Reflection

Physical Science | Lesson Guide

1st Grade

Photo Description

The picture shows a tall glass building. The glass acts like a mirror and shows another building inside it. The glass windows make a pattern of squares all over the building.

Scientific Phenomena

This image demonstrates reflection as an anchoring phenomenon. Light rays from the surrounding building bounce off the smooth glass surface of the modern building, creating a mirror-like image. This occurs because glass has a smooth, shiny surface that reflects light in a predictable way, allowing us to see images of objects that are not directly in front of us.

Core Science Concepts

1. Light and Reflection: Light bounces off smooth, shiny surfaces like glass and mirrors, allowing us to see reflections of objects.

2. Properties of Materials: Different materials interact with light in different ways - glass can be both transparent (see-through) and reflective depending on lighting conditions.

3. Patterns in Nature and Human-Made Objects: The building shows repeating patterns of windows and reflections that create visual designs.

Pedagogical Tip:

Use a handheld mirror during the lesson to let students explore reflection firsthand. Have them reflect light onto the ceiling or walls to make the abstract concept concrete and engaging.

UDL Suggestions:

Provide multiple ways for students to demonstrate understanding by having them draw what they see, use hand gestures to show light bouncing, or verbally describe reflections to accommodate different learning preferences.

Zoom In / Zoom Out

1. Zoom In: At the molecular level, light waves hit the smooth glass surface and bounce back at the same angle they arrived, creating the reflection we see.

2. Zoom Out: This building is part of a larger urban environment where many glass buildings create a "canyon effect," reflecting light and heat throughout the city, affecting local temperature and lighting conditions.

Discussion Questions

1. What do you think would happen if we shined a flashlight on this glass building? (Bloom's: Apply | DOK: 2)
2. How is this glass building similar to a mirror in your bathroom? (Bloom's: Analyze | DOK: 2)
3. Why can we see the other building in the glass but not see inside the glass building? (Bloom's: Analyze | DOK: 3)
4. What other things around school create reflections like this building? (Bloom's: Remember | DOK: 1)

Potential Student Misconceptions

1. Misconception: "The other building is inside the glass building."
   Clarification: The building we see is actually a reflection - like looking in a mirror. The other building is across the street.
2. Misconception: "Only mirrors can show reflections."
   Clarification: Any smooth, shiny surface can create reflections, including water, glass, and polished metal.

Cross-Curricular Ideas

1. Math - Patterns and Counting: Have students count the window squares in the photo and create their own grid patterns using graph paper. They can color in squares to make repeating patterns, reinforcing both reflection concepts and basic geometry skills.

2. ELA - Descriptive Writing: Ask students to describe what they see in the reflection using simple sentences. Create a class book titled "What I See in the Glass Building" where each student contributes one illustrated sentence, building vocabulary for describing reflections and observations.

3. Art - Mirror Drawings: Students create their own "reflections" by folding paper in half, drawing on one side, and then copying the drawing on the other side to create symmetrical artwork. This hands-on activity reinforces the concept that reflections mirror what they see.

4. Social Studies - Community Builders: Discuss how architects and builders use glass to create beautiful buildings in our cities. Show pictures of different glass buildings in your community and talk about how these structures are part of where we live and work.

STEM Career Connection

1. Architect: Architects are people who design buildings and decide what materials to use, like glass and metal. They draw plans for buildings that are safe, beautiful, and let in lots of light. They think about how light will reflect off different materials. Average Salary: $86,000 USD

2. Optical Engineer: Optical engineers work with light and special materials like glass and mirrors. They design things that use light, such as camera lenses, telescopes, and even the glass in buildings. They experiment with how light bounces and bends. Average Salary: $78,000 USD

3. Window and Glass Installer: These workers install large sheets of glass into buildings like the one in the photo. They make sure the glass is safe, clean, and positioned correctly so it reflects light beautifully and keeps buildings warm or cool inside. Average Salary: $54,000 USD

NGSS Connections

- Performance Expectation: 1-PS4-3: Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.
- Disciplinary Core Ideas: 1-PS4.B - Objects can be seen if light is available to illuminate them or if they give off their own light.
- Crosscutting Concepts: Patterns - Patterns in the natural and human designed world can be observed and used as evidence.

Science Vocabulary

* Reflection: When light bounces off a surface like a mirror or glass.
* Transparent: Something you can see through clearly, like clean glass.
* Surface: The outside or top part of something.
* Pattern: Something that repeats over and over in the same way.
* Material: What something is made of, like glass, wood, or metal.

External Resources

Children's Books:
- Mirrors and Reflections by David Dreier
- Light by David Dreier
- What Is Light? by Robin Johnson