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**Momentum and Impulse**

**Happy and Sad Balls**

**Do Now:** Please answer the following questions.

1. Calculate the change in momentum of a tennis ball as it bounces off a wall. The tennis ball’s mass is 0.40 kg, and its initial velocity is 60 m/s. The tennis ball’s final velocity is 55 m/s in the opposite direction.
2. Now calculate the change in momentum of a clay ball with the same mass and initial velocity as the tennis ball. The clay ball sticks to the wall and does not bounce back.
3. Which ball has the greater change in momentum?

**Make a Prediction:**

Please go to this website: <http://www.islephysics.net/pt3/experiment.php?topicid=3&exptid=129>

1. Watch the first video and observe the differences between the two balls. Write your observations below.
2. Each ball in turn is going to be rolled down a ramp and will collide with an upright block of wood. Which ball will most likely knock down the block of wood? Explain using words, sketches, and bar charts.

Assumptions:

1. Consider both the ball and the block of wood as your system.

Happy Ball: Sad Ball:

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1. Now, consider just the ball as your system.

Happy Ball: Sad Ball:

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**Test**

1. Watch the second video and explain what you see in the space below. Did the sad ball knock down the block of wood? Does this match your prediction? Why or why not?
2. Watch the third video and explain what you see. Did the happy ball knock down the block of wood? Does this match your prediction? Why or why not?

**Conclude**

1. Which type of collision (inelastic or elastic) provides a greater impulse to an object? Explain.