



Ramsbury School Calculation Policy

The National Curriculum aims that all children:

- ◆ become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that children develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- ◆ can reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- ◆ can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

It is vital that children have a conceptual understanding of numbers, the number system and the calculation methods they use. This will enable them to have a solid understanding in mathematics as well as giving them the tools to select appropriate calculation methods when solving mathematical problems.

Addition



Foundation Stage

National Curriculum 2014 reference(s):

Using quantities and objects, add two single-digit numbers and count on to find the answer.

Find the total number of items in two groups by counting all of them.

Say the number that is one more than a given number.

Find one more from a group of up to five objects, then ten objects.

In practical activities and discussion, begin to use the vocabulary involved in adding.

Calculation methods

Practically combine two sets of objects in one group .

$$2 + 3$$



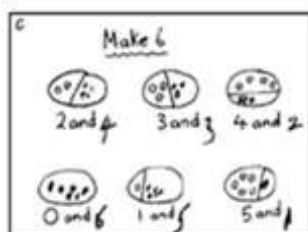
Count on in 1s from the total of the first set of objects.

Bead strings or bead bars can be used to illustrate addition including bridging ten by counting on 2 then 3.

$$8 + 5$$

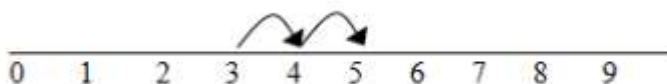


Partition one set into 2 groups.



Count on in ones using a number line or number track.

$$3 + 2 = 5$$



It is important that children have a clear understanding of the concept of equality, before using the '=' sign. Calculations should be on either side of the '=' so that children don't misunderstand '=' as to mean 'the answer'.

Key vocabulary

+, add, more, and, make, sum, total, altogether, score, double, one more, two more, ten more... how many more to make... ? how many more is... than...?

=, is the same as, equals

Addition



Year 1

National Curriculum 2014 reference(s):

Read, write and interpret mathematics statements including +, -, =.

Represent and use number facts within 20.

Recall and use addition facts to 10.

Solve one step problems that involve using concrete objects, pictorial representations and missing number problems.

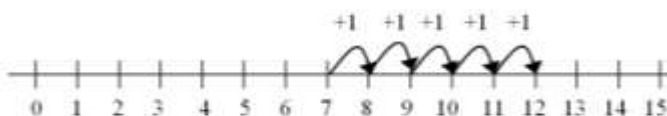
Add 1 digit and 2 digit numbers to 20, including 0, e.g. ($16+7=23$).

Given a number, identify one more.

Calculation methods

Combine two sets of objects in one group, counting on from the larger number.

Use numbered lines to add, by **counting on** in ones.
Encourage children to start with the larger number and count on.



Bridge through 10 using knowledge of number bonds.
Bead strings or bead bars can be used to illustrate addition.



It is important that children have a clear understanding of the concept of equality, before using the '=' sign. Calculations should be on either side of the '=' so that children don't misunderstand '=' as to mean 'the answer'.

To support this, when solving calculations, missing numbers should be placed in all possible places.

$$3 + 4 = \square$$

$$\square + 4 = 7$$

$$3 + \square = 7$$

$$7 = \square + 4$$

$$7 = \square + 3$$

$$\square = 3 + 4$$

Key vocabulary

+, add, more, plus, addition, make, sum, total, altogether, score, double, near double, one more, two more... ten more,

how many more to make...? how many more is... than...? how much more is...?

=, equals, sign, is the same as

Addition



Year 2

National Curriculum 2014 reference(s):

Solve problems that involve using concrete objects, pictorial representations, including numbers, quantities and measures.

Recall and use addition facts to 20, derive and use related facts to 100.

Add numbers using concrete objects, pictorial representations, and mentally, including:

2 digit numbers and ones, e.g. (23+6=29);

2 digit numbers and tens, e.g. (23+20=43);

two 2 digit numbers, e.g. (23+45=68);

three 1 digit numbers, e.g. (5+6+3=14).

Show that addition of 2 numbers can be done in any order.

Use inverse operation (-) to check and solve missing number problems.

Find combinations of coins that equal the same amounts of money.

Combine amounts in £ and p to make a particular value.

Solve simple problems in a particular context involving addition of money of the same unit, including giving change.

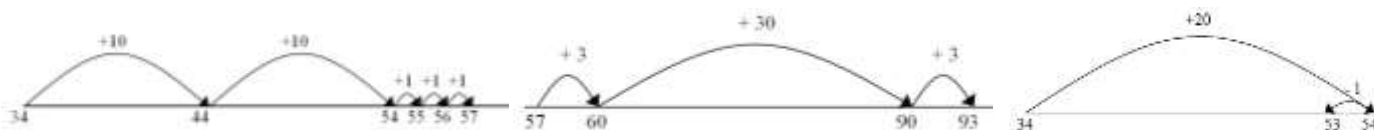
Calculation methods

Partition into tens and ones and then recombine.



Use **empty number lines** to add 2 digit numbers and ones, by **counting on** in multiples of one, using known number facts to support bridging ten. Encourage children to start with the larger number and count on.

Use **empty number lines** to add 2 digit numbers and tens, by **counting on** in multiples of ten. Use a **100 square**, then move on to understanding the value of the tens column and the fact that the units do NOT change



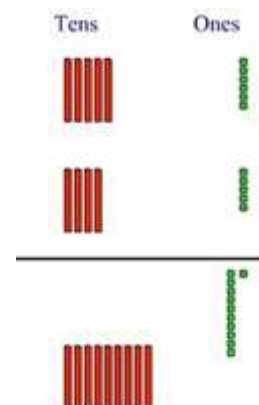
Use **empty number lines** to add two 2 digit numbers, by **counting on** in multiples of ten then multiples of one, using known number facts to support **bridging multiples of ten** and **compensating** for near multiples of ten.

Move on to **partitioned column method**, using **base 10 (Dienes)** or **place value counters** to support understanding.

Step 1: Only solve calculations that *do not* cross the tens boundary, until children are secure with the method.

Step 2: Solve calculations that *do* cross the tens boundary. The children need to be proficient in mentally adding multiples of ten to a 1 or 2 digit number to move on to this step.

$$\begin{array}{r} 25 \\ + 48 \\ \hline \end{array} = \begin{array}{r} 20 + 5 \\ 40 + 8 \\ \hline 60 + 13 = 73 \end{array}$$



Key vocabulary

+, add, addition, more, plus, make, sum, total, altogether, score, double, near double, one more, two more... ten more... **one hundred more**, how many more to make...? how many more is... than...? how much more is...?

=, equals, sign, is the same as

tens boundary

inverse

Addition



Year 3

National Curriculum 2014 reference(s):

Add numbers mentally, including:

3 digit numbers and ones, e.g. (243+6=249);

3 digit numbers and tens, e.g. (213+20=233);

3 digit number and hundreds, e.g. (215+200=415).

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

Solve problems, including missing number problems, using number facts, place value, and more complex addition.

Estimate the answer to a calculation and use the inverse (-) to check answers.

Add fractions with the same denominator within one whole.

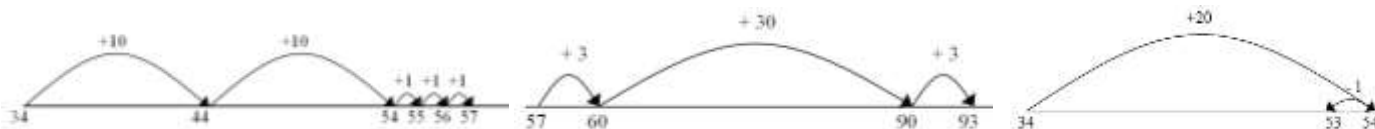
Add amounts of money, using both £ and p in practical contexts.

Solve measure and money addition problems involving numbers up to one decimal place.

Given a number, identify 10 or 100 more.

Calculation methods

Use empty number lines to add two 2 and 3 digit numbers, by **counting on** in multiples of ten then multiples of one, using known number facts to support **bridging** multiples of ten and **compensating** for near multiples of ten.



Step 1: Use **partitioned column method**.

$$\begin{array}{r} 442 \\ + 26 \\ \hline \end{array} = \begin{array}{r} 400 + 40 + 2 \\ + 20 + 6 \\ \hline 400 + 60 + 8 \end{array} = 468$$

Step 2: Use **expanded column method**.

- Children should add the 'units' or 'ones' first, in preparation for the compact column method.
- Children need to recognise the value of the hundreds, tens and units without recording the partitioning.
- Children need to be able to record accurately in columns.

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

Step 3: Once competent in the expanded column method, children can move on to **compact column method**.

- Children should always add the 'units' or 'ones' first.
- Numbers should be 'carried' underneath the bottom line.

$$\begin{array}{r} 625 \\ + 48 \\ \hline 673 \\ 1 \end{array} \quad \begin{array}{r} 783 \\ + 42 \\ \hline 825 \\ 1 \end{array} \quad \begin{array}{r} 536 \\ + 85 \\ \hline 621 \\ 11 \end{array}$$

Use base 10 (Dienes) or place value counters to support understanding.

Children should be reminded of the importance of aligning the columns accurately.

Key vocabulary

+, add, addition, more, plus, make, sum, total, altogether, score, double, near double, one more, two more... ten more... one hundred more, how many more to make...? how many more is... than...? how much more is...?

=, equals, sign, is the same as

tens boundary, **hundreds boundary**

inverse

Addition



Year 4

National Curriculum 2014 reference(s):

Practise mental methods.

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

Estimate and use the inverse (-) to check answers.

Solve two step problems in context, deciding which operations and methods to use and why.

Add fractions with the same denominator.

Solve measure and money addition problems involving numbers up to two decimal places (using decimal notation).

Given a number, identify 1000 more.

Calculation methods

Use compact column method:

- Children should add the 'units' or 'ones' first.
- Numbers should be 'carried' underneath the line.
- To ensure conceptual understanding, it is essential that place value is reinforced by frequently discussing the actual value of each digit, e.g. the 5 digit represents 5 hundreds.

$$\begin{array}{r} 587 \\ + 475 \\ \hline 1062 \\ 11 \end{array} \qquad \begin{array}{r} 3587 \\ + 675 \\ \hline 4262 \\ 111 \end{array}$$

Use base 10 (Dienes) or place value counters to support understanding of carrying and to ensure conceptual understanding of place value.

Children should be reminded of the importance of aligning the columns accurately.

Extend the use of the compact column method to decimals.

- Children should add the column furthest to the right first.
- Numbers should be 'carried' underneath the line.
- To ensure conceptual understanding, it is essential that place value is reinforced by frequently discussing the actual value of each digit, e.g. the 2 digit represents 2 tens.

$$\begin{array}{r} \text{£ } 23.59 \\ + \text{£ } 7.55 \\ \hline \text{£ } 31.14 \\ 1 \quad 1 \quad 1 \end{array}$$

Use actual money to support understanding.

Estimate to check answers to a calculation.

$$2576 + 1347 =$$

$$\text{Estimate } 2570 + 1350 = 3920 \qquad \text{Actual answer} = 3923$$

Key vocabulary

add, addition, more, plus, increase, sum, total, altogether, score, double, near double, how many more to make...?

equals, sign, is the same as

tens boundary, hundreds boundary

inverse

Addition



Year 5

National Curriculum 2014 reference(s):

Practise mental methods using increasingly large numbers.

Add numbers whole numbers with more than 4 digits, using formal written methods of columnar addition.

Use rounding to check answers and determine levels of accuracy.

Solve multistep problems in context, deciding which operations and methods to use and why.

Add fractions and mixed numbers with the same denominator and denominators that are multiples of the same number.

Solve addition problems involving numbers with up to three decimal places.

Solve comparison, sum and difference problems using information in tables, including timetables.

Calculation methods

Extend the use of **compact column method** to numbers with more than 4 decimal places and decimals:

- Children should add the column furthest to the right first.
- Numbers should be 'carried' underneath the line.
- To ensure conceptual understanding, it is essential that place value is reinforced by frequently discussing the actual value of each digit.

Use **base 10 (Dienes)** or **place value counters** to support understanding of carrying and to ensure conceptual understanding of place value.

$$\begin{array}{r} 37648 \\ + 41486 \\ \hline 79134 \\ 111 \end{array} \qquad \begin{array}{r} 6584 \\ + 5848 \\ \hline 12432 \\ 111 \end{array}$$

Children should be reminded of the importance of aligning the columns accurately.

Children should be able to add more than 2 numbers using the compact column method.

$$\begin{array}{r} 42 \\ 6432 \\ 786 \\ 3 \\ + 4681 \\ \hline 11944 \\ 121 \end{array}$$

Extend the use of compact column method to mixed decimals, not in the context of money.

- Where there is an 'empty' space in a decimal column, children should insert a zero to show the value.
- To ensure conceptual understanding, it is essential that place value is reinforced by frequently discussing the actual value of each digit, e.g. the 5 digit represents 5 hundredths.

Use **place value counters** to support understanding of carrying and to ensure conceptual understanding of place value, add counters with 0.1, and 0.01.

$$\begin{array}{r} 1 \ 9 \ . \ 0 \ 1 \\ 3 \ . \ 6 \ 5 \\ + 0 \ . \ 7 \ 0 \\ \hline 2 \ 3 \ . \ 3 \ 6 \\ 1 \ 1 \end{array}$$

Key vocabulary

add, addition, more, plus, increase, sum, total, altogether, score, double, near double, how many more to make...?

equals, sign, is the same as

tens boundary, hundreds boundary, **units boundary**, **tenths boundary**

inverse

Addition



Year 6

National Curriculum 2014 reference(s):

Perform mental calculations, including with mixed operations and large numbers.

Add whole numbers with more than 4 digits, using formal written methods of columnar addition.

Use estimation to check answers and determine levels of accuracy.

Solve multistep problems in context, deciding which operations and methods to use and why.

Add fractions with different denominators and mixed numbers, using the concept of equivalent fractions.

Calculation methods

Extend the use of **compact column method** to adding several numbers with mixed decimals.

Children should be reminded of the importance of aligning the columns accurately.

Where there is an 'empty' space in a decimal column, children could insert a zero to show the value.

Use **place value counters** to support understanding of carrying and to ensure conceptual understanding of place value, add counters with 0.1, 0.01, and 0.001.

$$\begin{array}{r} 23.361 \\ 9.080 \\ 59.770 \\ + 1.300 \\ \hline 93.511 \\ \underline{21.2} \end{array}$$

Key vocabulary

add, addition, more, plus, increase, sum, total, altogether, score, double, near double, how many more to make...?

equals, sign, is the same as

tens boundary, hundreds boundary, units boundary, tenths boundary

inverse

Subtraction



Foundation Stage

National Curriculum 2014 reference(s):

Using quantities and objects, subtract two single-digit numbers and count back to find the answer.

Find one less from a group of up to five objects, then ten objects.

In practical activities and discussion, begin to use the vocabulary involved in subtracting.

Calculation methods

Take away from a set of objects, counting what is left.



6 take away 2 is 4

Count back in 1s from the total of the first set of objects.

Cross out drawn objects to represent what has been taken away.



3 take away 2 is 1

Count back in ones using a number line or number track.

$$5 - 2 = 3$$



Key vocabulary

-, take (away), leave, how many are left/left over? how many have gone? one less, two less... ten less... how many fewer is... than...? difference between

=, is the same as, equals

Subtraction

Year 1

National Curriculum 2014 reference(s):

Read, write and interpret mathematics statements including +, -, =.

Represent and use number facts within 20.

Recall and use subtraction facts to 10.

Solve one step problems that involve using concrete objects, pictorial representations and missing number problems.

Subtract 1 digit and 2 digit numbers to 20, including 0, e.g. (27-5=22).

Given a number, identify one less.

Calculation methods

Count back in ones using a number line or number track.



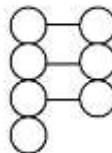
Put larger number in head and count back in ones.

Bridge through 10 using knowledge of number bonds.



Compare groups or pictures of objects to find the difference.

$7 - 6 =$



Use a numbered line to find the difference between two numbers by counting on. The number line should show 0 so children can cross out the section from 0 to the smallest number. Bead strings can be used to support.



Key vocabulary

-, subtract, take (away), minus, leave, how many are left/left over? how many have gone? one less, two less, ten less... how many fewer is... than...? how much less is...? difference between, half, halve

=, equals, sign, is the same as

Subtraction

Year 2

National Curriculum 2014 reference(s):

Solve problems that involve using concrete objects, pictorial representations, including numbers, quantities and measures.

Recall and use subtraction facts to 20, derive and use related facts to 100.

Subtract numbers using concrete objects, pictorial representations, and mentally, including:

2 digit numbers and ones, e.g. (23-6=17);

2 digit numbers and tens, e.g. (23-10=13);

Two 2 digit numbers, e.g. (23-15=8).

Use inverse operation (+) to check and solve missing number problems.

Solve simple problems in a practical context involving subtraction of money of the same unit, including giving change.

Calculation methods

For calculations that do not cross the tens boundary, **partition** into tens and ones and then recombine.

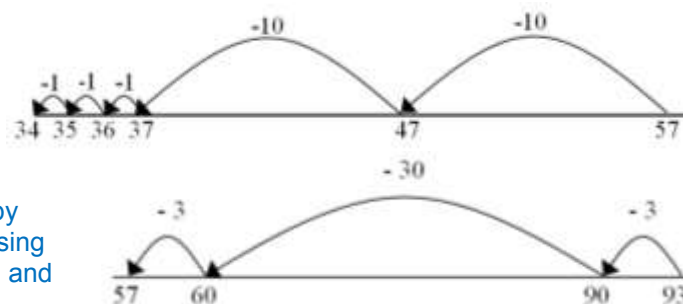
$$48 - 25 \longrightarrow 40 - 20 \text{ and } 8 - 5$$

For any calculation, **partition** the subtrahend into tens and ones, subtract the tens and then the ones.

$$48 - 25 \longrightarrow 48 - 20, \text{ then } 28 - 5$$

Use empty number lines to subtract 2 digit numbers and ones, by **counting back** in multiples of one, using known number facts to support bridging ten.

Use empty number lines to subtract 2 digit numbers and tens, by **counting back** in multiples of ten. Use a 100 square, then move on to understanding the value of the tens column and the fact that the units do NOT change



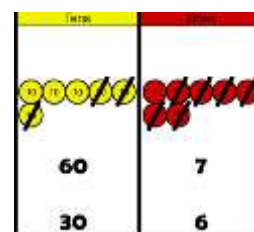
Use empty number lines to subtract two 2 digit numbers, by **counting back** in multiples of ten then multiples of one, using known number facts to support **bridging multiples of ten** and **compensating** for near multiples of ten.

Move on to **partitioned column method**, using base 10 (Dienes) or place value counters to support understanding.

Step 1: Only solve calculations that *do not* cross the tens boundary, until children are secure with the method.

$$\begin{array}{r} 87 \\ - 35 \\ \hline \end{array} = \begin{array}{r} 80 \\ - 30 \\ \hline \end{array} + \begin{array}{r} 7 \\ + 5 \\ \hline \end{array} = 50 + 2 = 52$$

Step 2: Solve calculations that *do* cross the tens boundary, starting by doing it practically using **Dienes**. The children need to be proficient in partitioning 2 digit numbers into different multiples of ten and 1 or 2 digit numbers to move on to the recorded step. Not all Year 2 children will reach this step.



$$\begin{array}{r} 91 \\ - 35 \\ \hline \end{array} = \begin{array}{r} 80 \\ - 30 \\ \hline \end{array} + \begin{array}{r} 11 \\ + 5 \\ \hline \end{array} = 50 + 6 = 56$$

Find the difference between two numbers by counting on from the smaller number to the larger. The number line should show 0 so children can cross out the section from 0 to the smaller number.



Key vocabulary

-, take (away), subtract, minus, leave, how many are left/left over? how many have gone? one less, two less, ten less... how many fewer is... than...? **how much less is...?** difference between, **half, halve, exchange**

=, equals, **sign**, is the same as
tens boundary, inverse

Subtraction

Year 3

National Curriculum 2014 reference(s):

Subtract numbers mentally, including:

3 digit numbers and ones, e.g. (248-6=242);

3 digit numbers and tens, e.g. (213-20=193);

3 digit number and hundreds, e.g. (215-200=215).

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

Solve problems, including missing number problems, using number facts, place value and more complex subtraction.

Estimate the answer to a calculation and use the inverse (+) to check answers.

Subtract fractions with the same denominator within one whole.

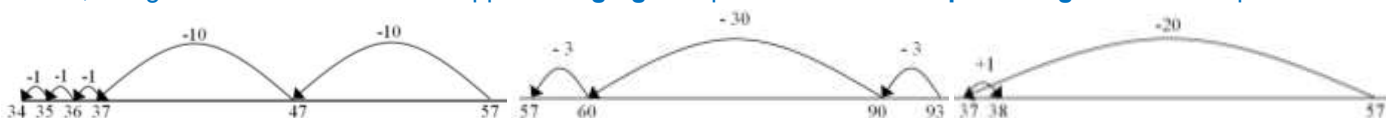
Subtract amounts of money, using both £ and p in practical contexts.

Solve measure and money - problems involving numbers up to one decimal place.

Given a number, identify 10 or 100 less.

Calculation methods

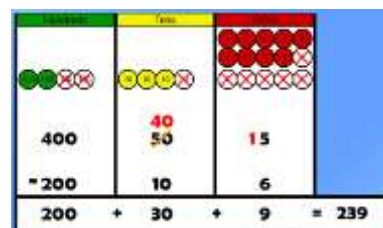
Use empty number lines to subtract two 2 and 3 digit numbers, by **counting back** in multiples of ten then multiples of one, using known number facts to support **bridging** multiples of ten and **compensating** for near multiples of ten.



Step 1: Use **partitioned column method** where no exchanging is required.

$$\begin{array}{r} 447 = 400 + 40 + 7 \\ - 23 \quad \underline{\quad - 20 + 3} \end{array}$$

Step 2: Solve calculations that *do* cross the tens boundary, exchanging practically using Dienes and place value counters.



Step 3: Children need to be proficient in partitioning 2 digit numbers into different multiples of ten and 1 or 2 digit numbers to move on to recorded **partitioned column method** with exchanging.

$$\begin{array}{r} 91 = 80 + 11 \\ - 35 \quad \underline{- 30 + 5} \\ 50 + 6 = 56 \end{array}$$

Once children are secure with exchanging, they can move on to calculations involving 3 digit numbers.

Children should be reminded of the importance of aligning the columns accurately.

Find the difference between two numbers by counting on from the smaller number to the larger. The number line should show 0 so children can cross out the section from 0 to the smaller number.



Key vocabulary

-, subtract, subtraction, take (away), minus, leave, how many are left/left over? one less, two less... ten less... one hundred less, how many fewer is... than...? how much less is...? difference between, half, halve, exchange

=, equals, sign, is the same as

tens boundary, **hundreds boundary**

inverse

Subtraction

Year 4

National Curriculum 2014 reference(s):

Practise mental methods.

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

Estimate and use the inverse (+) to check answers.

Solve two step problems in context, deciding which operations and methods to use and why.

Subtract fractions with the same denominator.

Solve measure and money subtraction problems involving numbers up to two decimal places.

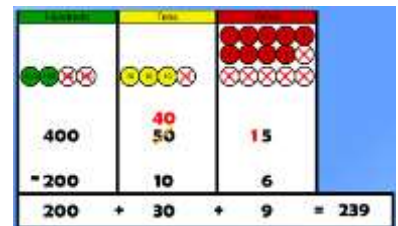
Given a number, identify 1000 less.

Calculation methods

Revise **partitioned column method** from Year 3, moving on to numbers with 4 digits.

Use **Dienes** and **place value counters** to support understanding of decomposition and place value.

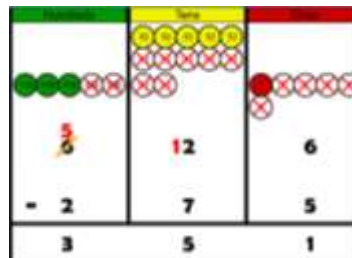
$$\begin{array}{r}
 2000 + 700 + 150 + 4 \\
 - 1000 + 500 + 60 + 2 \\
 \hline
 1000 + 100 + 90 + 2
 \end{array}$$



Once children are confident in exchanging and have a clear understanding of place value, move towards the **formal compact column method**.

Use **Dienes** and **place value counters** to support understanding of decomposition and place value.

$$\begin{array}{r}
 67 \cancel{14} / \cancel{14} \\
 - 86 \\
 \hline
 668
 \end{array}$$



Children should be reminded of the importance of aligning the columns accurately.

Key vocabulary

subtract, subtraction, take (away), minus, **decrease**, leave, how many are left/left over? difference between, half, halve, how many more/fewer is... than...? how much more/less is...?

equals, sign, is the same as

tens boundary, hundreds boundary

inverse

Subtraction

Year 5

National Curriculum 2014 reference(s):

Practise mental methods using increasingly large numbers.

Subtract whole numbers with more than 4 digits, using formal written methods of columnar subtraction.

Use rounding to check answers and determine levels of accuracy.

Solve multistep problems in context, deciding which operations and methods to use and why.

Subtract fractions and mixed numbers with the same denominator and denominators that are multiples of the same number.

Solve subtraction problems involving numbers with up to three decimal places.

Solve comparison, sum and difference problems using information in tables, including timetables.

Calculation methods

Revise **formal compact column method**, extending to calculations involving numbers with more than 4 digits.

Use **place value counters** to support understanding of decomposition and place value.

$$\begin{array}{r} 326714 \\ - 2486 \\ \hline 30268 \end{array}$$

When children are confident in using **formal compact column method** with integers and decimals involving money (where there are always 2 decimal places), move on to looking at using the method to subtract with mixtures of integers and decimals. It is essential that children have a clear understanding of place value in these instances. Remind children to align the decimal point and use '**place holders**', if needed.

$$\begin{array}{r} 512.1 \\ 263.0 \\ - 26.5 \\ \hline 236.5 \end{array}$$

Use **place value counters** to support understanding of decomposition and to ensure conceptual understanding of place value, add counters with 0.1, and 0.01.

Children should be reminded of the importance of aligning the columns accurately.

Key vocabulary

subtract, subtraction, take (away), minus, decrease, leave, how many are left/left over? difference between, half, halve, how many more/fewer is... than...? how much more/less is...?

equals, sign, is the same as

tens boundary, hundreds boundary, **units boundary**, **tenths boundary**

inverse

Subtraction

Year 6

National Curriculum 2014 reference(s):

Perform mental calculations, including with mixed operations and large numbers.

Subtract whole numbers with more than 4 digits, using formal written methods of columnar subtraction.

Use estimation to check answers and determine levels of accuracy.

Solve multistep problems in context, deciding which operations and methods to use and why.

Subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.

Calculation methods

Revise **formal compact column method**, extending to more complex integers and applying to problem solving using money and measures, including decimals with different numbers of decimal places.

Remind children to align the decimal point and use '**place holders**', if needed.

$$\begin{array}{r} 0 \quad 14 \quad 1 \quad \quad 3 \quad 1 \\ \cancel{1} \quad \cancel{5} \quad 3 \quad . \quad \cancel{4} \quad 1 \quad 9 \quad \text{kg} \\ - \quad 7 \quad 6 \quad . \quad 0 \quad 9 \quad 0 \quad \text{kg} \\ \hline 7 \quad 7 \quad . \quad 3 \quad 2 \quad 9 \quad \text{kg} \end{array}$$

Children should be able to apply their knowledge and understanding of a range of mental calculation strategies, formal and informal written methods when deciding which method is appropriate to solve a subtraction calculation.

Use **place value counters** to support understanding of decomposition and to ensure conceptual understanding of place value, add counters with 0.1, 0.01, and 0.001.

Children should be reminded of the importance of aligning the columns accurately.

Key vocabulary

subtract, subtraction, take (away), minus, decrease, leave, how many are left/left over? difference between, half, halve, how many more/fewer is... than...? how much more/less is...?

equals, sign, is the same as

tens boundary, hundreds boundary, units boundary, tenths boundary

inverse

Multiplication

X

Foundation Stage

National Curriculum 2014 reference(s):

Count reliably with numbers from 1 to 20.

Solve problems, including doubling.

Solve practical problems that involve combining groups of 2, 5 or 10.

Calculation methods

Use rhymes, songs and stories involving counting on and counting back in ones, twos, fives and tens.

When pupils are used to counting in 2s, 5s and 10s, use visual aids to support understanding of what is actually happening (combining groups of the same number).



Practically double a group of objects to find double of a number by combining then counting the two groups.

Double 4 is 8



More able pupils can practically combine groups of numbers (2s, 5s and 10s).

3 groups of 2 is the same as 6



Key vocabulary

count on (from, to), count back (from, to), count in ones, twos, fives, tens

double

=, equals, is the same as

Multiplication



Year 1

National Curriculum 2014 reference(s):

Count in different multiples including 2s, 5s and 10s.

Begin to recall and use multiplication facts for the 2, 5 and 10 tables.

Solve one-step problems, involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays, with the support of a teacher.

Calculation methods

Practically combine groups of objects (2s, 5s and 10s) and verbalise what has been found out.

There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?



$$2 \text{ add } 2 \text{ add } 2 \text{ equals } 6$$

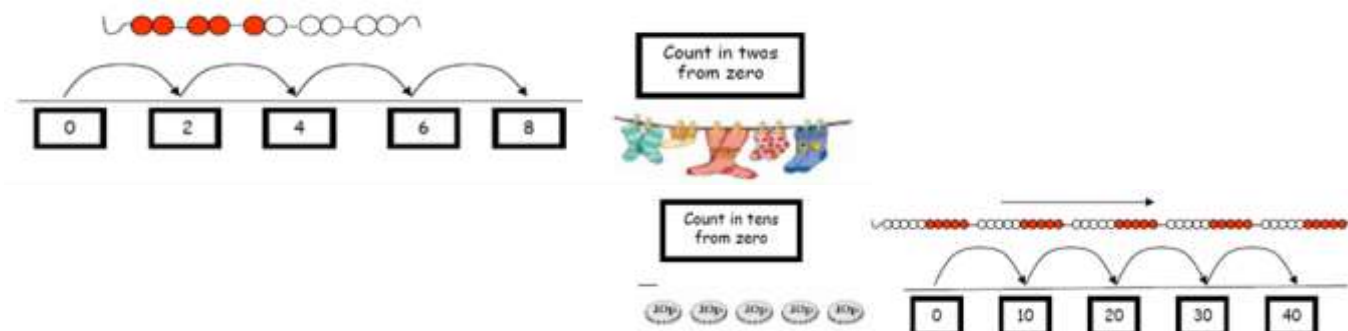
Practically combine groups of numbers (2s, 5s and 10s) and record what has been found out.

Dad washed 5 pairs of socks. How many socks did he get out of the washing machine?



$$2 + 2 + 2 + 2 + 2 = 10$$

Use different visual images to support counting in equal steps.



Begin to use and become familiar with arrays with the support of a teacher. Teach the children the associated vocabulary.

$$5 + 5 + 5 = 15$$

$$3 + 3 + 3 + 3 + 3 = 15$$



Key vocabulary

count, count (up) to, count on (from, to), count back (from, to), count in ones, twos, threes, fours, fives, tens

multiple

double, near double, halve

=, equals, sign, is the same as

array, row, column

Multiplication

X

Year 2

National Curriculum 2014 reference(s):

Count in different steps including 2, 3 and 5 from 0.

Count in tens from any number, forward and backwards.

Recall and use multiplication facts for the 2, 5 and 10 tables.

Recognise odd and even numbers.

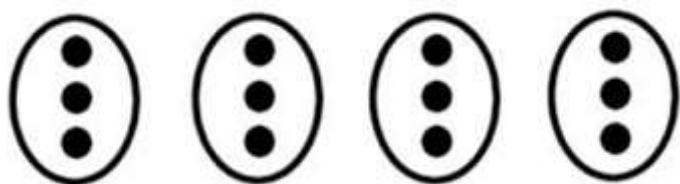
Calculate the mathematical statements for multiplication within the multiplication tables and write them using \times signs.

Show that multiplication of two numbers can be done in any order (commutative).

Solve problems involving multiplication, using materials, arrays, repeated addition, mental methods and multiplication facts, including problems in contexts.

Calculation methods

Use equal groups of objects for **repeated addition** and link this to representing multiplication number sentences.



$$3 + 3 + 3 + 3 = 12$$

$$3 \times 4 = 12$$



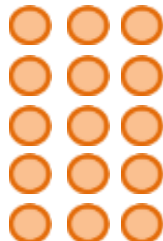
Use **arrays** for **repeated addition** and link this to representing multiplication number sentences.

Use **counters** or **objects** as well as visual representations to support understanding.

Using **arrays** should help children to understand that multiplication is commutative.

$$5 + 5 + 5 = 15$$

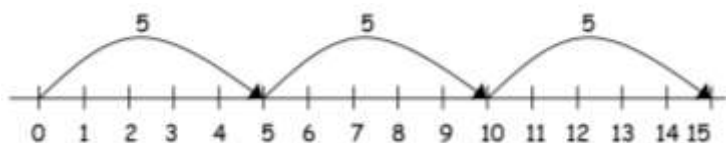
$$5 \times 3 = 15$$



$$3 + 3 + 3 + 3 + 3 = 15$$

$$3 \times 5 = 15$$

Use a **number line** or **bead string** for **repeated addition**.



$$5 + 5 + 5 = 15$$

Key vocabulary

count on (from, to), count back (from, to), count in ones, twos, threes, fours, fives, tens
once, twice, three times... ten times... times as (big, long, wide... and so on)

lots of, groups of

\times , times, multiply, multiplied by, multiplication, multiple

repeated addition

double, halve, near double

$=$, equals, sign, is the same as

Multiplication

X

Year 3

National Curriculum 2014 reference(s):

Count from 0 in multiples of 4, 8, 50 and 100.

Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10.

Recall and use multiplication facts for the 3, 4 and 8 tables.

Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including 2 digit x 1 digit, using mental and progressing to formal written methods.

Develop reliable written methods for multiplication, starting with calculations of 2 digit numbers by 1 digit numbers and progressing to the formal written methods of short multiplication.

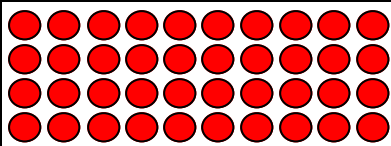
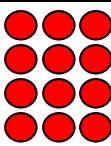
Solve problems including missing number problems, involving multiplication, including integer scaling problems and correspondence problems in which n objects are connected to m objects.

Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.

Calculation methods



Introduce the **grid method** by linking it to arrays initially (using counters).

$$13 \times 4 = 40 + 12 = 52$$

x	10	3
4		

Use base 10 (Dienes) with **grid method** to support children's understanding of place value.

$$13 \times 4 = 40 + 12 = 52$$

x	10	3
4		

Use the **grid method**.

$$13 \times 4 =$$

x	10	3
4	40	12

$$24 \times 3 =$$

x	20	4
3	60	12

To use **grid method**, children must be competent in the following:

- Partitioning numbers into tens and ones (units)
- Recall and working out of multiplication facts for the 2, 3, 4, 5, 8 and 10 times tables;
- Mentally multiplying multiples of ten by a single digit number
- Recombining tens and ones (units) to make a 2 digit number

Use **scaling** to solve problems.

Find a ribbon that is 4 times as long as the blue ribbon



5 cm



20 cm

Key vocabulary

count, count (up) to, count on (from, to), count back (from, to), count in ones, twos, threes, fours, fives, eights, tens, **hundreds**
lots of, groups of

x, times, multiply, multiplication, multiplied by, multiple, **product**
once, twice, three times... ten times...times as (big, long, wide... and so on)

repeated addition

array, row, column

=, equals, sign, is the same as

Multiplication



Year 4

National Curriculum 2014 reference(s):

Count from 0 in multiples of 6, 7, 9, 25 and 1000.

Recall and use multiplication facts for the tables up to 12 x 12 (6, 7, 9, 11 and 12 not learnt previously).

Use place value, known and derived facts to multiply mentally, including multiplying by 0 and 1, multiplying three numbers together.

Recognise and use factor pairs and commutativity in mental calculations.

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

Practise to become fluent in the formal written method of short multiplication for multiplying using multi-digit numbers.

Solve problems involving multiplying and adding, including the distributive law to multiply 2 digit numbers by 1 digit, integer scaling problems and harder multiplication problems such as n objects are connected to m objects.

Solve problems involving increasingly harder fractions to calculate quantities, including non-unit fractions where the answer is a whole number.

Solve simple measure and money problems involving fractions and decimals to 2 decimal places.

Convert between units of measure.

Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.

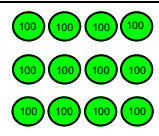

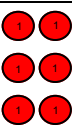
Calculation methods

Use the **grid method** as shown in Year 3, but extend to a 3 digit number x a 1 digit number. Use base 10 (Dienes) or place value counters to support if needed.

$412 \times 3 =$

x	400	10	2
3	1200	30	6

$$\begin{array}{r} 1200 \\ + 30 \\ \hline 1230 \end{array}$$

x	400	10	2
3			

Move on to **short multiplication** when children are proficient and accurate.

$$\begin{array}{r} 452 \\ \times 3 \\ \hline 1356 \\ 1 \end{array}$$

Key vocabulary

lots of, groups of
 times, multiply, multiplication, multiplied by, multiple of, product
 once, twice, three times... ten times... times as (big, long, wide... and so on)
 repeated addition
 array, row, column
 double
 inverse
 equals, sign, is the same as

Multiplication

X

Year 5

National Curriculum 2014 reference(s):

- Identify all multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- Solve problems involving multiplication where larger numbers are used by decomposing them into their factors.
- Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Establish where a number up to 100 is prime and recall prime numbers to 19.
- Multiply numbers mentally drawing upon known facts.
- Multiply numbers up to 4 digits by a 1 digit or 2 digit number using a formal written layout, including long multiplication for 2 digit numbers.
- Multiply whole numbers and those involving decimals by 10, 100 and 1000.
- Recognise and use square numbers and cube numbers, and the notation for squared and cubed.
- Solve problems involving all 4 operations, including combinations of these.
- Solve problems involving x, including scaling by simple fractions and problems involving simple rates.
- Convert between different units of metric measure.
- Calculate and compare the area of squares and rectangles, including using standard units.
- Solve problems involving converting between units of time.
- Use all 4 operations to solve problems involving measure using decimal notation and scaling.

Calculation methods

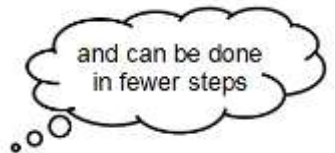
For short multiplication, use the **grid method** moving on to the standard method (see year 4).

Introduce **long multiplication** using the **grid method** initially, using **place value counters** to support if needed.

$42 \times 23 =$

x	40	2
20	800	40
3	120	6

$$\begin{array}{r}
 800 \\
 120 \\
 40 \\
 + \quad 6 \\
 \hline
 966
 \end{array}$$



Move on to **formal long multiplication** with simple numbers (2 digit number x 2 digit number).

$$\begin{array}{r}
 34 \\
 \times 13 \\
 \hline
 102 \\
 1 \\
 \hline
 340 \\
 442 \\
 \hline
 \end{array}$$

34 x 3, carrying 1 ten from 4 x 3

34 x 10

Move on to using **formal long multiplication** with more complex numbers.

$$\begin{array}{r}
 1243 \\
 \times 8 \\
 \hline
 9944 \\
 1 3 2 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 1234 \\
 \times 16 \\
 \hline
 7404 \\
 122 \\
 \hline
 12340 \\
 19744 \\
 \hline
 \end{array}$$

Key vocabulary

- lots of, groups of
- times, multiply, multiplication, multiplied by, multiple of, product
- once, twice, three times... ten times... times as (big, long, wide... and so on)
- repeated addition
- array, row, column
- double,
- inverse
- equals, sign, is the same as

Multiplication

X

Year 6

National Curriculum 2014 reference(s):

Identify common factors, common multiples and prime numbers.

Perform mental calculations, including mixed operations and large numbers.

Multiply multi-digit numbers up to 4 digits by a 2 digit whole number using the efficient written method of long multiplication.

Multiply numbers by 10, 100 and 1000 where answers are up to three decimal places.

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

Use knowledge of the order of operations to carry out calculations involving four operations.

Solve problems involving the calculation and conversion of unit of measure, using decimal notation up to three decimal places where appropriate.

Multiply simple pairs of proper fractions, writing the answer in its simplest form.

Calculate the area of parallelograms and triangles.

Calculate volume of cubes and cuboids using standard units.

Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication facts.

Solve problems involving the calculation of percentages.

Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

Calculation methods

Use **short multiplication** and **long multiplication** as in Year 5, but apply to numbers with decimals.

Children may need reminding that single digits belong in the ones (units) column.

$$\begin{array}{r} 319 \\ \times 8 \\ \hline 2552 \\ 17 \\ \hline \end{array}$$

Children need to have a sound understanding of place value and the formal method itself before progressing to decimal multiplication.

Use **place value counters** to support if needed but add counters with 0.1 and 0.01 on them.

Extend with ALGEBRA.

Key vocabulary

lots of, groups of
times, multiply, multiplication, multiplied by, multiple of, product
once, twice, three times... ten times... times as (big, long, wide... and so on)
repeated addition
array, row, column
double,
inverse
equals, sign, is the same as

Division

Foundation Stage



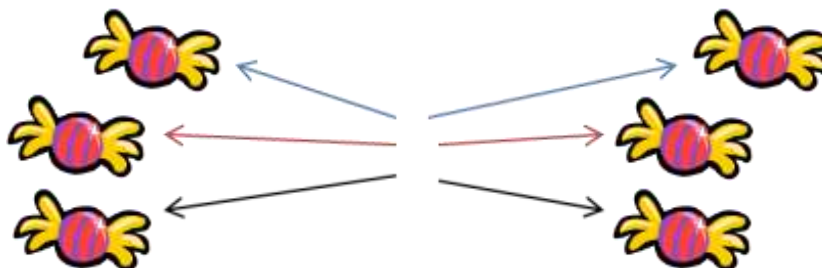
National Curriculum 2014 reference(s):

Count reliably with numbers from one to 20.
Solve problems, including halving and sharing.
Solve practical problems that involve sharing into equal groups.

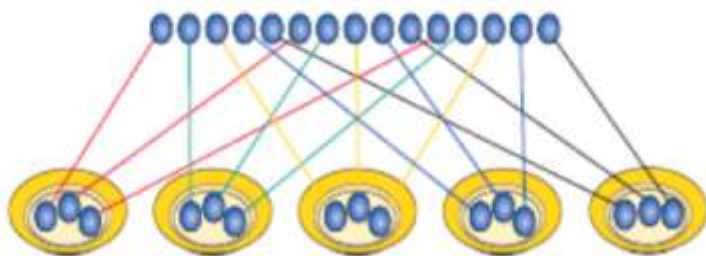
Calculation methods

Find half of a quantity of objects by sharing them between 2.

Half of 6 is 3



Practically 'share' objects fairly.



15 shared between 5 is 3

Key vocabulary

half, halve
count out, share out
left, left over

=, equals, is the same as

Division



Year 1

National Curriculum 2014 reference(s):

Count in different multiples including 2s, 5s, and 10s.

Begin to recall and use multiplication facts for the 2, 5, 10 tables.

Solve one-step problems, involving division, calculating the answer using concrete objects, pictorial representations and arrays with the support of a teacher.

Recognise, find and name a half as one of two equal; parts of an object, shape or quantity.

Recognise, find and name a quarter as one of four equal; parts of an object, shape or quantity.

Calculation methods

Children practically 'share' and 'group'.

There are 30 children, we need to get into groups of 5 to play a game. How many groups will we have?



How many groups of 4 stars can I make from 12 stars?



Find half of a quantity of objects by sharing them between 2.

Find a quarter of a quantity of objects by sharing them between 4.

One quarter of 8 is 2



Key vocabulary

half, halve
count out, share out,
share equally
group
equal
left, left over

=, equals, is the same as

Division



Year 2

National Curriculum 2014 reference(s):

Count in different steps including 2, 3, and 5 from 0.
Count in tens from any number, forward and backwards.
Recall and use division facts for the 2, 5, 10 tables.
Recognise odd and even numbers.

Calculate the mathematical statements for division within the multiplication tables and write them using $\div =$ signs.
Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.

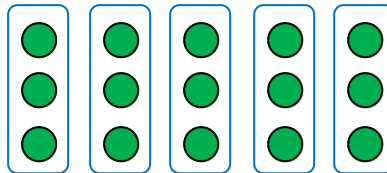
Solve problems involving division, using materials, arrays, repeated addition, mental methods, and division facts, including problems in contexts.

Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity.

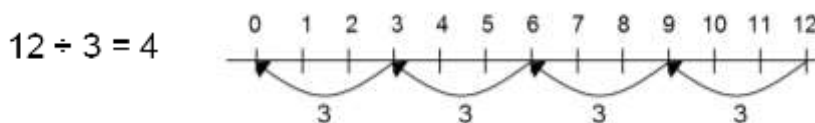
Calculation methods

Initially, children practically 'share' and 'group' using practical equipment and pictorial representation. Move on to using **arrays** to identify groups, use physical counters before pictorial representations.

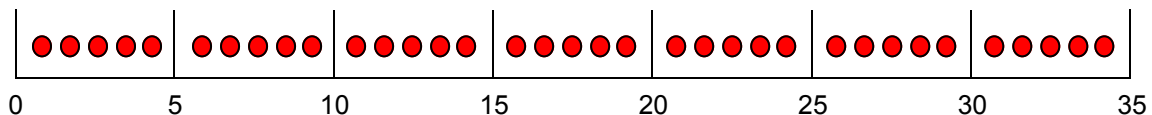
How many groups of 3 are in 15?



Group using a number line or bead string.



Use counters to support pupils understanding.



Use counters and number lines to introduce remainders.



Key vocabulary

array, row, column
halve

share, share equally,

one each, two each, three each... group in pairs, threes... tens
equal groups of

\div , divide, division, divided by, divided into

left, left over

remainder

inverse

=, equals, sign, is the same as

Division



Year 3

National Curriculum 2014 reference(s):

Count from 0 in multiples of 4, 8, 50 and 100.

Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10.

Recall and use division facts for the 3, 4 and 8 tables.

Write and calculate mathematical statements for division using the multiplication tables that they know, including 2 digit ÷ 1 digit, using mental and progressing to formal written methods.

Pupils develop reliable written methods for division, starting with calculations of two-digit numbers divided by one-digit numbers and progressing to the formal written methods of short division.

Solve problems including missing number problems, involving division, including integer scaling problems and correspondence problems in which n objects are connected to m objects.

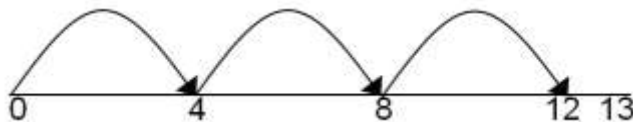
Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.

Calculation methods

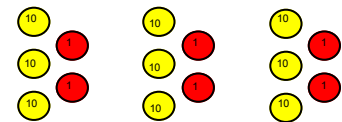
Group using a number line (see year 2), including calculations that leave remainders.
Use counters to support children's understanding.

Step 1: 1 digit answers

$$13 \div 4 = 3 \text{ r } 1$$

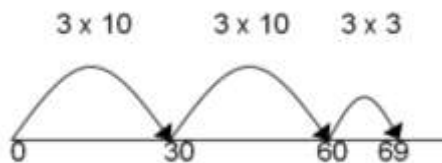


$$96 \div 3 = 32$$



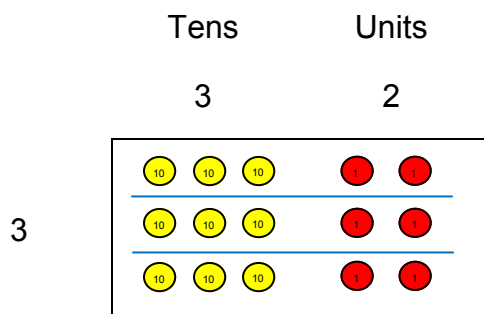
Step 2: 2 digit answers

$$69 \div 3 = 23$$



Use place value counters to develop children's understanding of **short division**.

Only when children have had experience with and demonstrated understanding of grouping for division, begin to look at **short division** with no remainders in the final answer.



Ensure that children understand what these digits represent: not 3 lots of 3 in 9, but 30 lots of 3 in 90.

$$\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$$

Key vocabulary

array, row, column
 halve
 share, share equally
 one each, two each, three each... group in pairs, threes... tens,
 equal groups of
 ÷, divide, division, divided by, divided into
 left, left over, remainder
 inverse
 =, equals, sign, is the same as

Division



Year 4

National Curriculum 2014 reference(s):

Recall and use division facts for the tables up to 12×12 (6, 7, 9, 11 and 12 not learnt previously).

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

Recognise and use factor pairs and commutativity in mental calculations.

Practise to become fluent in the formal written method of short division with exact answers when dividing by a 1 digit number.

Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number.

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 units, tenths and hundredths.

Solve simple measure and money problems involving fractions and decimals to 2 decimal places.

Convert between units of measure.

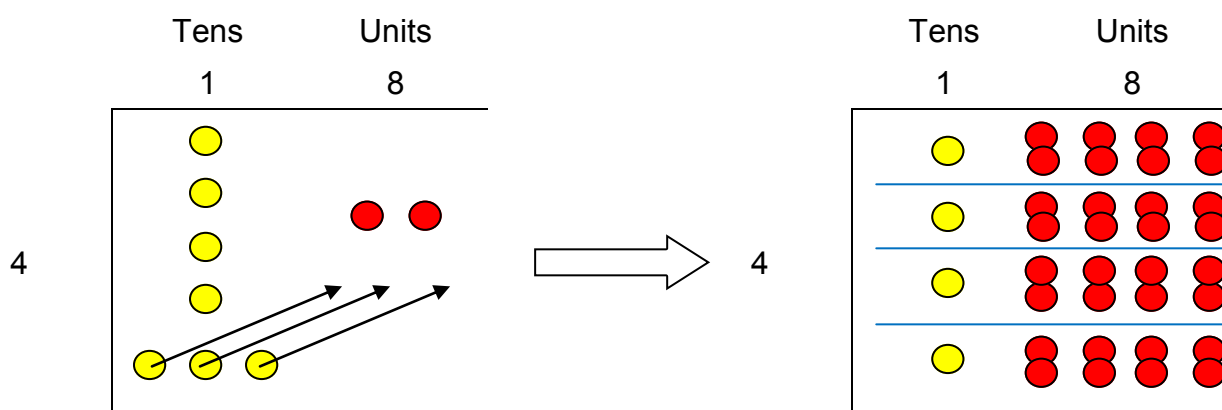
Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.

Calculation methods

Use **short division** with no remainders in the final answer, using **place value counters** to support (see year 3).

Step 1: 2 digit number \div by a 1 digit number

$$\begin{array}{r} 18 \\ 4 \overline{) 72} \end{array}$$



Step 2: 3 digit number \div by a 1 digit number

$$\begin{array}{r} 218 \\ 4 \overline{) 872} \end{array}$$

Step 3: 4 digit number \div by a 1 digit number

Key vocabulary

array, row, column

halve

share, share equally

one each, two each, three each...

group in pairs, threes... tens. equal groups of

divide, division, divided by, divided into

remainder

factor, quotient, divisible by

inverse

equals, sign, is the same as

Division



Year 5

National Curriculum 2014 reference(s):

Identify all multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.

Solve problems involving division where larger numbers are used by decomposing them into their factors.

Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.

Establish where a number up to 100 is prime and recall prime numbers to 19.

Divide numbers mentally drawing upon known facts.

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.

Divide whole numbers and those involving decimals by 10, 100 and 1000.

Recognise and use square numbers and cube numbers, and the notation for squared and cubed.

Solve problems involving all 4 operations, including combinations of these.

Solve problems involving \div , including scaling by simple fractions and problems involving simple rates.

Convert between different units of metric measure.

Solve problems involving converting between units of time.

Use all 4 operations to solve problems involving measure using decimal notation and scaling.

Calculation methods

Use **short division** with remainders.

Pupils should consider whether remainders should be left as a remainder, rounded to the nearest whole or converted into a decimal or fraction.

$$432 \div 5 = \begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Use **place value counters** to support changing remainders to decimals, exchange remainders for counters of the next column.

If children are confident and accurate in using short division when dividing by a 1 digit number, introduce long division for calculations where they should divide by a 2 digit number (see chunking, year 6).

Key vocabulary

array, row, column

half

share, share equally one each, two each, three each...

group in pairs, threes... tens, equal groups of

divide, division, divided by, divided into

remainder

factor, quotient, divisible by

inverse

equals, sign, is the same as

Division



Year 6

National Curriculum 2014 reference(s):

- 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.
- Use written division methods in cases where the answer has up to two decimal places.
- Identify common factors, common multiples and prime numbers.
- Perform mental calculations, including mixed operations and large numbers.
- Divide proper fractions by whole numbers.
- Divide numbers by 10, 100 and 1000 where answers are up to three decimal places.
- Use knowledge of the order of operations to carry out calculations involving four operations.
- Multiply simple pairs of proper fractions, writing the answer in its simplest form.
- Solve problems involving the relative sizes of two quantities where missing values can be found by using integer division facts.
- Solve problems involving the calculation of percentages.
- Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.
- Solve problems involving the calculation and conversion of unit of measure, using decimal notation up to three decimal places where appropriate.

Calculation methods

Use **short division**.

$$\begin{array}{r} 38 \text{ }^{4/15} \\ 15 \overline{) 574} \\ \underline{12} \\ 15 \\ \underline{15} \\ 4 \\ \underline{30} \\ 14 \end{array} \qquad \begin{array}{r} 14.6 \\ 35 \overline{) 511.0} \\ \underline{16} \\ 16 \\ \underline{21} \\ 11 \\ \underline{105} \\ 5 \\ \underline{35} \\ 0 \end{array}$$

Use **long division with chunking**. This shows where mistakes are made so may be preferable to short division when dividing by 2 digit numbers.

$$\begin{array}{r} 28 \\ 15 \overline{) 432} \\ \underline{300} \text{ }^{15 \times 20} \\ 132 \\ \underline{120} \text{ }^{15 \times 8} \\ 12 \end{array} \qquad \frac{12}{15} = \frac{4}{5} \qquad 28 \frac{4}{5}$$

Where an answer leaves a remainder, children should be able to convert the remainder to a fraction or decimal (depending on the questions).

Key vocabulary

array, row, column
halve

share, share equally one each, two each, three each...

group in pairs, threes... tens, equal groups of

divide, division, divided by, divided into

remainder

factor, quotient, divisible by

inverse

equals, sign, is the same as