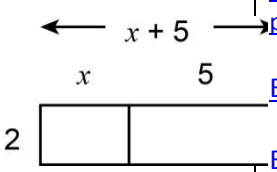
Chapter 2: Simple Algebra

Number of lessons (between 6&8)	**Content of the unit**	**Assumed prior learning (**tested at the beginning of the unit)
	• Algebraic Expressions • Simplifying Expressions • Substitution • Formulae	Simplify simple expressions. Multiply and divide simple terms. Recognise equivalent expressions. Calculate with negative numbers and terms.
Assessment points and tasks	**Written feedback points**	**Learning Outcomes (tested at the end and related to subject competences)**
Pre test Post test (half term exams/ mock exams)	Diagnostic marking (TF)-(green sticker)-(PF)/(SF) yellow and orange stickers Traffic lighting of exam papers	Use correct algebraic notation Write and Simplify expressions Use the index laws Multiply and divide expressions Substitute numbers into expressions Recognise the difference between a formula and an expression

Lesson	Clear learning intentions	Clear success criteria	Hook	Presentation of content	Guided practice	Independent practice (homework)	Closure
1 2.1. Algebraic Expressions Lesson Plan	Understand the vocabulary and notation of algebra	Use correct algebraic notation Write and simplify expressions	Cats and Dogs Activity *An apple is represented by the letter a. Write an expression to represent 2 apples.* *I have 2 apples. I buy another 3 apples. Write an expression to represent this.* *I have 6 apples. Tom takes 4 of the apples. Write an expression to represent this.* *I have 10 apples. I share them equally between 5 friends. Write an expression to represent this.*	Active teach pages 33 -34 Key Point 1 and Example 1 Collecting Like terms video Using letters to represent numbers video Mathswatch Clip 102a	GCSE Foundation Book Pg 33-34 Warm Up – Q1/2 Q3-Q5 (+ -) Q6-Q7 (* /) Q8-Q11 (letters as numbers) Strengthen – pg 50, q1-q5 Extend – pg 53, q1-q3		Working in groups, students write four questions and their answers on simplifying simple algebraic expressions and terms (including adding, subtracting, multiplying and dividing). They make sure they know the answers, and then give them to other groups to solve.
2 2.2. Simplifying Expressions Lesson Plan	Simplify algebraic expressions	Use the index laws Multiply and divide expressions	You've got the power! Instruct students to work in pairs or small groups. Each pair or group of students makes a set of 20 cards which they lay	Active teach Pages 35-36 Index Laws video Index Laws 2 video Multiplying	GCSE Foundation Book Pg 35-36 Warm Up – Q1-3 Q4-q6 (multiplying powers)	Active Learn: Homework, Practice and support: Foundation 2.2	Write four expressions that will give the answer $12x^{10}$, two made by multiplying two *x* terms and two made by dividing two *x* terms.

			face down. Ten cards have expressions with powers (such as 1^0, 1^1, 2^1, 2^2, 3^2, 3^3, 4^2, 4^3, 5^2, 5^3) and ten cards have equivalent expressions (in this case: 0, 1, 2, 4, 9, 27, 16, 64, 25, 125). Each person can turn over two cards on their go. The aim is to make a matching pair. If they do, they keep them and get another go. If they don't have a matching pair they replace the cards in the same position, face down. Continue taking turns until all the cards are matched. When they do not get a matching pair, they should try to remember the values on the cards and where they are. The person with the most pairs at the end is the winner.	Algebra video Mathswatch clip 102b 102c	Q7-q8 (dividing powers) Q9-q14 (x / algebra) Strengthen – pg 50, q6-q9 Extend – pg 53, q4-q5		Write an expression with three terms that will multiply or divide to give the same answer. Discuss.

3 2.3. Substitution Lesson Plan	Substitute numbers onto an expression	Calculate with negative numbers and terms.	'Answers from the future' Draw a square with side length s cm. Write an expression and work out the perimeter of the square if $s = 3$. (answer: perimeter $4s = 12$ cm) Change the side length to $5s$ cm. Write an expression and work out the perimeter if $s = 4$. (answer: perimeter $20s = 80$ cm)	Active teach pages 37-38 Example 4 Using substitution video Using letters to represent numbers video Mathswatch clip 66	GCSE Foundation Book Pg 37-38 Warm Up – Q1-3 Q4-Q5 (Writing simple algebraic statements). Q6-Q8 (Substitution) Q9-q13 (writing statements then sub) Strengthen – pg 51, q9-q11 Extend – pg 53, q6-q8		Q8 (Exam question) Write these expressions on the board. a^2 $a - 3$ $2a + 1$ $a + 1$ Think of different values of a, one at a time, and substitute them into the expressions. Put the expressions in order of size, according to the answers, for each substitution. *Is it possible to find values of a so that the order of the expressions is the same every time?* (answer: Values of $a = 3$ and above will give the same order.)
4 2.4. Formulae Lesson Plan	Recognise the difference between a formula and expression	Write a formula as an expression. Substitute	'Is it ready yet?' *Write a rule for working out P, the perimeter of a*	Active teach pages 39-40 Key Point 8	GCSE Foundation Book Pg 39-40 Warm Up – Q1-3	Active Learn: Homework, Practice and support: Foundation 2.4	Write two examples of formulae, and say what each of the terms and

		numbers into simple formula.	*rectangle with base b and height h. The rule should start with 'P =' (answer: P = 2(b + h)). Does your rule work when b = 3 and h = 5??* *Check whether this rule works for various lengths of sides. Change P, b and h in your formula to X, s and t. Does the rule still work?*	Example 5	Q4-Q15		variables represent. Use examples of formulae used in real-life, if possible. Students can use formulae they have seen in science lessons.
5 2.5. Expanding Lesson Plan	Can you expand brackets in an expression?	Expand brackets. Simplify expressions with brackets. Substitute numbers into expressions with brackets and powers.	 *Work out an expression for the area of the rectangle. (Hint: Work out the area of each small rectangle and add them together to get the area of the large rectangle.)* In each case draw the	Active teach pages 41-42 Example 6 Expanding single brackets video Multiplying out brackets in algebra video	GCSE Foundation Book Pg 41-42 Warm Up – q1-q3 Substitution – q4/q5 Expanding brackets- Q6-Q16 STRENGTHEN – p.51, q1-q2 EXTEND – p.54, q9	Active Learn: Homework, Practice and support: Foundation 2.4	*Say which of these are wrong and why.* 1. $3(x + 3) = 3x + 6$ 2 .$7(2a – 5) = 14a – 35$ 3 .$–b(3b – 4) = –3b^2 – 4b$ 4 .$2(5y – 4) = 25y – 24$ 5 .$–2x(5x – 1) = 2x – 10x^2$ (answers: 1 is wrong: the 3s are added in the second term, rather than multiplied. 3 is wrong: second term should be positive since – x

			rectangle on the board and label it as above (or ask students to label it). $3(x + 1)$ $5(x + 4)$ $10(x + 7)$ Expanding brackets starter				– = +. 4 is wrong: 2 x 5*y* = 10*y*, not 25*y* and 2 x 4 = 8, not 24.)
6 Problem Solving Lesson Plan	Use smaller numbers to help you solve problems.	focus on the use of a single problem-solving strategy to determine what to do independently think about their approach to problem-solving	Tell students to imagine that they have four problems to solve. Problem 1 includes the numbers 2, 3 and 6 Problem 2 includes the numbers 1.9, 4.1 and 2.5 Problem 3 includes the numbers 15, 8 and 31 Problem 4 includes the numbers 5, 20 and 1000. *Which problem do you think would be easiest/most difficult to solve,*	In this problem-solving lesson students use smaller numbers to help them solve problems. Smaller numbers give students a way of easily identifying the calculations necessary to solve a problem. Talk through the worked example: • Tell students that a good strategy is	GCSE Foundation book, Pages 47-48		Tell students to compare the smaller numbers they have used for some of the questions in this problem-solving lesson. *Did you use the same smaller numbers? If you used different smaller numbers, did it matter to your final answer? What do you have to think about when choosing smaller numbers to help solve problems?* Students may

			and why? Discuss with students why: it is easier to work with smaller numbers, like in Problem 1 it is easier to work with multiples of 5 and 10, like in Problem 4 larger numbers, like in problem 3, can be more difficult to work with decimals, like in problem 2, can be more difficult to work with.	to read one sentence of the question at a time, replacing any numbers with smaller numbers. Drawing a picture can help you see what to do next. • Read the first sentence of **Example 10** with students. *Do you think one packet of biscuits would be easier to deal with than 12?* Look at the picture. Tell students it doesn't			refer to those smaller numbers they find easiest to work with. Some numbers may not have given integer answers, which might have made calculations more difficult. *Did you change the number and try the calculation again? What did you discover if you did?* See if they gained any benefit from trying to find numbers that gave integer solutions.

				matter what smaller number you choose, as long as it is easier. You could have chosen two packets. ***See lesson plan for further detail.***			
7 **Homework Lesson**							
8 Check up lesson	Revision of objectives learnt throughout the topic.	Formative assessment on the core objectives, grouped by topic.			GCSE Foundation book, pages 49		The final question: 'How sure are you of your answers?' encourages students to reflect on their level of confidence, and helps them to choose their next step: Strengthen or Extend. Discuss challenge question (page

							249 Q13)