Roche CP School's Written and Mental Calculation Policy

Formal written methods for calculation

National curriculum expectations
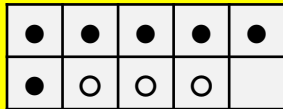
Addition
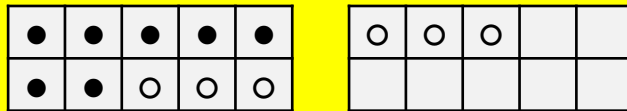
Column method

Year 1

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

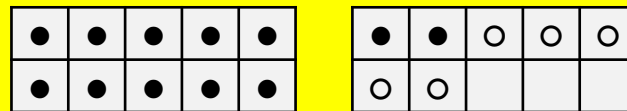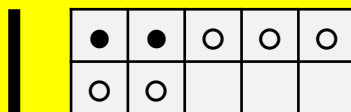Solid circles for the first addend, hollow circles for the second.

Example: 6 + 3 = 9

Example: 7 + 6 = 13

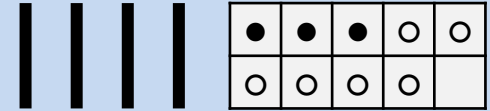Example (two frames): 12 + 5 = 17

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

Year 2

Add up to 2 two-digit numbers.

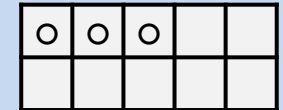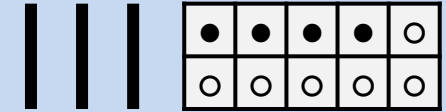**Two-digit + one-digit (not going over 10)**
Example 43 + 6 = 49

Two-digit + one-digit (going over 10)
Example 34 + 9 = 43
The first tens frame is complete, so we have **four** tens and **three** ones.

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.
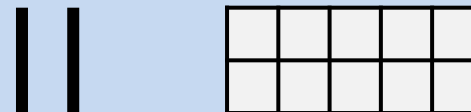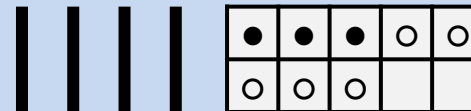
Two-digit + two-digit (going over 10)
Example 46 + 36 = 82
The first tens frame is complete, we have **eight** tens and **two** ones
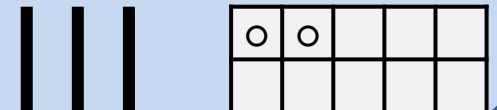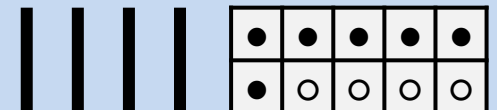
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PROMOTE CHECKING ANSWERS USING THE INVERSE OPERATION THROUGHOUT

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
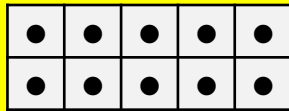
Two-digit subtract one-digit (crossing ten)

Example: 16 – 9 = 7
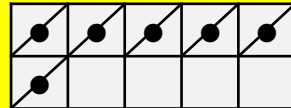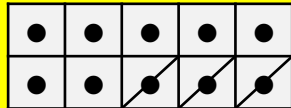
Two-digit subtract two-digit

Example: 19 – 13 = 6
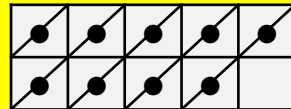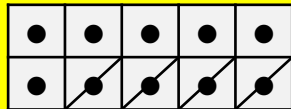
Year 2

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

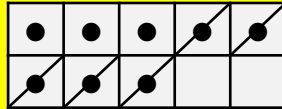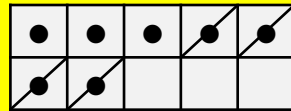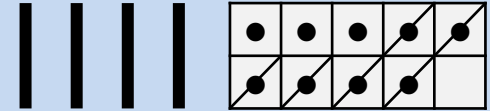**Two-digit - single digit (breaking 10)**
Example 34 - 9 = 25
We exchange a ten for ten ones, then cross out ones starting from the original ones.
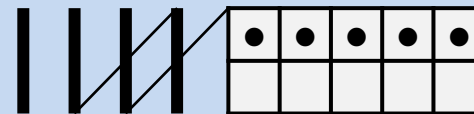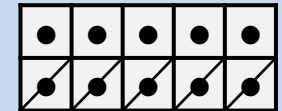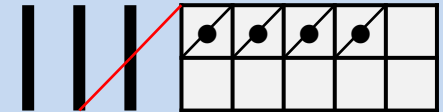
Two-digit - tens
Example 45 - 20 = 25
Cross out the tens.
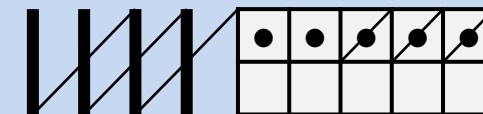
Two-digit - two-digit (not breaking 10)
Example 45 - 33 = 12
Cross out the ones, followed by the tens.

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.
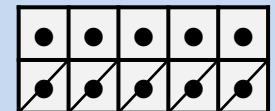
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PROMOTE CHECKING ANSWERS USING THE INVERSE OPERATION THROUGHOUT

Formal written methods for calculation

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

```
    4  7
+   7  6
   _____
   1  2  3
   1  1
```

3-digit + 3-digit

b) 123 + 456 = 579

```
   1  2  3
+  4  5  6
  _____
   5  7  9
```

c) 385 + 386 = 771

```
   3  8  5
+  3  8  6
  _____
   7  7  1
   1  1
```

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

```
   2  1  2  3
+  3  4  5  6
  _____
   5  5  7  9
```

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

```
   3  4  5  6
+  5  2  8  9
  _____
   8  7  4  5
      1     1
```

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

```
      7  7  7  7
+     8  8  8  8
  _____
   1  6  6  6  5
      1  1  1  1
```

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

```
   5  2  8  4  9
+  1  8  4  2  3
  _____
   7  1  2  7  2
   1  1  -  1
```

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

```
   2  6  6  8  7  7  7
+  2  7  7  6  8  9  9
  _____
   5  4  4  5  6  7  6
   1  1  1  1  1  1
```

**Decimals
(Same number of decimal places)**

i) 12.49 + 18.75 = 31.24

```
   1  2  .  4  9
+  1  8  .  7  5
  _____
   3  1  .  2  4
   1  1  -  1
```

**Decimals
(Different number of decimal places)**

j) 108.4 + 5.756 = 114.156

```
   1  0  8  .  4  0  0
+  0  0  5  .  7  5  6
  _____
   1  1  4  .  1  5  6
      1  1
```

Add in place holders to 'box' the addition.

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PROMOTE CHECKING ANSWERS USING THE INVERSE OPERATION THROUGHOUT

Formal written methods for calculation

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

```
    7  4
-   2  3
   _____
    5  1
```

b) 63 – 48 = 15

```
        5
    6  ¹3
-   4   8
   _____
    1   5
```

3-digit - 3-digit

c) 563 – 241 = 322

```
    5  6  3
-   2  4  1
   _____
    3  2  2
```

d) 652 - 287 = 365

```
    5     ¹4
    6  5  ¹2
-   2  8   7
   _____
    3  6   5
```

e) 600 – 255 = 345

```
    5   9
    6  ¹0  ¹0
-   2   5   5
   _____
    3   4   5
```

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

```
    8   4   6   9
-   2   1   2   7
   _____
    6   3   4   2
```

g) 7,503 – 3,278 = 4,225

```
            4       9
    7   5  ¹0  ¹3
-   3   2   7   8
   _____
    4   2   2   5
```

h) 6,000 – 2,543 = 3,457

```
    5   9   9
    6  ¹0  ¹0  ¹0
-   2   5   4   3
   _____
    3   4   5   7
```

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

```
        4
    5  ¹2  8   4   9
-   1   8  4   2   3
   _____
    3   4  4   2   6
```

j) 2,000,000 – 287, 941 = 1,712,059

```
    1   9   9   9   9   9
    2  ¹0  ¹0  ¹0  ¹0  ¹0  ¹0
-   0   2   8   7   9   4   1
   _____
    1   7   1   2   0   5   9
```

With decimals

k) 63.75 – 17.28 = 46.47

```
    5       6
    6  ¹3 . 7  ¹5
-   1   7 . 2   8
   _____
    4   6 . 4   7
```

l) 14 – 3.692 = 10.308

```
                3   9   9
    1   4 . ¹0 ¹0 ¹0
-   0   3 . 6   9   2
   _____
    1   0 . 3   0   8
```

Add in place holders to 'box' the subtraction.

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PROMOTE CHECKING ANSWERS USING THE INVERSE OPERATION THROUGHOUT

Multiplication

National curriculum expectations

Year 2

Calculate mathematical statements for multiplication within the multiplication tables and write them using the signs x and =

Number Statements

6 x 5 = 30
5 x 6 = 30

8 x 2 = 16
2 x 8 = 16

Year 3

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

Pupils practise to become fluent in the formal written method of short multiplication using the times tables they know.

**Short Method
2 x 1 examples**

21 x 4 = 84

```
    2 1
x     4
─────────
    8 4
```

14 x 5 = 70

```
    1 4
x     5
─────────
    7 0
    2
```

34 x 8 = 272

```
    3 4
x     8
─────────
  2 7 2
  2 3
```

Year 4

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

Pupils consolidate their fluency in the formal written method of short multiplication using all times tables facts.

**Short Method
3 x 1 examples**

121 x 4 = 84

```
  1 2 1
x     4
─────────
  4 8 4
```

119 x 4 = 476

```
  1 1 9
x     4
─────────
  4 7 6
    3
```

456 x 7 = 272

```
  4 5 6
x     7
─────────
  3 1 9 2
  3 3 4
```

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**

```
  1 2 3 4
x       4
─────────
  4 9 3 6
    1 1
```

**Multiplying decimals
(Short method)**

```
  3 . 4 4
x       6
─────────
 2 0 . 6 4
    2   2
```

**Long Multiplication
2 x 2 example**

```
      2 4
x   1 6
─────────
  1 4 4
      2
+ 2 4 0
─────────
  3 8 4
```

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**

```
      1 2 4
x       2 6
─────────
      7 4 4
      1 2
+ 2 4 8 0
─────────
  3 2 2 4
  1 1
```

4 x 2 example

```
    4 2 4 3
x       3 2
─────────
    8 4 8 6
      1
+ 1 2 7 2 9 0
      1
─────────
  1 3 5 7 7 6
    1     1
```

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PROMOTE CHECKING ANSWERS USING THE INVERSE OPERATION THROUGHOUT

Division

Formal written methods for calculation

National curriculum expectations

Year 2
Calculate mathematical statements for division within the multiplication tables and write them using the signs ÷ and =

Number Statements

$6 ÷ 2 = 3$
$20 ÷ 5 = 4$
$18 ÷ 2 = 9$

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
$92 ÷ 4 = 23$

$$\begin{array}{c|cc} & 2 & 3 \\ \hline 4 & 9 & {}^{1}2 \end{array}$$

Year 4
Pupils practise to become fluent in the formal written method of short division with exact answers.

Short Method: 3 x 1 example
$294 ÷ 3 = 98$

$$\begin{array}{c|ccc} & 0 & 9 & 8 \\ \hline 3 & 2 & {}^{2}9 & {}^{2}4 \end{array}$$

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
$4293 ÷ 9 = 477$

$$\begin{array}{c|cccc} & 0 & 4 & 7 & 7 \\ \hline 9 & 4 & {}^{4}2 & {}^{6}9 & {}^{6}3 \end{array}$$

Short Method that will have a decimal remainder e.g. £456 ÷ 5 = £91.20

$$\begin{array}{c|ccccc} & 0 & 9 & 1 & . & 2 \\ \hline 5 & 4 & {}^{4}5 & 6 & . & {}^{1}0 \end{array}$$

£456 ÷ 5 = £91.2**0**

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.

$10 ÷ 8 = 1.25$
Additional place holders needed here.

Long Division 4 x 2 example
$4832 ÷ 15 = 322 \ r \ 2$

$$\begin{array}{c|cccc} & & 3 & 2 & 2 \\ \hline 15 & 4 & 8 & 3 & 2 \\ - & 4 & 5 & & \\ \hline & & 3 & 3 & \\ & - & 3 & 0 & \\ \hline & & & 3 & 2 \\ & & - & 3 & 0 \\ \hline & & & & 2 \end{array}$$

Short Division 4 x 2 example
$4268 ÷ 22 = 194$

$$\begin{array}{c|cccc} & 0 & 1 & 9 & 4 \\ \hline 22 & 4 & {}^{4}2 & {}^{20}6 & {}^{8}8 \end{array}$$

Short Method Decimal by single digit
$267.75 ÷ 5 = 53.55$

$$\begin{array}{c|cccccc} & 0 & 5 & 3 & . & 5 & 5 \\ \hline 5 & 2 & {}^{2}6 & {}^{1}7 & . & {}^{2}7 & {}^{2}5 \end{array}$$

Short Method Whole number by single digit with decimal quotient

$$\begin{array}{c|ccccc} & 0 & 1 & . & 2 & 5 \\ \hline 8 & 1 & {}^{1}0 & . & {}^{2}0 & {}^{4}0 \end{array}$$

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