

## Addition – Year 3

**Add numbers with up to three digits, using formal written (columnar) methods**

Add to three digit numbers using physical and abstract representations (e.g. straws, Base Ten, place value counters, empty number lines, coins)

**Use manipulatives to support structure of the algorithm especially place value**

$$\begin{array}{r}
 30 + 4 \\
 20 + 5 \\
 \hline
 50 + 9
 \end{array}
 \begin{array}{c}
 \longrightarrow \\
 +25 \\
 \hline
 59
 \end{array}
 \begin{array}{c}
 \longrightarrow \\
 200 + 30 + 4 \\
 500 + 20 + 7 \\
 \hline
 700 + 60 + 1 \\
 10
 \end{array}
 \begin{array}{c}
 \longrightarrow \\
 \begin{array}{r}
 234 \\
 +527 \\
 \hline
 761 \\
 1
 \end{array}
 \end{array}$$

Informal methods of recording are used as stepping stones to help children understand the logic of formal written methods.

## Subtraction – Year 3

**Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.**

1. Extended columnar - no exchanging

$$87 - 53$$

80 and 7

50 and 3

$$30 \text{ and } 4 = 34$$

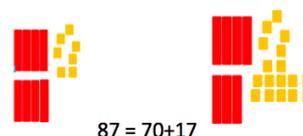
2. Extended columnar – with exchanging

$$87 - 58$$

70 + 17

50 + 3

$$20 + 9 = 29$$



$$87 = 70 + 17$$

## Multiplication – Year 3

**Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, progressing to formal written methods**

Estimate before calculating

Ensure written methods build on/relate to mental methods

– if formal methods are introduced, they will only be used alongside (and as a way to record) concrete manipulatives.

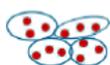
Towards the column method  
24 x 3 becomes:

$$\begin{array}{r}
 \text{X} \mid 3 \longrightarrow 24 \\
 4 \mid 12 \quad \text{x } 3 \\
 \hline
 20 \mid 60 \quad 12 \\
 \mid 72 \quad \underline{60} \\
 \quad \underline{72}
 \end{array}$$

## Division – Year 3

**Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.**

$$120 \div 3$$



New written methods can be modelled **alongside** mental or informal methods to ensure understanding (**not on their own as a method**). Formal short division is not used at this stage as we build their understanding of division facts related to times table facts.

## Addition – Year 4

### Add numbers with up to four digits, using the formal written (columnar) method

Add three digit numbers using columnar method and then move onto 4 digits.

Include decimal addition for money.

Use manipulatives to support structure of the algorithm especially place value.

$$\begin{array}{r}
 789 + 642 \text{ becomes:} \\
 \phantom{789} + 642 \\
 \hline
 1431 \\
 \phantom{1431} \phantom{00} 11
 \end{array}$$

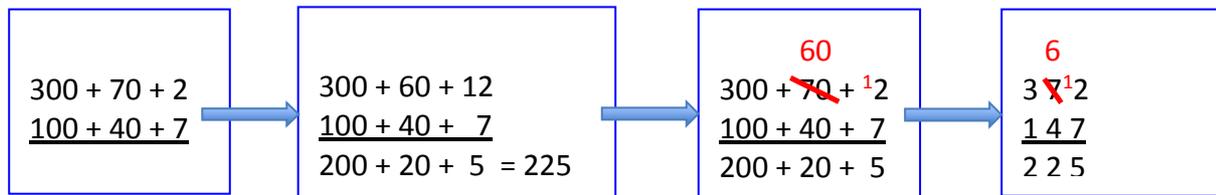
Go back to the expanded method if you are finding the formal method difficult.

## Subtraction – Year 4

### Add and subtract numbers with up to 4 digits using the formal written methods of columnar subtraction.

Build on formal, extended method (*from Year 3*) using exchange wherever necessary. Continue to use representations and manipulatives to develop understanding of place value.

$$372 - 147$$



## Multiplication – Year 4

### Multiply two-digit and three-digit numbers by a one-digit number using formal written layout

Estimate before calculating

Ensure written methods build on/relate to mental methods (e.g. grid method) based on an understanding of place value

**Use grid and expanded column methods** as stepping stones to formal method, alongside concrete manipulatives.

X	4	→	54	→	54
4	16		<u>x 4</u>		<u>x 4</u>
50	<u>200</u>		16 (4 x 4)		<u>216</u>
	216		<u>200</u> (50 x 4)		1
	<u>216</u>				

## Division – Year 4

"I know 6÷3=2,  
so 60÷3=20."  
"I know 12÷3=4,  
so 120÷3=40."

$693 \div 3$   
3

$2 \ 3 \ 1$

Children can work in pairs: child A constructs the array (dividing manipulatives into 3 rows), child B checks it and records this in a formal, short division format.

$4$

New written methods can be modelled **alongside** mental or informal methods to ensure understanding (**not on their own as a method**).

## Addition – Year 5

**Add whole numbers with more than four digits, using the formal written (columnar) method**

Add three digit numbers using columnar method and then move onto 4 digits.

Include decimal addition for money

Use manipulatives to support structure of the algorithm especially place value

$$\begin{array}{r}
 24172\text{m} \\
 + 5929\text{m} \\
 \hline
 30101\text{m} \\
 \hline
 1111
 \end{array}
 \qquad
 \begin{array}{r}
 \pounds 563.14 \\
 + \pounds 207.88 \\
 \hline
 \pounds 771.02 \\
 \hline
 111
 \end{array}$$

Remember to get decimal points lined up!

Go back to the expanded method if you are finding the formal method difficult.

## Subtraction – Year 5

**Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).**

*Practise adding and subtracting decimals.*

$\pounds 17.34 - \pounds 12.16$

What is the same about these models?  
What's different?

$$\begin{array}{r}
 1000+700+20+14\text{p} \\
 - 1000+200+10+6\text{p} \\
 \hline
 500+10+8\text{p}
 \end{array}$$

$$\begin{array}{r}
 1734\text{p} \\
 - 1216\text{p} \\
 \hline
 518\text{p}
 \end{array}$$

$$\begin{array}{r}
 \pounds 2 \\
 17.34 \\
 - 12.16 \\
 \hline
 5.18
 \end{array}$$

Remember to get decimal points lined up!

## Multiplication – Year 5

**Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers**

<p>2741 × 6 becomes</p> $  \begin{array}{r}  2741 \\  \times 6 \\  \hline  16446 \\  \hline  42  \end{array}  $ <p>Answer: 16 446</p>	<p>24 × 16 becomes</p> $  \begin{array}{r}  24 \\  \times 16 \\  \hline  240 \\  144 \\  \hline  384  \end{array}  $	<p>124 × 26 becomes</p> $  \begin{array}{r}  124 \\  \times 26 \\  \hline  744 \\  2480 \\  \hline  3224 \\  \hline  11  \end{array}  $
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## Division – Year 5

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

**Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding.**

<p>98 ÷ 7 becomes</p> $  \begin{array}{r}  14 \\  7 \overline{) 98} \\  \hline  98 \\  \hline  0  \end{array}  $ <p>Answer: 14</p>	<p>432 ÷ 5 becomes</p> $  \begin{array}{r}  86 \text{ r}2 \\  5 \overline{) 432} \\  \hline  40 \\  32 \\  \hline  32 \\  \hline  0  \end{array}  $ <p>Answer: 86 remainder 2</p>	<p>496 ÷ 11 becomes</p> $  \begin{array}{r}  45 \text{ r}1 \\  11 \overline{) 496} \\  \hline  44 \\  56 \\  \hline  56 \\  \hline  0  \end{array}  $ <p>Answer: 45 <math>\frac{1}{11}</math></p>
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## Addition – Year 6

**Add larger numbers using the formal written (columnar) method**

Add three digit numbers using columnar method and then move onto 4 digits.

Include decimal addition for money

$$\begin{array}{r}
 \text{£}563.14 \\
 + \text{£}207.88 \\
 \hline
 \text{£}771.02 \\
 \hline
 111
 \end{array}$$

Remember to get decimal points lined up!

Go back to the expanded method if you are finding the formal + method difficult.

## Subtraction – Year 6

**Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction). Solve problems involving the calculation and conversions of units of measure, using decimal notation of up to three decimal places where appropriate. (MEASURES)**

Consolidate columnar methods, paying particular attention to the occurrence of zeros as place holders.

932 – 457 becomes

$$\begin{array}{r}
 \overset{8}{9} \overset{12}{3} \overset{1}{2} \\
 - \quad 4 \quad 5 \quad 7 \\
 \hline
 4 \quad 7 \quad 5
 \end{array}$$

$$\begin{array}{r}
 1 \quad \overset{6}{8} \quad \overset{10}{7} \quad \overset{11}{1} \quad 1 \\
 - \quad 5 \quad 4 \quad 5 \quad 6 \\
 \hline
 1 \quad 3 \quad 2 \quad 5 \quad 5
 \end{array}$$

$$\begin{array}{r}
 1 \quad \overset{7}{8} \quad \overset{9}{0} \quad \overset{10}{1} \quad 1 \\
 - \quad 5 \quad 4 \quad 5 \quad 6 \\
 \hline
 1 \quad 2 \quad 5 \quad 5 \quad 5
 \end{array}$$

## Multiplication – Year 6

**Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication (short & long multiplication)**

**Multiply one-digit numbers with up to two decimal places by whole numbers**

Understand that standard written multiplication method involves a number of partial products e.g.  $36 \times 24$  is made up of four partial products  $30 \times 20$ ,  $30 \times 4$ ,  $6 \times 20$ ,  $6 \times 4$ .

$  \begin{array}{r}  124 \times 26 \text{ becomes} \\  \begin{array}{r}  \overset{1}{1} \quad \overset{2}{2} \\  1 \quad 2 \quad 4 \\  \times \quad 2 \quad 6 \\  \hline  7 \quad 4 \quad 4 \\  2 \quad 4 \quad 8 \quad 0 \\  \hline  3 \quad 2 \quad 2 \quad 4 \\  \hline  1 \quad 1  \end{array}  \end{array}  $	$  \begin{array}{r}  \text{£} \quad 6.23 \\  \times \quad 27 \\  \hline  43.61 \\  \overset{1}{1} \quad \overset{2}{2} \\  124.60 \\  \hline  \text{£} \quad 168.21 \\  \hline  1  \end{array}  $
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## Division – Year 6

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

*Pupils practise division for larger numbers, using the formal written methods of short and long division.*

$  \begin{array}{r}  432 \div 5 \text{ becomes} \\  \begin{array}{r}  \phantom{0} \quad 8 \quad 6 \quad r2 \\  5 \overline{) 432} \\  \underline{20} \phantom{0} \\  32 \phantom{0} \\  \underline{25} \phantom{0} \\  72 \\  \underline{70} \\  2  \end{array}  \end{array}  $ <p>Answer: 86 remainder 2</p>	$  \begin{array}{r}  496 \div 11 \text{ becomes} \\  \begin{array}{r}  \phantom{0} \quad 4 \quad 5 \quad r1 \\  11 \overline{) 496} \\  \underline{44} \phantom{0} \\  56 \\  \underline{55} \\  1  \end{array}  \end{array}  $ <p>Answer: <math>45 \frac{1}{11}</math></p>
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