Wind Activity 1

Why Does the Wind Blow?

Objectives and Standards
- To learn about the physical properties that contribute to the formation of the wind

NSTA Standards Addressed
Content Standards
A, B, D, F, G

4-H SET Abilities Addressed
Evaluate
Observe
Communicate
Smmarize/Relate

Supplies Needed

- Ball (to represent globe)
- water
- flashlight
- lazy susan
- piece of cardboard 15 in square
- scissors
- ruler
- marker
-large, lightweight trash bag
-powerful hair dryer
-cool room with high ceiling

Background

Our weather and climate are part of a closed system. The Earth is enveloped by the atmosphere which protects it from the harshness of the rest of the Solar System. As such, wind is created from things that already occur in our atmosphere, like the heating up of air masses by the Sun and the rotation of the Earth. When the Sun shines down on Earth, it heats the air unevenly. Air tends to get warmer along the equator and cooler near the poles because of the angle at which the Sun's rays hit the Earth. In this activity we look at the different pieces of the climate puzzle that, when put together, create our winds.

CoCoRaHS Extension Ideas

Print off a copy of the United States map with the associated precipitation measurements from the day from the CoCoRaHS website. Using another source, like the internet or a television weather forecaster, plot the path of the Jet Stream on the map of the United States. What direction does the Jet Stream flow? What physical systems are causing the Jet Stream to flow, and what impact does the Jet Stream have on the weather and climate of the United States?

Activity

Part 1.

1. Ask youth if the ball were a globe, where would the North Pole, South Pole and equator be. Label these on the ball with a washable marker.
2. Turn the ball so that the equator is running parallel to your body and your fingers are on the North and South poles.
3. Ask youth where water would fall if it was poured on top of the ball. Have them pour some water on the ball to check their answer. A cupful should be sufficient.
4. Ask what would be different if the ball was rotating when the water was poured. Have them pour more water on the ball while it is turning to check.
5. Explain that the ball represented the globe and the water represented the air surrounding the globe. When the globe is turning, it deflects air away from the equator and toward the poles, so when you poured water on the ball, it was deflected, from wherever it was poured, toward the poles.
6. Rotate the ball so that the North and South Poles are directly vertical, and the equator is where your hands are grasping the ball.
7. Have someone shine the flashlight directly onto the ball, aimed at the equator, and in exactly the same plane as the equator.
8. Ask where the sun shines most brightly; turn the ball to explain day and night, sunrise and sunset.

9. Ask students if the way you are holding the ball is exactly how the Earth sits in orbit (the answer is no; Earth is tilted about 23 degrees).
10. Tilt the ball so that the North Pole is about 23 degrees away from vertical and have the flashlight shone on the ball again from the same angle as the first time. Discuss what is different about the areas on the ball/globe that are now lit up.

Part 2.
1. Cut a circle out of the cardboard the size of the lazy susan being used.
2. Make a dot in the center to represent the North Pole.
3. Place the cardboard 'record' on the lazy susan.
4. Using a ruler and a marker, draw a straight line from the center of the cardboard to one edge.
5. Turn the lazy susan counterclockwise. Using the marker, try to draw another straight line from the center to the edge as it is turning.
6. Examine the second line and discuss what is different from the first.

Part 3.
1. Fill the trash bag with hot air using the hair dryer, then close and seal the opening.
2. Release bag, watch it rise. Point out that warm air weighs less than cool air.
3. Ask youth what they think will happen next (air will cool, trash bag will come back down).

Discussion

These activities illustrate some of the forces acting on wind; the Coriolis effect and the Sun's rays. What did you notice about the two activities showing the deflection caused by rotating the Earth? Is there a force that is working on the air that allows some movement? Do you notice this force in your every day life (like spinning in a circle with a bucket full of water, riding on a merry-go-round)?

Warm air weighs less, so it floats on top of cool air. When the trash bag moved, it was just acting as a place holder for the air so we could see the air actually move. The warmer the air is relative to the surrounding cool air, the faster and higher it will travel.

When the Sun heats the air, it warms and moves upward, and cool air moves down to take its place. We discussed in the introduction that the equator gets more energy from the Sun, so air flows up near the equator. It gets deflected by the rotating Earth, and as it moves upward and away from the equator, it gets cooler. This deflection is the same as the one seen when we poured water on the rotating ball. This creates a big circular path called a convection cell, or Hadley cell when talking about weather.

Please send us your feedback!

As a 4-H Educator, you know what has worked well, what has not, and how we can improve the *Tracking Climate in Your Backyard* curriculum. Please share your feedback about the curriculum. We'd love to receive copies of any reports or newspaper coverage about completed *Tracking Climate in Your Backyard* projects.

Fax or mail your completed feedback to Trisha Smrecak, Museum of the Earth, 1259 Trumansburg Rd., Ithaca, NY, 14850 or fax to: 607-273-6620.

Check the activity completed	Suggestions for improving the activity
Rainfall Activities ☐ Make It Rain ☐ Where Does the Rain Come From? ☐ Stormy Weather	
Snowfall Activities ☐ Confetti Snow Maps ☐ How Much Water? ☐ Edible Education ☐ The Snowflake Game ☐ Snow Journaling	
Temperature Activities ☐ Energetic Weather ☐ Shade of the Old Oak Tree ☐ Temperature Through Time	
Wind Activities ☐ Why Does the Wind Blow? ☐ Make Your Own Wind Dial	
Hydrologic Cycle Activities ☐ The Incredible Journey ☐ Understanding Evapotranspiration ☐ Pinecones: Mother Nature's Weather Forecasters ☐ What is a Watershed?	
Climate Activities ☐ Where is My Backyard? ☐ Soak up the CO_2 ☐ Buckets O' CO_2 : How Your Backyard Can Change the Ocean ☐ Raise the Waters	
CoCoRaHS Participation ☐ Precipitation measurements and other activities	

Please share your suggestions for improving the Tracking Climate in Your Backyard curriculum.

How have you used Tracking Climate in Your Backyard in your community?

Thank you for completing the Tracking Climate in Your Backyard curriculum feedback. We appreciate learning about how you are using the curriculum and receiving your suggestions for improving it.

Organization _____ **Contact Person** _____

Email _____ **Date** _____