Physical Science MOMENTUM LAB 2015 Date
Ms Toal Period
KJHS Name

The amount of MOMENTUM or "bashing power" that an object has depends on both its _____ and its _____. In this activity we'll see how an object's mass affects its bashing power.

OBJECTIVES:

Part A: If we increase mass, then momentum (bashing power) will increase.

Part B: If we increase ramp _____, then momentum will increase.

(increasing ramp _____ will increase speed, which will increase momentum, too)

PROCEDURE:

1. Set up the ruler on a smooth, level surface. Use a small piece of tape under the 30-cm end of the ruler to help hold it in positions on the supporting books.
2. The distance along the ruler from the starting point to the impact point should be 15 cm. Use three books stacked up together.
3. Place the 0 – cm end of the ruler on the table. Place the car at the edge of the ruler. Place a meter stick right up next to your car to measure the distance the car will travel.
4. Place a marble at the 15-cm mark (the starting point) and release it.
5. Determine how far the car moved by measuring (to the nearest .1 cm) the distance between the starting dot and the stopping point. Record your observation in the data table.
6. Measure the distance the paper car moves when it is hit by each different sized marble. Center the marble over the 15 – cm mark before release. Make three trial runs. Record these measurements in the data table.

PART A ***DROP MARBLE AT 15 – CM MARK

Number of marbles	Mass of marble (g)	Trial 1 (cm)	Trial 2 (cm)	Trial 3 (cm)	Average Distance
Small marble					
Med marble					
Large marble					

PART B ***RELEASE MARBLE AT DIFFERENT RAMP LENGTHS

Small marble	Trial 1 (cm)	Trial 2 (cm)	Trial 3 (cm)	Average (cm)
20 cm				
25 cm				
30 cm				
Med marble	Trial 1 (cm)	Trial 2 (cm)	Trial 3 (cm)	Average (cm)
20 cm				
25 cm				
30 cm				
Large marble	Trial 1 (cm)	Trial 2 (cm)	Trial 3 (cm)	Average (cm)
20 cm				
25 cm				
30 cm				

Write up questions:

1. What was the independent variable? _____
2. What was the dependent variable? _____
3. List three constants for this lab: _____
4. Which combination had the most momentum? (How far away, and what size marble created the paper car to move the farthest?) _____
   _____
   _____
5. Complete the following table to calculate momentum

Object	Mass (kg)	Velocity (m/s)	Momentum (kg-m/sec)
Blackbird	0.04	19	
Football player	100	10	
Skier	60	20	
Bullet	0.004	600	
Frog	0.9	12	
Meteorite	0.1	1,000	
Baseball	0.14	30	
Rocket	36,000	1,800	
Wagon	2	3	
Satellite	3,000	8,000	

6. **<u>Complete the following – show your work and box your answers: units are (g)(m/s)</u>**
   a) A golf ball travels at 16 m/s, while a baseball moves at 7 m/s. The mass of the golf ball is 0.0045 kg (4.5 g) and the mass of the baseball is 0.14 kg (140g). Which has a greater momentum?

   b) What's the momentum of a bird with a mass of 18 g flying at 15 m/s?

   c) How is it possible for a tiny bullet to have more momentum than a huge boulder?