

Name: _____ Date: _____ Hour: _____

Momentum Lab

Purpose: To further understand momentum in 1 dimensional collisions.

Problem: How does a collision between marbles demonstrate the law of conservation of momentum? Will the momentum of a marble be conserved in this lab? For instance, if one marble crashes into other marbles, will a marble roll away from the collision (momentum transfer)?

Hypothesis:

Materials: 1 ruler with a groove in the middle, 5 regular marbles, 1 large marble or steel ball, 1 textbook, tape, 1 piece of PVC pipe or cardboard tube

Procedure (Part 1): Regular marble collisions:

1. Lay one end of PVC pipe on 1 book to make a ramp.
2. Tape the other end of the pvc pipe to the ruler without blocking off the end of the tube. This way the marble can still roll out.
3. Place 4 regular marbles on the middle of the ruler and make sure that they are touching.
4. Make a prediction in your data table for how many marbles you think will move or roll off of the ruler after the collision.
5. Carefully place your fifth marble in the PVC tube by the book and let it roll into the 4 marbles on the ruler. Record your result.
6. For each trial, observe what happens to the marble that rolled down the tube as well as the number of marbles moving after the collision.
7. Repeat this experiment by now placing 3 marbles on the ruler and two marbles in the tube. Again, make sure the marbles are in contact on the ruler and as the two marbles roll down the tube!
8. Complete the data table for the regular marble collisions.

Data Table (Part:1): Regular marble collisions:

Trial	Marbles in tube	Marbles on ruler	Marbles moving off of ruler	
			Prediction	Result
1	1	4		
2	2	3		
3				
4				
5				

Questions (Part 1): Regular marble collisions:

1. What happened when you rolled one regular marble down the tube to collide with the four marbles on the ruler? How many marbles moved off the ruler?
2. What happened when you rolled two marbles down to collide with three marbles on the ruler?
3. Was there a relationship between the number of marbles you rolled down the tube and the number that ran off the end of the ruler?
4. Was momentum conserved and how can you tell?

Procedure (Part 2): Regular marble vs. Large marble or steel ball:

1. Place the large marble on the ruler and roll one small marble down the tube at it.
2. What do you notice about the collision between the regular marble and large marble? Make visual observations!

Questions (Part 2): Regular marble vs. Large marble or steel ball:

1. What happened when you rolled the regular marble at the large marble or steel ball?
2. Considering the mass of the two objects, after the collision between the regular marble and the large marble, what speed did the large marble roll away with? Did it move as fast as the small marble rolled down the ramp? Why might it roll at a different speed than the small marble?
3. How do your answers from the above question relate to the law of conservation of momentum? Was momentum conserved and how could you tell?