

## Teller Elementary Fluency Expectations

According to the Jo Boaler, a lead mathematics researcher and professor at Stanford University, "Fluency comes about when students develop **number sense**, when they are mathematically confident because they understand numbers," (Boaler, 2005). Having **number sense** means that one has a, "deep understanding of numbers and the ways they relate to each other," (Boaler, 2005). Fluency is much more than being fast to determine the quantity. Fluency is evident when students are flexible thinkers that see the relationships between numbers and are able to apply these relationships in a variety of situations.

Grade	Fluency for End of Grade Level	Strategies to Develop Fluency	Example	Video Example
Kindergarten	Add and subtract within 5	Subitizing	"I see a group of 3, and then 1 more, so there are 4."	<a href="https://www.youtube.com/watch?v=FkVZug3F0GU">https://www.youtube.com/watch?v=FkVZug3F0GU</a>
		Counting all (with manipulatives)	$1 + 4$ can be figured out by counting, "1, 2, 3, 4, 5."	<a href="https://www.youtube.com/watch?v=tkkL7kQUyTI">https://www.youtube.com/watch?v=tkkL7kQUyTI</a> <a href="https://www.youtube.com/watch?v=vzeeaxLQDkE">https://www.youtube.com/watch?v=vzeeaxLQDkE</a>
		Counting on, up, back, or down (with manipulatives)	$2 + 3$ can be figured out by saying, "3, 4, 5," and tracking the amount one is counting up.	<a href="https://www.youtube.com/watch?v=WRb5iK5fZD0">https://www.youtube.com/watch?v=WRb5iK5fZD0</a> (Counting up or on) <a href="https://www.youtube.com/watch?v=QhR1SEK49qM">https://www.youtube.com/watch?v=QhR1SEK49qM</a> (Counting back or down)
1st Grade	Add and subtract within 10	Counting on or up (with manipulatives)	$6 + 2$ can be figured out by saying, "6, 7, 8," and tracking the amount one is counting up.	<a href="https://www.youtube.com/watch?v=WRb5iK5fZD0">https://www.youtube.com/watch?v=WRb5iK5fZD0</a>
		Counting down or back (with manipulatives)	$8 - 4$ can be figured out by saying, "8, 7, 6, 5, 4," and tracking the amount one is counting down or back.	<a href="https://www.youtube.com/watch?v=QhR1SEK49qM">https://www.youtube.com/watch?v=QhR1SEK49qM</a>
		Related Numbers	"I know 5 and 2 make 7 so 5 and 3 make 8"	

2nd Grade	Add and subtract within 20 using mental strategies. By the end of 2nd grade, know from memory all sums of 2, 1-digit numbers.	Counting on/up or down/back (with manipulatives)	8 + 6 can be figured out by saying, "8, 9, 10, 11, 12, 13, 14," and tracking the amount one is counting up. 18 - 4 can be figured out by saying, "18, 17, 16, 15, 14," and tracking the amount one is counting down or back.	<a href="https://www.youtube.com/watch?v=PUY072JHE4g">https://www.youtube.com/watch?v=PUY072JHE4g</a> <a href="https://www.youtube.com/watch?v=QhR1SEK49qM">https://www.youtube.com/watch?v=QhR1SEK49qM</a>
		Decomposing a number to make a 10 (addition)	$8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$	<a href="https://www.youtube.com/watch?v=q9h4skGoWJ8">https://www.youtube.com/watch?v=q9h4skGoWJ8</a> <a href="https://www.youtube.com/watch?v=8iZ-TpNj-A">https://www.youtube.com/watch?v=8iZ-TpNj-A</a>
		Decomposing a number leading to a 10 (subtraction)	$13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$	<a href="https://www.youtube.com/watch?v=Jmrl3RKCMXM">https://www.youtube.com/watch?v=Jmrl3RKCMXM</a>
		Doubles + or -	For 6 + 7, one can think of the double 6 + 6 + 1 more	<a href="https://www.youtube.com/watch?v=nZUBwM36q-s">https://www.youtube.com/watch?v=nZUBwM36q-s</a>
2nd Grade	Add and subtract within 100, using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction (pencil and paper)	Decomposition of both numbers by place value (addition only)	$67 + 25 = 60 + 20 + 7 + 5 = 92$	<a href="https://www.youtube.com/watch?v=Kv7I8P4eygA">https://www.youtube.com/watch?v=Kv7I8P4eygA</a>
		Decomposition of one number by place value (addition and subtraction)	$67 + 25 = 67 + 20 + 5$ $88 - 25 = 88 - 20 - 5 = 63$	<a href="https://www.youtube.com/watch?v=fYJOW5gGAqw">https://www.youtube.com/watch?v=fYJOW5gGAqw</a>
		Decomposition for a particular reason	$67 + 25 = 67 + 3 + 20 + 2$	<a href="https://www.youtube.com/watch?v=XMCr-avfe10">https://www.youtube.com/watch?v=XMCr-avfe10</a>
		Decompose to get to a landmark number (group of 10s) (addition and subtraction)	$67 + 25 = x$ $67 + 3 = 70$ $70 + 22 = 92$ $X = 92$	<a href="https://www.youtube.com/watch?v=XMCr-avfe10">https://www.youtube.com/watch?v=XMCr-avfe10</a>
		Think addition for subtraction	$88 - 25 = x$ $25 + x = 88$	<a href="https://www.youtube.com/watch?v=NpCviQYCIBA">https://www.youtube.com/watch?v=NpCviQYCIBA</a>

3rd Grade	Multiply and divide within 100  *Students should have an understanding of multiplication being equal groups of a certain amount prior to using strategies to determine products	Skip counting	$3 \times 4 = 4, 8, 16$	<a href="https://www.youtube.com/watch?v=K7OCWWut43M">https://www.youtube.com/watch?v=K7OCWWut43M</a>
		Repeated addition	$3 \times 4 = 4 + 4 + 4$	<a href="https://www.youtube.com/watch?v=dpFOvoiYDaQ">https://www.youtube.com/watch?v=dpFOvoiYDaQ</a>
		Groups of 2- Doubles	$2 \times 6 = 6 + 6$	<a href="https://www.youtube.com/watch?v=BRd6TELRNIE">https://www.youtube.com/watch?v=BRd6TELRNIE</a>
		Groups of 4- Double, double	$4 \times 6 = 6 + 6$ and then $6 + 6$ again	<a href="https://www.youtube.com/watch?v=BRd6TELRNIE">https://www.youtube.com/watch?v=BRd6TELRNIE</a>
		Groups of 5- Half of 10s	If $10 \times 10$ is 100, then $5 \times 10$ is 50, because 5 is half of the groups of 10 and 50 is half of 100 I.e. $5 \times 12 = 60$ because $10 \times 12$ is 120 and 5 groups of 12 is half of 10 groups of 12 and 60 is half of 120.	<a href="https://www.youtube.com/watch?v=ikSch_v2-Jw">https://www.youtube.com/watch?v=ikSch_v2-Jw</a>
		Decompose groups of 6, 7, 8, 9 into two smaller or known factors	$8 \times 8 = 5 \times 8 + 3 \times 8$	<a href="https://www.youtube.com/watch?v=WoCMgu8K-mY">https://www.youtube.com/watch?v=WoCMgu8K-mY</a>
		Groups of 9- Think 10	$9 \times 7 = 10 \times 7 - 7$	<a href="https://www.youtube.com/watch?v=Xd_U290pio">https://www.youtube.com/watch?v=Xd_U290pio</a> (begins at 1:38)
	Think multiplication to divide	$81 / 9 = 9$ groups of ___	<a href="https://www.youtube.com/watch?v=gcMJ1pN36r4">https://www.youtube.com/watch?v=gcMJ1pN36r4</a>	
3rd Grade	Add and subtract within 1000	Decomposition of both numbers by place value (addition only)	$178 + 225 = 100 + 200 + 70 + 20 + 8 + 5$	<a href="https://www.youtube.com/watch?v=Pi8dlWRQiaq">https://www.youtube.com/watch?v=Pi8dlWRQiaq</a>
		Decomposition of one number by place value (addition and subtraction)	$167 + 25 = 167 + 20 + 5$ $188 - 25 = 188 - 20 - 5 = 163$	<a href="https://www.youtube.com/watch?v=kr0KaUqyugE">https://www.youtube.com/watch?v=kr0KaUqyugE</a>

		Decomposition for a particular reason	$167 + 25 = 167 + 3 + 20 + 2$	<a href="https://www.youtube.com/watch?v=XM Cr-avfe10">https://www.youtube.com/watch?v=XM Cr-avfe10</a>
		Decompose to get to a landmark number (group of 10s) (addition and subtraction)	$685 + 198 = 198 + 2 + 683$	<a href="https://www.youtube.com/watch?v=_v VU89epPZc">https://www.youtube.com/watch?v=_v VU89epPZc</a>
		Think addition for subtraction	$188 - 25 = x$ $25 + x = 188$ $25 + 5 = 30$ $30 + 70 = 100$ $100 + 88 = 188$ $5 + 70 + 88 = 163$	<a href="https://www.youtube.com/watch?v=AiS Kj8wl4rM">https://www.youtube.com/watch?v=AiS Kj8wl4rM</a>
4th Grade	<p>Add and subtract multi-digit whole numbers using the standard algorithm, within 1,000,000</p> <p>*4th Grade is the first time students are expected to use the standard algorithm for addition and subtraction. Previous addition and subtraction strategies from 2nd and 3rd grade are built upon in order for students to gain fluency with the standard algorithm.</p>	Decomposition of both numbers by place value (addition only)	$1178 + 225 = 1000 + 200 + 100 + 70 + 20 + 8 + 5$	<a href="https://www.youtube.com/watch?v=Pi8 dlWRQiaq">https://www.youtube.com/watch?v=Pi8 dlWRQiaq</a>
		Decomposition of one number by place value (addition and subtraction)	$1,167 + 25 = 1,167 + 20 + 5$ $1,188 - 25 = 1,188 - 20 - 5 = 1,163$	<a href="https://www.youtube.com/watch?v=kr0 KaUqyugE">https://www.youtube.com/watch?v=kr0 KaUqyugE</a>
		Decomposition for a particular reason	$1,167 + 125 = 1,167 + 3 + 120 + 2$	<a href="https://www.youtube.com/watch?v=XM Cr-avfe10">https://www.youtube.com/watch?v=XM Cr-avfe10</a>
		Decompose to get to a landmark number (group of 10s) (addition and subtraction)	$1,685 + 198 = 198 + 2 + 1,683$	<a href="https://www.youtube.com/watch?v=_v VU89epPZc">https://www.youtube.com/watch?v=_v VU89epPZc</a>
		Think addition for subtraction	$1,188 - 125 = x$ $125 + x = 1,188$ $125 + 75 = 200$ $200 + 800 = 1,000$ $1,000 + 188 = 1,188$	<a href="https://www.youtube.com/watch?v=AiS Kj8wl4rM">https://www.youtube.com/watch?v=AiS Kj8wl4rM</a>

			$75 + 800 + 188 = 1,063$	
		Standard addition algorithm	$  \begin{array}{r}  1 \\  1,285 \\  + 562 \\  \hline  1,847  \end{array}  $	
5th Grade	<p>Multiply multi-digit whole numbers using the standard algorithm</p> <p>*5th Grade is the first time students are expected to use the standard algorithm for multiplication. Previous multiplication strategies from 3rd and 4th grade are built upon in order for students to gain fluency with the standard algorithm.</p>	Decompose one factor into groups of 10	$45 \times 47 = (10 \times 47) + (10 \times 47) + (10 \times 27) + (10 \times 27) + (5 \times 47)$ OR $45 \times 47 = (10 \times 47) + (10 \times 47) + (20 \times 47) + (5 \times 47)$	<a href="https://www.youtube.com/watch?v=fQX74Eeo4Tw">https://www.youtube.com/watch?v=fQX74Eeo4Tw</a>
		Landmark numbers/think 10	For $49 \times 15$ , think $50 \times 15 - 15$ .	<a href="https://www.youtube.com/watch?v=1Cgf4Z8_l1A">https://www.youtube.com/watch?v=1Cgf4Z8_l1A</a>
		Standard algorithm	$  \begin{array}{r}  11 \\  123 \\  \times 15 \\  \hline  615 \\  + 1230 \\  \hline  1,845  \end{array}  $	