MoLab Mondays!

Walking Rainbows

MoLab is excited to have the opportunity to stay in touch with our MoFamilies and continue to provide on-the-go, dynamic, hands-on, and inquiry-based science experiences through a mobile laboratory that promotes discovery. Our weekly activities will engage your little investigators with hands-on learning that proves anyone can think like a scientist.

It is our tenth and final installment of MoLab Mondays! We are excited to wrap up our series of at-home-science fun with a colorful experiment that will leave a smile on your face. Our campers always enjoy this one and we hope you do too. Get ready to explore science in a colorful way!

Tools & Materials:

- 6 Clear Jars (wide mouthed jars or glasses work best)
- Water
- Food Coloring: Red, Yellow, and Blue
- Timer
- White Paper Towels (preferably sturdy ones)

Preparing the Activity

- Set up your 6 jars, or glasses, in a circle so that they are touching each other.
- Add water to each jar about ¾ full. There should be enough water in each jar that a paper towel will stretch from one jar to the adjacent jar and touch the water in both.
- Rip off six sheets of paper towels and then fold each sheet in thirds, length wise. If you are using smaller glasses, just cut a few inches off each so they fit in the glass.
- Add food coloring to every other jar. Add an equal number of drops to each jar starting with red to the first jar, the third jar with yellow, and the fifth with blue. Make sure each jar is well pigmented.
- The experiment is ready. Explain that the goal is to make a rainbow!

Make Observations and Ask Your Student

- What is the difference between the primary and secondary colors?
- Discuss what will happen when the paper towels are added.
- How will the colored water travel up the paper towel?
- Ask them to predict the outcome and form a hypothesis on the results.

Experiment Time!

- Place the folded-up paper towels in each jar one at a time. Start with one end in a clear jar and the other in a colored jar. Repeat the process until they are all connected.
- Set a timer to see how long it takes to create your rainbow.
- Watch:
    - What happens in the first 5 minutes?
    - After 20 minutes, what looks different?
    - Keep an eye on your water level. If there is not much happening, try adding more water to the jars.
    - To get the full rainbow effect, the process could take a couple of hours.
- For a more authentic experiment experience, ask your student to record the progress of the walking rainbow at regular intervals.

What's Going On?

How did your Walking Rainbow form? Well, it did not really "walk" but instead is was formed through a process called capillary action. Capillary action is the same process that gets water up the roots of a tree to the leaves. This gravity-defying ability gives water the capability to flow upwards. The paper towel, like the plants they are made of, consist of a sugar compound called cellulose. In this demonstration, the water flowed upwards through the tiny gaps in the cellulose fibers. The gaps in the paper towel behaved like capillary tubes pulling the water upwards.

As the colors travel up the paper towel, they mix with each other. Red, yellow, and blue are considered the primary colors. You could think of these colors as the parents of all the other colors of pigment. As your rainbow was forming, the primary colors "walked" from one glass to the other and formed new colors. Secondary colors are created when mixing two primary colors. The results of mixing red and yellow are orange. Mix yellow and blue and green is created. The result of mixing red and blue is purple.

Dig a Little Deeper

Water molecules tend to cling to different substances. This process is called adhesion. In this experiment the water molecules were clinging to the cellulose fibers in the paper towel. Water molecules are also attracted to each other and like to stick together. This process is called cohesion. The capillary action takes place when adhesive forces draws the water up the tiny gaps in the paper towel's fibers. The

cohesive forces help draw more water molecules upwards. When the paper towel becomes saturated the adhesive forces between the water and cellulose and the cohesive forces between the water molecules will be overcome by the gravitational force of the weight of the water in the paper towel. Gravity releases the accumulated water into the jars.

Extension Activity Ideas

- A Butterfly of Many Colors!
    - Explore deeper into traveling colors by creating butterfly chromatography art. You only need a white coffee filter, a black felt-tip pen (water – soluble), scissors, and a cup of water.
        - Fold your coffee filter in half and cut out a butterfly shape (or any symmetrical shape like a heart).
        - Unfold the butterfly.
        - Use your pen to draw a heavy black line down the center fold.
        - Hold the butterfly by one wing and dip it into the cup of water.
        - Lay it down and watch.
            - What is happening?
            - Which color travels the farthest or shortest distance?

Happy Experimenting from MoLab, Inc!