St Dennis Primary Academy

Maths Calculation Policy

Everyone matters, everyone succeeds, every moment counts.

"Without mathematics, there's nothing you can do. Everything around you is mathematics. Everything around you is numbers." – Shakuntala Devi

The aim of this policy is to ensure a clear and coherent progression in calculation skills throughout the school.

At St Dennis Primary Academy, we value the use of concrete and pictorial resources to consolidate and deepen understanding. The strategies included at each stage are a guide to teachers, who use their professional knowledge and understanding to tailor the learning to best suit each individual learner. Strategies from previous year groups should be revisited and built upon in order to develop links between calculation strategies.

The stage at which appropriate strategies for calculating using each of the four operations are aligned to the expectations of the National Curriculum.

This document is broken down into addition, subtraction, multiplication and division and includes the formal written methods taught. Each operation is broken into skills and has a section dedicated to show the different pictorial and concrete representations that we use to effectively teach that concept.

Oracy is a curriculum driver at St Dennis Primary Academy and as the National Curriculum states, the quality of language that pupils hear and speak are key in developing mathematical vocabulary to be able to present a mathematical justification or argument. To support this, key vocabulary and sentence stems are also included. Sentence stems provide pupils with a way to communicate with mathematical precision and clarity and their structure provides a framework to embed conceptual knowledge and build understanding.

EYFS - Number

Statutory Framework 2021

Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.

Nursery

Development Matters (July 2021)

- ✓ combine objects like stacking blocks and cups - put objects inside others and take them out again
- ✓ take part in finger rhymes with numbers
- ✓ react to changes of the amount in a group of up to 3 items
- ✓ compare amounts, saying 'lots', 'more' or 'same'
- ✓ develop counting-like behaviour, such as making sounds, pointing or saying some numbers in sequence
- ✓ develop fast recognition of up to 3 objects, without having to count them individually ('subitising')
- ✓ recite numbers past 5
- ✓ say one number for each item in order: 1,2,3,4,5
- ✓ know that the last number reached when counting a small set of objects tells you how many there are in total ('cardinal principle')
- ✓ show 'finger numbers' up to 5
- ✓ link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5
- ✓ experiment with their own symbols and marks as well as numerals
- ✓ solve real world mathematical problems with numbers up to 5

compare quantities using language: 'more than', 'fewer than'

Reception

Development Matters (July 2021)

- ✓ count objects, actions and sounds
- ✓ subitise
- ✓ link the number symbol (numeral) with its cardinal number value
- ✓ count beyond 10
- ✓ compare numbers
- ✓ understand the 'one more than or one less than' relationship between consecutive numbers
- ✓ explore the composition of numbers to 10
- ✓ automatically recall number bonds for numbers 0 to 5 and some to 10

ELG: Number Children at the expected level of development will:

Have a deep understanding of number to 10, including the composition of each number.

Subitise (recognise quantities without counting) up to 5.

Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

Year 1 - Addition

National Curriculum

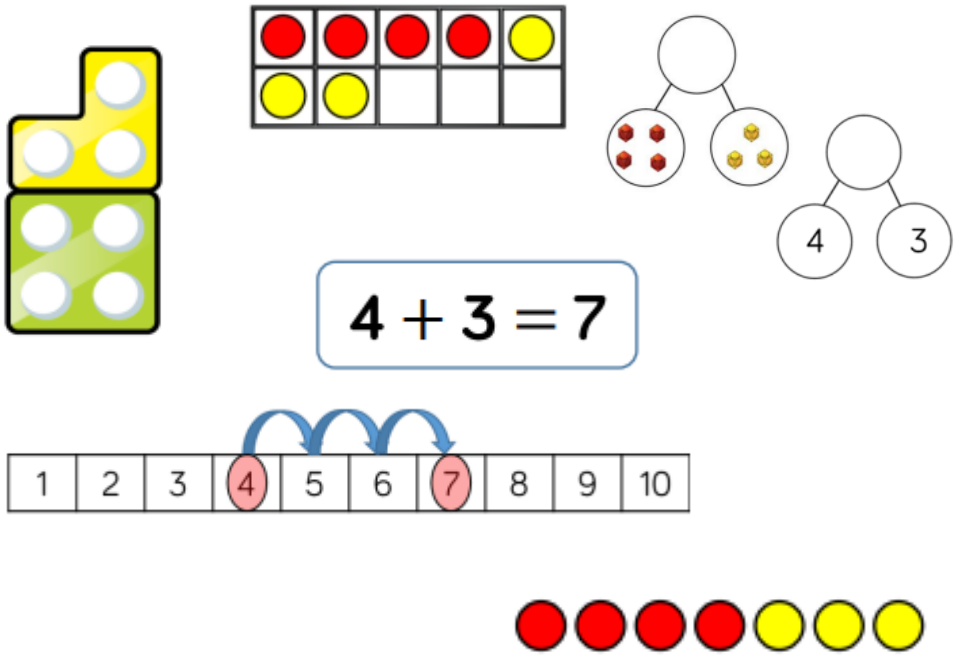
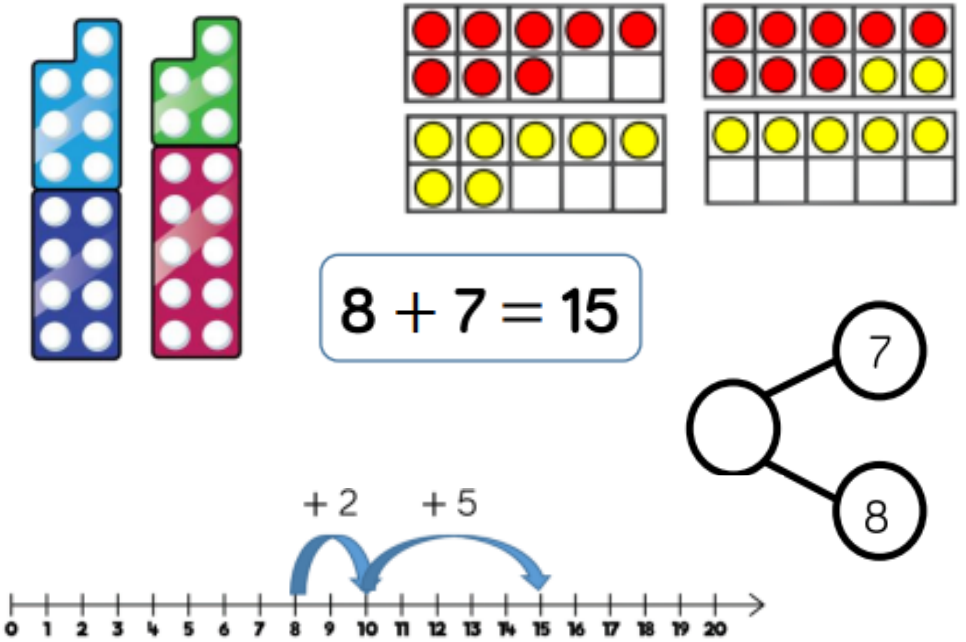
- ✓ read, write and interpret mathematical statements involving addition (+) and equals (=) signs
- ✓ represent and use number bonds within 20
- ✓ add one-digit and two-digit numbers to 20, including zero
- ✓ solve one-step problems that involve addition using concrete objects and pictorial representations, and missing number problems such as 15 = _ + 6.

Vocabulary

- ✓ add
- ✓ addition
- ✓ sum
- ✓ total
- ✓ altogether
- ✓ How many more...?
- ✓ How much more...?
- ✓ equals
- ✓ the same as
- ✓ partition (splitting a number into its component parts)

Sentence Stems

- ✓ Adding one gives one more.
- ✓ When zero is added to a number, the number does not change
- ✓ When adding numbers, the total will be the same whichever pair we add first *(commutative law).*
- ✓ The whole is (number). One part is (number), so the other part must be (number). OR (number) is the whole, (number) is a part, (number) is a part.
  The whole is 10. One part is 4, so the other part must be 6. OR 10 is the whole, 4 is a part, 6 is a part.
- ✓ First there were (number/ item). Then there were (number/ item) added. Now there are (number/ item).
  First there were 6 apples. Then there were 3 apples added. Now there are 9 apples.
- ✓ There are (number/ item) and (number/ item). We can write this a (number) plus (number).
  There are 5 cars and 5 trains. We can write this as 5 plus 5.
- ✓ (number) is equal to (number) plus (number). OR (number) plus (number) is equal to (number).
  6 is equal to 2 plus 4. OR 2 plus 4 is equal to 6.
- ✓ There are (number/ item). There are (number/ item). There are (number/ item/ description) altogether.
  There are 5 red cards. There are 3 black cards. There are 8 cards altogether.
- ✓ (number) plus (number) is equal to ten.
  7 plus 3 is equal to ten.

Add 1-digit numbers within 10	Add 1 and 2-digit numbers within 20 (Year 1 and 2)
	
When adding numbers to 10, children can explore both **aggregation** (combining two or more quantities or measures to find a total) and **augmentation** (increasing a quantity or measure by another quantity). The part-whole model, Numicon and ten frame support **aggregation**. The ten frame and number track support **augmentation**.	When adding 1-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. Different manipulatives can be used to represent this exchange. Use concrete resources alongside number lines to support children in understanding how to partition their jumps.

Year 2 - Addition

National Curriculum

- ✓ solve problems with addition:
  - using concrete objects and pictorial representations, including those involving numbers, quantities and measures
  - applying their increasing knowledge of mental and written methods
- ✓ recall and use addition facts to 20 fluently, and derive and use related facts up to 100
- ✓ add numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
  - adding three one-digit numbers
- ✓ show that addition of two numbers can be done in any order (commutative)
- ✓ recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

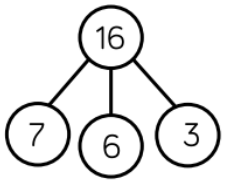
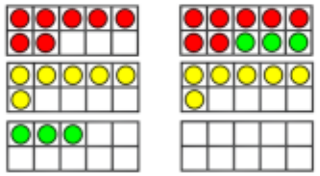
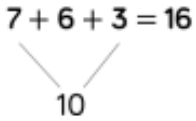
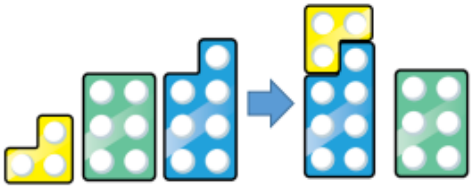
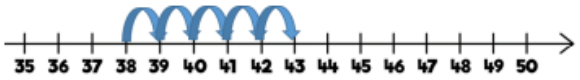
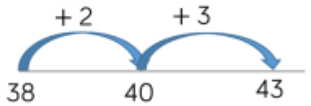
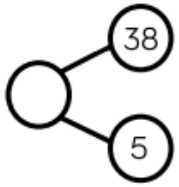
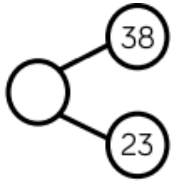
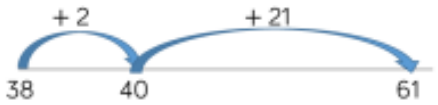
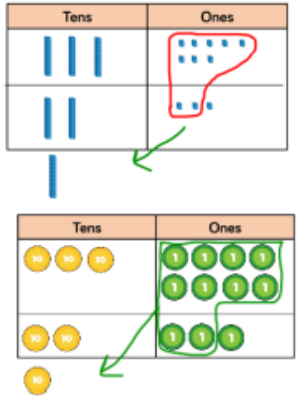
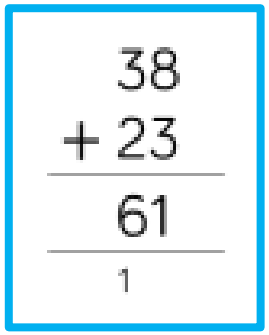
Vocabulary

- ✓ commutative (numbers can be added in any order)
- ✓ crossing the (tens) boundary or bridging
- ✓ exchange (change a number or expression for another of equal value)
- ✓ regrouping
- ✓ inverse

(plus previous)

Sentence Stems

- ✓ When adding numbers, we can add them in any order. (Commutative law – this can be applied to 2 or more addends.)
- ✓ (number) plus (number) is equal to (number) so (number) plus (number) is equal to (number).
  7 plus 3 is equal to 10 so 7 plus 4 is equal to 11. OR 7 plus 3 is equal to 10 so 17 plus 3 is equal to 20.
- ✓ (number) minus (number) is equal to (number) so (number) minus (number) is equal to (number).
  10 minus 7 is equal to 3 so 11 minus 7 is equal to 4. OR 10 minus 7 is equal to 3 so 20 minus 7 is equal to 13.
- ✓ The value on both sides of the equals symbol must be the same.
- ✓ When adding 10, the tens digit changes, the ones digit stays the same.
- ✓ If (number) plus (number) is equal to (number), then (number) tens plus (number) tens is equal to (number) tens.
  If 3 plus 2 is equal to 5, then 3 tens plus 2 tens is equal to 5 ten.
- ✓ This is (number). Ten more than (number) is (number). (number) is ten more than (number).
  This is 5. Ten more than 5 is 15. 15 is ten more than 5.

Add three 1-digit numbers	Add 1-digit and 2-digit numbers to 100 (Year 2 and 3)	Add two 2-digit numbers to 100 (Year 2 and 3)
  $7 + 6 + 3 = 16$  	  $38 + 5 = 43$  	  $38 + 23 = 61$  
When adding three 1-digit numbers, children should be encouraged to look for number bonds to add the numbers more efficiently. This supports their understanding of **commutativity**. Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.	When adding 1-digit numbers to a 2-digit number, children should be encouraged to count on from the larger number. Children should apply their knowledge of number bonds to add more efficiently e.g. 8 + 5 = 13 so 38 + 5 = 43. Hundred squares can support children to find the number bond to 10.	Children should be encouraged to use the formal column method when calculating alongside base 10 or place value counters. Children can also use a blank number line to count on to find the total. Encourage them to jump to multiple of 10 to become more efficient/

Year 3 - Addition

National Curriculum

- ✓ add and subtract numbers mentally, including:
  - a three-digit number and ones
  - a three-digit number and tens
  - a three-digit number and hundreds
- ✓ add numbers with up to three digits, using formal written methods of columnar addition
- ✓ estimate the answer to a calculation and use inverse operations to check answers
- ✓ solve problems, including missing number problems, using number facts, place value, and more complex addition

Vocabulary

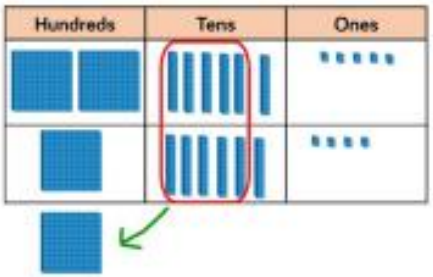
- ✓ addend (a number to be added to another)
- ✓ sum
- ✓ minuend (a quantity or number from which another is subtracted)
- ✓ subtrahend (a number to be subtracted from another)
- ✓ complement (in addition, a number and its complement make a total e.g. 300 is the complement of 700 to make 1000)
- ✓ exchange (change a number or expression for another of an equal value)

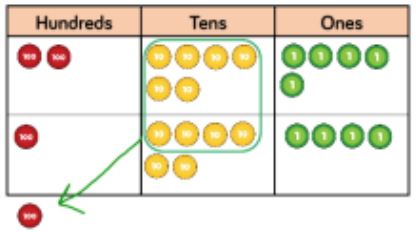
(plus previous)

Sentence Stems

- ✓ Addend plus addend equals the sum.
- ✓ Minuend minus subtrahend is equal to the difference.
- ✓ When using column addition start with the right most column.
- ✓ (number) one(s) add (number) one(s) is equal to (number) one(s).
- ✓ (number) ten(s) add (number) ten(s) is equal to (number) ten(s).
  For 35 + 23. 5 ones add 3 ones is equal to 8 ones. 3 tens add 2 tens is equal to 5 tens.
- ✓ When adding, if the (ones/ tens/ hundreds) is equal to (10/ 100/ 1,000 etc), we must regroup to the column on the left.

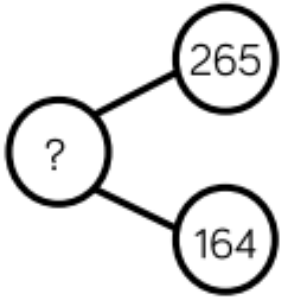
Add numbers with up to 3 digits

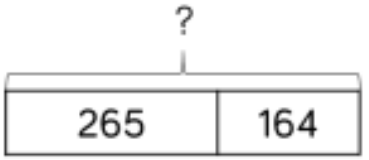


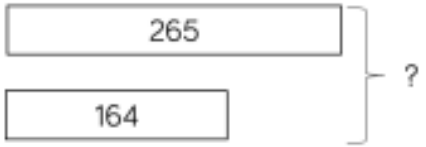


$$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$$

$$265 + 164 = 429$$







Base 10 and place value counters are the manipulatives we use when adding numbers with up to 3 digits.

Ensure children write their own calculation alongside concrete resources so they can see the links to the written column method.

Year 4 - Addition

National Curriculum

- ✓ add and subtract numbers with up to 4 digits using the formal written methods of columnar addition where appropriate
- ✓ estimate and use inverse operations to check answers to a calculation
- ✓ solve addition two-step problems in contexts, deciding which operations and methods to use and why.

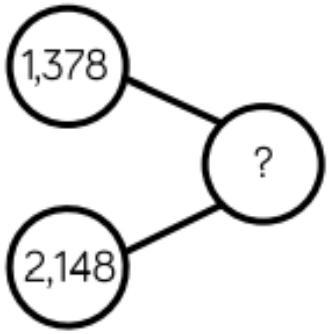
Vocabulary

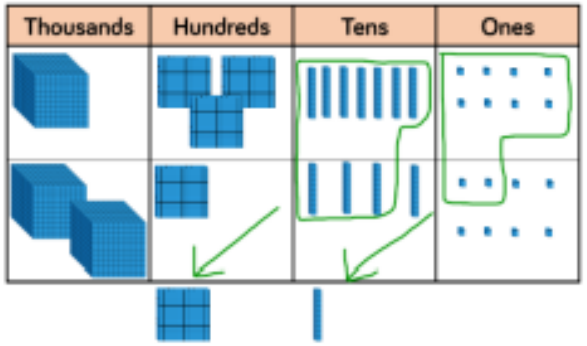
(see previous)

Sentence Stems

- ✓ For calculations involving addition we can add then subtract or subtract then add. The final answer will be the same.

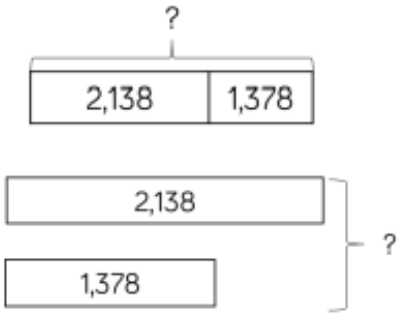
Add numbers with up to 4 digits

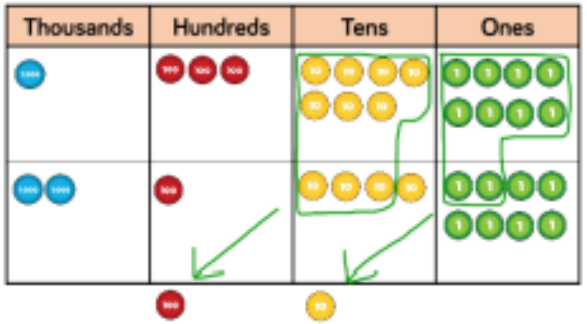




1,378 + 2,148 = 3,526

	1	3	7	8
+	2	1	4	8
	3	5	2	6
		1	1	





Base 10 and place value counters are the manipulatives we use when adding numbers with up to 4 digits.

Ensure children write their own calculation alongside concrete resources so they can see the links to the written column method.

Year 5 - Addition

National Curriculum

- ✓ add whole numbers with more than 4 digits, including using formal written methods (columnar addition)
- ✓ add numbers mentally with increasingly large numbers
- ✓ use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- ✓ solve multi-step problems in contexts, deciding which operations and methods to use and why.

Vocabulary

- ✓ additive
- ✓ estimation
- ✓ approximate

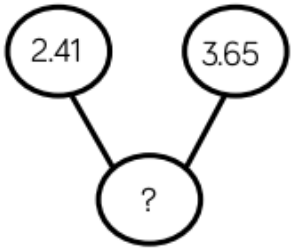
(plus previous)

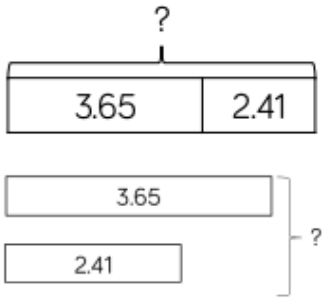
Sentence Stems

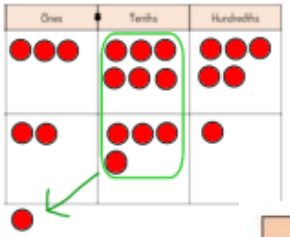
- ✓ If one addend is increased by an amount and the other addend is decreased by the same amount, the sum remains the same.
- ✓ If one addend is changed by an amount and the other addend is kept the same, the sum changes by that amount.
- ✓ If you have increased or decreased the minuend and subtrahend by the same amount, the difference stays the same.
- ✓ When a whole is split into equal parts, it can be both an additive and a multiplicative number sentence.
- ✓ The sum of the two known parts plus the missing part is equal to the whole.
- ✓ (First number) rounds to (number).
- ✓ (Second number) rounds to (number).
- ✓ When (adding/ subtracting) (first number) to/from (second number) the answer will be approximately (number).

  3,981, rounds to 4,000. 8,231 rounds to 8,000. When adding 3,981 to 8,231, the answer will be approximately 12,000.

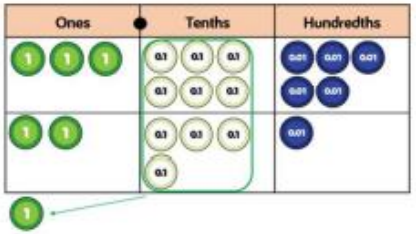
Add with up to 3 decimal places







$$3.65 + 2.41 = 6.06$$

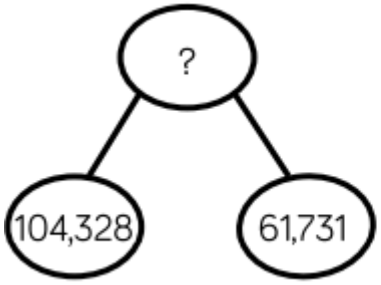


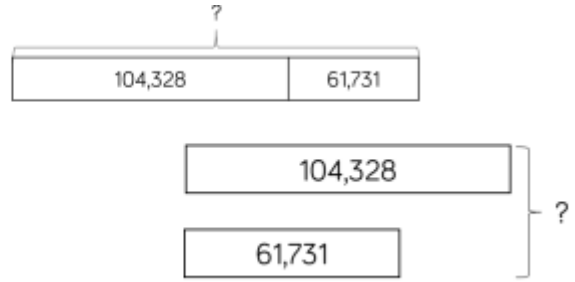
$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$$

Place value counters are the manipulatives we use when adding decimals with 1,2 and then 3 decimal places.

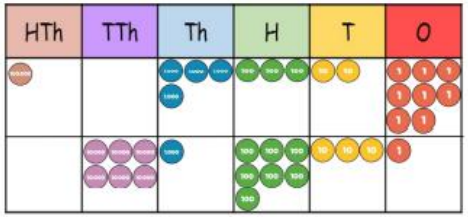
Ensure children have experience of adding decimals with a variety of decimal places. This includes putting this into context when adding other measures.

Add numbers with more than 4 digits (Year 5 and 6)





$$104{,}328 + 61{,}731 = 166{,}059$$



1	0	4	3	2	8
+	6	1	7	3	1
1	6	6	0	5	9
		1			

Place value counters are the manipulatives we use when adding numbers with more than 4 digits.

Children should be encouraged to work in the abstract, using the column method to add larger numbers efficiently.

Year 6 - Addition

National Curriculum

- ✓ perform mental calculations, including with mixed operations and large numbers
- ✓ use their knowledge of the order of operations to carry out calculations involving the four operations
- ✓ solve multi-step problems in contexts, deciding which operations and methods to use and why

Vocabulary	Sentence Stems
(see previous)	✓ When estimating you find an approximate answer.

Year 1 - Subtraction

National Curriculum

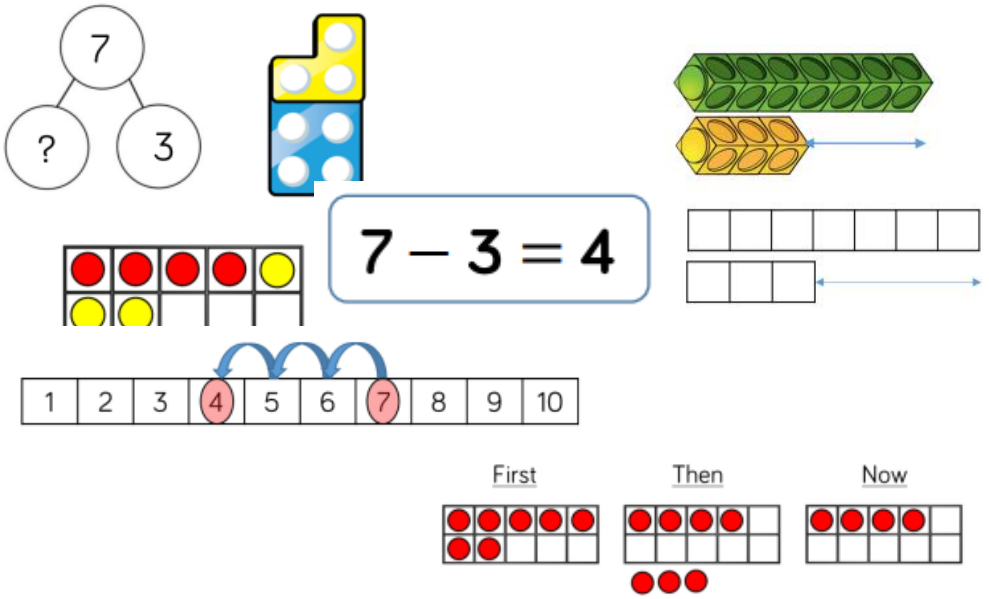
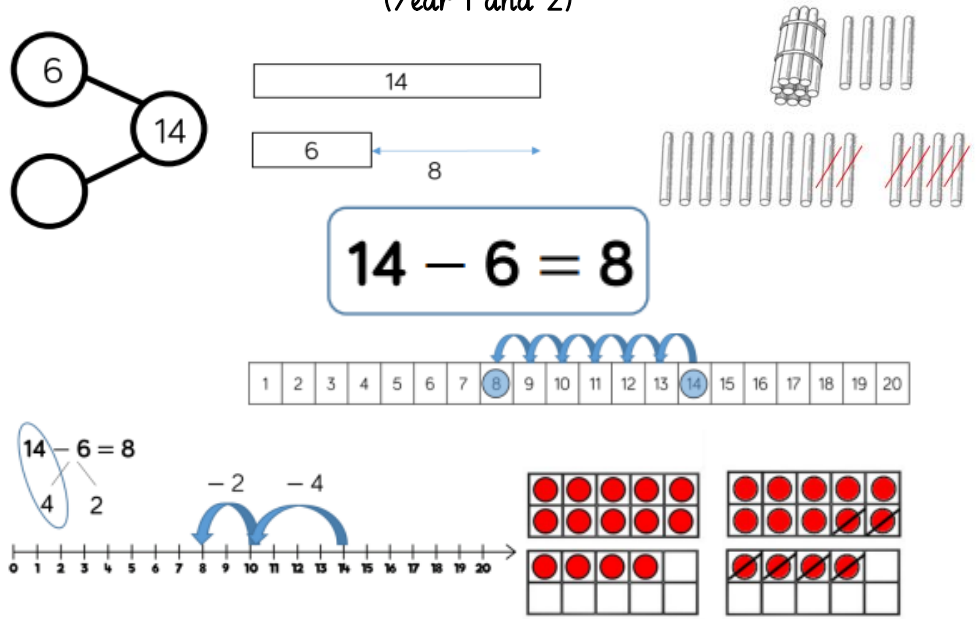
- ✓ read, write and interpret mathematical statements involving subtraction (–) and equals (=) signs
- ✓ represent and use number bonds and related subtraction facts within 20
- ✓ subtract one-digit and two-digit numbers to 20, including zero
- ✓ solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = _ – 9.

Vocabulary

- ✓ how many more...
- ✓ how much more...
- ✓ subtract
- ✓ take away
- ✓ left (left over)
- ✓ fewer
- ✓ difference
- ✓ minus
- ✓ equals
- ✓ the same as

Sentence Stems

- ✓ Subtracting one gives one less.
- ✓ When zero is subtracted from a number, the number does not change.
  (number) is equal to (number) subtract (number). OR (number) subtract (number) is equal to (number)
  6 is equal to 8 subtract 2. OR 8 subtract 2 is equal to 6.
- ✓ The difference between (number) and (number) is (number).
  The difference between 10 and 7 is 3.
- ✓ There are (number/ item) and (number/item) are taken away. We can write this as (number) subtract (number).
  There are 7 cars and 5 cars are taken away. We can write this as 7 subtract 5.
- ✓ First there were (number), then (number) were subtracted, (number) were left.
  First there were 10, then 2 were subtracted, 8 were left.

Subtract 1-digit numbers within 10	Subtract 1 and 2-digit numbers to 20 (Year 1 and 2)
	
Part-whole models, ten frames and number shapes support partitioning. Ten frames and number tracks support reduction. Cubes and bar models with two bars can support finding the difference.	When subtracting one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. Children should be encouraged to find the number bond to 10 when partitioning the subtracted number. Ten frames and number lines are particularly useful for this.

Year 2 - Subtraction

National Curriculum

- ✓ solve problems with subtraction:
  - using concrete objects and pictorial representations, including those involving numbers, quantities and measures
  - applying their increasing knowledge of mental and written methods
- ✓ recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100
- ✓ subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
- ✓ show that subtraction cannot be done in any order
- ✓ recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

Vocabulary

- ✓ crossing the (tens) boundary or bridging
- ✓ exchange
- ✓ regrouping

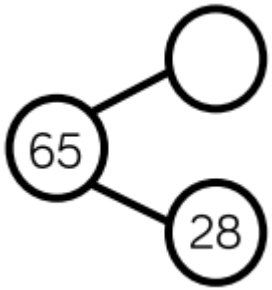
(plus previous)

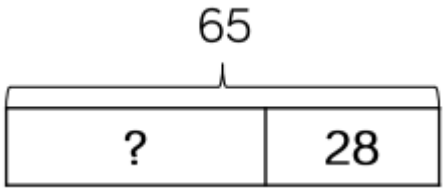
Sentence Stems

- ✓ (number) minus (number) is equal to (number) so (number) minus (number) is equal to (number).
  There are two ways to use this: 10 minus 7 is equal to 3 so 11 minus 7 is equal to 4. OR 10 minus 7 is equal to 3 so 20 minus 7 is equal to 13.
- ✓ The value on both sides of the equals symbol must be the same.
- ✓ The more we subtract, the less we are left with.
- ✓ The less we subtract, the more we are left with.
- ✓ When subtracting 10, the tens digit changes, the ones digit stays the same.
- ✓ If (number) plus (number) is equal to (number), then (number) tens plus (number) tens is equal to (number) tens.
  If 3 plus 2 is equal to 5, then 3 tens plus 2 tens is equal to 5 ten.
- ✓ This is (number). Ten more than (number) is (number). (number) is ten more than (number).
  This is 5. Ten more than 5 is 15. 15 is ten more than 5.
- ✓ If (number) minus (number) is equal to (number), then (number) tens minus (number) tens is equal to (number) tens.

	If 3 minus 2 is equal to 1, then 3 tens minus 2 tens is equal to 1 ten. ✓ This is (number). Ten less than (number) is (number). (number) is ten less than (number). *This is 15. Ten less than 15 is 5. 5 is ten less than 15.* *Partitioning* ✓ To subtract (number), first subtract (number) then subtract (number). *To subtract 6, first subtract 5 then subtract 1. OR To subtract 13, first subtract 3 then subtract 10.*

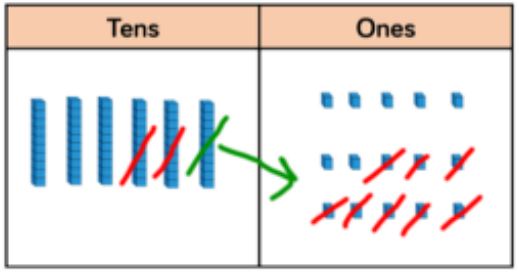
Subtract 1 and 2-digit numbers to 100





$65 - 28 = 37$

$$\begin{array}{r} {}^{5}\not{6}\,{}^{1}\not{5} \\ -\ 2\ 8 \\ \hline 3\ 7 \end{array}$$



At this stage, encourage children to use the formal method when calculating alongside base 10.

Year 3 - Subtraction

National Curriculum

- ✓ subtract numbers mentally, including:
  - a three-digit number and ones
  - a three-digit number and tens
  - a three-digit number and hundreds
- ✓ subtract numbers with up to three digits, using formal written methods of columnar subtraction
- ✓ estimate the answer to a calculation and use inverse operations to check answers
- ✓ solve problems, including missing number problems, using number facts, place value, and more complex subtraction

Vocabulary

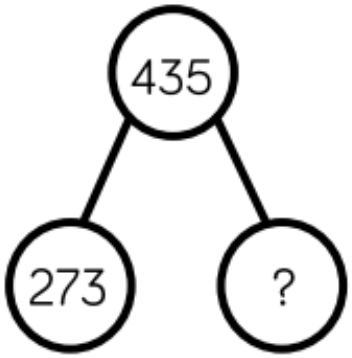
- ✓ minuend
- ✓ subtrahend
- ✓ difference
- ✓ exchange

(plus previous)

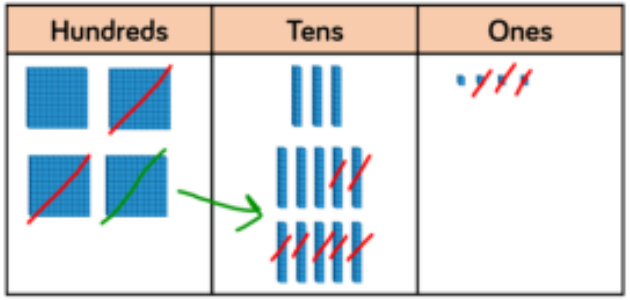
Sentence Stems

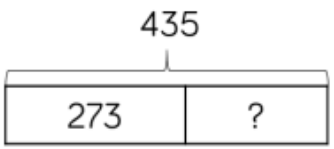
- ✓ *Minuend minus subtrahend is equal to the difference.*
- ✓ *When using column subtraction, start with the right most column.*
- ✓ *(number) one(s) add (number) one(s) is equal to (number) one(s). (number) ten(s) add (number) ten(s) is equal to (number) ten(s).*
  For 35 + 23. 5 ones add 3 ones is equal to 8 ones. 3 tens add 2 tens is equal to 5 tens.
- ✓ (number) one(s) subtract (number) one(s) is equal to (number) one(s).
  (number) ten(s) subtract (number) ten(s) is equal to (number) ten(s).
  For 35 - 23. 5 ones subtract 3 ones is equal to 2 ones. 3 tens subtract 2 tens is equal to 1 ten.
- ✓ If we cannot subtract, we must exchange from the column to the left.

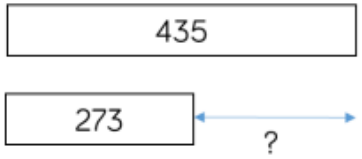
Subtract numbers with up to 3 digits



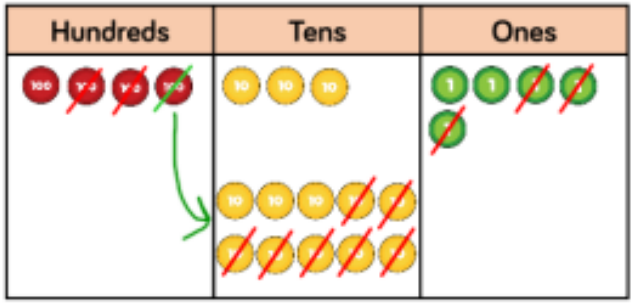
435 − 273 = 262







$$\begin{array}{r} {}^{3}\cancel{4}{}^{1}\cancel{3}5 \\ -\ 273 \\ \hline 262 \end{array}$$



Base 10 (used in Year 2) and place value counters are the most effective manipulative when subtracting numbers with up to 3 digits.

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

Year 4 - Subtraction

National Curriculum

- ✓ subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate
- ✓ estimate and use inverse operations to check answers to a calculation
- ✓ solve subtraction two-step problems in contexts, deciding which operations and methods to use and why

Vocabulary

- ✓ Inverse

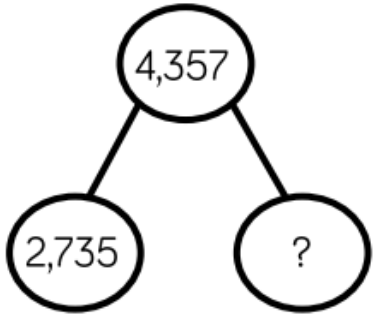
(plus previous)

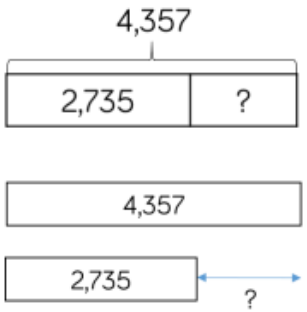
Sentence Stems

- ✓ For calculations involving both addition and subtraction, we can add then subtract or subtract then add. The final answer will be the same.

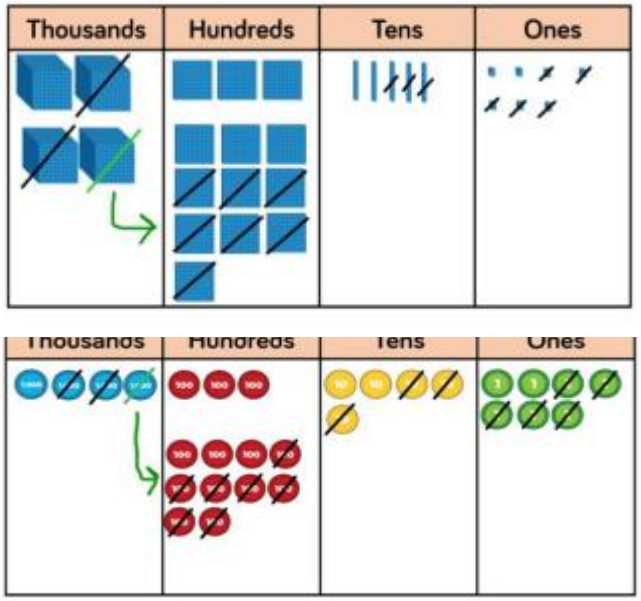
Subtract numbers with up to 4 digits

$$4{,}357 - 2{,}735 = 1{,}622$$





$$\begin{array}{r} {}^{3}\cancel{4}^{1}357 \\ -\ 2735 \\ \hline 1622 \end{array}$$



Base 10 and place value counters are the most effective manipulative when subtracting numbers with up to 4 digits.

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

Year 5 - Subtraction

National Curriculum

- ✓ subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)
- ✓ subtract numbers mentally with increasingly large numbers
- ✓ use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- ✓ solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Vocabulary

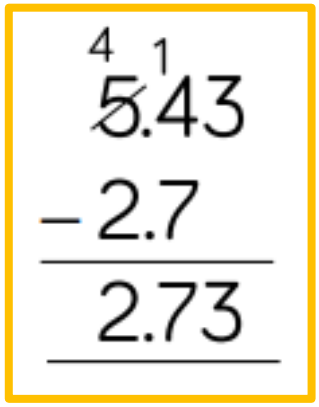
- ✓ additive
- ✓ estimation
- ✓ approximate

(plus previous)

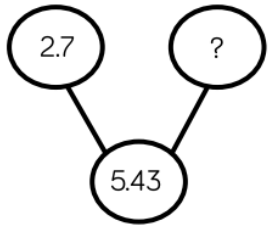
Sentence Stems

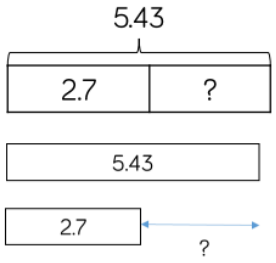
- ✓ If one addend is increased by an amount and the other addend is decreased by the same amount, the sum remains the same.
- ✓ If one addend is changed by an amount and the other addend is kept the same, the sum changes by that amount.
- ✓ If you have increased or decreased the minuend and subtrahend by the same amount, the difference stays the same.
- ✓ When a whole is split into equal parts, it can be both an additive and a multiplicative number sentence.
- ✓ For a question where the whole is split into three parts and two of the values are known. The sum of the two known parts plus the missing part is equal to the whole.
- ✓ For a question where the whole is split into three parts and two of the values are known. The whole minus the two known parts is equal to the missing parts.
- ✓ (First number) rounds to (number).
- ✓ (Second number) rounds to (number).
- ✓ When (adding/ subtracting) (first number) to/from (second number) the answer will be approximately (number).
  3,981, rounds to 4,000. 8,231 rounds to 8,000. When adding 3,981 to 8,231, the answer will be approximately 12,000.

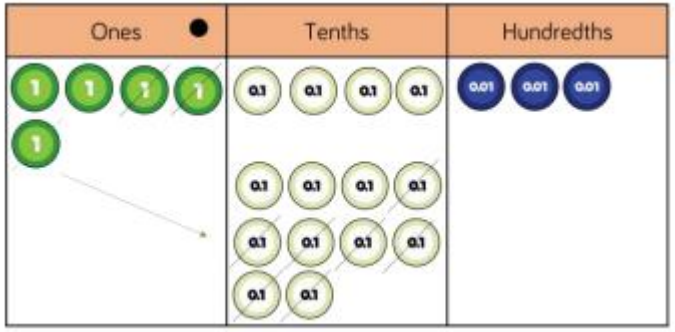
Subtract with up to 3 decimal places



5.43 − 2.7 = 2.73







Place value counters are the most effective manipulative when subtracting decimals with 1, 2 and then 3 decimal places.

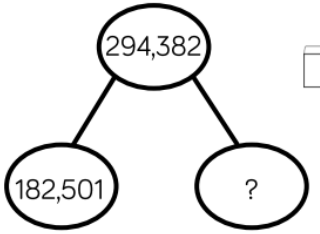
Ensure children have experience of subtracting decimals with a variety of decimal places. This includes putting this into context when subtracting money and other measures.

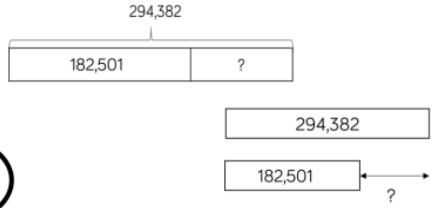
Subtract numbers with more than 4 digits

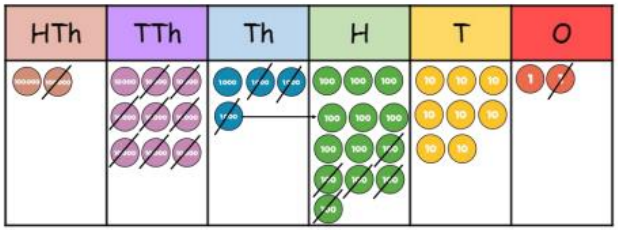
(Year 5 and 6)

294,382 − 182,501 = 111,881

	2	9	3 ~~4~~	1 3	8	2
−	1	8	2	5	0	1
	1	1	1	8	8	1







Place value counters are the most effective concrete resource when subtracting numbers with more than 4 digits.

At this stage, children should be encouraged to work in the abstract, using the column method to subtract larger numbers efficiently.

Year 6 - Subtraction

National Curriculum

- ✓ perform mental calculations, including with mixed operations and large numbers
- ✓ use their knowledge of the order of operations to carry out calculations involving the four operations
- ✓ solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Vocabulary	Sentence Stems
(see previous)	✓ When estimating you find an approximate answer.

Year 1 - Multiplication

National Curriculum

- ✓ solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

Vocabulary

- ✓ lots of
- ✓ sets of
- ✓ groups of
- ✓ equal groups
- ✓ patterns
- ✓ double
- ✓ doubling
- ✓ twice as much as...
- ✓ twos
- ✓ fives
- ✓ tens
- ✓ skip counting

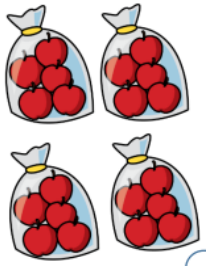
Sentence Stems

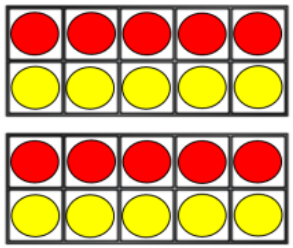
Equal groups/ unequal groups

- ✓ There are (number) groups/lots/sets of (number/ item).
  There are 3 groups of 5 cars.
- ✓ This is not (number) groups/lots/sets of (number/ item) as they are not equal groups.
  This is not 2 groups of 10 sweets, as they are not equal groups.

Double

- ✓ Double (number) is (number).
  Double 5 is 10.
- ✓ Twice as much as (number) is (number).
  Twice as much as 5 is 10.

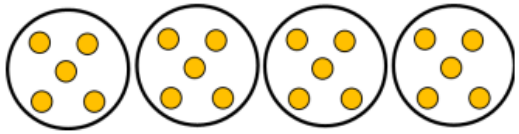




Solve 1-step problems using multiplication

(Year 1 and 2)

One bag holds 5 apples.
How many apples do 4 bags hold?



Children represent multiplication as repeated addition in many different ways.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.

Year 2 - Multiplication

National Curriculum

- ✓ recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- ✓ calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) 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

Vocabulary

- ✓ times
- ✓ multiplication
- ✓ multiply
- ✓ multiplied by
- ✓ multiple of
- ✓ ×
- ✓ =
- ✓ array
- ✓ row
- ✓ column
- ✓ repeated addition
- ✓ ten/five times as
- ✓ much/many as...
- ✓ once, twice, three
- ✓ times... ten times
- ✓ multiplication facts
- ✓ multiplication table
- ✓ commutative law
- ✓ commutativity
- ✓ calculation
- ✓ equation
- ✓ bar model

Sentence Stems

- ✓ (number) groups/lots/sets of (number) is the same as (number) times/multiplied by/x (number), which equals/= (number).
  5 groups of 4 is the same as 5 times 4, which equals 20.
- ✓ (number) is a multiple of (number) because it is in the (number) times table.
  8 is a multiple of 2 because it is in the 2 times table.
- ✓ (number) cannot be in the (number) times table because...
  21 cannot be in the 10 times table because....
- ✓ Multiplication is commutative – you can swap the numbers in the calculation/ equation.

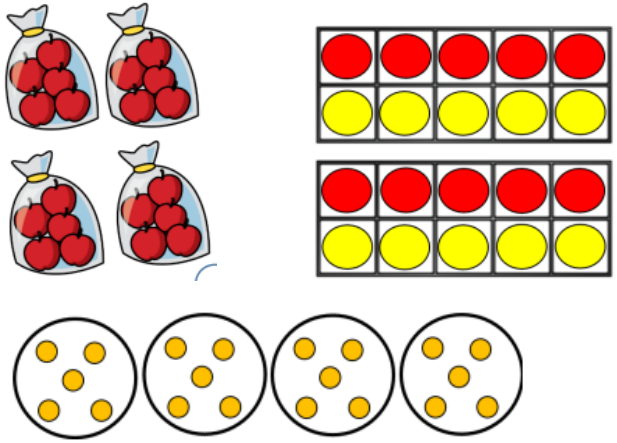
<u>Repeated Addition (array)</u>

- ✓ There are (number) groups of (number/item). (number) + (number) = (number). There are (number/ item) altogether.
  There are 3 groups of 5 stars. 5 + 5 + 5 = 15. There are 15 stars altogether.
- ✓ There are (number) lots of (number/ item). There are (total/ item) altogether.
  There are 9 lots of 5 apples. There are 45 apples altogether.
- ✓ (number a) x (number b) = (number b) x (number a).
  3 × 10 = 10 × 3
- ✓ In this array, there are (number/ item) in each row. There are (number) rows of (number/ item). So (number) x (number) = (total)
  In this array, there are 5 oranges in each row. There are 6 rows of 5 oranges. So 5 × 6 = 30 [Link to fact family: 30 ÷ 5 = 6 and 30 ÷ 6 = 5]
- ✓ In this array, there are (number/ item) in each column. There are (number) columns of (number/ item). So (number) x (number) = (total)

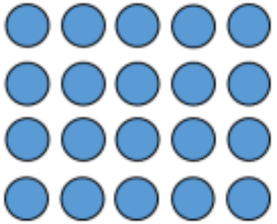
	In this array, there are 10 cookies in each column. There are 3 columns of 10 cookies. So 10 × 3 = 30 [Link to fact family: 30 ÷ 3 = 10 and 30 ÷ 10 = 3]

Solve 1-step problems using multiplication

(Year 1 and 2)



One bag holds 5 apples.
How many apples do 4 bags hold?



$5 + 5 + 5 + 5 = 20$

$4 \times 5 = 20$

$5 \times 4 = 20$

Children represent multiplication as repeated addition in many different ways, including arrays.

In Year 2, children are introduced to the multiplication symbol.

Year 3 - Multiplication

National Curriculum

- ✓ recall and use multiplication facts for the 3, 4 and 8 multiplication tables
- ✓ write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- ✓ solve problems, including missing number problems, involving multiplication and including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Vocabulary

- ✓ threes
- ✓ fours
- ✓ eights
- ✓ product
- ✓ factor
- ✓ short multiplication
- ✓ associative law
- ✓ associativity
- ✓ scaling (integers)
- ✓ correspondence

Sentence Stems

- ✓ I know that (number a) times (number b) equals (number c) because (number b) times (number a) equals (number c).
  I know that 3 times 6 equals 18 because 6 times 3 equals 18.
- ✓ The product of (number a) and (number b) is (number c).
  The product of 7 and 4 is 28.
  If (number a) x (number b) = (number c), then (number c) ÷ (number a/b) = (number b/a)
  If 3 × 8 = 24, then 24 ÷ 8 = 3 OR 24 ÷ 3 = 8

<u>Multiply by 4 and 8</u>

- ✓ To calculate 4 lots of (number), I can double (number) and double the answer.
  To calculate 4 lots of 6, I can double 6 and double the answer.
- ✓ (multiplier) x 4 = (product)
  6 × 4 = 24
- ✓ To multiply by 8, I can double and double again.

<u>Using known facts</u>

- ✓ *If (number a) x (number b) = (number c), then (number a) tens x (number b) = (number c) tens.*
  If 8 × 7 = 56, then 8 tens × 7 = 56 tens = 560 and 8 × 7 tens = 56 tens = 560
- ✓ If (number a) x (number b) = (number c), then (number c) ÷ (number a/b) = (number b/a)
  If 40 × 2 = 80, then 80 ÷ 2 = 40 OR 80 ÷ 40 = 2

	Scaling ✓ There are (number) times as many (item) as (item). *There are 3 times as many red tops as blue tops.* Correspondence E.g. How many outfits combinations could be made? ✓ (number a/ item a) and (number b/ item b) means (number a) x (number b). So there are (product) different combinations. *4 shirts and 3 shorts means 4 × 3. So there are 12 different combinations.*

Multiply 2-digit numbers by 1-digit numbers

(Year 3 and 4)

$34 \times 5 = 170$

	H	T	O		
		3	4		
×			5		
		2	0	(5 × 4)	
+	1	5	0	(5 × 30)	
	1	7	0		

	H	T	O	
		3	4	
×			5	
	1	7	0	
	1	2		

The expanded column method is used before moving on to the short multiplication method.

The place value counters are used to support the understanding of the method rather than supporting the calculation, as children will use times table knowledge.

Year 4 - Multiplication

National Curriculum

- ✓ recall multiplication facts for multiplication tables up to 12 × 12
- ✓ use place value, known and derived facts to multiply mentally, including:
  - multiplying by 0 and 1
  - multiplying together three numbers
- ✓ recognise and use factor pairs and commutativity in mental calculations
- ✓ multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- ✓ solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

Vocabulary

- ✓ inverse
- ✓ distributive law
- ✓ multiplying by 0 and 1
- ✓ multiplying by 10, 100

Sentence Stems

<u>Inverse</u>

- ✓ The inverse of 'multiply' is 'divide'.
- ✓ The distributive law (number a) groups of (number b) is the same as (number c) groups of (number b) plus (number d) groups of (number b).
  12 groups of 6 is the same as 10 groups of 6 plus 2 groups of 6
- ✓ The distributive law: (number) x (number) = (number) x (number) –/+ (number) x (number)
  The distributive law:
  9 × 8 = 10 × 8 – 1 × 8
  11 × 8 = 10 × 8 + 1 × 8

<u>Multiplying by 0</u>

- ✓ Multiplying anything by 0 gives an answer of 0 as this is the same as no lots of anything.

<u>Multiplying by 1</u>

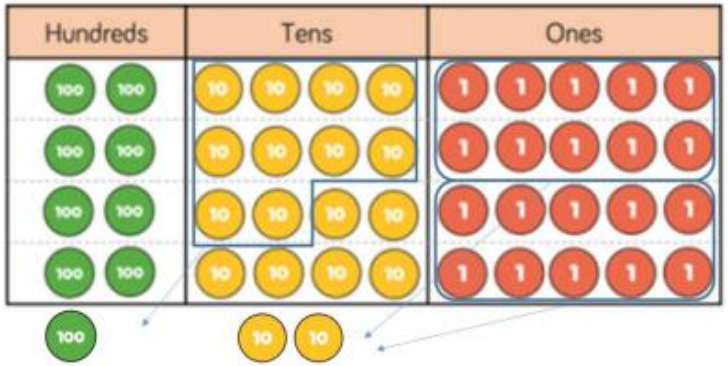
- ✓ Multiplying anything by 1 gives the same number as this is the same as one lot of anything.

<u>Multiplying by 10, 100</u>

- ✓ When multiplying by 10, the digits move one place to the left.
- ✓ When multiplying by 100, the digits move two places to the left.
- ✓ When multiplying by (10/ 100), the number is (10/ 100) times bigger.

	Multiply by 6 ✓ *To multiply by 6, I can multiply by 3 and double the answer.*

Multiply 3-digit numbers by 1-digit numbers



$$245 \times 4 = 980$$

	H	T	O
	2	4	5
×			4
	9	8	0
	1	2	

Children use the short, formal written method.

Place value counters continue to support the understanding of the written method.

Children are moved away from resources when multiplying larger numbers.

Year 5 - Multiplication

National Curriculum

- ✓ identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- ✓ know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers
- ✓ establish whether a number up to 100 is prime and recall prime numbers up to 19
- ✓ 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
- ✓ multiply numbers mentally drawing upon known facts
- ✓ 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 (^{2}) and cubed (^{3})
- ✓ solve problems involving multiplication including using their knowledge of factors and multiples, squares and cubes
- ✓ solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- ✓ solve problems involving multiplication, including scaling by simple fractions and problems involving simple rates

Vocabulary

- ✓ common multiples
- ✓ composite numbers
- ✓ multiplying by 10, 100 and 1000
- ✓ square
- ✓ squared
- ✓ cube
- ✓ cubed

Sentence Stems

Common multiples

- ✓ Common multiples of given numbers are numbers that are in the times tables of both numbers.
- ✓ Common multiples of (number a) and (number b) are ....
  Common multiples of 2 and 5 are 10, 20, 30...

Composite numbers

- ✓ All numbers with more than two factors are composite numbers.

Prime numbers

- ✓ A prime number only has two factors, 1 and itself.

Multiplying by 1,000

- ✓ *When multiplying by 1,000, the digits move three places to the left.*
- ✓ *When multiplying by 1,000, the number is 1,000 times bigger.*

Square number

- ✓ A square number is made when you multiply a number by itself.
- ✓ (number) x (number) = (product), so (product) is a square number.
  4 × 4 = 16, so 16 is a square number.

Cube number

- ✓ A cube number is made when you multiply a number by itself twice.
- ✓ (number) x (number) x (number) = (product), so (product) is a cube number.

2 × 2 × 2 = 8, so 8 is a cube number.

Multiply 4-digit numbers by 1-digit numbers

1,826 × 3 = 5,478

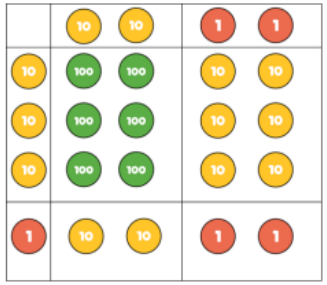
	Th	H	T	O
	1	8	2	6
×				3
	5	4	7	8
	2		1	

Place value counters are the best manipulative to use to support understanding of the formal written method.

If children are multiplying larger numbers and are struggling with their times tables, encourage the use of multiplication grids so children can focus on the written method.

Multiply 2-digit numbers by 2-digit numbers

22 × 31 = 682



×	20	2
30	600	60
1	20	2

	H	T	O
		2	2
×		3	1
		2	2
	6	6	0
	6	8	2

The grid method may be used to model understanding, before moving on to the formal written multiplication method.

Multiply 3-digit numbers by 2-digit numbers

234 × 32 = 7,488

×	200	30	4
30	6,000	900	120
2	400	60	8

Th	H	T	O
	2	3	4
×		3	2
	4	6	8
$^{1}7$	$^{1}0$	2	0
7	4	8	8

Encourage children to move towards the formal written method, seeing links with the grid method.

Year 6 - Multiplication

National Curriculum

- ✓ multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- ✓ perform mental calculations, including with mixed operations and large numbers
- ✓ identify common factors, common multiples and prime numbers
- ✓ use their knowledge of the order of operations to carry out calculations involving the four operations
- ✓ solve problems involving multiplication
- ✓ use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Vocabulary

- ✓ indices (powers)
- ✓ lowest common multiple
- ✓ brackets
- ✓ order of operations (bidmas)

Sentence Stems

Lowest common multiple

- ✓ The smallest common multiple of any given numbers is called the lowest common multiple (LCM).
- ✓ The LCM of (number) and (number) is (LCM).
  The LCM of 3 and 6 is 6.

Indices (powers)

- ✓ Indices show how many times to multiply a number by itself.
- ✓ For (number) squared, write (number)2. This is the same as (number) x (number).
  For 5 squared, write 5^2. This is the same as 5 x 5.
- ✓ For (number) cubed, it is the same as (number) x (number) x (number). This can be read as (number) to the power of 3.
  For 5 cubed, it is the same as 5 x 5 x 5. This can be read as 5 to the power of 3.

Bracket

- ✓ A bracket is used to tell us which part of an equation to do first according to BIDMAS.

BIDMAS

- ✓ BIDMAS tells us the order in which to complete a calculation. We do Brackets, Indices, Division & Multiplication, Addition and Subtraction.

Multiply 4-digt numbers by 2-digit numbers

$$2{,}739 \times 28 = 76{,}692$$

TTh	Th	H	T	O
	2	7	3	9
×			2	8
$^{2}2$	$^{5}1$	$^{3}9$	$^{7}1$	2
$^{1}5$	4	$^{1}7$	8	0
7	6	6	9	2
		1		

Children should be confident in the formal written method.

If they are struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method.

Consider where exchanged digits are placed and make sure this is consistent.

Year 1 - Division

National Curriculum

- ✓ solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

Vocabulary

- ✓ equal groups of
- ✓ equal lots of
- ✓ equal sets of
- ✓ grouping
- ✓ share equally
- ✓ sharing
- ✓ share
- ✓ half
- ✓ halves
- ✓ halving
- ✓ half as much/
- ✓ many as...
- ✓ arrays
- ✓ row
- ✓ column
- ✓ patterns

Sentence Stems

Grouping

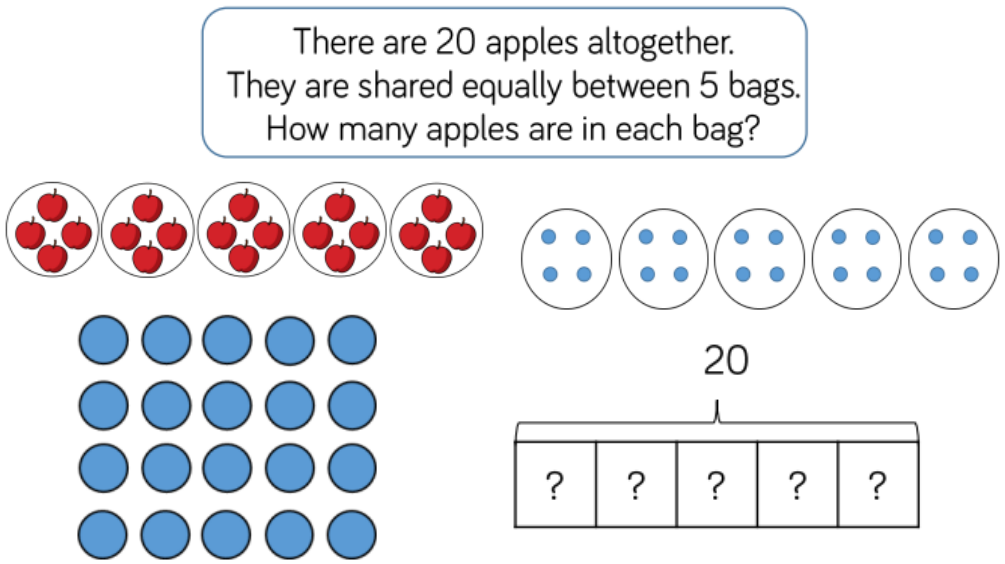
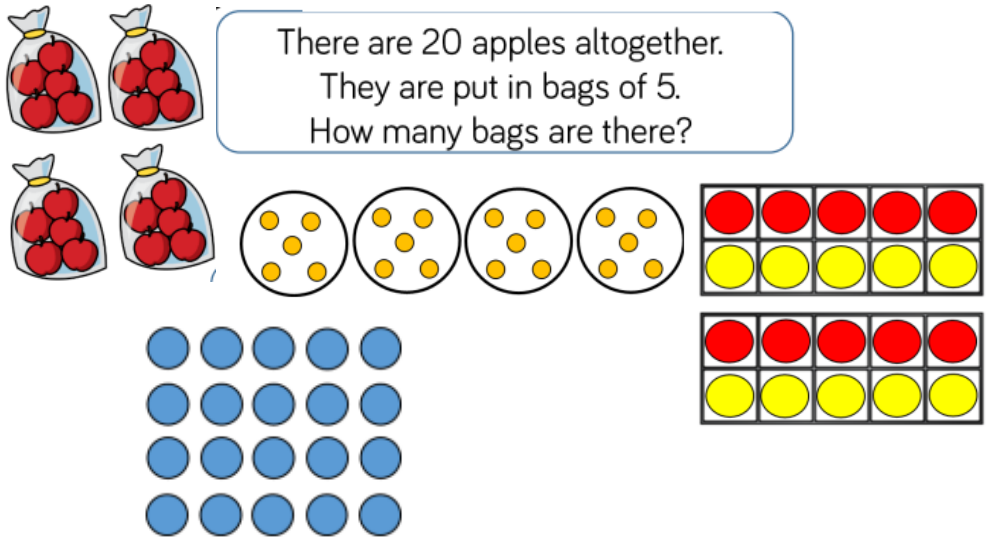
- ✓ One group of (number), two groups of (number), three groups of (number)...
  One group of 5, two groups of 5, three groups of 5,...
- ✓ Each (item) can hold (number/ item). (number/ item) will need (number/ item).
  Each box can hold 2 cupcakes. 8 cupcakes will need 4 boxes.
- ✓ There are (number) equal groups of (number). There are (number) altogether.
  There are 6 equal groups of 2. There are 12 altogether.

Sharing

- ✓ One for you, one for you, one for you,....
- ✓ (number/ item) have been shared equally into (number) groups/ lots/sets.
- ✓ There are (number/ item) in each group/lot/set. OR each group/lot/set has (number/ item).
  15 toy cars have been shared equally into 3 groups. There are 5 toy cars in each group. OR Each group has 5 toy cars.
- ✓ (number/ item) have not been shared equally between (number) groups/lots/ sets. There are not equal groups/lots/sets of (item).
  20 sweets have not been shared equally between 3 groups. There are not equal groups of sweets.
- ✓ Share (number) equally between (number) groups. Each group has (number).
  Share 14 equally between 2 groups. Each group has 7.

Array

- ✓ (number/ item) have been used to make this array. There are (number) rows of (number/ item).
  10 oranges have been used to make this array. There are 5 rows of 2 oranges.

	✓ (number/ item) have been used to make this array. There are (number) columns of (number/ item). *15 cookies have been used to make this array. There are 3 columns of 5 cookies.* <u>Half</u> ✓ Half of (number) is (number). *Half of 10 is 5.*
Solve 1-step problems using multiplication (Year 1 and 2) 	**Solve 1-step problems using multiplication (grouping) (Year 1 and 2)** 
Children solve problems by sharing amounts into equal groups. In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally.	Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction.

Year 2 - Division

National Curriculum

- ✓ recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- ✓ calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs
- ✓ show that division of one number by another cannot be done in any order
- ✓ solve problems involving division, using materials, arrays, repeated addition, mental methods, and division facts, including problems in context

Vocabulary

- ✓ division
- ✓ divide
- ✓ divided by
- ✓ divided into
- ✓ repeated
- ✓ subtraction
- ✓ left over
- ✓ one each, two
- ✓ each, three each...
- ✓ ten each
- ✓ group in pairs,
- ✓ threes... tens
- ✓ multiple
- ✓ division facts
- ✓ commutative law
- ✓ commutativity
- ✓ calculation
- ✓ equation
- ✓ ÷
- ✓ =

Sentence Stems

- ✓ Division is not commutative – you cannot swap the numbers around in the calculation/equation.

<u>Grouping</u>

- ✓ (number a) can be put into groups of (number b). This is the same as (number a) being divided into groups of (number b), which equals (number c). This can be written as (number a) ÷ (number b) = (number c)

  20 can be put into groups of 4. This is the same as 20 divided into groups of 4, which equals 5. This can be written as 20 ÷ 4 = 5
- ✓ (number a) divided by (number b) equals (number c).

  20 divided by 4 equals 5.

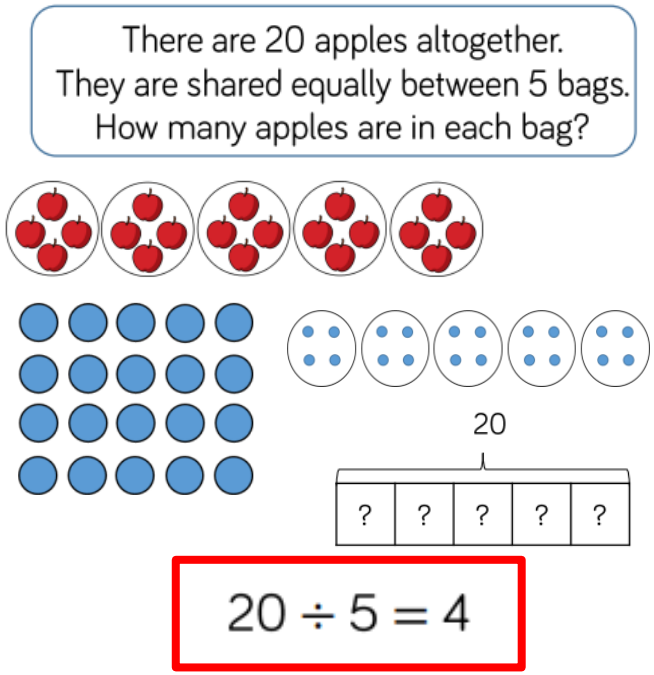
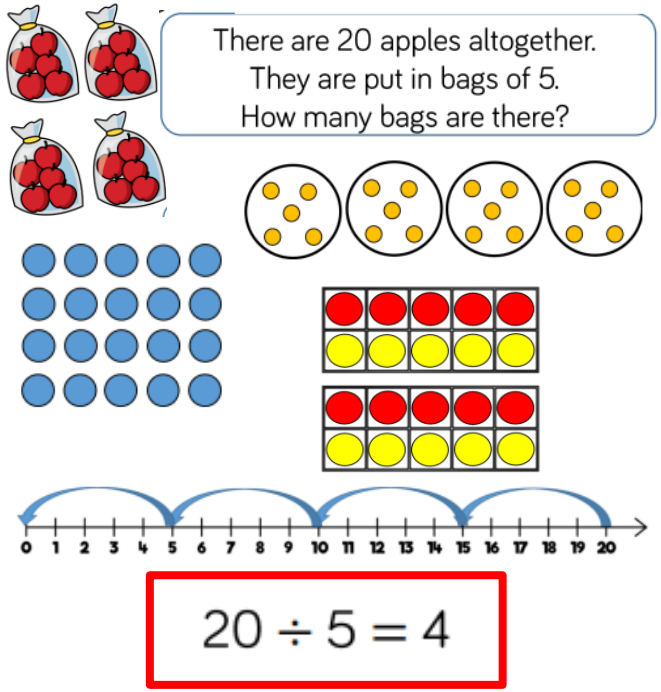
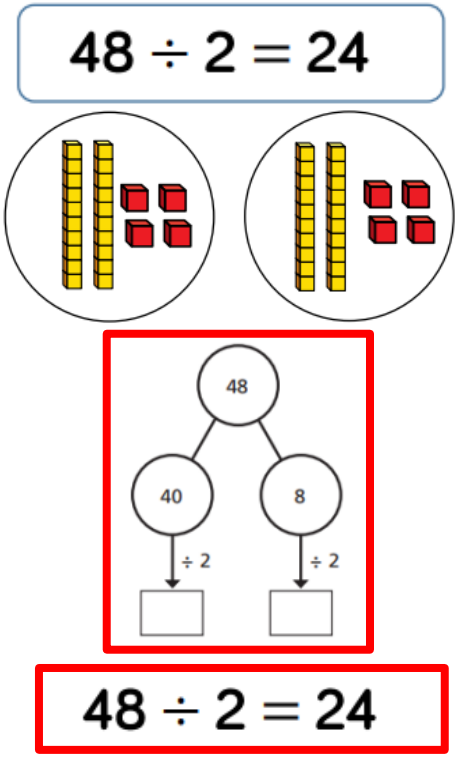
<u>Sharing</u>

- ✓ (number a) can be shared equally between (number b) groups/lots/etc. This is the same as (number a) shared into (number b) groups/lots/set, which equals (number c). This can be written as (number a) ÷ (number b) = (number c)

  20 can be shared equally between 4 groups. This is the same as 20 shared into 4 groups, which equals 5. This can be written as 20 ÷ 4 = 5
- ✓ (number a) can be shared equally into (number b) groups/lots/sets because
- ✓ (number a) can be shared equally into (number b) groups because (number a) is a multiple of (number b).

  20 can be shared equally into 2 groups because 20 is a multiple of 2.
- ✓ *(number a) cannot be shared into (number b) groups/lots/sets because there is/are (number c) left over.*

  21 cannot be shared equally into 2 groups because there is 1 left over.

Solve 1-step problems using multiplication (sharing) (Year 1 and 2)	Solve 1-step problems using multiplication (grouping) (Year 1 and 2)	Divide 2-digits by 1-digit
		
Children solve problems by sharing amounts into equal groups. In Year 2, children are introduced to the division symbol.	Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction.	When dividing larger numbers, children can use manipulatives to allow them to partition into tens and ones. Base 10 can be used to share numbers into equal groups. Part-whole provide children with a clear written method that matches the concrete representation.

Year 3 - Division

National Curriculum

- ✓ recall and use division facts for the 3, 4 and 8 multiplication tables
- ✓ write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- ✓ solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

Vocabulary

- ✓ threes
- ✓ fours
- ✓ eights
- ✓ product
- ✓ remainder
- ✓ short division
- ✓ scaling (integer)
- ✓ quarter
- ✓ third
- ✓ eighth

Sentence Stems

Using known facts

- ✓ I know that (number a) ÷ (number b) = (number c) because (number c) × (number b) = (number a)

  I know that 24 ÷ 3 = 8 because 8 × 3 = 24
- ✓ (number a) ÷ (number b) = ?, this means ? x (number b) = (number a)

  72 ÷ 8 = ?, this means ? × 8 = 72

  If (number a) x (number b) = (number c), then (number c) tens ÷ (number b) = (number a) tens, so (number c x 10) ÷ (number b) = (number a x 10).

  If 8 × 7 = 56, then 56 tens ÷ 7 = 8 tens, so 560 ÷ 7 = 80.
- ✓ If (number a) ÷ (number b) = (number c), then (number a) tens ÷ (number b) = (number c) tens, so (number a x 10) ÷ (number b) = (number c x 10)

  If 40 ÷ 4 = 10, then 40 tens ÷ 4 = 10 tens, so 400 ÷ 4 = 100

Divide by 4 and 8

- ✓ To divide a number by 4, I can half the number and half the answer.
- ✓ To find a quarter of something is the same as dividing by 4.
- ✓ To divide something by 8, I can halve, halve and halve again.

Remainder

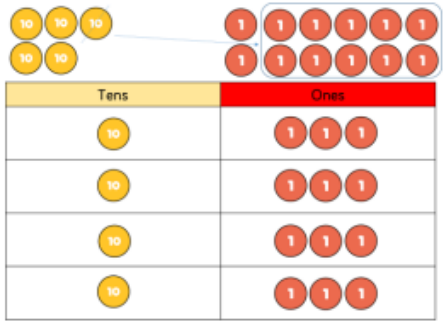
- ✓ (number a) is not in the (number b) times tables; when you divide (number a) by (number b) there is a remainder of (number c).

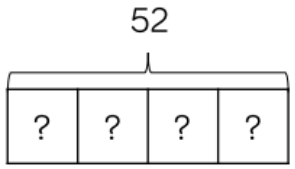
  32 is not in the 3 times tables; when you divide 32 by 3 there is a remainder of 2.

Divide 2-digits by 1-digit (sharing with exchange)	Divide 2-digits by 1-digit (sharing with remainders)

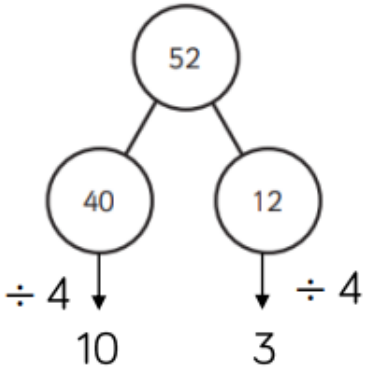
(Year 3 and 4)

$52 \div 4 = 13$





$52 \div 4 = 13$



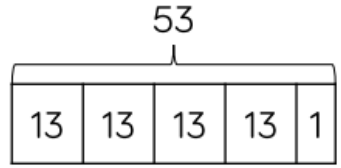
$10 + 3 = 13$

Children can use place value counters to exchange one ten for ten ones.

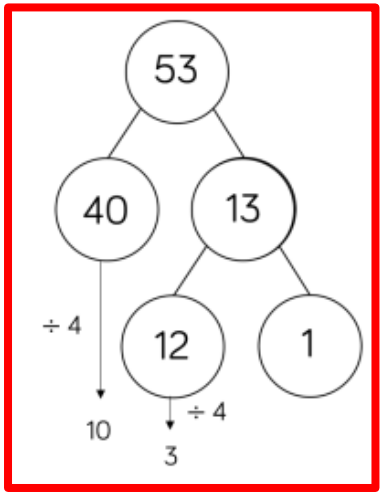
Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows.

(Year 3 and 4)

$53 \div 4 = 13\ r1$



$53 \div 4 = 13\ r1$



Children can use place value counters to exchange one ten for ten ones.

Starting with the equipment ouside the place value grid will highlight remainders, as they will have been left outside the grid once the equal groups have been made.

Flexible partitioning in a part-whole model supports this method.

Year 4 - Division

National Curriculum

- ✓ recall division facts for multiplication tables up to 12 × 12
- ✓ use place value, known and derived facts to divide mentally, including:
  - dividing by 1

Vocabulary

- ✓ inverse
- ✓ dividend
- ✓ divisor
- ✓ quotient
- ✓ divisible by
- ✓ dividing by 10, 100
- ✓ factor
- ✓ factor pair

Sentence Stems

- ✓ The dividend is the number you are dividing.
- ✓ The divisor is the number you are dividing by.
- ✓ The quotient is the answer to a division fact. (42 ÷ 6 = 7, so the quotient is 7).

Factor/Factor pairs and multiples

- ✓ (number a) ÷ (number b) = (number c), so (number b) and (number c) are factors of (number a).
  48 ÷ 8 = 6, so 8 and 6 are factors of 48.
- ✓ The product of (number a) and (number b) is (number c), so (number a) and (number b) are a factor pair of (number c)
  The product of 6 and 8 is 48, so 6 and 8 are a factor pair of 48
- ✓ (number a) is a multiple of both (number b) and (number c).
  - *48 is a multiple of both 8 and 6*

Inverse

- ✓ I know that (number a) ÷ (number b) = *(number c) because (number b/c) x (number c/b) = (number a).*
  I know that 48 ÷ 6 = 8 because 8 × 6 = 48

Dividing by 10, 100

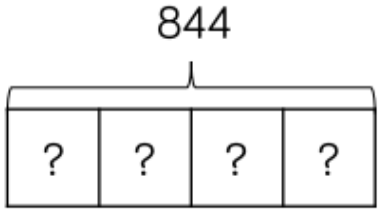
- ✓ When dividing by (10 or 100), the number is being split into (10 or 100) equal parts. The number is (10 or 100) times smaller.
- ✓ When dividing by 10, we move the digits one place to the right.
- ✓ When dividing by 100, we move the digits two places to the right.
- ✓ There are (number) tens in (number).
  There are 10 tens in 100.

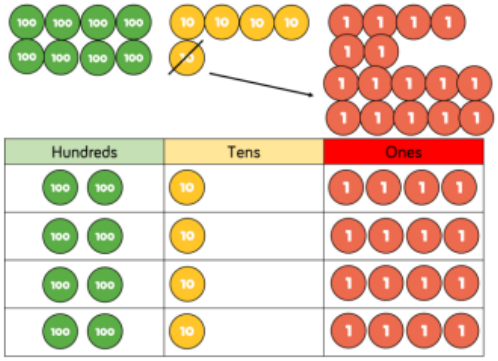
Divide by 1

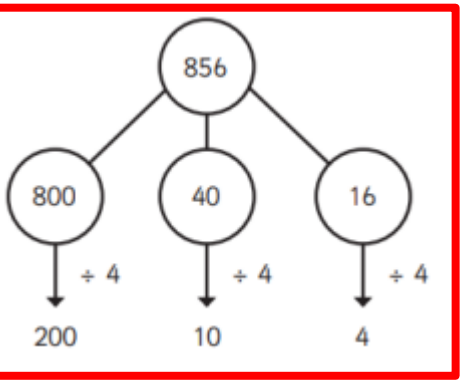
	✓ Dividing anything by 1 gives the same number as this is just one group of anything.

Divide 3-digits by 1-digit (sharing)

$$844 \div 4 = 211$$







$$844 \div 4 = 211$$

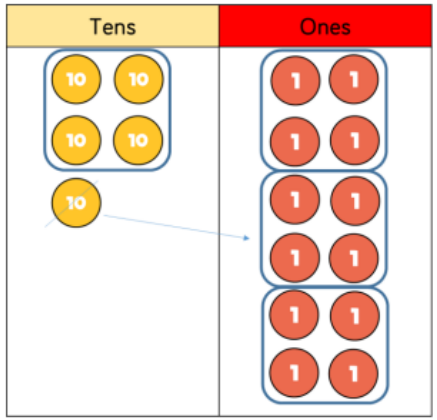
Children can continue to use place value counters to share 3-digit numbers into equal groups.

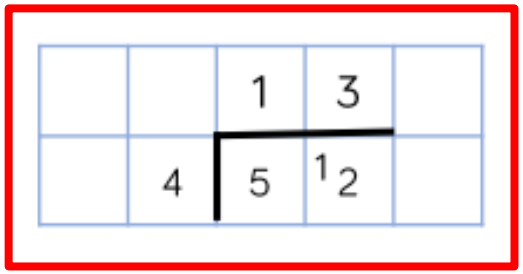
Children should start with the equipment outside the place value grid before sharing the hundreds, tens and ones equally between the rows. This method can also help to highlight any remainders.

Flexible partitioning in a part-whole model supports this method.

Divide 2-digits by 1-digit (grouping)

$$52 \div 4 = 13$$





When using the short division method, children use grouping. Starting with the largest place value, they group by the divisor.

Language is important here and children should consider 'How may groups of 4 tens can we make?' and 'How many groups of 4 ones can we make?'

Remainders can also be seen as they are left ungrouped.

Year 5 - Division

National Curriculum

- ✓ identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- ✓ know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers
- ✓ establish whether a number up to 100 is prime and recall prime numbers up to 19
- ✓ divide numbers mentally drawing upon known facts
- ✓ 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
- ✓ 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 (^{2}) and cubed (^{3})
- ✓ solve problems involving division including using their knowledge of factors and multiples, squares and cubes
- ✓ solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- ✓ solve problems involving division, including scaling by simple fractions and problems involving simple rates

Vocabulary

- ✓ common factors
- ✓ prime
- ✓ prime factors
- ✓ composite numbers
- ✓ dividing by 10, 100 and 1,000

Sentence Stems

Divisible by

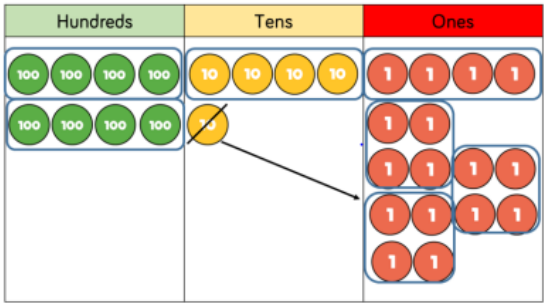
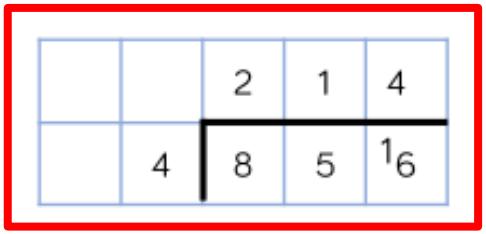
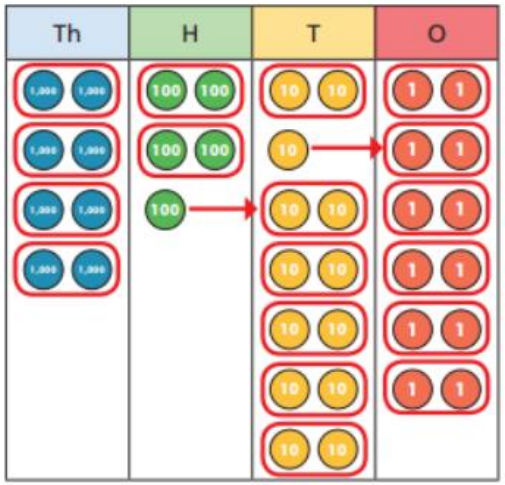
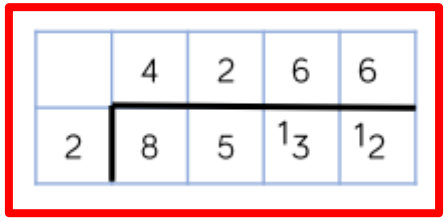
- ✓ (number a) is a multiple of (number b) This means that (number a) is divisible by (number b).
  108 is a multiple of 9. This means that 108 is divisible by 9.
- ✓ (number a) is divisible by (number b) because (number b) x (number c) = (number a)
  108 is divisible by 9 because 9 × 12 = 108

Common factors

- ✓ The factors of (number a) are...
- ✓ The factors of (number b) are...
- ✓ The common factors of (number a) and (number b) are...

  The factors of 15 are 1, 3, 5, 15.
  The factors of 21 are 1, 3, 7 and 21.
  The common factors of 15 and 21 are 1 and 3.

Composite numbers

	✓ A composite number is not prime, it has more than two factors. Dividing by 1,000 ✓ When dividing by 1,000, the digits move three places to the right. ✓ When dividing by 1,000, the number is 1,000 times smaller.
Divide 3-digits by 1-digit (grouping) 856 ÷ 4 = 214   	**Divide 4-digits by 1-digit (grouping)** 8,532 ÷ 2 = 4,266  
Children can continue to use grouping to support their understanding of short division. Place value counters can be used to support this understanding.	Place value counters can be used to support this understanding. Children should be encouraged to move away from the concrete when dividing numbers with multiple exchanges.

Year 6 - Division

National Curriculum

- ✓ divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- ✓ divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- ✓ perform mental calculations, including with mixed operations and large numbers
- ✓ identify common factors, common multiples and prime numbers
- ✓ use their knowledge of the order of operations to carry out calculations involving the four operations
- ✓ solve problems involving addition, subtraction, multiplication and division
- ✓ use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Vocabulary

- ✓ highest common factor
- ✓ brackets
- ✓ order of operations (BIDMAS)

Sentence Stems

Highest common factor

- ✓ The highest common factor (HCF) is the largest common factor of given numbers.
- ✓ The common factors of (number) and (number) are … – the HCF is (number).
  The common factors of 16 and 20 are 1, 2 and 4 – the HCF is 4.

Bracket

- ✓ A bracket is used to tell us which part of an equation to do first according to BIDMAS.

BIDMAS

- ✓ BIDMAS tells us the order in which to complete a calculation. We do Brackets, Indices, Division & Multiplication, Addition and Subtraction.

Divide multi-digits by 2-digits

$$432 \div 12 = 36$$

		0	3	6
	12	4	$4^{}_{3}$	$7^{}_{2}$

$$7{,}335 \div 15 = 489$$

15	30	45	60	75	90	105	120	135	150

		0	4	8	9
	15	7	$7^{}_{3}$	$13^{}_{3}$	$13^{}_{5}$

When children begin to divide up to 4-digits by 2-digits, written methods become the most accurate.

Children can write out their multiples to support their calculations with larger remainders.

Children will also solve problems with remainders where the quotient can be rounded as appropriate.

Divide multi-digits by 2-digits (long division)

$$432 \div 12 = 36$$

		0	3	6	
1	2	4	3	2	(×30)
	–	3	6	0	
			7	2	(×6)
	–		7	2	
				0	

12
24
36
48
60
72
84
96
108
120

$$7{,}335 \div 15 = 489$$

	0	4	8	9	
15	7	3	3	5	
–	6	0	0	0	(×400
	1	3	3	5	
–	1	2	0	0	(×80)
		1	3	5	
–		1	3	5	(×9)
				0	

15
30
45
60
75
150

Children can also divide using long division.

Children can write out multiples to support their calculations with larger remainders where the quotient can be rounded as appropriate.

Divide multi-digits by 2-digits (long division)

$$372 \div 15 = 24 \text{ r}12$$

			2	4	r	1	2
1	5	3	7	2			
	–	3	0	0			
			7	2			
	–		6	0			
			1	2			

15
30
45
60
75
90
105
120
135
150

$$372 \div 15 = 24\frac{4}{5}$$

			2	4	$\frac{4}{5}$
1	5	3	7	2	
	–	3	0	0	
			7	2	
	–		6	0	
			1	2	

When a remainder is left at the end of a calculation, children can either leave it as a remainder or convert it to a fraction. This will depend on the context of the question.

Children can also answer questions where the quotient needs to be rounded according to the context.

Documents used and quoted (including images) in this policy:

National Curriculum - https://www.gov.uk/government/publications/national-curriculum-in-england-framework-for-key-stages-1-to-4

Early Years Statutory Framework - https://www.gov.uk/government/publications/early-years-foundation-stage-framework--2

Development Matters - https://www.gov.uk/government/publications/development-matters--2

White Rose Calculation Policy - Addition and Subtraction / Multiplication and Division - https://whiterosemaths.com/

Third Space Learning Sentence Stems – Addition and Subtraction & Multiplication and Division - https://thirdspacelearning.com/