

## Photo Description



A person holds an orange tool that measures how hot or cold things are. The tool shows numbers on a small screen. It can tell the temperature without touching something.

## Scientific Phenomena

This image shows an infrared thermometer demonstrating the anchoring phenomenon of thermal radiation detection. All objects emit invisible infrared light (heat energy) based on their temperature. The thermometer's sensor detects this infrared radiation and converts it into a temperature reading. This non-contact measurement works because thermal energy naturally radiates from warmer objects to cooler surroundings, and the intensity of this radiation correlates directly with the object's temperature.

## Core Science Concepts

1. Heat as Energy: All things have heat energy that we can measure with numbers called temperature
2. Hot and Cold Comparison: Some things are hotter than others, and we can compare them
3. Tools Help Us Learn: Special tools can tell us things our hands cannot feel safely
4. Numbers Tell Us Information: The numbers on the screen tell us how hot or cold something is

### Pedagogical Tip:

Use familiar objects at different temperatures (ice cube, warm water, room temperature toys) to help students connect the abstract concept of temperature to concrete experiences they can relate to.

### UDL Suggestions:

Provide multiple ways for students to experience temperature differences: visual thermometer readings, color-coded temperature charts, and safe tactile experiences with warm and cool objects to support diverse learning needs.

## Zoom In / Zoom Out

1. Zoom In: At the tiny level we cannot see, all the small pieces (molecules) in objects are moving and shaking. When they move faster, the object feels hotter. When they move slower, the object feels colder.
2. Zoom Out: Temperature affects everything around us - the weather outside, the food we eat, the clothes we wear, and even the animals and plants in nature. Understanding temperature helps us stay safe and comfortable.

### Discussion Questions

1. What do you think would happen if we pointed this tool at an ice cube versus a warm cookie? (Bloom's: Predict | DOK: 2)
2. How can we tell if something is hot or cold without touching it? (Bloom's: Analyze | DOK: 2)
3. What are some hot and cold things you know about in your house? (Bloom's: Remember | DOK: 1)
4. Why might it be helpful to measure temperature without touching something? (Bloom's: Evaluate | DOK: 3)

### Potential Student Misconceptions

1. Misconception: "The thermometer makes things hot or cold"  
Clarification: The thermometer only measures temperature - it doesn't change how hot or cold something is
2. Misconception: "You have to touch something to know its temperature"  
Clarification: This special thermometer can measure temperature from far away by detecting invisible heat energy
3. Misconception: "Cold things don't have any heat"  
Clarification: All things have some heat energy, even ice cubes - some things just have less heat than others

### NGSS Connections

- Performance Expectation: K-PS3-1: Make observations to determine the effect of sunlight on Earth's surface
- Disciplinary Core Idea: K-PS3.A - Energy and Matter: Sunlight warms Earth's surface
- Crosscutting Concept: Patterns - Patterns in the natural world can be observed and used as evidence

### Science Vocabulary

- \* Temperature: A number that tells us how hot or cold something is
- \* Thermometer: A tool that measures how hot or cold things are
- \* Heat: Energy that makes things feel warm or hot
- \* Measure: To find out how much of something there is using numbers
- \* 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 David Dreier
- Hot or Cold? by Tea Benduhn

YouTube Videos:

- "Hot and Cold for Kids" - Simple explanation of temperature concepts with everyday examples: <https://www.youtube.com/watch?v=YA58Dbo3erk>
- "What is Temperature? - Science for Kids" - Kid-friendly introduction to measuring temperature: <https://www.youtube.com/watch?v=T3ReOW8iBJ0>