Force

Physical Science | Lesson Guide

1st Grade

Photo Description

A big American flag waves in the wind on top of a tall building. The flag has red, white, and blue colors. There are many tall buildings made of stone and glass around it.

Scientific Phenomena

The Anchoring Phenomenon shown here is wind causing motion. The American flag is moving and waving because invisible air (wind) is pushing against it. Wind happens when air moves from one place to another. Even though we cannot see air, we can see what it does when it pushes on objects like flags, leaves, or our hair.

Core Science Concepts

1. Air is real even though we cannot see it - Air takes up space and can push on things
2. Wind is moving air - When air moves, it can make other things move too
3. Forces cause motion - The wind pushes on the flag and makes it wave
4. We can observe evidence of invisible things - We see the flag moving, which tells us wind is there

> **Pedagogical Tip:**
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> Use everyday examples like blowing on a pinwheel or feeling wind on the playground to help students connect to the concept that air can push and move things.

> **UDL Suggestions:**
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> Provide multiple ways for students to experience air movement: visual (watching flags/pinwheels), tactile (feeling wind on their face), and kinesthetic (moving scarves or ribbons in the air).

Zoom In / Zoom Out

1. Zoom In: Air is made of tiny invisible particles called molecules that are always moving and bumping into things. When lots of air molecules move together in the same direction, they push against the flag fabric.

2. Zoom Out: Wind is part of Earth's weather system. The sun heats different parts of Earth differently, causing air to move around the whole planet, creating weather patterns and helping move clouds and storms.

Discussion Questions

1. What do you think is making the flag move? (Bloom's: Analyze | DOK: 2)
2. How can we tell that wind is there if we cannot see it? (Bloom's: Evaluate | DOK: 3)
3. What other things have you seen move because of wind? (Bloom's: Remember | DOK: 1)

4. What would happen to the flag if there was no wind? (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

1. Misconception: "There is no air when it's not windy."
   Clarification: Air is always around us, but we only notice it when it moves (becomes wind).

2. Misconception: "Only big winds can move things."
   Clarification: Even gentle air movement can make light objects like flags, leaves, or paper move.

3. Misconception: "The flag moves by itself."
   Clarification: The flag needs a force (wind) to push it and make it move.

Cross-Curricular Ideas

1. Math + Science: Create a simple graph showing "Windy Days vs. Calm Days" over two weeks. Students can draw a picture of a waving flag or still flag each day and sort them into two groups. Count which type of day happened more often.

2. ELA + Science: Read The Wind Blew by Pat Hutchins together. Have students dictate or write simple sentences about what the wind blew away in the story, then draw pictures to match. Connect it to the flag in the photo: "The wind blew the flag. The wind moves many things."

3. Art + Science: Provide students with scarves, ribbons, or crepe paper streamers. Play music while they move their streamers to show how wind moves the flag. Discuss how the materials move differently (some flutter, some wave smoothly).

4. Social Studies + Science: Talk about the American flag and what it represents. Discuss why flags are placed on important buildings like government buildings and why wind makes flags visible and noticeable from far away.

STEM Career Connection

1. Weather Scientist (Meteorologist): A meteorologist is a scientist who studies air, wind, clouds, and weather. They help people know when it will be sunny, rainy, or windy so we can plan our days. They use special tools to measure wind speed and direction. Average Salary: $97,000/year

2. Wind Energy Engineer: A wind energy engineer designs and builds big windmills (called wind turbines) that use moving air to make electricity for homes and schools. They use the power of wind to help people have light and heat. Average Salary: $106,000/year

3. Flag Designer: A flag designer creates the colors, patterns, and shapes of flags for countries, cities, and organizations. They think about what colors and symbols mean important things and what will look beautiful when the flag waves in the wind. Average Salary: $52,000/year

NGSS Connections

- Performance Expectation: K-PS2-1 Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object
- Disciplinary Core Ideas: K-PS2.A - Forces and Motion
- Crosscutting Concepts: Cause and Effect

Science Vocabulary

* Wind: Moving air that we can feel and see effects of
* Force: A push or pull that can make things move
* Motion: When something moves from one place to another
* Air: The invisible gas all around us that we breathe
* Push: A force that moves something away from you

External Resources

Children's Books:
- The Wind Blew by Pat Hutchins
- Gilberto and the Wind by Marie Hall Ets
- Feel the Wind by Arthur Dorros