Adapted to STEMAZing ECE Format by
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Walking Rainbow

<u>NOTE: Children should always be given ample time to experiment, notice, and wonder before they are provided an explanation.</u>

Always engage children with our two favorite questions:

What do you notice?

What do you wonder?

Resist the urge to answer any questions children have while exploring. Instead, respond back with questions to children and let them make sense of the world. Sample questions you might use: What do you think? Do you notice any patterns? What could we change? Can we test something else? What can we try next? If children ask a testable question, which they could answer by doing an experiment, talk through with them how they might design a test to help answer their question. As much as possible and within reason, let them test their questions by trying the experiments they propose.

Learning Objectives

Children will…

- define capillary action.
- observe color mixing.

Key Question

How can we make a rainbow with three colors?

Vocabulary (See **What the heck? Explanation of Science** at the end for definitions.)

Capillary Action
Cellulose

Materials

6 mason jars or clear plastic cups
Food coloring (red, blue, yellow)
Timer
Paper Towels

Special note about the primary colors: While red, blue, and yellow are used here for this experiment because they are the easiest colors to source, they are NOT the real primary colors of dye, paints, or pigments. The REAL primary colors are cyan, yellow, and magenta. Sometimes if you get neon food coloring, you will find cyan (turquoise) and magenta (pink) food coloring. Learn more here: https://stemazing.org/realprimarycolors/

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Notice and Wonder Developmentally Appropriate Practice

1. Fill three jars with water. Add red food coloring to one, blue to another, and yellow to another.
    - What do you notice?
2. Ask how they will make a rainbow from just three colors.
3. Put an empty jar between red and yellow; yellow and blue, and blue and red.
4. Roll the paper towels into one tube like piece and put one end in a full jar and one in empty jar. Keep alternating until all jars have some paper towels in it.
5. The paper towels will start soaking up the water right away, but it will take about 48 hours before the process is complete.
    - What do you notice?
6. Set a timer to find out exactly how long it takes to start mixing colors. Within a few hours, you will see the color starting to mix in the empty jars.
    - What do you wonder?
7. Carefully take out the paper towel and let it dry. Then hang up in your classroom.

Children should notice…

- the colors mix on the paper towel that is in the jars without water.

Differentiating Developmentally Appropriate Practice

Younger children can draw pictures of their observations over time.

Older children can journal observations every hour.

Extensions for Additional Learning

As always, ask the children throughout the experiment what they notice and what they wonder. If their wonder questions are testable, as much as possible and within reason, let them test their questions by trying new experiments.

See below for examples of what they might wonder and experiments they might do to test their wonderings.

- I wonder what would happen if we used toilet paper instead?
    - Let them try it!
- I wonder what would happen if we used more or less water?
    - Let them try it!
- I wonder what would happen if we used different starting colors?
    - Let them try it!

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#STEMAZingPictureBook Recommendation: *What are the primary colors? NOT red, blue and yellow* by DaNel Hogan and Fabiana Estrella
https://stemazing.org/real-primary-colors-book/

Connections to the activity:

Teach color mixing (green, purple, orange) before completing this experiment.

Use the color wheel and show the children how mixing colors will create different colors

SAFETY CONCERNS

n/a

AZ Early Learning Standards

Science Standard - Strand 1: Inquiry & Application - Concept 1: Exploration, Observation & Hypotheses
The child observes, explore, and interacts with materials, others, and the environment.

Science Standard - Strand 1: Inquiry & Application - Concept 2: Investigation
The child researches their own predictions and the ideas of others through active exploration and experimentation.

Walking Rainbow

What the heck? Explanation of the Science (Vocabulary in bold.)

The colored water travels up the paper towel by a process called capillary action. **Capillary action** is the ability of a liquid to flow upward, against gravity, in narrow spaces. This is the same thing that helps water climb from a plant's roots to the leaves in the treetops.

Paper towels, and all paper products, are made from fibers found in plants called **cellulose**. In this demonstration, the water flowed upwards through the tiny gaps between the cellulose fibers. The gaps in the towel acted like capillary tubes, pulling the water upwards.

The water is able to defy gravity as it travels upward due to the attractive forces between the water and the cellulose fibers.

Paper towels (plants work the same way): molecules in the water are attracted to the molecules in the paper towels, and into the next jar. Eventually the water level in all the jars will even out.

https://thestemlaboratory.com/walking-water-rainbow/