LESSON OBJECTIVES
1. Determine velocities of an inelastic collision using conservation of momentum.
2. Determine velocities of an elastic collision using conservation of momentum and conservation of kinetic energy
3. Determine impact forces using impulse-momentum.

In-Class
Determine the peak magnitude of force $F_0$, neglecting friction.
Given: A horizontal force $F(t)$ is applied for 0.2 seconds to a cue ball that weighs 0.55 lbs, resulting in a velocity of 8 ft/sec in the ball.

Homework (due Friday)
1. A 50-lb box is at rest before a force $F(t)=5 + 2t$ pounds is applied for 10 seconds, causing it to slide. Determine the velocity at $t = 10$, if
   a. The coefficient of friction is zero,
   b. The coefficient of friction is 0.2.
   Hint: the box will not move at first. You must consider the net force in order to assess the motion.

2. Two railroad cars are coupled by a collision. The coupling takes place over a period of 0.6 seconds, after which the cars move as a unit. Determine:
   a. The final velocity of the cars, moving together.
   b. The average impulsive force, when coupling occurs.

3. A truck weighing 40000lbs is moving at 35 mph when it strikes a 4000lb car in front of it that is moving 30 mph. Because the speed difference is small, the collision is elastic, causing the vehicles to bounce off one another.
   a. Determine the velocities of both vehicles, after the collision using units of mph, specifying their directions.
   b. If possible, determine the average force of collision (units: kips). If it is not possible to determine this force, report the information that you would need to know in order to determine this average force.