

Rounding and Estimation: From a Rule to Reasoning About Distance

Math Success with DMTI

DMT Insight 33 · Rounding and Estimation: Reasoning About Proximity and Magnitude

In today's edition, we explore:

- Why students can apply a rounding rule without understanding proximity.
- What a student has to see before rounding makes sense.
- How complete units, benchmarks, and midpoint support rounding.
- What common errors tell us about students' place-value understanding.

Educators!

Rounding and estimation are often taught as procedures, but both depend on reasoning about magnitude. When students round, they locate a number between two benchmarks and determine which benchmark is closer. That same reasoning is important in measurement, fractions, decimals, and proportional reasoning.

The instructional shift is from applying a rule about a digit to reasoning about benchmarks and distance. A student may round 47 to 50 correctly by looking at the 7 and still not understand why 47 is closer to 50 than to 40. That difference becomes important when students work with decimals or use estimation in context.

Classroom Tips

1. Ask for the complete units first. Before rounding, ask students to identify the complete units of the target size. For 273, ask, "How many complete units of 10 are in 273?" Then identify the next unit of 10: 280.
2. Put both benchmarks on an open number line. Mark 270 and 280, identify the midpoint at 275, and place 273. Ask which benchmark is closer and how the number line shows the distance between them.
3. Give the estimate a purpose. Ask students what the estimate will be used for and which benchmark is most useful in that context. Then have them justify the benchmark they chose.

A Teacher's Perspective

IN THE CLASSROOM

"I thought they had it, because the worksheets came back correct. Then I asked one of my students why 47 rounds to 50, and he said it was because of the seven. Now we start with how many tens are in the number. It slowed us down for about a week, and then it clicked."

Maria, a Grade 4 Teacher

The important point is whether students understand where the number is located relative to the benchmarks. The rounding rule should follow that understanding rather than replace it.

What Does the Research Say?

Rittle-Johnson and Schneider (2015) describe conceptual and procedural knowledge as developing together. Siegler and Booth (2004) connect numerical estimation to students' developing understanding of numerical magnitude. Schneider and colleagues (2020) found, across studies, a strong association between number-line estimation and broader mathematical competence.

More Information

- Read the full research overview and watch the video at mathsuccess.io/dmtinsights.
- To access the Math Learning Profile (MLP), Targeted Activities, and more, visit mathsuccess.io.
- Have a teaching tip that works? Send it to contact@dmthinstitute.com, and we may feature it.
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