Infrared Thermometer

Physical Science | Lesson Guide

Photo Description

A person holds an orange tool that measures how hot things are. The tool shows the number 113.5 on its screen. The tool can tell temperature without touching something.

Scientific Phenomena

The Anchoring Phenomenon is non-contact temperature measurement using infrared radiation. All objects emit invisible heat energy called infrared radiation. The infrared thermometer detects this energy and converts it into a temperature reading. This happens because warmer objects give off more infrared energy than cooler objects, allowing the device to measure temperature from a distance without physical contact.

Core Science Concepts

1. Heat Energy Transfer - All objects give off invisible heat energy that we cannot see but special tools can detect
2. Temperature Measurement - We can measure how hot or cold things are using different kinds of tools
3. Observable Properties - Objects have properties like temperature that we can measure and describe
4. Technology as Tools - Scientists use special tools to help them observe and measure things they cannot see or touch safely

Pedagogical Tip:

Use concrete examples from students' daily lives when introducing temperature concepts. Have them feel warm and cool objects first before introducing measurement tools to build foundational understanding.

UDL Suggestions:

Provide multiple ways for students to experience temperature differences through touch, visual color coding (red=hot, blue=cold), and kinesthetic movement activities like "hot potato" games to support diverse learning needs.

Zoom In / Zoom Out

1. Zoom In: At the invisible level, tiny particles in all objects are always moving. When objects are hot, the particles move faster and give off more invisible heat energy. When objects are cold, the particles move slower and give off less heat energy.

2. Zoom Out: Temperature measurement helps us understand weather patterns, cooking safety, and keeping our bodies healthy. Scientists use temperature tools to study everything from the heat of the sun to the coldness of ice at the North Pole.

Discussion Questions

1. What do you think would happen if we pointed this tool at an ice cube? (Bloom's: Predict | DOK: 2)
2. How is this different from the thermometer the nurse uses? (Bloom's: Compare | DOK: 2)
3. What are some things in our classroom that might be warm or cool? (Bloom's: Apply | DOK: 1)
4. Why might scientists want to measure temperature without touching something? (Bloom's: Analyze | DOK: 3)

Potential Student Misconceptions

1. Misconception: The thermometer makes things hot or cold
   Clarification: The thermometer only measures temperature - it does not change how hot or cold something is

2. Misconception: You have to touch something to know its temperature
   Clarification: Some special tools can measure temperature from far away by detecting invisible heat energy

3. Misconception: Only living things give off heat
   Clarification: All objects give off some amount of heat energy, even rocks and toys

NGSS Connections

- Performance Expectation: K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change
- Disciplinary Core Ideas: K-PS3.A - Energy and Matter
- Crosscutting Concepts: Patterns - Observable patterns help us make predictions

Science Vocabulary

* Temperature: How hot or cold something is
* Thermometer: A tool that measures temperature
* Heat energy: Invisible energy that makes things feel warm
* Measure: To find out how much of something there is
* Tool: Something that helps us do work or learn about things

External Resources

Children's Books:
- Hot and Cold by Karen Bryant-Mole
- Temperature: Heating Up and Cooling Down by Darlene Stille
- Thermometers by Jim Whiting

YouTube Videos:
- "What is Temperature? | Physics for Kids" - Simple explanation of temperature concepts with animations suitable for young learners (https://www.youtube.com/watch?v=n7BfwJw_dpQ)
- "Hot and Cold Science Experiment for Kids" - Hands-on activities demonstrating temperature differences using safe materials (https://www.youtube.com/watch?v=8B8zY8l_S7o)