Activity Plan

Title
Weather and Wind

Subject
Dance: Creating

Author
ArtsEdge:
Rebecca Haden
Adaptation

Grade level
Grades 5-8

Time duration
60-120 mins

Overview
This lesson introduces the expanding and condensing properties of air masses and the unequal heating of Earth as the force behind the wind. Students will write a report on a topic related to wind and weather patterns, and will create a dance to demonstrate their understanding of weather patterns.

Objective
Students will:

- Learn about the concept of wind and how it affects the weather.
- Understand the concept of molecular expansion and contraction as it relates to temperature.
- Write a report that will discuss a concept related to wind and weather.
- Create a movement sequence to show understanding of weather concepts.

Materials
What You'll Need
Materials
Resources

- **Printable**
- **Diagrams**
- **Weather on the Move**

Required Technology

- **1 Computer per Classroom**

Activities and procedures
ENGAGE

1. Introduce or review the Shrinking Wall Exercise (from Sphere's Density Dance lesson): Tell the students that you represent an imaginary moving wall. As you cross the room toward the students, the space available for the students shrinks. As the space shrinks, the students must move their bodies closer together. Open the space back up (by walking away from the students). As the space expands, the students can move further apart from each other. Repeat this exercise several times.

2. Show students a thermometer (not digital) and ask for guesses about how it works. Explain that heat is energy, and that molecules with more energy move around more and take up more space. Thus, when it's hotter, the mercury in a thermometer expands and takes up more space. As it gets colder, the mercury takes up less space, and the column on the thermometer gets shorter. Show Diagram 1 from the handout entitled Diagrams, or slides 6 and 7 of the Weather on the Move Presentation located within the Resource Carousel.

3. Have students practice being a thermometer. Have students make a line. Call out temperatures; when you call a hotter temperature, the line will grow as students move more and take up more room, and vice versa. Repeat until all students grasp the concept.

4. Ask students to try acting like air, referring again to Diagram 1, or to slide 8. Air, like mercury, moves faster and takes up more space as it gets hotter. As it gets colder, it takes up less space. Have students stand in one place and expand like hot air, and then collapse like cold air. If students have trouble with this, model standing tall with raised arms and moving around for hot air, and sinking down to the ground for cold air.

BUILD KNOWLEDGE

1. Explain the relationship between wind and weather. If it weren't for wind, we wouldn't have any changes in weather. It's the movement of air, and the things that happen when hot air meets cold air, that cause rain, storms, and other weather phenomena.

2. Refer students to Diagram 2 in the Diagram handouts (or slides 9 and 10) and tell them that they are going to learn about what creates weather on our planet and how the wind is created. Using the diagram, show them that energy traveling through the atmosphere at the equator must pass through a smaller amount of atmosphere than at the poles. Explain that when the solar energy reaches the earth's atmosphere, it is very hot, but as it passes through the atmosphere, its energy spreads into the air. The solar energy passing through the atmosphere at the equator has less time and space to spread energy than the solar energy at the poles. Ask students to take some time, in pairs, to discuss what might happen to the air as the sun's energy passes through it. If students seem stumped, look at the classroom

globe or world map and see what countries are at the equator and which are at the poles. This should remind students that the air at the equator is hotter than the air at the poles. Energy, in the form of heat, spreads through the air and warms it up. At the equator, this solar energy is more concentrated, and so it is hotter.

3. Assign some students to act like polar air and some to act like equatorial air. The polar air students should sink down and make themselves small, while the equatorial air students rise up and move more.

4. Show students Diagram 3 in the Diagram handouts. Explain that as the air from the equator rises and the air at the poles falls, it creates a cycle that becomes the wind. The hot air gets less dense (more space among the molecules) and lighter, so it goes up. What happens on the ground when the hot air is gone? Cold air moves in. What happens when the cold air moves into the space where the hot air has risen? Hot air moves in.

5. Have equatorial air students and polar air students rise and fall in a cycle. See where more space becomes available (above the polar students, and at the feet of the equatorial students) and note that other air would rush to fill in the space. Remind students that smaller temperature changes also affect wind: night vs. day, for example, water vs. land, and different landforms.

6. Discuss what happens where the hot and cold air masses meet. Ask students what happens if they put ice into their mouths. They'll know that the ice melts and their mouths feel cold. Remind students that the heat energy from the hot air moves into the cold air masses where they touch. Have they ever seen drops of water condense on a cold glass of water on a hot day? Just so, the water in the air condenses as hot and cold air meet, leading to rain and other kinds of weather.

APPLY

1. Tell students that they will each explain a particular aspect of wind to the class, through a movement sequence and a report.

2. Brainstorm with students about possible wind-related topics that could be expressed through movement. Some examples:

- Air masses rise and expand or descend and condense
- As hot air masses move over cold air masses, temperature changes lead to storms
- The wind moves in a circle or cycle
- The wind turns clockwise or counterclockwise
- The speed of the wind depends on the pressure gradient
- Bodies of water next to land heat differently, and create winds
- Different landforms (deserts, mountains, etc.) affect wind

- Wind energy can be put to human use with windmills

3. Give students time to explore information about winds. Some useful websites:

- NOAA Education Page
- Energy Kids Wind Page
- LiveScience Weather 101
- National Oceanic and Atmospheric Association: National Weather Service

4. Have students choose a topic and research that topic more deeply. Suggest that students begin with an interesting topic they discovered in the previous step, and narrow it or extend it to create an idea they'd like to communicate.

5. Have students communicate what they learned by creating a dance sequence. Remind students of the way they used movement to help themselves understand about molecules, heat, and wind. Suggest that they think of a sequence of movements that would communicate their point about wind and weather.

6. Have students perform their dances. If students have created movement sequences requiring more than one dancer, give them time to recruit and train other students to help them perform their dances. Allow the class to ask questions.

Conclusions

REFLECT

1. Discuss the dances. Consider whether the movements conveyed the factual information that inspired them, deepened students' understanding of points already discussed, or expressed feelings the students had about the wind. Did knowing the facts that inspired the dance make the dance more meaningful? Did seeing the movement sequences make the facts about wind more memorable?

2. Have students write individual 1-page reports explaining what they learned about wind. Students should convey the factual details that were hard to express in movement, as well as share their creative process in preparing their dances.

ASSESS

1. Assess students according to the following criteria:

- Their participation in group discussion and movement
- The quality of their dance sequence, and how clearly it communicates the weather concept
- The quality of their research paper, and how well it explains the weather concept being discussed

Adaptations

Links and Websites

Lesson Setup

Teacher Background

Wind is caused by the movements of hot and cold air. Temperature differences caused by the differing temperatures at the poles and even between night and day cause some masses of air to be hotter or colder than others. Hot air rises, and since nature abhors a vacuum, cold air rushes in to fill the space it left. Hot air fills the space the cold air was in, creating a cycle. As the air masses meet and their different temperatures seek equilibrium, storms arise.

Teacher should understand how wind is created by temperature variations.

Teachers may want to review the science of wind and weather using the following resources:

- **LiveScience Weather 101**
- **National Oceanic and Atmospheric Association: National Weather Service**

Prior Student Knowledge

Students should be familiar with basic ideas of energy and heat. The following resources may be used to refresh the students:

- **Energy kids**
- **Physics 4 Kids**

Students should have basic information about molecules. The following resource may be used to refresh the students:

- **New York Hall of Science Molecules Exhibit**

Students should know about the equator and the poles.

Students should have basic information about the earth's atmosphere. The following resources may be used to refresh the students:

- **Interactive diagram**
- **NASA's info page**