

Convection

*Teachers note: In the following activity the greater the space between the juice glass and the rim of the big jar the more dramatic the results.
Students can perform this experiment in groups or individually depending on supplies.*

Time: 60 minutes

Prior to starting experiment:

1. Have the students write the materials list and procedures in their notebooks.
2. Have the students predict the results:
3. What will happen to the jar with warm water?
4. What will happen to the jar with cold water?
5. Instruct the students to perform the experiment.
6. Students will record the results in their notebooks.

Materials:

Two juice glasses that will fit into a quart jar or similar setup.

Two quart jars

Food coloring

Half-gallon of warm water in an easy-to-pour container

Quart of cold water in an easy-to-pour container

Two small squares of tin foil

Sharpened pencil

Device for stirring water

Procedure:

1. Prepare an easy to clean, clutter-free space to work in.
2. Fill both juice glasses three-fourths full of warm water. Put drops of food coloring in until the water is a deep shade of the color chosen (*different types of food coloring act differently, the best is Easter egg coloring tablets a half a tablet per glass, it is also the best at staining a work surface*).
3. Stir well.
4. Carefully fill the juice glasses to the rim with warm water.
5. Place the tin foil tightly around the rim of the juice glasses. Make a tight seal that will not spill.
6. Set each juice glass into its own quart jar.
7. Fill one quart jar with warm water
8. Fill the other quart jar with cold water.
9. Use a pencil to poke three holes in each jar's tin foil. (The foil may need to be gently pushed down if the food coloring jar is not full enough)
10. Observe and record your results

Student inquiry questions:

**Do not give the inquiry questions until after the experiment is performed. **

Q1) Which setup has the greatest temperature difference (warm/warm or cold/warm)?

Q2) Is the warm dye water more or less dense than the cold water?

Q3) Why does the dye look like circular swirls? Why not just even color or lines?

Q4) Draw a conclusion between what is happening in the water to weather patterns.

Answers to inquiry questions:

Q1) Which setup has the greatest temperature difference (warm/warm or cold/warm)?

A) Cold/warm

Q2) Is the warm dye water more or less dense than the cold water?

A) The warm water is less dense than the cold. The cold water is more dense than warm because its molecules are closer together.

Q3) Why does the dye look like circular swirls? Why not just even color or lines?

A) Because the warm dye water rises, and as it hits the cold water it cools and falls back down creating a "convection cell".

Q4) Draw a conclusion between what is happening in the water to weather patterns.

A) Cold air falls because it is heavier, hot air rises which creates the movement for weather.