

“Targeting Instruction with Formative Assessment Probes”

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I. Warm-Up

1. What do these terms mean to you?

Being diagnostic

Targeting instruction

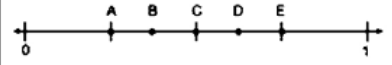
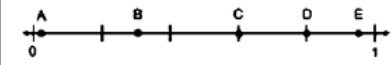
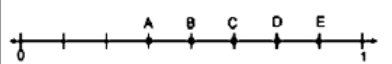
2. Read the quote and reflect: What does it take to put this mathematics teaching practice into action?

“Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.” NCTM, *Principles to Actions*, 2014, p. 53

II. Probes

A **probe** is a short, highly focused, quick-to-administer diagnostic assessment designed to pinpoint key foundational ideas that students *do* understand, as well as any specific misunderstandings they may have, regarding a particular mathematics concept. A probe is composed of 3–6 items designed for completion by students in about 10–15 minutes. Each item requires a two-part response from the student: a selected response and a written explanation using words and/or pictures. Here are *two sample probes*:

Comparing Fractions	
1. $\frac{1}{7}$ <input type="checkbox"/> Greater than (>) $\frac{1}{10}$ <input type="checkbox"/> Less than (<) <input type="checkbox"/> Equivalent (=)	Explain your choice using words and/or pictures
2. $\frac{6}{8}$ <input type="checkbox"/> Greater than (>) $\frac{3}{4}$ <input type="checkbox"/> Less than (<) <input type="checkbox"/> Equivalent (=)	Explain your choice using words and/or pictures
3. $\frac{4}{5}$ <input type="checkbox"/> Greater than (>) $\frac{6}{7}$ <input type="checkbox"/> Less than (<) <input type="checkbox"/> Equivalent (=)	Explain your choice using words and/or pictures

Locating Fractions on a Number Line	
1. Choose the letter that shows the location of $\frac{3}{8}$. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E	
Explain why you chose this location:	
2. Choose the letter that shows the location of $\frac{3}{10}$. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E	
Explain why you chose this location:	
3. Choose the letter that shows the location of $\frac{3}{4}$. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E	
Explain why you chose this location:	

Resources: Sample probes are available at Addressing Accessibility in Mathematics website:
<http://www2.edc.org/accessmath/resources/diagprobes.asp>

Diagnostic assessments are available at the *Eliciting Mathematics Misconceptions* website:
<http://em2.edc.org/>

III. Probes as a tool for targeting instruction: A five-step process

Step	Guiding Questions
1. Establish a math content focus.	<i>What conceptual math understanding do you want to assess? Why? What is difficult about this concept for students?</i>
2. Develop a plan to collect evidence.	<i>What probe will use to gather evidence of student thinking about the ideas related to your content focus? When will you administer the probe? How?</i>
3. Process the results	<i>How will you analyze and interpret the student work you collect?</i>
4. Plan and implement targeted instruction.	What instructional activities are good choices for building on students' strengths to address areas of difficulty? What are ways to differentiate the instruction for a range of learners?
5. Reflect and adjust.	How will you determine what impact the instruction had on student learning? What next steps will you take based on students' current understanding.

IV. Targeting Instruction

Key Questions: How will you build on students' strengths? How will you address students' difficulties? What strategies and activities would be a good match to the needs you identified? How will you differentiate instruction to address the range of learners?

Formats to Consider: Make adaptations to an upcoming lesson ♦ Add a new lesson or mini-lesson ♦ Use a stations or centers format ♦ Have students engage in small group work with same general activity differentiated by level of challenge/support in the problem sets ♦ Use different activities with different groups of students ♦ Provide additional instruction/support to a small group of students while others do independent work

V. Discussion Questions

1. How do you gather information on students' math understandings and difficulties?
2. How do you analyze the information?
3. How do you use the findings to inform your instruction?
4. What's one approach that works well for you?
5. What challenges have you faced in this process?