

# **Measurement:** **The Measured Mystery**

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## **Science Objective**

This book demystifies the many types of measurements we make and the standard units we use to make them. Children discover that measurement covers height, length, and distance; weight and mass; volume; and temperature; and that each type of measurement requires its own unit of measure. They learn that we measure length in feet or meters; distance in miles or kilometers; liquids in quarts or liters; weight by ounces and pounds or grams and kilograms; temperature in degrees Fahrenheit or Celsius.

## **iScience Puzzle: Treasure Hunt**

This treasure hunt based on answering clues about measurement is certain to pique children's interest in learning about the many kinds of measurement in our world. As they learn the different units of measure, each clue brings them closer to the discovery of a birthday treat in a freezer.

### **Materials**

- meterstick
- ruler
- yardstick

### **Objectives** ► Children will:

- use a ruler to measure height and length in inches, feet, and yards.
- convert measurements in the U.S. customary system to the metric system.
- learn that liquids are measured in quarts or liters.
- learn that weight is measured in ounces and pounds or grams and kilograms.
- read the temperature using degrees Fahrenheit and Celsius.
- understand that volume is the capacity a container can hold and that it is measured by using a formula.

# Lesson Plan

## Before Reading

### Investigation

To introduce the topic of measurement, ask children questions such as *How old are you? How much do you weigh? How tall are you? How far away from school do you live? What time is it?* Explain that they are measuring many different things using different units of measure.

### Science Concepts

Measurement is based on standard units of measure.

Walk heel-to-toe across the floor and count off how many “feet” it is. Then have a volunteer repeat the exercise. Ask: *How do we measure something so that it is always the same length?*

Making observations is fundamental to the study of science.

Ask children to tell what kinds of things they need to measure in a week. Write their responses on the board. Then ask children to categorize the measurements. Ask: *When we measure milk, do we measure it the same way that we measure how much something weighs?*

Accessing prior knowledge gets children thinking about the topic.

Explain that children will read all about the different ways that we measure things. Invite them to consider how they use measurement not only in their daily lives but also in science. Encourage them to think about their own personal experiences as they answer the questions in the book.

## During Reading

### Investigation

**pp. 6–9:** Have children first estimate and then measure the length of various classroom objects or the distances between two things. Ask: *Why is it important sometimes to know exactly how long something is?*

### Science Concepts

Linear measurements are made with a ruler, yardstick, or meterstick.

**p. 11:** Have children use a ruler, a yardstick, and a meterstick to measure the same objects.

The meter is the standard unit of measure in the metric system.

**pp. 12–13:** Begin a chart on the board with column headings for different kinds of measurement and the units of measure. The first column heading is *Length*. The units of measure are the *foot* and the *meter*. Add to this chart as children continue reading.

Good record-keeping is vital when studying science.

## During Reading (continued)

### Investigation

### Science Concepts

**p. 15:** Add *Time* as the next column heading and *minutes* as the unit of measure.

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**p. 16:** *Distance* is another type of linear measurement and is usually measured in *miles* or *kilometers*. Add these to the chart.

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**p. 17:** Make sure that children understand the difference between weight and mass. When children weigh something in kilograms, they are measuring its mass. Add a column heading for *Mass*. The units of measure for weight are *ounce* and *pound* and for mass are *gram* and *kilogram*.

Mass is the amount of matter in an object.

**pp. 21–22:** Add *Volume* to the chart. Volume of a cube or a box is measured in *cubic inches* or *cubic centimeters*. Volume of liquid is measured in *quarts* or *liters*. Children may need extra examples to understand volume. You may want to focus on finding the volume of water.

Volume is the three-dimensional space enclosed within a container or occupied by an object.

**p. 24:** The capacity of the cylinder pictured on this page is measured in units of liquid measure (*quarts* or *liters*). Explain that when children measure something, they need to know if they are measuring it by weight or by volume. A cup of cream and a cup of milk have the same volume but different weights.

Capacity is the volume of a material or a substance that a container can hold.

**pp. 25–27:** Add *Temperature* to the chart and *degrees Fahrenheit* and *Celsius* as the units of measure. You may want to give children the formula for converting the two systems:

$$C = (F - 32) \times 5/9 \text{ and } F = C \times 5/9 + 32$$

We measure the temperature of liquids, air, and our body.

Temperature is the measure of how much heat is in something.

**p. 29:** Divide children into small groups and have them complete the Beyond the Puzzle.

Demonstrating scientific knowledge and achievement builds confidence.

## After Reading

Restate the key ideas in the book. People use exact measurements based on standard units to measure many things: length, distance, weight, mass, volume, time, and temperature. The way we measure things depends on the units of measure we use.

## After Reading (continued)

### Investigation

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Continue estimating and finding exact measurements of various objects around the classroom. Have children record the information in a chart.

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Look up information about the measurements of the human body in an art book or on the Internet. The head can be a standard unit of measure. Most people are between 6 and 8 heads tall. Have children measure themselves.

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Bring in unpopped popcorn and containers of different sizes and have children guess how much popcorn will fit in each container.

### Understanding Science

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Making observations is fundamental to the study of science.

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Research skills are tremendously important in science.

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Estimating is an important skill in both science and mathematics.