



Making Mathematical Thinking Visible

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Alignment to Learning Forward Standards

The new education law, Every Student Succeeds Act (ESSA), redefines professional development with a purposeful influence from Learning Forward.

Learning Forward, a national association recognized as leaders in professional learning, has established standards for professional learning that set a high bar for quality learning experiences.

This session aligns to the following standard:

- Outcomes - When the content of professional learning integrates student curriculum and educator performance standards, the link between educator learning and student learning becomes explicit, increasing the likelihood that professional learning contributes to increased student learning.

Today's Storyline:

Central to the learning design process is the sense-making of the educator. They must be able to articulate the Big Ideas that are essential for the learner to access.

Instruction must be responsive to real evidence of the student's progression toward mastery.

The classroom environment must make every effort to value each student's contribution and leverage structures that promote student autonomy.

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“Data driven is the worst term in education. We are CHILD driven.”

Agree or Disagree?

I struggle with not only the term “**data driven**”, but I struggle with the word “**data**” in itself because we have made the term “data” all about numbers in education. I believe we need to be “**evidence informed**”.

- George Couros

Data is factual information such as numbers, percentages, and statistics.

Evidence is data that is relevant and furnishes proof that supports a conclusion.



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Here's a problem...

2 A student sorted 950 crayons into boxes that hold 36 crayons each. How many more crayons will the student need to completely fill the last box?

- A** 6
- B** 14
- C** 22
- D** 30

Here's a problem... what can we infer about student thinking?

2 A student sorted 950 crayons into boxes that hold 36 crayons each. How many more crayons will the student need to completely fill the last box?

~~A~~ 6

~~B~~ 14

C 22

~~D~~ 30

Here's another problem...

Does the expression below show a way to represent the quotient of $586 \div 25$?

Circle Your Choice	Explain why you chose Yes or No:
<p>1) 23 r11</p> <p>Is this a way to represent the quotient $586 \div 25$?</p> <p>Circle One: Yes No</p>	
<p>2) 23 $\frac{11}{23}$</p> <p>Is this a way to represent the quotient $586 \div 25$?</p> <p>Circle One: Yes No</p>	

Here's another problem...

Does the expression below show a way to represent the quotient of $586 \div 25$?

Circle Your Choice	Explain why you chose Yes or No:
<p>3) 23.11</p> <p>Is this a way to represent the quotient $586 \div 25$?</p> <p>Circle One: Yes No</p>	
<p>4) $23\frac{44}{100}$</p> <p>Is this a way to represent the quotient $586 \div 25$?</p> <p>Circle One: Yes No</p>	

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Does the expression below show a way to represent the quotient of $586 \div 25$?

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<p>1) 23 r11</p> <p>Is this a way to represent the quotient $586 \div 25$?</p> <p>Circle One: <u>Yes</u> No</p>	<p>Yes because if you divide 25 into 586 that's the answer you get.</p> <div><div>$\begin{array}{r} 23 \\ 25 \overline{) 586} \\ \underline{50} \\ 86 \\ \underline{75} \\ 11 \end{array}$</div><div>$\begin{array}{r} \times 25 \\ 50 \\ \underline{3} \\ 75 \end{array}$</div></div>
<p>2) 23 $\frac{11}{23}$</p> <p>Is this a way to represent the quotient $586 \div 25$?</p> <p>Circle One: Yes <u>No</u></p>	

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<p>2) 23 $\frac{11}{23}$</p> <p>Is this a way to represent the quotient $586 \div 25$?</p> <p>Circle One: <u>Yes</u> No</p>	<p>Yes because in a fraction the smaller number goes on top and $\frac{11}{23}$ 11 is smaller than 23.</p>

Here's another problem... what can we infer about student thinking?

Does the expression below show a way to represent the quotient of $586 \div 25$?

Circle Your Choice	Explain why you chose Yes or No:
<p>3) 23.11</p> <p>Is this a way to represent the quotient $586 \div 25$?</p> <p>Circle One: Yes <input checked="" type="radio"/> No</p>	<p>No because remainder 11 is not a decimal.</p>
<p>4) $23 \frac{44}{100}$</p> <p>Is this a way to represent the quotient $586 \div 25$?</p> <p>Circle One: Yes No</p>	

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<p>4) $23 \frac{44}{100}$</p> <p>Is this a way to represent the quotient $586 \div 25$?</p> <p>Circle One: Yes <input checked="" type="radio"/> No</p>	<p>No because 11 isn't 44 and where did the 100 come from</p>

Compare to what we've just done

2 A student sorted 950 crayons into boxes that hold 36 crayons each. How many more crayons will the student need to completely fill the last box?

- A** 6
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- C** 22
- D** 30



Here's a problem...

4

$$8 - 4 \times 3^3 + 11$$

What is the value of this expression?

- A** -89
- B** -17
- C** 23
- D** 119

Here's a problem... what can we infer about student thinking?

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$$8 - 4 \times 3^3 + 11$$

What is the value of this expression?

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C 23

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Here's a problem...

Without calculating an answer, use your understanding of integer operations to determine whether the product or quotient is **positive, negative or 0**.

Circle Your Choice	Explain why you chose your answer:
<p>1) $-13 \bullet 13$</p> <p>The result is:</p> <p>Positive Negative Zero (0)</p>	
<p>2) $\frac{-62}{-14}$</p> <p>The result is:</p> <p>Positive Negative Zero (0)</p>	

Here's a problem...

Without calculating an answer, use your understanding of integer operations to determine whether the product or quotient is **positive, negative or 0**.

Circle Your Choice	Explain why you chose your answer:
<p>3) $53 \div (-53)$</p> <p>The result is:</p> <p>Positive Negative Zero (0)</p>	
<p>4) $(-15)^4$</p> <p>The result is:</p> <p>Positive Negative Zero (0)</p>	

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<p>1) $-13 \bullet 13$</p> <p>The result is:</p> <p>Positive <u>Negative</u> Zero (0)</p>	<p>13 groups of -13</p> <p>$(-13) (-13) (-13) \dots$</p> <p>must be negative</p>
<p>2) $\frac{-62}{-14}$</p> <p>The result is:</p> <p>Positive Negative Zero (0)</p>	

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<p>2) $\frac{-62}{-14}$</p> <p>The result is:</p> <p><u>Positive</u> Negative Zero (0)</p>	<p>$-62 \div -14$</p> <p>-62 has how many -14's \rightarrow more than 3</p> <p><u>positive</u></p>

Here's a problem... what can we infer about student thinking?

Without calculating an answer, use your understanding of integer operations to determine whether the product or quotient is **positive, negative or 0**.

Circle Your Choice	Explain why you chose your answer:
<p>3) $53 \div (-53)$</p> <p>The result is:</p> <p>Positive Negative Zero (0)</p>	<p>because any ^{negative} number that is the same or higher will equal negative</p>
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<p>4) $(-15)^4$</p> <p>The result is:</p> <p>Positive <u>Negative</u> Zero (0)</p>	<p>because the 4 is + and 15 is -</p>

Compare to what we've just done

4

$$8 - 4 \times 3^3 + 11$$

What is the value of this expression?

- A** -89
- B** -17
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- D** 119

Tasks & Activities that Elicit Evidence of Student Thinking

Not Observed	Beginning	Developing	Progressing	Extending
The teacher did not engage the class with any tasks or activities to elicit evidence of student thinking.	The teacher uses tasks or activities that are not aligned to the learning goals or will not provide evidence of student progress toward those goals.	The teacher uses tasks or activities that are loosely aligned to the learning goals and will provide limited evidence of student progress toward those goals.	The teacher uses well-crafted tasks and activities that are mostly aligned to the learning goals and will provide evidence of student progress toward those goals.	The teacher uses a series of integrated, well-crafted tasks and activities that are tightly aligned to the learning goals and will provide evidence of student progress toward those goals.



Cheryl Tobey • 3d

OK-MAP Diagnostic Mathematics Probes

Probe and Implementation Resource Sets

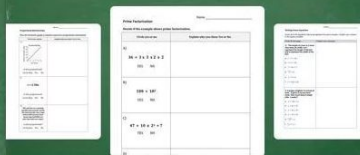
Probes are organized by grade spans.

Grade 3-5 Probes



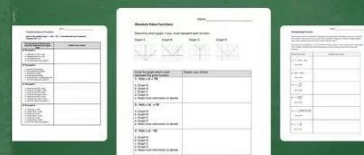
Grade 3-5
OK-Map Probes
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Grade 6-8 Probes



Grade 6-8
OK-Map Probes
cheryl tobey

Algebra I and II Probes



Algebra I and II
OK-Map Probes
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Mathematics Diagnostic Probes

The following posts will help you learn more about the probes and how to use them



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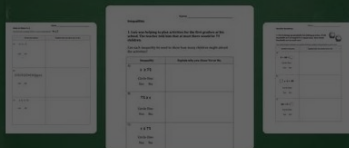
OK-MAP Diagnostic Mathematics Probes

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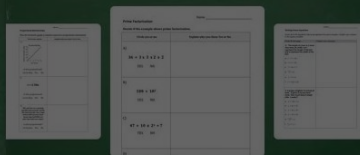
https://padlet.com/MathProbes/OK_Map

Grade 3-5 Probes



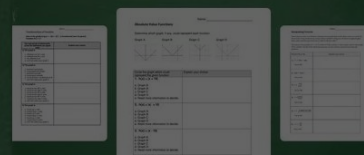
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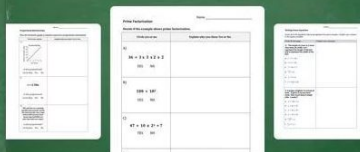
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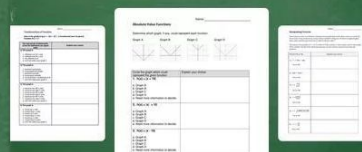
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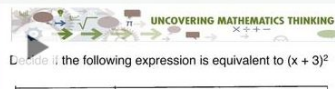
Intro to Probes Grades 3-5

Video Overview



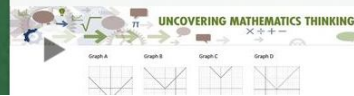
Intro to Probes Grades 6-8

Video Overview



Intro to Probes Alg I and II

Video Overview



Using Probes with Students

Document

Administering and Using Mathematics Diagnostic Probes

What is a Mathematics Diagnostic Probe?

- A mathematics diagnostic probe (or probe for short) is a targeted diagnostic assessment designed to elicit common understandings and misunderstandings in a topic of mathematics.

What does this mean for you?

What's Next?

Webinars + Short Course = Formative Assessment Probes