

DMT COMPANION

Insight 11 · 2025 · for teachers, coaches, principals, and families



PERCENT IS A RELATIONSHIP

How to Use This

This Companion is for anyone working with DMT Insight 11. Start with the three questions that follow. Answer them before you read the Insight or watch the video, then come back and answer them again. Coaches can open a team meeting with the same three questions, and use the worked examples to keep the conversation close to the classroom.

Key Idea • Answer the three questions first, then read. The gap between your two answers is the point of the Companion.

Three Guiding Questions

Answer these before you read the Insight or watch the video, then again afterward.

1. When your students find a percent, can they say what quantity represents 100%?
2. Do your students treat a percent as an amount, or as a relationship between two quantities?
3. What do your students reason from when a percentage is greater than 100, or when the reference quantity changes?

Before and After: The Shift This Insight Asks For

The shift is from calculating a percent to naming the relationship the percent describes. In the before, the student multiplies 0.25 by 80 and reports 20. In the after, the student names the reference quantity: 80 represents 100%, and 20 is one-fourth of 80, so 20 is 25% of 80.

BEFORE • the procedure gives the answer

$$\begin{array}{c} 25\% \text{ of } 80 \\ 0.25 \times 80 = 20 \end{array}$$

"I multiplied and got 20."
The answer is correct. The relationship is not visible.

AFTER • the student names the relationship

80 represents 100%

20			
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25%

"80 represents 100%. 20 is one-fourth of 80, so 20 is 25% of 80."

The explanation names the reference quantity.

Before: a procedure that gives an answer. After: a relationship between two quantities.

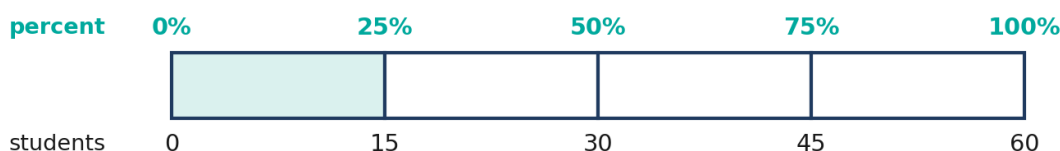
The answer is the same in both. What differs is whether the student can say what quantity represents 100% and what quantity is being compared to it. Without the reference quantity, the procedure still produces an answer, and the student has nothing to check it against.

Key Idea • A percent does not describe a quantity by itself. It describes one quantity relative to a reference quantity represented as 100%.

Worked Examples: The Model and the Words to Use

Example 1 • the bar model, 15 of 60 students

15 of 60 students: the same relationship as 25 to 100



The reference quantity, 60 students, is represented as 100%. 15 students are one-fourth of 60, so 15 is 25% of 60.

The language to use:

“What quantity represents 100%? Show me on the bar model.”

“What quantity are we comparing to it?”

“15 to 60 is the same relationship as what number to 100? How do you know?”

Example 2 • benchmarks, composing 35% of 80

35% of 80, composed from benchmarks

percent	100%	10%	5%	30%	35%
quantity	80	8	4	24	28
reference quantity					

10% of 80 is 8, because 80 partitioned into 10 equal units gives 8.
5% is half of 10%, so 5% is 4. 30% is three iterations of 10%, so 30% is 24.
30% and 5% compose 35%, so 35% of 80 is $24 + 4 = 28$.

The ratio table records the reasoning. 80 is the reference quantity, and 35% is composed from 30% and 5%.

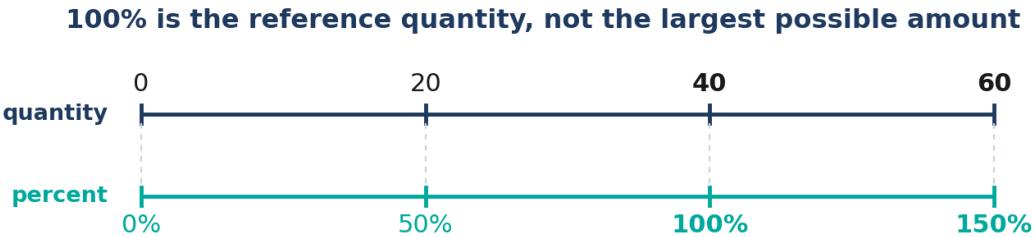
The language to use:

“What represents 100%? What is 10% of that quantity?”

“How could you use 10% and 5% to build 35%?”

“Record your reasoning in a ratio table. Where is the same relationship in a bar model?”

Example 3 • a percentage greater than 100

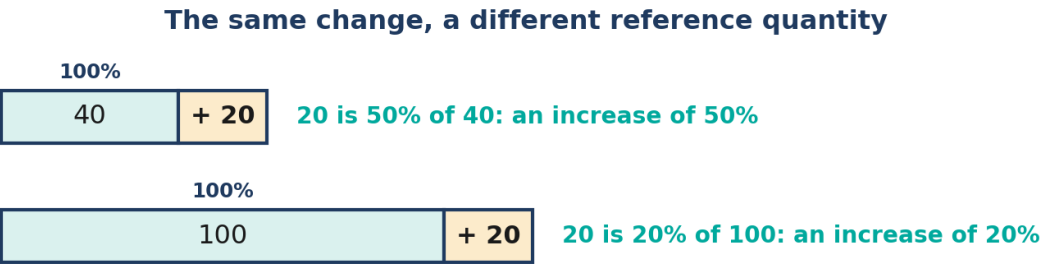


40 represents 100%. 60 is 150% of 40, which is 1.5 times the reference quantity.

The language to use:

- “Which quantity represents 100%? Where is it on the double number line?”
- “Is 60 more or less than the reference quantity? What does that tell you about the percent?”
- “60 is how many times as much as 40? How does 1.5 connect to 150%?”

Example 4 • percent change and the reference quantity



Both quantities increase by 20. The increase is 50% of 40 and 20% of 100.

The language to use:

- “What was the original quantity? That quantity represents 100%.”
- “How does the amount of change compare to the original quantity?”
- “Why is an increase of 20 a different percent change in each situation?”

Key Idea • One model per example, and the words to say alongside it. Each question returns to the quantity that represents 100%.

The Language Shift

Keep this by the board. The left column asks for a procedure or states a rule. The right column asks for the relationship.

Instead of	Say
What is the whole?	What quantity represents 100%?
Move the decimal point two places.	What is 10% of this quantity? What is 1%?

Percent means out of 100.	A percent compares a quantity to a reference quantity represented as 100%.
You cannot have more than 100%.	What would 150% of this quantity be?
It went up 20.	From what quantity? What percent of that quantity is 20?
Use the formula.	What is the reference quantity? What quantity is being compared to it? What relationship connects the two?

What to look for in a classroom:

- Students naming the quantity that represents 100% before they calculate.
- Models that show both the reference quantity and the compared quantity.
- Students composing a percentage from benchmarks such as 10%, 5%, and 1%.
- Students explaining a percent change by naming the original quantity.

Key Idea • When a percentage does not make sense to a student, return to the reference quantity.

Across the Grades

Percent builds on what students know about fractions, decimals, and ratios. The quantities and contexts change, and the question of what represents 100% continues.

Grade band	Example	Model	The shift it asks for
Grades 3-5	Finding one-half, one-fourth, and one-tenth of a quantity such as 80	Bar model	From parts of a shape to a fraction of a quantity, the reasoning that benchmark percentages build on
Grade 6	Finding 35% of 80, and finding the reference quantity when 20 is 25% of it	Bar model, ratio table, double number line	From a procedure to a ratio expressed relative to 100
Grades 7-8	Percent increase and decrease, percentages greater than 100, tax, and discounts	Double number line, ratio table, equation	From an amount of change to a change relative to the original quantity

Key Idea • The numbers and contexts change across the grades. The question continues: What quantity represents 100%?

Where to Go Next

Read DMT Insight 11, Percent Is a Relationship, and watch the short video. Find both at mathsuccess.io/dmtinsights, along with the rest of the DMT Insights series.

Try this every day for a week. Before students calculate a percent, ask what quantity represents 100%. Their answers will show you who is reasoning about the relationship and who is following a procedure.