



Lesson Extension

Physics 16: Energy

This activity is intended for children ages 10 to 14 years and should be completed only under the supervision of a parent or guardian.

In class, we saw that energy could be converted between many different forms. At one of our stations, we looked at a ball being dropped to the floor and bouncing back up. The ball had gravitational potential energy when we held it, kinetic energy as it fell, elastic energy as it bounced, and then kinetic and finally gravitational potential energy again. Some of the energy was also converted into sound and heat when the ball hit the floor, so the height that the ball bounced back to was lower than the height it started from.

So we understand what happens when we drop one ball to the floor. In this activity, we're going to see what happens when we drop two at a time, and learn about transferring energy between objects.

Potential and Kinetic Energy Transfer – “Launch” Version!

Materials:

- A basketball or playground ball
- A tennis ball or other small, light ball
- Enough space – it's a good idea to do this outside

Procedure:

1. First, drop the basketball. Notice how high it bounces – a bit lower than the height you dropped it from.
2. Then, drop the tennis ball. Again, pay attention to its bounce height. This is what you'll use for comparison in the next parts.
3. Now, place the basketball on top of the tennis ball. Hold them together, with one hand on the tennis ball and the other keeping the basketball in place. Try to get the basketball positioned right on top of the tennis ball.
4. Drop the two balls together, at the same time. What happens? Does the basketball bounce higher than it did before? What does the tennis ball do?
5. Last, hold the tennis ball right on top of the basketball. Just like the last try, drop them at the same time. Make sure you're not looking straight down at them when you do this! What happens?

What's Going On? (Read this after you've tried the experiment yourself!)

Steps 1 and 2 are the same thing we did in class. In step 3, if you had the basketball exactly over the tennis ball, all the elastic energy that the tennis ball had when it hit the ground got transferred to the basketball as kinetic energy. That made the basketball bounce a little higher than it did before, while the tennis ball had no kinetic energy and didn't bounce at all (though if you didn't get them lined up exactly, the tennis ball probably rolled to one side while the basketball went the other way...).

In the “Launch!” part, steps 4 and 5, the large basketball started with a lot of potential energy. When it fell, landed, and bounced with the tennis ball on top of it, its elastic energy got transferred to the tennis ball as kinetic energy. Since the basketball is a lot bigger than the tennis ball, the kinetic energy that got transferred to the tennis ball was enough to really launch it!

Go Further:

- The Exploratorium, a science museum in San Francisco, has a version of this experiment that adds an exploration of launching different kinds of balls: <http://www.exploratorium.edu/baseball/baseketball.html>

