

DMT COMPANION

Insight 51 · 2026 · for teachers, coaches, principals, and families



PLACE VALUE: THE UNDERSTANDINGS THAT PREDICT LATER MATH SUCCESS

How to Use This

This Companion accompanies DMT Insight 51, for teachers, coaches, principals, and families. Work the three guiding questions before the Insight or the video, and again afterward. The move that makes it work is small: stop asking what place a digit is in, and start asking how many tens or hundreds the number holds.

Three Guiding Questions

ANSWER THESE BEFORE THE INSIGHT, AND AGAIN AFTER

1. When your students work with a number like 526, are they naming the places, or reasoning about the units each digit stands for?
2. What does one unit represent in the number your students worked with today, and can they say it out loud?
3. Where will shaky place value quietly show up later this year: subtracting across zeros, multiplying by ten, or comparing decimals?

Before and After: Naming the Places and Counting the Units

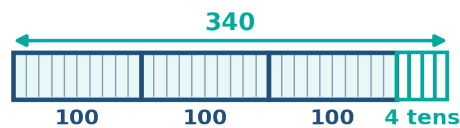
A filled-in place-value chart shows that a student can label a column. It does not show whether the student can count the units the number is built from. The same number, drawn as units, asks for the count and makes the answer something the student can see and say.

BEFORE the places are named

hundreds	tens	ones
3	4	0

Every column has a label and every label has a digit. Nothing has been counted.

AFTER the units are counted



Three hundreds are thirty tens, so 340 is 34 tens. The count is something the student can see and say.

Figure 1. The same number twice: 340 named in a place-value chart, beside 340 built from units of a hundred and units of ten.

The takeaway: naming a place indicates that a student has learned a label. Counting the units shows what the student understands about the quantity.

Worked Examples

Each example pairs the model students should build with the language that asks for units, magnitude, and value rather than for a place name. The first four parallel the four Place Value constructs, and the fifth extends the same reasoning to decimals.

Example 1 · Unitizing, Composing & Decomposing



the same quantity, the same length, counted in a different unit

Figure 2. The same length read two ways: 3 hundreds and 4 tens above, and 34 tens below.

Unitizing is treating a group as one unit while still knowing what it is composed of. The question that reveals it is not which digit sits in the tens place but how many tens the whole number contains. A student who answers 34 for 340 is counting in a composite unit. A student who answers 4 is reading a digit.

- “How many tens are in 340, and how do you know?”
- “Show me one unit of ten on your model. Now show me one unit of a hundred.”
- “How many hundreds are in 2,500? What did you have to do to the thousands?”

Example 2 · Magnitude & Number Line



Figure 3. 472 located on a number line from 0 to 1,000, just under the halfway benchmark.

A place-value chart shows how a number is composed, and a number line shows where the number lives. Students need both. Locating a number asks for a judgment about size that naming a place never requires, and the reasoning is in the justification rather than in the mark.

- “Where does 472 go on this number line, and what did you use to decide?”
- “Which is greater, 509 or 590, and how do you know before you look at the digits?”
- “Is 6,000 minus 2,950 closer to 3,000 or to 4,000? How did you decide?”

Example 3 · Position & Value

Naming a place is not the same as knowing what a digit counts and what it is worth. In 4,372, the 3 is the digit, hundreds is its position and the unit it counts, and 300 is its value, while the number is the single quantity all four place values compose. The distinction becomes diagnostic when a digit changes: if the 3 becomes a 5, the number grows by two hundreds, or 200, and the thousands, tens, and ones are untouched. A student who tracks digit, position, unit, value, and quantity can predict that change, and a student who reads the digits independently cannot.

- “In 4,372, what unit does the 3 count, and what is its value?”
- “If the 3 changes to a 5, how much does the whole number change, and which digits stay the same?”
- “Point to the digit, name its unit, and say its value. Which one tells you how much it adds to the number?”

Example 4 · $\times 10$ Structure and Equivalence

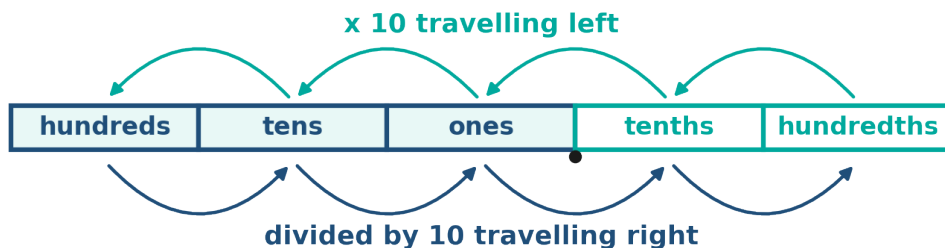


Figure 4. Each place is worth ten times the place to its right and one-tenth of the place to its left, and the relationship continues past the ones place.

This property separates base-ten understanding from a memorized list of place names. It is also what makes adding a zero fail: the rule survives whole numbers and collapses at decimals. Students who hold the structure can say why 0.1 is ten hundredths, and why 30 is ten times 3.

- “What happens to the value of a digit when it moves one place to the left?”
- “How many times greater is the 7 in 7,000 than the 7 in 70?”
- “How many tenths are in 5? How many hundredths are in 0.5?”

Equivalence and Renaming: The Other Half of the Same Construct

3 hundreds and 4 ones



2 hundreds, 10 tens, and 4 ones



the same total, ready to subtract across the zero

Figure 5. 304 drawn twice: as 3 hundreds and 4 ones, and as 2 hundreds, 10 tens, and 4 ones.

The same quantity can be named in many equivalent ways, and flexible renaming is what makes subtracting across a zero sensible rather than procedural. This is also where the equals sign earns its meaning: two decompositions of one number are genuinely equal, not a problem and its answer.

- “Show me 304 a second way. Why are the two the same?”
- “Explain why 6 tens and 14 ones equal 74.”
- “Which renaming of 304 would you want before subtracting 178, and why?”

Example 5 · Extending the Structure to Decimals



each small unit is one hundredth. 0.38 is 38 hundredths and 0.4 is 40 hundredths, so 0.38 sits to the left

Figure 6. A number line from 0.3 to 0.5 partitioned into hundredths. 0.38 sits to the left of 0.4.

Decimals extend the same base-ten structure to the right of the ones place rather than forming a new construct. A student who says 0.38 is greater than 0.4 is applying whole-number reasoning to a decimal, and the error is rule-governed rather than careless. The number line settles it by making both numbers countable in the same unit: 38 hundredths and 40 hundredths. The same unit reasoning that built whole numbers extends to the right of the ones place.

- “Which is greater, 0.38 or 0.4, and where does each one land on this number line?”
- “How many hundredths are in 0.4? How many are in 0.38?”
- “What unit are you counting in when you compare these two numbers?”

The Language Shift

Wording can either ask for a label or ask for the reasoning. Keep this by the board.

Instead of	Say
What place is the 7 in?	How many tens are in the number, and how do you know?
Line them up and look at the first digit.	Which quantity is larger? Where would each one land on the number line?
To multiply by ten, add a zero.	What happens to the unit when you multiply by ten? How many times greater is it?
Borrow from the hundreds.	Partition one unit of a hundred into ten units of ten. What do you have now?
The zero is just a placeholder.	What does the 0 in 406 tell you about the tens? How many complete tens are there?

What to look for in a classroom

- Students counting in tens and hundreds rather than reading a digit.
- Number lines used to locate numbers, with the benchmarks marked before a number is placed.
- Times-ten and divided-by-ten language in place of adding and removing zeros.
- The equals sign read as “is the same as” rather than as an instruction to compute.
- A student asked how they know every time the answer is correct.

Across the Grades

Band	What students build	Model	What changes in their thinking
K–2	Ten ones composed into one unit of ten, and quantities built and taken apart by hand.	Part-whole bar models and number lines within 100.	A group becomes something that can be counted as one while its contents stay known.
3–5	Numbers renamed flexibly, located on a number line, and related by a factor of ten.	Bar models, number lines, area models, and place-value charts.	The unit becomes something to identify, iterate, and partition, and the places become related rather than listed.
6–8	The same nested unit structure extended to tenths, hundredths, and proportional relationships.	Number lines with decimals, ratio tables, and equations.	Magnitude and unit reasoning carry into rational numbers and early algebra rather than restarting.

Reading Where Students Are

Insight 51 is a Math Learning Profile (MLP) Insight, so this Companion closes with the four readings the profile reports. Each reading rests on an item whose reasoning is visible, and each one points to a different next move.

Reading	An item that reveals it	What a gap looks like	The next move
Unitizing, Composing & Decomposing	How many hundreds are in 2,500, and how do you know?	Counts up by ones, or reads the hundreds digit.	Compose and decompose units of ten and a hundred before any further work on regrouping.
Magnitude & Number Line	Place 472 on a number line from 0 to 1,000.	Space points evenly, with no sense of where the number falls.	Establish and locate benchmarks first. Comparison items mean little until they are there.
Position & Value	In 4,372, what unit does the 3 count, and what is its value?	Names the place but cannot say what unit the digit counts or what it is worth.	Distinguish digit, position, unit, and value, and ask how the quantity changes when one digit changes.
$\times 10$ Structure and Equivalence	How many times greater is the 7 in 7,000 than the 7 in 70? Show 304 a second way and explain why the two are equal.	Adds a zero to multiply by ten, or produces only the standard decomposition.	Make the times-ten relationship explicit, and read the equals sign as a relation before renaming.

Take the four readings again when decimals arrive. A student can hold unit structure securely for whole numbers and lose it when the unit becomes a tenth, and only a reading taken at that moment will show it.

Where to Go Next

Read the full research overview and watch the accompanying video on the DMT Insights page at mathsuccess.io/dmtinsights. This issue's newsletter includes a one-page version for families and staff meetings. To access the Math Learning Profile (MLP), Targeted Activities, and more, visit mathsuccess.io.