



WATER DROPS ON A PENNY

(Recommended for grades 2 through 5)

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OBJECTIVE

To teach students about cohesion and surface tension.

RECOMMENDED AUDIENCE AND SETTING

This activity is appropriate for elementary students in grades 2 through 5. The activity can be performed indoors or outdoors, and is best suited for short rotations of 5 to 10 minutes.

MATERIALS NEEDED

- ▶ Penny
- ▶ Medicine dropper or eyedropper
- ▶ Glass, cup, or small bowl
- ▶ Tap water
- ▶ Dish soap
- ▶ Dish towel or paper towel
- ▶ Flat, level surface that can get wet (such as a kitchen counter)
- ▶ Paper and pencil/pen (optional)

TOOLS REQUIRED

- ▶ No special tools required.

PREPARATION

- Step 1** Place the penny on a flat, level surface. Expect the surface to get a little wet.
- Step 2** Fill one cup or bowl with tap water.
- Step 3** Fill one cup or bowl with soapy water.

ACTIVITY

Time Required: 5 to 10 minutes.

Explain that this activity will demonstrate cohesion and surface tension. Cohesion is the attraction of like

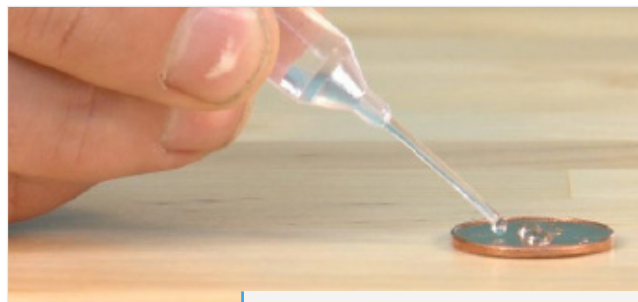


Figure 1. Medicine dropper for adding drops of water on the penny.

molecules to one another. In this activity, the molecules of water are made up of hydrogen and oxygen. Surface tension is a term used for the cohesion between water molecules. Water's cohesion and surface tension are special because of hydrogen bonds, which are formed by the hydrogen atoms of one molecule being attracted to the oxygen atoms of another molecule. The cohesion and surface tension of water becomes obvious when the drops of water are added to the penny. When the water reaches the edge of the penny, a bubble or dome of water forms on top of the penny. The bubble shape is formed as water molecules cling together.

Have the student add one drop of water at a time to the top of the penny, holding the medicine dropper (Fig. 1) just above the top of the penny but not touching it. **[Optional:** Have the student write down how many drops he or she thinks can fit on top of the penny using the Data Sheet (Fig. 2) to record the results.] Slowly add more drops of water to the penny. Note: The water continues to get bigger and bigger until it reaches the edge of the penny. Keep adding drops to the penny until it begins to spill over the side. **[Optional:** Have the student count the number of drops. Was the initial guess correct?]

Repeat the process, but this time use the soapy water. Have the student add drops of soapy water to the penny until it starts to spill over the side. Explain that soap actually decreases the surface tension of water so that the water can enter the tiny holes, cracks, and fibers and remove dirt from dishes or clothing. Since soapy water

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How many drops of water will my penny hold?



My Hypothesis:

Vocabulary:
surface tension

Take your time and use a pipette to drop water onto a penny, one drop at a time. Count each drop as you go. When the water spills over, stop counting and record your results.

Number of Drops My Penny Held?	My Hypothesis	Difference between my actual results and my hypothesis?

reduces surface tension, fewer drops can be added to the penny before the water spills over the side. **[Optional:** Repeat the test with different liquids, such as milk, orange juice, or salty water.]

Source: <https://www.scientificamerican.com/article/measure-surface-tension-with-a-penny/>

Figure 2. A sample Data Sheet.