

In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them. Encourage children to choose and use the most efficient and appropriate method for the numbers and the situation.

	Addition	Subtraction	Multiplication	Division
Y5	<p>Children should extend the compact method to numbers with at least four digits, including decimals (see below).</p> <p>Compact Method</p> <p>Compensation Children need to round and adjust to the nearest 10 / 100/1000 especially in the context of money.</p> <p>£4.95 + £6.80 + £9.14 = £5.00 - 5p + £7.00 - 20p + £9.00 + 14p = £5.00 + £7.00 + £9.00 = £21.00 + 14p - 25p = - 11p = £21.00 - 11p = £ 20.89</p> <p>Using similar methods, children will:</p> <ul style="list-style-type: none"> ✓ add several numbers with different numbers of digits; ✓ begin to add two or more decimal fractions with up to three digits and the same number of decimal places; ✓ know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 3.2 m - 280 cm. 	<p>Children should still be encouraged to use the number line where appropriate.</p> <p>Number lines and Difference 'Find the difference by counting up' E.g. 754 - 586 or 21.4cm - 18.6cm = 18.6cm + ___ = 21.4cm</p> <p>Where the numbers involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used. E.g. 1209 - 388 = 821</p> <p>Partitioning and decomposition Model with Base 10 equipment and/. place value counters</p> <p>600 140 14 700 + 50 + 4 - 200 + 80 + 6 400 + 60 + 8 = 468</p> <p>Decomposition (Only when secure with the expanded form)</p> <p>3 12 2 16 3000 1200 20 16 4236 4000 200 30 6 - 2827 - 2000 800 20 7 = 1409 1000 400 0 9</p> <p>Moving onto decimals when secure with place value</p> <p>Children should:</p> <ul style="list-style-type: none"> ✓ be able to subtract numbers with different numbers of digits; ✓ begin to find the difference between two decimal fractions with up to three digits and the same number of decimal places; ✓ know that decimal points should line up under each other ✓ encourage children to record in the most efficient way: just two steps. 	<p>Grid method (See Y4 to link grid method with arrays) Children should calculate TOxO mentally, with jottings (not grid). 3 and 4 digit x 1 digit numbers Short multiplication (multiplication by a single digit) Children will approximate first 346 x 9 is approximately 350 x 10 = 3500</p> <p>Long multiplication (multiplication by more than a single digit) Children will approximate first 72 x 38 is approximately 70 x 40 = 2800</p> <p>Use Base 10 to model transition towards expanded written method e.g. 13 x 11 =</p> <p>Expanded column method (most able children) Children should multiply decimals with one decimal place by a single digit number, approximating first. They should know that the decimal points line up under each other. 4.9 x 3 is approximately 5 x 3 = 15</p> <p>Factorise to multiply by larger numbers eg. 35x14 35x (2x7) (35x2) x 7 70x7 = 490</p>	<p>Children should calculate TO ÷ O mentally, with jottings, using knowledge of known facts.</p> <p>Short division HTO ÷ O Children can start to subtract larger multiples of the divisor, by x multiples of 10</p> <p>196 ÷ 6</p> <p>Solve division by chunking into known multiples of the divisor and illustrate on a vertical number line. (if children struggle return to Y4 and model chunking on a horizontal line)</p> <p>Any remainders should be shown as integers, then as fractions, i.e. if the children were dividing 32 by 10, the answer should be shown as 3.2 or 3 ²/₁₀ (which could then be written as 3 ¹/₅ in it's lowest terms), depending on the context</p> <p>Children need to make sensible decisions about rounding up or down after division, according to the context.</p> <p>(See Y4)</p> <p>2000 ÷ 400 2000 ÷ 4 1500 ÷ 500 1500 ÷ 5 400 x 5 500 x 4 1/4 of 2000 1/5 of 2000</p> <p>Known Facts</p>

Encourage children to check results by using the inverse, using a different method e.g. equivalent calculation and by estimation where appropriate.

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Y6

Addition

Children should

- ✓ add several numbers with different numbers of digits;
- ✓ begin to add two or more decimal fractions with up to four digits and either one or two decimal places;
- ✓ know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. $401.2 + 26.85 + 0.71$

$$\begin{array}{r} 7648 \\ + 1486 \\ \hline 9134 \\ \hline \end{array}$$

$$\begin{array}{r} 6584 \\ + 5648 \\ \hline 12432 \\ \hline \end{array}$$

$$\begin{array}{r} 42 \\ 6432 \\ 786 \\ + 4681 \\ \hline 11944 \\ \hline \end{array}$$

Encourage self-checking by writing the inverse calculation alongside

$$\begin{array}{r} 7648 \\ + 1486 \\ \hline 9134 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \ 10 \ 12 \ 14 \\ \cancel{6} \ \cancel{1} \ \cancel{3} \ \cancel{4} \\ - 1486 \\ \hline 7648 \\ \hline \end{array}$$

Subtraction

Children should:

- ✓ be able to subtract numbers with different numbers of digits;
- ✓ be able to subtract two or more decimal fractions with up to three digits and either one or two decimal places;
- ✓ know that decimal points should line up under each other.

Number lines 'Find the difference by counting up' Where the numbers are involved in the calculation are close together or near to multiples of 1, 10, 100 etc counting on using a number line should be used. E.g. $3002 - 1997 = 1005$



Partitioning leading to decomposition (See Y5) Only when fully secure in using number lines.

$$6467 - 2684 = 3783$$

$$\begin{array}{r} 5000 - 2000 = 3000 \\ 1300 - 600 = 700 \\ 160 - 80 = 80 \\ 7 - 4 = 3 \end{array}$$

$$\begin{array}{r} 5 \ 13 \\ 6467 \\ - 2684 \\ \hline 3783 \end{array}$$

Decomposition (only when secure in using expanded form)

$$\begin{array}{r} 5 \ 1316 \\ 6467 - 2000 = 4000 \\ 6000 - 2000 = 4000 \\ 4000 - 2000 = 2000 \\ 600 - 200 = 400 \\ 80 - 20 = 60 \\ 7 - 4 = 3 \end{array}$$

$$\begin{array}{r} 3783 \\ 2684 + \\ \hline 6467 \end{array}$$

Self check using inverse

Multiplication

Short multiplication (by a single digit) - Grid method, Expanded and contracted vertical method (3 and 4 digit x 1 and 2 digit numbers)

$$4346 \times 8$$

x	4000	300	40	6	
8	32000	2400	320	48	

$$\begin{array}{r} 4346 \\ \times 8 \\ \hline 48 \\ 320 \\ 2400 \\ 32000 \\ \hline 34768 \end{array}$$

Children will approximate first. 372×24 is approximately $400 \times 25 = 10000$

x	300	70	2	
20	6000	1400	40	
4	1200	280	8	

$$\begin{array}{r} 6000 \\ + 1400 \\ + 1200 \\ + 280 \\ + 40 \\ + 8 \\ \hline 8928 \end{array}$$

Using similar methods, they will be able to multiply decimals with up to two decimal places by a single digit number and then two digit numbers, approximating first. They should know that the decimal points line up under each other.

$$4.92 \times 3 \text{ is approximately } 5 \times 3 = 15$$

x	4	0.9	0.02	
3	12	2.7	0.06	

$$\begin{array}{r} 12 \\ 2.7 \\ +0.06 \\ \hline 14.76 \end{array}$$

Both Expanded and contracted methods to be used only when children are confident with the Grid method.

BODMAS- (brackets over division, multiplication, addition, subtraction)

Division

Children will continue to use written methods to solve short division (division by a single digit)

$$1268 \div 4 = \square$$

$$\begin{array}{r} 4 \overline{) 1268} \\ \underline{4} \\ 8 \\ \underline{8} \\ 0 \\ \underline{0} \\ 0 \end{array}$$

$$\begin{array}{r} 1200 = 4 \times 300 \\ 400 = 4 \times 100 \\ 40 = 4 \times 10 \\ 20 = 4 \times 5 \\ 8 = 4 \times 2 \end{array}$$

$$\begin{array}{r} 1200 \div 4 = 300 \\ 60 \div 4 = 15 \\ 8 \div 4 = 2 \\ \hline 1268 \div 4 = 317 \end{array}$$

Solve divisions with 3 and 4 digit numbers $\div 1$ and 2 digit numbers. Continue to use informal jottings on an empty number line to show chunking. E.g. $972 \div 36 = 27$ $36 \times 27 = 972$ $36 \times 20 = 720$ $36 \times 5 = 180$ $36 \times 2 = 72$

Long division (3 digit \div 2 digit)

$$972 \div 36$$

$$\begin{array}{r} 27 \\ 36 \overline{) 972} \\ \underline{72} \\ 252 \\ \underline{252} \\ 0 \end{array}$$

Answer: 27

20x
7x

Any remainders should be shown as fractions, i.e. if the children were dividing 32 by 10, the answer should be shown as $3 \frac{2}{10}$ which could then be written as $3 \frac{1}{5}$ in its lowest terms.

Extend to decimals with up to two decimal places. Children should know that decimal points line up under each other.

$$87.5 \div 7$$

$$\begin{array}{r} 12.5 \\ 7 \overline{) 87.5} \\ \underline{70} \\ 17 \\ \underline{14} \\ 3 \\ \underline{35} \\ 0 \end{array}$$

Answer: 12.5

10x
2x
0.5x

Increasingly children to be secure with finding fractions using division methods.

BODMAS- (brackets over division, multiplication, addition, subtraction)

Y7

By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved. More able children should be given further opportunities to explore alternative methods. Children should not be made to go onto the next stage if they are not ready or if they are not confident. They should be encouraged to approximate their answers before calculating. Children should be encouraged to consider if a mental calculation would be appropriate before using formal written methods

Encourage children to check results by using the inverse, using a different method e.g. equivalent calculation and by estimation where appropriate.

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