SCIENCE
FROM HOME

Splitting Ink

Materials

- Scissors
- Paper coffee filter
- Black marker, many different types (not permanent)
- Water
- Shallow dish
- Paper towels

Instructions

- Cut a triangle out of the coffee filter.
- With the black marker, draw a line across the circle, about 1 inch up from the bottom.
- Pour water in the dish-enough to cover the bottom.
- Dip the tip of the triangle in the water and lay the rest of it on the paper towel.
    - Note: If you want to try doing the whole coffee filter, curl it so it fits inside a cup. Make sure the bottom of the circle is in the water.
- Watch as the water flows up the paper. When it touches the black line, you'll start to see some different colors.
- Leave the paper in the water until the colors go all the way to the top edge. How many colors can you see?
- Try it again with another black marker, on a clean filter, and with fresh water. Then, compare the results.

Questions to Ask

- Does the second marker make different colors than the first one? Why?

About This Experiment

Most nonpermanent markers use inks that are made of colored pigments and water. On a coffee filter, the water in the ink carries the pigment onto the paper. When the ink dries, the pigment remains on the paper.

When you dip the paper in water, the dried pigments dissolve. As the water travels up the paper, it carries the pigments along with it. Different-colored pigments are carried along at different rates; some travel farther and faster than others. How fast each pigment travels depends on the size of the pigment molecule and on how strongly the pigment is attracted to the paper. Since the water carries the different pigments at different rates, the black ink separates to reveal the colors that were mixed to make it.

Why does mixing many colors of ink make black?
Ink and paint get their colors by absorbing some of the colors in white light and reflecting others. Green ink looks green because it reflects the green part of white light and absorbs all the other colors. Red ink looks red because it reflects red light and absorbs all the other colors. When you mix green, red, blue, and yellow ink, each ink that you add absorbs more light. That leaves less light to reflect to your eye. Since the mixture absorbs light of many colors and reflects very little, you end up with black.

Background information courtesy of EXPLORATORIUM.