Stratford School Academy
Schemes of Work

Number

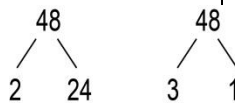
Number of lessons (between 6&8)	**Content of the unit**	**Assumed prior learning** (tested at the beginning of the unit)
2 weeks	**Key concepts:** • use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor and lowest common multiple • use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 recognize and use sequences of triangular, square and cube numbers, simple arithmetic progression	• Know how to find common multiples of two given numbers • Know how to find common factors of two given numbers • Recall multiplication facts to 12 × 12 and associated division facts
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) • When using Eratosthenes sieve to identify prime numbers, why is there no need to go further than the multiples of 7? If this method was extended to test prime numbers up to 200, how far would you need to go? Convince me. • Kenny says '20 is a square number because $10^2 = 20$'. Explain why Kenny is wrong. Kenny is partially correct. How could he change his statement so that it is fully correct? Always / Sometimes / Never: the lowest common multiple of two numbers is found by multiplying the two numbers together	Diagnostic marking (TF)-(green sticker)-(PF)/(SF) yellow and orange stickers Traffic lighting of exam papers • Many pupils believe that 1 is a prime number – a misconception which can arise if the definition is taken as 'a number which is divisible by itself and 1' • A common misconception is to believe that $5^3 = 5 \times 3 = 15$ • See pedagogical note about the square root symbol too	1.4 Recognise 2-digit prime numbers. . Find factors and multiples of numbers. Find common factors and common multiples of two numbers. Find the HCF and LCM of two numbers by listing. 1.5 Find square roots and cube roots. Recognise powers of 2, 3, 4 and 5. Understand surd notation on a calculator. 1.6 Use index notation for powers of 10. Use index notation in calculations. Use the laws of indices. 1.7 Write a number as the product of its prime factors. Use prime factor decomposition and Venn diagrams to find the HCF and LCM.

Lesson	Clear learning intentions	Clear success criteria	Hook	Presentation of content	Guided practice	Independent practice (homework)	Closure
1. Lesson Plan	• Find the Highest common factor of two numbers	• Know the meaning of 'highest common factor' • Recognise when a problem involves using the highest common factor of two numbers	List the factors of 27 and the factors of 45. What is the highest number that will divide into 27 and 45? (answer: 9) What is the lowest number that has 12 factors?	Activeteach page 11, key point 12 (*see lesson plan for additional notes)* Video on finding the HCF Mathswatch clip 96a Boardworks-ks3-N3- slides 48-50	New GCSE Foundation textbook – Page 11 – Q9, Q13, Q15 Page 22, Q13a (*Strengthen):* Page 25, Factors multiples and primes, Q1.		Ask students to list three things they have learned today. Ask them to write their own context question (like Q15) using the HCF
2 Lesson Plan	• Find the lowest common multiple of two numbers	• Know the meaning of 'lowest common multiple' • Recognise when a	List the first five multiples of 8 and the first five multiples of 12. What is the smallest number that is a	Video on finding the LCM Mathswatch clip 96b	New GCSE Foundation textbook – Page 11-12: – Q10, Q11, Q12, Q14, Q16, Q17 (*exam question),*	Active Learn: Homework, Practice and support: Foundation 1.4	Ask students to list three things they have learned today. Ask them to write

		problem involves using the lowest common multiple of two numbers	multiple of 8 and a multiple of 12? (answer: 24)	Boardworks-ks3-N3- slides 44-46	Q18. Page 22, Q13b (*Strengthen):* Page 26, Factors multiples and primes, Q2.		their own context question (like Q16-18) using the LCM. Q17 (*Exam Q)* LCM word problem.
3. Lesson Plan	• Can you explore powers and root? •	• Understand the use of notation for powers • Know the meaning of the square root symbol (√) • Use a scientific calculator to calculate powers and roots • Make the connection between squares and square roots (and cubes and cube roots)	What are the first 6 square numbers? Find the area of a 6 x 6 square? Show three squares with sides of length 1 cm, 3 cm and 5 cm. What is the area of each square? Ask students to write equations to explain their answer (such as $1 \times 1 = 1$ or 1 2 = 1). Count the cubes	Discuss the relevant calculator keys for finding squares, cubes and roots (as shown in the Q4 hint). Check students are familiar with them. ● Display Q6 hint. Ensure students understand the ± notation. ● Display Example 6. Remind students that they should be familiar with common square numbers and cube numbers. ● Display Key point 14 and check students understand surd	New GCSE Foundation textbook – Page 13 – Page 14, Q5-Q24 Q23/Q24 (Surds)		Ask students to simplify √18 , √50 and √75 using a calculator. Ask them to explain how they have been simplified, then ask them to use their findings to simplify √27 without a calculator.

				notation. Point out that expressions must be in their simplest form and the calculator will do this for you. Ensure all students can use their calculator to convert between surd and decimal form.			
4. Lesson Plan	• Can you use index notation?	Use index notation for powers of 10 Use index notation in calculations Use the laws of indices.	Binary numbers Ask students to copy and complete these calculations. $1^2 = \square$, $4 = \square^2$, $3^2 = \square$, $25 = \square^2$ $\square^3 = 1$, $2^3 = \square$, $\square^3 = 64$	Display **Key point 15**. Ensure students familiarise themselves with the correct notation for base and power. After they have completed **Q5**, ask them if they can see the connection between the number of zeros and the power. Display key point 16 and 17.	New GCSE Foundation textbook – (*Index notation)* Page 15, Q5-9 (*Simplifying Powers/Index Laws)* : Page 16 – Adding – Q10-Q12 Subtracting- Q13-Q14 Multiplying-Q15 *Exam style question* Q16 *Strengthen* – Page 25, Q1 –Q8		Display these calculations. Ask students to identify and correct the errors, explaining their answers. 1 $\frac{2^8}{2^2} = 2^4$ (2^6; subtract the powers rather than dividing) 2 $\frac{5^3 \times 5^2}{5} = 5^5$ (5^4; add the powers in the numerator rather

				Simplifying Powers video Index Laws video Mathswatch clip 111	*Extend* – Page 27, Q8, Page 28, Q17-Q20.		than multiplying) 3 $7^3 \times 7^2 = 7^6$ (7^5; add the powers rather than multiplying) 4 $3^2 \times 2^3 = 6^5$ (72; you can only add the powers if the base number is the same) 5 $(3a^2)^4 = 12a^6$ ($81a^8$; raise 3 to power 4 rather than multiplying 3 by 4; multiply the powers rather than adding)
5. Lesson Plan 1.7	• Can you write a number as a product of its prime factors?	• Use prime factor decomposition and Venn diagrams to find the HCF and LCM.	What are the factors of 15, 12, 18? Which of these factors are prime? Number each student in turn from 1 to 10, then start again at 1, until every student has a number. The whole class starts sitting down. Tell them that they need to react by	Active teach page 18, example 8 Active teach page 19, example 9, finding HCF/LCM Mathswatch clip 95 Boardworks-ks3-N3- slides 31-37, 51-53	New GCSE Foundation textbook- Page 18, Q4-Q6 (factor trees) Page 19 ,Q7-Q13 (HCF/LCM) *Strengthen* – pg 26, q3, q4 *Extend* – pg 28, q20	Active Learn: Homework, Practice and support: Foundation 1.7	Display this diagram, which shows the first branches of three factor trees for the number 48. Ask students to complete them. *Do they all give you the same answer? Are there any other ways of writing*

			standing up if they are sitting down, or by sitting down if they are standing up, if the statements you read out are applicable to their number. Is your number divisible by 1? Give students a chance to react. (*see lesson plan for more detail and questions).* Shape challenge starter activity				*the factor tree?* 
6. Homework Lesson							
7. **Problem Solving Lesson Plan**	Use pictures to help you solve problems.	Think about different approaches to problem solving Recognise how to use pictures t help you reach an answer	*Have you heard the saying 'a picture paints a thousand words'?* Discuss how this saying applies to mathematics. Encourage them to list all the different visual representations of mathematical concepts they have seen in this unit (function machines, Venn diagrams, factor trees). Then	In this lesson students use pictures to help them solve problems. Pictures give students a way of visualising problems. This helps them recognise how to reach an answer. Talk through **Example 10**: Tell students that a good strategy is	GCSE Foundation book, Pages 20-21		**Ask students to compare the pictures they have drawn for some of the questions in this problem-solving lesson. *Did you draw the same pictures? In what ways are they the same? In what ways are they different? Does it matter if they are different? Is there***

			ask how these pictures helped them to answer questions in the unit. Ask students to add to their list other mathematical pictures they can recall (examples include graphs, statistical diagrams like bar charts and pie charts, and so on). *Why do you think pictures may be important to mathematicians?* A possible answer could be that pictures help mathematicians to see relationships and understand how things relate to each other. Display **Example 8** in Lesson 1.7 – the factor tree diagram shows how 180 relates to its prime factors.	to read one sentence of the question at a time, then begin to build a picture. Read the first sentence of the question with students, then look at how the four steps to the entrance of the office are represented. Read each subsequent sentence in the question with students. After each sentence, identify what has been added to the picture. Discuss how the picture helps when writing the calculation for the total number of steps. *Do you think the picture is a good representation?* Discuss the need to draw a representative			***a correct picture to help solve a problem?***

				picture that is simple, rather than an accurate picture which takes a long time to draw. Drawing each of the four steps to the entrance, then each of the 22 steps between each floor, for example. Before students start solving problems themselves, remind them to draw a simple picture, reading one sentence of the question at a time and adding any new information to their picture. Encourage students to be independent learners and use the question hints to help them.			
8. Check Up	Revision of objectives learnt throughout the topic.	Formative assessmen			GCSE Foundation book, pages 21-22		The final question: 'How

		t on the core objectives, grouped by topic.					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 22 Q16)

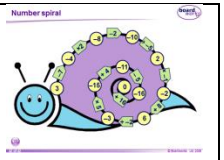
2. NEGATIVE NUMBERS AND BIDMAS

Number of lessons (between 6&8)	**Content of the unit**	**Assumed prior learning** (tested at the beginning of the unit)
3 weeks	• Calculate with negative numbers • Apply the correct order of operations	• Fluently recall and apply multiplication facts up to 12 × 12 • Know and use column addition and subtraction • Know the formal written method of long multiplication • Know the formal written method of short division • Convert between an improper fraction and a mixed number Know the order of operations for the four operations and brackets
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) • Convince me that -3 - -7 = 4 • Show me an example of a calculation involving addition of two negative numbers and the solution -10. And another. And another … Create a Carroll diagram with 'addition', 'subtraction' as the column headings and 'one negative number', 'two negative numbers' as the row headings. Ask pupils to create (if possible) a calculation that can be placed in each of the four positions. If they think it is not possible, explain why. Repeat for multiplication and division.	Diagnostic marking (TF)-(green sticker)-(PF)/(SF) yellow and orange stickers • Traffic lighting of exam papers • Some pupils may use a rule stated as 'two minuses make a plus' and make many mistakes as a result; e.g. -4 + -6 = 10 • Some pupils may incorrectly apply the principle of commutativity to subtraction; e.g. 4 – 7 = 3 • The order of operations is often not applied correctly when squaring negative numbers. As a result pupils may think that $x^2 = -9$ when x = -3. The fact that a calculator applies the correct order means that $-3^2 = -9$ and	• apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative use conventional notation for priority of operations, including brackets, powers, roots and reciprocals

	this can actually reinforce the misconception. In this situation brackets should be used as follows: $(-3)^2 = 9$.	

Lesson	Clear learning intentions	Clear success criteria	Hook	Presentation of content	Guided practice	Independent practice (homework)	Closure
1 Lesson Plan – 1.1. Calculations	Know and apply the correct order of operations	Use priority of operations with positive and negative numbers. Simplify calculations by cancelling. Use inverse operations.	It's Freezing Tell students they are going to make a sieve of Eratosthenes. Give each student a 10 by 10 number square. *Cross out the number 1. Circle the number 2 and cross out all other multiples of 2. Next, circle the number 3 and cross out all other multiples of 3.* Let them continue in this way, each	Active teach pages 3-4 Simple calculations video Example 1 Mathswatch clip 59	Mathswatch worksheet Gcse Foundation book , page 3, Q4 (rules of x /) Q5, 6, 7, 8, 12, 13. Strengthen pg 23, q7, 8, 9 Extend, pg 26, q1, 2.		Ask them to write a priority of operations question for their neighbour to solve.

			time finding the next uncrossed number, circling it and crossing out all its other multiples, until all the numbers are either circled or crossed out. They should end up with all the prime numbers under 100 circled and all other numbers crossed out. Make sure that students realise that 1 is not prime, as it does not have exactly two distinct factors. This can also be done with a 12 by 12 number square.				
2. Lesson Plan n/a	Use calculators for more complex functions	• Enter negative numbers into a calculator • Interpret a calculator display when working with negative numbers • Use powers and roots and brackets	Mathswatch Hard Calculator Clip 63	Board Works N10 Using a calculator Mathswatch Hard Calculator Clip 63	Mathswatch Hard Calculator Clip 63 – Worksheet Qs		Mini-whiteboards Complete a selection of calculator Qs to check order of priority and calculator functions are used correctly

3. Negative Lesson Plan n/a	• Evaluate negative numbers using all four number operations and brackets.	• Use the number line for adding and subtracting • Understand and use the rules for multiplying and dividing negative and positive integers	Boardworks N2 NEGATIVE Numbers Ordered Paths –slide 6	Mathswatch Four rules of negatives (+/-) Four rules of negatives (/ & x)	Mathswatch FOUR rules of negatives Clip 99– Worksheet Qs		 N2 NEGATIVE Numbers Number Spiral – slide 42
4. LESSON PLAN 4.3	• Multiplying fractions	• Multiply whole numbers fractions ,and mixed number • Simplify calculations by cancelling .	Fractions of a shape	Video-multiplying fractions Active Teach page 99	Gcse Foundation book , page 98-100 Strengthen pg 114 q6-9 Extend p 116 (selected Qs)	Mymaths mathswatch	Mini whiteboards These are non-calculator questions. *Alison works in a shop. She works* $5\frac{3}{4}$ *hours a day from Monday to Friday. How many hours does she work in 4 weeks? She is paid* £6.80 *an hour. How much does she earn in this period of time? How would you use fractions to calculate how*

							much money Alison earns? Find out the minimum wage, and make up your own similar examples to work out how much a person would earn on the minimum wage in a one-month period. Use people of different ages in your examples (as the minimum wage is different at different ages).
5. LESSON PLAN 4.4	• Dividing fractions	• Divide with negative numbers • Simplify calculations by cancelling Understand the term reciprocal	Fill it up	Video dividing fractions Active Teach page 100	Gcse Foundation book , page 100 - 101 Strengthen pg 114 q 10-12 Extend p 116(selected Qs)		*Steve is building a sheep shed.* *His sheep shed will have an area of* 1500 m^2. *Steve wants each sheep to have at least* $2\frac{1}{2}$ m^2 *of*

							space in the shed. He wants to have 590 *sheep in it.* *Will the sheep have enough space in Steve's shed?*
6 Lesson Plan-1.2. Decimal Numbers	• Calculate with decimals	Multiply and divide decimal numbers Round to a given number of decimal places	Skate off starter Display a series of large numbers. *Round them to nearest 10, 100, 1000, and 10 000*. Students should write their answers on 'show me' boards. Display a series of large numbers that have been rounded. Tell students these have been rounded to the nearest 10, 100, 1000, and 10 000. *Write the maximum and minimum possible value on your boards.*	Long multiplication with decimals clip 60 Active teach pages 6-7 Example 2 Dividing decimals video Multiplication and division with decimals-clip 19	Long multiplication with decimals (includes worded questions) GCSE Foundation book, page 6, Q4-Q8 (rounding) Q11-Q17 (Multiplying) Q18-Q22 (Dividing)	Active Learn: Homework, Practice and support: Foundation 1.2	Ask students to list three things they have learned in this lesson. Ask them to use an alternative method (not multiplying by 10) to work out 17.2 ÷ 2.5, 27 ÷ 1.5, 28 ÷ 3.5.

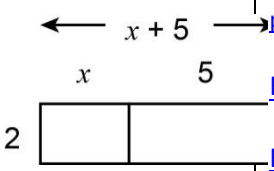
3.

Number of lessons (8) **3. Algebraic Proficiency (Tinkering)**	**Content of the unit**	**Assumed prior learning** (tested at the beginning of the unit)
	• use and interpret algebraic notation, including: a^2b in place of $a \times a \times b$, coefficients written as fractions rather than as decimals • understand and use the concepts and vocabulary of factors • simplify and manipulate algebraic expressions by taking out common factors and simplifying expressions involving sums, products and powers, including the laws of indices • substitute numerical values into scientific formulae • rearrange formulae to change the subject	• Know basic algebraic notation (the rules of algebra) • Simplify an expression by collecting like terms • Know how to multiply a single term over a bracket • Substitute positive numbers into expressions and formulae Calculate with negative numbers
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	• Know how to write products algebraically • Use fractions when working in algebraic situations • Identify common factors (numerical and algebraic) of terms in an expression • Factorise an expression by taking out common factors • Simplify an expression involving terms with combinations of variables (e.g. $3a^2b + 4ab^2 + 2a^2 – a^2b$) • Know the multiplication (division, power, zero) law of indices • Understand that negative powers can arise • Substitute positive and negative numbers into formulae • Be aware of common scientific formulae • Know the meaning of the ‘subject’ of a formula • Change the subject of a formula when one step is required Change the subject of a formula when a two steps are required

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	You've got the power! Instruct students to work in pairs or small	Active teach Pages 35-36 Index Laws video	GCSE Foundation Book Pg 35-36 Warm Up – Q1-3	Active Learn: Homework, Practice and support: Foundation 2.2	Write four expressions that will give the answer $12x^{10}$, two made by

		expressions	groups. Each pair or group of students makes a set of 20 cards which they lay 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	Index Laws 2 video Multiplying Algebra video Mathswatch clip 102b 102c	Q4-q6 (multiplying powers) Q7-q8 (dividing powers) Q9-q14 (x / algebra) Strengthen – pg 50, q6-q9 Extend – pg 53, q4-q5		multiplying two *x* terms and two made by dividing two *x* terms. Write an expression with three terms that will multiply or divide to give the same answer. Discuss.

			person with the most pairs at the end is the winner.				
3 2.3. Substitution Lesson Plan	Substitute numbers onto an expression Substitute numbers into formulae	Calculate with negative numbers and terms. Substitute numbers into formulae (including scientific formulae)	'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	Recognise the	Write a formula	'Is it ready yet?'	Active teach	GCSE Foundation	Active Learn:	Write two

2.4. Formulae Lesson Plan	difference between a formula and expression	as an expression. Substitute numbers into simple formula.	*Write a rule for working out P, the perimeter of a 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?*	pages 39-40 Key Point 8 Example 5	Book Pg 39-40 Warm Up – Q1-3 Q4-Q15	Homework, Practice and support: Foundation 2.4	examples of formulae, and say what each of the terms and 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*	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,	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

			rectangle.) In each case draw the 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		q9		multiplied. 3 is wrong: second term should be positive since – x – = +. 4 is wrong: 2 x 5y = 10y, not 25y and 2 x 4 = 8, not 24.)
6 2.6. Factorising Lesson Plan	Can you factorise algebraic expressions?	Recognise factors of algebraic terms. Factorise algebraic expressions. Use the identity symbol ≡ and the not equals symbol ≠	*Match the expressions on the left to the corresponding expressions on the right. Which expressions are left over?* Expressions on left: a) 4x – 4 b) 4x – 1 c) 4x – x^2 d) 4x + x^2 e) 4 + 4x	Active teach pages 43-44 Example 6 Expanding single brackets video Multiplying out brackets in algebra video	GCSE Foundation Book Pg 43-44 Q5 Finding the HCF Factorising Q6-Q14 STRENGTHEN – p.51, q3-q5 EXTEND – p.54, q10		Instruct students to write a question with at least one letter term outside a bracket and with two different letter terms inside. They could put numbers next to each of the letter terms. They should then expand the bracket and give

			f) $x^2 + 4$ Expressions on right: 1) $4(x - 1)$ 2) $x(4 - x)$ 3) $4(1 + x)$ 4) $x(x + 4)$ (answer: 1 = a, 2 = c, 3 = e, 4 = d. b and f are left over.)				this answer to a partner to factorise. *Have they managed to work out your original question?* Students should discuss where errors were made.
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*	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	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?*

			difficult to solve, 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.	strategy is 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			Students may 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.

				doesn't 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 20.5 lesson plan	rearrange formulae to change the subject	Know and use inverse operations Know how to inverse roots Rearrange formulae to required subject	Fluency task & WARM UP GCSE FOUNDATION PAGE 606	Key point 7 & 8 and class discussion on Q3 GCSE FOUNDATION PAGE 606	GCSE FOUNDATION PAGE 607 Qs 4-16		Exam style question GCSE Foundation book, pages 609
8 **Homework Lesson**							
9 Check up lesson	Revision of objectives learnt throughout the topic.	Formative assessment on the			GCSE Foundation book, pages 49		The final question: 'How sure are you of

		core objectives, grouped by topic.					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)

4. Investigating angles & Construction **Number of lessons** (between 6&8)	**Content of the unit**	**Assumed prior learning** (tested at the beginning of the unit)
	• use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries • use the standard conventions for labelling and referring to the sides and angles of triangles • **understand and use alternate and corresponding angles on parallel lines** • **derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)** • **Construct unique triangles**	• Use a ruler to measure and draw lengths to the nearest millimetre Use a protractor to measure and draw angles to the nearest degree • Know the meaning of parallel, perpendicular • Know the notation for equal sides, parallel sides, right angles • Use angles at a point, angles at a point on a line and vertically opposite angles to calculate missing angles in geometrical diagrams • Know that the angles in a triangle total 180°
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	• Identify alternate angles and know that they are equal • Identify corresponding angles and know that they are equal • Use knowledge of alternate and corresponding angles to calculate missing angles in geometrical diagrams • Establish the fact that angles in a triangle must total 180° • Use the fact that angles in a triangle total 180° to work out the total of the angles in any polygon • Establish the size of an interior angle in a regular polygon • Know the total of the exterior angles in any polygon Establish the size of an exterior angle in a regular polygon • Develop knowledge of angles Explore geometrical situations involving parallel lines • **Recognise & Construct unique triangles**

Lesson	Clear learning intentions	Clear success criteria	Hook	Presentation of content	Guided practice	Independent practice (homework)	Closure
1 Parallel and perpendicular lines	Recognise parallel lines and perpendicular lines	• Use notation for parallel lines • Know the meaning of 'perpendicular' and identify perpendicular lines • Use AB notation for describing lengths • Use ∠ABC notation for describing angles •	Give examples of parallel and perpendicular lines.	Boardworks – KS3- S1 Lines and Angles – Slides 1-16 Parallel and perpendicular lines ppt.	Parallel and perpendicular line worksheet. Geometric notation review worksheet		Write down the definitions and properties of parallel and perpendicular lines.
• 2 Angles of parallel lines	• Understand and use the angle properties of parallel lines	• Identify alternate angles and know that they are equal • Identify corresponding angles and know that they are equal	Warm up page 154 FOUNDATION	Key point 2 & 3 Discuss Qs 2- 5 Pg 155	GCSE Foundation book, pages 156 Q6-Q9		Exam style question GCSE Foundation book, pages 156

3. Properties of polygons	• Can you calculate interior and exterior angles of regular polygons?	• Understand what a regular and irregular polygons are. • Know how to differentiate between exterior and interior angles • Understand the link between the number of polygon sides and the related interior and exterior angles	Polygon Riddle 1: Solve the riddle to find the name of the polygon then sum the interior angles. Polygon Riddle 2: A "My first is in..." type riddle leading to a polygon interior angle calculation. Polygon Riddle 3: Work out which mathematical shape the riddle describes.	Interior and exterior angles ppt	KM: Investigating polygons. Tasks one and two should be carried out with irregular polygons.		Traffic lights and WWW/EBI
4 & 5 Constructing triangles	• Construct triangles	• Use ruler and protractor to construct triangles from written descriptions • Use ruler and compasses to construct triangles when all three sides known	Count the triangles See ppts for starters	Constructing triangles ppt Triangles-Construction-2 ppt	Triangles-construction-RAG worksheet Triangles-construction-extension Constructing triangles	My maths	GCSE Foundation book, pages 448 Sometimes, always, never Q12: Reasoning and discussion

					worksheet		
6. Revision of objectives learnt throughout the topic.	Formative assessment on the core objectives, grouped by topic.			GCSE Foundation book, pages179-180		Strengthen or Extend. PAGES 172-178	
7 **Homework Lesson**	•	•					