Calculation policy

Updated September 2024

CHRIST CHURCH CE SCHOOL

Progression of skills - Addition

Year group	Skill
Nursery	• Subitise to 3 • Count how many • Make numbers to 5 • Add 1 more (through songs and rhymes)
Reception	• Conceptual • 1 more • Notice the composition of numbers within 10 • Combine 2 groups • Add more
Year 1	• Add together • Add more • Bonds within 10 • Related facts within 20 • Missing numbers

Progression of skills - Addition

Year group	Skill
Year 2	• Add 1s to any number (related facts) • Add three 1-digit numbers • Add across a 10 • Add multiples of 10 • Add 10s to any number • Add two 2-digit numbers (not across a ten) • Add two 2-digit numbers (across a ten) • Missing numbers
Year 3	• Add 1s, 10s and 100s to a 3-digit number • Add two numbers (no exchange) • Add two numbers across a 10 or 100 • Complements to 100 • Add fractions with the same denominator within 1 whole • Calculate the duration of events

Progression of skills - Addition

Year group	Skill
Year 4	• Add 1s, 10s and 100s to a 4-digit number • Add up to two 4-digit numbers • Add decimal numbers in the context of money • Add fractions and mixed numbers with the same denominator beyond 1 whole
Year 5	• Add using mental strategies • Add whole numbers with more than 4 digits • Add decimals with up to 2 decimal places • Complements to 1 • Add fractions with denominators that are a multiple of one another
Year 6	• Add integers up to 10 million • Add decimals with up to 3 decimal places • Order of operations • Negative numbers • Add fractions
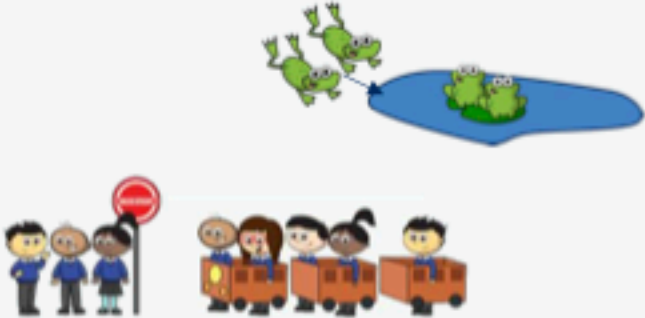
Addition

Nursery	• Begin to have an understanding of numbers to 5 • We recommend focusing on noticing and representing small quantities, perceptual subitising and counting.
Progression of skills	**Key representations**

Progression of skills	Key representations	
Subitise to 3 Instantly see how many.	How many do you see?	
Count how many Begin to count objects using 1-1 correspondence.	How many are there? 1 2 3 4 5	Count out ... from a larger group. E.g. Collect 3 beanbags for a game.
Make numbers to 5 Start by showing 1, 2 and 3 using fingers.	Show me...	Begin to link numerals to quantities.
Add 1 more Through stories, songs and rhymes.	How many do I have now?	
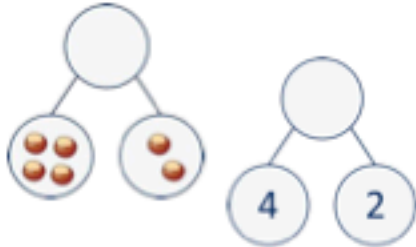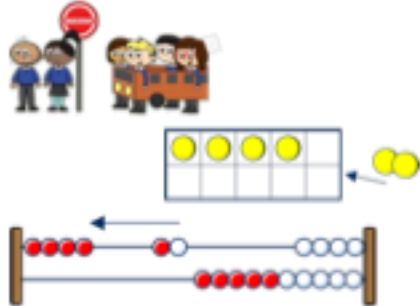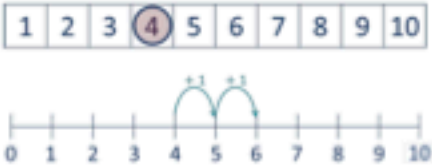
Addition

Reception	• Have a deep understanding of numbers 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 and some number bonds to 10, including double facts.
Progression of skills	**Key representations**
Conceptually subitise to 5 Notice the parts that make up the whole.	What do you see? How do you see it?
1 more Continue to link to stories, songs and rhymes.	1 more than ... is ...
Notice the composition of numbers within 10 Link to stories, songs and rhymes.	How many...? How many...? How many altogether? 	How many ways can you make...?
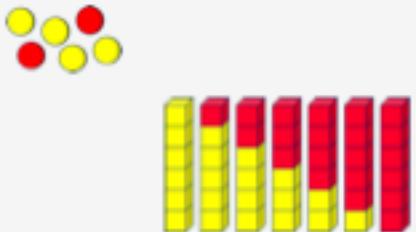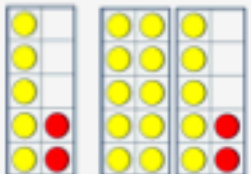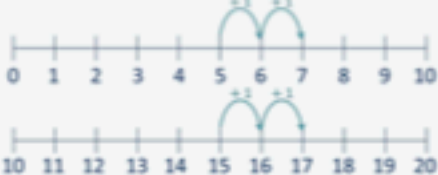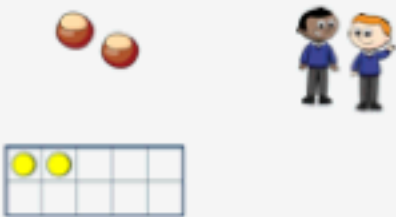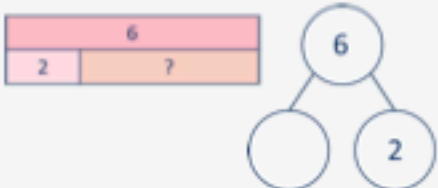
Addition

Progression of skills	Key representations	
Combine 2 groups 2 groups are combined to find the total.	There are …. There are …. There are …. altogether.	…. and …. make ….
Add more A quantity is increased.	First… Then…. Now….	I have …. I add …. more. Now I have….
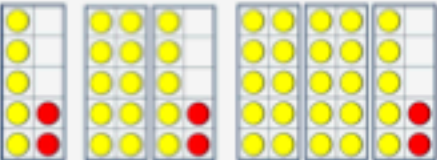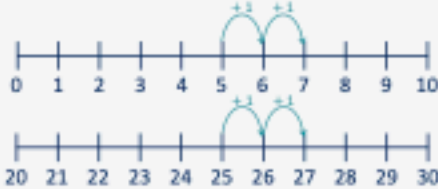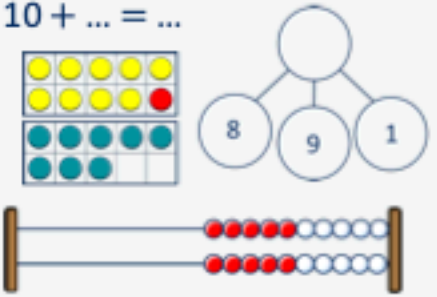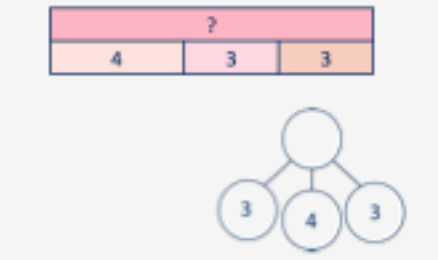
Addition

Year 1	• Read, write and interpret mathematical statements involving addition (+) and equals (=) signs. • Represent and use number bonds within 20 • Add 1-digit and 2-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 $7 = \boxed{} + 2$
Progression of skills	**Key representations**
Add together (aggregation) 2 quantities are combined to find the total.	There are … There are … There are … altogether. 	… is a part. … is a part. … is the whole. 	… plus … is equal to … … is equal to …. + … $4 + 2 = 6$ $2 + 4 = 6$ $6 = 4 + 2$ $6 = 2 + 4$
Add more (augmentation) A quantity is increased.	First… Then… Now… 	I start at … I jump on … I land on … 	… plus … is equal to … is equal to … + … $4 + 2 = 6$ $2 + 4 = 6$ $6 = 4 + 2$ $6 = 2 + 4$
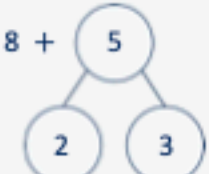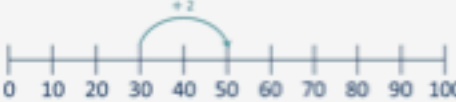
Addition

Progression of skills	Key representations		
Bonds within 10 Include bonds for each number within 10 Encourage children to notice patterns.	… is made of … and … … and … make …	… can be partitioned into … and …	… plus … is equal to … $6 + 0 = 6$ $5 + 1 = 6$ $4 + 2 = 6$ $3 + 3 = 6$ $2 + 4 = 6$ $1 + 5 = 6$ $0 + 6 = 6$
Related facts within 20 Make links to known facts.	I know that … and … = … so … and … = …	… more than … is … so … more than … is …	What patterns do you notice? $5 + 2 = 7$ $15 + 2 = 17$ $7 = 5 + 2$ $17 = 15 + 2$
Missing numbers Make links to known facts.	How many more do you need to make …?	If … is the whole and … is a part, the other part must be…	… plus … is equal to … $2 + \square = 6$ $6 = 2 + \square$
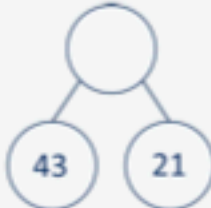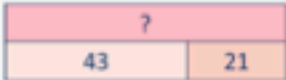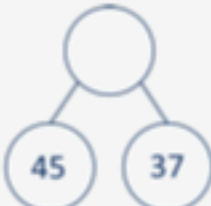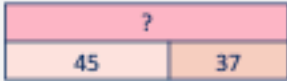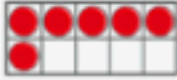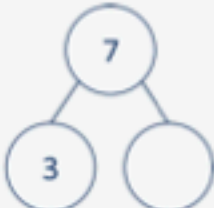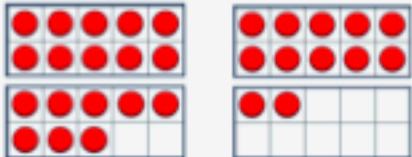
Addition

Year 2	• 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 1s
	    • a two-digit number and 10s
	    • 2 two-digit numbers
	    • adding 3 one-digit numbers
	• Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Progression of skills	**Key representations**
Add ones to any number (related facts) Make links to known facts.	I know that … and … = … so … and … = … 	… more than … is … so … more than … is … 	What do you notice? Can you continue the pattern? $5 + 2 = 7$ $15 + 2 = 17$ $25 + 2 = 27…$
Add three 1-digit numbers Prompt children to understand that addition can be done in any order and to make links to known facts.	… and … are a bond to 10 $10 + … = …$ 	Double … + … = … 	What do you notice? Which addition is the easiest to calculate? $8 + 9 + 1 =$ $8 + 1 + 9 =$ $9 + 1 + 8 =$

Addition

Progression of skills	Key representations

Add across a 10

Partition the number being added to make a full ten.

... can be partitioned into ... and ...

$8 +$ (5), (2), (3)

I add ... to get to ... then I add ...

$8 + 5 = 13$
$28 + 5 = 33$

$28 +$ (5), (2), (3)

Add multiples of 10

Make links to known facts within ten.

... ones + ... ones = ... ones
so ... tens + ... tens = ... tens

$3 + 2 = 5$
$30 + 20 = 50$

What is the same?
What is different?

Add 10s to any number

Make links to known facts.

... tens + ... tens = ... tens
... tens and ... ones = ...

To add ... I need to add 10 ... times.

I know that ... and ... = ...
so ... and ... = ...

$30 + 20 = 50$
$34 + 20 = 54$
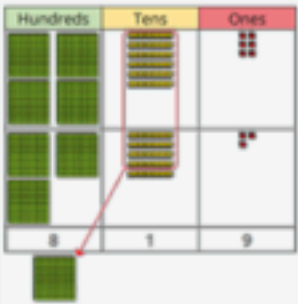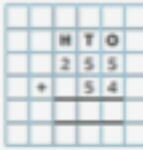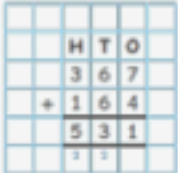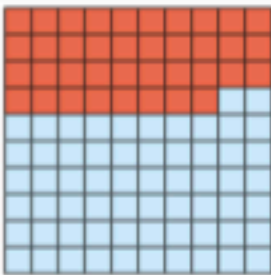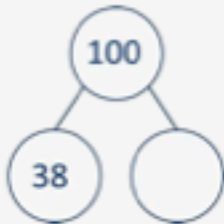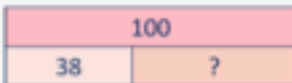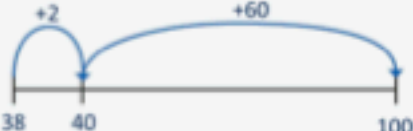
Addition

Progression of skills	Key representations
Add 2-digit numbers (not across a ten) Lining up ones and tens in columns will support with later written methods.	… ones + … ones = … ones … tens + … tens = … tens *(Tens/Ones place value chart and part-whole model: 43 and 21)* 3 ones + 1 one = 4 ones 4 tens + 2 tens = 6 tens 6 tens + 4 ones = 64 *(Bar model: ? over 43 and 21)*
Add 2-digit numbers (across a ten) Begin to exchange 10 ones for 1 ten.	There are …. ones, so I do/do not need to make an exchange. … ones = … ten and … ones *(T/O place value charts showing exchange; bar model: ? over 45 and 37; part-whole model 45 and 37)* 5 ones + 7 ones = 12 ones 12 ones = 1 ten and 2 ones 4 tens + 3 tens + 1 ten = 8 tens 8 tens and 2 ones = 82
Missing numbers Solve missing number problems and use the inverse to check.	**How many more do you need to make …?** *(ten frame with 5 counters)* $6 + \square = 10$ $10 - \square = 6$

If … is a whole and … is a part, then … is the other part.

$\square + 3 = 7$

$7 - 3 = \square$

(part-whole model: 7 with part 3)

… can be partitioned into … and …

$10 + 8 = 12 + \square$

(ten frames showing 18 and 12)
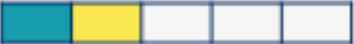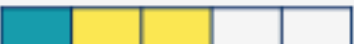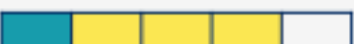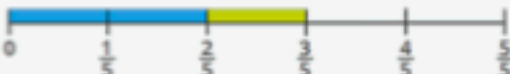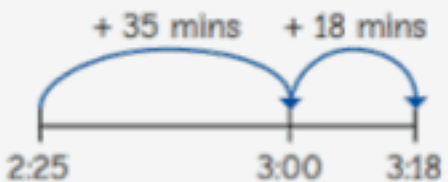
Addition

Year 3	• Add 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. • Add fractions with the same denominator within 1 whole. • Calculate the time taken by particular events or tasks.
Progression of skills	**Key representations**

| **Add 1s, 10s or 100s to a 3-digit number**

Emphasis on mental strategies including number bonds and related facts.
Prompt children to notice which digit changes. | The ones/tens/hundreds column will increase by …

$444 + 5 =$
$444 + 50 =$
$444 + 500 =$ $777 + 2 =$
$777 + 20 =$
$777 + 200 =$ | What patterns do you notice?

$235 + 3 =$
$235 + 30 =$
$235 + 300 =$

$604 + 20 =$
$604 + 50 =$
$604 + 90 =$

$111 + \boxed{} = 118$
$111 + \boxed{} = 181$
$111 + \boxed{} = 811$ |
| **Add two numbers (no exchange)**

Mental strategies and introduction of formal written method. | … ones + … ones = … ones
… tens + … tens = … tens
… hundreds + … hundreds = … hundreds
 | |
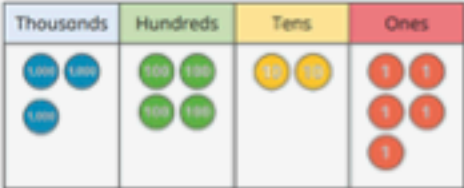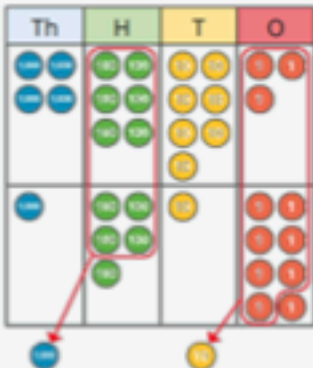
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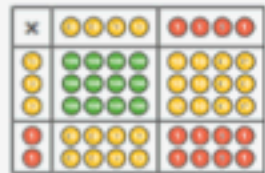| Progression of skills	Key representations
Add two numbers across a 10 or 100 Formal written method involving up to 2 exchanges including 3-digit plus 2-digit numbers.	There are … ones, so I do/do not need to make an exchange. There are … tens, so I do/do not need to make an exchange. … ones = … ten and … ones. … tens = … hundred and … tens.
Complements to 100 Pairs of numbers which total 100	… plus … is equal to 100 I add … to get to the next 10, then … to get to 100 $38 + 62 = 100$ $62 + 38 = 100$ $100 = 38 + 62$ $100 = 62 + 38$

Addition

Progression of skills	Key representations
Add fractions with the same denominator within 1 whole Make links with known facts.	When adding fractions with the same denominator, I only add the numerator. … fifths $+$ … fifths $=$ … fifths $\frac{1}{5} + \frac{1}{5}$ $\frac{1}{5} + \frac{2}{5}$ $\frac{1}{5} + \frac{3}{5}$
Calculate the duration of events Find durations of time between a given start and end point. Children will need to calculate complements to 60	From … to … o'clock is … minutes. From … o'clock to … is … minutes. The total time taken is … minutes. start finish 4:25 start 4:55 finish + 35 mins + 18 mins 2:25 3:00 3:18

Addition
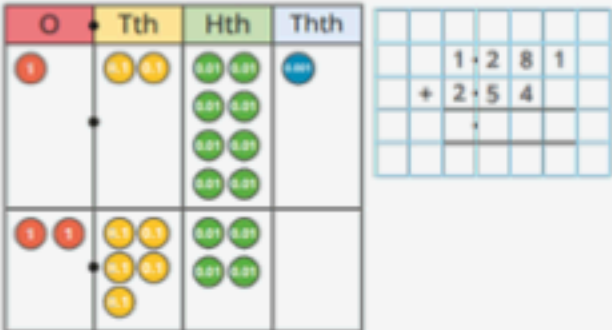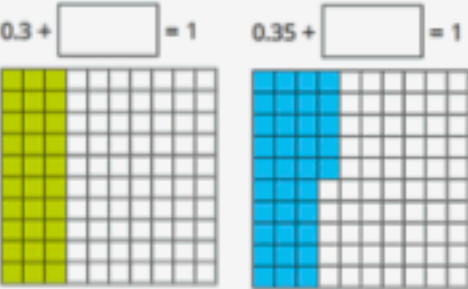
Year 4	• Add numbers with up to 4 digits using a formal written method. • Solve simple measure and money problems involving fractions and decimals to 2 decimal places. • Add fractions with the same denominator.
Progression of skills	**Key representations**
Add 1s, 10s and 100s to a 4-digit number Emphasis on mental strategies including number bonds and related facts. Prompt children to notice which digit changes.	The ones/tens/hundreds/thousands column will increase by … $3,425 + 3 =$ $3,425 + 300 =$ $3,425 + 30 =$ $3,425 + 3,000 =$ What patterns do you notice? $2,350 + 3 =$ $2,350 + 30 =$ $2,350 + 300 =$ $2,350 + 3,000 =$ $6,040 + 200 =$ $6,040 + 500 =$ $6,040 + 900 =$ $2,211 + \boxed{} = 2,251$ $2,211 + \boxed{} = 2,215$ $2,211 + \boxed{} = 2,511$
Add up to two 4-digit numbers Formal written method with up to 3 exchanges. Encourage children to estimate and use inverse operations to check answers to calculations.	There are … ones/tens/hundreds so I do/do not need to make an exchange. I can exchange 10 … for 1 …

Addition

Progression of skills	Key representations	
Add decimal numbers in the context of money Emphasis on partitioning and use of number lines rather than formal written calculations.	... pence + ... pence = ... pence ... pounds + ... pounds = ... pounds £2.45 £3.25 $45p + 25p = 70p$ $£2 + £3 = £5$ $£5 + 70p = £5.70$	£3.25 can be partitioned into £3 + 20p + 5p $+ £3$ $+ 20p$ $+ 5p$ £2.45 £5.45 £5.65 £5.70
Add fractions and mixed numbers with the same denominator beyond 1 whole	When adding fractions with the same denominator, I only add the numerator. ... fifths + ... fifths = ... fifths $\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$ $\frac{3}{5}$ $\frac{4}{5}$ $+\frac{3}{5}$ 0 1 $1\frac{1}{5}$ $1\frac{4}{5}$ 2 3	
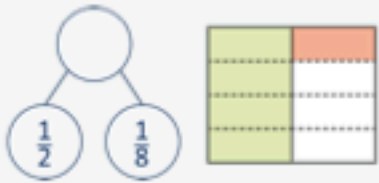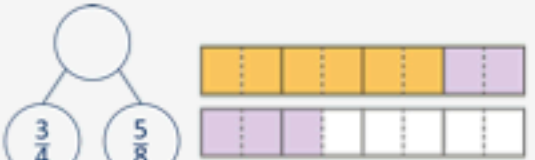
Addition

Year 5	- Add whole numbers with more than 4 digits, including using formal written methods. - Add numbers mentally with increasingly large numbers. - Add decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 - Add fractions with the same denominator, and denominators that are multiples of the same number.
Progression of skills	**Key representations**
Add using mental strategies Add 1s, 10s, 100s, etc. to any number. Use number bonds and related facts.	TTh | Th | H | T | O $48,650 + 300 =$ $48,650 + 30,000 =$ $48,650 + 30 \ =$ To add ..., I can add ... then subtract ... ? / 6,458 | 99 + 100 + 99 -1 6,458 ... 6,557 6,558
Add whole numbers with more than 4 digits Encourage children to estimate and use inverse operations to check answers to calculations.	I can exchange 10 ... for 1 ... TTh | Th | H | T | O 4 2 8 0 5 2 6 5 7 4 + 1 6 2 3 1 4 2 8 0 5 1 1 4 1 + 2 8 4 8 9 9 2 6

Addition

Progression of skills	Key representations
Add decimals with up to 2 decimal places Progress from the same number of decimal places to a different number of decimal places, and from no exchange to exchange.	I do/do not need to make an exchange because … I can exchange 10 … for 1 …
Complements to 1 Pairs of numbers with up to 3 decimal places which total 1 Encourage children to make links with bonds to 10 and complements to 100 and 1,000	 $4 + 6 = 10$ $0.4 + 0.6 = 1$ $44 + 56 = 100$ $0.44 + 0.56 = 1$ $444 + 556 = 1,000$ $0.444 + 0.556 = 1$
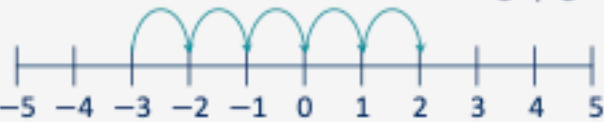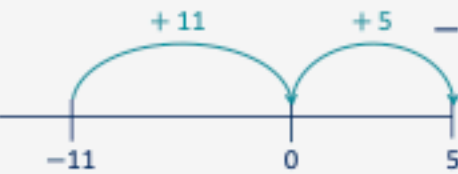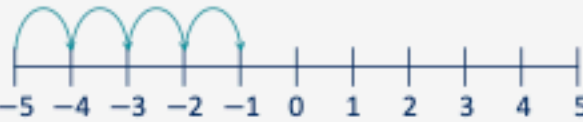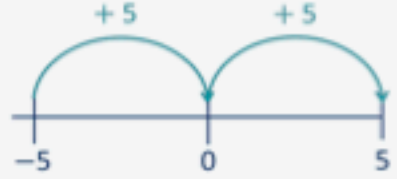
Addition

Progression of skills	Key representations
Add fractions with denominators that are a multiple of one another Encourage children to convert fractions to the same denominator before adding. Progress from adding fractions within 1 whole to adding fractions beyond 1 whole.	The denominator has been multiplied by …, so the numerator needs to be multiplied by… for the fractions to be equivalent. $\frac{1}{2} + \frac{1}{8} = \frac{4}{8} + \frac{1}{8} = \frac{5}{8}$ $\frac{1}{4} + \frac{3}{8} = \frac{2}{8} + \frac{3}{8} = \frac{5}{8}$ $\frac{3}{4} + \frac{5}{8} = \frac{6}{8} + \frac{5}{8} = \frac{11}{8} = 1\frac{3}{8}$
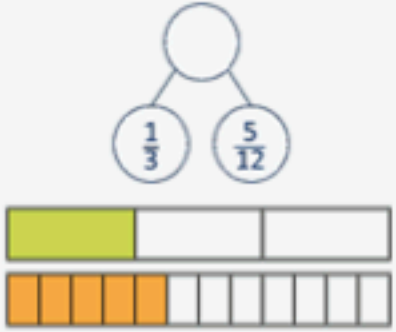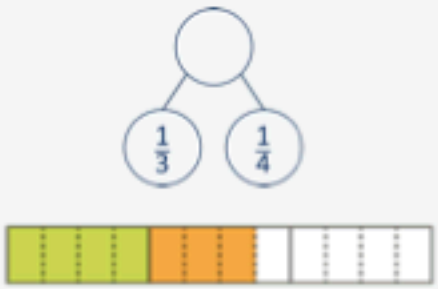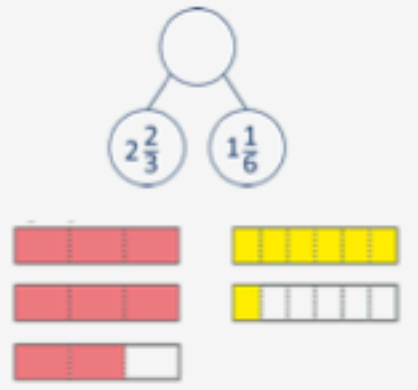
Addition

Year 6	• Add larger numbers, using the formal written method of columnar addition. • Use their knowledge of the order of operations to carry out calculations involving the 4 operations. • Calculate intervals across zero. • Add fractions with different denominators and mixed numbers, using the concept of equivalent fractions.
Progression of skills	**Key representations**
Add integers up to 10 million Encourage children to estimate and use inverse operations to check answers to calculations.	
Add decimals with up to 3 decimal places Progress to numbers with digits in different place value columns. Encourage children to check that they have lined up the columns correctly.	I do/do not need to make an exchange because …

Addition

Progression of skills	Key representations
Order of operations Calculations in brackets should be done first. Multiplication and division should be performed before addition and subtraction. *When no brackets are shown and the operations have the same priority, work left to right.	... has greater priority than ..., so the first part of the calculation I need to do is ... $(3 + 4) \times 2 = 14$ $3 + 4 \times 2 = 11$ $3 \times 4 + 2 = 14$
Negative numbers Children add to negative numbers and carry out calculations which cross 0	... plus ... is equal to ... $-3 + 5 = 2$ $-11 + 16 = 5$ The difference between -5 and -1 is 4 $+5$ $+5$ The difference between -5 and 5 is 10

Addition

Progression of skills	Key representations		
Add fractions Convert fractions to the same denominator before adding. Progress from fractions where one denominator is a multiple of the other, to any fractions and then to mixed numbers.	The denominator has been multiplied by …, so the numerator needs to be multiplied by … 	The lowest common multiple of … and … is … $$\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$$	…is made up of … wholes and …

Progression of skills - Multiplication

Year group	Skill
Nursery	• Continue with counting and subitising skills as a foundation for later work on equal groups. (see addition and subtraction sections)
Reception	• Double to 10 • Make equal groups
Year 1	• Count in 2s, 5s and 10s • Add equal groups • Make arrays • Make doubles

Progression of skills - Multiplication

Year group	Skill
Year 2	• Link repeated addition and multiplication • Use arrays • Double • The 2 times-table • The 10 times-table • The 5 times-table • Missing numbers
Year 3	• The 3 times-table • The 4 times-table • The 8 times-table • Related facts • Multiply a 2-digit number by a 1-digit number - no exchange • Multiply a 2-digit number by a 1-digit number - with exchange • Scaling • Correspondence problems

Progression of skills - Multiplication

Year group	Skill
Year 4	• Times-table facts to 12 × 12 • Multiply by 1 and 0 • Multiply 3 numbers • Factor pairs • Multiply by 10 and 100 • Related facts • Mental strategies • Multiply a 2 or 3-digit number by a 1-digit number • Scaling • Correspondence problems
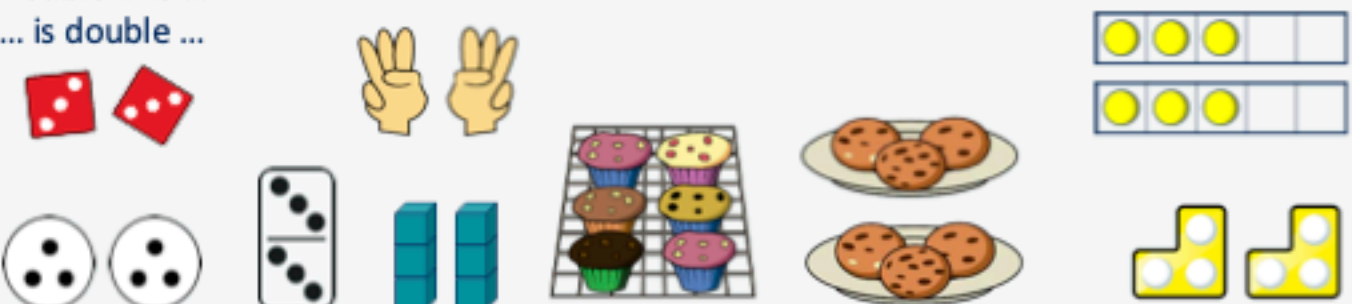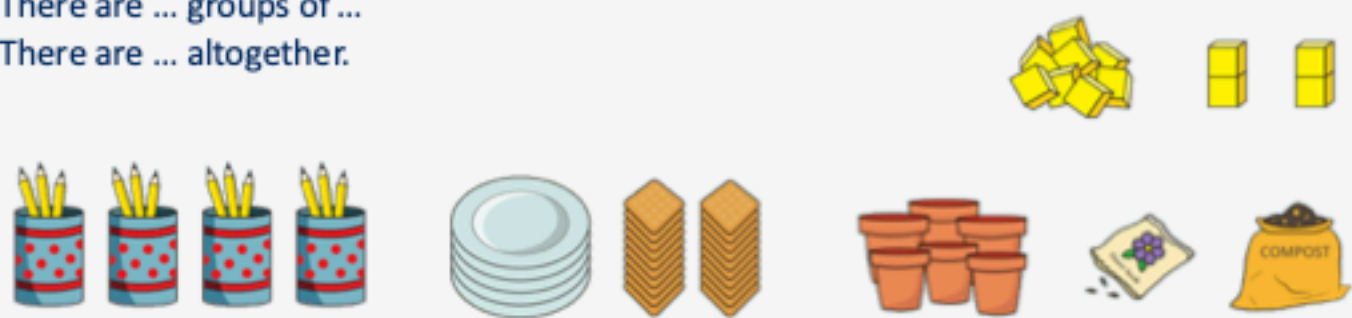
Progression of skills - Multiplication

Year group	Skill
Year 5	• Multiples and factors • Square and cube numbers • Multiply numbers up to 4 digits by a 1-digit number • Multiply numbers up to 4 digits by a 2-digit number • Multiply by 10, 100 and 1,000 • Mental strategies • Multiply fractions by a whole number • Multiply mixed numbers by a whole number • Find the whole

Progression of skills - Multiplication

Year group	Skill
Year 6	• Multiply numbers up to 4 digits by a 2-digit number • Multiply by 10, 100 and 1,000 • Order of operations • Multiply decimals by integers • Multiply fractions by fractions • Find the whole • Calculations involving ratio
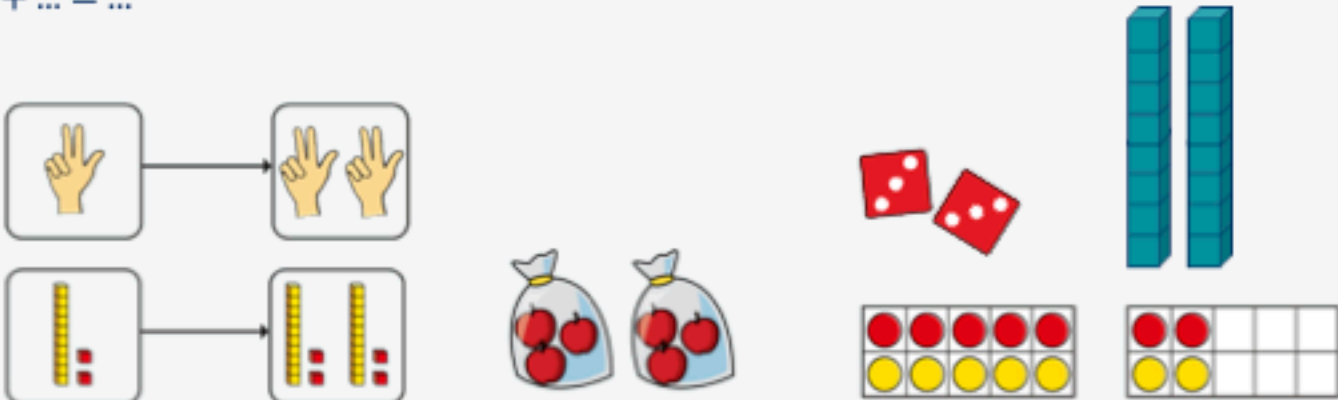
Multiplication

Reception	• 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 and some number bonds to 10, including double facts. • Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.
Progression of skills	**Key representations**
Double to 10 Prompt children to notice that double means twice as many and to notice that there are two equal groups.	Double ... is ... ... is double ...
Make equal groups Provide opportunities to make equal groups when tidying up or during snack time. Encourage children to check that each group has the same amount.	There are ... groups of ... There are ... altogether.
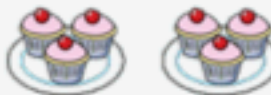
Multiplication

Year 1	• Count in multiples of twos, fives and tens. • Solve one-step problems involving multiplication, using concrete objects, pictorial representations and arrays with the support of the teacher.
Progression of skills	**Key representations**

Count in 2s, 5s and 10s Begin by counting objects that naturally come in 2s, 5s and 10s, for example pairs of socks or fingers.	There are ... equal groups of ... There are ... altogether. 	Continue to colour in ...s What do you notice? 	Complete the number track/number line by counting in ...s.

Add equal groups (repeated addition) Children should be able to write a repeated addition to represent equal groups and to draw pictures or use objects to represent a repeated addition.	There are ... groups of ... There are ... altogether. $10 + 10 + 10 = 30$ $5 + 5 + 5 + 5 = 20$	What is the same? What is different? $$2 + 2 + 2 =$$ $$5 + 5 + 5 =$$ $$10 + 10 + 10 =$$ Use objects or a drawing to represent the equal groups and find how many in total.
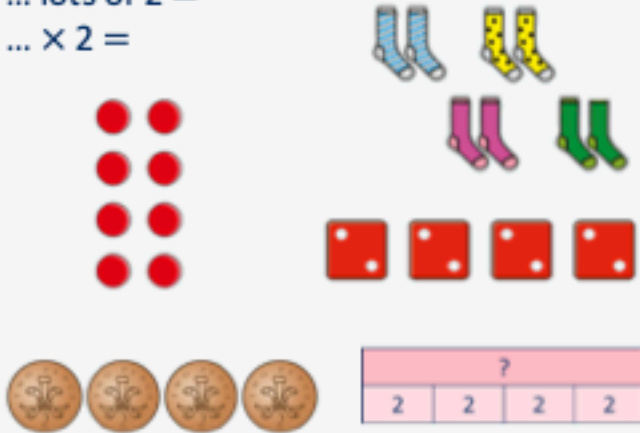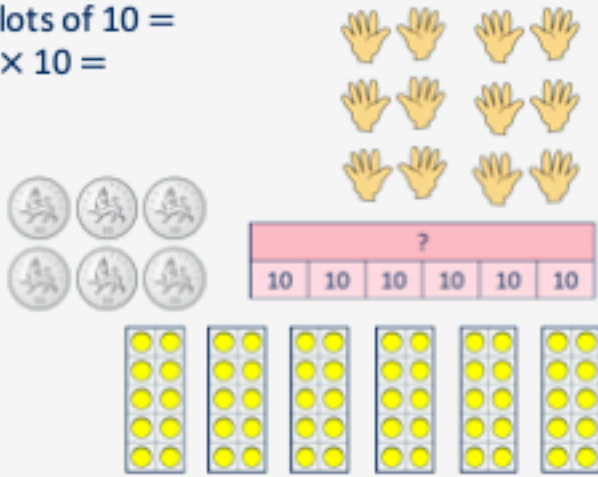
Multiplication

Progression of skills	Key representations
Make arrays Children use their knowledge of adding equal groups to arrange objects in columns and rows.	There are … rows of … There are … altogether. There are … columns of … There are … altogether.
Make doubles Children understand that doubles are two equal groups. Children may begin to explore doubles beyond 20 using base 10	Double … is … … + … = …
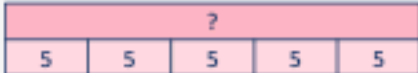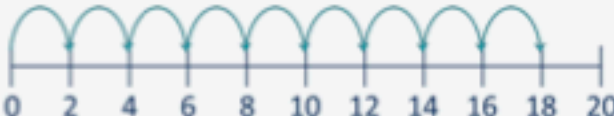
Multiplication

Year 2	• Recall and use multiplication facts for the 2, 5 and 10 multiplication tables. • 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).
Progression of skills	**Key representations**
Link repeated addition and multiplication Encourage children to make the link between repeated addition and multiplication.	There are … equal groups with … in each group. There are … altogether. $3 + 3 = 6$ $2 \times 3 = 6$ $5 + 5 + 5 + 5 = 20$ $4 \times 5 = 20$
Use arrays Encourage children to see that multiplication is commutative.	There are … rows with … in each row. There are … columns with … in each column. 3 lots of 5 = 15 $5 + 5 + 5 = 15$ 5 lots of 3 = 15 $3 + 3 + 3 + 3 + 3 = 15$	I can see … × … and … ×… $3 \times 5 = 15$ $5 \times 3 = 15$ $3 \times 5 = 5 \times 3$
Double Encourage children to make links with related facts.	Double … is … Double $4 = 4 + 4$ Double 4 is 8	Double … is … so double … is … Double 4 is 8 Double 40 is 80
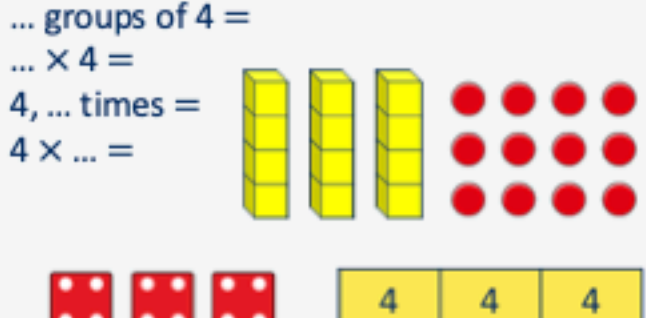
Multiplication

Progression of skills	Key representations	
The 2 times-table Encourage daily counting in multiples both forwards and back. Notice that all multiples of 2 are even numbers.	... lots of 2 = ... × 2 = 	... times 2 is equal to ... $1 \times 2 = 2 \quad 2 = 1 \times 2$ $2 \times 2 = 4 \quad 4 = 2 \times 2$ $3 \times 2 = 6 \quad 6 = 3 \times 2$
The 10 times-table Encourage daily counting in multiples both forwards and back. Notice the pattern in the numbers.	... lots of 10 = ... × 10 = 	... times 10 is equal to ... $1 \times 10 = 10 \quad 10 = 1 \times 10$ $2 \times 10 = 20 \quad 20 = 2 \times 10$ $3 \times 10 = 30 \quad 30 = 3 \times 10$

Multiplication

Progression of skills	Key representations	
The 5 times-table Encourage daily counting in multiples both forwards and back. Notice the pattern in the numbers.	… lots of 5 = … × 5 = 	… times 5 is equal to … $1 \times 5 = 5 \qquad 5 = 1 \times 5$ $2 \times 5 = 10 \qquad 10 = 2 \times 5$ $3 \times 5 = 15 \qquad 15 = 3 \times 5$
Missing numbers Make links to known facts.	… is equal to … groups of … 18 socks, how many pairs? 	… times … is equal to … $\Box \times 2 = 18$ $18 = 2 \times \Box$

Multiplication

Year 3	• 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, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.
Progression of skills	**Key representations**

| **The 3 times-table**

Encourage daily counting in multiples both forwards and back. | ... groups of 3 =
... × 3 =
3, ... times =
3 × ... = | ... times 3 is equal to ...

$4 \times 3 = 12 \quad 12 = 4 \times 3$

0 3 6 9 12 15 18 21 24 27 30 33 36 |
| **The 4 times-table**

Encourage daily counting in multiples both forwards and back. Encourage children to notice links between the 2 and 4 times-tables. | ... groups of 4 =
... × 4 =
4, ... times =
4 × ... = | ... times 4 is equal to ...

$3 \times 4 = 12 \quad 12 = 3 \times 4$

0 4 8 12 16 20 24 28 32 36 40 44 48 |
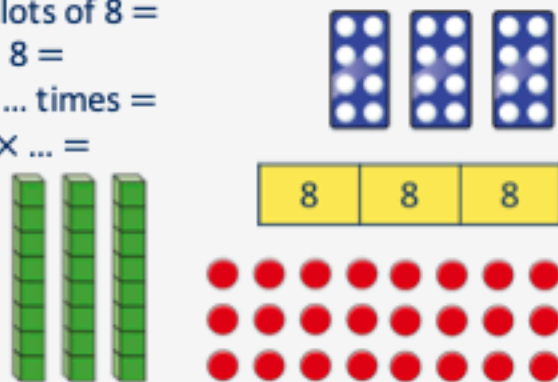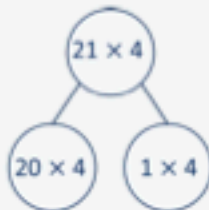
Multiplication

Progression of skills	Key representations
The 8 times-table Encourage daily counting in multiples both forwards and back. Encourage children to notice links between the 2, 4 and 8 times-tables.	… lots of 8 = × 8 = 8, … times = 8 × … = … times 8 is equal to … $3 \times 8 = 24$ $24 = 3 \times 8$
Related facts Use knowledge of multiplying by 10 to scale times-table facts.	… × … ones is equal to … ones so … × … tens is equal to … tens. $3 \times 4 = 12$ $3 \times 40 = 120$
Multiply a 2-digit number by a 1-digit number - no exchange Children apply their understanding of partitioning to represent and solve calculations using the expanded method.	… tens multiplied by … is equal to … tens. …ones multiplied by … is equal to … ones. $30 \times 2 = 60$ $2 \times 2 = 4$ $32 \times 2 = 64$

Multiplication

Progression of skills	Key representations
Multiply a 2-digit number by a 1-digit number - with exchange Children apply their understanding of partitioning to represent and solve calculations using the expanded method.	... tens multiplied by ... is equal to ... tens. ... ones multiplied by ... is equal to ... ones. **Tens / Ones** $20 \times 4 = 80$ $4 \times 4 = 16$ $24 \times 4 = 96$ 45×3 40×3 5×3 Tens / Ones
Scaling Children focus on multiplication as scaling (.... times the size) as opposed to repeated addition.	There are .... times as many ... as ... 2 2 2 2 There are 3 times as many triangles as circles. ... is ... times the size of ... ... is ... times the length/height of ... 4 cm 16 cm Miss Smith is twice the height of Jo.

Multiplication
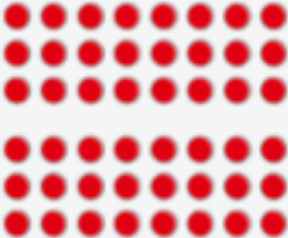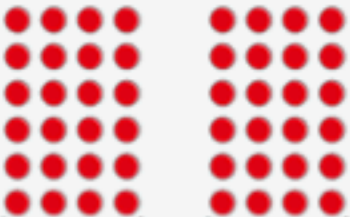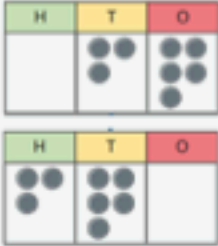
Progression of skills	Key representations
Correspondence problems (How many ways?) Encourage children to work systematically to find all the different possible combinations.	For every … , there are … possible … There are … × … possibilities altogether. For every hat, there are two possible scarves. $3 \times 2 = 6$ There are 6 possibilities altogether.
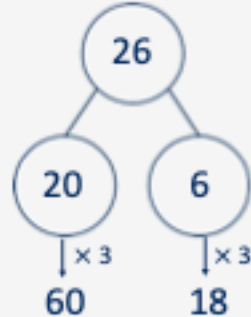
Multiplication

Year 4	• 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.
Progression of skills	**Key representations**
Times-table facts to 12 × 12 Encourage daily counting in multiples both forwards and back. Encourage children to notice links between related times-tables.	… groups of … = … times … is equal to … … × … =
Multiply by 1 and 0	Any number multiplied by 1 is equal to … Any number multiplied by 0 is equal to … … × … = … $1 \times 1 = 1$ $\quad$ $1 \times 0 = 0$ $2 \times 1 = 2$ $\quad$ $2 \times 0 = 0$ $3 \times 1 = 3$ $\quad$ $3 \times 0 = 0$ $4 \times 1 = 4$ $\quad$ $4 \times 0 = 0$

Multiplication

Progression of skills	Key representations
Multiply 3 numbers Children use their understanding of commutativity to multiply more efficiently.	To work out … $\times$ … $\times$ …, I can first calculate … $\times$ … and then multiply the answer by … $4 \times 2 \times 3 = 8 \times 3 = 24$ $2 \times 3 \times 4 = 6 \times 4 = 24$ $3 \times 4 \times 2 = 12 \times 2 = 24$
Factor pairs Children explore equivalent calculations using different factors pairs.	$12 = \ldots \times \ldots$, so … $\times$ 12 $= \ldots \times \ldots \times \ldots$ $8 \times 6 = 8 \times 3 \times 2$ $8 \times 6 = 24 \times 2$ $6 \times 8 = 6 \times 4 \times 2$ $6 \times 8 = 24 \times 2$
Multiply by 10 and 100 Some children may over-generalise that multiplying by 10 or 100 always results in adding zeros. This will cause issues later when multiplying decimals.	When I multiply by 10, the digits move … place value column to the left. … is 10 times the size of … $35 \times 10 = 350$	When I multiply by 100, the digits move … place value columns to the left. … is 100 times the size of … $14 \times 100 = 1,400$

Multiplication

Progression of skills	Key representations
Related facts Use knowledge of multiplying by 10 and 100 to scale times-table facts.	... × ... ones is equal to ... ones so ... × ... tens is equal to ... tens and ... × ... hundreds is equal to ... hundreds. $3 \times 7 = 21$ $7 \times 3 = 21$ $3 \times 70 = 210$ $7 \times 30 = 210$ $3 \times 700 = 2,100$ $7 \times 300 = 2,100$
Mental strategies Partition 2 or 3-digit numbers to multiply using informal methods.	... tens multiplied by ... is equal to ... tens. ...ones multiplied by ... is equal to ... ones. $3 \times 26 = 60 + 18 = 78$ $26 \times 8 = 80 + 80 + 48 = 208$

Multiplication

Progression of skills	Key representations
Multiply a 2 or 3-digit number by a 1-digit number The short multiplication method is introduced for the first time, initially in an expanded form.	To multiply a 2-digit number by … , I multiply the ones by … and the tens by … To multiply a 3-digit number by … , I multiply the ones by … , the tens by … and the hundreds by …
Scaling Children focus on multiplication as scaling (… times the size).	… is … times the size of … A computer mouse costs £7 A keyboard costs 6 times as much. A red ribbon is 6 cm. A yellow ribbon is 7 times as long.
Correspondence problems Encourage children to use tables to show all the different possible combinations.	For every … , there are … possibilities. There are … × … possibilities altogether. A pizza company offers a choice of 5 toppings and 3 bases. $5 \times 3 = 15$ |	Deep pan	Italian	Thin
---	---	---	---
Cheese	C DP	C I	C Th
Mushroom	M DP	M I	M Th
Vegetable	V DP	V I	V Th
Chicken	C DP	C I	C Th
Tuna	T DP	T I	T Th	

Multiplication

Year 5	• Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers • Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}) • 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 • Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.
Progression of skills	**Key representations**
Multiples and factors Encourage children to notice patterns and make links with known facts.	... is a multiple of ... because ... × ... = ... is a factor of ... because ... × ... = ... •••••••• 1 × 8 2 × 4 1, 2, 4 and 8 are factors of 8 The common factors of ... and ... are ... Factors of 20 Factors of 12 20 5 1 2 3 6 10 4 12
Square and cube numbers	... squared means ... × ... 1 × 1 2 × 2 3 × 3 4 × 4 $1^2 = 1$ $2^2 = 4$ $3^2 = 9$ $4^2 = 16$ ... cubed means ... × ... × ... 1 × 1 × 1 2 × 2 × 2 3 × 3 × 3 $1^3 = 1$ $2^3 = 8$ $3^3 = 27$
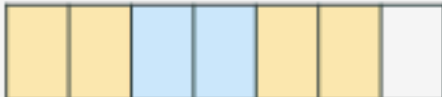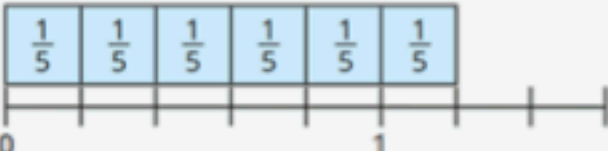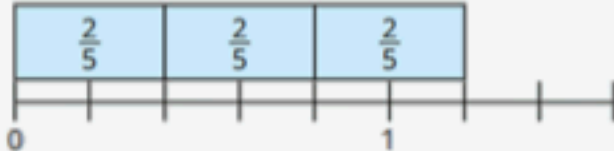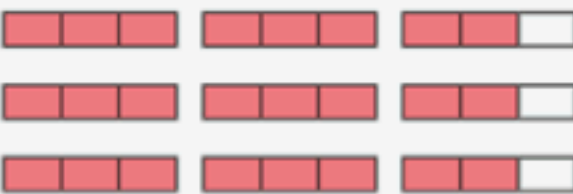
Multiplication

Progression of skills	Key representations
Multiply numbers up to 4 digits by a 1-digit number This builds on the short multiplication method introduced in Y4	To multiply a 4-digit number by … , I multiply the ones by … , the tens by … , the hundreds by … and the thousands by …

| **Multiply numbers up to 4 digits by a 2-digit number**

Numbers are first partitioned using an area model then long multiplication is introduced for the first time. | I can partition … into … and …

$32 \times 44 = 1,200 + 80 + 120 + 8$
$32 \times 44 = 1,408$ | First, I multiply by the … Then I multiply by the …

$300 + 90 + 20 + 6 = 416$

(32×3)
(32×10) |
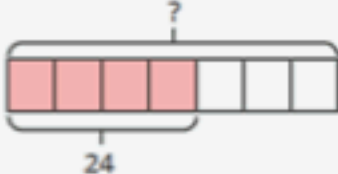
Multiplication

Progression of skills	Key representations
Multiply by 10, 100 and 1,000 Some children may over-generalise that multiplying by a power of 10 always results in adding zeros. This will cause issues later when multiplying decimals.	To multiply by 10/100/1,000, I move all the digits … places to the left. … is 10/100/1,000 times the size of … $234 \times 10 = 2,340$ $234 \times 100 = 23,400$ $234 \times 1,000 = 234,000$ $2.34 \times 10 = 23.4$ $2.34 \times 100 = 234$ $2.34 \times 1,000 = 2,340$
Mental strategies Children continue to use efficient mental strategies such as partitioning and knowledge of factor pairs and related facts to multiply.	The most efficient strategy to calculate … × … is … To calculate … × 12, I can do … × … × … For example: 121×12 I could calculate 100×12 plus 20×12 plus 1×12 I could calculate 121×10 plus 121×2 I could calculate $121 \times 6 \times 2$ I could calculate $121 \times 4 \times 3$

Multiplication

Progression of skills	Key representations
Multiply fractions by a whole number Make links with repeated addition. E.g. $\frac{1}{5} \times 4 = \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5}$	To multiply a fraction by an integer, I multiply the numerator by the integer and the denominator remains the same. $\frac{1}{7} \times 5 = \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} = \frac{5}{7}$ $\frac{2}{7} \times 3 = \frac{2}{7} + \frac{2}{7} + \frac{2}{7} = \frac{6}{7}$ $\frac{1}{5} \times 6 = \frac{6}{5} = 1\frac{1}{5}$ $\frac{2}{5} \times 3 = \frac{6}{5} = 1\frac{1}{5}$
Multiply mixed numbers by a whole number	I can partition $\boxed{\ }\frac{\boxed{\ }}{\boxed{\ }}$ into $\boxed{\ }$ and $\frac{\boxed{\ }}{\boxed{\ }}$ $2\frac{2}{3} \times 3$ $2 \times 3 = 6$ $\frac{2}{3} \times 3 = \frac{6}{3} = 2$ $2\frac{2}{3} \times 3 = 6 + 2 = 8$
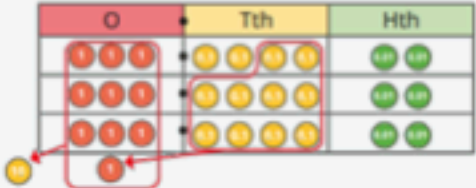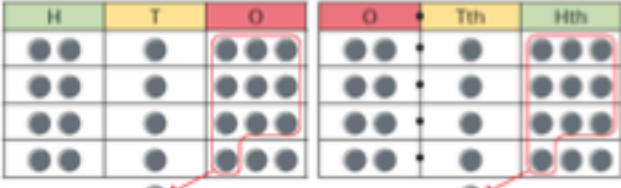
Multiplication

Progression of skills	Key representations	
Find the whole Children multiply to find the whole from a given part.	If $\frac{1}{\square}$ is ... , then the whole is ... $\times$ ... $\frac{1}{5}$ of __ = 6 ? $5 \times 6 = 30$ $\frac{1}{5}$ of **30** = 6	If $\frac{\square}{\square}$ is ... , then $\frac{1}{\square}$ is ... and the whole is ... $\times$ ... $\frac{4}{7}$ of __ = 24 $\frac{1}{7} = 24 \div 4 = 6$ $7 \times 6 = 42$ $\frac{4}{7}$ of **42** = 24

Multiplication

Year 6	• Identify common factors and common multiples. • Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. • Multiply numbers by 10, 100 and 1,000 • Multiply one-digit numbers with up to two decimal places by whole numbers. • Use their knowledge of the order of operations to carry out calculations involving the 4 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 multiplication and division facts. • Solve problems involving the calculation of percentages.
Progression of skills	**Key representations**
Multiply numbers up to 4 digits by a 2-digit number	To multiply by a 2-digit number, first multiply by the ones, then multiply by the tens and then find the total. $\begin{array}{r} 1\ 2\ 0\ 7 \\ \times\quad\ 3\ 6 \\ \hline +\ \ 7\ 2\ 4\ 2 \quad (1{,}207 \times 6) \\ 3\ 6\ 2\ 1\ 0 \quad (1{,}207 \times 30) \\ \hline 4\ 3\ 4\ 5\ 2 \\ {}^{1}\ \ \end{array}$
Multiply by 10, 100 and 1,000 Some children may over-generalise that multiplying by a power of 10 always results in adding zeros.	To multiply by 10/100/1,000, I move all the digits … places to the left. … is 10/100/1,000 times the size of … | M	HTh	TTh	Th	H	T	O | | Th	H	T	O • Tth	Hth	Thth | $234 \times 10 = 2{,}340$ $234 \times 100 = 23{,}400$ $234 \times 1{,}000 = 234{,}000$ $0.234 \times 10 = 2.34$ $0.234 \times 100 = 23.4$ $0.234 \times 1{,}000 = 234$

Multiplication

Progression of skills	Key representations
Order of operations Calculations in brackets should be done first. Multiplication and division should be performed before addition and subtraction.	… has greater priority than …, so the first part of the calculation I need to do is … $(3 + 4) \times 2 = 14$ $3 + 4^2 = 19$ $3 + 4 \times 2 = 11$
Multiply decimals by integers This is the first time children multiply decimals by numbers other than 10, 100 or 1,000 Encourage them to make links with known facts and whole number multiplication.	I know that … $\times$ … = …, so I also know that … $\times$ … = … $6 \times 2 = 12$ $6 \times 0.2 = 1.2$ I need to exchange 10 … for 1 … $213 \times 4 = 852$ $2.13 \times 4 = 8.52$

Multiplication

Progression of skills	Key representations
Multiply fractions by fractions Encourage children to give answers in their simplest form.	When multiplying a pair of fractions, I need to multiply the numerator and multiply the denominator. $\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$ $\qquad$ $\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$ $\qquad$ $\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$
Find the whole Children multiply to find the whole from a given part.	If $\frac{1}{\square}$ is ... , then the whole is ... $\times$ ... $\qquad$ If $\frac{\square}{\square}$ is ... , then $\frac{1}{\square}$ is ... and the whole is ... $\times$ ... $\frac{1}{3}$ of ___ = 18 $\qquad\qquad\qquad\qquad$ $\frac{4}{9}$ of ___ = 48 $\qquad$ $18 \times 3 = 54$ $\qquad$ $\qquad$ $\frac{1}{9} = 48 \div 4 = 12$ $\qquad\qquad\qquad\qquad$ $\frac{1}{3}$ of **54** = 18 $\qquad\qquad\qquad\qquad$ $9 \times 12 = 108$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ $\frac{4}{9}$ of **108** = 48

Multiplication

Progression of skills	Key representations
Calculate percentages Children first learn how to find 1%, 10%, 20%, 25% and 50% before using multiples of these amounts to find any percentage.	There are … lots of … % in 100% To find … %, I need to divide by … **100%** / 50% / 50% / 25% / 25% / 25% / 25% 50% of … = …÷ 2 25% of … = …÷ 4 … % is made up of … %, and … % **100%** / 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% To find 30%, I can find 10% and then multiply it by 3 To find 23%, I can use 10% × 2 and 1% × 3 To find 99%, I can find 1%, then subtract from 100%
Calculations involving ratio Encourage children to see the multiplicative relationship between ratios. They will need to multiply or divide each value by the same number to keep the ratio equivalent. Double number lines and ratio tables help children to see both horizontal and vertical multiplicative relationships.	For every … , there are … For every 1 adult on a school trip, there are 6 children. adults ▢ children ▢▢▢▢▢▢ The ratio of adults to children is 1 : 6 × 6 | Adults	Children
1	6
2	12
3	18 | × 3 … × 3 × 6 0 1 2 3 4 5 6 Adults / Children 0 6 12 18