



Observing Convection

Directions

In this exercise, you will work with a small group to observe heat transfer by convection.

Materials for each group

- four 6 or 8-ounce cups
- clear pie plate
- water samples at different temperatures
(room temperature water, very hot water, cold water)
- food coloring

To Do

- 1** Invert three of the cups and place them in a triangular pattern on a flat surface. Place a clear pie plate on top of the inverted cups so that it sits securely on the top of the cups.
- 2** Fill the pie plate with room temperature water – about 5 cm deep.
- 3** Put a fourth cup filled with room temperature water facing up under the center of the pie plate.
- 4** Carefully place a drop of food coloring in the bottom center of the pie plate.
- 5** Observe what happens.
Use words and pictures to describe what you observe in your notebook.
- 6** Discuss with your group:
 - What is happening to the dye?
 - Why does the dye move?
 - Do you think the movement of the dye is due to heat transfer by convection? (Think about the conditions necessary for transfer – are they present?)
 - Where is heat coming from and where is it going?**Summarize your group's ideas in your notebook.**
- 7** Carefully remove the cup with the room temperature water, discard the contents.

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8 Fill the cup with very hot water and place this in the center underneath the pie pan.

9 Place a drop of food color in the bottom center of the plate. Watch how it moves. Use words and pictures to describe what you observe in your notebook. Try gently stirring the water, let the water settle, and try another drop between the center and edge of the pan. Watch how the dye moves.

10 Discuss with your group:

- What is happening to the dye?
- Why does the dye move?
- Do you think the movement of the dye is due to heat transfer by convection? (Think about the conditions necessary for transfer – are they present?)
- Where is heat coming from and where is it going?

Summarize your group's ideas in your notebook.

11 Experiment with different temperatures and dye locations. Look for patterns of movement. Does the dye move up, down, sideways, horizontally? What is going on in terms of heat transfer? Use words and pictures to describe what you observe in your notebook.

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12 Clean up as directed by your teacher.

Adapted from Great Explorations in Math and Science (GEMS) teachers' guide, *Convection: A Current Event*, 1988, Regents of the University of California and Dr. Art's Guide to Science, Dr. Art Sussman, 2006, *Chapter 8: Energy on Earth*