

NEWSLETTER

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WHAT DOES 100% REPRESENT?

DMT Insight 11 · Percent Is a Relationship: Building Percentage Understanding

In today's edition, we explore:

- Why the reference quantity matters
- Three student conceptions and what is behind them
- Three moves for the classroom
- A task to try tomorrow

Educators!

A student may know that 50% means one-half and still struggle with 150%, percent change, or a problem in which the reference quantity changes.

Before teaching another percent procedure, ask one question: What quantity represents 100%?

Percent describes one quantity relative to a reference quantity. If students lose track of that reference quantity, the procedure may still produce an answer, but the underlying relationship is gone.

What a Percent Describes

To reason about a percent, students do three things:

1. Identify the quantity represented by 100%.
2. Determine the quantity being compared to that reference.
3. Reason about the multiplicative relationship between the two quantities.

Fractions, decimals, ratios, and percents can express the same relationship in different forms.

Three Student Conceptions

Each of these is a reasonable idea extended to a situation where the relationship has changed. Research on percent documents all three (Dole et al., 1997; Parker & Leinhardt, 1995).

- **"100% is the biggest percent."** The student is treating 100% as the largest possible amount, not as the reference quantity. 150% is 1.5 times the reference quantity.
- **"A larger change means a larger percent change."** The student is comparing amounts of change without attending to the reference quantity. An increase of 20 is 50% of 40 and 20% of 100.

- **“To find a percent, I just multiply or divide.”** The student is using a procedure without identifying the quantity represented by 100%, so there is nothing to check the answer against.

Three Moves for the Classroom

- 1. Ask what represents 100%.** Do this before students calculate.
- 2. Make the relationship visible.** Use a bar model, double number line, or ratio table to show the reference quantity and the compared quantity.
- 3. Reason from benchmarks.** Use 50%, 25%, 10%, and 1% to compose, decompose, and scale other percentages.

Try This Tomorrow

Ask students to find 35% of 80 without giving them a percent procedure. Then ask:

- What represents 100%?
- What is 10%?
- How could you use 10% and 5% to build 35%?
- Where do you see the same relationship in a bar model or ratio table?

Percent procedures become easier to remember when students understand what the procedure tracks: a relationship between two quantities. Before students calculate, ask: What represents 100%?

Keep developing mathematical thinkers.

More Information

This is a quick overview. To download the full research overview on percent and watch the short video, go to DMT Insights at mathsuccess.io/dmtinsights.

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