

# Number Talk String Planning: Multiplication

<p><b>Mathematical Goal</b></p> <p>What is the math? Where are my students?</p>	<p><b>Math:</b> Encourage students to use friendlier numbers (multiples of 10) when multiplying two 2-digit numbers in an area model.</p> <p>Based on student work, we see students:</p> <ul style="list-style-type: none"> <li>partitioning rectangles in inefficient ways and creating a cumbersome solution path when multiplying.</li> <li>not be able to connect their understanding of multiplying by 10's to the area model.</li> </ul>
<p><b>Number Talk String</b></p> <p>What problems will I ask? What do I anticipate they will do?</p>	<p>[Each problem will be an open array with sides labeled]</p> <p><b>10 x 20</b> - splits easily and Ss will know product quickly.</p> <ul style="list-style-type: none"> <li><i>Anticipate: split 20 into 10 + 10, <math>(10 \times 10) + (10 \times 10)</math></i></li> </ul> <p><b>10 x 23</b> - builds on understanding of 1st problem. Adds 3 to one side.</p> <ul style="list-style-type: none"> <li><i>Anticipate: split 23 into 20+3 or 10+10+3, <math>(20 \times 10) + (3 \times 10)</math></i></li> </ul> <p><b>13 x 20</b> - changes the other factor in the same way as problem 2.</p> <ul style="list-style-type: none"> <li><i>Anticipate: split 13 into 10+3, <math>(10 \times 20) + (3 \times 20)</math>, possibly split 20 into 10+10</i></li> </ul> <p><b>15 x 23</b> - changes both factors</p> <ul style="list-style-type: none"> <li><i>Anticipate: split 20 into 20+3, <math>(15 \times 20) + (15 \times 3)</math> or split 15 into 10+5 and 23 into 20+3, <math>(10 \times 20) + (10 \times 3) + (20 \times 10) + (20 \times 5)</math></i></li> </ul>
<p><b>Recording</b></p> <p>What is important about my recording?</p>	<ul style="list-style-type: none"> <li>Use red pen to notate the students' explanations so it shows up differently than the black outline of the rectangle.</li> <li>Use dotted lines to partition the rectangle so students do not confuse them with the sides themselves.</li> <li>Write the equation in each partitioned area so students can see the dimensions of each smaller rectangle.</li> <li>When a student breaks apart a side, I will label how the side length was broken apart.</li> </ul>
<p><b>Questioning</b></p> <p>What questions will be important to ask?</p>	<p>For initial responses:</p> <ul style="list-style-type: none"> <li>What is the area of the rectangle?</li> <li>How did you break up the rectangle?</li> <li>Why did you choose to break up the rectangle that way?</li> </ul> <p>To encourage discourse:</p> <ul style="list-style-type: none"> <li>Do you agree or disagree? Why?</li> <li>Can anyone re-explain ____'s strategy in their own words?</li> <li>Did anyone break the rectangle apart in a different way?</li> </ul>
<p><b>Follow Up</b></p> <p>What will I use as a formative assessment?</p>	<p>Ask students to choose one of two rectangles to find the area of and record it on an index card. Encourage them to use a strategy we used today in our Number Talk.</p>



# Number Talk String Planning: Equations

<p><b>Mathematical Goal</b></p> <p>What is the math? Where are my students?</p>	<p><b>Math:</b> Encourage students to “cover-up” variable expressions in equations to make it easier to use arithmetic to solve equations.</p> <p>Based on student work, we see students:</p> <ul style="list-style-type: none"> <li>• Able to reason towards a solution with simple equations like “<math>x + 5 = 0</math>”</li> <li>• Subtracting 1 from each side to solve an equation like <math>3x - 1 = 20</math></li> <li>• Subtracting from each side to eliminate coefficients</li> </ul>
<p><b>Number Talk String</b></p> <p>What problems will I ask? What do I anticipate they will do?</p>	<ul style="list-style-type: none"> <li>• <b><math>A + 16 = 0</math></b> - Both students can do this, 16 splits well, avoids adding a negative (for now) <ul style="list-style-type: none"> <li>◦ <i>Anticipate: If you start with -16 you need to add 16 to make 0, should be easy for these kids</i></li> </ul> </li> <li>• <b><math>2X + 16 = 0</math></b> - Directly related to previous equation, halving is relatively easy next move, using X to resemble “normal” equations <ul style="list-style-type: none"> <li>◦ <i>Anticipate: Subtracting 2 from both sides; “2x is -16”</i></li> </ul> </li> <li>• <b><math>2B - 16 = 0</math></b> - Uses the same numbers but moves into subtraction <ul style="list-style-type: none"> <li>◦ <i>Anticipate: “Same thing but positive”; “2B is 16”</i></li> </ul> </li> <li>• <b><math>2W - 16 = 4</math></b> - Uses many of the same numbers, using “cover up” <math>2B = 20</math> which is easier to think about in your head <ul style="list-style-type: none"> <li>◦ <i>Anticipate: “I added 16 to both sides”; “I figured 2B must be 20”</i></li> </ul> </li> </ul>
<p><b>Recording</b></p> <p>What is important about my recording?</p>	<ul style="list-style-type: none"> <li>• Circle the “2X” (“2B,” or “2W”) each time to “cover it up”</li> <li>• When recording the cover up method, write a little missing number equation under the original equation (e.g. <math>2W - 16 = 4 \rightarrow \underline{\quad} - 16 = 4</math>)</li> <li>• Make sure to give full honor to other solutions on the board, so leave room for two recordings under each equation</li> </ul>
<p><b>Questioning</b></p> <p>What questions will be important to ask?</p>	<p>For initial responses:</p> <ul style="list-style-type: none"> <li>• What is the value of the variable?</li> <li>• How did find the value?</li> <li>• Why did you choose to solve the problem in that way?</li> </ul> <p>To encourage discourse:</p> <ul style="list-style-type: none"> <li>• Do you agree or disagree? Why?</li> <li>• Can anyone re-explain ____’s strategy in their own words?</li> <li>• Did anyone solve it in a different way?</li> </ul>
<p><b>Follow Up</b></p> <p>What will I use as a formative assessment?</p>	<p>Follow-up equations (on index cards?):</p> <ul style="list-style-type: none"> <li>• <math>3Q - 1 = 35</math></li> </ul>

## Number Talk String

What problems will I ask?  
What do I anticipate they will do?

- $2p=20$ 
  - Anticipate "2 'what's' equal 20?"
- $2p+4=20$ 
  - Anticipate "Now I only need 16, so half of that is 8"
- $2p-6=20$ 
  - Anticipate "Now I need 26, so half of that is 13."
- $2(p+4)=20$ 
  - Anticipate "p+4 needs to equal 10, so p is 6"

## Number Talk String

What problems will I ask?  
What do I anticipate they will do?

- $16 + 49 = x + 50$ 
  - Anticipate "since 49 increased by 1, 16 has to go down by 1 to stay equal."
- $30 + 14 = 2x + 14$ 
  - Anticipate, "Since the 14 is the same, 2 times what equals 30.
- $x - 15 = 81 - 17$ 
  - Anticipate "Since 15 increased by 2, to keep the distance the same between the two numbers, I need to subtract 2 from 81"
- $30 - 14 = 4x - 12$ 
  - Anticipate "Since 14 decreased, the 30 needs to as well so 4x has to equal 28, so x=7."

## Number Talk String

What problems will I ask?  
What do I anticipate they will do?

- $3x = x + x + \underline{\hspace{1cm}}$
- $3x + 4 = x + \underline{\hspace{1cm}} + \underline{\hspace{1cm}}$
- $\underline{\hspace{1cm}} + 16 = 4x + 16 + x$
- $5x - \underline{\hspace{1cm}} = 2x + \underline{\hspace{1cm}} + 10$

\*trying to get at what the coefficient means here, not sure it does a good job

# Number Talk String Planning Guide

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## Mathematical Goal

What is the math?  
Where are my students?

## Number Talk String

What problems will I ask?

## Recording

What is important about my recording?

## Questioning

What questions will be important to ask?

## Follow Up

What will I use as a formative assessment?

For initial responses:

To encourage discourse:

