

Engineering

- <http://pbskids.org/zoom/printables/activities/>
- http://pbskids.org/zoom/growups/scitraining/res_activities.html

Zoom sci

Drops on a Penny

What You Need:
 • penny
 • eyedropper
 • clip of water
 • newspaper

How many water drops can you fit on a penny?

Science Scoop
 When you place water drops on a penny the drops pile up into a small dome. Why? Water molecules are attracted to each other in all directions, making them "stick" together. However, the molecules at the surface "stick" only to molecules next to and below them. This makes them more attracted to each other than to the surface act as if it had a thin "skin." This is called surface tension. As you add more drops, the force of gravity becomes stronger than the force of attraction among the water molecules at the surface. This causes the water to spill over the edge of the coin.

Try it Out!

- 1 Cover your work surface with newspaper.
- 2 Predict how many drops of water will fit on the head of a penny before the water spills over.
- 3 Test it! Count the number of drops and compare it to your prediction.
- 4 Try it again! Repeat the test three times. Do you get about the same number of drops each time?
- 5 If you get a different number for each test, find the average number of drops. Here's how: Add your results from each test. Then divide by three.

Zoom
 Now it's time for you to experiment. What happens if you use a different coin, like a nickel, a dime, or a quarter? Use what you know about a penny to predict how many drops will fit on a different coin. What happens if you mix soap with the water and then add the drops? Choose one thing to change (that's the variable) and make a prediction. Then test it and send your results to ZOOM!

Sent in by: Dan H. of Benton, MN

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Hoop Glider

What You Need
 • paper
 • ruler
 • scissors
 • pencil
 • nonbendable, plastic drinking straw
 • tape

Engineering Scoop
 If you draw a plain straw, it doesn't go very far but when you add paper hoops, the straw glides through the air. That's because the hoops act like wings. Things that fly—like insects, birds, and airplanes—all have wings. But wings are not all the same shape and size. Different wings can be better for different kinds of flight. For example, an eagle has long, wide wings that help it glide. An airplane has wings with small flaps that move up and down to turn the plane. Try changing the wings on your glider. How does it fly with different wings?

1 Cut two strips of paper. Make one strip **1 inch wide and 5 inches long.** Make the second strip **1 inch wide and 10 inches long.**

2 Curl each paper strip into a hoop. **Tape** the ends together. Now you have a big hoop and a small hoop.

3 Tape the small hoop to one end of the straw.

4 Tape the big hoop on the other end of the straw. Make sure the big hoop **lines up** with the small hoop.

5 Hold your Hoop Glider in the middle of the straw, with the small hoop in front. **Throw** it gently like a spear. It might take some practice to get the hang of it. How far does your glider fly?

Sent in by: Stephanie C. of Milton, NH

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Cotton Ball Catapult

Try it Out!

1 Make a catapult for a cotton ball from the materials.

2 Test your catapult. **How far** can you fling a cotton ball?

What You Need
 • 4 cotton balls
 • masking tape
 • 12" ruler
 • (or wood paint stirrer)
 • 4 rubber bands
 • plastic spoon

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 Now it's time for you to experiment. What happens if you arrange the materials in a different way? Make a new catapult and compare it to your first one. What happens if you add weight to the cotton balls by wrapping them in tape or rubber bands? Change one thing (that's the variable) and predict what you think will happen and why. Then test it and send your results to ZOOM!

Sent in by: Cullen W. of Orchard Park, NY

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