

Momentum Bashing



Crash test question(s)

- What determines if one car has more momentum than another in a two-car collision?
- Does increasing an object's mass increase its momentum?

Purpose

- To determine if increasing mass increases momentum
- To describe automobile technologies that reduce the risk of injury in a collision

Materials needed

For each group:

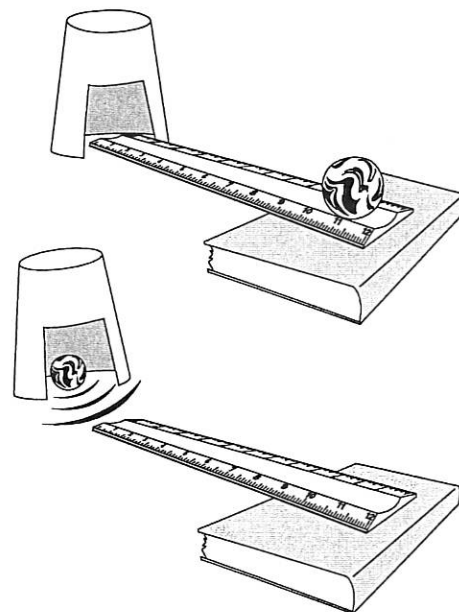
- ruler with center groove
- 4 marbles, same size
- 5-ounce (148 ml) paper cup
- scissors
- meter sticks (2)
- book to support track (3–4 cm height)

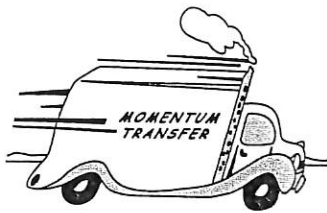
Discussion

To better understand what happens in a crash, it helps to see how force, inertia, and speed are related in a property called momentum. The amount of momentum, often referred to as "oomph" or "bashing power," that an object has depends on its mass and its velocity. In this activity you will investigate how an object's mass affects its "bashing power!"

Procedure

1. Cut a 3.0 cm square section from the top of the paper cup.
2. Place the ruler with one end on a textbook (approximately 3.0 cm height) and the other end resting on the desk.
3. Place the 3.0 sq. cm opening of the cup over the end of the ruler resting on the desk.
4. Place a meter stick along side the cup to measure the distance it moves.
5. Position ONE (1) marble in the groove at the ruler's maximum height.



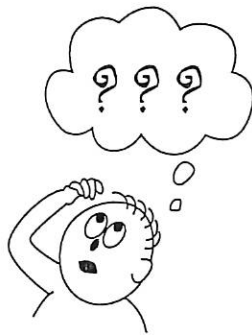


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6. Release the marble and observe the cup.
7. Measure the distance the cup moved (to the nearest 0.1 cm).
8. Perform three (3) trials for 1, 2, 3, and 4 marbles and average the results. Record these measurements in the data table below.

number of marbles	measured distance cup moves (cm)			average distance cup moves (cm)
	trial 1	trial 2	trial 3	
1				
2				
3				
4				



Analysis

1. Describe the relationship between the number of marbles hitting the cup and the distance the cup moves.

Crash questions:

1. What determines if one car has more momentum than another in a two-car collision?

2. Explain why an 80,000 pound big rig traveling 2 mph has the same momentum as a 4,000 pound sport utility vehicle (SUV) traveling 40 mph.
