

Photo Description



This image shows a large rock sitting on the ground with grass and moss growing around it. The rock has a dark shadow cast on the ground next to it. The shadow is made by the sun shining on the rock, creating a dark shape that looks like the rock itself.

Scientific Phenomena

Anchoring Phenomenon: Why does the rock have a dark shadow?

When sunlight hits an object like a rock, the light cannot pass through it because the rock is solid and opaque. The light bounces off the rock or gets blocked by it, creating a dark area on the ground behind the object—this is the shadow. The shadow forms because the rock is blocking the light from reaching that spot on the ground. As the sun moves across the sky throughout the day, the position and length of the shadow changes. This is a foundational observation that helps young learners understand how light behaves and interacts with objects in their environment.

Core Science Concepts

- * Light and Shadows: Light travels in straight lines from the sun. When an object blocks the light, it creates a shadow on the other side.
- * Objects Block Light: Opaque objects (solid things you cannot see through, like rocks) stop light from passing through them, which is why they make shadows.
- * Light Source Position Matters: The position of the sun in the sky affects where the shadow appears and how long or short it is.
- * Shadows Change Throughout the Day: As the sun moves, shadows move and change shape and size.

Pedagogical Tip:

For Kindergarten learners, focus on the observable, concrete experience of shadows rather than explaining light rays. Use direct observations ("Look at where the shadow is!") and encourage students to make and play with their own shadows outdoors. Repeat the same shadow observation at different times of day to help children notice patterns and changes.

UDL Suggestions:

UDL Strategy - Multiple Means of Representation: Provide shadow experiences through multiple modalities. Allow students to:

- See shadows outdoors in real time
- Feel the difference between the warm, sunny spot and the cool, shaded spot created by a shadow
- Draw or trace shadows on paper to create a visual record
- Use hand shadows and flashlights indoors as an accessible, controlled way for all learners (including those with mobility challenges) to explore how objects block light

Zoom In / Zoom Out

Zoom In: Microscopic Level

At a microscopic level, light is made of tiny particles called photons that travel from the sun in straight lines. When these photons hit the surface of the rock, they bounce off or are absorbed by the rock's surface, which is made of minerals and crystals. The photons cannot pass through the solid material, so the area behind the rock receives no photons—that empty space is the shadow.

Zoom Out: Ecosystem and Time Scale

Shadows are important in larger ecosystems and across seasons. In nature, shadows create microclimates—small areas that are cooler and damper than sunny spots. Plants and animals use these shaded areas for protection from intense heat. Throughout the year, as Earth orbits the sun and the seasons change, shadows become longer in fall and winter and shorter in spring and summer. This pattern of shadows helps us measure the passage of time and seasons.

Discussion Questions

1. "What do you see in this picture? Where is the shadow?" (Bloom's: Remember | DOK: 1)
2. "Why do you think there is a dark area next to the rock? What is making it dark?" (Bloom's: Analyze | DOK: 2)
3. "If we came back to look at this rock at a different time of day, what do you think the shadow might look like? Would it be in the same place?" (Bloom's: Predict | DOK: 2)
4. "Can you find a shadow outside right now? What is making that shadow?" (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

- * Misconception: "Shadows are dark things that live on the ground or follow me."
 - Clarification: Shadows are not objects or creatures. A shadow is a dark area made when something blocks light from reaching the ground. It is the absence of light, not a "thing" that moves on its own.
- * Misconception: "The shadow is the same size and shape all day long."
 - Clarification: Shadows change size and direction as the sun moves across the sky. In the morning and afternoon, shadows are long. At noon when the sun is high, shadows are short. The shadow always points in the direction away from the sun.
- * Misconception: "Only people and animals make shadows."
 - Clarification: Any object—rocks, trees, buildings, toys, clouds—can make a shadow when the sun shines on it. The object just has to be solid and block the light.

Extension Activities

1. Shadow Hunt Outdoor Exploration

Students walk around the outdoor classroom or playground and locate 3–5 different shadows made by trees, buildings, playground equipment, or rocks. Students point to each shadow and describe what object is making it. Optional: Take photos or make simple drawings of different shadows found.

2. Hand Shadow Play with Flashlights (Indoors)

In a darkened classroom corner or box, provide a flashlight (or use sunlight through a window). Students make shapes with their hands in front of the light and observe the shadows on a wall or paper. Encourage them to make shadows of animals, letters, or objects and describe how moving their hands closer to or farther from the light changes the shadow.

3. Shadow Tracing Activity

On a sunny day, place a rock (or student's hand) on paper and trace the outline of the shadow with chalk or marker. Return to the same spot 1–2 hours later and trace the shadow again. Compare the two tracings to show how shadows change as the sun moves.

Cross-Curricular Ideas

* Mathematics: Measure shadows using hand-spans, string, or blocks. Compare shadow lengths at different times of day. Create simple graphs or charts showing "long shadow" vs. "short shadow."

Language Arts & ELA: Read shadow-themed picture books like *My Shadow** (simple sequencing). Have students dictate or draw stories: "What if the rock could talk about its shadow?" or "My shadow is my friend because..."

* Art: Create shadow art by arranging objects on black paper in sunlight and observing the shadow patterns. Cut out shadow shapes from black paper and create collages or mobiles.

* Social Studies: Discuss how shadows help us understand time of day (morning, noon, afternoon). Explore how different cultures and civilizations used shadows to tell time (sundials—age-appropriate introduction).

STEM Career Connection

Astronomer: Astronomers study the sun, moon, and stars. They learn about how light from the sun creates shadows on Earth and on other planets. An astronomer helps us understand space! Average Salary: \$119,750/year*

Landscape Designer: Landscape designers plan outdoor spaces like parks and gardens. They think about where shadows fall during the day so they can place plants, shade structures, and benches in the right spots to keep people cool and comfortable. Average Salary: \$67,500/year*

Photographer: Photographers use light and shadows to take beautiful pictures. They understand how to position objects and people so that shadows make their photos look interesting and cool. Average Salary: \$63,500/year*

NGSS Connections

Performance Expectation: K-PS3-1 Make observations to determine the effect of sunlight on Earth's surface

Disciplinary Core Idea: K-PS3.B Effects of Earth in the Universe

Crosscutting Concepts:

- Patterns (shadows follow patterns as the sun moves)
- Cause and Effect (sunlight causes shadows to form; objects block light, which causes shadows)

Science Practice: Students will make direct observations of shadows outdoors and describe what they notice about their position, length, and direction relative to the sun.

Science Vocabulary

* Shadow: A dark area on the ground made when something blocks sunlight.

- * Light: The bright energy that comes from the sun and helps us see things.
- * Block: To stop something from going through or past something else (in this case, the rock blocks light).
- * Opaque: Something you cannot see through because it is solid (like a rock or a book).
- * Sunlight: The light and energy that comes to Earth from the sun.

External Resources

Children's Books:

My Shadow* by Robert Louis Stevenson (Classic poem with illustrations)

Shadow* by Michael Ahlberg (Simple picture book exploring shadows)

The Shadow Book* by Beatrice TExpandable Editorials (Interactive exploration of shadows and light)