

Roche CP School's Written and Mental Calculation Policy



Formal written methods for calculation

National curriculum expectations

Addition

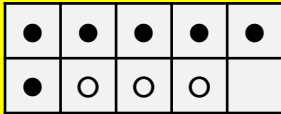
Column method

Year 1

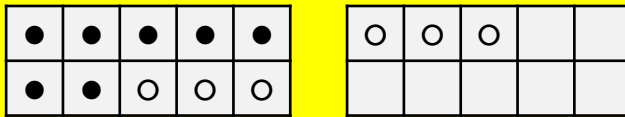
Add two one-digit numbers and a two-digit and one-digit number with a total less than 20.

Solid circles for the first addend, hollow circles for the second.

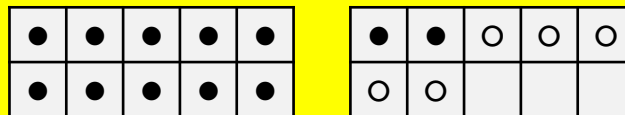
Example: $6 + 3 = 9$



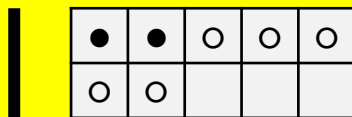
Example: $7 + 6 = 13$



Example (two frames): $12 + 5 = 17$



Example (tens and ones): $12 + 5 = 17$

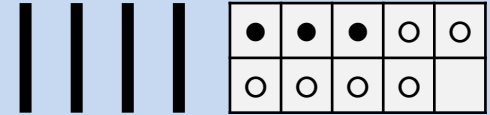


Year 2

Add up to 2 two-digit numbers.

Two-digit + one-digit (not going over 10)

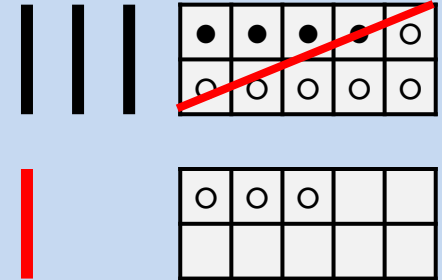
Example $43 + 6 = 49$



Two-digit + one-digit (going over 10)

Example $34 + 9 = 43$

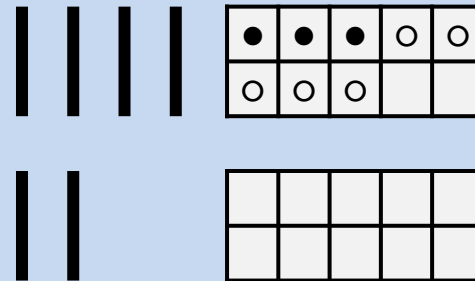
The first tens frame is complete, so we swap that for another ten.



Two-digit + two-digit (not going over 10)

Example $43 + 25 = 68$

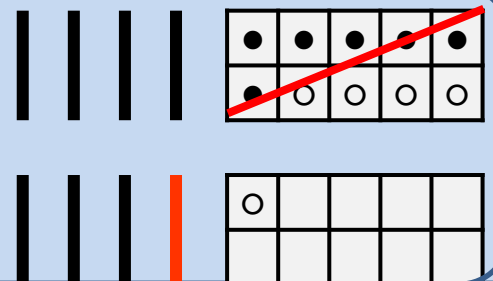
The tens for the second addend go beneath the tens for the first. The ones for both addends are filled in the same tens frame.



Two-digit + two-digit (going over 10)

Example $46 + 35 = 81$

The first tens frame is complete, so we swap that for another ten.



Formal written methods for calculation

National curriculum expectations

Subtraction

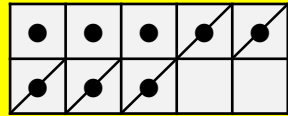
Column method

Year 1

Subtract one-digit and two-digit numbers to 20, including zero.

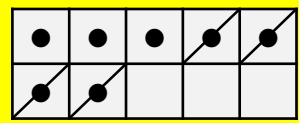
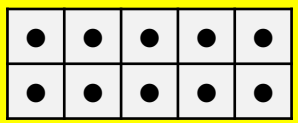
Draw the starting number in **solid** circles and then cross out the amount you are taking away.

Example: $8 - 5 = 3$



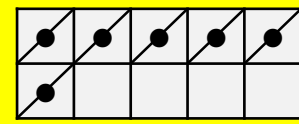
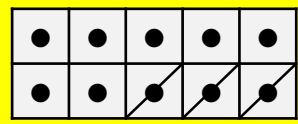
Two-digit subtract one-digit (not crossing ten)

Example: $17 - 4 = 13$



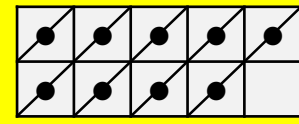
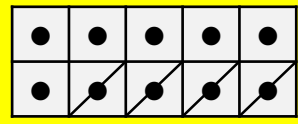
Two-digit subtract one-digit (crossing ten)

Example: $16 - 9 = 7$



Two-digit subtract two-digit

Example: $19 - 13 = 6$

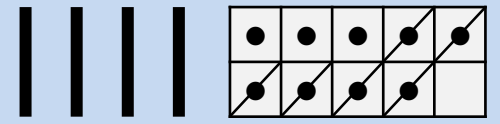


Year 2

Subtract ones from a two-digit number.
Subtract tens from a two-digit number.
Subtract one two-digit number from another.

Two-digit - single digit (not breaking 10)

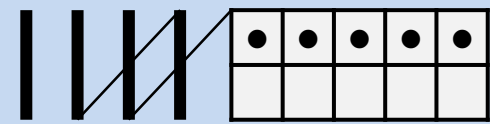
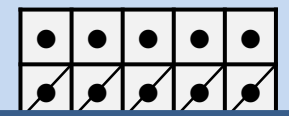
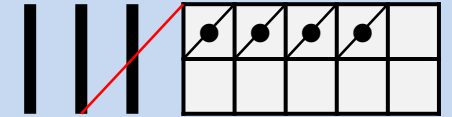
Example $49 - 6 = 43$



Two-digit - single digit (breaking 10)

Example $34 - 9 = 25$

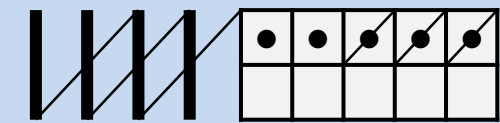
We exchange a ten for ten ones, then cross out ones starting from the original ones.



Two-digit - tens

Example $45 - 20 = 25$

Cross out the tens.



Two-digit - two-digit (not breaking 10)

Example $45 - 33 = 12$

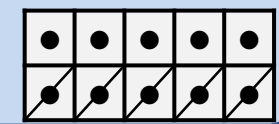
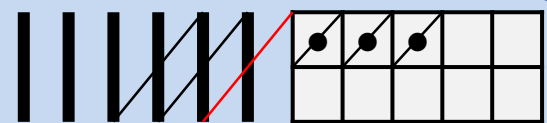
Cross out the ones, followed by the tens.



Two-digit - two-digit (breaking 10)

Example $63 - 28 = 35$

We exchange a ten for ten ones, then cross out ones starting from the original ones. We then cross out the tens.



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

Formal written methods for calculation

National curriculum expectations

Addition

Column method

Year 3

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

2-digit + 2-digit

a) $47 + 76 = 123$

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

3-digit + 3-digit

b) $123 + 456 = 579$

$$\begin{array}{r} 123 \\ + 456 \\ \hline 579 \\ \hline \end{array}$$

c) $385 + 386 = 771$

$$\begin{array}{r} 385 \\ + 386 \\ \hline 771 \\ \hline \end{array}$$

Year 4

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

4-digit + 4-digit

d) $2,123 + 3,456 = 5,579$

$$\begin{array}{r} 2123 \\ + 3456 \\ \hline 5579 \\ \hline \end{array}$$

e) $3,456 + 5,289 = 8,745$

$$\begin{array}{r} 3456 \\ + 5289 \\ \hline 8745 \\ \hline \end{array}$$

f) $7,777 + 8,888 = 16,665$

$$\begin{array}{r} 7777 \\ + 8888 \\ \hline 16665 \\ \hline \end{array}$$

Year 5 and Year 6

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 $0.17 + 0.83 = 1$.

g) $52,849 + 18,423 = 71,272$

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

h) $2,668,777 + 2,776,899 = 5,445,676$

$$\begin{array}{r} 2668777 \\ + 2776899 \\ \hline 5445676 \\ \hline \end{array}$$

Decimals (Same number of decimal places)

i) $12.49 + 18.75 = 31.24$

$$\begin{array}{r} 12.49 \\ + 18.75 \\ \hline 31.24 \\ \hline \end{array}$$

Decimals (Different number of decimal places)

j) $108.4 + 5.756 = 114.156$

$$\begin{array}{r} 108.400 \\ + 005.756 \\ \hline 114.156 \\ \hline \end{array}$$

Add in place holders to 'box' the addition.

Formal written methods for calculation

National curriculum expectations

Subtraction

Column method

Year 3

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

2-digit - 2-digit

a) $74 - 23 = 51$

$$\begin{array}{r} 74 \\ - 23 \\ \hline 51 \end{array}$$

b) $63 - 48 = 15$

$$\begin{array}{r} 63 \\ - 48 \\ \hline 15 \end{array}$$

3-digit - 3-digit

c) $563 - 241 = 322$

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

d) $652 - 287 = 365$

$$\begin{array}{r} 652 \\ - 287 \\ \hline 365 \end{array}$$

e) $600 - 255 = 345$

$$\begin{array}{r} 600 \\ - 255 \\ \hline 345 \end{array}$$

Year 4

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

4-digit - 4-digit

f) $8,469 - 2,127 = 6,342$

$$\begin{array}{r} 8469 \\ - 2127 \\ \hline 6342 \end{array}$$

g) $7,503 - 3,278 = 4,225$

$$\begin{array}{r} 7503 \\ - 3278 \\ \hline 4225 \end{array}$$

h) $6,000 - 2,543 = 3,457$

$$\begin{array}{r} 6000 \\ - 2543 \\ \hline 3457 \end{array}$$

Year 5 and Year 6

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, followed by decimals with different numbers of decimal places.

i) $52,849 - 18,423 = 34,426$

$$\begin{array}{r} 52849 \\ - 18423 \\ \hline 34426 \end{array}$$

j) $2,000,000 - 287,941 = 1,712,059$

$$\begin{array}{r} 2000000 \\ - 287941 \\ \hline 1712059 \end{array}$$

With decimals

k) $63.75 - 17.28 = 46.47$

$$\begin{array}{r} 63.75 \\ - 17.28 \\ \hline 46.47 \end{array}$$

l) $14 - 3.692 = 10.308$

$$\begin{array}{r} 14.000 \\ - 3.692 \\ \hline 10.308 \end{array}$$

Add in place holders to 'box' the subtraction.

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

$$38 \times 6 = 228$$

x	30	8
6	180	48
1 8 0		
+ 0 4 8		
2 2 8		
±		

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

$$245 \times 4 = 980$$

x	200	40	5
4	800	160	20
8 0 0			
1 6 0			
+ 0 2 0			
9 8 0			

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

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

Multiplying decimals (Short method)

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

Long Multiplication 2 x 2 example

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

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

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

4 x 2 example

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

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

$$92 \div 4 = 23$$

$$\begin{array}{r} 23 \\ 4 \overline{) 92} \\ \underline{8} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

Year 4

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

Short Method: 3 x 1 example

$$294 \div 3 = 98$$

$$\begin{array}{r} 98 \\ 3 \overline{) 294} \\ \underline{6} \\ 29 \\ \underline{27} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

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

$$4293 \div 9 = 477$$

$$\begin{array}{r} 0477 \\ 9 \overline{) 4293} \\ \underline{36} \\ 69 \\ \underline{63} \\ 63 \\ \underline{63} \\ 0 \end{array}$$

Short Method that will have a decimal remainder e.g. $\pounds 456 \div 5 = \pounds 91.20$

$$\begin{array}{r} 091.20 \\ 5 \overline{) 456.10} \\ \underline{20} \\ 25 \\ \underline{25} \\ 10 \\ \underline{10} \\ 0 \end{array}$$

$$\pounds 456 \div 5 = \pounds 91.20$$

Additional place holder for the quotient as money always has 2 decimal places.

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.

$$10 \div 8 = 1.25$$

Additional place holders needed here.

Long Division 4 x 2 example

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

$$\begin{array}{r} 322 \\ 15 \overline{) 4832} \\ \underline{45} \\ 33 \\ \underline{30} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Short Division 4 x 2 example

$$4268 \div 22 = 194$$

$$\begin{array}{r} 0194 \\ 22 \overline{) 4268} \\ \underline{44} \\ 206 \\ \underline{220} \\ 88 \\ \underline{88} \\ 0 \end{array}$$

Short Method Decimal by single digit

$$267.75 \div 5 = 53.55$$

$$\begin{array}{r} 053.55 \\ 5 \overline{) 267.75} \\ \underline{25} \\ 17 \\ \underline{15} \\ 27 \\ \underline{25} \\ 25 \\ \underline{25} \\ 0 \end{array}$$

Short Method Whole number by single digit with decimal quotient

$$\begin{array}{r} 01.25 \\ 8 \overline{) 10.20} \\ \underline{8} \\ 20 \\ \underline{16} \\ 40 \\ \underline{40} \\ 0 \end{array}$$