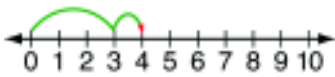


When working with **elementary (PK-5th grade)** students,

You can NEVER do enough of the following things:

You Can Never Do Enough...	Because...
<p style="text-align: center;">Modeling with NUMBER LINES</p> <p style="text-align: center;">$3 + 1 = 4$</p> 	<ul style="list-style-type: none"> • It helps to visualize addition and subtraction as movement. • It reinforces the importance of 10 in the base 10 number system. • It give students a visual representation for many topics • It is easy to draw anywhere, anytime • It is familiar to most students, so it gives most students language to enter and discuss the problem <p>Try it with...</p> <p>Negative numbers (use wind chill as a reference)</p>
<p style="text-align: center;">SKIP COUNTING</p>	<ul style="list-style-type: none"> • It is easy to do anywhere, anytime • It can be adapted for students at ANY grade-level • It reinforces pattern recognition and repetition, which can transition into discussions about rules and equations • It flexes the mental math muscle <p>Try it with...</p> <p>2's, 5's, 10's, 4's and 3's</p> <p>Start at a number not ending in zero and count by 10's (34, 44,...)</p> <p>Counting Backwards</p>
<p style="text-align: center;">Solving multiple types of STORY PROBLEMS</p>	<ul style="list-style-type: none"> • Problems put in the context of a story help students visualize the action of the math. • Story problems put math into a real world context and can engage student interests. <p>Try it with...</p> <p><u>Non-Traditional Problems:</u> $3 + \square = 7$ Story: I have 3 books. I got some more at the library. Now I have 7. How many did I get at the library?</p> <p><u>Comparing Problems:</u> Sara has 6 dollars. Mike has 10 dollars. How many more dollars does Mike have?</p>
<p style="text-align: center;">Getting students to EXPLAIN THEIR THINKING</p>	<ul style="list-style-type: none"> • It forces students to think about what they are doing, not just getting the answer. • It gives better insight into student understanding and reveals misconceptions. <p>Try it with...</p> <p>“How did you figure that out?”</p> <p>“So you are saying...” or “Why did you do it that way?”</p>

Elementary - You can NEVER do enough of the following things: (continued)

You Can Never Do Enough...	Because...																												
<p style="text-align: center;">Creating EQUIVALENT NUMBER SENTENCES</p>	<ul style="list-style-type: none"> Students struggle with the ideas that 2 things that look different can be equal to one another. It emphasizes the meaning of the = (equal sign) as “the same as” rather than “the answer comes next.” It sets the stage for the work students will do when they begin to study algebra. <p>Try it with...</p> <p><u>True and False Problems</u> $5 = 5$ $7 = 3 + 4$ $3 = 1 + 0 + \frac{1}{2} + 1$ $5 + 5 + 1 = 5 + 6$</p> <p><u>Open Number Sentences</u> $4 + \square = 10 + 4$ $10 + \square = 20 + 17$ $6 \times 6 = 12 \times \square$</p>																												
<p style="text-align: center;">Assuring students have a FLEXIBLE UNDERSTANDING OF THE BASE TEN NUMBER SYSTEM</p>	<ul style="list-style-type: none"> Many students enter middle school lacking a deep understanding of place value. The ability to decompose (break apart) numbers flexibly is key to solving problems efficiently and estimating answers. <p>Try it with...</p> <p>Decomposing and composing whole numbers in multiple ways. $42 = 20 + 20 + 2$ or $42 = 40 + 2$ or $42 = 10 + 12 + 20$</p> <p>Looking at a number and stating its value accurately. 432 ↙ 30</p> <p>Using partial sums, differences, products, and quotient strategies.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right; padding-right: 20px;">436</td> <td style="text-align: right; padding-right: 20px;">729</td> <td style="text-align: right; padding-right: 20px;">26</td> <td style="text-align: right; padding-right: 20px;">14</td> </tr> <tr> <td style="text-align: right;">+129</td> <td style="text-align: right;">-457</td> <td style="text-align: right;">x34</td> <td style="text-align: right;">4 56 10</td> </tr> <tr> <td style="text-align: right;">500 (400+100)</td> <td style="text-align: right;">300 (700-400)</td> <td style="text-align: right;">600 (30x20)</td> <td style="text-align: right;">- 40</td> </tr> <tr> <td style="text-align: right;">50 (30+20)</td> <td style="text-align: right;">-30 (20-50)</td> <td style="text-align: right;">180 (30x6)</td> <td style="text-align: right;">16 4</td> </tr> <tr> <td style="text-align: right;">+ 15 (6+9)</td> <td style="text-align: right;">2 (9-7)</td> <td style="text-align: right;">80 (4x20)</td> <td style="text-align: right;">- 16</td> </tr> <tr> <td style="text-align: right;">565</td> <td style="text-align: right;">272</td> <td style="text-align: right;">+ 24 (4x6)</td> <td style="text-align: right;">0</td> </tr> <tr> <td></td> <td></td> <td style="text-align: right;">884</td> <td></td> </tr> </table> <div style="border: 1px solid gray; border-radius: 50%; padding: 10px; width: fit-content; margin-left: auto; margin-top: 10px;"> What can I multiply 4 by that will get me close to 56? </div>	436	729	26	14	+129	-457	x34	4 56 10	500 (400+100)	300 (700-400)	600 (30x20)	- 40	50 (30+20)	-30 (20-50)	180 (30x6)	16 4	+ 15 (6+9)	2 (9-7)	80 (4x20)	- 16	565	272	+ 24 (4x6)	0			884	
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<p style="text-align: center;">SUBITIZING NUMBERS</p> <div style="border: 1px solid gray; border-radius: 10px; padding: 5px; margin: 10px auto; width: 80%;"> <p>SUBITIZE: Immediately recognizing the number in a collection without counting.</p> </div>	<ul style="list-style-type: none"> In order to move beyond simple counting by one strategies, students need to see numbers as sets rather than counting them 1 by 1. It allows students to begin doubling and tripling. <p>Try it with...</p> <p><u>Doubles</u></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin: 5px;">●●●</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">●●●●</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">●●●●●</div> </div> <p><u>10s +</u></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin: 5px;">●●●●●●</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">●●●</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">●●●●●●</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">●●●●●</div> </div>																												

When working with secondary students,

You can NEVER do enough of the following things:

You Can Never Do Enough...	Because...
Modeling with NUMBER LINES	<ul style="list-style-type: none">• It give students a visual representation for many topics• It is easy to draw anywhere, anytime• It is familiar to most students, so it gives most students language to enter and discuss the problem <p>Try it with...</p> <p>Integer Operations</p>
SKIP COUNTING	<ul style="list-style-type: none">• It is easy to do anywhere, anytime• It can be adapted for students at ANY grade-level• It reinforces pattern recognition and repetition, which can transition into discussions about rules and equations• It flexes the mental math muscle <p>Try it with...</p> <p>Fractions (Be sure to properly name whole numbers!)</p> <p>Starting at a number that is not a multiple of your counter (ex. Skip count by 3's starting at 14)</p> <p>Counting backwards beyond zero, into negative numbers</p>
GRAPHING	<ul style="list-style-type: none">• It is one area that students have multiple opportunities to see outside of the classroom• It is a skill that is necessary for multiple subject areas• It is easy for students to make seemingly small errors that make a big difference <p>Try it with...</p> <p>Different types of graphs and make comparisons ("What do all of the graphs have in common?")</p> <p>Discussing when it is appropriate to use the different types of graphs ("What does this graph explain/show best?")</p>
Transitioning between the 5 FORMS OF A FUNCTION	<ul style="list-style-type: none">• It reinforces the relationship between situations, equations, graphs, and tables.• It builds a deeper conceptual understanding of functions <p>Try it with...</p> <p>Starting with any of the representations and creating the others</p>

You can NEVER do enough of the following things: (continued)

You Can Never Do Enough...	Because...
<p style="text-align: center;">Getting students to EXPLAIN THEIR THINKING</p>	<ul style="list-style-type: none"> • It forces students to think about what they are doing, not just getting the answer • It gives better insight into student understanding and reveals misconceptions <p>Try it with...</p> <p>“What do you notice?”</p> <p>“Think out loud.”</p> <p>“What is going on in your brain?”</p> <p>“Tell me what you are thinking.”</p>
<p style="text-align: center;">Creating EQUIVALENT EXPRESSIONS</p>	<ul style="list-style-type: none"> • Students struggle with the ideas that 2 things that look different can be equal to one another. <p>Try it with...</p> <p>Fractions $\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$</p> <p>Algebraic expressions $2x + 3 = 5x + 3 - 3x$ or $x^2 = (x)(x)$</p> <p>Rational Numbers $0.75 = \frac{3}{4}$ or $5 = \frac{-5}{-1}$</p> <p>Forms of linear equations (While these are not expressions, this will still help students build the idea of equality)</p>
<p style="text-align: center;">Assuring students have a FLEXIBLE UNDERSTANDING OF THE BASE TEN NUMBER SYSTEM</p>	<ul style="list-style-type: none"> • A deep understanding of place value is one of the 2 major concepts all elementary students enter middle school weak in. <p>Try it with...</p> <p>Decomposing and composing integers ($542 = 500 + 40 + 2$)</p> <p>Saying 5.62 without using the word “point” (“5 and 62 hundredths”)</p> <p>Using base 10 blocks</p>
<p style="text-align: center;">Discussing real-life examples of RATIOS, RATES and PROPORTIONAL RELATIONSHIPS</p>	<ul style="list-style-type: none"> • Proportional reasoning is the #1 weakness of high school mathematics students. • Understanding ratios, rates and unit rates deepens students understanding of proportions. <p>Try it with...</p> <p>Grocery store data (cost per ounce)</p> <p>Speed of human running, car driving, etc.</p> <p>Create ratios comparing anything you see around you (ratio of boys to girls, ratio of boys to all students, ratio of pencils to pens, etc.)</p>