

ACTIVITY 4: CREATE A SELF-STARTING SIPHON

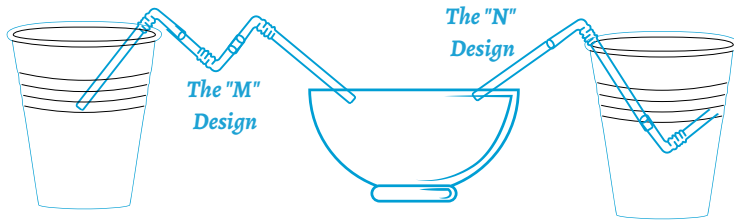


Image Credit: Gary Abud, Jr.

In this activity, students will create a self-starting siphon inspired by the siphon demonstration they observed in the launch phase of the lesson.

Materials:

- Water
- Clear plastic cups
- Clear plastic flex straws
- Scissors
- Tape
- Food coloring (optional to tint the water)
- Bowl or plastic container

There are two designs that can accomplish this. Have students work in pairs to create one of each design, so they can compare how each one works compared to the other. You may wish to create one of each design ahead of time on your own to test and demonstrate them to students before this experiment.

Ask students to recall the demonstration from the launch phase of the lesson with the siphon. Draw their recollection to how you had your finger over the hole of one end of the straw while placing the other end in the water. Discuss with them how releasing your finger allowed the water to fill the straw and rush up the one side, spilling over the flexible section of the straw (because the water rose up the straw to match the water level in the cup) and then it began to pour over and down the other side of the straw, which because of the attractive forces between the water molecules started to cause the rest of the water to follow and flow out the straw.

Explain the task and challenge ahead of them: to create a self-starting siphon. You can demonstrate how one, or both, of the designs work. Show the difference in how the self-starting siphon works when placed slowly vs. quickly into the water. Ask students what they observe and why that is. Discuss their responses.

First, distribute the materials to students and have them fill their plastic cups to the brim with water and place it next to their small containers. They can add food coloring to the cup before filling with water, if they choose.

Next, give them time to create the siphon designs—"M-style" and "N-style"—based off of the models you showed them. They can use the scissors to cut slits in the ends of the straw, or to make the segments of the straws shorter. Alternatively, they can fold the ends of the straw (think folding a taco) to help them fit inside one another. They'll need three full flex straws for the "M" design and two full flex straws + one extra straight segment for the "N" design.

Note: Make sure they orient their siphons to have the flexible segment of the straw positioned to rest on the edge of the cup, and ensure that there is a height difference between the peaks of the "M" design variation (the peak touching the cup rim should be lower in height than the other peak when the "M" is on the table standing up). Once assembled, have students seal the connections between the straws with tape so they are air/water tight.

Then, allow them the opportunity to test their siphons and make any adjustments. Remember that the siphons need to be quickly put into the water in order to start flowing. But they can also check for leaks and seal those up with more tape, as needed, if water doesn't flow.

Last, once the siphons are working, have students compare the two designs to see which one is more effective at transferring water. Have them make qualitative and quantitative observations about each design to support a conclusion about which design is best.

Last, engage the whole class in discussing their findings to arrive at a consensus about which design of self-starting siphon works best and the reasons they would give to support their conclusion. You can extend student thinking by having them draw a particle diagram to represent how the siphon works in terms of forces, air pressure, and water pressure.