How Temperature Affects Air Movement

Lesson Overview

In this lesson, students experience through a demonstration and then a hands-on investigation how temperature affects air movement. Students use prior knowledge of solar energy sources and properties, energy transformation, and heat energy transfer to make connections to their new learning.

Standards Addressed

SC 2005	6-4.7 Explain how solar energy affects Earth's atmosphere and surface (land and water. 6-4.8 Explain how convection affects weather patterns and climate.
SC 2014	6.E.2B.3 Develop and use models to represent how solar energy and convection impact Earth's weather patterns and climate conditions (including global winds, the jet stream, and ocean currents.)
NGSS	MS-ESS 2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

Disciplinary Literacy Best Practices

Notebooking*
Think-Ink-Pair-Share

Students use science notebooking daily.

Lesson Plan

Time Required –One 60 minute class period

Disciplinary Vocabulary –atmosphere, convection, energy transformation, solar energy, heat transfer, condensation

Materials Needed:

- Balloon observation handout (below)
- iPads for Kahoot!
- Cans
- Bowls—2 for teacher demonstration, 2 per student group for student investigation
- Ice
- hotplate for teacher demonstration (In this district, policy prohibits the use of hotplates by students.)
- balloons—1 per student group
- flasks—1 per student group

Engage

- (Optional) The teacher may want to use Kahoot! or a similar online game to review the previous concepts taught in the weather unit. After each question, the teacher can lead a discussion of the answers.
- The teacher will conduct a demonstration prior to the student investigation to show how heating and cooling changes the air in a soda can.
    - Put 2-3 drops of ice water in an empty soda can.
    - Place the can on top of a hot plate.
    - Place the can upside down in the ice water to show the collapse of the can.
- After the demonstration, students THINK about what they saw and INK their observations.
- Students SHARE their thinking about what happened to the can to cause it to crush.

Explore

- Students will work in small groups to complete the Balloon Observation (see handout.)
- Teacher will facilitate partner dialogue and assist as needed with student investigations. Ask why and justify!

Explain

- Students record their observations and answer questions on the observation handout.
- The teacher will facilitate a discussion about the investigation and provide vocabulary terms to describe what students observed.
    - When you put your flask into the container with the hot water, what did you see happening with the balloon?
    - Why did the balloon deflate in the cold water?
- Think-Ink-Pair-Share: How does temperature affect air movement?

Teacher Reflections and Biographical Information

Using Kahoot! as a review showed areas of weakness prior the quiz the next day. Students were actively involved in the review because of the technology and the competition format used by Kahoot! The purpose for the can demonstration was for students to see what happens to air when the can is heated and then cooled. Unfortunately, it didn't work for the class that was videoed. That was the only class it didn't work in, but by monitoring, adjusting, and using the can from the previous class, students were able to see what should have happened. During the student investigation, I was able to formatively assess the students' understanding of the concept by questioning small groups of students.

Lesson Author:

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Balloon Observation

1. Squeeze all of the air from a balloon.
2. Place the opening of the balloon over the mouth of a bottle.
2. Sit the bottle in a bowl of hot water.
3. Observe the balloon for two minutes.
4. Record your observation.

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5. Take the bottle out of the hot water and place it in a bowl of ice cold water.
6. Observe the balloon for two minutes.
7. Record your observation.

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8. Why do you think the balloon behaved as you observed in the cold and hot water?

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