

# Good Vibrations

## Post-field trip lesson for Go With the Flow

### Engagement

Ask the students to remember their lesson at the Discovery. Ask them if they can tell you how much space is between the molecules of a gas, a liquid and a solid. Draw a diagram of each on the board. Tell the students that they're going to do an experiment that will require them to write down their observations; they'll need their science notebooks and to have their pencils ready.

### Exporation

Tell the students that molecules don't just sit there—they vibrate! Ask them what they think might make molecules vibrate really quickly, and what might make them move slowly. Write their responses on the board. Tell them that today they'll be conducting an experiment to determine whether hot molecules or cold molecules move faster. Ask them to form a hypothesis about why they believe one temperature might make molecules vibrate faster. Write their ideas on the board.

Fill the two glasses with the same amount of water. In one of them, place a couple of ice cubes and let them sit in the glass for several minutes. Put the other glass in the microwave for about 30-40 seconds, long enough to get the water very hot. Remove the glass of water very carefully, using the pot holder to protect your hand. Remove the ice from the glass of cold water and set the two glasses side by side. Squeeze one drop of food coloring into each glass- be sure you only use a single drop of food coloring. Tell the students to observe the food coloring as it moves through the water in each glass and to write descriptions and make drawings of what they see in their notebooks. Ask them to tell you what they see in each glass- is the food coloring dispersing in one glass more than the other? Which one? Ask why they think that's happening. Again ask which glass they think has the fastest vibrating molecules- see if anyone has changed their mind and ask why.

### Explanation

The molecules in the hot water are moving faster than the ones in the cold water- vibrating molecules release energy, in this case, heat. The food coloring dispersed faster in the glass of hot water because the fast moving water molecules spread out the colored molecules in the food coloring faster. The food coloring in the cold water held together- the slow moving molecules in the cold water didn't break up the food coloring's molecules, so it hung in the water without being dispersed.

#### Next Generation Science Standards:

5-PS1-1. Science and Engineering practices: Conduct an investigation collaboratively, use measurement and observation to produce data.

#### Nevada Science Standards:

N.5.A.1, P.5.A.1 P.5.A.6, P.5.B

### What You Will Need:

- Two identical clear glasses (don't use plastic)
- A microwave
- Ice
- Food coloring
- Pot holder

