Number

Number of lessons (between 6&8)	Content of the unit	Assumed prior learning (tested at the beginning of the unit)
7 weeks	• BIDMAS • Decimal Numbers • Place Value • Factors and Multiples • Squares, Cubes and Roots • Index Notation • Prime Factors	• Understand the meaning of the words 'less than'. • Find a fraction of a number. • Recall square numbers. • Understand the meaning of 'total'. • Understand the commutative property of multiplication. Identify place value. Round to the nearest 100, 10 and whole number. Understand the meaning of the words 'prime', 'factor', 'multiple' and 'product'. Find the area of a square and identify square numbers. Use simple powers of 10. List the factors of numbers; identify which factors are prime.
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	1.1. Use priority of operations with positive and negative numbers. Simplify calculations by cancelling. Use inverse operations. 1.2. Round to a given number of decimal places. Multiply and divide decimal numbers. 1.3. Write decimal numbers of millions. Round to a given number of significant figures. Estimate answers to calculations. Use one calculation to find the answer to another. 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 – 1.1. Calculations	Know and apply the correct order of operations	Use priority of operations with positive and negative numbers. Simplify calculations by	It's Freezing Tell students they are going to make a sieve of Eratosthenes. Give each student a 10 by 10 number	Active teach pages 3-4 Simple calculations video Example 1	Mathswatch worksheet Gcse Foundation book , page 3, Q4 (rules of x /) Q5, 6, 7, 8, 12, 13.		Ask them to write a priority of operations question for their neighbour to solve.

		cancelling. Use inverse operations.	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 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.	Mathswatch clip 59	Strengthen pg 23, q7, 8, 9 Extend, pg 26, q1, 2.		

2	Explore written methods of calculation	• Be fluent at multiplying a three-digit or a two-digit number by a two-digit number	Mental Maths test on times tables.	Long multiplication mathswatch clip 15	Long multiplication worksheet		Ask them to write a l2 digit x 3 digit Q for their neighbour to solve.
3 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.
4 Lesson Plan – 1.3 Place Value	• Apply understanding of place value	• Use knowledge of place value to multiply and	What was the attendance? (rounding)	Significant figures video and key point 8	New GCSE Foundation textbook,		Ask students to list three things they have

		divide with decimals • Estimate answers to calculations	Display the following instructions. Think of a 2-digit number with two different digits. Reverse the digits to get another 2-digit number. Subtract the smaller number from the larger number. Add the digits of your answer together. Write down the answer. Ask students to do this with at least two different starting numbers. *What do you notice? Can you explain why?*	Estimating calculations video Example 4 (estimating) Active teach pages 8-9 Mathswatch clip 15 (place value when multiplying)	Page 8, Q1 (multiplying and dividing decimals by powers of 10) Q8/Q9/10 (Sig. figs) Q11-Q17 (Estimating) Mathswatch worksheet place value when multiplying Using place value worksheet		learned today. Ask them to write three calculations in fraction form (similar to those in **Q16** or **Q17**). Ask them to work out the answers using their calculators and check by estimation.
5 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	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	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

		factor of two numbers		[Boardworks-ks3-N3- slides 48-50](#)			
6 [Lesson Plan](#)	• Find the lowest common multiple of two numbers	• Know the meaning of 'lowest common multiple' • Recognise when a problem involves using the lowest common multiple of two numbers	List the first five multiples of 8 and the first five multiples of 12. What is the smallest number that is a multiple of 8 and a multiple of 12? (answer: 24)	[Video on finding the LCM](#) [Mathswatch clip 96b](#) [Boardworks-ks3-N3- slides 44-46](#)	New GCSE Foundation textbook – Page 11-12: – Q10, Q11, Q12, Q14, Q16, Q17 (*exam question*), Q18. Page 22, Q13b (*Strengthen*): Page 26, Factors multiples and primes, Q2.	Active Learn: Homework, Practice and support: Foundation 1.4	Ask students to list three things they have learned today. Ask them to write their own context question (like Q16-18) using the LCM. [Q17 (*Exam Q*) LCM word problem.](#)
7 [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	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 $1\ 2 = 1$).	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	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.

		• Make the connection between squares and square roots (and cubes and cube roots)	Count the cubes	students that they should be familiar with common square numbers and cube numbers. ● Display Key point 14 and check students understand surd 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.			
8 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	New GCSE Foundation textbook – (*Index notation*) Page 15, Q5-9 (*Simplifying Powers/Index Laws*) : Page 16 – Adding – Q10-Q12		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

| | | | | can see the connection between the number of zeros and the power.

Display key point <u>16</u> and <u>17</u>.

<u>Simplifying Powers video</u>

<u>Index Laws video</u>

<u>Mathswatch clip 111</u> | Subtracting- Q13-Q14

Multiplying-Q15

Exam style question Q16

Strengthen – Page 25, Q1 –Q8

Extend – Page 27, Q8, Page 28, Q17-Q20. | | powers rather than dividing)
2

$$\frac{5^3 \times 5^2}{5} = 5^5$$
(5^4; add the powers in the numerator rather 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 $\left(3a^2\right)^4$
$= 12a^6$ ($81a^8$; raise 3 to power 4 rather than multiplying 3 by 4; multiply the powers rather than adding) |
| 9
<u>Lesson Plan 1.7</u> | • Can you write a number as a product of its prime factors? | • Use prime factor decomposition and Venn diagrams to | What are the factors of 15, 12, 18? Which of these factors are prime? | <u>Active teach page 18, example 8</u>

<u>Active teach page 19, example 9,</u> | New GCSE Foundation textbook-Page 18, Q4-Q6 (factor trees) | Active Learn: Homework, Practice and support: Foundation 1.7 | Display this diagram, which shows the first branches of three factor |

		find the HCF and LCM.	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 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	finding HCF/LCM Mathswatch clip 95 Boardworks-ks3-N3- slides 31-37, 51-53	Page 19 ,Q7-Q13 (HCF/LCM) *Strengthen* – pg 26, q3, q4 *Extend* – pg 28, q20		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 the factor tree?* 48 48 2 24 3 1
10 Homework Lesson							
11 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	*Have you heard the saying 'a picture paints a thousand words'?* Discuss how this saying applies to mathematics. Encourage them to	In this lesson students use pictures to help them solve problems. Pictures give students a way of	GCSE Foundation book, Pages 20-21		**Ask students to compare the pictures they have drawn for some of the questions in this problem-solving**

			an answer	list all the different visual representations of mathematical concepts they have seen in this unit (function machines, Venn diagrams, factor trees). Then 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	visualising problems. This helps them recognise how to reach an answer. Talk through **Example 10**: Tell students that a good strategy is 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			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 a correct picture to help solve a problem?*

			Example 8 in Lesson 1.7 – the factor tree diagram shows how 180 relates to its prime factors.	calculation for the total number of steps. *Do you think the picture is a good representation?* Discuss the need to draw a representative 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.			
12 Check Up	Revision of objectives learnt throughout the topic.	Formative assessment on the core objectives, grouped by topic.			GCSE Foundation book, pages 21-22		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 22 Q16)