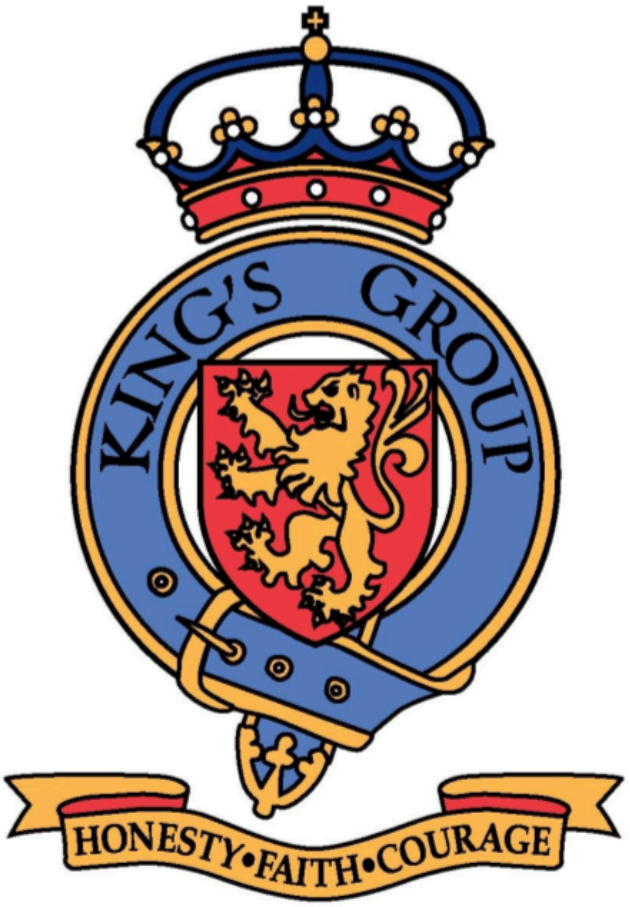
King’s Academy Gomer



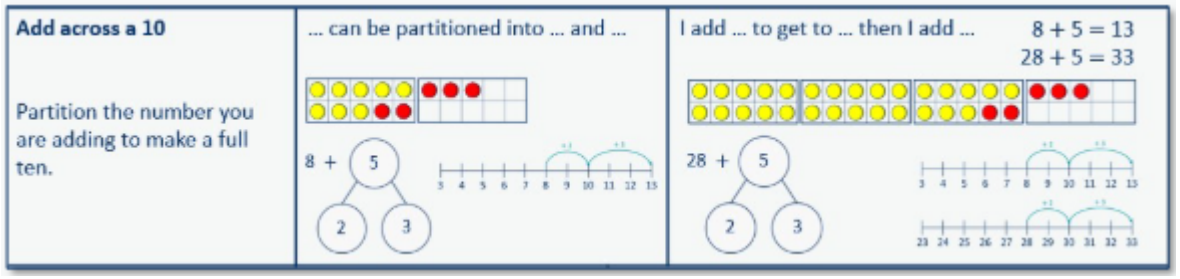
Calculation Policy 2025

Guidance for teachers

The calculation policy is divided into four sections: addition, subtraction, multiplication and division. At the start of each section, you will find an overview of the progression of skills. Calculations involving decimal numbers and fractions are included.

The calculation policy follows the same concrete, pictorial, abstract approach as our main schemes of learning. Where appropriate, sentence stems and key questions are included alongside the key representations.

Where skills are divided into more than one section across the page, there is a progression in the level of difficulty from left to right.
For example, when adding across a 10, children need to be able to add across 10 itself, before making links with related facts.



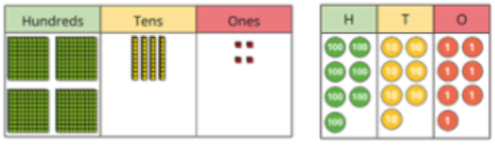
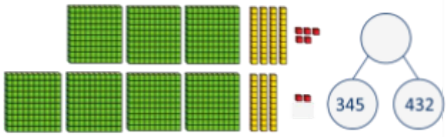
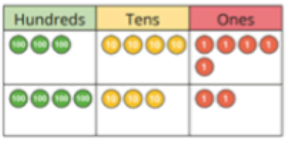
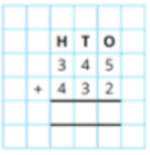
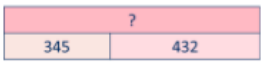
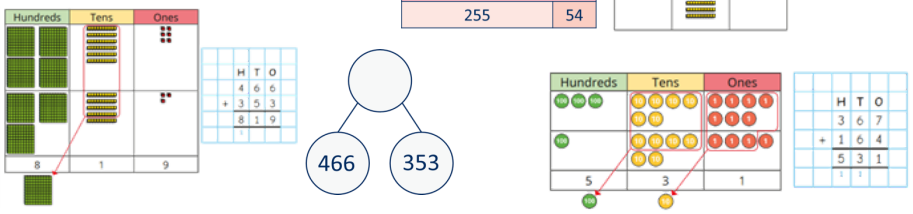
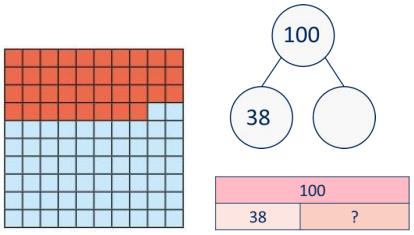
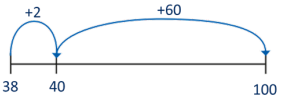
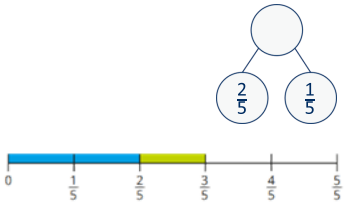
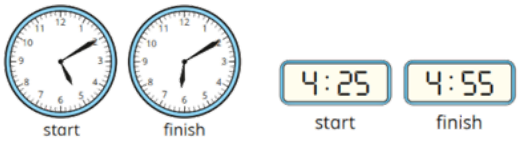
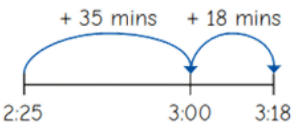
Progression of skills - Addition

Nursery to Yr 2 have been included for reference of learning prior to joining KGA Gomer at Year 3.

Yr Group	Skill
Nursery	Subitise to 3 Count how many Make numbers to 5 Intro to adding 1 more
Year R	Subitise to 5 1 more Composition of numbers to 10 Combine 2 groups Add more
Year 1	Add together Add more Bonds within 10 Related facts within 20 Missing numbers
Year 2	Add 1s to any number Add 3 1-digit numbers Add across a 10 Add multiples of 10 Add 10s to any number Add two 2-digit numbers Missing numbers
Year 3	Add integers up to 10 million Add decimals with up to 3 decimal places Order of operations Negative numbers Add fractions
Year 4	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 5	Add 1s, 10s and 100s to a 4-digit number Add up to two 4-digit numbers Complements to 1 Add decimal numbers in the context of money Add fractions and mixed numbers with the same denominator beyond 1 whole
Year 6	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 duration of events

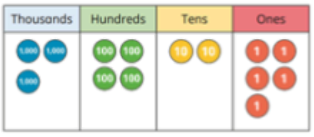
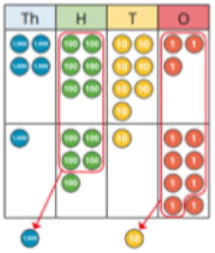
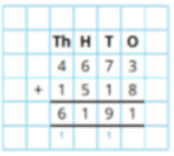
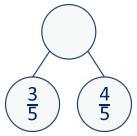
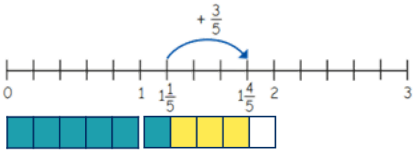
Addition Year 3

- 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 + ☐ = 118 111 + ☐ = 181 111 + ☐ = 811
Add two numbers (no exchange) Mental strategies and introduction of formal written method.	… ones + … ones =… ones … tens + … tens =… tens … hundreds + … hundreds =… hundreds    
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
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  
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.  

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 + 30 = 3,425 + 300 = 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 + ☐ = 2,251 2,211 + ☐ = 2,215 2,211 + ☐ = 2,511
Add up to two 4digit 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 regroup. I can regroup 10 … for 1 …  	
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  45p + 25p = 70p £2 + £3 = £5 £5 + 70p = £5.70	£3.25 can be partitioned into £3 +20p +5p 	
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 $\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$   	

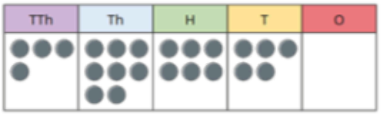
Addition
Year 5

- 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

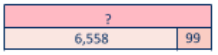
Add using mental strategies

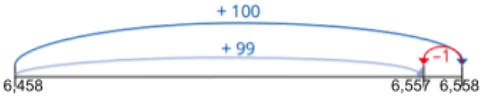
Add 1s, 10s, 100s, etc. to any number.
Use number bonds and related facts.



48,650 + 300 =
48,650 + 30,000 =
48,650 + 30 =

To add …, I can add … then subtract …

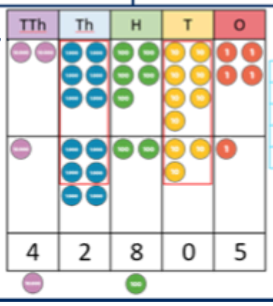




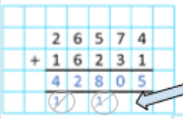
Add whole numbers with more than 4 digits

Encourage children to estimate and use inverse operations to check answers to calculations.

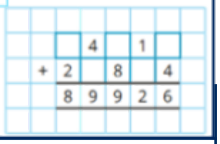
I can regroup 10 … for 1 …



Circle and cross the regrouped



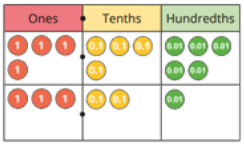
Circle and cross the exchange once counted

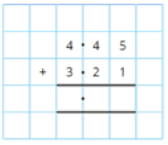


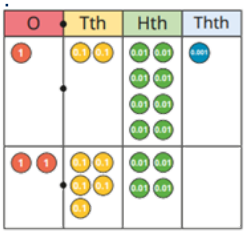
Add decimals with up to 2 decimal places

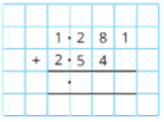
Progress from the same number of decimal places to a different number of decimal places, and from no exchange to exchange.

I do/do not need to make an regroup because …
I can regroup 10 … for 1 …



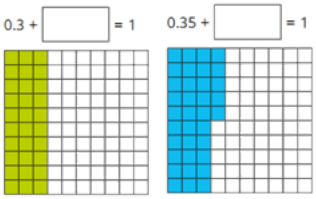






Complements to 1

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
44 + 56 = 100
444 + 556 = 1,000

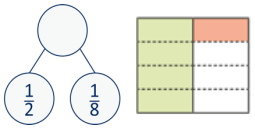
0.4+ 0.6 = 1
0.44+ 0.56 = 1
0.444+ 0.556 = 1

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.

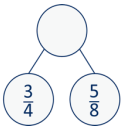
The denominator has been multiplied by …, so the numerator needs to be multiplied by… for the fractions to be equivalent.

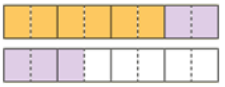


$\frac{1}{2} + \frac{1}{8} = \frac{4}{8} + \frac{1}{8} = \frac{5}{8}$

$\frac{1}{4} + \frac{3}{8} = \frac{2}{8} + \frac{3}{8} = \frac{5}{8}$

Make links with denominators and times table facts





$\frac{3}{4} + \frac{5}{8} = \frac{6}{8} + \frac{5}{8} = \frac{11}{8} = 1\frac{3}{8}$

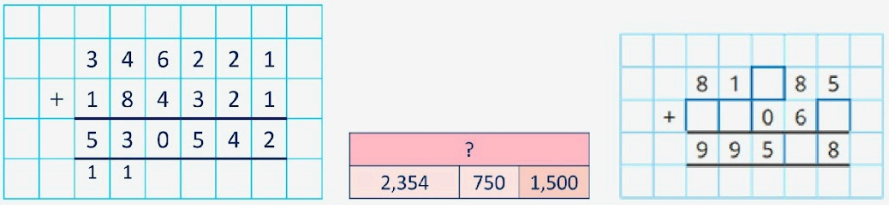
Addition Year 6

- Add larger numbers, using the formal written methods of columnar addition.
- Use their knowledge of the order of operations to carry out calculations involving the 4 operations.
- Calculate intervals actress 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.

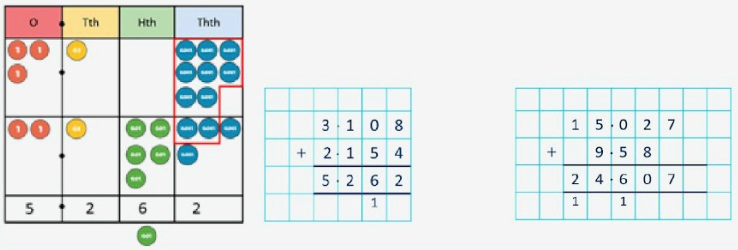


Add decimals with up to 3 decimal places

Progress to numbers with digits in different place value columns.

Encourage children to check that they have lined up the columns correctly.

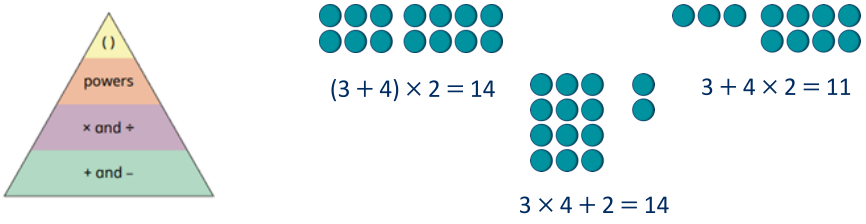
I do/do not need to make an exchange because …



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.

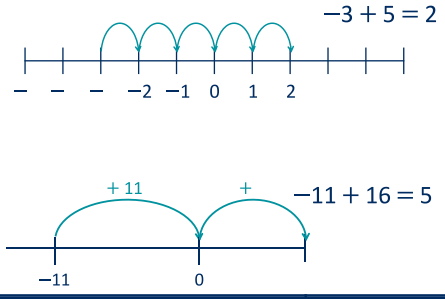
… has greater priority than …, so the first part of the calculation I need to do is …

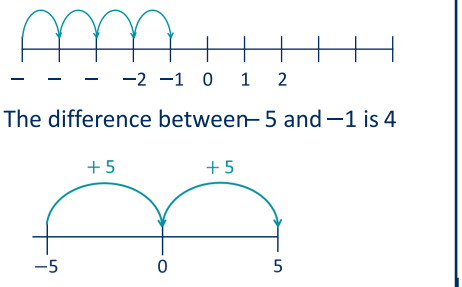


Negative numbers

Children add to negative numbers and carry out calculations which cross 0

… plus … is equal to …

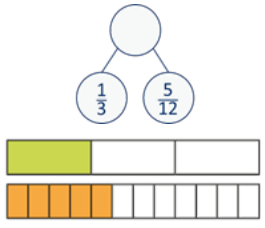




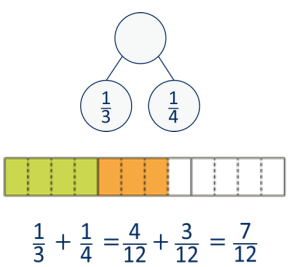
Add fractions

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.

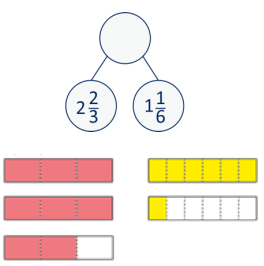
The denominator has been multiplied by …, so the numerator needs to be multiplied by …



The lowest common multiple of … and … is …



…is made up of … wholes and …



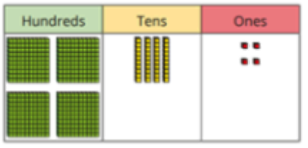
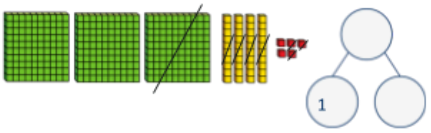
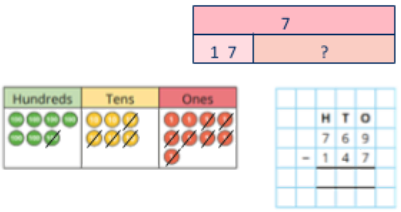
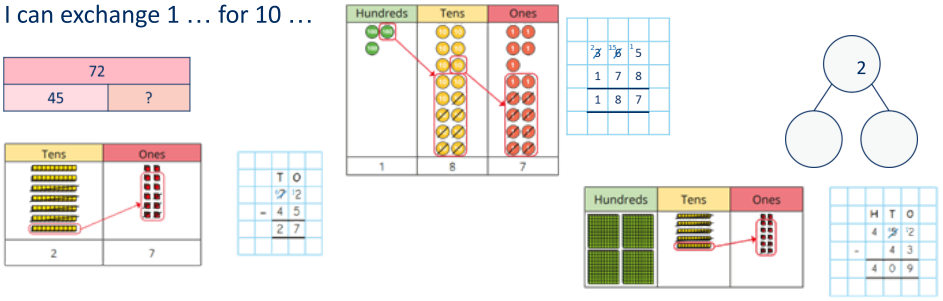
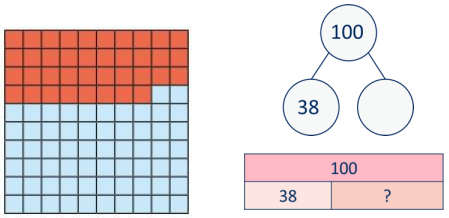
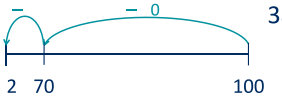
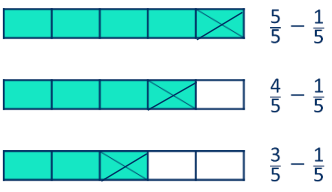
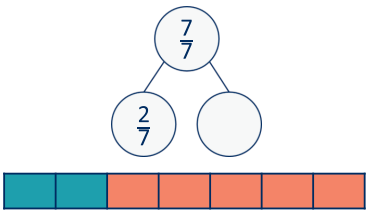
Progression of skills - Subtraction

Nursery to Yr 2 have been included for reference of learning prior to joining KGA Gomer at Year 3.

Yr Group	Skill
Nursery	Subitise to 3 Count how many Make numbers to 5 Take 1 away (through songs and rhymes)
Year R	Subitise to 5 1 less Composition of numbers to 10 Partition Take away
Year 1	Find a part Take away Bonds within 10 Related facts within 20 Missing numbers
Year 2	Subtract 1s from any number Subtract across a 10 Subtract multiples of 10 Subtract 10s from any number Subtract two 2-digit numbers (not across a ten) Subtract two 2-digit number (across a ten) Missing numbers
Year 3	Subtract 1s, 10s and 100s from a 3-digit number Subtract two numbers (no exchange) Subtract two numbers across a 10 or 100 Complement to 100 Subtract fractions with the same denominator within 1 whole
Year 4	Subtract 1s, 10s, 100s and 1,000s from a 4-digit number Subtract up to two 4-digit numbers Subtract decimal numbers in the context of money Subtract fractions and mixed numbers with the same denominator
Year 5	Subtract whole numbers with more than 4 digits Subtract using mental strategies Subtract decimals with up to 2 decimal places Complements to 1 Subtract fractions with denominators that are a multiple of one another
Year 6	Subtract integers up to 10 million Subtract decimals with up to 3 decimal places Order of operations Negative numbers Subtract fractions

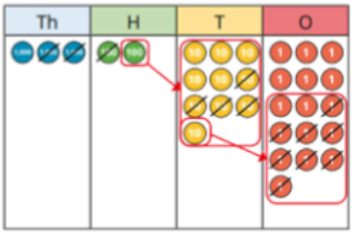
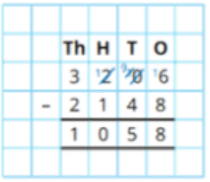
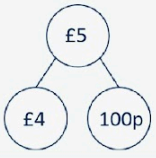
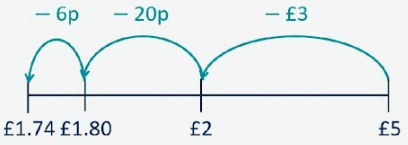
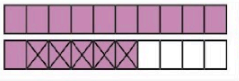
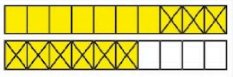
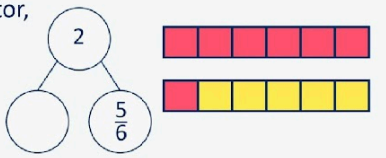
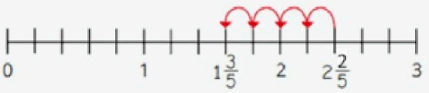
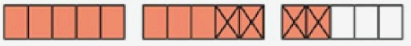
Subtraction
Year 3

- 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.
- Subtract fractions with the same denominator within 1 whole.

Progression of skills	Key representations	
Subtract 1s, 10s and 100s from 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 decrease by …  444 − 2 = 444 − 20 = 444 − 200 = 777 − 4 = 777 − 40 = 777 − 400 =	What patterns do you notice? 235 − 3 = 235 − 30 = 235 − 300 = 624 − 20 = 654 − 50 = 694 − 90 = 118 − ☐ = 111 181 − ☐ = 111 811 − ☐ = 111
Subtract two numbers (no exchange) Mental strategies and introduction of formal written method.	… ones − … ones = … ones … tens − … tens = … tens … hundreds − … hundreds = … hundreds   	
Subtract two numbers across a 10 or 100 Formal written method involving up to 2 exchanges including 3-digit subtract 2-digit numbers.	I need to subtract … ones. I do/do not need to make an exchange. I need to subtract … tens. I do/do not need to make an exchange. I can exchange 1 … for 10 …  	
Complements to 100 Focus on subtraction facts. Encourage children to notice patterns.	100 minus … is equal to …  	I subtract … tens, then I subtract … ones. 100 − 38 = 62 100 − 62 = 38 62 = 100 − 38 38 = 100 − 62 
Subtract fractions with the same denominator within 1 whole Make links with known facts.	When subtracting fractions with the same denominator, I only subtract the numerator. … fifths − … fifths = … fifths  $\frac{5}{5} - \frac{1}{5}$ $\frac{4}{5} - \frac{1}{5}$ $\frac{3}{5} - \frac{1}{5}$	

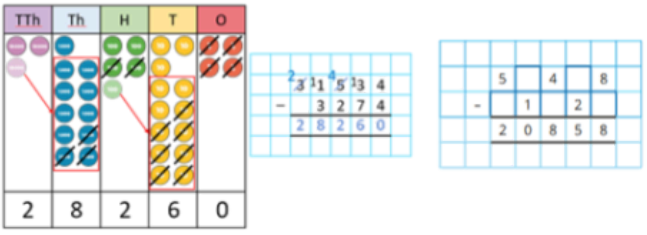
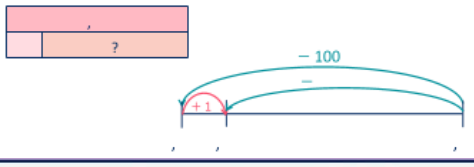
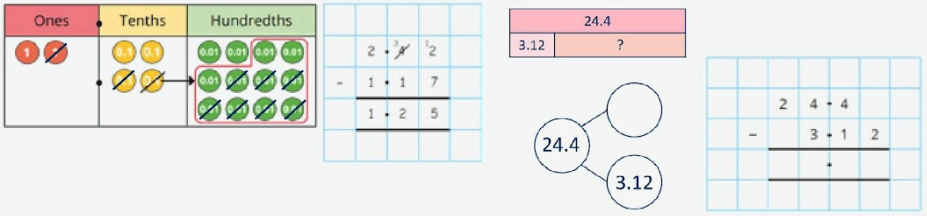
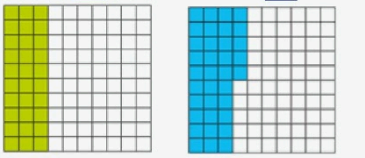
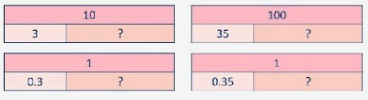
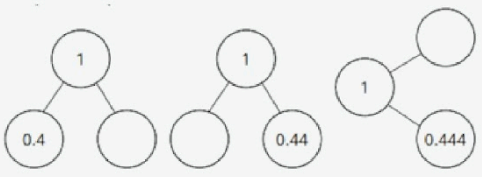
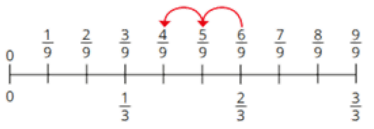
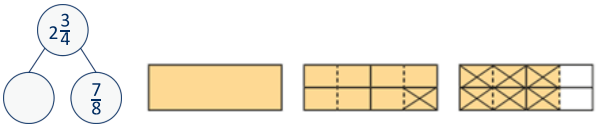
Subtraction Year 4

- Subtract 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.
- Subtract fractions with the same denominator.

Progression of skills	Key representations
Subtract 1s, 10s, 100s and 1,000s from a4-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 decrease by …  3,425 − 2 = 3,425 − 20 = 3,425 − 200 = 3,425 − 2,000 = What patterns do you notice? 4,356 − 3 = 4,356 − 30 = 4,356 − 300 = 4,356 − 3,000 = 6,940 − 200 = 6,940 − 300 = 6,940 − 400 = 4,433 − ☐ = 4,430 4,433 − ☐ = 4,033 4,433 − ☐ = 4,403
Subtract up to two 4digit numbers Formal written method with up to 3 exchanges. Encourage children to estimate and use inverse operations to check answers to calculations.	I need to subtract… ones/tens/hundreds. I do/do not need to make an exchange. I can exchange 1… for 10…  
Subtract decimal numbers in the context of money Emphasis here is on partitioning and use of number lines rather than formal written calculations.	I can partition £… into £… and 100p £… − £… = £… 100p − …p = …p **£5 − £3.26** £4 − £3 = £1 100p − 26p = 74p £5 - £3.26 = £1.74  £3.26 can be partitioned into £3 + 20p + 6p 
Subtract fractions and mixed numbers with the same denominator Include subtracting fractions from wholes.	When subtracting fractions with the same denominator, I only subtract the numerator. … tenths − … tenths = … tenths  $\frac{16}{10} - \frac{5}{10}$  $\frac{16}{10} - \frac{9}{10}$   

Subtraction Year 5

- Subtract whole numbers with more than 4 digits.
- Subtract numbers mentally with increasingly large numbers.
- Subtract decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1
- Subtract fractions with the same denominator, and denominators that are multiples of the same number.

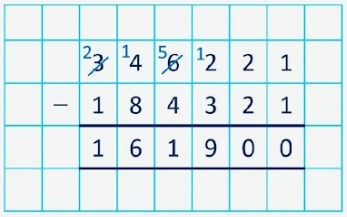
Progression of skills	Key representations
Subtract whole numbers with more than 4 digits Encourage children to estimate and use inverse operations to check answers to calculations.	I can exchange 1 … for 10 … 
Subtract using mental strategies Subtract 1s, 10s, 100s etc from any number. Use number bonds and related facts.	 48,650 − 300 = 48,650 − 30,000 = 48,650 − 30 = To subtract …, I can subtract … then add … 
Subtract 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.	
Complements to 1 Encourage children to make links with bonds to 10 and complements to 100 and 1,000 when finding a missing part or subtracting from 1	0.3 + □ = 1 0.35 + □ = 1    10 − 4 = 6 1 − 0.4 = 0.6 100 − 44 = 56 1 − 0.44 = 0.56 1,000 − 444 = 556 1 − 0.444 = 0.556
Subtract fractions with denominators that are a multiple of one another Convert fractions to the same denominator before subtracting. Progress from subtracting fractions within 1 whole to subtracting from a mixed number.	The denominator has been multiplied by …, so the numerator needs to be multiplied by… for the fractions to be equivalent.  $\frac{1}{3} - \frac{1}{15} = \frac{5}{15} - \frac{1}{15} = \frac{4}{15}$  $\frac{2}{3} - \frac{2}{9} = \frac{6}{9} - \frac{2}{9} = \frac{4}{9}$ 

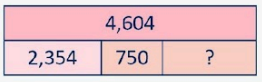
Subtraction Year 6

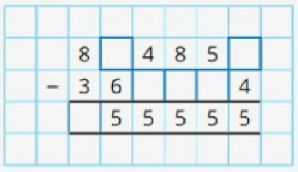
- Subtract larger numbers, using the formal written methods of columnar subtraction.
- Use their knowledge of the order of operations to carry out calculations involving the 4 operations.
- Calculate intervals across zero.
- Subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.

Subtract integers up to 10 million

Encourage children to estimate and use inverse operations to check answers to calculations.



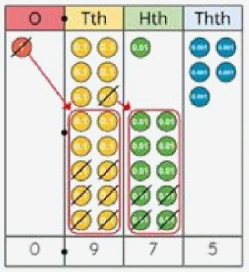


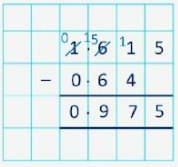


Subtract decimals with up to 3 decimal places

Progress from the same number of decimal and whole number places to a different number of decimal and whole number places.

I do/do not need to make an exchange because ...

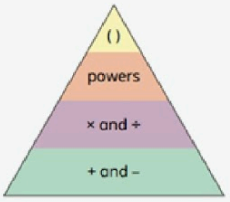


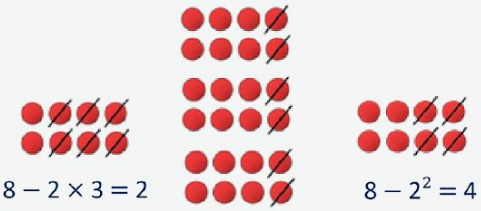


Order of operations

Children learn the order of priority for operations in a calculation. 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 ...

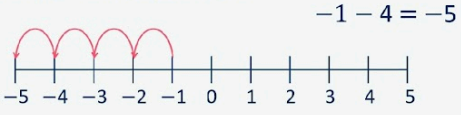


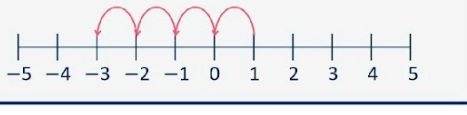


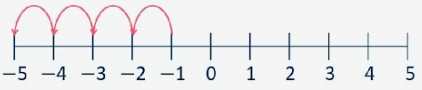
Negative numbers

Children subtract from positive and negative numbers and calculate intervals across 0

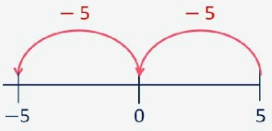
... minus ... is equal to ...







The difference between – 5 and −1 is 4



The difference between 5 and −5 is 10

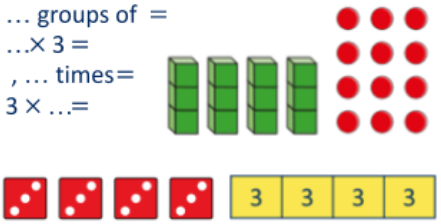
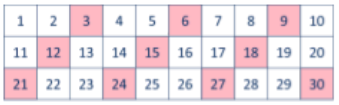
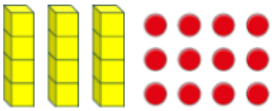
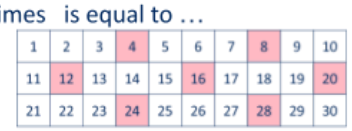
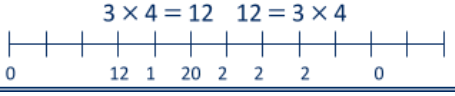
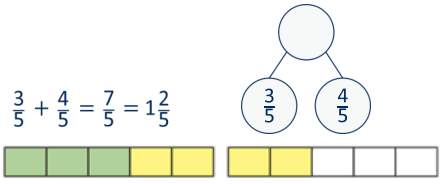
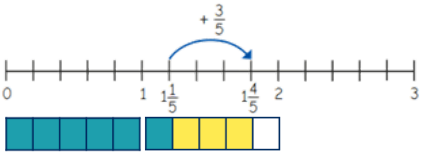
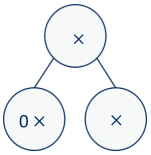
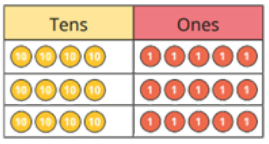
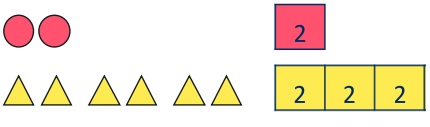
Progression of skills - Multiplication

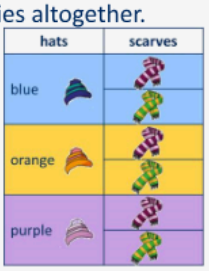
Nursery to Yr 2 have been included for reference of learning prior to joining KGA Gomer at Year 3.

Yr Group	Skill
Nursery	N/A (continue counting and subitising)
Year R	Double to 10 Make equal groups
Year 1	Count in 2s, 5s and 10s Add equal groups Make arrays Make doubles
Year 2	Link repeated addition and multiplication Doubles The 10 times-table Missing numbers Use arrays The 2 times-table The 5 times-table
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
Year 4	Times-table facts to 12x12 Multiply by 1 and 0 Multiply 3 numbers Factor pairs Multiply by 10 and 100 Related facts Mental strategies Multiply a 2 3-digit number by a 1-digit number Scaling Correspondence problems
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
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

Multiplication Year 3

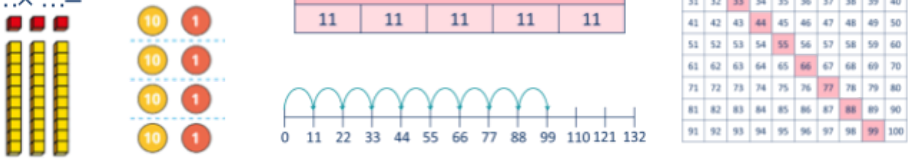
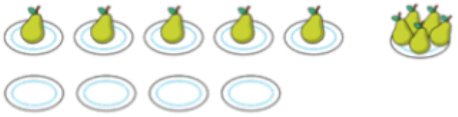
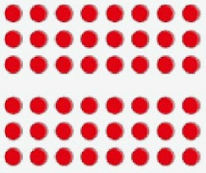
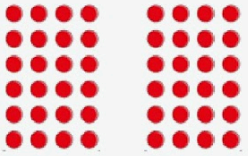
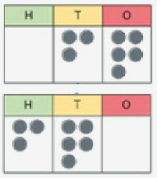
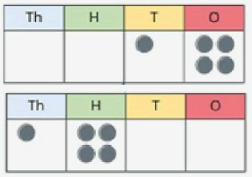
- Recall and use multiplication facts for the 3, 4 and 8 multiplication tables.
- Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two- digit numbers times two-digit numbers, using mental and progressing to formal written methods.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

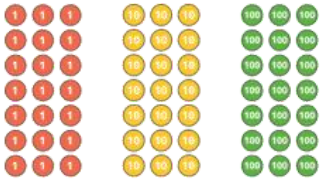
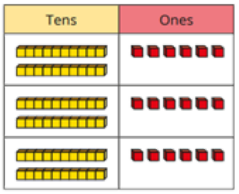
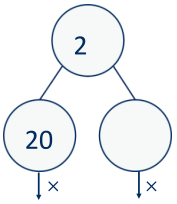
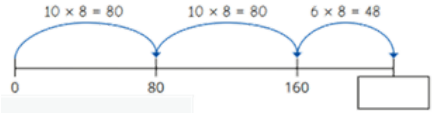
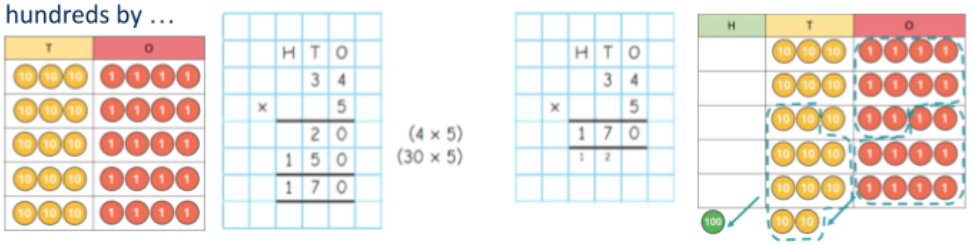
Progression of skills	Key representations
The 3 times-table Encourage daily counting in multiples both forwards and back.	… groups of … = …× 3 = , … times = 3 × … =  … times … is equal to …  4 × 3 = 12 12 = 4 × 3 
The 4 times-table Encourage daily counting in multiples both forwards and back. Encourage children to notice links between the 2 and 4 times-tables.	… groups of … = …× 4 = , … times = 4 × … =   … times … is equal to …  3 × 4 = 12 12 = 3 × 4 
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  45p + 25p = 70p £2 + £3 = £5 £5 + 70p = £5.70	£3.25 can be partitioned into £3 + 20p + 5p 
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  	
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.  20 × 4 = 80 4 × 4 = 16 24 × 4 = 96  	
Scaling Children focus on multiplication as scaling (…. times the size) as opposed to repeated addition.	There are …. times as many … as …  There are 3 times as many triangles as circles.	… is … times the size of … … is … times the length/height of …   Miss Smith is twice the height of Jo.

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 x 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.

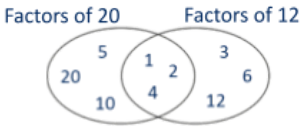
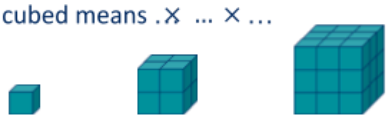
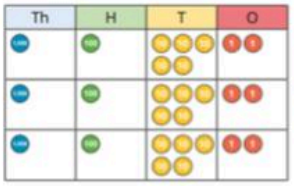
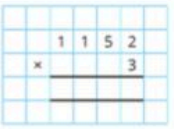
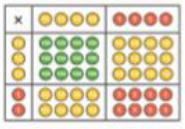
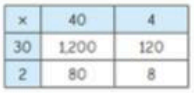
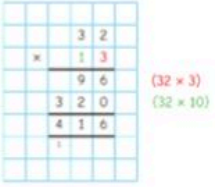
Progression of skills	Key representations
Times-table facts to 12 × 12 Encourage daily counting in multiples both forwards and back. Encourage children to notice links between related times-tables.	… groups of … = … … times … is equal to … …× …= … 
Multiply by 1 and 0	Any number multiplied by 1 is equal to … Any number multiplied by 0 is equal to …  …× …= … 1 × 1 = 1 1 × 0 = 0 2 × 1 = 2 2 × 0 = 0 3 × 1 = 3 3 × 0 = 0 4 × 1 = 4 4 × 0 = 0
Multiply 3 numbers Children use their understanding of commutativity to multiply more efficiently.	To work out … × … × …, I can first calculate … × … and then multiply the answer by …  4 × 2 × 3 = 8 × 3 = 24 2 × 3 × 4 = 6 × 4 = 24 3 × 4 × 2 = 12 × 2 = 24
Factor pairs Children explore equivalent calculations using different factors pairs.	12 = … × … , so … × 12 = …× …× …  8 × 6 = 8 × 3 × 2 8 × 6 = 24 × 2  6 × 8 = 6 × 4 × 2 6 × 8 = 24 × 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 × 10 = 350 When I multiply by 100, the digits move … place value columns to the left. … is 100 times the size of …  14 × 100 = 1,400

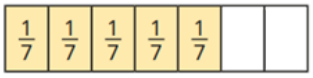
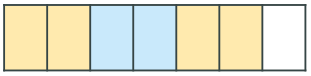
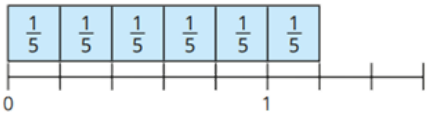
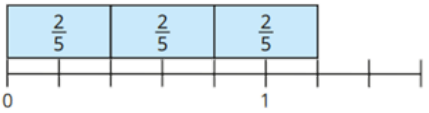
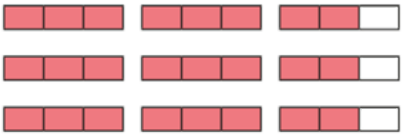
Progression of skills	Key representations
Related facts Use knowledge of multiplying by 10 and 100 to scale times-table facts.	…× … ones is equal to … ones so …× … tens is equal to … tens and …× … hundreds is equal to … hundreds.  $3 \times 7 = 21$ $7 \times 3 = 21$ $3 \times 70 = 210$ $7 \times 30 = 210$ $3 \times 700 = 2{,}100$ $7 \times 300 = 2{,}100$
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.    $3 \times 26 = 60 + 18 = 78$ $26 \times 8 = 80 + 80 + 48 = 208$
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 … 
Square and cube numbers	… squared means … × …  1 × 1 = 1^2 = 1 2 × 2 = 2^2 = 4 3 × 3 = 3^2 = 9 4 × 4 = 4^2 = 16 … cubed means … × … × …  1 × 1 × 1 = 1^3 = 1 2 × 2 × 2 = 2^3 = 8 3 × 3 × 3 = 3^3 = 27
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 × 44 = 1,200 + 80 + 120 + 8 32 × 44 = 1,408 First, I multiply by the … Then I multiply by the …  300 + 90 + 20 + 6 = 416 

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

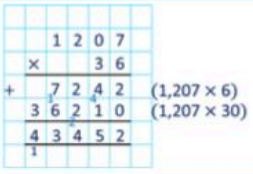
Multiplication
Year 6

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

Progression of skills	Key representations

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

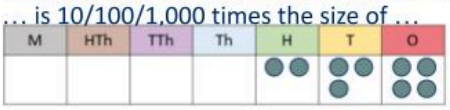
To multiply by a 2-digit number, first multiply by the ones, then multiply by the tens and then find the total.

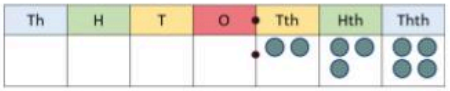


Multiply by 10, 100 and 1,000

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 …





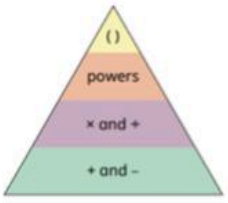
$234 \times 10 = 2{,}340$
$234 \times 100 = 23{,}400$
$234 \times 1{,}000 = 234{,}000$

$0.234 \times 10 = 2.34$
$0.234 \times 100 = 23.4$
$0.234 \times 1{,}000 = 234$

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 …



$(3 + 4) \times 2 = 14$

$3 + 4^2 = 19$

$3 + 4 \times 2 = 11$

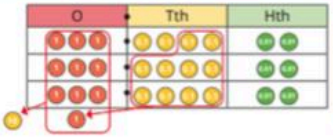
Multiply decimals by integers

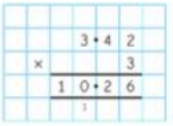
This is the first time children multiply decimals by numbers other than 10, 100 or 1,000
Encourage them to make links with known facts and whole number multiplication.

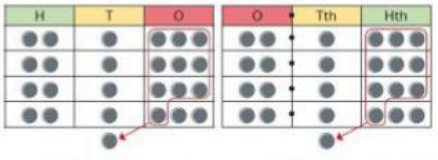
I know that … × … = …,
so I also know that… × … = …

$6 \times 2 = 12$ $6 \times 0.2 = 1.2$

I need to exchange 10 … for 1 …





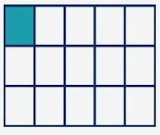


$213 \times 4 = 852$ $2.13 \times 4 = 8.52$

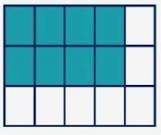
Multiply fractions by fractions

Encourage children to give answers in their simplest form.

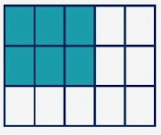
When multiplying a pair of fractions, I need to multiply the numerator and multiply the denominator.



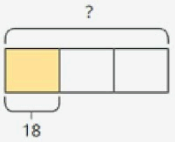
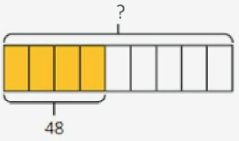
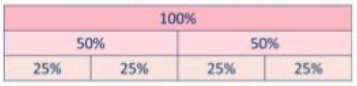
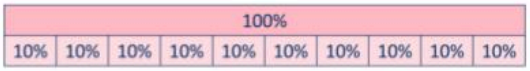
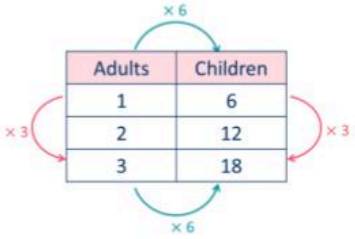
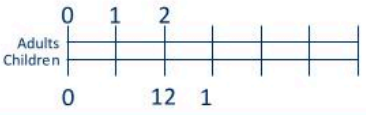
$\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$



$\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$



$\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$

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 … × … $\frac{1}{3}$ of ___ = 18  18 × 3 = 54 $\frac{1}{3}$ of **54** = 18	If $\frac{\square}{\square}$ is … , then $\frac{1}{\square}$ is … and the whole is … × … $\frac{4}{9}$ of ___ = 48  $\frac{1}{9}$ = 48 ÷ 4 = 12 9 × 12 = 108 $\frac{4}{9}$ of **108** = 48
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 …  0% of …= ..÷ 2 2 % of …= ..÷ 4	… % is made up of … %, and … %  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	 

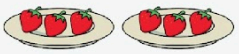
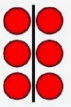
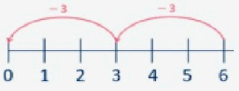
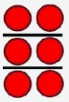
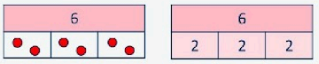
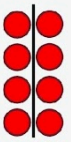
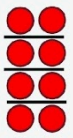
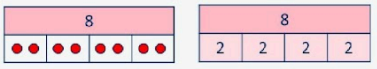
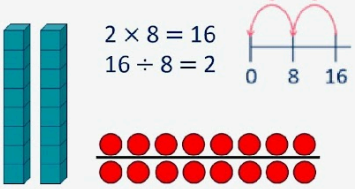
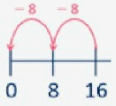
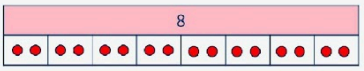
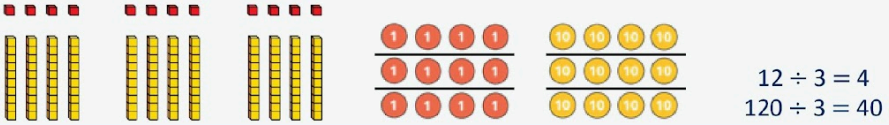
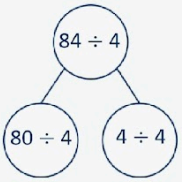
Progression of skills - Division

Nursery to Yr 2 have been included for reference of learning prior to joining KGA Gomer at Year 3.

Yr Group	Skill
Nursery	Continue with counting and subitising skills as a foundation for later work on equal groups.
Year R	Sharing Grouping
Year 1	Make equal groups - grouping Make equal groups - sharing Find a half Find a quarter
Year 2	Divide by 2 Divide by 10 Divide by 5 Missing numbers Unit fractions Non-unit fractions
Year 3	Divide by 3 Divide by 4 Divide by 8 Related facts Divide a 2-digit number by a 1-digit number - no exchange Divide a 2-digit number by a 1-digit number - with remainders Unit fractions of a set of objects Non-unit fractions of a set of objects
Year 4	Division facts to 12 x 12 Divide a number by 1 and itself Related facts Divide a 2 or 3-digit number by a 1-digit number Divide by 10 and 100
Year 5	Mental strategies Divide numbers up to 4 digits by a 1-digit number Divide by 10, 100 and 1,000 Fraction of an amount
Year 6	Short division Mental strategies Long division Order of operations Divide by 10, 100 and 1,000 Divide decimals by integers Decimal and fraction equivalents Divide a fraction by an integer Fraction of an amount Calculate percentages Calculations involving ratio

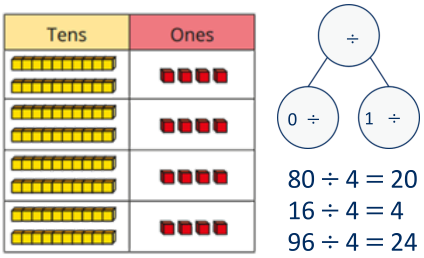
Division
Year 3

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

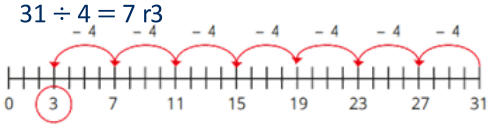
Progression of skills	Key representations	
Divide by 3 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are ... groups of 3 in ... ... ÷ 3 =  2 × 3 = 6 6 ÷ 3 = 2   	... has been shared equally into 3 equal groups. ... ÷ 3 =  2 × 3 = 6 6 ÷ 3 = 2  
Divide by 4 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are ... groups of 4 in ... ... ÷ 4 =  2 × 4 = 8 8 ÷ 4 = 2   	... has been shared equally into 4 equal groups. ... ÷ 4 =   2 × 4 = 8 8 ÷ 4 = 2 
Divide by 8 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are ... groups of 8 in ... ... ÷ 8 =  2 × 8 = 16 16 ÷ 8 = 2  	... has been shared equally into 8 equal groups. ... ÷ 8 =   2 × 8 = 16 16 ÷ 8 = 2
Related facts Link to known times-table facts.	... ÷ ... is equal to ..., so ... tens ÷ ... is equal to ... tens.  12 ÷ 3 = 4 120 ÷ 3 = 40	
Divide a 2-digit number by a 1-digit number - no exchange Partition into tens and ones to divide and then recombine.	... tens divided by ... is equal to ... tens. ... ones divided by ... is equal to ... ones.  60 ÷ 2 = 30 4 ÷ 2 = 2 64 ÷ 2 = 32   	

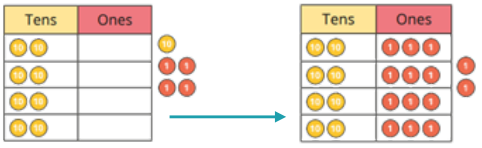
<table>
<tr><th>Progression of skills</th><th colspan="2">Key representations</th></tr>
<tr><td rowspan="2">Divide a 2-digit number by a 1-digit number- with remainders

Encourage children to partition numbers flexibly to help them to divide more efficiently.</td><td>… tens divided by … is equal to … tens.
… ones divided by … is equal to … ones.

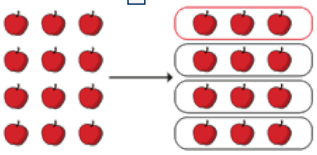
 

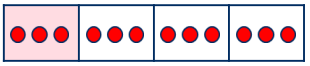
80 ÷ 4 = 20
16 ÷ 4 = 4
96 ÷ 4 = 24</td><td>There are … groups of …
There are … remaining.

31 ÷ 4 = 7 r3
 

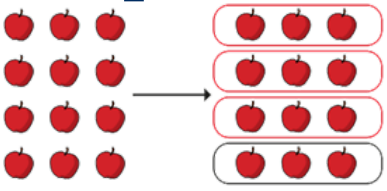
94 ÷ 4 = 23 r2
 
</td></tr>
<tr><td>Unit fractions of a set of objects

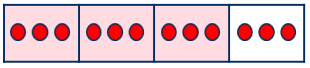
Bar models are useful to show the link between division and fractions, for example, dividing by 3 and finding a third.</td><td>The whole is divided into … equal parts.
Each part is $\frac{1}{\square}$ of the whole.

 
$\frac{1}{\square}$ of 12 apples is 3 apples.</td><td>ne … of … is …

$\frac{1}{\square}$ of 12 is 3
 
$\frac{1}{\square}$ of 36 is 12
  </td></tr>
<tr><td>Non-unit fractions of a set of objects

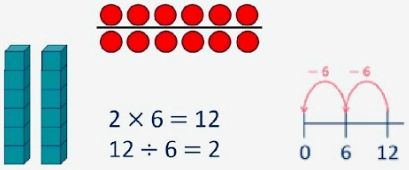
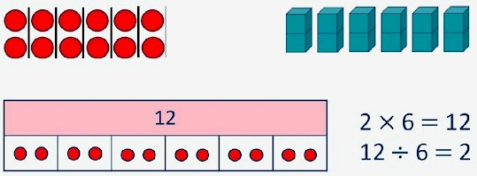
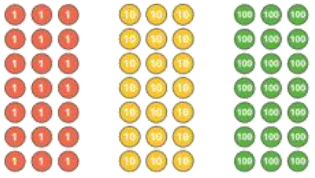
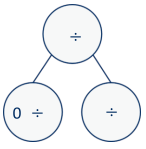
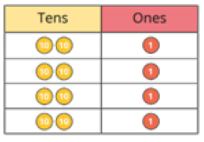
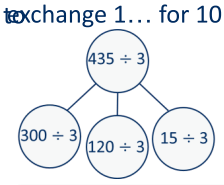
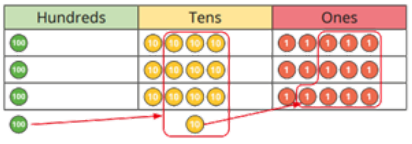
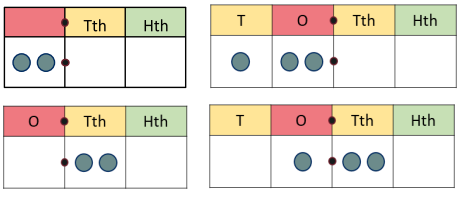
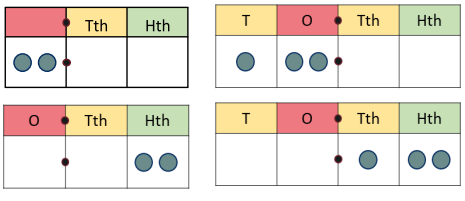
Bar models are a useful representation and show the links with division and multiplication.</td><td>The whole is divided into … equal parts.
Each part is $\frac{1}{\square}$ of the whole.

 
of 12 apples is 9 apples.</td><td>$\frac{1}{\square}$ of … is …, so $\frac{\square}{\square}$ of … is …

of 12 is 9
 
$\frac{2}{\square}$ of 36 is 24
  </td></tr>
</table>

Division
Year 4

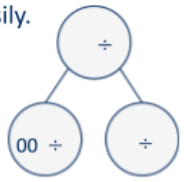
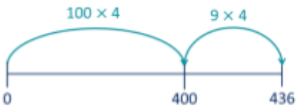
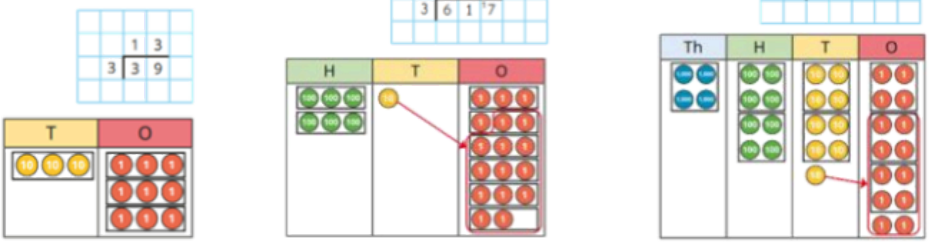
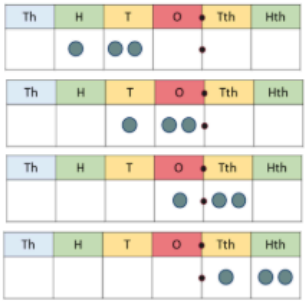
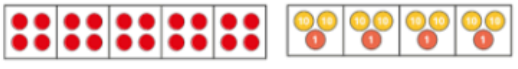
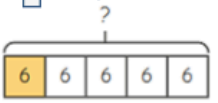
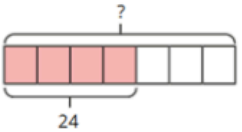
- Recall division facts for the multiplication tables up to 12 x 12
- Use place value, known and derived facts to divide mentally, including: dividing by 1
- Find the effect of dividing a one - or two-digit number by 10 and 100, identifying the Value of the digits in the answer as ones, tenths and hundredths.

Progression of skills	Key representations	
Division facts to 12 × 12 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are … groups of … in … … ÷ … =  	… has been shared equally into … equal groups. … ÷ … = 
Divide a number by 1 and itself Children may try to divide a number by zero and it should be highlighted that this is not possible.	When I divide a number by 1, the number remains the same. 5 shared between 1 is 5 There are **5** groups of 1 in 5 	When I divide a number by itself, the answer is 1 5 shared between 5 is 1 There is **1** group of 5 in 5 
Related facts Link to known timestable facts.	… ÷ … is equal to … so … tens÷ … is equal to … tens and … hundreds÷ … is equal to … hundreds.  21 ÷ 7 = 3 210 ÷ 7 = 30 2,100 ÷ 7 = 300 21 ÷ 3 = 7 210 ÷ 3 = 70 2,100 ÷ 3 = 700	
Divide a 2 or 3-digit number by a 1-digit number Progress from divisions with no exchange, to divisions with exchange and then divisions with remainders.	I can partition… into… tens and… ones.  80 ÷ 4 = 20 4 ÷ 4 = 1 84 ÷ 4 = 21  	I cannot share the hundreds/tens equally, so I need to exchange 1… for 10…  300 ÷ 3 = 100 120 ÷ 3 = 40 15 ÷ 3 = 5 435 ÷ 3 = 145 
Divide by 10 and 100 Encourage children to notice that dividing by 100 is the same as dividing by 10 twice.	When I divide by 10, the digits move 1 place value column to the right. …is one-tenth the size of…  2 ÷ 10 = 0.2 12 ÷ 10 = 1.2	When I divide by 100, the digits move 2 place value columns to the right. …is one-hundredth the size of…  2 ÷ 100 = 0.02 12 ÷ 100 = 0.12

Division

Year 5

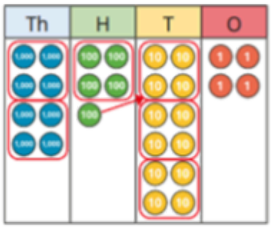
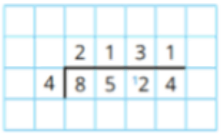
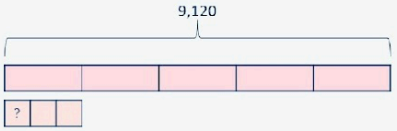
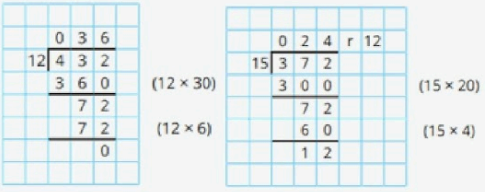
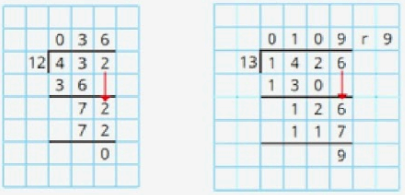
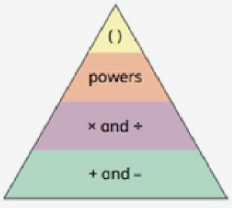
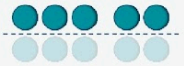
- Divide numbers mentally drawing upon known facts.
- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.
- Divide whole numbers and those involving decimals by 10, 100 and 1,000

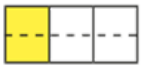
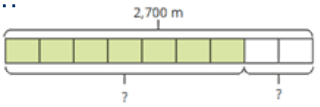
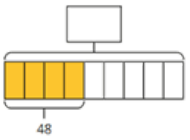
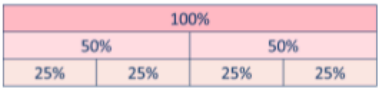
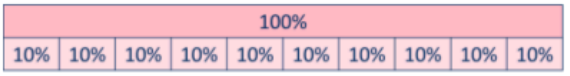
Progression of skills	Key representations		
Mental strategies	I can partition… into… and … to help me to divide more easily. 	I can show groups of… on a number line. 	To divide by…, I can divide by… and then divide the result by… 436 ÷ 4 = 436 ÷ 2 ÷ 2 436 ÷ 2 = 218 218 ÷ 2 = 109
Divide numbers up to 4 digits by a 1-digit number The short division method is introduced for the first time.	There are… groups of … hundreds/tens/ones/in… I can exchange 1 … for 10 … 		
Divide by 10, 100 and 1,000 Encourage children to notice that dividing by 100 is the same as dividing by 10 twice, and that dividing by 1,000 is the same as dividing by 10 three times.	To divide by 10/100/1,000, I move all the digits … places to the right. … is one-tenth/one-hundredth/one-thousandth the size of …  120 ÷ 10 = 12 120 ÷ 100 = 1.2 120 ÷ 1,000 = 0.12		
Fraction of an amount Bar models support children to understand that to find a fraction of an amount, we divide by the denominator and multiply by the numerator.	To find $\frac{\square}{\square}$ of …, I need to divide by … and multiply by …  $\frac{1}{\square}$ of 20 = $\frac{1}{\square}$ of ___ = ___ $\frac{\square}{\square}$ of 20 = $\frac{\square}{\square}$ of ___ = ___	If $\frac{1}{\square}$ is …, then the whole is … × …  $\frac{1}{\square}$ of ___ = 6  $\frac{7}{\square}$ of ___ = 24	

Division

Year 6

- Perform mental calculations, including with mixed operations and large numbers.
- 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.
- Divide numbers by 10, 100 and 1,000 giving answers up to three decimal places.
- Use written division methods in cases where the answer has up to two decimal places.
- Associate a fraction with division and calculate decimal fraction equivalents.
- Divide proper fractions by whole numbers [for example, $\frac{1}{2} \div 2 = \frac{1}{4}$]
- Solve problems involving the calculation of percentages.

Progression of skills	Key representations
Short division Encourage children to interpret remainders in context, for example knowing that "remainder 1" could mean complete boxes with 1 leftover so 5 boxes will be needed.	There are … groups of … hundreds/tens/ones/ in … I can exchange 1 … for 10 …  
Mental strategies Include partitioning and number line strategies outlined in Y5 as well as division using factors.	To divide by … , I can first divide by … and then divide the answer by … 240 ÷ 60 = 240 ÷ 10 ÷ 6  480 ÷ 24 = 480 ÷ 4 ÷ 6  9,120 ÷ 15 = 9,120 ÷ 5 ÷ 3 
Long division The long division method is introduced for the first time. Two alternative methods are shown.	Method 1  Method 2 
Order of operations Calculations in brackets should be done first, then powers. 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 …   (6 + 4) ÷ 2 = 5  6 + 4 ÷ 2 = 8

Progression of skills	Key representations		
Divide a fraction by an integer This is the first time children divide fractions by an integer.	… ones divided by 2 is … ones so … sevenths divided by 2 is … sevenths.  $7 \div \quad = \frac{1}{7}$ $7 \div 2 = \frac{2}{7}$	I am dividing by … , so I can split each part into … equal parts.  $\frac{1}{\quad} \div 2 = \frac{1}{\quad}$	… is equivalent to … so … ÷ … = … ÷ …  $\frac{2}{\quad} =$ so $\frac{2}{\quad} \div \quad = \quad \div \quad = \frac{1}{\quad}$
Fraction of an amount Children divide and multiply to find fractions of an amount. Bar models can still be used to support understanding where needed.	To find $\frac{1}{\square}$ I divide by … $\frac{1}{2}$ of $\quad = \quad \div 2$ $\frac{1}{12}$ of $36 = \quad \div 12$	If $\frac{1}{\square}$ is equal to …, then $\frac{\square}{\square}$ are equal to …  $\frac{7}{\quad}$ of $2{,}700 = \frac{1}{\quad}$ of $2{,}700 \times 7$	If $\frac{\square}{\square}$ is equal to …, then the whole is equal to …  of $\_\_ = 48$
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 …  0% of …= ..÷ 2 2 % of …= ..÷ 4	… % is made up of … %, and … %  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 6 children on a school trip, there is 1 adult. adults  children  The ratio of children to adults is 6 : 1