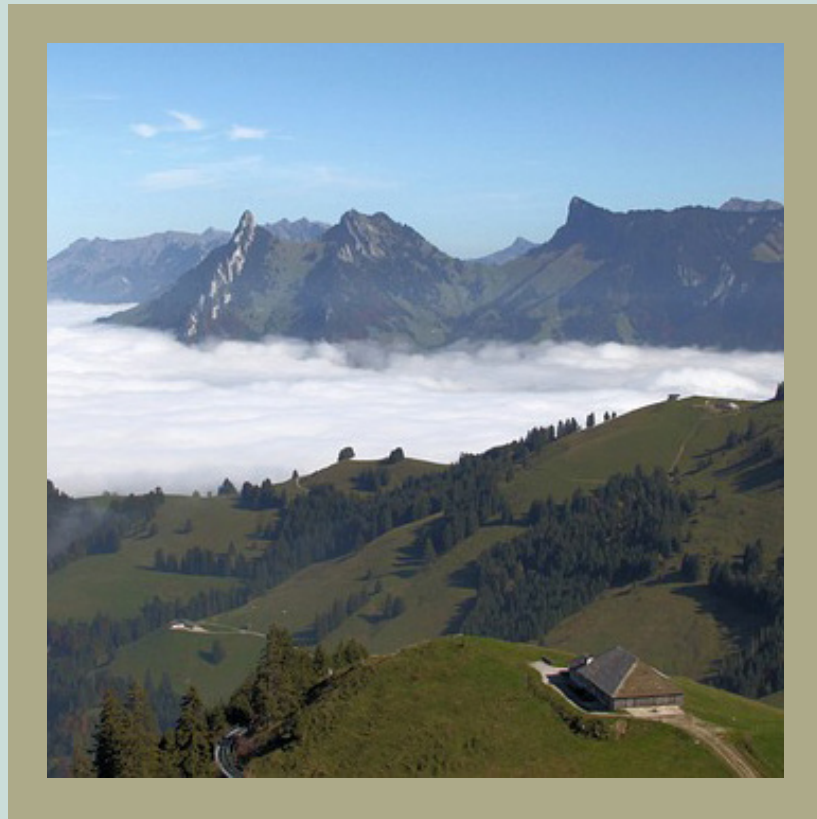


STEM *Sims*™

Weather



Weather

**Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.**

Start learning right now about how weather can affect your life. Take the following brief quiz to see how much you already know about weather and climate. See the bottom of page 4 to check your answers.

1. How many side extensions do most snowflakes have?
 - a. 3
 - b. 4
 - c. 5
 - d. 6
2. If the entire Antarctic ice cap melted, about how much more of Earth's land would be covered by ocean water compared to the present day?
 - a. 10%
 - b. 25%
 - c. 50%
 - d. 75%
3. Which location is considered to be the "driest place on Earth"?
 - a. Sahara Desert, Africa
 - b. Atacama Desert, South America
 - c. Gobi Desert, China
 - d. Kalahari Desert, Africa
4. About how many tornadoes does the United States average each year?
 - a. 120
 - b. 1,200
 - c. 12,000
 - d. 120,000
5. What was the highest temperature ever recorded in Antarctica?
 - a. 37 °F
 - b. 47 °F
 - c. 59 °F
 - d. 68 °F



Under Pressure

A barometer is a device used to measure air pressure. Since air pressure changes based on weather conditions, a barometer can be a valuable weather forecasting tool. In this activity, you will make a simple barometer that you can use to predict weather. No pressure, but it's time to get started.

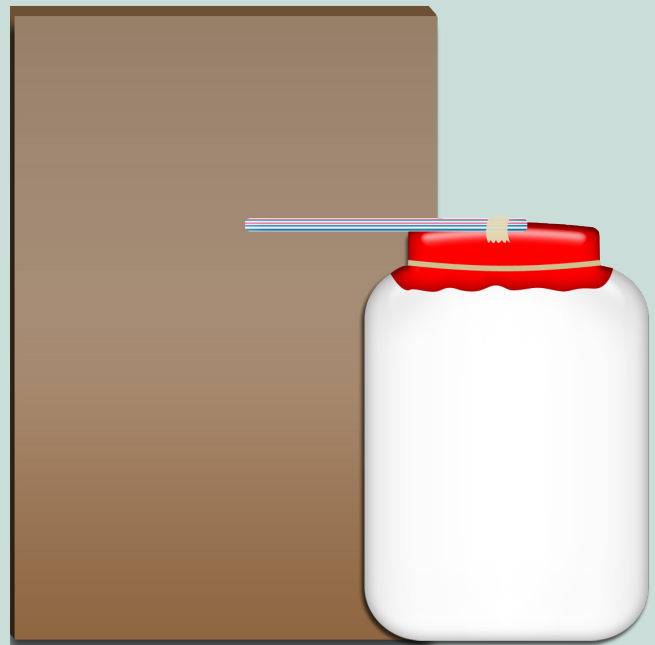
Materials

clean empty jar about the size of a peanut butter container
cardboard backing from a letter-sized note pad
clear tape
scissors

balloon
rubber band
straw

Procedure

1. Stretch the balloon a few times to loosen the balloon.
2. Carefully cut the top half off the balloon. Discard the bottom half of the balloon that has the mouth opening.
3. Stretch the top half of the balloon over the top of the empty jar. Make sure to pull the sides of the balloon down so it covers an inch or two of the side of the jar. The jar and balloon should look like a drum with the stretched balloon as the drum head.
4. Use the rubber band to secure the balloon in place on the jar.
5. Place the straw horizontally on the top side of the jar (with the balloon). One end of the straw should be at the center point of the jar, while about one-half of the straw should extend over the edge of the jar. Tape the straw in this position. The straw will function as a pointer that indicates air pressure.
6. Stand the cardboard materials upright next to the jar, but close to the straw. See the figure above for the complete set-up. Make sure the straw is free to move up and down and that it does not contact the cardboard. Tape the cardboard to the jar in this position. You can use the cardboard to mark the level of the straw pointer at different times as an indicator of air pressure.
7. On various days with different weather, mark the straw pointer's position.



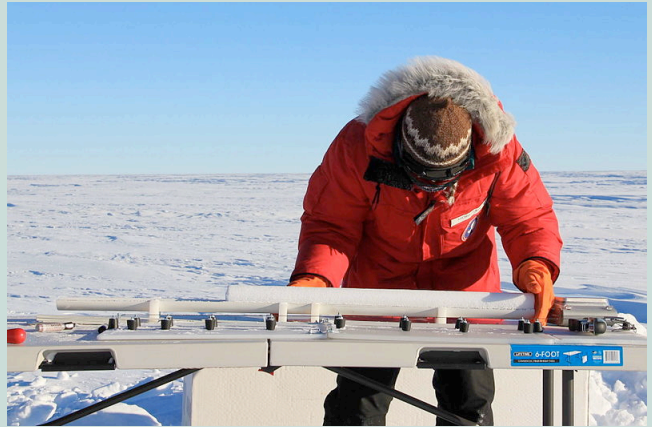
Question

1. What can you conclude about the relationship between air pressure and weather?

Weather

To the Core

One of the methods scientists use for investigating past climates on Earth hundreds of thousands of years ago is to study ice cores extracted from areas with large sheets of ice, such as Antarctica and Greenland. Snow that fell on these areas over these many years was compacted and now reach depths of about 2 miles. Each layer of ice was deposited over the course of one year. The ice sheets provide a record of the annual average temperatures and the percentage of gases that made up the atmosphere during those years.



Tiny air bubbles exist at each layer of the ice. The gas contained in these bubbles is analyzed to determine the relative amount of two oxygen isotopes. Since the ratio of oxygen isotopes gives a direct estimate of the current atmospheric temperature, scientists have a very good idea of the average temperature of Earth's atmosphere for each year over the past 400,000 years.



The average temperature during this time period of the region where the ice cores were collected has varied between 2 °C warmer and 8 °C colder.

The bubbles in the ice also trapped carbon dioxide and dust particles. Measurements of carbon dioxide concentrations in the atmosphere showed a correlation with average temperatures. Higher temperatures were associated with larger amounts of atmospheric carbon dioxide, while lower temperatures and less carbon dioxide were related. Analysis of the dust particles indicated which types of plants and animals thrived during this time.

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Answers: Page 2 Answers: (1) d, (2) b, (3) b, (4) c, (5) c. Page 3 Answers: Under Pressure – On sunny and clear days, air pressure tends to be high and pushes the balloon downward into the jar opening, which raises the opposite end of the straw. As the straw moves to a higher position, clear weather is indicated. On stormy days, air pressure is lower. The lower pressure outside of the jar causes the balloon to bulge outward, which causes the pointer end of the straw to move to a lower position.

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