

Roche CP School's Written and Mental Calculation Policy



Formal written methods for calculation

National curriculum expectations

First formal methods for recording

Year 1 + 2

Read, write and interpret mathematical statements involving addition and equals.

Recording addition in columns supports place value and prepares for formal written methods with larger numbers.

Number Statements

6 + 3 = 9
12 + 9 = 21

Setting out

$$\begin{array}{r} 3 + 4 = 7 \\ 3 \\ + 4 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 23 + 4 = 27 \\ 23 \\ + 4 \\ \hline 27 \end{array}$$

Year 3

Add numbers with up to 3 digits using formal written methods of columnar addition.

Partitioning

13 + 36 = 49

$$\begin{array}{r} 10 + 3 \\ 30 + 6 \\ \hline 40 + 9 = 49 \end{array}$$

47 + 76 = 123

$$\begin{array}{r} 40 + 7 \\ 70 + 6 \\ \hline 110 + 13 = 123 \end{array}$$

362 + 457 = 819

$$\begin{array}{r} 300 + 60 + 2 \\ 400 + 50 + 7 \\ \hline 700 + 110 + 9 \\ = 819 \end{array}$$

Year 4

Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate.

Column method

47 + 76 = 123

$$\begin{array}{r} 47 \\ + 76 \\ \hline 123 \\ 1 \end{array}$$

52849 + 18423 = 71272

$$\begin{array}{r} 52849 \\ + 18423 \\ \hline 71272 \\ 111 \end{array}$$

Year 5

Add whole numbers with more than 4 digits including using formal written methods (columnar addition).

Practise adding decimals including a mix of whole numbers and decimals, decimals with different numbers of decimal places and compliments of 1 e.g 0.17 + 0.83 = 1.

Column method (With decimals)

12.49 + 8.75 = 21.24

$$\begin{array}{r} 12.49 \\ + 8.75 \\ \hline 21.24 \\ 111 \end{array}$$



Addition

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National curriculum expectations

Year 1 + 2

Read, write and interpret mathematical statements involving subtraction and equals.

Recording subtraction in columns supports place value and prepares for formal written methods with larger numbers.

Number Statements

$$6 - 3 = 3$$

$$12 - 5 = 7$$

Setting out

$$9 - 4 = 5$$

$$\begin{array}{r} 9 \\ - 4 \\ \hline 5 \end{array}$$

$$23 - 2 = 21$$

$$\begin{array}{r} 23 \\ - 2 \\ \hline 21 \end{array}$$

Year 3

Subtract numbers with up to 3 digits using formal written methods of columnar subtraction.

Partitioning Example 1

$$\begin{array}{r} 500 + 60 + 3 \\ - 200 + 40 + 1 \\ \hline 300 + 20 + 2 \end{array}$$

$$563 - 241 = 300 + 20 + 2 = 322$$

Example 2 'Borrowing' from the hundreds.

$$\begin{array}{r} 400 + 160 \\ 500 + 60 + 3 \\ - 200 + 70 + 1 \\ \hline 200 + 90 + 2 \end{array}$$

$$563 - 271 = 200 + 90 + 2 = 292$$

Year 4

Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate.

Partitioning Example 3

'Borrowing' from the hundreds to the tens and the tens to the units.

$$\begin{array}{r} 150 \\ 400 + 50 + 13 \\ 500 + 60 + 3 \\ - 200 + 70 + 8 \\ \hline 200 + 80 + 5 \end{array}$$

$$563 - 278 = 200 + 80 + 5 = 285$$

Example 4 Dealing with zeros when 'borrowing'.

$$\begin{array}{r} 90 \\ 400 + 0 + 13 \\ 500 + 0 + 3 \\ - 200 + 70 + 8 \\ \hline 200 + 20 + 5 \end{array}$$

$$503 - 278 = 200 + 20 + 5 = 225$$

Year 5

Subtract whole numbers with more than 4 digits including using formal written methods (columnar subtraction).

Practise subtracting decimals including a mix of whole numbers and decimals, and then decimals with different numbers of decimal places.

Column method Examples 1-4

1.

$$\begin{array}{r} 563 \\ - 241 \\ \hline 322 \end{array}$$

3.

$$\begin{array}{r} 415 \\ 5613 \\ - 278 \\ \hline 285 \end{array}$$

2.

$$\begin{array}{r} 4 \\ 5163 \\ - 271 \\ \hline 292 \end{array}$$

4.

$$\begin{array}{r} 49 \\ 51013 \\ - 278 \\ \hline 225 \end{array}$$

Column method (With decimals)

$$63.75 - 17.2$$

$$\begin{array}{r} 5 \\ 613.75 \\ - 17.20 \\ \hline 46.55 \end{array}$$

Multiplication

National curriculum expectations

First formal methods for recording

Formal written methods for calculation

Year 2

Calculate mathematical statements for multiplication within the multiplication tables and write them using the signs \times and $=$

Number Statements

$$6 \times 5 = 30$$

$$5 \times 6 = 30$$

$$8 \times 2 = 16$$

$$2 \times 8 = 16$$

Year 3

Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for 2 digit numbers times 1 digit numbers.

Pupils develop reliable written methods for multiplication starting with calculations of 2 digit by 1 digit and progression to the formal written methods of short multiplication.

Grid Method 2 x 1 example

\times	30	8
7	210	56

$$38 \times 7 = 210 + 56$$

$$38 \times 7 = 266$$

Year 4

Multiply 2 and 3 digit numbers by a 1 digit number using a formal written layout.

Pupils practise to become fluent in the formal written method of short multiplication with exact answers.

Grid Method 3 x 1 example

\times	200	40	5
4	800	160	20

$$245 \times 4 = 800 + 160 + 20$$

$$245 \times 4 = 980$$

Grid Method 2 x 2 example

\times	20	7
50	1000	350
6	120	42

$$27 \times 56 = 1000 + 350 + 120 + 42$$

$$27 \times 56 = 1512$$

Year 5

Multiply numbers up to 4 digits by a 1 or 2 digit number using a formal written method, including long multiplication for 2 digit numbers.

Short Method 4 x 1 example

$$\begin{array}{r} 1 \quad 2 \quad 3 \quad 4 \\ \times \quad \quad \quad 4 \\ \hline 4 \quad 9 \quad 3 \quad 6 \\ \hline 1 \quad 1 \end{array}$$

Multiplying decimals (Short method)

$$\begin{array}{r} 3 \quad . \quad 4 \quad 4 \\ \times \quad \quad \quad 6 \\ \hline 2 \quad 0 \quad . \quad 6 \quad 4 \\ \hline 2 \quad \quad 2 \end{array}$$

Long Multiplication 2 x 2 example

$$\begin{array}{r} 2 \quad 4 \\ \times 1 \quad 6 \\ \hline 1 \quad 4 \quad 4 \\ 2 \quad \quad \quad \\ + 2 \quad 4 \quad 0 \\ \hline 3 \quad 8 \quad 4 \end{array}$$

Year 6

Multiply multi-digit numbers up to 4 digits by a 2 digit whole number using the formal written method of long multiplication.

Multiply 1 digit numbers with up to 2 decimal places by whole numbers.

Long Multiplication 3 x 2 example

$$\begin{array}{r} 1 \quad 2 \quad 4 \\ \times \quad 2 \quad 6 \\ \hline 7 \quad 4 \quad 4 \\ 1 \quad 2 \quad \quad \quad \\ + 2 \quad 4 \quad 8 \quad 0 \\ \hline 3 \quad 2 \quad 2 \quad 4 \\ \hline 1 \quad 1 \end{array}$$

4 x 2 example

$$\begin{array}{r} 4 \quad 2 \quad 4 \quad 3 \\ \times \quad \quad 3 \quad 2 \\ \hline 8 \quad 4 \quad 8 \quad 6 \\ + 1 \quad 2 \quad 7 \quad 2 \quad 9 \quad 0 \\ \hline 1 \quad 3 \quad 5 \quad 7 \quad 7 \quad 6 \\ \hline 1 \quad \quad 1 \end{array}$$

Please use this as guidance but be prepared to use methods outside of your year group should pupils either progress beyond or not achieve the required progress

PROMOTE CHECKING ANSWERS USING THE INVERSE OPERATION THROUGHOUT

First formal methods for recording

Year 2

Calculate mathematical statements for division within the multiplication tables and write them using the signs \div and $=$

Number Statements

$$\begin{aligned} 6 \div 2 &= 3 \\ 20 \div 5 &= 4 \\ 18 \div 2 &= 9 \end{aligned}$$

Year 3

Write and calculate mathematical statements for division using the multiplication tables that they know, including for 2 digit numbers times 1 digit numbers.

Pupils develop reliable written methods for division starting with calculations of 2 digit by 1 digit and progression to the formal written methods of short division.

Short Method 2 x 1 example

$$\begin{array}{r} 2 \quad 3 \\ 4 \overline{) 9 \quad 12} \end{array}$$

Year 4

Pupils practise to become fluent in the formal written method of short division with exact answers.

Short Method 3 x 1 example

$$\begin{array}{r} 0 \quad 9 \quad 8 \\ 3 \overline{) 2 \quad 29 \quad 24} \end{array}$$

Formal written methods for calculation

Year 5

Divide numbers up to 4 digits by a 1 digit number using the formal written method of short division and interpret remainders appropriately for the context.

Short Method 4 x 1 example

$$\begin{array}{r} 0 \quad 4 \quad 7 \quad 7 \\ 9 \overline{) 4 \quad 42 \quad 69 \quad 63} \end{array}$$

Short Method that will have a remainder
e.g. $\pounds 456 \div 5 =$

$$\begin{array}{r} 0 \quad 9 \quad 1 \quad . \quad 2 \\ 5 \overline{) 4 \quad 45 \quad 6 \quad . \quad 10} \end{array}$$

$$\pounds 465 \div 5 = \pounds 91.20$$

Year 6

Divide numbers up to 4 digits by a 2 digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.

Divide numbers up to 4 digits by a 2 digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.

Pupils are introduced to the division of decimal numbers by 1 digit whole number, initially, in practical contexts involving measures and money.

Long Division 4 x 2 example

$$\begin{array}{r} 3 \quad 2 \quad 2 \\ 15 \overline{) 4 \quad 8 \quad 3 \quad 2} \\ \underline{4 \quad 5 \quad 0 \quad 0} \\ 3 \quad 3 \quad 2 \\ \underline{3 \quad 0 \quad 0} \\ 3 \quad 2 \\ \underline{3 \quad 0} \\ 2 \end{array}$$

$$4832 \div 15 = 322 \text{ r } 2$$

Short Division 4 x 2 example

$$\begin{array}{r} 0 \quad 1 \quad 9 \quad 4 \\ 22 \overline{) 4 \quad 42 \quad 206 \quad 88} \end{array}$$

Short Method Decimal by single whole digit

$$\begin{array}{r} 0 \quad 5 \quad 3 \quad . \quad 5 \quad 5 \\ 5 \overline{) 2 \quad 26 \quad 17 \quad . \quad 27 \quad 25} \end{array}$$