



# Dean Field Community Primary School

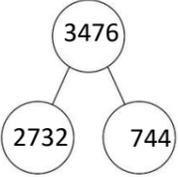
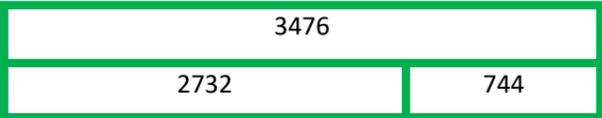
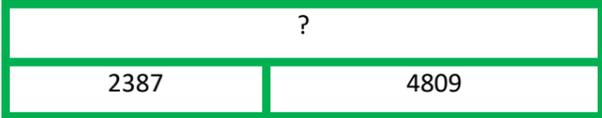
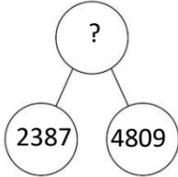
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## Calculation Methods

### Year 4

This booklet contains the calculation methods used in year 4 for each of the four operations - addition, subtraction, multiplication and division.

Please use this document as a tool to support your child at home. The methods we use in school may or may not be familiar to you. Children can become confused when they seek support from an adult at home because often, the adult will teach the method they, themselves were taught. Knowing how the methods in this booklet work will help you to help your child. All staff in school use this document so that we can ensure the consistency of our approach.

	National Curriculum Objectives	Mental Calculation	Written Calculation
<b>Y4</b> +	<p><b>Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate</b></p> <p><b>Estimate and use inverse operations to check answers to a calculation</b></p> <p><b>Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why</b></p>	<p>Simple mental addition to ensure no errors with column addition.</p> <p>Use of place value to find 10, 100 or 1000 more.</p> <p>Use of place value to find more than a given number and including in negative numbers. <b>For example: Find 3 more than -8.</b></p> <p>Use number line initially, then jottings and then mentally</p> <p>Relate number bonds to 10 to number bonds to 100 and 1000 (e.g. <math>3 + 7 = 10</math> so <math>30 + 70 = 100</math> therefore <math>300 + 700 = 1000</math> and be able to recall them.</p>	<p><b>Continue to use part whole models and bar models</b> <b>Use to represent related addition and subtraction facts.</b></p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p><math>2732 + 744 = 3476</math></p> <p><math>744 + 2732 = 3476</math></p> <p>So...</p> <p><math>3476 - 2732 = 744</math></p> <p><math>3476 - 744 = 2732</math></p> </div> <div style="text-align: center;">  </div> </div> <p><b>Use to help solve missing number problems/ inverse. Use to check answers to a calculation.</b></p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>We know that <math>2387 + 4809 = ?</math></p> <p>We can help visualise this problem by putting it into a bar model (or part whole model) like on the right, now we know we need to add them together. We can do <math>2387 + 4809</math> to find our missing number (<math>=7196</math>).</p> <p>We can now do <math>7196 - 2387</math> to check. If we get 4809 we are correct.</p> </div> <div style="text-align: center;">     </div> </div> <p><b>Column addition for up to two 4-digit number, with 1 or more regrouping</b></p> <p>Use of (compact) column addition with up to two 4-digit numbers (may also do 4 digit number + 3 digit number, or three 4 digit numbers added together etc). May have no regrouping, one regroup or multiple regroupings.</p> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> <p><b>Regroup once</b></p> <math display="block">\begin{array}{r} 5162 \\ +3497 \\ \hline 8659 \\ \hline 1 \end{array}</math> <p><b>Regroup multiple times</b></p> <math display="block">\begin{array}{r} 5864 \\ +3497 \\ \hline 9361 \\ \hline 111 \end{array}</math> </div> <div style="width: 50%;"> <p>Starting with the ones, add each column in turn. When adding 6 tens + 9 tens = 15 tens = 1 hundred = 5 tens.</p> <p>Place 1 hundred <u>under</u> the equal sign on the hundred column and the 5 tens in the answer ('hang it on the washing line')</p> <p>Starting with the ones, add each column in turn. Regroup tens, hundreds and/or thousands as required ('hang it on the washing line')</p> </div> </div>

NB: Emphasis to be made on the place value of each digit and when introduced in Y4 (already done version of this in Y2 and Y3) to the method children should be shown it with counters and place value grid on the IWB to model regrouping.

If need practical apparatus - use Numicon or Base 10 to model the regrouping.

Y4  
+  
continued

(See above)

(See above)

### Column addition for decimals

Use of (compact) column addition for numbers with the same amount of decimal places

**For example:** when solving addition problem with a money context that goes into the decimal system with tenths and hundredths

For two amounts with same number of decimal places (only tenths):

$$£8.20 + £1.70$$

$$\begin{array}{r} 8.20 \\ + 1.70 \\ \hline 9.90 \\ = £9.90 \end{array}$$

For two amounts with same number of decimal places (tenths and hundredths):

$$£2.61 + £4.26$$

$$\begin{array}{r} 2.61 \\ + 4.26 \\ \hline 6.87 \\ = £6.87 \end{array}$$

For two amounts with same number of decimal places (tenths & hundredths) and require regrouping:

$$£4.87 + £1.95$$

$$\begin{array}{r} 4.87 \\ + 1.95 \\ \hline 6.82 \\ = £6.82 \end{array}$$

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

**Estimate and use inverse operations to check answers to a calculation**

**Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why**

Simple mental subtraction to ensure no errors with column subtraction.

Use of place value to find 10, 100 or 1000 less.

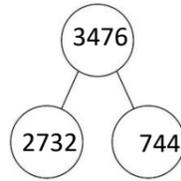
Use of place value to find less than a given number and going into negative numbers.

**For example: Find 7 less than 2.**

Use number line initially, then jottings and then mentally

**Continue to use part whole models and bar models**

**Use to represent related addition and subtraction facts.**



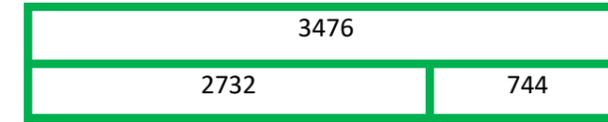
$2732 + 744 = 3476$

$744 + 2732 = 3476$

So...

$3476 - 2732 = 744$

$3476 - 744 = 2732$

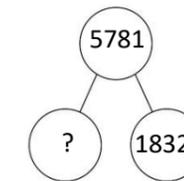
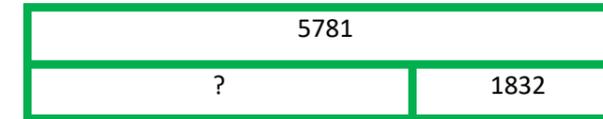


**Use to help solve missing number problems and represent inverse.**

We know that  $5781 - ? = 1832$

We can help visualise this problem by putting it into a bar model (or part whole model) like on the right. Now we can see the other subtraction we need to do.

We now know we can do  $5781 - 1832$  to find our missing number.



**Column subtraction for up to two 4-digit number, with 1 or more exchange**

Use of (compact) column subtraction with up to two 4-digit numbers (may also do 4 digit number – 3 digit number etc). May have no exchanging, one exchange or multiple exchanging.

**One exchange**

$$\begin{array}{r} 61 \\ 5749 \\ - 3471 \\ \hline 2278 \end{array}$$

Starting with the ones, subtract each column in turn. When subtracting 4 tens - 7 tens, exchange 1 hundred to make:

$14 \text{ tens} - 7 \text{ tens} = 7 \text{ tens}$

**Multiple exchanges**

$$\begin{array}{r} 6131 \\ 5742 \\ - 3476 \\ \hline 2266 \end{array}$$

Starting with the ones, subtract each column in turn. Exchange tens, hundreds and/ or thousands as required.

NB: Emphasis to be made on the place value of each digit and when introduced in Y4 (already done version of this in Y2 and Y3) to the method children should be shown it with counters and place value grid on the IWB to model exchanging.

If need practical apparatus - use Numicon or Base 10 to model the exchanging.

Y4  
–  
continued

(See above)

(See above)

### Column Subtraction

#### Column subtraction for decimals

Use of (compact) column subtraction for numbers with the same amount of decimal places

**For example:** when solving subtraction problem with a money context that goes into the decimal system with tenths and hundredths.

For two amounts with same number of decimal places:

$$\begin{array}{r} \pounds 6.52 - \pounds 2.30 \\ \hline 6.52 \\ - 2.30 \\ \hline 4.22 \\ \hline = \pounds 4.22 \end{array}$$

For two amounts with same number of decimal places and require exchanging:

$$\begin{array}{r} \pounds 7.12 - \pounds 3.86 \\ \hline \overset{6}{\cancel{7}} \overset{10}{.} \overset{1}{\cancel{1}} 2 \\ - 3.86 \\ \hline 3.26 \\ \hline = \pounds 3.26 \end{array}$$

Y4  
X

Recall multiplication facts for multiplication tables up to 12 x 12

Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together 3 numbers

Recognise and use factor pairs and commutativity in mental calculations

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

Solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

(not necessarily in this order)

Learn shortcuts for mental multiplication

**For example:**

- to x4 you x2 and x2 again
- to x5 you x10 and divide by 2
- to x20 you x2 and x10

Use known multiplication facts to mentally solve other multiplications

**For example:** if you know  $8 \times 3 = 24$  you know...

- $8 \times 30 = 240$
- $80 \times 3 = 240$
- $80 \times 30 = 2400$

Multiplication is commutative

Factor pairs of numbers

Fact families – using known fact to find the others

**For example:** if you know  $9 \times 4 = 36$  then you know  $4 \times 9 = 36$  and  $36 \div 9 = 4$  and  $36 \div 4 = 9$

Multiplying by 1

Know that any number x by 1 = itself

**For example:**  $81 \times 1 = 81$

Multiplying by 0

Know that any number x by 0 = 0

**For example:**  $72 \times 0 = 0$

Multiplying 3 numbers together and shortcuts to take

**For example:**  $8 \times 7 \times 2$

First solve  $8 \times 7 = 56$  (as it's the trickier one)

Then  $56 \times 2 = 112$  (as doubling is easier)

### Multiplying a number by 10 and 100

Use of place value grids

Moving 1 place to the left for x10  
or 2 places to the left for x100  
or 3 places to the left for x1000

NB: Start with counters then write digits in.

Th	H	T	U
Thousands	Hundreds	Tens	Units
			1
		1	<u>0</u>
	1	<u>0</u>	<u>0</u>

x 10  
x 100

Once children understand the place value reasons behind this they can use shortcuts of putting zeros onto the end (making it more of a mental calculation)

**For example:**  $78 \times 10$ . Multiplying by 10 → 10 has 1 zero so I need to put 1 zero on the end of my number → 780

**For example:**  $6 \times 100$ . Multiplying by 100 → 100 has 2 zeroes so I need to put 2 zeroes on the end of my numbers → 600

**For example:**  $52 \times 100$ . Multiplying by 100 → 100 has 2 zeroes so I need to put 2 zeroes on the end of my numbers → 5200

**Children to learn both of the following methods and choose what they prefer to use (guided towards choosing column method.)**

### Using grid method for multiplication

NB: If children struggled, can use either of these methods with counters & PV grid.

$$\begin{array}{r}
 123 \times 5 \\
 \times \begin{array}{|c|c|c|} \hline 100 & 20 & 3 \\ \hline \end{array} \\
 \hline
 500 \quad 100 \quad 15 \\
 \hline
 500 \\
 + 100 \\
 + 15 \\
 \hline
 615
 \end{array}$$

Multiplying 2 and 3 digit numbers x 1 digit numbers using grid method.

- First – partition the number into its (hundreds,) tens and ones.
- Draw grid and set out partitioned numbers into the grid.
- Multiply each partitioned number along the top by the 1 digit number, fill in the answer
- Line up all the parts of the answer and complete a column addition
- Now you have the final answer

### Using column method for multiplication

Multiplying 2 and 3 digit numbers x 1 digit numbers using column multiplication method

	H	T	O
		3	4
x			5
	1	7	0
	1	2	

- First set out the numbers in a column method ensuring HTO are accurately lined up
- Start by multiplying the ones by the x number
- Record the answer under the line in the correct column
- Work through the tens and then hundreds.
- If the digits are larger than 9 they need to be regrouping into the next place value column as the children are familiar in doing with column addition.

**Y4**  
÷

**(Multiplication & Division)**

**Recall division facts for multiplication tables up to 12 × 12**

**Use place value, known and derived facts to divide mentally, including dividing by 1**

**Recognise and use factor pairs and commutativity in mental calculations**

**(Fractions & Decimals)**

**Find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths**

Use their multiplication knowledge to divide mentally.  
Eg.  $8 \times 9 = 72$  so  $72 \div 8 = 9$   
Use inverse of factors and factor pairs.

Eg. Know that factors of 36 are 1 and 36, 2 and 18, 3 and 12, 4 and 9, and 6.  
Therefore we know that  $36 \div 3 = 12$ .

Know that division is not commutative.

Fact families – using known fact to find the others

Eg. if you know  $9 \times 4 = 36$  then you know  $4 \times 9 = 36$  and  $36 \div 9 = 4$  and  $36 \div 4 = 9$

Know that any number  $\div$  by 1 = itself

Eg.  $81 \div 1 = 81$

Use of place value grids

Moving 1 place to the right for  $\div 10$   
or 2 places to the right for  $\div 100$

NB: Start with counters then write digits in.

**Dividing a number by 10 and 100**

Th	H	T	U
Thousands	Hundreds	Tens	Units
	1	0	0
		1	0
			1

→  $\div 10$   
→  $\div 100$

**Bus stop Division**

Bus stop division for 2 or 3 digit numbers divided by 1 digit number (no remainders)

Start with numbers that fully divide (no regrouping required) - with 2 digit

	2	1
4	8	4

or 3 digit

	3	1	2
3	9	3	6

Then move onto some regrouping across - with 2 digit

	1	5
3	4	15

or 3 digit & one regroup

	2	1	4
4	8	5	16

or 3 digit & one regroup

	0	4	5
8	3	36	40