We Have Art Down to a Science
Pre-Lab Activity 1– Teacher Guide
Grades K-3

Overview:

The students will work in teams to discover that mixing colors can create new colors. They will also see capillary action in process as the colored water spreads (travels) from one cup to another cup.

Materials:

Each team will need:

- 6 clear plastic cups (should hold at least 12 ounces)
- 6 sheets of paper towels (smaller sheets work best)
- Water (to fill 3 of the cups, approximately 10 - 11 ounces per cup)
- 3 Popsicle sticks

Additional supplies:

- Newspaper to cover tables
- Extra paper towels (in case of spills)
- Food coloring: (red, yellow and blue)

Getting Ready:

- Collect the necessary materials for the experiment.
- Cover the desks with newspaper or paper towels, in case there are any water spills.
- If using whole sheets of paper towels, cut them to measure 11 ½ by 6 ½ inches.
- **For each team**, label one cup RED, one cup YELLOW, and one cup BLUE. The remaining 3 cups **for each team** will be unlabeled.
- Fill each labeled cup (RED, YELLOW, BLUE) with water before the experiment begins. You can fill the labeled cups with water or have the students fill their RED, YELLOW, and BLUE cups with the water.

Procedure:

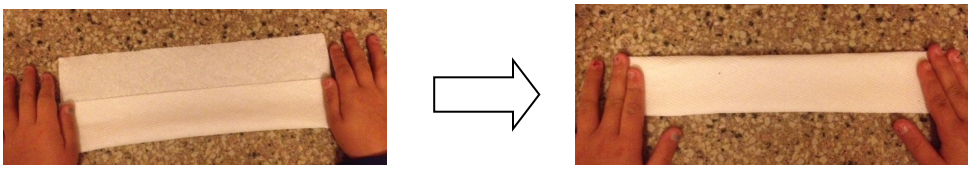
Tell the students that today they are going to see water travel from one place to another. Ask the students if they have ever seen water travel (or move) from one place to another. Some of the students may say waves at the beach or in circles when a rock is thrown into a pond or lake. Those examples are correct of water moving, but today they will see the water move from one

cup to another cup at their tables. Explain to them that you want them to SEE the water moving so food coloring will be added to the water. Tell the students that they will be using red, blue and yellow food coloring to add to their cups of water.

At each table, have the students place their cups into a circle with an empty cup **between** each labeled cup. The labeled cups need to be filled with water at this time, if you haven't already filled them. Each cup should be almost completely full. Have the students add 6 to 8 drops of food coloring to the appropriately labeled cup and stir carefully with the Popsicle stick.

Say to the students:
If you look at your circle of cups on your tables, there are 3 cups with water and in between each filled cup there is an empty cup. The water is going to travel from the filled cup to the empty cup.
Ask the following questions: **(allow time for students to respond)**
How do you think the water is going to get into the empty cups?
What do you think the water will look like once it goes into the empty cup?
Will the water look the same in each empty cup?
How do you think the water will be different?

Have the students fold the small sheet of paper towels into thirds (lengthwise). You should demonstrate for them how to do this procedure.



Tell the students to bend their paper towel in half so they have two shorter parts.

They are going to place each part into a cup filled with colored water and the other part into the empty cup beside it. Every cup (filled and empty) should have a paper towel part placed in it. The empty cups should have two paper towel parts, one from each filled cup on either side of it. For example, the empty cup between red and yellow will have the paper towel coming from the red cup and the paper towel coming from the yellow cup. Double check and make sure each team table has completed this part of the activity correctly.

You should see the color traveling up each section of the paper towel from the colored water and then traveling down the other section into the empty cup. Once the red water mixes with the yellow water in the empty cup, you will see orange water. The yellow water mixes with the blue water to make green water. The blue water mixes with the red water to make purple water. Allow the experiment sufficient time to have the water travel from one cup to the other cup to mix the colors. You see results after about 15 minutes. The water will continue to travel from one cup to the other cup until the water levels are all about the same.

As the water travels and the colors are mixing, discuss with the students what they are seeing. Ask them to try to explain how this is happening.

Once the water levels are the about the same, the water will stop moving. Carefully remove the wet paper towels and unroll them. Show them to the students and once again start a discussion about what they see. Lay the wet paper towels flat to dry. Then you will have beautiful tie-dyed sheets to use in an art activity of your choosing.

Explanation:

The colored water travels up the paper towel because of capillary action. Capillary action is the ability of a liquid to flow upward, against gravity, in a narrow space. This is the process that plants use to get water from the ground (soil) through their roots to the rest of the plant. Paper towels (actually all paper products) are made from plant fibers. These plant fibers contain cellulose which allows the liquid to flow between the tiny gaps in this fiber.

Water is also very adhesive. The water molecules like to stick together and they will cling to the cellulose fibers in the paper towels.

The water will travel down the paper towel into the empty cup because of gravity and the cohesiveness of the water to the cellulose fibers. When the colors mix, the new color is formed.

Assessment:

Ask the students the following questions to determine their level of understanding of this concept:
How did the water get into the empty cups?
What part did the paper towel play in helping the water get into the empty cup?
Would this happen with something other than a paper towel?

Additional Information:

- You may choose to use wide mouth canning jars instead of cups.
- Using warm (not hot) water will speed the process up to see faster results.
- The cheaper paper towels seem to give the best results.
- You can elevate the cups with the colored water to help give gravity a boost for a faster result.