NAMES: _____ _____ _____

Conservation of Momentum Lab

Score: _____/10

Getting Started:

1. Go to the web site http://library.thinkquest.org/27948/collision.html
2. Fill in the **Before** section of the table for the values initially given. Calculate the momentum before the collision.
3. Hit the Start button and run the simulation. Record the results in the table below.
4. Repeat the experiment by using different values for mass and velocity. Try some negative velocities for wagon 2. Do not exceed 1.0 kg or 0.5 m/s

Elastic Collisions											
Before						**After**					
Wagon 1			Wagon 2			Wagon 1			Wagon 2		
Mass (kg)	Velocity (m/s)	Momentum (kg m/s)	Mass (kg)	Velocity (m/s)	Momentum (kg m/s)	Mass (kg)	Velocity (m/s)	Momentum (kg m/s)	Mass (kg)	Velocity (m/s)	Momentum (kg m/s)

5. Select the inelastic collision button. Repeat the experiment using different values. For the last simulation, set it up so that both carts come to rest in the center. Record the results in the table below.

Inelastic Collisions								
Before						**After**		
Wagon 1			Wagon 2			Wagon 1 & Wagon 2		
Mass (kg)	Velocity (m/s)	Momentum (kg m/s)	Mass (kg)	Velocity (m/s)	Momentum (kg m/s)	Mass (kg)	Velocity (m/s)	Momentum (kg m/s)

6. Select one measurement from the Elastic collision table and one measurement from the Inelastic collision table and show that $p_{before} = p_{after}$

7. Determine the final velocity for the following situation. Wagon 1 with mass = 400 g travelling at 0.4 m/s collides *inelastically* with wagon 2 of mass = 200g travelling at 0.2 m/s.

8. Using the Inelastic simulation to confirm your answer. Are you correct? _____
9. Determine the final velocity for the following situation. Wagon 1 with mass = 400 g travelling at 0.3 m/s collides *inelastically* with wagon 2 of mass = 200g travelling at -0.5 m/s.

10. Using the Inelastic simulation to confirm your answer. Are you correct? _____

Additional Momentum Problems:

1. A 30.0 kg object moving to the right at a velocity of 1.00 m/s collides with a 20.0 kg object moving to the left at a velocity of 5.00 m/s. If the 20.0 kg object continues to move left at a velocity of 1.25 m/s, what is the velocity of the 30.0 kg object?

2. A 4.50×10^3 kg railway car is moving east at a velocity of 5.0 m/s on a level frictionless track when it collides with a stationary 6.50×10^3 kg railway car. If the two cars lock together upon collision, how fast are they moving after the collision?

3. A 925 kg car moving at a velocity of 18.0 m/s right collides with a stationary truck of unknown mass. The two vehicles lock together as a result of the collision and move off at a velocity of 6.5 m/s. What is the mass of the truck?

4. A 50.0 g bullet strikes a 7.0 kg stationary wooded block. If the bullet becomes embedded in the block, and the block with the embedded bullet moves off at a velocity of 5.0 m/s, what was the initial velocity of the bullet?

5. A 76 kg student, standing at rest on a frictionless horizontal surface, throws a 0.20 kg object horizontally with a velocity of 22m/s left. What was the initial velocity of the student upon release of the object.

6. A 7.0 kg object at rest explodes into two parts. If part A has mass 2.0 kg and a velocity of 10.0 m/s right, what is the velocity of part B?

7. A 1.0×10^5 N truck moving at a velocity of 15 m/s north collides head on with a 1.0×10^4 N car moving at a velocity of 25 m/s south. If they stick together upon impact, what is the velocity of the combined masses?

8. A 225 g ball moves with a velocity of 30.0 cm/s to the right. This ball collides with a 125 g ball moving in the same direction at a velocity of 10.0 cm/s, After the collision the velocity of the 125 g ball is 24.0 cm/s to the right. What is the velocity of the 225 g ball after the collision?

Answers: 1. 1.50 m/s left, 2. 2.0 m/s east, 3. 1.65×10^3 kg, 4. 706 m/s, 5. 0.058 m/s right 6. 4.0 m/s left, 7. 11 m/s north, 8. 22.2 cm/s right