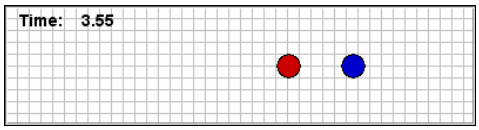
# *Worksheet for Exploration 8.2: An Elastic Collision*




The animation shows an elastic collision between two masses **(position given in centimeters and time given in seconds)**.

a. **Set the initial velocity of the blue ball to zero**. For the three conditions of the relative masses of the blue and red balls shown in the table, PREDICT what value (or values) of the initial velocity of the red ball will result in...
   i. Fill out the table (predictions).

1. both balls moving to the right after the collision.
2. the red ball stopping after hitting the blue ball.
3. the red ball moving to the left after the collision and the blue ball moving to the right after the collision.

| **Enter the range of initial velocity values for red ball that results in...** | 1 | 2 | 3 |
|---|---|---|---|
| $m_{red} = m_{blue}$ | | | |
| $m_{red} = 2*m_{blue}$ | | | |
| $m_{red} = 0.5*m_{blue}$ | | | |

AFTER you have made your predictions, test them using the animation. Were you correct? If not, explain.

b. Now set the initial velocity of the blue ball to -20 cm/s, the initial velocity of the red ball to 5 cm/s, and the masses equal. PREDICT the direction each ball be traveling after impact. AFTER you have made your prediction, try it. Were you correct? If not, explain.

Predicted direction Red_____

Predicted direction Blue_____

Measured direction Red_____

Measured direction Blue_____

c. Set the initial velocity of the blue mass to -10 cm/s and the red mass to half the mass of the blue ball. PREDICT the velocity the red mass must have in order to completely stop the blue mass when they collide. Now try it, were you correct? If not, explain.

i. $V_{red}$=_____

ii. Check your conservation laws and make sure momentum and kinetic energy are conserved for this elastic collision. Assume the mass of the blue ball is 1.00 kg.

d. Set the initial velocity of the blue mass to -10 cm/s and the red mass to twice the mass of the blue ball. PREDICT the velocity the red mass must have in order to completely stop the blue mass when they collide. Now try it, were you correct? If not, explain.

$V_{red}$=_____