Sunrise

Earth & Space Science | Lesson Guide

2nd Grade

Photo Description

This image shows a beautiful sunrise over a flat, open landscape with a straight road stretching toward the horizon. The sky is filled with colorful clouds—orange, pink, and red near the horizon, changing to gray and blue higher up. Trees line the distant horizon, and the sun is just beginning to rise, creating a warm glow across the sky.

Scientific Phenomena

Anchoring Phenomenon: Why does the sky change colors at sunrise?

When the sun rises, its light travels through Earth's atmosphere at a low angle. The sunlight passes through more air and dust particles than it does at midday. These particles scatter the shorter blue wavelengths of light away, allowing the longer red and orange wavelengths to reach our eyes. This is called Rayleigh scattering. Additionally, the sun itself appears larger and more orange near the horizon due to an optical illusion caused by our perception of distance and the contrast with objects on the landscape. The changing colors we observe demonstrate how light, atmosphere, and Earth's rotation work together to create predictable daily patterns.

Core Science Concepts

* Earth's Rotation: Earth rotates on its axis, which causes the sun to appear to move across the sky from east to west. This rotation creates day and night and the predictable pattern of sunrise and sunset.

* Light and Atmosphere: Sunlight scatters differently through Earth's atmosphere depending on the angle and the particles in the air. At sunrise and sunset, light travels through more atmosphere, scattering away blue light and revealing reds, oranges, and yellows.

* Weather and Sky Conditions: Clouds and atmospheric conditions affect what we see during sunrise. The clouds in this image reflect and scatter the colored light, creating the beautiful gradient effect visible in the photo.

* Patterns and Predictions: Sunrises happen every day in a predictable pattern. By observing the sky, we can learn to predict when sunrise will occur and what colors we might see based on weather conditions.

Pedagogical Tip:

Second graders are natural observers! Rather than explaining all the science at once, start with what they can SEE: "What colors do you notice?" and "What's different about the sky now compared to midday?" This grounds the lesson in direct observation before introducing vocabulary or deeper concepts. Build from their observations toward explanations.

UDL Suggestions:

Multiple Means of Representation: Provide images of sunrises in different weather conditions (clear vs. cloudy) so students can compare. Some students may benefit from a simple diagram showing the sun's position at sunrise, midday, and sunset. Multiple Means of Expression: Allow students to document their observations through drawing, painting, or photography rather than only writing or verbal discussion. Multiple Means of Engagement: Connect to student interests by asking, "What's happening in your home when the sun rises?" or "Do animals wake up with the sunrise?"

Discussion Questions

1. Why do you think the sky looks different colors at sunrise than it does in the middle of the day? (Bloom's: Analyze | DOK: 2)

2. If you observe the sunrise tomorrow morning, what colors do you predict you will see, and why? (Bloom's: Predict | DOK: 3)

3. How is a sunrise different from a sunset? Do you think the same science explains both? (Bloom's: Evaluate | DOK: 3)

4. What would happen if Earth did not rotate? Would we still have sunrises? (Bloom's: Evaluate | DOK: 3)

Extension Activities

1. Sunrise Observation Journal: Over one or two weeks, have students observe and sketch the sunrise (or ask families to help them observe at home). Students can record the colors they see, the weather, and the time. Create a class chart to look for patterns in their observations. This connects to Patterns and builds data literacy.

2. Color Mixing Experiment: Provide watercolors or food coloring in water and have students mix colors to recreate the colors they see in a sunrise. As they mix, discuss how the colors blend and change—a hands-on way to explore light and color without needing to understand Rayleigh scattering deeply.

3. Shadow Tracking: On a sunny day, have students place a stick upright in the ground and trace its shadow at sunrise (or early morning), midday, and afternoon. Students can observe how the shadow's length and direction change as the sun moves across the sky, providing evidence of Earth's rotation and the sun's apparent movement.

NGSS Connections

Performance Expectation:
2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

Relevant Disciplinary Core Ideas:
- 2-ESS1.A Earth's place in the universe (daily patterns of sunlight and shadows)
- 2-ESS1.B Earth and the solar system (patterns of the sun, moon, and stars)

Crosscutting Concepts:
- Patterns The sun's movement creates predictable patterns we observe as sunrise and sunset
- Systems and System Models The sun, atmosphere, and Earth work together to create the colors we see

Science Vocabulary

* Sunrise: The moment when the sun appears above the horizon in the morning and the sky begins to get bright.

* Horizon: The line far away where the sky seems to meet the land or ocean.

* Atmosphere: The blanket of air that surrounds Earth.

* Scatter: When light bounces off particles in the air and spreads out in different directions, instead of traveling straight.

* Rotate: To spin or turn, like how Earth spins on its axis.

* Pattern: Something that happens in the same way over and over again in a regular order.

External Resources

Children's Books:
- Sun by Sam Usher (explores how the sun affects our daily lives with beautiful illustrations)
- Come Sun, Go Sun by Jean McElroy (celebrates sunrise and sunset through rhythmic text)
- Earth's Place in Space by Nuria Roca (part of the "My First Discovery" series; includes day/night concepts)

YouTube Videos:
- "Why Is the Sky Different Colors at Sunrise and Sunset?" by SciShow Kids (3:45 minutes) — A clear, animated explanation of why the sky changes colors. https://www.youtube.com/watch?v=xqHdvI8fNNU

- "Day and Night | How Earth Rotates" by National Geographic Kids (2:30 minutes) — Simple animation showing how Earth's rotation creates day and night. https://www.youtube.com/watch?v=PrreKzVJXXw