

NEWSLETTER

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MULTIPLYING BY 10 IS NOT “ADDING A ZERO”

Help students see the $\times 10$ structure of our number system

In today's edition, we explore:

- **The Classroom Reality:** Why adding a zero gets 340 but hides what happened to the quantity
- **The Structure:** Why multiplying by ten makes a quantity ten times as large, unit by unit
- **The Instructional Shift:** Language and moves that keep the focus on units, quantity, and the $\times 10$ relationship

Educators!

Ask a student what happens when 34 is multiplied by ten. Many will say, add a zero. They may get 340, but the explanation tells us very little about whether they understand what happened to the quantity.

34 times ten is 340 because the quantity is now ten times as large. The 3 that counted tens now counts hundreds. The 4 that counted ones now counts tens. Each digit represents a unit that is ten times larger. That is the structure we want students to understand.

Try This Tomorrow

- **Build it.** Use nested base-ten units: 10 ones = 1 ten, 10 tens = 1 hundred, 10 hundreds = 1 thousand.
- **Rename it.** $340 = 34 \text{ tens} = 340 \text{ ones}$. Ask students how each representation names the same quantity.
- **Compare it.** $34 \rightarrow 340 \rightarrow 3,400$. Ask: How many times as large? What unit does each digit count? What happens to the value of the 3?
- **Extend it.** $100 \rightarrow 10 \rightarrow 1 \rightarrow 0.1 \rightarrow 0.01$. Ask: What is happening to the unit each time?
- **Say it precisely.** Replace "add a zero" with "the quantity is ten times as large," and move the decimal, with each digit now representing a unit ten times as large.

Patterns can help students notice what happens. Structure helps them understand why. We want students to move beyond adding a zero and recognize the relationship among units, values, and quantities.

What Does the Research Say?

Students who reason about why a procedure works, rather than memorizing it, build understanding that transfers (Brez & Allen, 2016; Saenz et al., 2023). Concrete base-ten materials help when they are used to reveal the $\times 10$ relationship, not just to demonstrate steps (Carbonneau, Marley, & Selig, 2013). Error analysis shows that adding a zero is a common shortcut that breaks down with decimals (Ashlock, 2010).

Multiplying by ten is not about adding a zero or moving digits. It is about a quantity becoming ten times as large, and each digit counting a unit ten times as large. When students can build, rename, compare, and extend units, we can see that understanding developing.

Keep developing mathematical thinkers.

More Information

For the full research overview and the accompanying video, visit the DMT Insights page at mathsuccess.io/dmtinsights. You will find Insight 20, the Companion, and related classroom resources there.

Have a classroom story, tip, or question to share? We feature teacher voices in future editions. Email us at mathsuccess@dmtinstitute.com.

