

EXTRA BOUNCE

MATERIALS

- 1 large ball that bounces (e.g. a soccer ball)
- 1 small ball that bounces (~10cm diameter)

DIRECTIONS

- 1.** Pick up the large ball and hold it out at a shoulder height. Drop the ball to see how high it bounces.
- 2.** Pick up the small ball and repeat this, again noting how high it bounces.
- 3.** Hold the small ball on top of the large ball at shoulder height and then drop them. The small one will shoot off much higher than the sum of the original bounces put together! Repeat and watch the larger ball. You will see that it hardly bounces at all.

STEM ACTIVITY CARDS



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ACTIVITY FOUND AT:
[http://www.physics.org/interact/
physics-to-go/extra-bounce/](http://www.physics.org/interact/physics-to-go/extra-bounce/)

WHY?

This experiment is all about conservation of energy and momentum. When the balls are dropped together, most of the momentum from both is transferred to the small one. Both the kinetic energy and the momentum of any moving object depend on its mass.

If the smaller ball receives all of the kinetic energy and momentum from the larger one, it will bounce much higher than the original larger ball because it is so much lighter. Add to that the original energy and momentum in the smaller ball and you get a bounce that is much greater than the sum of the two original bounces.

There are also complications due to the materials used to make the balls (bouncy balls go wild). This experiment can also be used as a good demonstration of chaos effects - small changes in the initial conditions (e.g. exactly how the two balls are held above each other) can cause large differences in the end result.

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SCIENCE TERMS FOR FURTHER DISCUSSION:

- **Mass**
- **Gravity**
- **Conservation of Momentum**