

The Models Matter

A Companion to DMT Insight 59 · For Teachers, Instructional Coaches, Principals, and Parents

Jonathan Brendefur, PhD · Math Success by DMTI

How to Use This

This Companion accompanies the DMT Insight on visual models. Answer the three questions below on your own first, then read the Insight, then come back to your answers. It works in a team meeting, in a coaching cycle, or on your own.

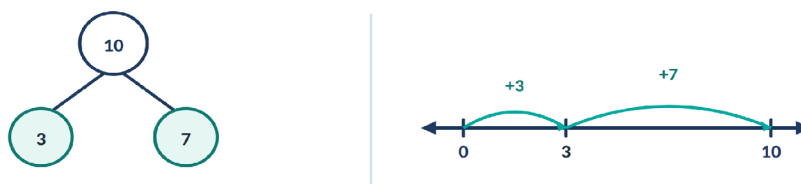
Three Guiding Questions

Answer these first, before the Insight or the video, then return to them.

1. When a student solves this, are they moving digits or reasoning about the quantities?
2. Does the model keep the size of the numbers visible, or only their names?
3. Can the student place the number on a line and say why it belongs there?

Before and After: Showing the Shift

The shift is from a model that organizes a quantity to one that preserves it. Before, the number bond shows that 3 and 7 make 10, and the circles are the same size, so nothing shows how large each quantity is. After, the number line places 3 and 7, and the distance to 10 is something the student can see.



Left: the bond records that 3 and 7 add up to 10, but the circles are the same size, so the magnitude is missing. Right: on the line, 3 is a short jump, and 7 is a long one, and together they land on 10.

Both students say 3 and 7 make 10. Only the number line shows how large each quantity is.

Worked Examples

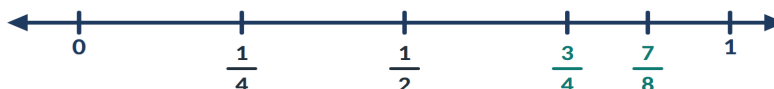
Subtracting 503 minus 297 on a number line.



Jump to a friendly number, then measure the rest.

Say: “How far apart are 297 and 503?” “Jump to 300 first, that is 3.” “Now from 300 to 503, that is 203.” “So the difference is 206.”

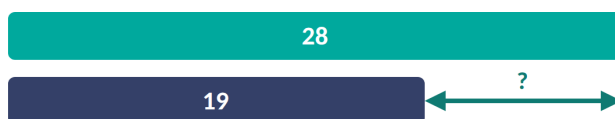
Comparing three fourths and seven eighths on a number line.



Place both fractions and compare their size.

Say: “Which is closer to 1, three fourths or seven eighths?” “How do you know, from where they sit?” “So seven eighths is greater than three fourths.”

Comparing 28 and 19 with a bar model.



Draw both quantities and mark the difference as a length.

Say: “How much more is 28 than 19?” “Mark the extra length. What number is it?” “So 28 less 19 is 9.”

The Language Shift

Keep this by the board. The words on the right make the number sizes explicit.

Instead of	Say
“What’s the answer?”	“Where does it belong on the line?”
“Line up the digits.”	“Which is bigger, and how do you know?”
“A whole and its parts.”	“A total and its quantities.”
“Use a picture.”	“Bar models organize quantities; number lines locate and measure them.”

Across the Grades (K to 8)

The same idea, that a model should keep the size of a number in view, grows across the grades.

Grade band	Example	Model	The shift it asks for
K–2	Place 7 and teen numbers on a number line.	Number line	From filling ten-frame cells to placing and measuring.
Grades 3–5	Place and compare $\frac{3}{4}$, $\frac{7}{8}$, 0.35, and 0.5.	Number line, bar model	From following steps to reasoning about size.

Grade band	Example	Model	The shift it asks for
Grades 6–8	Reason about rate and ratio, such as 3 for every 4.	Double number line, ratio bar	From adding the same amount to scaling by the same factor.

Where to Go Next

- The Insight: “The Models Matter: Why Some Visual Models Build Mathematical Structure, and Others Reach Their Limit.”
- The short video that accompanies the Insight is at mathsuccess.io/dmtinsights.
- More at mathsuccess.io and dmtinstitute.com.

To access the Math Learning Profile (MLP), Targeted Activities, and more, visit mathsuccess.io.