

Name: _____

Date: _____

Impulse, Momentum, and Bouncing

Objective: To see how the effect of bouncing changes the impulse and momentum of two balls.

Materials:

2 balls meterstick masking tape timer

Procedure:

1. Find the mass of a happy ball and a sad ball. Convert to kilograms and record in the table below.
2. In the stairwell, measure the distance from the floor to a predetermined height from which you will drop two balls. Be sure to include the distance above the landing or stair you will stand on. Record in the data table below.
3. For the sad ball, drop the ball from this predetermined location and record the time it takes for it to hit the ground. It is important that you do NOT throw the ball downwards. Repeat for three trials.
4. For the happy ball, drop the ball from the same predetermined location. It is important that you do NOT throw the ball downwards. You do not need to time the drop! Look to see how high the ball bounces after striking the ground. Use masking tape (if possible) or the blocks in the wall as a means of judging how high the ball rebounded. Record this height in the data table below. Repeat for three trials.

Data:

Sad Ball			
Mass of ball (kg)			
Height for drop (m)			
Time to reach ground (s)			

Happy Ball			
Mass of ball (kg)			
Height for drop (m)			
Height of rebound (m)			

Analysis/Conclusion:

Sad Ball:

1. Find the average time it takes for the sad ball to reach the ground.
2. Use the average time to calculate the velocity of the ball when it strikes the ground.
3. Find the momentum of the ball when as it strikes the ground.
4. What is the momentum of the ball after it strikes the ground?
5. What is the impulse needed cause this change in momentum?

Happy Ball:

1. Find the average height for the rebound of the happy ball.
2. Since the happy ball reaches the ground at the same time as the sad ball, what is its velocity when it strikes the ground?
3. Find is the momentum of the happy ball as it strikes the ground?
4. What is the momentum of the ball after it strikes the ground?
5. What is the impulse needed cause this change in momentum?
6. Find the time it takes for the happy ball to reach its rebound height.
7. Use this time to determine its velocity as it leaves the ground.
8. Find the momentum of the ball as it bounces off the ground.
9. What is the impulse needed to cause this change in momentum (from rest to bounce)?
10. What is the total impulse needed to cause the ball to bounce?

Finally – Did you verify that a bounced object will have a larger impulse than one that remains on the ground? Why will the bounced object always have the larger impulse?