

The Reasons for the Seasons

5th Grade

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References: adapted from:

<http://www.lpi.usra.edu/education/skytellers/seasons/activities/sequences.shtml>

Benchmarks:

ES-3: Describe the characteristics of Earth and its orbit around the sun. In this experiment, the focus will be the Earth's tilted axis and why it causes the seasons.

Objectives:

Explain why the Earth has seasons and why different hemispheres experience "opposite" seasons.

Materials

Alcohol burners or tea light candles
Objects (apples or Styrofoam balls) to represent the Earth
Thermometers

Initial Observation/Demonstration:

I will ask the students: "What causes the seasons?" They will write their hypothesis in their science journals and some will share their answers. We will discuss some hypotheses and then discuss the Earth's tilt of 23.5°. I will demonstrate the proper way to light and work with the alcohol burners and describe the experiment.

Initial Observations:

Students will observe using their thermometers that the warmest spot around the "sun" is in a straight line away from it.

Initial Model:

Students will now write a hypothesis telling where they think the Earth (apple) will be the warmest.

Procedure:

Students should be broken into groups of 3.
Candles/burners should be passed out (and lit by you depending on the experience level of the students)
The worksheet that gives step by step directions and probing questions should be passed out, and the students can work within their groups.

Discussion/Summary:

The students should find that according to the thermometers (and their own sense of touch) that the warmest part of the Earth is the part that is most directly lined up with the sun. (NOTE: in this case, the students will be tilting the Earth 23.5 degrees from the horizontal because the burner or candle will mostly be releasing heat in the vertical direction. So in essence, the position of the Earth and sun are rotated by 90 degrees in this experiment.)

Revised Model:

The students will record a new, correct hypothesis in their science journal. “The Earth’s seasons are caused by its tilted axis.

Discussion/Summary:

It is important to have them rotate the Earth on its axis to show that rotation does NOT have an affect on the Earth’s seasons.

8. Take the Earth away from the flame and touch the Southern hemisphere with your finger. How does it feel? _____
9. What season is it in the Southern hemisphere? _____
10. Rotate the Earth on its axis. What is weird about the North Pole? Are their days and nights the same length as ours? _____
11. Orbit your Earth half of the way around the sun. Make sure you keep it tilted the same way.
12. Place the thermometer in the Northern hemisphere. What is the temperature?

13. Take the Earth away from the flame and touch the Northern hemisphere with your finger. How does it feel? _____
14. What season is it in the Northern hemisphere? _____
15. Tilt the Earth exactly the same as you had it before. This time, place the thermometer in the Southern hemisphere. What is the temperature? _____
16. Take the Earth away from the flame and touch the Southern hemisphere with your finger. How does it feel? _____
17. What season is it in the Southern hemisphere? _____
18. What causes the seasons?

19. When it is summer here, what season is it in Australia? _____