

# Kingsmoor Primary School Mental Fluency Progression

**Overview:** The aim at Kingsmoor Primary School is that by the end of Key Stage 2, children should be able to use an efficient method for each operation confidently and with understanding. It is encouraged that children recognise how and when to use mental methods to work out a calculation. For calculations that they cannot do in their heads they choose an appropriate written method which they can use accurately and with confidence (refer to written calculation policy).

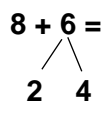
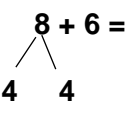
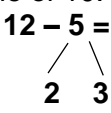
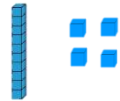

## Reception

Counting	Count to and from 20 and beyond
Recall	Identify 1 more and 1 less than a number to 10/20 Order numbers to 20
Mental + and -	Doubles and halves to 5 (e.g. 5 + 5) Subitise numbers to 5 Understand the cardinal value of number words (e.g. understanding 'four' relates to 4 objects) Begin to experience partitioning and combining numbers within 10

## Year 1

Counting	<ul style="list-style-type: none"> <li>Count forwards and backwards to/from 100, starting from any number.</li> <li>Count from 0 in steps of 2, 5 and 10, starting from any multiple forwards and backwards.</li> <li>Count forwards and backwards in 2s through the odd numbers.</li> </ul>
Recall	<ul style="list-style-type: none"> <li>Place numbers 1 – 9 on a marked/unmarked number line</li> <li>Addition &amp; subtraction facts for all numbers within 10 (5 + 4, 9 – 6...), including number bonds to 10.</li> <li>Solve missing addend problems within 10 (e.g. 4 + ___ = 10).</li> <li>Doubles and halves to at least 10 (e.g. 10 + 10, 20 – 10...)</li> <li>One more/one less than any number up to 100</li> <li>Add 10 and a single digit number (e.g. 10 + 5, 10 + 7...)</li> <li>Subitise numbers to 10</li> <li>Know that 10 ones are equivalent to 1 ten, and multiples of 10 are made up from a number of tens (e.g. 50 is 5 tens)</li> </ul>
Mental + and – skills:  (numbers up to 20)  <i>Working with resources then mentally, with jottings if needed,</i>	<p><b>Finding complements:</b> <i>Look for 'friendly numbers' like doubles.</i></p> <p><math>7 + 6 =</math>      <math>7 + \overset{7}{\textcircled{6}} =</math>      I know <math>7 + 7 = 14</math>, subtract 1 is 13.</p> <p><i>Look out for number bonds to 10 and 20.</i></p> <p><math>8 + 3 =</math>      <math>8 + \overset{2}{\textcircled{3}} =</math>      I know <math>8 + 2 = 10</math>, add 1 is 11.</p> <p><i>Reorder the numbers to make them easier.</i></p> <p><math>2 + \textcircled{6} =</math>      I know <math>6 + 2 = 9</math>, so <math>2 + 6 = 9</math>.</p>

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<p>children are able to:</p>	<p><b>Compensating:</b>          This works well if a number is one away from a tens number. Round it up or down and then adjust your answer.</p> <p><math>9 + 3 = </math> <math>\overset{10}{\textcircled{9}} + 3 =</math>      I know <math>10 + 3 = 13</math>, and then subtract 1 which makes 12.</p> <p><math>18 - 9 = </math> <math>18 - \overset{10}{\textcircled{9}} =</math>      I know <math>18 - 10 = 8</math>, and then add 1 which makes 9.</p>
	<p><b>Regrouping (Addition)</b>          This method works well when adding two 1-digit numbers that total more than ten. Regroup one of the numbers to land on 10.</p> <p><math>8 + 6 =</math>      This could be solved by doing <math>8 + 2 + 4</math></p>  <p><math>8 + 6 =</math>      or <math>6 + 4 + 4</math>.</p> 
	<p><b>Regrouping (Subtraction):</b>          This method works well when subtracting a 1-digit number from a number that crosses a multiple of 10.</p> <p><math>12 - 5 =</math>      I know that <math>12 - 2 = 10</math>, then subtract 3.</p> 
	<p><b>Partition &amp; Recombine:</b>          Partition both numbers into tens and ones and add up how many you have altogether.</p> <p><math>14 + 3 =</math></p> <p><math>10 + 0 = 10</math>            Partition your numbers into tens and ones.          Add up your answers to find the total.</p> <p><math>4 + 3 = 7</math></p> <p><math>10 + 7 = 17</math>      </p>
	<p><b>Finding the Difference:</b>          This method is used in a subtraction calculation where the numbers are close together.</p> <p><math>9 - 7 = 2</math>      Start with the smallest number in the calculation and count on until you get to the biggest.</p> <p>“9 is 2 more than 7.”</p>
<p>Multiplication &amp; Division</p>	<p>Recall multiplication and division facts for the 10x table</p>

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## Year 2

Counting	<ul style="list-style-type: none"> <li>Counting forwards and backwards to/from 100 in steps of 1, 2, 3, 5 and 10, from 0.</li> <li>Counting forwards and backwards to/from 100 in steps of 10, starting from any number (e.g. 2, 12, 22, 32, 42, 52...)</li> </ul>
Recall	<ul style="list-style-type: none"> <li>Recognise the place-value of each digit in a 2-digit number</li> <li>Locate any 2-digit number on a marked/unmarked number line, including identifying the next and previous multiple of 10.</li> <li>Addition &amp; subtraction facts within 10</li> <li>All pairs of numbers with a total of 20</li> <li>Add a multiple of 10 and any 1-digit number (e.g. 50 + 4)</li> <li>Doubles and halves to at least 20 (e.g. 15 + 15, 30 – 15...), and multiples of 10 to 50 (e.g. 40 + 40 = 80)</li> </ul>
<p>Mental + and – skills:</p> <p><i>With resources then working mentally, with jottings if needed, introduce children to:</i></p>	<ul style="list-style-type: none"> <li>Develop fluency for addition and subtraction facts for all numbers to 20 (e.g. 9 + 8, 17 - 8) using mental strategies.</li> <li>Add a single digit number to make the next multiple of 10 (e.g. 52 + ___ = 60)</li> <li>Add/subtract a multiple of 10 to/from any 2-digit number (e.g. 34 + 20)</li> <li>Add &amp; subtract multiples of 10 up to 100 (e.g. 90 + 10, 50 + 40. 70 - 20)</li> </ul> <p><b>(Numbers to 100 – examples)</b>  <b>Finding complements:</b>  <i>Look for ‘friendly numbers’ like doubles.</i></p> <p>40 + 41 =                      40 + <math>\overset{40}{\textcircled{41}}</math> =                      I know 40 + 40 = 80, then add 1 is 81</p> <p>22 + 20 =                      <math>\overset{20}{\textcircled{22}}</math> + 20 =                      I know 20 + 20 = 40, then add 2 is 42</p> <p>16 – 9 =                      16 – <math>\overset{8}{\textcircled{9}}</math> =                      I know 16 – 8 = 8, then – 1 more is 7</p> <p><i>Look out for ‘friendly numbers’ like bonds to 10, 20 and 100</i></p> <p>17 + 4 =                      17 + <math>\overset{3}{\textcircled{4}}</math> =                      I know 17 + 3 = 20, add 1 is 21.</p> <p>60 + 31 =                      60 + <math>\overset{30}{\textcircled{31}}</math> =                      I know 60 + 30 = 90, then add 1 is 91</p> <p>52 + 8 =                      I know 2 + 8 = 10, so 52 + 8 = 60</p> <p><i>Reorder the numbers to make them easier.</i></p> <p><math>\textcircled{6}</math> + 3 + <math>\textcircled{6}</math> =                      I know 6 + 6 = 12, then add 3.</p> <p>5 + <math>\textcircled{34}</math> =                      5 + 34 is the same as 34 + 5.</p>

# Kingsmoor Primary School Mental Fluency Progression

## Compensating:

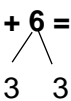
This works well if a number is one or two away from a tens number (numbers that end in 0). Round it up or down and then adjust your answer.

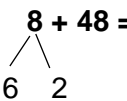
$$19 + 16 = \quad \overset{20}{\textcircled{19}} + 16 = \quad \text{I know } 20 + 16 = 36, \text{ then subtract 1 is 35.}$$

$$52 - 18 = \quad 52 - \overset{20}{\textcircled{18}} = \quad \text{I know } 52 - 20 = 32, \text{ then add 2 back on is 34}$$

## Regrouping (Addition):

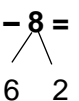
This method works well when adding a 1-digit number to another number. Partition the smallest number to land on a multiple of 10.

$$17 + 6 = \quad \text{This could be solved by doing } 17 + 3 + 3.$$


$$8 + 48 = \quad \text{This could be solved by doing } 48 + 2 + 6.$$


## Regrouping (Subtraction):

When subtracting, partition the second number in the calculation to land on a multiple of 10.

$$46 - 8 = \quad \text{This could be solved by doing } 46 - 6 - 2 =$$


## Partition & Recombine:

Partition both numbers into tens and ones then add up how many you have altogether.

$$32 + 16 = \quad 45 + 26 =$$

$30 + 10 = 40$	$40 + 20 = 60$
$2 + 6 = 8$	$5 + 6 = 11$
$40 + 8 = 48$	$60 + 11 = 71$

\*For subtraction only partition the second number.

$$66 - 23 =$$

$$66 - 3 = 63$$

$$63 - 20 = 43$$

## Finding the Difference:

This method is used in a subtraction calculation where the numbers are close together.

$$17 - 14 = 3 \quad \text{Start with the smallest number in the calculation and count on until you get to the biggest.}$$

Multiplication  
& Division

- Recall multiplication and division facts for the 10, 5, 2 and 4 times tables.

# Kingsmoor Primary School Mental Fluency Progression

## Year 3

Counting	<ul style="list-style-type: none"> <li>Count from 0 in multiples of 4, 8, 50 and 100</li> </ul>
Recall	<ul style="list-style-type: none"> <li>Know that 10 tens are equivalent to one hundred</li> <li>Recognise the place-value of each digit in a 3-digit number</li> <li>Locate any three-digit number on a marked/unmarked number line, including identifying the next and previous multiple of 10.</li> <li>Complements to 100 (e.g. <math>75 + 25 = 100</math>, <math>64 + 36 = 100</math>)</li> <li>Doubles &amp; halves of multiples of 10 and 100 (e.g. <math>90 + 90</math>, <math>900 + 900</math>)</li> </ul>
Mental + and - (Up to 3-digit numbers)  <i>Working with resources then mentally, with jottings if needed, children should be able to:</i>	<ul style="list-style-type: none"> <li>Develop fluency for numbers up to 20, then numbers to 100 (see Y1 and Y2)</li> <li>Apply place value knowledge to work out sums and differences of multiples of 10 &amp; 100 up to 1000 (e.g. <math>60 + 50</math>, <math>600 + 200</math>, <math>800 - 500</math>)</li> <li>Add/subtract a multiple of 10 to any number (e.g. <math>423 + 20</math>)</li> <li>Add/subtract a multiple of 100 to any number (e.g. <math>256 + 200</math>)</li> <li>Calculate small differences (e.g. 72 and 74).</li> </ul> <p><b>(Numbers to 1000)</b>  <b>Finding complements:</b>  <i>Look for 'friendly numbers' like doubles.</i></p> <p><math>80 + 82 =</math>                      <math>80 + \overset{80}{\textcircled{82}} =</math>                      I know <math>80 + 80 = 160</math>, then add 2.</p> <p><math>703 + 700 =</math>                      <math>\overset{700}{\textcircled{703}} + 700 =</math>                      I know <math>700 + 700 = 1400</math>, then add 3.</p> <p><math>400 - 199 =</math>                      <math>400 - \overset{200}{\textcircled{199}} =</math>                      I know <math>400 - 200 = 200</math>, then + 1</p> <p><i>Look out for 'friendly numbers' like bonds to 10 and 100.</i></p> <p><math>70 + 32 =</math>                      <math>70 + \overset{30}{\textcircled{32}} =</math>                      I know <math>70 + 30 = 100</math>, then add 2.</p> <p><math>65 + 36 =</math>                      <math>\overset{35}{\textcircled{36}} + 65 =</math>                      I know <math>65 + 35 = 100</math>, then add 1.</p> <p><i>Reorder the numbers to make them easier.</i></p> <p><math>75 + 95 + 25 =</math>                      <math>\textcircled{75} + 95 + \textcircled{25} =</math>                      I know <math>75 + 25 = 100</math>. Then add 95.</p> <p><math>500 + 65 + 300 =</math>                      <math>\textcircled{500} + 65 + \textcircled{300} =</math>                      I know <math>500 + 300 = 800</math>, then add 65.</p>

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## Compensating:

This works well if a number is a couple away from a tens or hundreds number. Round it up or down and then adjust your answer.

$$232 + 49 = \quad 232 + \overset{50}{\textcircled{49}} = \quad \text{I know } 232 + 50 = 282, \text{ then } - 1.$$

$$95 + 162 = \quad \overset{100}{\textcircled{95}} + 162 = \quad \text{I know } 162 + 100 = 262, \text{ then } -5.$$

$$632 - 596 = \quad 632 - \overset{600}{\textcircled{596}} = \quad \text{I know } 632 - 600 = 32, \text{ then } + 4$$

## Regrouping (Addition):

*Think 10:*

$$\begin{array}{r} 165 + 8 = \\ \swarrow \quad \searrow \\ 5 \quad 3 \end{array}$$

*Think 100:*

$$\begin{array}{r} 370 + 50 = \\ \swarrow \quad \searrow \\ 30 \quad 20 \end{array}$$

This could be solved by doing  $165 + 5 + 3$ . This could be solved by doing  $370 + 30 + 20$ .

## Regrouping (Addition):

When subtracting, partition the second number in the calculation to land on a multiple of 10.

$$172 - 9 = \quad \text{This could be solved by doing } 172 - 2 - 7.$$

$$\begin{array}{r} 172 - 9 = \\ \swarrow \quad \searrow \\ 2 \quad 7 \end{array}$$

## Partition & Recombine:

$213 + 132 =$

$356 + 118 =$

$200 + 100 = 300$

$300 + 100 = 400$

$10 + 30 = 40$

$50 + 10 = 60$

$3 + 2 = 5$

$6 + 8 = 14$

$300 + 40 + 5 = 345$

$400 + 60 + 14 = 474$

Partition your numbers into hundreds, tens and ones. Add up your answers to find the total.

\*For subtraction only partition the second number.

$266 - 132 =$

$176 - 45 =$

$266 - 2 = 264$

$176 - 5 = 171$

$264 - 30 = 234$

$171 - 40 = 131$

$234 - 100 = 134$

Multiplication & Division

- Recall multiplication and division facts for 10, 5, 2, 4, 8, 3 and 6 times tables.
- Apply place value knowledge to known multiplicative number facts (e.g.  $30 \times 4 = 120$ ,  $120 \div 4 = 30$ )
- Divide 100 into 2, 4, 5 and 10 equal parts (in preparation for reading number lines and scales).

# Kingsmoor Primary School Mental Fluency Progression

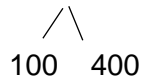
## Year 4:

Counting	<ul style="list-style-type: none"> <li>Count in multiples of 6, 7 9, 25 and 1000</li> </ul>
Recall	<ul style="list-style-type: none"> <li>Know that 10 hundreds are equivalent to 1000.</li> <li>Recognise the place value of each digit in four-digit numbers</li> <li>Reason about the location of any four-digit number on a marked/unmarked number line, including identifying the next and previous multiple of 1000 and 100.</li> <li>Sums &amp; differences of multiples of 10, 100 &amp; 1000 (e.g. 4000 + 3000)</li> <li>Doubles &amp; halves of multiples of 10, 100 and 1000 (e.g. 3000 + 3000, 6000 – 3000)</li> <li>Calculate small differences (e.g. 150 and 147).</li> </ul>
Mental + and -  (up to 4-digit numbers)  <i>Working with resources then mentally, with jottings if needed, children begin to be able to:</i>	<ul style="list-style-type: none"> <li>Develop fluency strategies for numbers up to 3-digits.</li> <li>Add/subtract a multiple of 10, 100 and 1000 to any number (e.g. 1342 + 2000)</li> <li>Complements to 1000 (e.g. 750 + 250)</li> </ul> <p><b>Finding complements:</b> <i>Look for 'friendly numbers' like doubles.</i></p> <p><b>4002 + 4000 =</b>                      I know 4000 + 4000 = 8000, then + 2.</p> <p><b>8000 – 3997 =</b>                      I know 8000 – 4000 = 4000, then + 3.</p> <p><i>Look out for 'friendly numbers' like bonds to 10, 100 and 1000.</i></p> <p><b>650 + 349 =</b>                      I know 650 + 350 = 1000, then – 1.</p> <p><i>Reorder the numbers to make them easier.</i></p> <p><b>.750 + 400 + 250</b>                      I know 750 + 250 = 1000, then +400.</p> <p><b>Compensating</b> This works well if a number is a couple away from a tens, hundreds or thousands number. Round it up or down and then adjust your answer.</p> <p><b>5657 + 29</b>                      I know 5657 + 30 = 5687, then -1.</p> <p><b>3548 – 102 =</b>                      I know 3548 – 100 = 3448, then – 2.</p> <p><b>4476 + 2998 =</b>                      I know 4476 + 3000 = 7476, then – 2.</p> <p><b>6537 – 3999 =</b>                      I know 6537 – 4000 = 2537, then + 1.</p> <p><b>Regrouping (Addition)</b> <i>Think 10:</i>  <math display="block">\begin{array}{r} 5643 + 8 = \\ \phantom{564} \swarrow \searrow \\ \phantom{564} 7 \phantom{0} 1 \end{array}</math>           This can be solved as 5643 + 7 + 1.</p> <p><i>Think 100:</i>  <math display="block">\begin{array}{r} 290 + 50 = \\ \phantom{29} \swarrow \searrow \\ \phantom{29} 10 \phantom{0} 40 \end{array}</math>           This can be solved as 290 + 10 + 40.</p>

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Think 1000:

$$4900 + 500 =$$



This can be solved by as  $4900 + 100 + 400$ .

## Regrouping (Subtraction)

Think 10:

$$754 - 7 =$$



This can be solved by doing  $754 - 4 - 3$ .

Think 100:

$$230 - 70 =$$



This can be solved by doing  $230 - 30 - 40$ .

## Partition & Recombine

$$1213 + 132 =$$

$$2356 + 1112 =$$

$$1000 + 0 = 1000$$

$$2000 + 1000 = 3000$$

$$200 + 100 = 300$$

$$300 + 100 = 400$$

$$10 + 30 = 40$$

$$50 + 10 = 60$$

$$3 + 2 = 5$$

$$6 + 2 = 8$$

$$1000 + 300 + 40 + 5 = 1345$$

$$3000 + 400 + 60 + 8 = 3468$$

Partition your numbers into hundreds, tens and ones. Add up your answers to find the total.

Introduce rebalancing strategies: equal sum for addition and equal difference for subtraction.

## Rebalancing

To help us to add and subtract numbers mentally, we can rebalance the calculation to make a 'friendly number' (a multiple of 10, 100 or 1000) so that it is easier to handle.

## Equal sum

$$52 + 37 =$$

I take 2 away from 50.

I add 2 to 37.

Now I solve  $50 + 39$ .

$$564 + 197 =$$

I add 3 to 197.

I take 3 away from 564.

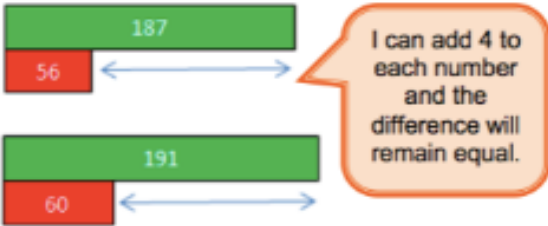
Now I solve  $561 + 200$ .

Rules:

1. You must do the same to both sides to keep the difference between the numbers equal
2. You **MUST** make one of the numbers friendly or else you'll make the question trickier.



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	<p><b>Equal difference</b></p>  <p><b>187 – 56 =</b> I can add 4 to the second number to make 60. Therefore I add 4 to the first number to make 191. <math>191 - 60 = 131</math> so <math>187 - 56</math> is also 131.</p> <p>Rules:</p> <ol style="list-style-type: none"><li>1. You must do the same to both sides to keep the difference between the numbers equal</li><li>2. You <b>MUST</b> make the <u>second</u> number a friendly number or else you'll make the question trickier.</li></ol>
Multiplication & Division	<ul style="list-style-type: none"><li>• Revise and teach multiplication and division facts up to <math>12 \times 12</math></li><li>• Apply place value knowledge to known multiplicative number facts (e.g. <math>300 \times 4 = 1200</math>)</li><li>• Multiply and divide whole numbers by 10 and 100</li><li>• Divide 1000 into 2, 4, 5 and 10 equal parts (in preparation of reading scales/number lines)</li></ul>

# Kingsmoor Primary School Mental Fluency Progression

## Year 5

Counting	<p>Count in multiples of 11 and 12 from 0</p> <p>Count forwards and backwards in steps of powers of 10 for any given number up to 1 000 000</p> <p>Count forwards and backwards with positive and negative whole numbers, including through 0</p>
Recall	<ul style="list-style-type: none"><li>• Know that 10 tenths are equivalent to 1 one</li><li>• Know that 100 hundredths are equivalent to 1 one</li><li>• Know that 10 hundredths are equivalent to 1 tenth</li><li>• Recognise the place value of each digit in numbers with up to 2 decimal places</li><li>• Locate any number with up to 2 decimal places in the linear number system, including identifying the next multiple of 1 and 0.1</li><li>• Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000</li></ul>
Mental + and - (more than 4-digits)  <i>Working with resources then mentally, with jottings if needed, children should be able to:</i>	<p>Revision of all mental calculation strategies up to 4-digit numbers.</p>
Multiplication & Division	<ul style="list-style-type: none"><li>• Secure all tables up to 12 x 12 and related division facts</li><li>• Apply place value knowledge to known multiplicative number facts (e.g. <math>8 + 6 = 14</math>, <math>0.8 + 0.6 = 1.4</math>, <math>0.08 + 0.06 = 0.14</math>)</li><li>• Multiply and divide numbers by 10 and 100</li><li>• Divide 1 into 2, 4, 5 and 10 equal parts (reading scales/number lines)</li><li>• Find factors and multiples of positive whole numbers, including common factors and common multiples</li></ul>

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## Year 6

Counting	
Recall	<ul style="list-style-type: none"><li>• Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1,000).</li><li>• Recognise the place value of each digit in numbers up to 10 million</li><li>• Locate any number up to 10 million, including decimal fractions, in the linear number system</li></ul>
Mental + and - (more than 4-digits)  <i>Working mentally, with jottings if needed, children should be able to:</i>	<ul style="list-style-type: none"><li>• Revision of all mental calculation strategies and begin to apply to numbers with more than 4 digits.</li></ul>
Multiplication & Division	<ul style="list-style-type: none"><li>• Secure all tables up to 12 x 12 and related division facts</li><li>• Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal parts (Read scales/number lines)</li><li>• Use a given multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships and place value understanding.</li><li>• Solve problems involving ratio relationships</li><li>• Solve problems with 2 unknowns</li></ul>