Year 4

Calculation policy

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Guidance for teachers

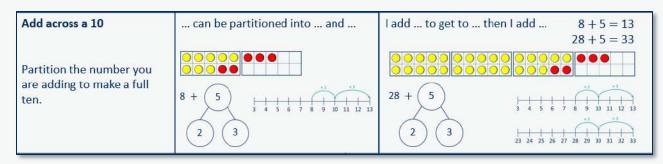


The calculation policy is divided into four sections: addition, subtraction, multiplication and division. At the start of each section, you will find an overview of the progression of skills. Calculations involving decimal numbers and fractions are included.

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



Year 3	Year 4	Year 5
 Add 1s, 10s and 100s to a 3- digit number 	Add 1s, 10s and 100s to a 4- digit number	Add using mental strategiesAdd whole numbers with
Add two numbers (no exchange)Add two numbers across a 10	 Add up to two 4-digit numbers Add decimal numbers in the 	more than 4 digitsAdd decimals with up to 2 decimal places
 or 100 Complements to 100 Add fractions with the same denominator within 1 whole 	 context of money Add fractions and mixed numbers with the same denominator beyond 1 whole 	 Complements to 1 Add fractions with denominators that are a multiple of one another
Calculate the duration of events		

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 Thousands Hundreds Tens Ones Thousands Hundreds Tens Ones 3,425 + 3 = 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 = $2,211 +$ $= 2,2516,040 + 500 =$ $2,211 +$ $= 2,2156,040 + 900 =$ $2,211 +$ $= 2,511$	
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.	do/do not need to make an exchange.	Th H T O Th H T O 4 6 7 3 + 1 5 1 8 6 1 9 1	

Addition



Progression of skills	Key representations				
Add decimal numbers in the context of money	pence + pence = pence pounds + pounds = pounds	£3.25 can be partitioned into £3 + 20p + 5p			
Emphasis on partitioning and use of number lines rather than formal written calculations.	45p + 25p = 70p £2 + £3 = £5 £5 + 70p = £5.70	£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 den fifths $+$ fifths $=$ fifths $\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$	ominator, I only add the numerator.			

Progression of skills - Subtraction



Year 3	Year 4	Year 5
Subtract 1s, 10s and 100s from a 3-digit number	 Subtract 1s, 10s, 100s and 1,000s from a 4-digit number 	Subtract whole numbers with more than 4 digits
Subtract two numbers (no exchange)	 Subtract up to two 4-digit numbers 	Subtract using mental strategies
Subtract two numbers across a 10 or 100	Subtract decimal numbers in the context of money	Subtract decimals with up to 2 decimal places
Complements to 100	Subtract fractions and mixed	Complements to 1
Subtract fractions with the same denominator within 1 whole	numbers with the same denominator	Subtract fractions with denominators that are a multiple of one another

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 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 decrease by Thousands Hundreds Tens Ones 4,356 $- 3 = 4,356 - 30 = 4,356 - 300 = 4,356 - 3,000 = 4,356 - 3,000 = 4,433 - 4$			
Subtract 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.	I need to subtract ones/tens/hundreds. I do I can exchange 1 for 10	H T O		

Subtraction



Progression of skills	Key representations			
Subtract decimal numbers in the context of money	I can partition £ into £ and 100p $f f = f$ $100pp =p$	£3.26 can be partitioned into £3 + 20p + 6p		
Emphasis here is on partitioning and use of number lines rather than formal written calculations.	£5 - £3.26 £4 - £3 = £1 100p - 26p = 74p £5 - £3.26 = £1.74	- 6p - 20p - £3 £1.74 £1.80 £2 £5		
Subtract fractions and mixed numbers with the same denominator Include subtracting fractions from wholes.	When subtracting fractions with the same de I only subtract the numerator tenths — tenths = tenths	nominator, 2 5 6		
from wholes.	$\frac{16}{10} - \frac{5}{10}$ $\frac{16}{10} - \frac{9}{10}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		

Progression of skills – Multiplication



	Year 3		Year 4		Year 5
•	The 3 times-table	•	Times-table facts to 12×12	•	Multiples and factors
•	The 4 times-table	•	Multiply by 1 and 0	•	Square and cube numbers
•	The 8 times-table	•	Multiply 3 numbers	•	Multiply numbers up to 4
•	Related facts		Factor pairs		digits by a 1-digit number
•	Multiply a 2-digit number by a 1-digit number - no exchange	•	Multiply by 10 and 100	•	Multiply numbers up to 4 digits by a 2-digit number
•	Multiply a 2-digit number by a	•	Related facts	•	Multiply by 10, 100 and 1,000
	1-digit number - with exchange	•	Mental strategies	•	Mental strategies
•	Scaling	•	Multiply a 2 or 3-digit number	•	Multiply fractions by a whole
•	Correspondence problems		by a 1-digit number		number
		•	Scaling	•	Multiply mixed numbers by a
		•	Correspondence problems		whole number
				•	Find the whole



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 × = 11	51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90	
Multiply by 1 and 0	Any number multiplied by 1 is equal to Any number multiplied by 0 is equal to	$ \times =$ $1 \times 1 = 1 \qquad 1 \times 0 = 0$ $2 \times 1 = 2 \qquad 2 \times 0 = 0$ $3 \times 1 = 3 \qquad 3 \times 0 = 0$ $4 \times 1 = 4 \qquad 4 \times 0 = 0$	



Progression of skills	Key representations			
Multiply 3 numbers	To work out $ imes$, I can first calculate $ imes$ and then multiply the answer by			
Children use their understanding of commutativity to multiply more efficiently.	$4 \times 2 \times 3 = 8 \times 3 = 2$ $2 \times 3 \times 4 = 6 \times 4 = 2$ $3 \times 4 \times 2 = 12 \times 2 = 2$	24		
Factor pairs	12 = × , so × 12 = × × .			
Children explore equivalent calculations using different factors pairs.	$8 \times 6 = 8 \times 3 \times 2$ $8 \times 6 = 24 \times 2$	$6 \times 8 = 6 \times 4 \times 2$ $6 \times 8 = 24 \times 2$		
Multiply by 10 and 100 Some children may overgeneralise that multiplying by 10 or 100 always results in adding zeros. This will cause issues later when	When I multiply by 10, the digits move place value column to the left is 10 times the size of	When I multiply by 100, the digits move place value columns to the left is 100 times the size of		
multiplying decimals.	$35 \times 10 = 350$	$14 \times 100 = 1.400$		



Progression of skills	Key representations				
Related facts Use knowledge of	$\dots \times \dots$ ones is equal to \dots ones so $\dots \times \dots$ tens is equal to \dots tens and $\dots \times \dots$ hundreds is equal to \dots hundreds.				
multiplying by 10 and 100 to scale times-table facts.	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$				
Mental strategies	tens multiplied by is equal to tens. ones multiplied by is equal to ones.				
Partition 2 or 3-digit numbers to multiply using informal methods.	Tens Ones 26				



Progression of skills	Key representations				
Multiply a 2 or 3-digit number by a 1-digit number	To multiply a 2-digit number by, I mult To multiply a 3-digit number by, I mult hundreds by	• •	•	•	d the
The short multiplication method is introduced for the first time, initially in an expanded form.	T 0 H T 0 3 4 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		H T O 3 4 5 5 1 7 O 1 2		
Scaling	is times the size of	is times the size of			
Children focus on multiplication as scaling (times the size).	7 7 7 7 7 7 7 6 6 6 6 6 6 6 6 A computer mouse costs £7 A red ribbon is 6 cm.				
(A keyboard costs 6 times as much.			7 times as l	ong.
Correspondence problems	For every, there are possibilities.				
	There are × possibilities altogether.		Deep pan	Italian	Thin
Encourage children to use		Cheese	C DP	СІ	C Th
tables to show all the	A pizza company offers a choice	Mushroom	M DP	MI	M Th
different possible	of 5 toppings and 3 bases.	Vegetable	V DP	VI	V Th
combinations.		Chicken	C DP	C I	C Th
	$5 \times 3 = 15$	Tuna	T DP	TI	T Th

Progression of skills – Division



Year 3	Year 4	Year 5
Divide by 3	• Division facts to 12 × 12	Mental strategies
Divide by 4	Divide a number by 1 and	Divide numbers up to 4 digits
Divide by 8	itself	by a 1-digit number
Related facts	Related facts	Divide by 10, 100 and 1,000
Divide a 2-digit number by a 1-digit number - no exchange	Divide a 2 or 3-digit number by a 1-digit number	Fraction of an amount
 Divide a 2-digit number by a 1-digit number - with remainders 	Divide by 10 and 100	
 Unit fractions of a set of objects 		
Non-unit fractions of a set of objects		

Division



Year 4	 Recall division facts for multiplication tables up to 12 × 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 \div = $2 \times 6 = 12$ $12 \div 6 = 2$ $0 6 12$	has been shared equally into equal groups \div $=$ $ 2 \times 6 = 12 $ $ 12 \div 6 = 2 $
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

Division



Progression of skills	Key representations	
Related facts Link to known times-table facts.	÷ is equal to so tens ÷ is equal to tens and hundreds ÷ is equal to 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	hundreds. $21 \div 7 = 3 \qquad 21 \div 3 = 7$ $210 \div 7 = 30 \qquad 210 \div 3 = 70$ $2,100 \div 7 = 300 \qquad 2,100 \div 3 = 700$
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. $80 \div 4 = 20$ $4 \div 4 = 1$ $80 \div 4 = 21$	I cannot share the hundreds/tens equally, so I need to exchange 1 for 10 $300 \div 3 = 100$ $120 \div 3 = 40$ $15 \div 3 = 5$ $435 \div 3 = 145$

Division



Progression of skills	Key representations			
Divide by 10 and 100 Encourage children to	When I divide by 10, the digits move 1 place value column to the right is one-tenth the size of	When I divide by 100, the digits move 2 place value columns to the right is one-hundredth the size of		
notice that dividing by 100 is the same as dividing by 10 twice.	O Tth Hth T O Tth Hth	O Tth Hth T O Tth Hth		
	O Tth Hth T O Tth Hth	O Tth Hth T O Tth Hth		
	$2 \div 10 = 0.2$ $12 \div 10 = 1.2$	$2 \div 100 = 0.02$ $12 \div 100 = 0.12$		