

Year 5

Daisyfield Primary School Calculation Policy

Updated March 2025

Progression Toward Mental Calculation Strategies **(Addition and Subtraction)**

The ability to calculate mentally is an essential skill, but, as with written methods of calculation, children need to be taught. **It is important to ensure that when teaching particular strategies, children have the appropriate prerequisite skills and are guided as to how and when that strategy is appropriate.**

Children should be taught and encouraged to ask themselves the following questions when faced with a calculation:

- Do I know the answer?
- Can I work it out in my head?
- Do I need to do a jotting?
- Do I need to use a written method?

When using a jotting, there is no requirement to follow a particular method of recording.

A feature of mental calculation is that a type of calculation can often be worked out in several different ways. Which method is best will depend on the numbers involved, the age of the children and the range of methods that they are confident with.

In developing a progression through mental calculation strategies for addition and subtraction, it is important that children understand the relevant concepts, in that addition is:

- combining two or more groups to give a total or sum
- increasing an amount

and subtraction is:

- removal of an amount from a larger group (take away)
- comparison of two amounts (difference)

They also need to understand and work with certain principles, that:

- addition and subtraction are inverses
- addition is commutative i.e. $5 + 3 = 3 + 5$ but subtraction is not $5 - 3$ is not the same as $3 - 5$
- addition is associative i.e. $5 + 3 + 7 = 5 + (3 + 7)$ but subtraction is not $10 - 3 - 2$ is not the same as $10 - (3 - 2)$

Commutativity and associativity mean that calculations can be rearranged, e.g. $4 + 13 = 17$ is the same as $13 + 4 = 17$.

Y5

End of Year Objective:

Add and subtract numbers mentally, including: two three-digit numbers where one or both are multiples of 10 or 100; two or three-digit numbers to or from a four digit number; two four-digit numbers (where there is no carrying or exchange involved); pairs of decimals to one decimal place

Rapid Recall:

Children should be able to:

- Recall and use addition and subtraction facts for 1 and 10 (with decimal numbers to one decimal place)
- Derive and use addition and subtraction facts for 1 (with decimal numbers to two decimal places)

Mental Strategies

Partition and combine multiples of thousands hundreds, tens and ones

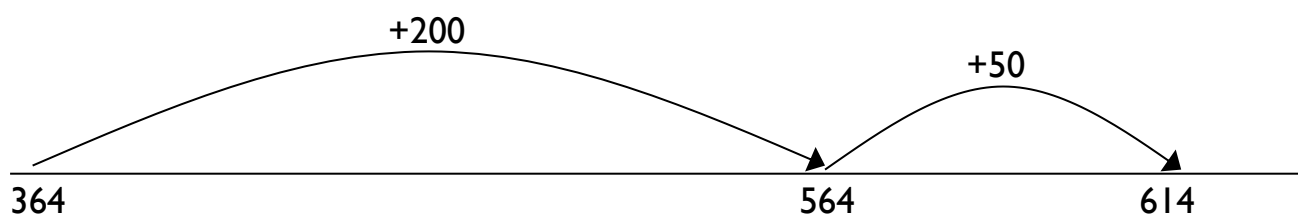
Partitioning numbers is a core strategy for adding and subtracting pairs of numbers. Children can either partition both of the numbers in the calculation, or keep the first number the same and just partition the second. (See Y2, Y3 and Y4 for more information).

Examples of calculations:

4300 + 1400	4300 add 1000 and 400 = 4300 add 1000 add 400
364 + 250	364 add 200 and 50 = 364 add 200 add 50
3600 - 1200	3600 take away 1000 and 200 = 3600 take away 1000 take away 200
432 - 240	432 take away 200 and 40 = 432 take away 200 take away 40
5124 + 1352	5124 add 1000 and 300 and 50 and 2 = 5124 add 1000 add 300 add 50 add 2 (crossing no boundaries)
7584 - 2351	7584 take away 2000 and 300 and 50 and 1 = 7584 take away 2000 take away 300 take away 50 take away 1 (crossing no boundaries)

Prerequisite skills:

- Count forwards and backwards in ones, tens, hundreds and thousands
 - Understand place value and understand which digit changes if one, ten or hundred is added or subtracted
 - Partition numbers into hundreds, tens and ones
- 364 + 250 = 614 (shown using a numberline)



$364 + 250 = 614$ (shown using number sentences)

$$364 + 200 = 564$$

$$564 + 50 = 614$$

$432 - 240 = 192$ (shown using a numberline)



$432 - 240 = 192$ (shown using number sentences)

$$432 - 200 = 232$$

$$232 - 40 = 192$$

Partition and combine multiples of ones and tenths

Partitioning numbers is a core strategy for adding and subtracting pairs of numbers. Children can either partition both of the numbers in the calculation, or keep the first number the same and just partition the second. The calculations do not cross ones boundaries.

Examples of calculations:

$$5.4 + 3.2$$

$$5.4 \text{ add } 3 \text{ and } 0.2 = 5.4 \text{ add } 3 \text{ add } 0.2$$

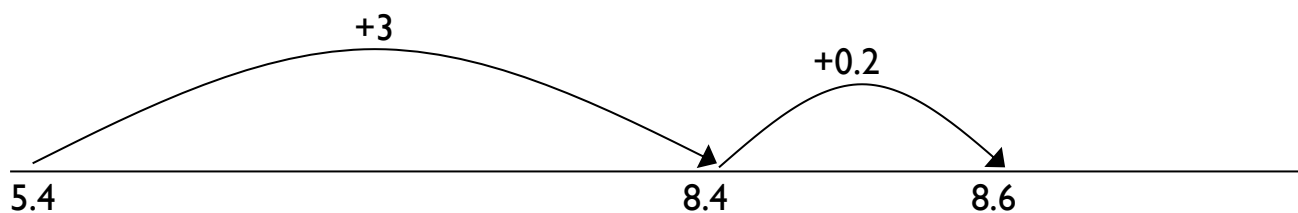
$$4.7 - 2.5$$

$$4.7 \text{ take away } 2 \text{ and } 0.5 = 4.7 \text{ take away } 2 \text{ take away } 0.5$$

Prerequisite skills:

- Count forwards and backwards in tenths and ones
- Understand place value of decimal numbers

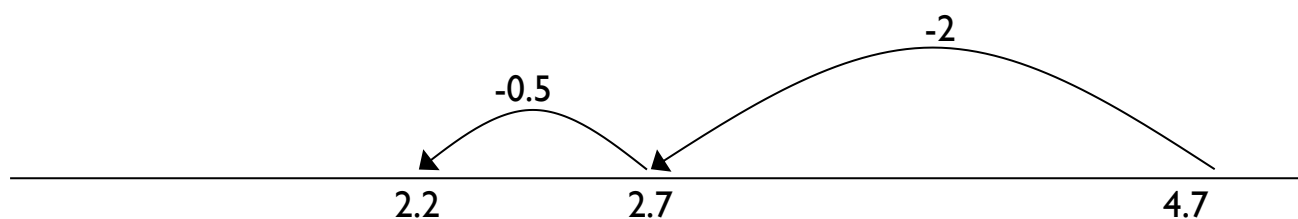
$5.4 + 3.2 = 8.6$ (shown using a numberline)



$5.4 + 3.2 = 8.6$ (shown using number sentences)

$$5.4 + 3 = 8.4$$
$$8.4 + 0.2 = 8.6$$

$4.7 - 2.5 = 2.2$ (shown using a numberline)



$4.7 - 2.5 = 2.2$ (shown using number sentences)

$$4.7 - 2 = 2.7$$
$$2.7 - 0.5 = 2.2$$

Identify and use knowledge of number bonds within a calculation and identify related facts, e.g. $1.5 + 2.7$ from $15 + 27$

Children should use their knowledge of the number system to help them use related facts to calculate, e.g. 1.5 is ten times smaller than 15, 2.7 is ten times smaller than 27, so the answer to $1.5 + 2.7$ will be ten times smaller than $15 + 27$.

Examples of calculations:

$1.2 + 0.8$	using knowledge of $12 + 8 = 20$
$2.5 + 1.3$	using knowledge of $25 + 13 = 38$
$3.8 + 4.5$	using knowledge of $38 + 45 = 83$
$2 - 0.7$	using knowledge of $20 - 7 = 13$
$4.6 - 1.5$	using knowledge of $46 - 15 = 31$
$8.3 - 5.4$	using knowledge of $83 - 54 = 29$

Prerequisite skills:

- Know, or quickly derive, number bonds to 1, 10, 100 1000

- Identify number bonds within other numbers, e.g. identifying
- 7 + 3 within the calculations 257 + 343 or 1.7 + 2.3

Find differences by counting up through the next multiple of 1, 10, 100 or 1000

In Y5, children need to build on their knowledge and understanding gained in Y4 to find differences that cross 1, 10, 100 and 1000 boundaries. When deciding whether to use a mental or a written method for a calculation, **children should be encouraged to select the method which is most efficient.**

e.g. $5003 - 1960 =$. It is more efficient to count up from 1960 to 5003 in three steps (+40, +3000, +3) than to use the formal written method of:

$$\begin{array}{r} 5003 \\ - 1960 \\ \hline 3043 \end{array}$$

which requires a lot of exchanging.

Examples of calculations:

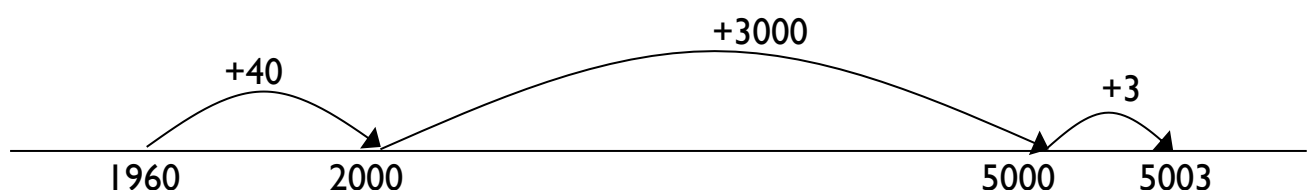
$$\begin{array}{l} 604 - 289 \\ 523 - 160 \\ 1200 - 785 \\ 5003 - 1960 \\ 7.3 - 2.8 \\ 20.1 - 6.7 \end{array}$$

Prerequisite skills:

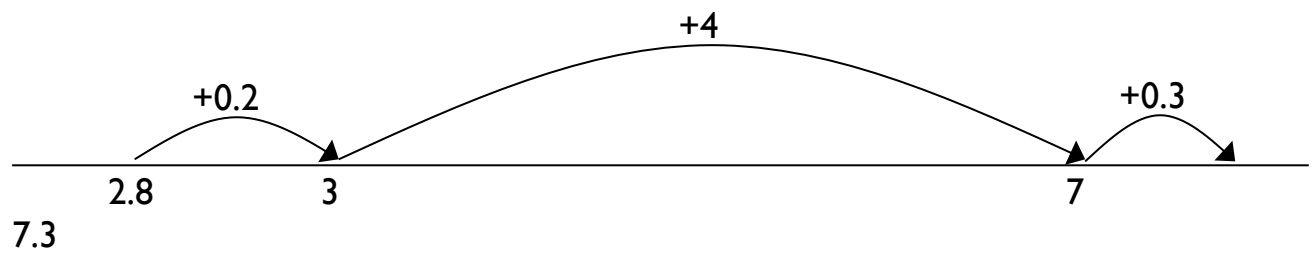
- Understand the place value of numbers to identify which number is the greater or lesser
- Establish whether numbers are close together or near to multiples of 10 or 100
- Place numbers appropriately on an unmarked numberline
- Count forwards and backwards in ones and tens

Children could use empty numberlines to record the calculation.

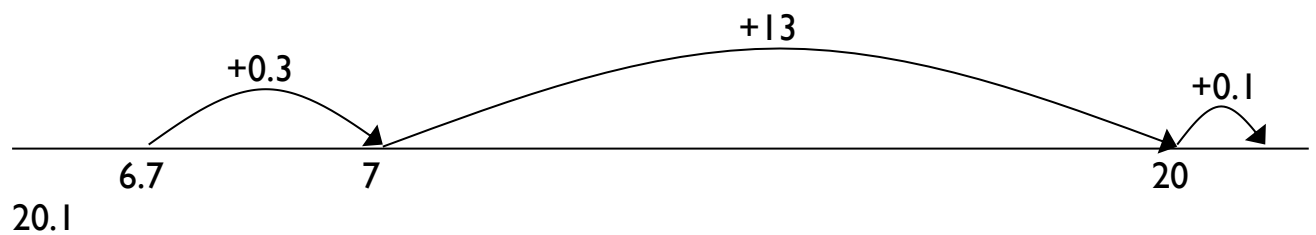
$$5003 - 1960 = 3043$$



$$7.3 - 2.8 = 4.5$$



$$20.1 - 6.7 = 13.4$$



Bridge through 10 when adding or subtracting a single digit number (partitioning, e.g. $58 + 5 = 58 + 2 + 3$ or $76 - 8 = 76 - 6 - 2$)

In Y5, children need to build on their knowledge and understanding gained in Y4. (See Y4 for more information).

Examples of calculations:

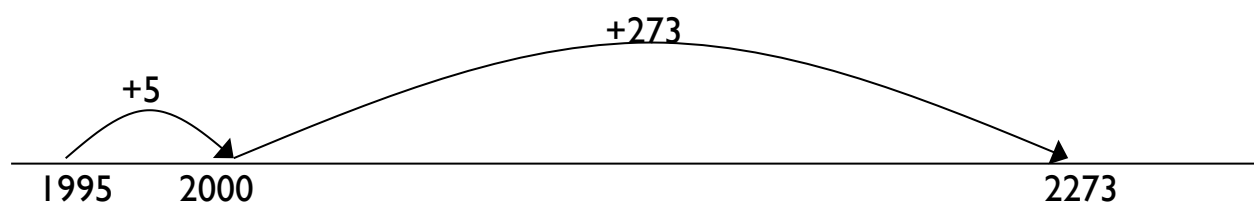
$594 + 170$	as $594 + 6 + 164$
$1995 + 278$	as $1995 + 5 + 273$
$703 - 128$	as $703 - 3 - 125$
$3002 - 87$	as $3002 - 2 - 85$

Prerequisite skills:

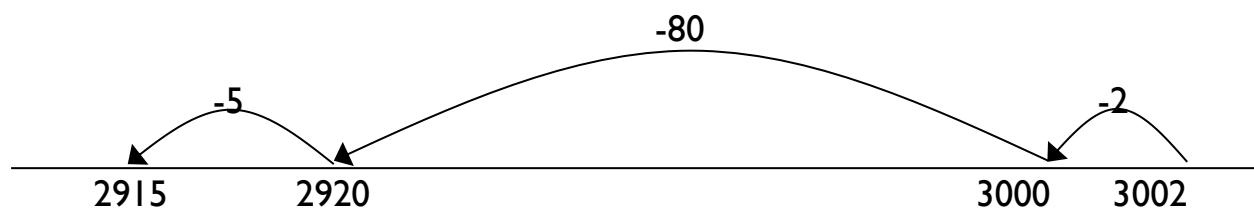
- Partition numbers in different ways, e.g. 5 as $2 + 3$ to enable $58 + 5$ as $58 + 2 + 3$
- Know, or quickly derive, number bonds to 10

Children could use empty numberlines to record the calculation.

$$1995 + 278 = 2273$$



$$3002 - 87 = 2915$$



Add or subtract a multiple of 10 and adjust (for those numbers close to multiples of 10)

In Y5, children need to build on their knowledge and understanding gained in Y4 (See Y4 for more information) to add and subtract numbers close to a multiple of 10.

Examples of calculations:

$$257 + 68 \quad \text{as } 257 + 70 - 2$$

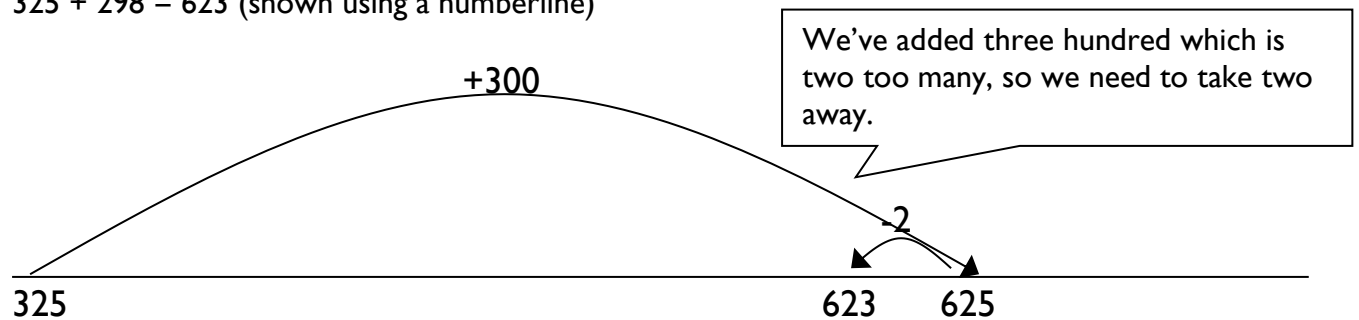
$$325 + 298 \quad \text{as } 325 + 300 - 2$$

$$764 - 88 \quad \text{as } 764 - 90 + 2$$

$$876 - 397 \quad \text{as } 876 - 400 + 3$$

Prerequisite skills:

- Identify the difference between the number being added and subtracted and the multiple of 10
 - Understand that the adjustment needs to be the opposite of the operation carried out
- $325 + 298 = 623$ (shown using a numberline)

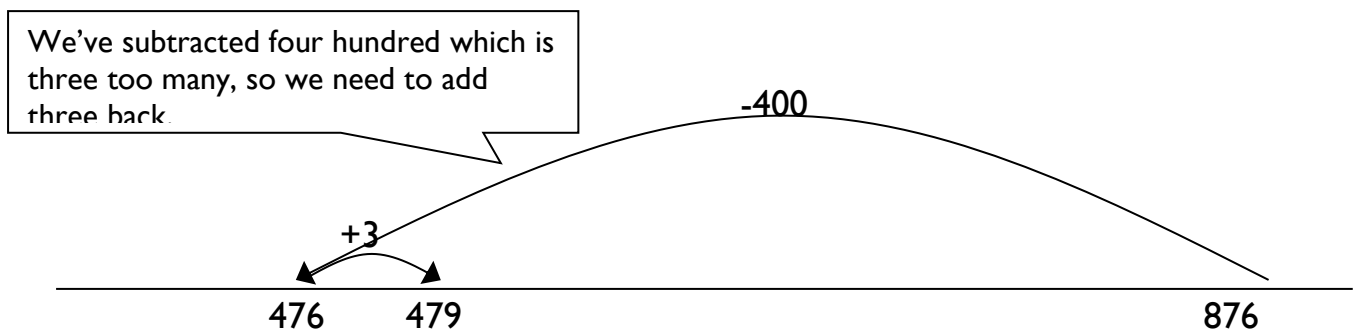


$325 + 298 = 623$ (shown using number sentences)

$$325 + 300 = 625$$

$$625 - 2 = 623$$

$876 - 397 = 479$ (shown using a numberline)



$876 - 397 = 479$ (shown using number sentences)

$$876 - 400 = 476$$

$$476 + 3 = 479$$

WRITTEN ADDITION

End of Year Objective:

Add whole numbers with more than 4 digits *and* decimals with two decimal places, including formal written methods (columnar addition).

Children should continue to use the carrying method to solve calculations such as:

$$\begin{array}{r} 3364 \\ + 247 \\ \hline 3611 \\ \hline \end{array}$$

$$\begin{array}{r} 3121 \\ + 37 \\ \hline 3308 \\ \hline \end{array}$$

$$\begin{array}{r} 3.56 \\ + 2.47 \\ \hline 6.03 \\ \hline \end{array}$$

They will also be adding:

- several numbers with different numbers of digits, understanding the place value;
- *decimals with up to two decimal places (with each number having the same number of decimal places), knowing that the decimal points line up under one another.*
- amounts of money and measures, including those where they have to initially convert from one unit to another

WRITTEN SUBTRACTION

End of Year Objective:

Subtract whole numbers with more than 4 digits *and* decimals with two decimal places, including formal written methods (columnar subtraction).

Children should continue to use the decomposition method to solve calculations such as:

$$\begin{array}{r} \overset{6}{7}0\overset{6}{7}2 \\ - 3226 \\ \hline 3846 \\ \hline \end{array}$$

$$\begin{array}{r} \overset{2}{3}.\overset{13}{4}2 \\ - 1.76 \\ \hline 1.66 \\ \hline \end{array}$$

They will also be subtracting:

- numbers with different numbers of digits, understanding the place value;
- *decimals with up to two decimal places (with each number having the same number of decimal places), knowing that the decimal points line up under one another.*
- amounts of money and measures, including those where they have to initially convert from one unit to another

Y5 PROGRESSION IN MENTAL CALCULATION – Multiplication and Division

End of Year Objective:

Multiply and divide numbers mentally drawing upon known facts

Rapid Recall

Children should be able to:

- Recall related tables facts for multiples of 10 ($70 \times 6 = 420$ because $7 \times 6 = 42$)
- Using times tables, identify related unit fractions, e.g. $7 \times 9 = 63$ so one-ninth of 63 is 7 and one-seventh of 63 is 9
- Use partitioning to double or halve any number, including decimals to two decimal places
- Recall prime numbers up to 19
- Recall square (2) numbers up to 12×12

Mental Strategies

In Year 5 children build on their skills and understanding from previous year groups to multiply and divide mentally with larger numbers and numbers to two decimal places. Children should be encouraged to choose the most appropriate strategy based on the numbers involved in the calculation.

Multiply numbers mentally drawing upon known facts

Multiply whole numbers and decimals to two decimal places by 10, 100 and 1000 using a place value chart

Building on their knowledge of multiplying by 10 and 100 from Year 3 and Year 4, children can use transparent counters to help them develop their understanding of multiplying numbers to two decimal places by 10, 100 and 1000

e.g. 3.72×1000

The children represent 3.72 on a place value chart using transparent counters.

00000	0000	000	00	0	0.0	0.00
10 000	1000	100	10	1	0.1	0.01
20 000	2000	200	20	2	0.2	0.02
30 000	3000	300	30	3	0.3	0.03
40 000	4000	400	40	4	0.4	0.04
50 000	5000	500	50	5	0.5	0.05
60 000	6000	600	60	6	0.6	0.06
70 000	7000	700	70	7	0.7	0.07
80 000	8000	800	80	8	0.8	0.08
90 000	9000	900	90	9	0.9	0.09

00 because 1000 is $10 \times 10 \times 10$

00000	0000	000	00	0	0.0	0.00
10 000	1000	100	10	1	0.1	0.01
20 000	2000	200	20	2	0.2	0.02
30 000	3000	300	30	3	0.3	0.03
40 000	4000	400	40	4	0.4	0.04
50 000	5000	500	50	5	0.5	0.05
60 000	6000	600	60	6	0.6	0.06
70 000	7000	700	70	7	0.7	0.07
80 000	8000	800	80	8	0.8	0.08
90 000	9000	900	90	9	0.9	0.09

Examples of calculations

$$75.91 \times 10$$

$$5.07 \times 10$$

$$670.4 \times 100$$

$$360 \times 1000$$

$$0.76 \times 1000$$

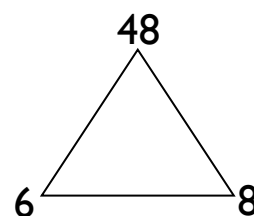
Prerequisite skills:

- Partition a number into thousands, hundreds, tens, ones, tenths and hundredths
- Recombine multiples of a hundred thousand, ten thousand, thousand, hundred, ten, one and tenth

Use related facts to multiply Th000 by a one-digit number

NB Th000 represents a multiple of 1000

Children should be encouraged to identify the **relationships** between numbers in multiplication calculations, e.g. $6 \times 8 = 48$ could be represented using a multiplication trio as this model allows children to see the **relationships** between the numbers:

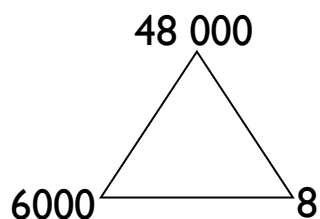


This can be used to derive the following calculations:

$$6 \times 8 = 48$$

$$8 \times 6 = 48$$

Children can then use the multiplication trio to derive related facts, e.g. $6000 \times 8 =$



Children should be able to explain that because 6000 is one thousand times greater than 6, the answer to 6000×8 will be one thousand times greater than 48. They can then use their understanding of multiplying by 1000 to calculate this.

Examples of calculations

$$3000 \times 3$$

$$7000 \times 5$$

$$8000 \times 9$$

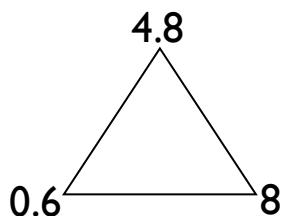
Prerequisite skills:

- Recall multiplication tables
- Understand the effect of multiplying a one- or two-digit number by 1000

Use related facts to multiply 0.t by a one-digit number

NB 0.t represents a multiple of a tenth

The multiplication trio from the previous strategy can also be used to derive 0.t multiplied by a one-digit number, e.g. 0.6×8



Children should be able to explain that because 0.6 is ten times smaller than 6, the answer to 0.6×8 will be ten times smaller than 48. They can then use their understanding of dividing by 10 to calculate this.

Examples of calculations

$$0.3 \times 7$$

$$0.6 \times 9$$

$$0.5 \times 4$$

Prerequisite skills:

- Recall multiplication tables
- Understand the effect of dividing a one- or two-digit number by 10

Use factor pairs to multiply T0 x T0

Calculations that involve multiplying T0 x T0 can be broken down into smaller steps by using factor pairs.

e.g. $60 \times 40 =$
becomes $6 \times 10 \times 4 \times 10 =$ (using knowledge of factor pairs)
which becomes $6 \times 4 \times 10 \times 10 =$ (using knowledge of commutativity/associativity)
which becomes $24 \times 100 = 2400$

Examples of calculations

$$30 \times 60$$

$$70 \times 80$$

$$50 \times 40$$

Prerequisite skills:

- Recall multiplication tables
- Understand the effect of multiplying a one- or two-digit number by 100
- Recognise and use factor pairs

Use compensation to multiply H99 by a one-digit number

NB H99 represents a three-digit number with 9 tens and 9 ones

Building on their understanding from Year 4 of multiplying T9 by a one-digit number, children multiply by the nearest multiple of a hundred and then compensate appropriately.

e.g. $699 \times 3 =$

$$699 \times 3 = 700 \times 3 \text{ subtract } 1 \times 3$$

$$700 \times 3 = 2100$$

So $699 \times 3 = 2100 - 3$ (one group of 3 less than 2100)

$$699 \times 3 = 2097$$

Examples of calculations

$$599 \times 4$$

$$399 \times 7$$

$$699 \times 9$$

Prerequisite skills:

- Recall multiplication tables
- Understand how multiplying by 99 is related to multiplying by 100
- Use related facts to multiply H00 by a one-digit number
- Subtract a one-digit number from a multiple of a hundred

Use partitioning to multiply U.t by a one-digit number

Children should be encouraged to choose the most efficient method, which may be mental, rather than simply opting for a written method.

e.g. $3.8 \times 4 =$

$$3 \times 4 = 12$$

$$0.8 \times 4 = 3.2$$

$$3.8 \times 4 = 15.2$$

Examples of calculations

$$6.7 \times 4$$

$$3.2 \times 7$$

$$8.5 \times 6$$

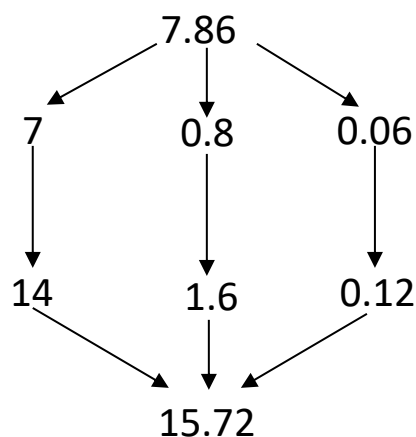
Prerequisite skills:

- Recall multiplication tables
- Partition U.t into ones and tenths
- Use related facts
- Add numbers with different amounts of digits

Use partitioning to double numbers including those with two decimal places

Children should use related facts to double numbers. For example, double 9 is 18 so double 0.09 (a hundred times smaller than 9) is 0.18 (a hundred times smaller than 18).

e.g. double 7.86



The diagram above illustrates the way children should be thinking about doubling using partitioning, but it is not necessary for them to record in this way if it is not helpful to the child.

Examples of calculations

Double 56.7

Double 485.6

Double 8.59

Double 36 742

Prerequisite skills:

- Count forwards in hundredths, tenths, ones, tens, hundreds and thousands
- Partition a number into thousands, hundreds, tens, ones, tenths and hundredths
- Use related facts to double multiples of hundredths, tenths, ones, tens, hundreds and thousands
- Recombine multiples of hundredths, tenths, ones, tens, hundreds and thousands

Divide numbers mentally drawing upon known facts

Divide whole numbers and decimals by 10, 100 and 1000 using a place value chart

Building on their knowledge of dividing by 10 and 100 from Year 3 and Year 4, children can use transparent counters to help them develop their understanding of dividing numbers by 10, 100 and 1000. Answers should include decimals up to two decimal places.

e.g. $35\ 600 \div 1000 =$

The children represent 35 600 on a place value chart using transparent counters.

00000	0000	000	00	0	0.0	0.00
10 000	1000	100	10	1	0.1	0.01
20 000	2000	200	20	2	0.2	0.02
30 000	3000	300	30	3	0.3	0.03
40 000	4000	400	40	4	0.4	0.04
50 000	5000	500	50	5	0.5	0.05
60 000	6000	600	60	6	0.6	0.06
70 000	7000	700	70	7	0.7	0.07
80 000	8000	800	80	8	0.8	0.08
90 000	9000	900	90	9	0.9	0.09

They then move each counter three places to the right to divide the number by 1000
1000 is $10 \times 10 \times 10$ so dividing by 1000 is the same as $\div 10 \div 10 \div 10$

00000	0000	000	00	0	0.0	0.00
10 000	1000	100	10	1	0.1	0.01
20 000	2000	200	20	2	0.2	0.02
30 000	3000	300	30	3	0.3	0.03
40 000	4000	400	40	4	0.4	0.04
50 000	5000	500	50	5	0.5	0.05
60 000	6000	600	60	6	0.6	0.06
70 000	7000	700	70	7	0.7	0.07
80 000	8000	800	80	8	0.8	0.08
90 000	9000	900	90	9	0.9	0.09

Examples of calculations

$$874 \div 10$$

$$60.1 \div 10$$

$$7043 \div 100$$

$$48\,750 \div 1000$$

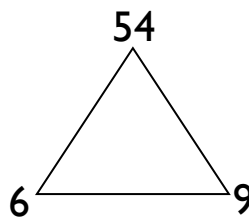
Prerequisite skills:

- Partition a number into hundred thousands, ten thousands, thousands, hundreds, tens, ones and tenths
- Recombine multiples of ten thousand, thousand, hundred, ten, one, tenth and hundredth

Use related facts to divide ThH00 by a one-digit number

NB ThH00 represents a four-digit multiple of 100

Children should be encouraged to identify the **relationships** between numbers in division calculations, e.g. $54 \div 6 = 9$ could be represented using a division trio:

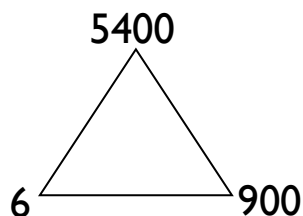


This can be used to derive the following calculations:

$$54 \div 6 = 9$$

$$54 \div 9 = 6$$

Children can then use the division trio to derive related facts, e.g. $5400 \div 6 = 900$



Children should be able to explain that because 5400 is a hundred times greater than 54, the answer to $5400 \div 6$ will be a hundred times greater than 9. They can then use their understanding of multiplying by 100 to calculate this.

Examples of calculations

$$8100 \div 9$$

$$3000 \div 6$$

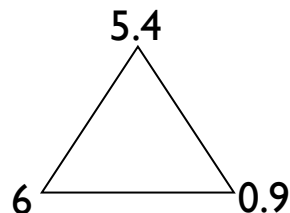
$$9600 \div 8$$

Prerequisite skills:

- Recall multiplication tables
- Understand the effect of multiplying a one or two-digit number by 100

Use related facts to divide U.t by a one-digit number

The division trio from the previous strategy can also be used to derive U.t divided by a one-digit number, e.g. $5.4 \div 6 =$



Children should be able to explain that because 5.4 is ten times smaller than 54, the answer to $5.4 \div 6$ will be ten times smaller than 9. They can then use their understanding of dividing by 10 to calculate this.

Examples of calculations

$$2.1 \div 7$$

$$3.6 \div 9$$

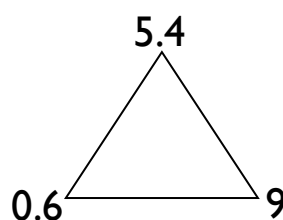
$$4.8 \div 4$$

Prerequisite skills:

- Recall multiplication tables
- Understand the effect of dividing a one- or two-digit number by 10

Use related facts to divide U.t by a 0.t

The division trio from the previous strategy can also be used to derive U.t divided by 0.t, e.g. $5.4 \div 0.6 =$



Children should be able to explain that 5.4 is ten times smaller than 54 and 0.6 is ten times smaller than 6. This means that both numbers have been scaled down by the same amount, so the relationship between the numbers stays the same. The answer to $5.4 \div 0.6$ will therefore be 9 because there are 9 groups of 0.6 in 5.4

Examples of calculations

$$2.1 \div 0.7$$

$$3.6 \div 0.9$$

$$4.8 \div 0.4$$

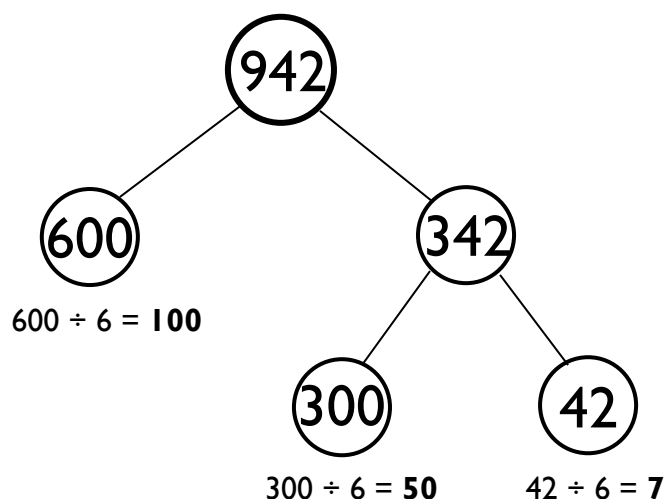
Prerequisite skills:

- Recall multiplication tables
- Understand division as repeated subtraction

Use partitioning to divide HTU by a one-digit number

Building on their understanding of using partitioning to divide TU by a one-digit number from Year 4, children decide how to partition HTU to help them divide it by a one-digit number.

e.g. $942 \div 6 = 157$



The diagram above illustrates the way children should be thinking about dividing using partitioning, but it is not necessary for them to record in this way if it is not helpful to the child.

Examples of calculations

- $756 \div 9$ By partitioning into 720 and 36
- $765 \div 5$ By partitioning into 500 and 250 and 15
- $861 \div 7$ By partitioning into 700 and 140 and 21

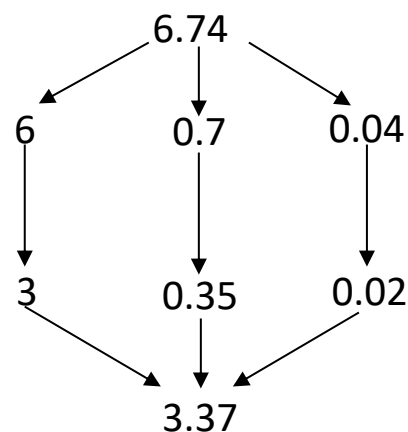
Prerequisite skills:

- Recall multiplication tables
- Understand division as repeated subtraction
- Partition three-digit numbers in different ways

Use partitioning to halve any number including to two decimal places

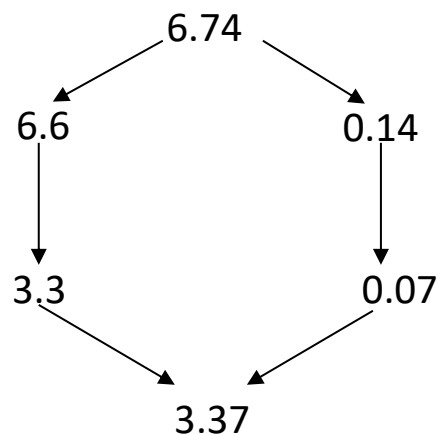
Children should be encouraged to decide the best way to partition a number to halve it.

e.g. Find half of 6.74



An alternative way of partitioning would be:

Find half of 6.74



The diagrams above illustrate the way children should be thinking about halving using partitioning, but it is not necessary for them to record in this way if it is not helpful to the child.

Examples of calculations

Find half of 4.62

Find half of 18.46

Find half of 8.94

Find half of 17.92

Find half of 32 784

Prerequisite skills:

- Partition numbers (including in different ways for efficiency)
- Use related facts to halve a multiple of a hundredth, tenth, ten, hundred and thousand
- Recombine multiples of one, ten, hundred and thousand
- Recombine multiples of a tenth and a hundredth

Y5 WRITTEN MULTIPLICATION

End of Year Objective:

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.

Children should continue to use the grid method and extend it to multiplying numbers with up to four digits by a single digit number, e.g.

4346 x 8

x	4 000	300	40	6
8	32 000	2400	320	48

$$\begin{array}{r}
 32000 \\
 + 2400 \\
 + 320 \\
 + 48 \\
 \hline
 34768
 \end{array}$$

and numbers with up to four digits by a two-digit number, e.g.

2693 x 24

x	2000	600	90	3
20	40000	12000	1800	60
4	8000	2400	360	12

$$\begin{array}{r}
 40000 \\
 + 8000 \\
 + 12000 \\
 + 2400 \\
 + 1800 \\
 + 360 \\
 + 60 \\
 + 12 \\
 \hline
 64632 \\
 \text{I I I}
 \end{array}$$

The long list of numbers in the addition part can be used to check that all of the answers from the grid have been included, however, when children are working with numbers where they can confidently and correctly calculate the addition (or parts of the addition) mentally, they should be encouraged to do so.

For example,

x	2000	600	90	3	
20	40000	12000	1800	60	= 53 860
4	8000	2400	360	12	= 10 772 +
					<u>64 632</u>
					I I

Adding across mentally, leads children to finding the separate answers to:

$$2\ 693 \times 20$$

$$2\ 693 \times 4$$

Children should also be using this method to solve problems and multiply numbers in the context of money or measures.

During Year 5, the transition from the grid method into the formal vertical method for multiplication should take place. The traditional vertical compact method of written multiplication is a highly efficient way to calculate, but it has a very condensed form and needs to be introduced carefully.

It is most effective to begin with the grid method, moving to an expanded vertical layout, before introducing the compact form. This allows children to see, and understand, how the processes relate to each other and where the individual multiplication answers come from e.g.

$$368 \times 6$$

x	300	60	8	
6	1 800	360	48	$\begin{array}{r} 1800 \\ + 360 \\ + 48 \\ \hline 2208 \end{array}$

Th	H	T	U
3	6	8	
x			6
		4	8 (8 × 6)
	3	6	0 (60 × 6)
+	1	8	0 0 (300 × 6)
	2	2	0 8

Th	H	T	U
3	6	8	
x			6
		4	8 (8 × 6)
	3	6	0 (60 × 6)
+	1	8	0 0 (300 × 6)
	2	2	0 8

becomes

Th	H	T	U
3	6	8	
x			6
		4	8
	3	6	0
+	1	8	0 0
	2	2	0 8

The place value columns are labelled to ensure children understand the size of the partitioned digits in the original number(s) and in the answer.

It is vital that the teacher models the correct language when explaining the process of the compact method.

The example shown should be explained as:

“Starting with the least significant digit... 8 multiplied by 6 is 48, put 8 in the units and carry 4 tens (40).

6 tens multiplied by 6 are 36 tens. Add the 4 tens carried over to give 40 tens (which is the same as 4 hundreds and 0 tens). Put 0 in the tens place of the answer and carry 4 hundreds.

3 hundreds multiplied by 6 are 18 hundreds. Add the 4 hundreds carried over to give 22 hundreds (which is the same as 2 thousands and 2 hundreds). Write 2 in the hundreds place of the answer and 2 in the thousands place of the answer.”

Children should recognise that the answer is close to an estimated answer of $400 \times 6 = 2400$

Long multiplication could also be introduced by comparing the grid method with the compact vertical method. Mentally totalling each row of answers is an important step in children making the link between the grid method and the compact method.

×	600	90	3	
20	12000	1800	60	= 13 860
4	2400	360	12	= 2 772 +
				<u>16 632</u>

Children should only be expected to move towards this next method if they have a secure understanding of place value. It is difficult to explain the compact method without a deep understanding of place value.

The example shown should be explained as:

“Starting with the least significant digit... 3 multiplied by 4 is 12; put 2 in the units and carry 1 ten (10).

9 tens multiplied by 4 are 36 tens. Add the 1 ten carried over to give 37 tens (which is the same as 3 hundreds and 7 tens). Put 7 in the tens place of the answer and carry 3 hundreds.

6 hundreds multiplied by 4 are 24 hundreds. Add the 3 hundreds carried over to give 27 hundreds (which is the same as 2 thousands and 7 hundreds). Write 7 in the hundreds place of the answer and 2 in the thousands place of the answer. We have now found the answer to 693×4 . Step 1 is complete so to avoid confusion later, we will cross out the carried digits 3 and 1.”

Notice this answer can clearly be seen in the grid method example.

Step 1

$$\begin{array}{r}
 \text{TTh Th H T U} \\
 693 \\
 \times 24 \\
 \hline
 2772 \quad (693 \times 4) \\
 \text{3 1}
 \end{array}$$

Step 2

$$\begin{array}{r}
 \text{TTh Th H T U} \\
 693 \\
 \times 24 \\
 \hline
 2772 \quad (693 \times 4) \\
 + 13860 \quad (693 \times 20) \\
 \hline
 16632
 \end{array}$$

Now we are multiplying 693 by 20. Starting with the least significant digit of the top number... 3 multiplied by 20 is 60. Write this answer in.

90 multiplied by 20 is 1 800. There are no units and no tens in this answer, so write 8 in the hundreds place and carry 1 in the thousands.

600 multiplied by 20 is 12 000. Add the 1 (thousand) that was carried to give 13 000. There are no units, no tens and no hundreds in this answer, so write 3 in the thousands place and 1 in the ten thousands place.

Step 3

$$\begin{array}{r}
 \text{TTh Th H T U} \\
 693 \\
 \times 24 \\
 \hline
 2772 \quad (693 \times 4) \\
 + 13860 \quad (693 \times 20) \\
 \hline
 16632
 \end{array}$$

The final step is to total both answers using efficient columnar addition.

When using the compact method for long multiplication, all carried digits should be placed below the line of that answer e.g. 3×4 is 12, so the 2 is written in the units column and the 10 is carried as a small 1 in the tens column.

This carrying below the answer is in line with the written addition policy in which carried digits are always written below the answer/line.

Y5 WRITTEN DIVISION

End of Year Objective:

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.

Children may continue to use the key facts box for as long as they find it useful. Using their knowledge of linked tables facts, children should be encouraged to use higher multiples of the divisor. **During Year 5, children should be encouraged to be efficient when using the chunking method and not have any subtraction steps that repeat a previous step. For example, when performing $347 \div 8$ an initial subtraction of 160 (20×8) and a further subtraction of 160 (20×8) should be changed to a single subtraction of 320 (40×8).** Also, any remainders should be shown as integers, e.g.

$$523 \div 8$$

$$\begin{array}{r}
 65\text{r}3 \\
 8 \overline{) 523} \\
 \underline{- 320} \quad 40\times \\
 203 \\
 \underline{- 160} \quad 20\times \\
 43 \\
 \underline{- 40} \quad 5\times \\
 3 \\
 \underline{-} \\
 \hline
 \end{array}$$

By the end of year 5, children should be able to use the chunking method to divide a four digit number by a single digit number. If children still need to use the key facts box, it can be extended to include 100x.

$$2458 \div 7$$

$$\begin{array}{r}
 351\text{r}1 \\
 7 \overline{) 2458} \\
 \underline{- 2100} \quad 300\times \\
 358 \\
 \underline{- 350} \quad 50\times \\
 8 \\
 \underline{- 7} \quad 1\times \\
 1 \\
 \underline{-} \\
 \hline
 \end{array}$$

Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.