van traveling at a speed of 20 m/s due north.

What is the magnitude and direction of the velocity of the car/van combination?

25.0 m/s   20.0 m/s

18.0 m/s   v

Before
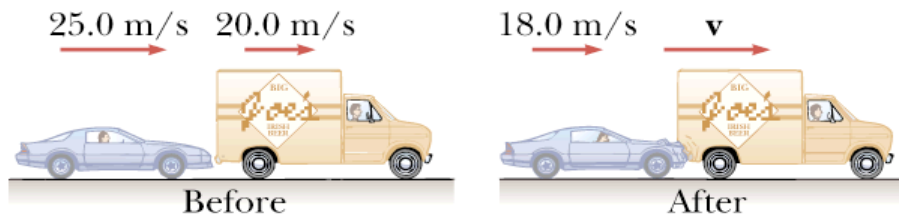
After

A 1200 kg car traveling due east collides with a 9000 kg truck with the speeds indicated.

What is the velocity of the truck right after the collision. How much mechanical energy is lost in the collision?