Algebra, ratio and proportion

Reading and Writing Numbers		
Three and Four-Year-Olds	Mathematics	• Link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5. • Experiment with their own symbols and marks as well as numerals.
Reception	Mathematics	• Link the number symbol (numeral) with its cardinal number value.

Year Group	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Algebra	•Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and **missing number problems** such as 7 = □ - 9 •Represent and use number bonds and related subtraction facts within 20	• Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and **missing number** problems. **20 -□ = 15** **15 +** □ = 20 •Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100	•Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction •solve problems, including **missing number** problems, involving multiplication and division, including integer scaling (e.g. There are three biscuits in a packet. How many are there in seven packets?)	•Perimeter can be expressed algebraically as 2(a + b) where and b are the dimensions in the same unit.	•Use the properties of rectangles to deduce related facts and find missing lengths and angles •Pupils calculate the perimeter of rectangles and related composite shapes, including using the relations of perimeter or area to find unknown lengths. Missing measures questions such as these can be expressed algebraically, for example 4 + 2b = 20 for a rectangle of sides 2	•Use simple formulae •Generate and describe linear number sequences •Express missing number problems algebraically •Find pairs of numbers that satisfy an equation with two unknowns •Enumerate possibilities of combinations of two variables. recognise when it is possible to use **formulae** for area and volume of shapes

		3 + 7 = 10; 10 – 7 = 3 and 7 = 10 – 3 to calculate 30 + 70 = 100; 100 – 70 = 30 and 70 = 100 – 30.			cm and b cm and perimeter of 20cm .	
Ratio and proportion					•Solve simple problems involving direct proportion by scaling quantities up or down	•Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts •Solve problems involving similar shapes where the scale factor is known or can be found •Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. • Solve problems involving the calculation of percentages [for example, of measures, such as 15% of 360] and the use of percentages for comparison

	Vocabulary progression – algebra, ratio and proportion
EYFS	Missing number, equal to, pattern, puzzle, draw, compare, sort
Year 1	Missing number, equal to, pattern, puzzle, problem, what could we try next? How did you work it out? Explain your thinking ,recognise, describe, draw, compare, sort
Year 2	Missing number, equal to, balance, pattern, puzzle problem, what could we try next? How did you work it out? show how you … explain your thinking ,explain your method, describe the pattern, describe the rule, investigate, recognise, describe, draw, compare, sort,
Year 3	Missing number, equal to, balance, pattern puzzle problem, what could we try next? how did you work it out? show how you … explain your thinking, explain your method, describe the pattern, describe the rule, investigate, recognise, describe, draw, compare, sort greatest value, least value
Year 4	Missing number, equal to, balance, Pattern, puzzle, explain your thinking, explain your method, describe the pattern, describe the rule, investigate, recognise, describe, draw, compare, sort, greatest value, least value ,mental calculation, written calculation, statement, justify, make a statement, explain your reasoning
Year 5	Missing number, equal to, balance, missing length, missing angle, pattern, puzzle problem, what could we try next? How did you work it out? show how you … explain your thinking, explain your method, describe the pattern, describe the rule, investigate, recognise ,describe draw, compare ,sort greatest value, least value, statement, justify ,make a statement, explain your reasoning
Year 6	Linear number, sequence, substitute, variables, symbol, known values, ratio, scale factor continue , pattern, pair, rule relationship, equal to, next, consecutive > greater than < less than, integer, positive, negative above/below zero, minus negative numbers, pattern puzzle, problem, symbols, what could we try next? How did you work it out? show how you … explain your thinking explain your method describe the pattern describe the rule investigate recognise describe draw compare sort greatest value, least value mental calculation written calculation statement justify make a statement explain your reasoning