Freeman's Endowed CE Junior Academy

Calculation Policy

Calculation policy for: addition, subtraction, multiplication, division, length & height, perimeter & area, position & direction and fractions, decimals and percentages.

From September 2022

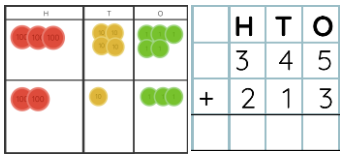
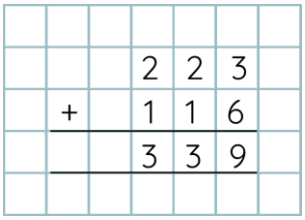
Maths at Freeman's

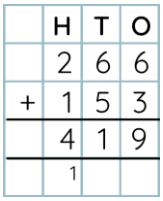
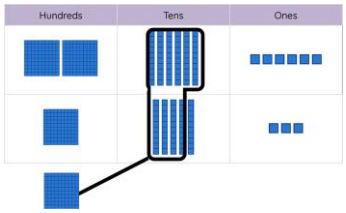
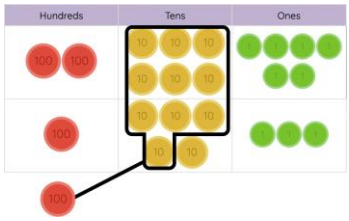
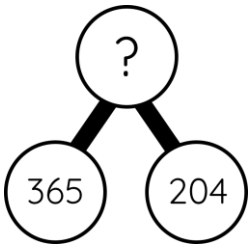
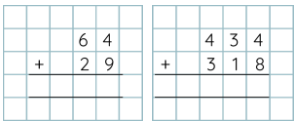
- **We follow a mastery approach that enables children to have a deep understanding of the mathematics they are learning. We have an ambitious mastery curriculum for all.**
- Children are happy, confident and resilient mathematicians
- Children have a 'can-do' attitude, believing that by working hard they can succeed
- Learning is embedded by giving all pupils the chance to revisit and reinforce key concepts
- Teachers model using the 'my turn, our turn, your turn' approach to scaffold children's new understanding in small steps
- CPA approach for all children to develop conceptual understanding
- Frequent opportunities for mathematical talk
- Correct use of mathematical vocabulary modelled and expected from children
- All children given the opportunity to reason mathematically and solve problems
- Pupils who are struggling to grasp a concept, quickly identified and provision pin place to ensure that they keep up with the rest of the class
- Children become fluent in the fundamentals of Maths, able to recall and apply knowledge fluently and accurately

Addition

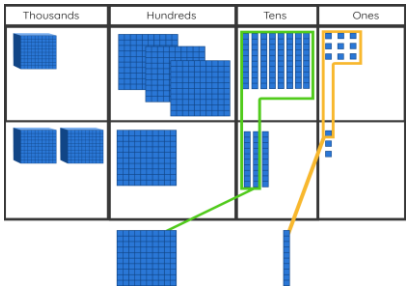
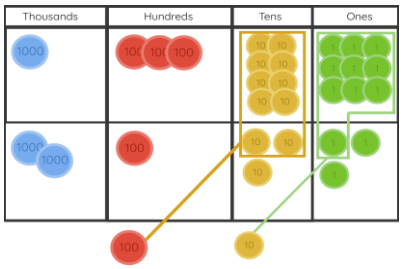
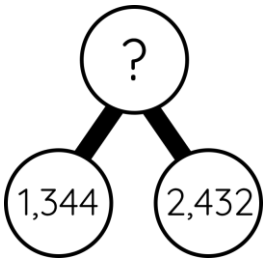
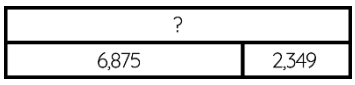
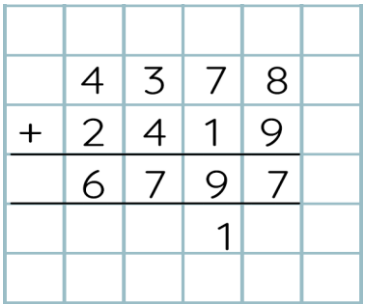
In Year 3:

Vocabulary taught:	add, plus, altogether, total, part, whole, number bonds, facts, 2 digit number, sum, commutative, tens boundary, **exchange, regroup, hundreds boundary**	**Manipulatives and models used:**	Dienes/Base 10 Place value counters Part-Whole Model Bar Model (With dienes, counters progressing to numbers)

Skill:	Concrete:	Pictorial:	Abstract:
Column addition (no regrouping)	Use dienes first, then move onto place value counters. -Add the ones. -Add the tens. -Add the hundreds Children should rearrange the tens and ones into columns, but **DO NOT** label them as tens and ones as this results in an incorrect representation of their value at this stage.	Use pictorial representations to help children solve the equations - these can be provided or children can draw their own.  Again, children should add the ones first, then the tens, then the hundreds.	

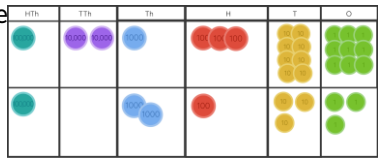
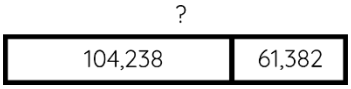
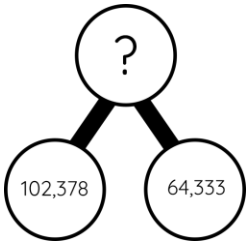
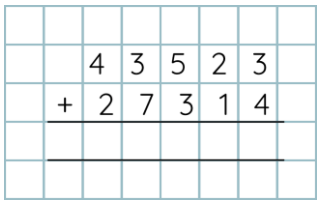
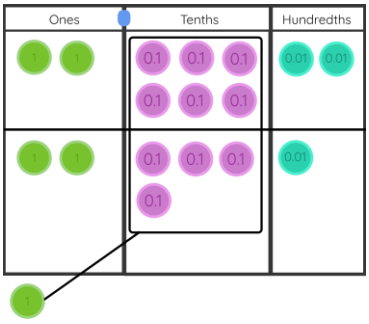
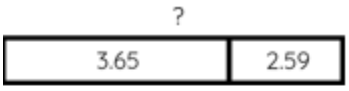
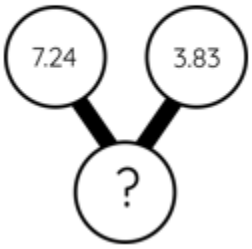
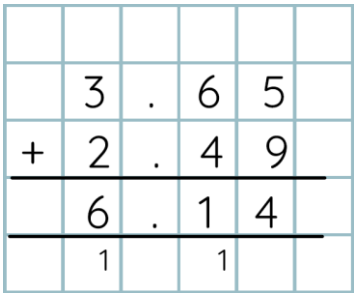
Column addition (regrouping)	Use dienes first, then move onto place value counters. -Add the ones -Regroup (if needed) ten ones as one ten and place in tens column. -Add the tens -Regroup (if needed) ten tens as one hundred and place in hundreds column -Add thehundreds	Use pictorial representations to help children solve the equations - these can be provided or children can draw their own.     	
Notes:	It is important that the place value of each digit is verbalised when modelling the process, e.g. 4 ones add 3 ones; 7 tens add 4 tens; 6 hundreds add 5 hundreds etc.		

In Year 4			
Vocabulary taught:	add, plus, altogether, total, part, whole, number bonds, facts, 2 digit number, sum, commutative, tens boundary, exchange, regroup, hundreds boundary, **thousands**	**Manipulatives and models used:**	Dienes/Base 10 Place value counters Part-Whole Model Bar Model (with numbers)

Skill:	Concrete:	Pictorial:	Abstract:
Add numbers with up to 4 digits	Initially, use dienes and then move onto place value counters. > Add the ones > Regroup (if needed) ten ones as one ten and place in the tens column. > Add the tens > Regroup (if needed) ten tens as one hundred and place in the hundreds column > Add the hundreds > Regroup (if needed) ten hundreds as one thousand > Add the thousands Ensure children write out the calculation alongside any manipulatives so they can see the links to the written column method.	  Ensure children write out the calculation alongside any pictorial resources so they can see the links to the written column method.   	

Notes:	It is important that the place value of each digit is verbalised when modelling the process, e.g. 4 ones add 3 ones; 7 tens add 4 tens; 6 hundreds add 5 hundreds etc.

In Year 5 and 6			
Vocabulary taught:	add, plus, altogether, total, part, whole, number bonds, facts, 2 digit number, sum, commutative, tens boundary, exchange, regroup, hundreds boundary, thousands, **ten thousands, hundred thousands, millions**	**Manipulatives and models used:**	Place value counters Part-Whole Model Bar Model (With numbers)

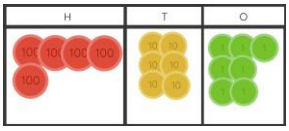
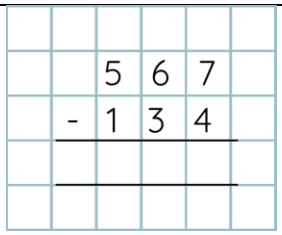
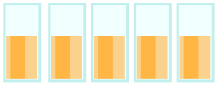
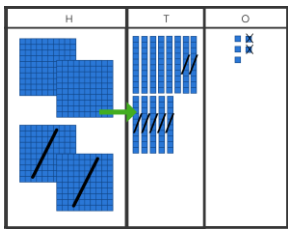
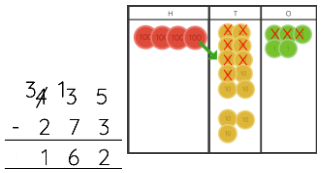
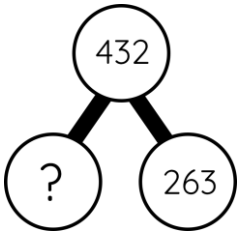
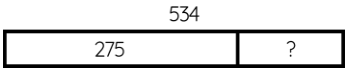
Skill:	Concrete:	Pictorial:	Abstract:
Add numbers with more than 4 digits.	Use place value counters to explore practically. Ensure children write out the calculation alongside the manipulatives. Align digits in the correct place value column Starting from the right, add each column in turn. Regroup to the next column if the total adds to more than 9.	  	
Add using up to three decimal places.	Place value counters and double sided counters on a place value grid.	  	

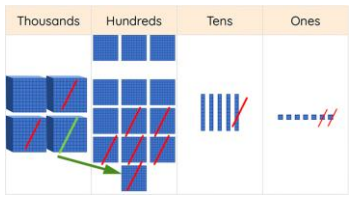
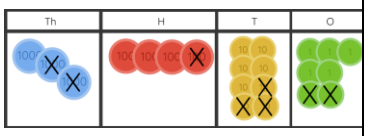
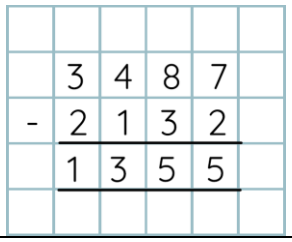
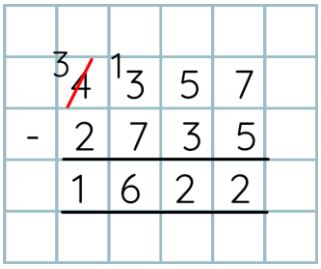
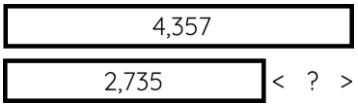
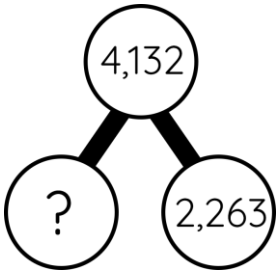
Notes:	At this stage, children should be encouraged to work in the abstract. It is important that the place value of each digit is verbalised when modelling the process, e.g. 4 ones add 3 ones; 7 tens add 4 tens; 6 hundreds add 5 hundreds etc.

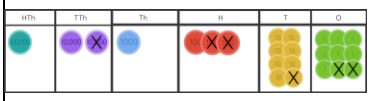
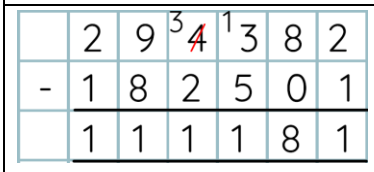
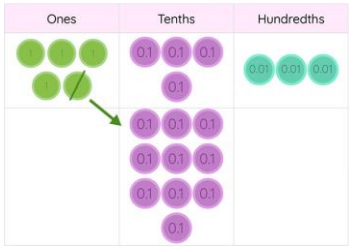
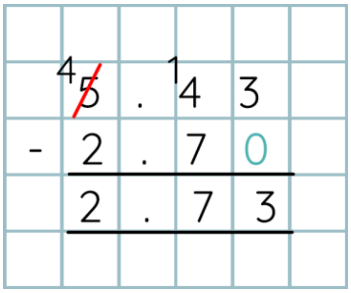
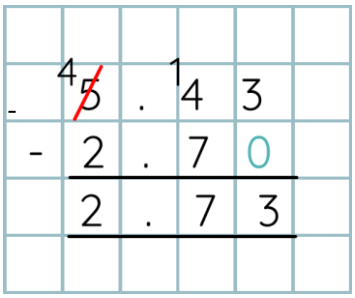
Subtraction

In Year 3

Vocabulary taught:	first, then, now, take away, minus, part, whole, subtract, take away, less, fewer, difference between, subtract, tens boundary, hundreds boundary	**Manipulatives and models used:**	Interlocking cubes Bar model Part-whole model Double sided counters Tens frame Dienes Place value counters

Skill:	Concrete:	Pictorial:	Abstract:
Column subtraction (no exchanging)	Use dienes first, then move onto place value counters.	Use pictorial representations to help children solve the equations - these can be provided or children can draw their own. 	 5 6 7 - 1 3 4  Tom has 73 drinks. He gives 29 to Mary. How many does he have left?
Column subtraction (exchanging)	Use dienes first, then move onto place value counters. 	Use pictorial representations to help children solve the equations - these can be provided or children can draw their own. 	 432 ? 263  534 275 ?

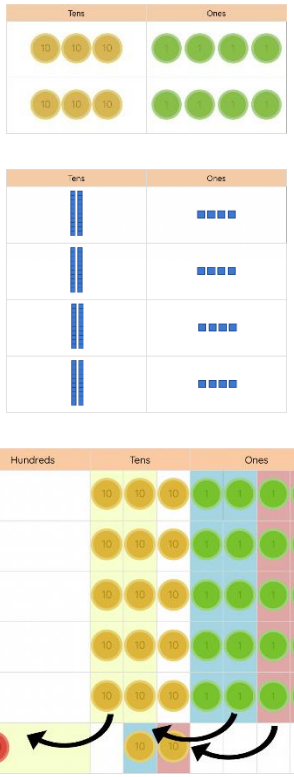
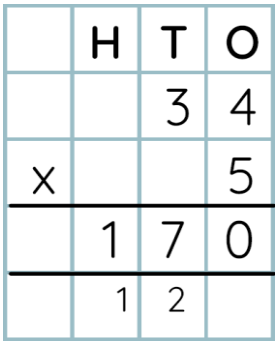
In Year 4			
Vocabulary taught:	first, then, now, take away, minus, part, whole, subtract, take away, less, fewer, difference between, subtract, tens boundary, hundreds boundary	**Manipulatives and models used:**	Interlocking cubes Bar model Part-whole model Double sided counters Tens frame Dienes Place value counters
Objective:	**Concrete:**	**Pictorial:**	**Abstract:**
Subtract numbers with up to 4 digits.	Use dienes (initially if needed) and then place value counters. Use dienes first, then move onto place value counters. Ensure children write out the calculation alongside any manipulatives so they can see the links to the written column method.	   Ensure children write out the calculation alongside any pictorial resources so they can see the links to the written column method.	  

In Year 5 and 6			
Vocabulary taught:	first, then, now, take away, minus, part, whole, subtract, take away, less, fewer, difference between, subtract, tens boundary, hundreds boundary, **thousands boundary**	**Manipulatives and models used:**	Place value counters Bar model Part-whole model Double sided counters
Objective:	**Concrete:**	**Pictorial:**	**Abstract:**
Subtract numbers with more than 4 digits	Use place value counters or double sided counters on a place value grid. At this stage children should be encouraged to work in the abstract wherever possible.	 	294,382 - 182,501 = 111,181 294,382 182,501 < ? >
Subtract numbers up to 3 decimal places	Use place value counters or double sided counters on a place value grid.	  Use pictorial representations alongside abstract.	 5.43 2.7 < ? >

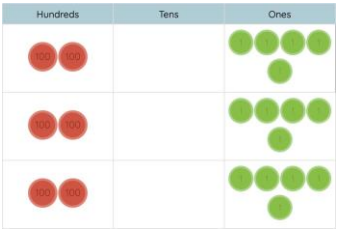
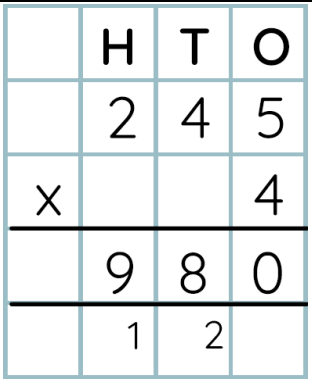
Multiplication

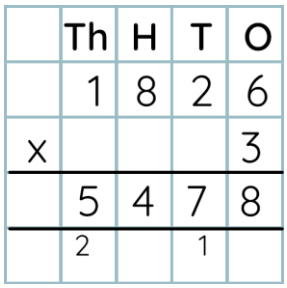
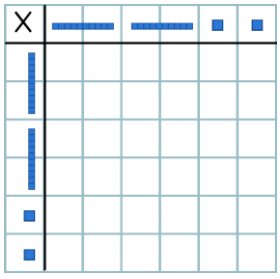
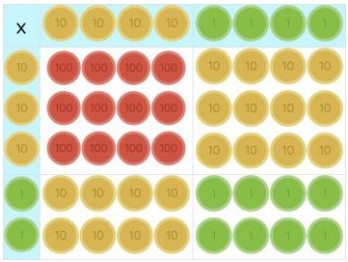
In Year 3

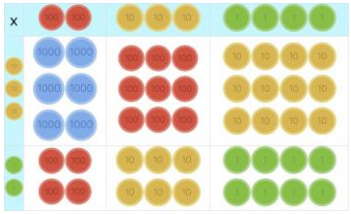
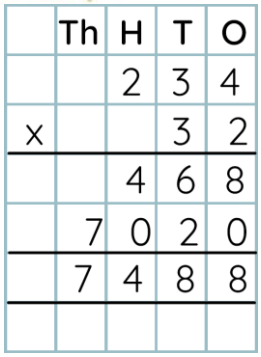
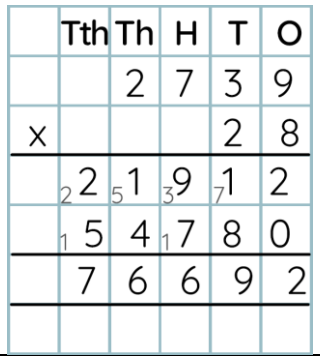
Vocabulary taught:	equal, unequal, group, odd, even, array, multiple, multiplication, multiplied by, times, repeated addition, row, column, **factor, product**	**Manipulatives and models used:**	Dienes Place value counters

Skill:	Concrete:	Pictorial:	Abstract:
Multiply 2-digit numbers by 1-digit numbers	Use dienes and place value counters. These should be used to support understanding of the method rather than supporting the multiplication, as pupils should use their times table knowledge.	Children can draw/images can be provided to support children to solve calculations. 	

	H	T	O
		3	4
x			5
	1	7	0
	1	2	

In Year 4			
Vocabulary taught:	equal, unequal, group, odd, even, array, multiple, multiplication, multiplied by, times, repeated addition, row, column, factor, product	**Manipulatives and models used:**	Dienes Place value counters
Objective:	**Concrete:**	**Pictorial:**	**Abstract:**
Multiply 3-digit numbers by 1 digit numbers	Use dienes and place value counters to support formal written methods.	Use images/draw pictures of dienes and place value counters to support formal written method 	

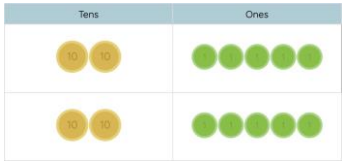
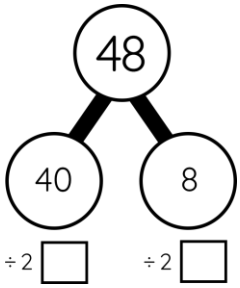
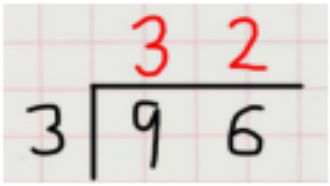
In Year 5 and Year 6			
Vocabulary taught:	equal, unequal, group, odd, even, array, multiple, multiplication, multiplied by, times, repeated addition, row, column, factor, product	**Manipulatives and models used:**	Place value counters Dienes
Objective:	**Concrete:**	**Pictorial:**	**Abstract:**
Multiply 4-digit numbers by 1-digit numbers	Use place value counters if children still need to use a concrete resource.	Children could draw images of place value counters to support if needed. A multiplication square could also be used if children need support with times tables facts. 	
Multiply 2-digit numbers by 2-digit numbers	Use the area model with dienes to help children understand the size of the numbers they are using.  This can be adapted to use place value counters and links to the grid method.	Children could draw images of place value counters/dienes to support if needed. A multiplication square could also be used if children need support with times tables facts. 	

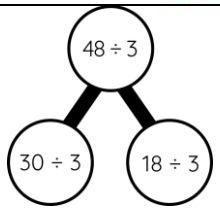
Multiply 3-digit numbers by 2-digit numbers	Continue to use the area model, but with place value counters as this is more efficient. 234x32 	Children could draw images of place value counters to support if needed. A multiplication square could also be used if children need support with times tables facts.	
Multiply 4-digit numbers by 2-digit numbers	Children should be confident in the written method. If they are struggling with times tables, provide multiplication grids to support the written method.	Children should be confident in the written method. If they are struggling with times tables, provide multiplication grids to support the written method.	

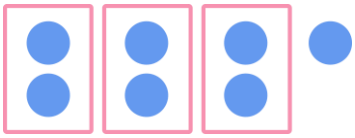
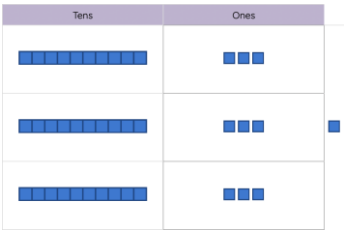
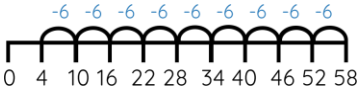
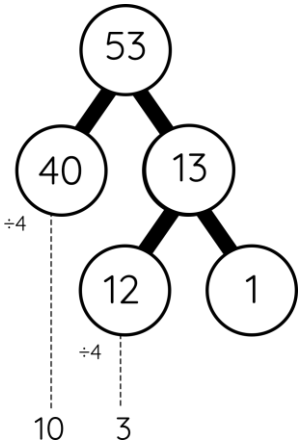
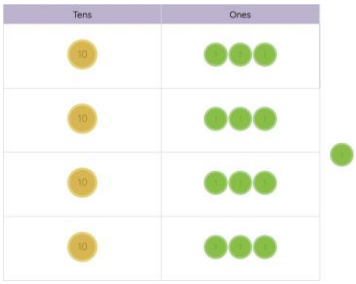
Division

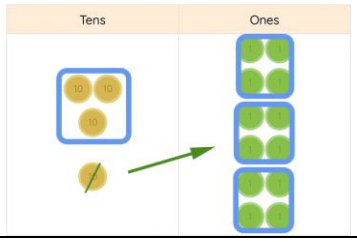
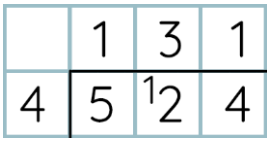
In Year 3

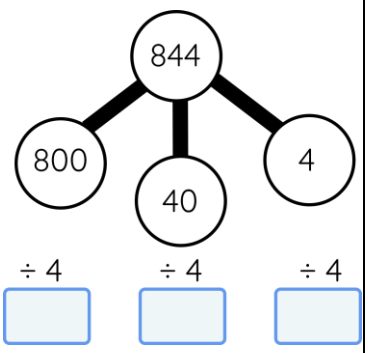
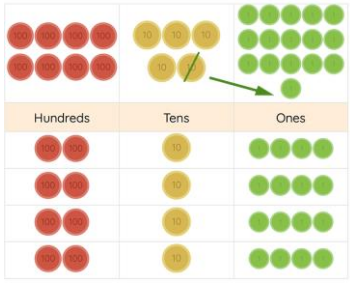
Vocabulary taught:	equal, unequal, group, even, odd, division, dividing, grouping, groups of	**Manipulatives and models used:**	Dienes Place value counters Place value grid

Skill:	Concrete:	Pictorial:	Abstract:
Divide a 2-digit number by a 1-digit number (sharing with no exchange)	Use dienes and place value counters to partition into equal groups, sharing the tens and ones. NB: Children should be taught to divide the tens first and then the ones. 	Draw pictorial representations of dienes/place value counters, sharing the tens and ones. A part-whole model is useful to use alongside this. 	Calculate: 96 ÷ 3 = 32 
Divide a 2-digit number by a 1-digit number (sharing with an exchange)	Use dienes and place value counters to exchange one ten for ten ones. Children start with equipment outside the place value grid before sharing the tens and ones equally between rows.	Use images/drawings of dienes/place value counters, alongside a part-whole model. 	Complete the statement using <, > or = 42 ÷ 3 ☐ 52 ÷ 4

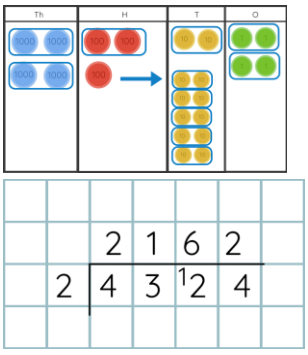
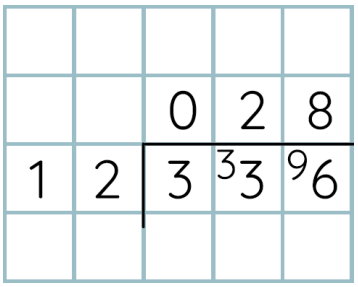
	 Tens Ones	 48 ÷ 3 30 ÷ 3 18 ÷ 3	

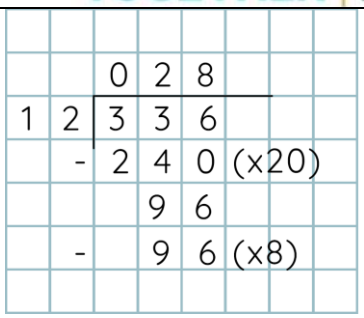
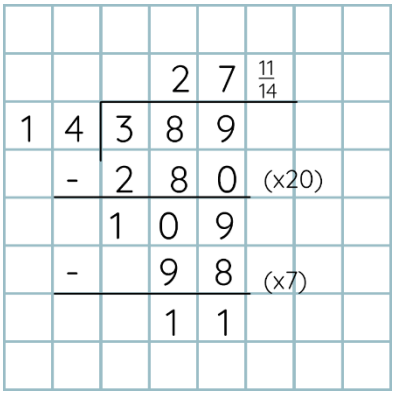
Division with remainders	Children explore grouping a given quantity of counters with a remainder.  Use dienes and place value counters so children can exchange one ten for ten ones. Start with dienes or place value counters outside the grid as they will be left outside the grid once the equal groups have been made.  	Jump back equal jumps on a number line then see how many are left to find the remainder.  Draw dots and group them to divide an amount and clearly show a remainder. Use images/drawings of dienes/place value counters, alongside a part-whole model.   	Complete calculation and show the remainder using r. 38 ÷ 3 = 12 r 2

In Year 4			
Vocabulary taught:	equal, unequal, group, even, odd, division, dividing, grouping, groups of	**Manipulatives and models used:**	Place value counters Place value grid Double sided counters
Skill:	**Concrete:**	**Pictorial:**	**Abstract:**
Divide a 3-digit number by a 1-digit number (short division)	Use place value or double sided counters in a place value grid alongside the bus stop method. Children need to group the place value counters by the divisor, starting with the largest place value. For example: 42 ÷ 3 Start by asking - 'How many groups of 3 tens can we make?' (any remaining tens will be exchanged for ten ones) Then 'How many groups of 3 ones can we make?' 	Children can continue to use drawn diagrams using circles to represent double-sided or place value counters.	 Following the short division method.
Divide a 3-digit number by a 1-digit number (sharing)	Building on learning in Year 3, children use place value counters and a place value grid to share 3-digit numbers into equal groups. Start with the	Use images/drawings of place value counters, alongside a part-whole model.	What is 208 divided by 8?

	manipulatives outside the grid, before sharing the hundreds, tens and ones equally between the rows. This method is supported by flexible partitioning.   - - -  		

In Year 5 and Year 6			
Vocabulary taught:	equal, unequal, group, even, odd, division, dividing, grouping, groups of	**Manipulatives and models used:**	Place value counters Place value grid Double sided counters

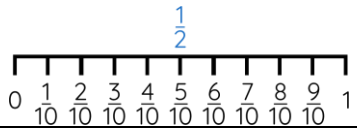
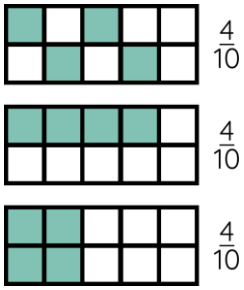
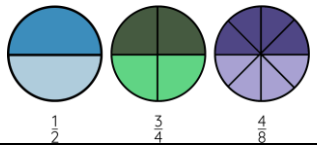
Skill:	Concrete:	Pictorial:	Abstract:
Divide a 4 digit number by a 1 digit number **Short division**	Use place value or double sided counters in a place value grid alongside the bus stop method.	Children can continue to use drawn diagrams using circles to represent double-sided or place value counters.	What is 2240 divided by 7?
	Children need to group the place value counters by the divisor, starting with the largest place value.  		
Divide multi-digits by 2 digits (short division)	Concrete and pictorial methods become less effective so written methods should be used.		

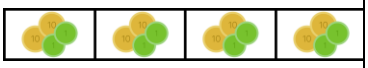
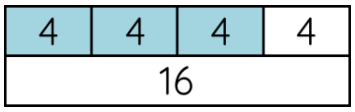
Divide multi-digits by 2 digits (long division)	Concrete and pictorial methods become less effective so written methods should be used.	 1 x 12 = 12 2 x 12 = 24 3 x 12 = 36 4 x 12 = 48 5 x 12 = 60 6 x 12 = 72 7 x 12 = 84 8 x 12 = 96 9 x 12 = 108 10 x 12 = 120 11 x 12 = 132 12 x 12 = 144 When there is a remainder, children should convert the remainder to a fraction. can 

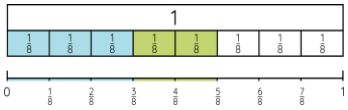
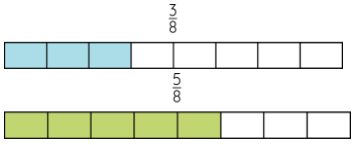
Fractions, Decimals and Percentages

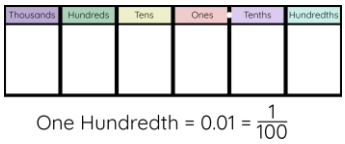
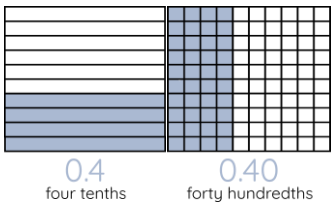
In Year 3

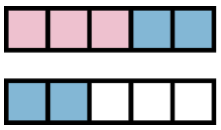
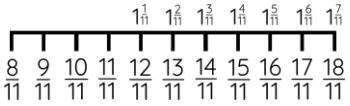
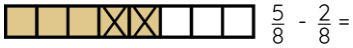
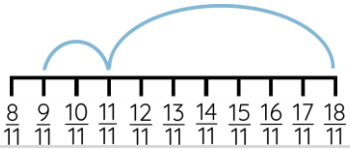
Vocabulary taught:	fraction, equal part, equal grouping, equal sharing, parts of a whole, half, quarter, three quarters, third, equivalent fractions, unit fractions, non-unit fractions, numerator, denominator, one whole, two quarters, **tenths**	**Manipulatives and models used:**	Bar model Place value counters Double sided counters Fraction cubes Counting stick Tens frame

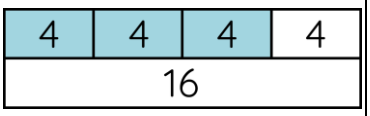
Skill:	Concrete:	Pictorial:	Abstract:
Counting in tenths	Children will be shown fractions on a counting stick or bar model and will count up and down in tenths. 		1/10 of 8 is 0.8 because 8 divided by 10 is 0.8.
Finding equivalent fractions	Use fraction cubes to show equivalence.	Pictorial representations can be explored - any area representation can and should be used. It doesn't have to be a circle. 	Peter says 3/6 is the same as a half. Is he correct? How do you know?

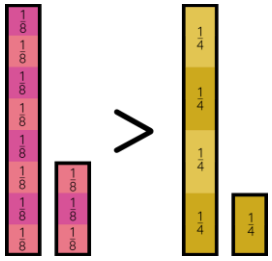
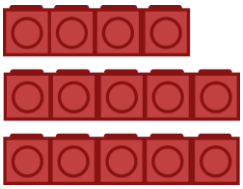
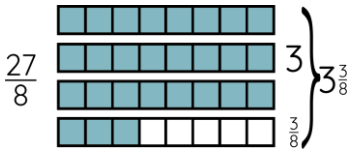
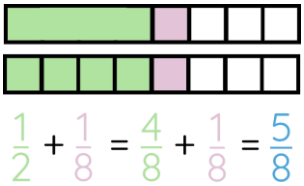
Finding fractions of an amount	Use bar model and counters to find fraction of an amount, e.g. ⅕ of 25. Build on strategy taught in Year 2.  This can extend into larger numbers by using place value counters. E.g. ¼ of 88:  Extend when finding the fraction of a non-unit fraction by circling the number of parts of the whole they are being asked to find.	If necessary, use a bar model and draw dots/tens and ones to find a fraction of an amount. Build on strategy taught in Year 2. **NB:** Children must be taught to put one dot in each part, working left to right. This should move onto using digits in each part of the bar model, rather than dots/tens and ones as soon as possible.  The aim is to build towards: -Divide the whole by the denominator -Multiply by the numerator. The bar model can also be used to support problem solving.	Follow success steps of: > Divide the whole by the denominator Multiply by the numerator $\frac{2}{3}$ of 36 36 ÷ 3 = 12 12 x 2 = 24 $\frac{2}{3}$ of 36 = 24

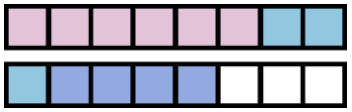
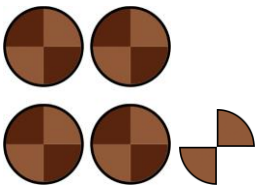
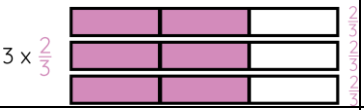
Add fractions	Fraction cubes could be used here as a concrete resource to reinforce understanding. Real life objects such as a cake or an apple could also be used, e.g by using a fraction story.	Pictorial representations are crucial to help children develop conceptual understanding. A bar model and number line can both be used. For example; $\frac{3}{8} + \frac{2}{8}$ 	$\frac{2}{5} + \frac{3}{5} =$ When adding fractions with the same denominator, just add the numerators. The denominator stays the same.
Compare and order fractions (with the same denominator)	Fraction cubes could be used here to compare and order fractions.	Use a diagram or bar model.  $\frac{3}{8} < \frac{5}{8}$ A number line can also be used.  $\frac{6}{8} > \frac{2}{8}$	$\frac{1}{8}$ $\frac{3}{8}$ $\frac{6}{8}$ $\frac{7}{8}$

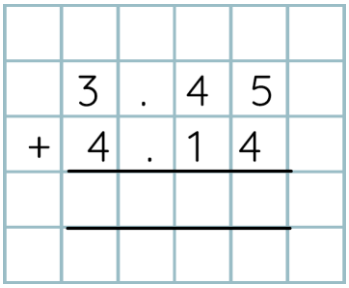
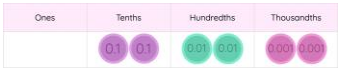
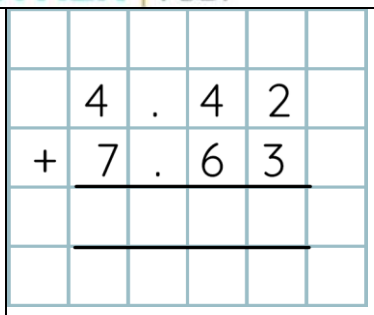
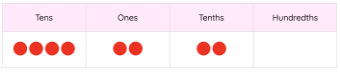
In Year 4			
Vocabulary taught:	fraction, equal part, equal grouping, equal sharing, parts of a whole, parts of a whole, half, quarter, fraction, equal parts, groups, sharing, equivalent fraction, numerator, denominator, tenths, **decimal equivalence hundredths, convert, proper fractions, improper fractions, decimal point**	**Manipulatives and models used:**	Bar model Place value counters Double sided counters Number line Fraction cubes Place value chart
Skill:	**Concrete:**	**Pictorial:**	**Abstract:**
Count up and down in hundredths	Count up and down a number line displayed on w/board or counting stick. 	Use a place value grid to emphasise the position of the hundredths.  One Hundredth = 0.01 = $\frac{1}{100}$	1/100 of 80 is 0.8 because 80 ÷ 100 = 0.8.
Recognise and write decimal equivalents of tenths or hundredths	Use a blank tens frame (representing whole) or blank hundred square representing (representing whole) and double sided counters or decimal place value counters.	Use images of tens frame or hundred square. 	$\frac{1}{10} = 0.1$ $\frac{5}{10} = \frac{1}{2} = 0.5$
Divide a 1-digit or 2-digit number by 10 or 100	Use counters on a place value chart to see how the counters move when dividing by 10 or 100. 	Use a place value chart with digits e.g. 5 ÷ 10 = 0.5 	0.2 = _____ ÷ 10

Add 2 or more fractions	Fraction cubes could be used here as a concrete resource to reinforce understanding. Real life objects such as a cake or an apple could also be used, e.g by using a fraction story.	 $\frac{3}{5} + \frac{4}{5} =$ The answer can be written as an improper fraction or a mixed number. 	$\frac{1}{9} + \frac{11}{9} + 1$ $\frac{?}{9} + \frac{5}{9} + \frac{7}{9} = \frac{17}{9}$
Subtract 2 fractions	Fraction cubes could be used here as a concrete resource to reinforce understanding. Real life objects such as a cake or an apple could also be used, e.g by using a fraction story.	Pictorial representations are crucial to help children develop conceptual understanding. A bar model and number line can both be used.  $\frac{5}{8} - \frac{2}{8} =$ $\frac{18}{11} - \frac{9}{11} =$ 	$\frac{\square}{7} - \frac{3}{7} = \frac{\square}{7} - \frac{\square}{7}$ $\frac{\square}{7} - \frac{3}{7} = \frac{\square}{7} + \frac{\square}{7}$

Find fractions of a quantity	Use a bar model and counters to find the fraction of an amount. Circle the number of parts they are being asked to find of the whole.	If necessary, use a bar model and draw dots/tens and ones to find a fraction of an amount. Build on strategy taught in Year 2 (and repeated in Year 3). **NB:** Children must be taught to put one dot in each part, working left to right. This should move onto using digits in each part of the bar model, rather than dots/tens and ones as soon as possible.  The aim is to build towards: · Divide the whole by the denominator · Multiply by the numerator.	Follow success steps of: > Divide the whole by the denominator > Multiply by the numerator $\frac{2}{3}$ of 36 36 ÷ 3 = 12 12 x 2 = 24 $\frac{2}{3}$ of 36 = 24

Recognise mixed numbers and improper fractions. **Convert from one form to the other.**	Use fractions bars to explore this.  Unifix cubes can also be used - e.g to convert 14/5 into a mixed number. 	A bar model can be used.  	$\frac{7}{2} = 3\frac{1}{2}$ because 7 ÷ 2 = 3 wholes with one half remaining $\frac{7}{3} = 2\frac{1}{3}$ because 2 x 3 = 6 with with one remaining
Add and subtract fractions within 1 (different denominators)	N/A	Use pictorial representations (e.g. diagram or bar model) to convert the fractions so they have the same denominator. It is important that the children write their working alongside these.  	$\frac{2}{5} - \frac{1}{4}$ x4 ↻ $\frac{2}{5} = \frac{8}{20}$ ↺ x4 x5 ↻ $\frac{1}{5} = \frac{5}{20}$ ↺ x5 $\frac{8}{20} - \frac{5}{20} = \frac{3}{20}$ So, $\frac{2}{5} - \frac{1}{4} = \frac{3}{20}$

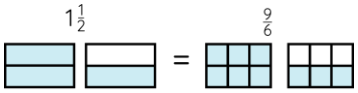
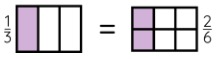
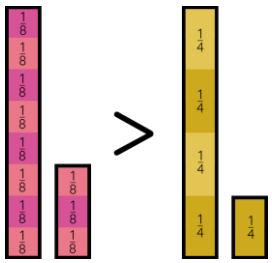
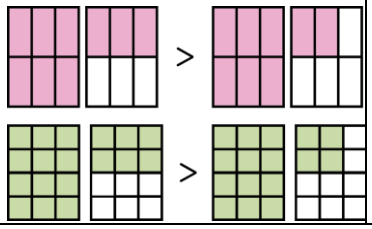
Add and subtract fractions (where the total is greater than one)	N/A	As above - a diagram or bar model can be used. $\frac{3}{4} + \frac{3}{8} + \frac{1}{2} =$ 	$\frac{3}{4} + \frac{5}{12} + \frac{1}{2}$
Multiply proper fractions and mixed numbers by whole numbers	N/A	Use diagrams to help children see the link between repeated addition and multiplication.   6 lots of ¾  $4\frac{2}{4}$ altogether  $3 \times \frac{2}{3}$	$\frac{3}{4} \times 6 = \frac{18}{4}$ Then, convert to a mixed number. $\frac{18}{4} = 4\frac{2}{4}$
Adding and subtracting decimals	Use place value counters and a place value chart, alongside the written method. This will support	Children may move from concrete to abstract but if needed could draw images onto a place	Use the column addition method.

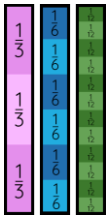
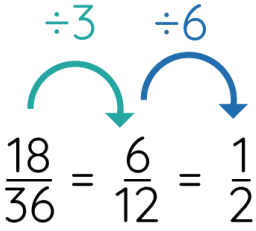
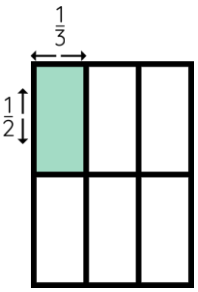
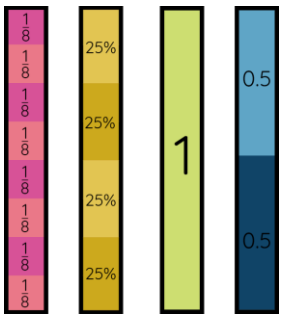
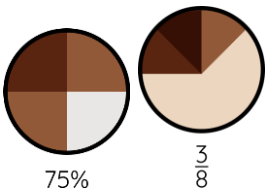
	children to understand the value of each digit and know when to exchange.   3 . 4 5 + 4 . 1 4	value chart, alongside the written method. 	 4 . 4 2 + 7 . 6 3
Multiplying and dividing numbers with decimals by 10, 100 and 1000	Use a place value grid and counters. 	Use a place value chart, with a moveable whiteboard, and write in the digits so children can physically move the digits to the left or right.	34.2 ÷ ☐ = 0.342
Notes:	When adding and subtracting decimals which cross the whole, children should be taught to spot complements to 1.		

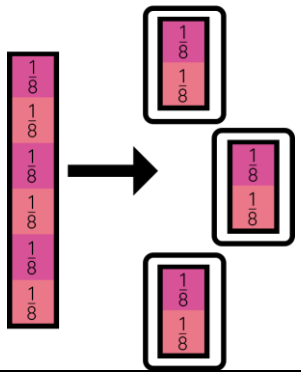
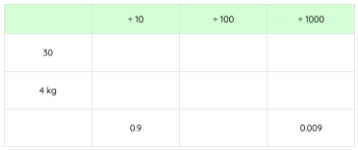
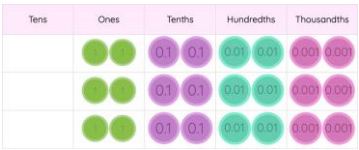
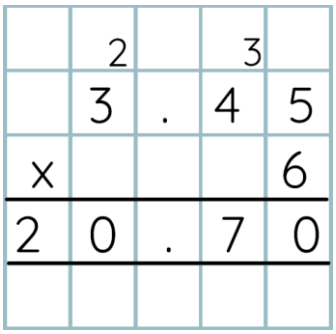
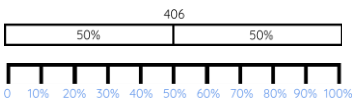
Fractions, decimals and percentages

In Year 6

Vocabulary taught:	parts of a whole, half, quarter, fraction, equal parts, groups, sharing, equivalent fraction, numerator, denominator, thirds, sixths, sevenths, eights, tenths, hundredths, decimal, decimal fraction, decimal point, decimal place, decimal equivalent, proportion percentage, per cent, %, reduced to, proper/improper fraction, **ratio**	**Manipulatives and models used:**	Fraction bars Bar model Fraction wall Place value counters Place value chart Part-whole model

Skill:	Concrete:	Pictorial:	Abstract:
Add and subtract numbers with different denominators and mixed numbers	N/A	$1\frac{1}{2} + \frac{1}{3}$   $\frac{9}{6} + \frac{2}{6} = \frac{11}{6} = 1\frac{1}{6}$	$1\frac{1}{2} + \frac{1}{3} = 1\frac{5}{6}$ Why? $1\frac{1}{2} = \frac{3}{2}$ $\frac{3}{2} = \frac{9}{6}$ and $\frac{1}{3} = \frac{2}{6}$ So, $\frac{9}{6} + \frac{2}{6} = \frac{11}{6} = 1\frac{5}{6}$
Compare and order fractions	Use fraction bars 	Use diagrams 	Which is greater? $\frac{2}{8}$ or $\frac{6}{16}$

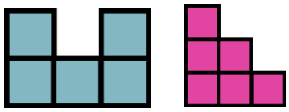
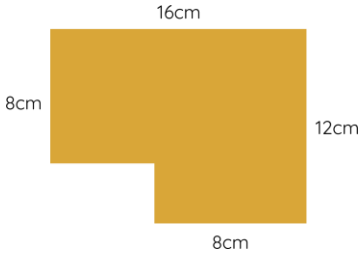
Use common factors to simplify fractions; use common multiples to express fractions in the same denomination	Use fraction bars 	Use a fraction wall to support simplifying 	
Multiply simple pairs of proper fractions	Children can fold paper to help them. E.g. ⅓ x ½ Children fold a piece of paper into half and then fold the half into thirds. They shade the fraction of paper they have created and then open the piece of paper up again to show the fraction of the whole piece of paper.	Use diagrams to illustrate $\frac{1}{3} \times \frac{1}{2} =$ 	$\frac{1}{2} \times \frac{2}{4} = \frac{3}{8}$ 1. Multiply the numerators 2. Multiply the denominators 3. Simplify
Recall and use equivalences between fractions, decimals and percentages	Use fraction bars 	Use diagrams. Would you prefer 75% or ⅜ of a cake? 	Peter scored 40/80 in his spelling test and Fraser scored 40%. Who had the higher score? Peter - 40/80 = 50% Fraser - 40% Therefore Peter had the higher score.
Divide proper fractions by whole numbers	Use fractions bars	Use a bar model to support. $\frac{4}{7} \div 4 =$ 	$\frac{1}{2} \div 3 = \frac{1}{6}$ $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$

	$\frac{6}{8} \div 3 = \frac{2}{8}$ 		
Multiply and divide by 10, 100 or 1000	Use a place value chart and counters.	Use a place value chart with moveable whiteboards, writing in the digits.	
Multiply decimals by integers	Use place value counters and a place value grid alongside the written method. 	Children could draw place value counters onto a place value grid alongside the written method.	Use the written method. 
Find the percentage of an amount	N/A	Children could use a bar model to help them visualise the problem. 	Use known percentages to help e.g 'Find 30% of 230' 10% of 230 = 23 23 x 3 = 69 So 30% of 230 is 69.

Area

At Freeman's:

Vocabulary taught:	rectilinear shape, area, square centimetre, square millimetre, square metre, compound shape, irregular shape	**Manipulatives, resources and models used:**	Multiplication square Squared paper

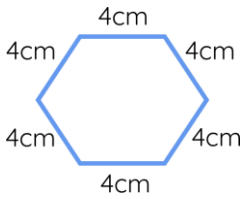
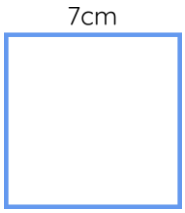
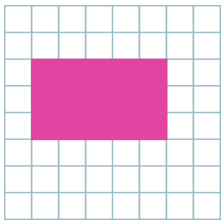
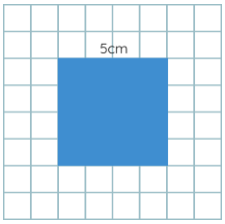
Stage of understanding:	Strategy:	Arithmetic Skills:	Representation:
Year 4 **Counting squares**	Count the squares included in the shape. **N.B.** Ensure children cross o‰ counted squares.	1. Count the squares one by one. 2. Look for multiplication facts to count the squares more efficiently.	 Jack uses his times tables to count the squares more e ciently. He can see the shape is four squares wide and two squares tall. Therefore it is 4 squares x 2 squares so the area is 8 squares.
Year 5 **Introducing formula for rectilinear shapes** **Compound shapes**	Area of rectangle = Length x Width Calculating area of compound shapes Area of irregular shapes	1. Identify the most effective and efficient way to split the compound shape 2. Use known facts, where possible, to solve the calculations. Use prior knowledge of counting squares from Year 4 and use knowledge of fractions to combine part-covered squares to make a whole. Ensure children are marking counted squares.	

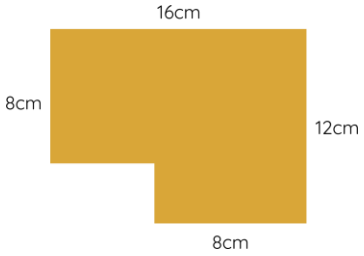
Year 6 **Introducing formula for triangles and parallelograms**	Rectilinear shapes with the same area Area of triangle = base x perpendicular height ÷ 2 Area of a parallelogram = base x perpendicular height	Use their knowledge of factors to work systematically. Use prior knowledge of counting squares from Year 4 and 5 to estimate the area by counting. Then, following the formula to find the area. Follow the formula to find the area. Utilise known multiplication facts to find the area if possible.	

Perimeter

In Freeman's

Vocabulary taught:	perimeter, rectilinear shape, compound shape	**Manipulatives, resources and models used:**	Multiplication square Squared paper

Stage of understanding:	Strategy:	Arithmetic Skills:	Representation:
Year 3 **Calculate perimeter**	Children explore different methods for calculating perimeter, considering which is the most ef f i cient. They should be taught to consider repeated addition and known number and multiplication facts e.g doubles and number bonds.	1. Number bonds 2. Doubles and near doubles 3. Repeated addition 4. Multiplication facts	 
Year 4 **Perimeter on a grid**	Children calculate the perimeter of rectilinear shapes (shapes where all the sides meet at right angles).	1. Counting squares on a grid	
Perimeter of a rectangle	Children need to be given chance to explore different approaches, e.g. adding all the sides together or adding the length and width together and multiplying by 2.	1. Number bonds 2. Doubles and near doubles 3. Repeated addition 4. Multiplication facts They will need to be taught to think about which method is most efficient for the given question.	
Perimeter of rectilinear shapes	Children begin to calculate the perimeter of rectilinear shapes without squared paper.	1. Number bonds 2. Doubles and near doubles 3. Repeated addition 4. Multiplication	

		facts. They will need to be taught to think about which method is most efficient for the given question.	
Year 5 **Calculate perimeter**	Children use their knowledge of perimeter to find unknown side lengths.	1. Number bonds 2. Doubles and near doubles 3. Repeated addition 4. Multiplication facts They will need to be taught to think about which method is most e cient for the given question.	
Year 6 **Relationship between area and perimeter**	Children explore that shapes with the same area can have the same or di‰erent perimeters.	1. Number bonds 2. Doubles and near doubles 3. Repeated addition 4. Multiplication facts They will need to be taught to think about which method is most e cient for the given question.	
Notes:	When calculating the perimeter of shapes, children should be taught to mark o‰ the sides as they add them up to avoid mistakes involving repetition of counting or missing sides.		