Progression in Mathematics at Elliston Primary Academy
KS2

	Year 3	Year 4	Year 5	Year 6
Big Ideas **NCETM** **Place Value**	The value of a digit is determined by its position in a number. Place value is based on unitising, treating a group of things as one 'unit'. This generalises to 3 units + 2 units = 5 units (where the units are the same size).	Imagining the position of numbers on a horizontal number line helps us to order them: the number to the right on a number line is the larger number. So 5 is greater than 4, as 5 is to the right of 4. But –4 is greater than –5 as –4 is to the right of –5. Rounding numbers in context may mean rounding up or down. Buying packets of ten cakes, we might round up to the nearest ten to make sure everyone gets a cake. Estimating the number of chairs in a room for a large number of people we might round down to estimate the number of chairs to make sure there are enough. We can think of place value in additive terms: 456 is 400 + 50 + 6, or in multiplicative terms: one hundred is ten times as large as ten.	Large numbers of six digits are named in a pattern of three: hundreds of thousands, tens of thousands, ones of thousands, mirroring hundreds, tens and ones. It is helpful to relate large numbers to real-world contexts, for example the number of people that a local sports arena can hold.	For whole numbers, the more digits a number has, the larger it must be: any 4-digit whole number is larger than any 3digit whole number. But this is not true of decimal numbers: having more digits does not make a decimal number necessarily bigger. For example, 0·5 is larger than 0·35. Ordering decimal numbers uses the same process as for whole numbers i.e. we look at the digits in matching places in the numbers, starting from the place with the highest value i.e. from the left. The number with the higher different digit is the higher number. For example, 256 is greater than 247 because 256 has 5 tens but 247 has only 4 tens. Similarly 1·0843 is smaller than 1·524 because 1·0843 has 0 tenths but 1·524 has 5 tenths.
NCETM Spine			AS Y5 1.27	

Place Value Counting	count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number **Autumn 1** **Autumn 2**	• count in multiples of 6, 7, 9, 25 and 1000 • count backwards through zero to include negative numbers **Autumn 1** **Autumn 2**	• count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 • count forwards and backwards with positive and negative whole numbers, including through zero **Autumn 1**	
NRICH			Sea Level https://nrich.maths.org/5929 Swimming Pool https://nrich.maths.org/5836 Tug Harder https://nrich.maths.org/5898	
Progression in Reasoning NCETM	Spot the mistake: 50,100,115,200 What is wrong with this sequence of numbers? True or False? 38 is a multiple of 8 What comes next? 936-10= 926 926 -10 = 916 916- 10= 906	Spot the mistake: 950, 975,1000,1250 What is wrong with this sequence of numbers? True or False? 324 is a multiple of 9 What comes next? 6706+ 1000= 7706 7706 + 1000 = 8706 8706 + 1000 = 9706	Spot the mistake: 177000,187000,197000, 217000 What is wrong with this sequence of numbers? True or False? When I count in 10's I will say the number 10100 What comes next? 646000-10000= 636000 636000 –10000 = 626000 626000- 10000 = 616000	Spot the mistake: -80,-40,10,50 What is wrong with this sequence of numbers? True or False? When I count backwards in 50s from 10 I will say -200 True or False? The temperature is -3. It gets 2 degrees warmer. The new temperature is -5
NCETM Spine	AS Y3 1.18	AS Y4 1.22	AS Y5 1.26	AS Y6 1.30

Place Value: represent	☐ identify, represent and estimate numbers using different representations	☐ identify, represent and estimate numbers using different representations	☐ read, write, order and compare numbers to at least 1 000 000 and	☐ read, write, order and compare numbers up to 10 000 000 and determine the value of each digit

	☐ read and write numbers up to 1000 in numerals and in words **Autumn 1**	☐ read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and **Autumn 1**	determine the value of each digit ☐ read Roman numerals to 1000 (M) and recognise years written in Roman numerals **Autumn 1**	**Autumn 1**
Place value: compare	• recognise the place value of each digit in a three-digit number (hundreds, tens, ones) • compare and order numbers up to 1000 **Autumn 1**	• find 1000 more or less than a given number • recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) • order and compare numbers beyond 1000 **Autumn 1**	☐ read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit **Autumn 1**	☐ read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit **Autumn 1**
NRich	Coded Hundred Square https://nrich.maths.org/6554 Which Scripts? https://nrich.maths.org/774	Four-digit Targets https://nrich.maths.org/6342 The Deca Tree https://nrich.maths.org/2006 Dicey Operations https://nrich.maths.org/6606 Nice or Nasty https://nrich.maths.org/6605		

Progression in Reasoning	Do, then explain 835 535 538 388 508 If you wrote these numbers in order starting with the smallest, which number would be third? Explain how you ordered the numbers Do, then explain	Do, then explain 5035 5053 5350 5530 5503 If you wrote these numbers in order starting with the largest, which number would be third? Explain how you ordered the numbers. Do, then explain	Do, then explain Show the value of the digit 5 in these numbers? 350114 567432 985376 Explain how you know. Make up an example/Give further examples Create six digit numbers where the digit sum is five and the thousands digit is two.	Do, then explain Show the value of the digit 6 in these numbers? 6787555 95467754 Explain how you know. Make up an example Create seven digit numbers where the digit sum is six and the tens of thousands digit is two.

	Show the 3 value of the digit 3 in these numbers? 341 503 937 Explain how you know. Make up an example Create numbers where the digit sum is three. E.g. 120, 300, 210 What is the largest/smallest number?	Show the value of the digit 4 in these numbers? Explain how you know. 3041 4321 5497 Make up an example Create four digit numbers where the digit sum is four and the tens digit is one. E.g. 1210, 2110, 3010. What is the largest/smallest number? Undoing I divide a number by 100 and the answer is 0.3. What number did I start with?	e.g. 3002000 2102000 What is the largest/smallest number? Do, then explain 747014, 774014, 747017, 774077, 744444 If you wrote these numbers in order starting with the smallest, which number would be third? Making links 7 x 8 = 56 How can you use this fact to solve these calculations? 0.7 x 0.8 = 5.6 ÷ 8 = Undoing I divide a number by 100 and the answer is 0.33 What number did I start with? Another and another Write down a number with two decimal places which when multiplied by 100 gives an answer between 33 and 38. . and another, … and another,	E.g. 4020000 What is the largest/smallest number? Do, then explain Find out the populations in five countries. Order the populations starting with the largest. Explain how you ordered the countries and their populations. True or false? In all of the numbers below, the digit 6 is worth more than 6 hundredths. 3.6, 3.063, 3.006, 6.23, 7.761, 3.076 Is this true or false? Change some numbers so that it is true. What needs to be added to 6.543 to give 7? What needs to be added to 3.582 to give 5? Circle the two decimals which are closest in value to each other. 0.9 0.09 0.99 0.1 0.01
NCETM Spine			AS Y5 1.27 AS Y5 1.28	

Place value: problems and rounding	▯ solve number problems and practical problems involving these ideas. **Autumn 1**	• round any number to the nearest 10, 100 or 1000 • solve number and practical problems that involve all of the above and with	▯ interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero	• round any whole number to a required degree of accuracy • use negative numbers in context, and calculate intervals across zero
		increasingly large positive numbers **Autumn 1**	• round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 • solve number problems and practical problems that involve all of the above **Autumn 1**	▯ solve number and practical problems that involve all of the above. **Autumn 1**
NRich	Take Three Numbers https://nrich.maths.org/8063 A Mixed-Up Clock https://nrich.maths.org/2127 Number Match https://nrich.maths.org/6937 Number Differences https://nrich.maths.org/2790 Magic V's https://nrich.maths.org/6274 Planning a School Trip https://nrich.maths.org/6969	Reasoned Rounding https://nrich.maths.org/10945 Round the Dice Decimals 1 https://nrich.maths.org/10438	Route Product https://nrich.maths.org/5632 Forgot the Numbers https://nrich.maths.org/1015 Spiralling Decimals https://nrich.maths.org/10326 Greater Than Or Less Than https://nrich.maths.org/10587 Round the Dice Decimals 2 https://nrich.maths.org/10428	

Progression in Problem Solving	Possible answers A number rounded to the nearest ten is 540. What is the smallest possible number it could be? What do you notice? Round 296 to the nearest 10. Round it to the nearest 100. What do you notice? Can you suggest other numbers like this?	Possible answers A number rounded to the nearest ten is 540. What is the smallest possible number it could be? What do you notice? Round 296 to the nearest 10. Round it to the nearest 100. What do you notice? Can you suggest other numbers like this? Do, then explain	Possible answers A number rounded to the nearest thousand is 76000. What is the largest possible number it could be? What do you notice? Round 343997 to the nearest 1000. Round it to the nearest 10000. What do you notice? Can you suggest other numbers like this? Do, then explain	Possible answers Two numbers each with two decimal places round to 23.1 to one decimal place. The total of the numbers is 46.2. What could the numbers be? What do you notice? Give an example of a six digit number which rounds to the same number when rounded to the nearest 10000 and 100000 Do, then explain
		Circle each decimal which when rounded to the nearest whole number is 5. 5.3 5.7 5.2 5.8 Explain your reasoning Top tips Explain how to round numbers to one decimal place?	Circle each decimal which when rounded to one decimal place is 6.2. 6.32 6.23 6.27 6.17 Explain your reasoning Top tips Explain how to round decimal numbers to one decimal place?	Write the answer of each calculation rounded to the nearest whole number 75.7 × 59 7734 ÷ 60 772.4 × 9.7 20.34 × (7.9 – 5.4) What's the same, what's different? when you round numbers to one decimal place and two decimal places?

Year	**3**	**4**	**5**	**6**

Big Ideas NCETM Addition & Subtraction	Relating numbers to 5 and 10 helps develop knowledge of the number bonds within 20. For example, given 8 + 7, thinking of 7 as 2 + 5, and adding the 2 and 8 to make 10, then the 5 to 15. This should then be applied when calculating with larger numbers. Subtraction bonds can be thought of in terms of addition: for example, in answering 15 – 8, thinking what needs to be added to 8 to make 15. Counting on for subtraction is a useful strategy that can also be applied to larger numbers.	It helps to round numbers before carrying out a calculation to get a sense of the size of the answer. For example, 4786 – 2135 is close to 5000 – 2000, so the answer will be around 3000. Looking at the numbers in a calculation and their relationship to each other can help make calculating easier. For example, 3012 – 2996. Noticing that the numbers are close to each other might mean this is more easily calculated by thinking about subtraction as difference.	Before starting any calculation is it helpful to think about whether or not you are confident that you can do it mentally. For example, 3689 + 4998 may be done mentally, but 3689 + 4756 may require paper and pencil. Carrying out an equivalent calculation might be easier than carrying out the given calculation. For example 3682 – 2996 is equivalent to 3686 – 3000 (constant difference).	Deciding which calculation method to use is supported by being able to take apart and combine numbers in many ways. For example, calculating 8·78 + 5·26 might involve calculating 8·75 + 5·25 and then adjusting the answer. The associative rule helps when adding three or more numbers: 367 + 275 + 525 is probably best thought of as 367 + (275 + 525) rather than (367 + 275) + 525.
NCETM Spine	AS Y3 1.17, 1.19, 1.20 & 1.21		AS Y5 1.29	AS Y6 1.30

Addition and subtraction: Recall, Represent & Use	▯ estimate the answer to a calculation and use inverse operations to check answers **Autumn 2**	▯ estimate and use inverse operations to check answers to a calculation **Autumn 2**	▯ use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy **Autumn 2**	

Addition & Subtraction: Calculations	• add and subtract numbers mentally, including: • a three-digit number and ones • a three-digit number and tens • a three-digit number and hundreds • add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction **Autumn 2**	□ add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate Autumn 2	• add and subtract whole numbers with more than 4 digits, including using formal written method (columnar addition and subtraction) • add and subtract numbers mentally with increasingly large numbers **Autumn 2**	• perform mental calculations, including with mixed operations and large numbers • use their knowledge of the order of operations to carry out calculations involving the four operations **Autumn 2**
Progression in Reasoning NCETM **Addition & Subtraction**	True or false? Are these number sentences true or false? 597 + 7 = 614 804 – 70 = 744 768 + 140 = 908 Give your reasons. Hard and easy questions Which questions are easy / hard? 323 + 10 = 393 + 10 = 454 - 100 = 954 - 120 =	True or false? Are these number sentences true or false? 6.7 + 0.4 = 6.11 8.1 – 0.9 = 7.2 Give your reasons. Hard and easy questions Which questions are easy / hard? 13323 - 70 = 12893 + 300 = 19354 - 500 = 19954 + 100 = Explain why you think the hard questions are hard?	True or false? Are these number sentences true or false? 6.17 + 0.4 = 6.57 8.12 – 0.9 = 8.3 Give your reasons. Hard and easy questions Which questions are easy / hard? 213323 - 70 = 512893 + 300 = 819354 - 500 = 319954 + 100 = Explain why you think the hard questions are hard?	True or false? Are these number sentences true or false? 6.32 +__ = 8 ___ = 1.68 Give your reasons. Hard and easy questions Which questions are easy / hard? 213323 - 70 = 512893 + 37 = 8193.54 - 5.9 = Explain why you think the hard questions are hard? Missing symbols

	Explain why you think the hard questions are hard? Convince me __ __ + __ __ = __ __ __ The total is 201 Each missing digit is either a 9 or a 1. Write in the missing digits. Is there only one way of doing this or lots of ways? Convince me Possibilities I bought a book which cost between £9 and £10 and I paid with a ten pound note. My change was between 50p and £1 and was all in silver coins. What price could I have paid?	Convince me ____- 666 = 8_ 5 What is the largest possible number that will go in the space? What is the smallest? Convince me Possibilities Adult tickets cost £8 and Children's tickets cost £4. How many adult and children's tickets could I buy for £100 exactly? Can you find more than one way of doing this?	Convince me ____+ 1475 = 6_24 What numbers go in the boxes? What different answers are there? Convince me	Write the missing signs (+ - x ÷) in this number sentence: 6 12.3 = 61.9 11.9 What else do you know? If you know this: 86.7 + 13.3 = 100 what other facts do you know? Convince me Three four digit numbers total 12435. What could they be? Convince me
Addition & Subtraction: Solve problems	solve problems, including missing number problems, using number facts, place value, and more complex addition & subtraction. **Autumn 2**	solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why. **Autumn 2**	• solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. • solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Autumn 2

			Autumn 2	
NRich	Sitting Round the Party Tables https://nrich.maths.org/7228 Finding Fifteen https://nrich.maths.org/2645 4 Dom https://nrich.maths.org/179 Domino Square https://nrich.maths.org/146 Dice In A Corner https://nrich.maths.org/8586 Super Shapes https://nrich.maths.org/1056 Make 37 https://nrich.maths.org/1885 Consecutive Numbers https://nrich.maths.org/317	Roll These Dice https://nrich.maths.org/53 Sealed Solution https://nrich.maths.org/1177 Fifteen Cards https://nrich.maths.org/7506 Amy's Dominoes https://nrich.maths.org/1044	Six Numbered Cubes https://nrich.maths.org/10918 Six Ten Total https://nrich.maths.org/10917 Make 100 https://nrich.maths.org/91 Reach 100 https://nrich.maths.org/1130 Twenty Divided Into Six https://nrich.maths.org/1047	
Progression in Reasoning NCETM **Addition & Subtraction Problem Solving**	Making an estimate Which of these number sentences have the answer that is between 50 and 60 174 - 119; 333 – 276; 932 - 871 Always, sometimes, never Is it always, sometimes or never true that if you subtract a multiple of 10 from any number the units digit of that number stays the same?	Making an estimate Which of these number sentences have the answer that is between 550 and 600 1174 - 611 3330 – 2779 9326 - 8777 Always, sometimes, never Is it always sometimes or never true that the difference between two odd numbers is odd?	Making an estimate Which of these number sentences have the answer that is between 0.5 and 0.6? 11.74 - 11.18 33.3 – 32.71 Always, sometimes, never Is it always, sometimes or never true that the sum of four even numbers is divisible by 4?	Making an estimate Circle the number that is the best estimate to 932.6 - 931.05 1.3 1.5 1.7 1.9 Always, sometimes, never Is it always, sometimes or never true that the sum of two consecutive triangular numbers is a square number?

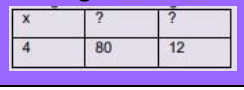
	Is it always, sometimes or never true that when you add two numbers together you will get an even number?			

Year	3	4	5	6
Big Ideas NCETM Multiplication & Division	It is important for children not just to be able to chant their multiplication tables but also to understand what the facts in them mean, to be able to use these facts to figure out others and to use in problems. It is also important for children to be able to link facts within the tables (e.g. 5× is half of 10×). They understand what multiplication means, see division as both grouping and sharing, and see division as the inverse of multiplication.	It is important for children not just to be able to chant their multiplication tables but to understand what the facts in them mean, to be able to use these facts to figure out others and to use them in problems. It is also important for children to be able to link facts within the tables (e.g. 5× is half of 10×). They understand what multiplication means and see division as both grouping and sharing, and to see division as the inverse of multiplication. The distributive law can be used to partition numbers in different ways to create equivalent calculations. For example, 4 × 27 = 4 × (25 + 2) = (4 × 25) + (4 × 2) = 108. Looking for equivalent calculations can make calculating easier. For example, 98 × 5 is equivalent to 98 × 10 ÷	Pupils have a firm understanding of what multiplication and division mean and have a range of strategies for dealing with large numbers, including both mental and standard written methods. They see the idea of factors, multiples and prime numbers as connected and not separate ideas to learn. They recognise how to use their skills of multiplying and dividing in new problem solving situations. Fractions and division are connected ideas: 36 ÷ 18 = 2 = $\frac{18}{36}$ = $\frac{1}{2}$ Factors and multiples are connected ideas: 48 is a multiple of 6 and 6 is a factor of 48.	Standard written algorithms use the conceptual structures of the mathematics to produce efficient methods of calculation. Standard written multiplication method involves a number of partial products. For example, 36 × 24 is made up of four partial products 30 × 20, 30 × 4, 6 × 20, 6 × 4. There are connections between factors, multiples and prime numbers and between fractions, division and ratios. The Big Ideas (Ratio and Proportion) It is important to distinguish between situations with an additive change or a multiplicative change (which involves ratio). For example, if four children have six

		2 or to (100 × 5) – (2 × 5). The array model can help show equivalences.		sandwiches to share and two more children join them, although two more children have been added, the number of sandwiches then needed for everyone to still get the same amount is calculated multiplicatively
NCETM Spine	MD Y3 2.7 2.8 2.9	MD Y4 2.11	MD Y5 2.18 2.20 2.21	
Multiplication & division: Recall, Represent & Use	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables **Autumn 2**	• recall multiplication and division facts for multiplication tables up to 12 × 12 • use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers • recognise and use factor pairs and commutativity in mental calculations **Autumn 2** **Spring 1**	• identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers • know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers • establish whether a number up to 100 is prime and recall prime numbers up to 19 • recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3) **Autumn 2**	• identify common factors, common multiples and prime numbers • use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. **Autumn 2**

NRich	Music To My Ears https://nrich.maths.org/5483 Ordering Cards https://nrich.maths.org/8058	Multiplication Jigsaw https://nrich.maths.org/5573 Shape Times Shape https://nrich.maths.org/5714 Let Us Divide https://nrich.maths.org/8308	Trebling https://nrich.maths.org/2004 All the Digits https://nrich.maths.org/1129 Division Rules https://nrich.maths.org/10490	Become Maths Detectives https://nrich.maths.org/6928 Counting Cogs https://nrich.maths.org/6966 Mystery Matrix https://nrich.maths.org/1070

		Carrying Cards https://nrich.maths.org/2726 Light the Lights Again https://nrich.maths.org/7035 Multiples Grid https://nrich.maths.org/5429 Zios and Zepts https://nrich.maths.org/1005 Times Tables Shifts https://nrich.maths.org/6863 Tables Patterns Go Wild https://nrich.maths.org/6924	Picture a Pyramid https://nrich.maths.org/5809 Cycling Squares https://nrich.maths.org/1151 One Wasn't Squares https://nrich.maths.org/1119 Up and Down Staircases https://nrich.maths.org/2283 Two Primes Make One Square https://nrich.maths.org/1150 Pebbles https://nrich.maths.org/48 Factors and Multiples Game https://nrich.maths.org/5468 Factor Trek https://nrich.maths.org/7468 Abundant Numbers https://nrich.maths.org/1011 Flashing Lights https://nrich.maths.org/1014 Multiplication Squares https://nrich.maths.org/1134 Which Is Quicker? https://nrich.maths.org/1817 Sweets in a Box https://nrich.maths.org/84	The Moons of Vuvv https://nrich.maths.org/1066 Factor-multiple Chains https://nrich.maths.org/5578

Progression in Reasoning NCETM	Use a fact 20 x 3 = 60.Use this fact to work out 21 x 3 = 22 x 3 = 23 x 3 = 24 x 3 = Prove It What goes in the missing box?  	Use a fact 63 ÷ 9 = 7 Use this fact to work out 126 ÷ 9 = 252 ÷ 7 = Prove It What goes in the missing box? 6 □ x 4 = 512 Prove it. How close can you get?	Use a fact 3 x 75 = 225 Use this fact to work out 450 ÷ 6 = 225 ÷ 0.6 = To multiply by 25 you multiply by 100 and then divide by 4. Use this strategy to solve	Use a fact 0.7 x 8 = 5.6. How can you use this fact to solve these calculations? 0.7 x 0.08 = 0.56 ÷ 8 = Prove It What goes in the missing box? 18 _ 4 ÷ 12 = 157; 38 _ 5 ÷ 18 = 212.5
	Prove it. How close can you get? __ __× ___ Using the digits 2, 3 and 4 in the calculation above how close can you get to 100? What is the largest product? What is the smallest? Missing numbers 24 = x Which pairs of numbers could be written in the boxes? Making links Cards come in packs of 4. How many packs do I need to buy to get 32 cards? True or false? All the numbers in the two times table are even. There are no numbers in the three times table that are also in the two times table.	__ __ __x 7 Using the digits 3, 4 and 6 in the calculation above how close can you get to 4500? What is the largest product? What is the smallest product?	48 x 25 78 x 25 4.6 x 25 Prove It What goes in the missing box? 12 __ 3 ÷ 6 = 212 12 __3 ÷ 7 = 212 22 __ 3 ÷ 7 = 321 r 6 323 x __ 1 = 13243	33 _ 2 ÷ 8 = 421.5; 38 x _ .7 = 178.6 Can you find? Can you find the smallest number that can be added to or subtracted from 87.6 to make it exactly divisible by 8/7/18? Which is correct? Which of these number sentences is correct? 3 + 6 x 2 =15; 6 x 5 – 7 x 4 = 92; 8 x 20 ÷ 4 x 3 = 37
NCETM Spine		MD Y4 2.14	MD Y4 2.15	MD Y6 2.23, 2.24 & 2.25

Multiplication & Division: Calculations	write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods **Autumn 2**	multiply two-digit and three-digit numbers by a one-digit number using formal written layout **Spring 1**	• multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for twodigit numbers • multiply and divide numbers mentally drawing upon known facts • divide numbers up to 4 digits by a one-digit	• multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication • divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret

	Spring 1		number using the formal written method of short division and interpret remainders appropriately for the context multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 **Autumn 2** **Spring 1** **Summer 1**	remainders as whole number remainders, fractions, or by rounding, as appropriate for the context • divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context • perform mental calculations, including with mixed operations and large numbers **Autumn 2**

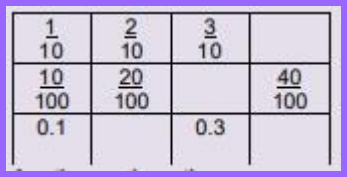
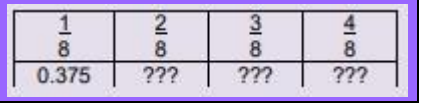
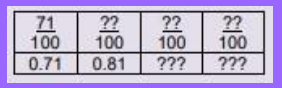
Progression in Reasoning NCETM Checking	Use the inverse Use the inverse to check if the following calculations are correct 23 x 4 = 82; 117 ÷ 9 = 14 Size of an answer Will the answer to the following calculations be greater or less than 80 23 x 3= 32 x 3 = 42 x 3 = 36 x 2=	Use the inverse Use the inverse to check if the following calculations are correct: 23 x 4 = 92 117 ÷ 9 = 14 Size of an answer Will the answer to the following calculations be greater or less than 300 152 x 2= 78 x 3 = 87 x 3 = 4 x 74 =	Use the inverse Use the inverse to check if the following calculations are correct: 4321 x 12 = 51852 507 ÷ 9 = 4563 Size of an answer The product of a two digit and three digit number is approximately 6500. What could the numbers be?	Use the inverse Use the inverse to check if the following calculations are correct: 2346 x 46 = 332796 27.74 ÷ 19 = 1.46 Size of an answer The product of a single digit number and a number with two decimal places is 21.34 What could the numbers be?
NCETM Spine		MD Y4 2.10 2.17	MD Y5 2.22	MD Y6 2.28
Multiplication & Division: Solve Problems	▯ solve problems, including missing number problems, involving multiplication and	▯ solve problems involving multiplying and adding, including using the	▯ solve problems involving multiplication and division including using their	▯ solve problems involving addition, subtraction, multiplication and division
	division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects. **Spring 1**	distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects. **Spring 1**	knowledge of factors and multiples, squares and cubes ▯ solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. **Autumn 2** **Spring 1**	**Autumn 2**

			▯ solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign **Spring 1**	▯ use their knowledge of the order of operations to carry out calculations involving the four operations **Autumn 2**
NRich	Share Bears https://nrich.maths.org/2358 Lots of Biscuits https://nrich.maths.org/6883 Doubling Fives https://nrich.maths.org/10588		Cubes Within Cubes https://nrich.maths.org/1155 Odd Squares https://nrich.maths.org/2280 Curious Numbers https://nrich.maths.org/7218	Rectangle Tangle https://nrich.maths.org/1048 Jumping https://nrich.maths.org/7407 Pumpkin Pie Problem https://nrich.maths.org/1026

Year	3	4	5	6
Big Ideas NCETM Fractions	Fractions are equal parts of a whole. Equal parts of shapes do not need to be congruent but need to be equal in area. Decimal fractions are linked to other fractions.	Fractions arise from solving problems, where the answer lies between two whole numbers. Fractions express a relationship between a whole and equal parts of a whole.	Representations that may appear different sometimes have similar underlying ideas. For example 1 4, 0·25 and 25% are used in different contexts but are all connected to the same idea.	Fractions express a relationship between a whole and equal parts of a whole. Pupils should recognise this and speak in full sentences when answering a question involving fractions. For example, in response to the

	The number line is a useful representation that helps children to think about fractions as numbers.	Children should recognise this and speak in full sentences when answering a question involving fractions. For example, in response to the question What fraction of the chocolate bar is shaded? the pupil might say Two sevenths of the whole chocolate bar is shaded. Equivalency in relation to fractions is important. Fractions that look very different in their symbolic notation can mean the same thing.		question 'What fraction of the journey has Tom travelled?' the pupil might respond, 'Tom has travelled two thirds of the whole journey.' Equivalent fractions are connected to the idea of ratio: keeping the numerator and denominator of a fraction in the same proportion creates an equivalent fraction. Putting fractions in place on the number lines helps understand fractions as numbers in their own right. **Ratio & Proportion** It is important to distinguish between situations with an additive change or a multiplicative change (which involves ratio). For example, if four children have six sandwiches to share and two more children join them, although two more children have been added, the number of sandwiches then needed for everyone to still get the same amount is calculated multiplicatively
NCETM Spine	F Y3 3.1, 3.2, & 3.3	AS Y4 1.23 & 1.24	F Y4 3.5 F Y5 3.7	
Fractions: Recognise & Write	count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing	count up and down in hundredths; recognise that hundredths arise when dividing an object by one	identify, name and write equivalent fractions of a given fraction, represented visually,	

	one-digit numbers or quantities by 10 • recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators • recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators **Spring 2**	hundred and dividing tenths by ten. **Spring 2**	including tenths and hundredths recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$	
Fractions: Compare	• recognise and show, using diagrams, equivalent fractions with small denominators • compare and order unit fractions, and fractions with the same denominators **Summer 1**	recognise and show, using diagrams, families of common equivalent fractions **Spring 2**	compare and order fractions whose denominators are all multiples of the same number **Spring 2**	• use common factors to simplify fractions; use common multiples to express fractions in the same denomination • compare and order fractions, including fractions > 1 **Spring**

Progression in Reasoning NCETM Finding & Using Equivalence	Odd one out. Which is the odd one out in each of these trios? ½ 3/6 5/8 3/9 2/6 4/9 Why?	Odd one out. Which is the odd one out in each of these trio? 5¾ 9/12 4/6 9/12 10/15 2/3 Why? Complete the pattern by filling in the blank cells in this table:  Another and another	Odd one out. Which is the odd one out in each of these collections of 4 fractions? 6/10 3/5 18/20 9/15 30/100 3/10 6/20 3/9 Put in Order Imran put these fractions in order starting with the smallest. Are they in the correct order? Two fifths, three tenths, four twentieths How do you know? Complete the pattern	Odd one out. Which is the odd one out in each of these collections of 4 fractions? ¾ 9/12 26/36 18/24 4/20 1/5 6/25 6/30 Give an example of a fraction that is greater than 1.1 and less than 1.5. Now another example that no one will think of. Explain how you know. Complete the pattern 
		Write a decimal numbers (to one decimal place) which lies between a half and three quarters? … and another, … and another, … Ordering Put these numbers in the correct order, starting with the smallest. ¼ 0.75 5/10 4/8 ¾ 1/4	 Another and another Write a fraction with a denominator of one hundred which has a value of more than 0.75? … and another, … and another, … Ordering Put these numbers in the correct order, starting with the largest. Explain your thinking 7/10, 0.73, 7/100, 0.073 71%	Another and another Write a unit fraction which has a value of less than 0.5? … and another, … and another, … Ordering Which is larger $\frac{1}{3}$ or $\frac{2}{5}$? Explain how you know. Put the following amounts in order, starting with the largest. 23%, 5/8, 3/5, 0.8
NCETM Spine	F Y3 3.4		F Y4 3.6 F Y5 3.8	F Y6 3.9

NRich	Matching Fractions https://nrich.maths.org/8283 Fraction Match https://nrich.maths.org/6938	Fraction Wall https://nrich.maths.org/4519 Fractional Triangles https://nrich.maths.org/2124 Bryony's Triangle https://nrich.maths.org/7392		
Fractions: Calculations	□ add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$ Summer 1	□ add and subtract fractions with the same denominator Spring 2	• add and subtract fractions with the same denominator and denominators that are multiples of the same number • multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams Spring 2	• add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions • multiply simple pairs of proper fractions, writing the answer in its simplest form • divide proper fractions by whole numbers Spring

Fractions: Solve Problems	□ solve problems that involve all of the above. Spring 2 Summer 1	□ solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number Spring 2		

NRich		Chocolate https://nrich.maths.org/34 Fractions In A Box https://nrich.maths.org/1103 Andy's Marbles https://nrich.maths.org/2421		
Progression in Reasoning NCETM Fractions	What comes next? 6/10, 7/10, 8/10, ….., 12/10, 11/10, ….., ….., … True or false? 2/10 of 20cm = 2cm 4/10 of 40cm = 4cm 3/5 of 20cm = 12cm Give an example of a fraction that is less than a half. Now another example that no one else will think of. Explain how you know the fraction is less than a half. (draw an image) Put in Order Ben put these fractions in order starting with the smallest. Are they in the correct order? One fifth, one seventh, one sixth What do you notice?	What comes next? 83/100, 82/100, 81/100, ….., ….., …. 31/100, 41/100, 51/100, ….., ….., What do you notice? 1/10 of 100 = 10 1/100 of 100 = 1 2/10 of 100 = 20 2/100 of 100 = 2 How can you use this to work out 6/10 of 200? 6/100 of 200? True or false? 1/20 of a metre= 20cm 4/100 of 2 metres = 40cm Give an example of a fraction that is more than a half but less than a whole. Now	Give an example of a fraction that is more than three quarters. Now another example that no one else will think of. Explain how you know the fraction is more than three quarters. What do you notice? Find 30/100 of 200 Find 3/10 of 200 What do you notice? Can you write any other similar statements?	Spot the mistake Identify and explain mistakes when counting in more complex fractional steps What do you notice? One thousandth of my money is 31p. How much do I have? What do you notice? 8/5 of 25 = 40 5/4 of 16 = 20 7/6 of 36 = 42 Can you write similar statements?

	1/10 of 10 = 1 2/10 of 10 = 2 3/10 of 10 = 3 Continue the pattern. What do you notice? What about 1/10 of 20? Use this to work out 2/10 of 20, etc What do you notice? Find 2/5 of 10 Find 4/10 of 10. What do you notice? Can you write any other similar statements?	another example that no one else will think of. Explain how you know the fraction is more than a half but less than a whole. (draw an image) What do you notice? Find 4/6 of 24 Find 2/3 of 24 What do you notice? Can you write any other similar statements?		
NCETM Spin		MD Y4 2.13		MD Y5 2.19 MD Y6 2.29
Decimals: Recognise and Write		• recognise and write decimal equivalents of any number of tenths or hundredths • recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ Spring 2 Summer 1	read and write decimal numbers as fractions [for example, 0.71 = $\frac{71}{100}$] recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents Spring 2	identify the value of each digit in numbers given to three decimal places Autumn ???
Decimals: Compare		• round decimals with one decimal place to the nearest whole number • compare numbers with the same number of decimal places up to two decimal places Summer 1	round decimals with two decimal places to the nearest whole number and to one decimal place read, write, order and compare numbers with up to three decimal places Spring 2	

Decimals: Calculation and Problems		▯ find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths Spring 2	▯ solve problems involving number up to three decimal places Summer 1	▯ Multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places ▯ multiply one-digit numbers with up to two decimal places by whole numbers ▯ use written division methods in cases where the answer has up to two decimal places ▯ solve problems which require answers to be rounded to specified degrees of accuracy Spring
Progression in Reasoning NCETM Decimals	Spot the mistake six tenths, seven tenths, eight tenths, nine tenths, eleven tenths … and correct it.	Spot the mistake sixty tenths, seventy tenths, eighty tenths, ninety tenths, twenty tenths … and correct it. Missing symbol Put the correct symbol < or > in each box 3.03 3.33 0.37 0.32 What needs to be added to 3.23 to give 3.53? What needs to be added to 3.16 to give 3.2?	Spot the mistake 0.088, 0.089, 1.0 What comes next? 1.173, 1.183, 1.193 What do you notice? One tenth of £41, One hundredth of £41, One thousandth of £41 Continue the pattern. What do you notice? 0.085 + 0.015 = 0.1 0.075 + 0.025 = 0.1 0.065 + 0.035 = 0.1 Continue the pattern for the next five number sentences. True or false? 0.1 of a kilometre is 1m. 0.2 of 2 kilometres is 2m. 0.3 of 3 Kilometres is 3m 0.25 of 3m is 500cm. 2/5 of £2 is 20p	

			Missing symbol Put the correct symbol < or > in each box 4.627 4.06 12.317 12.31	
NCETM Spine		AS Y4 1.25		F Y6 3.10
Fractions, Decimals and Percentages		solve simple measure and money problems involving fractions and decimals to two decimal places. Spring 2 Summer 1	• recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal • solve problems which require knowing percentage and decimal equivalents of $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{5}$, $\frac{2}{5}$ and $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25. Spring 2	• associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction $\frac{3}{8}$ • recall and use equivalences between simple fractions, decimals and percentages, including in different contexts Spring 2 ???
NRich			Matching Fractions, Decimals and Percentages https://nrich.maths.org/1249	

Progression in Reasoning NCETM Calculating with FDP	What do you notice? 1/10 + 9/10 = 1 2/10 + 8/10 = 1 3/10 + 7/10 = 1 Continue the pattern Can you make up a similar pattern for eighths?	What do you notice? 5/5 – 1/5 = 4/5 4/5 – 1/5 = 3/5 Continue the pattern Can you make up a similar pattern for addition? The answer is 3/5, what is the question?	What do you notice? ¾ and ¼ = 4/4 = 1 4/4 and ¼ = 5/4 = 1 ¼ 5/4 and ¼ = 6/4 = 1 ½ Continue the pattern up to the total of 2. Can you make up a similar pattern for subtraction?	True or false? 25% of 23km is longer than 0.2 of 20km. Convince me. Another and another Write down two fractions which have a

	The answer is 5/10, what is the question? (involving fractions / operations)	What do you notice? 11/100 + 89/100 = 1 12/100 + 88/100 = 1 13/100 + 87/100 = 1 Continue the pattern for the next five number sentences.	The answer is 1 2/5 , what is the question? Continue the pattern ¼ x 3 = ¼ x 4 = ¼ x 5 = Continue the pattern for five more number sentences. How many steps will it take to get to 3? 5/3 of 24 = 40 Write a similar sentence where the answer is 56. The answer is 2 ¼ , what is the question Give your top tips for multiplying fractions. Which is more: 20% of 200 or 25% of 180? Explain your reasoning.	difference of 1 2/… and another, … and another, … Another and another Write down 2 fractions with a total of 3 4/5. … and another, … and another, … Continue the pattern What do you notice? 1/3 ÷ 2 = 1/6, 1/6 ÷ 2 = 1/12, 1/12 ÷ 2 = 1/24 Give your top tips for dividing fractions. What else do you know? 88% of a sum of money = £242. Make up some other statements. Write real life problems for your number sentences. Undoing I think of a number and then reduce it by 15%. The number I end up with is 306. What was my original number? In a sale where everything is reduced by 15% I paid the following prices for three items. What was the original selling price? £255, £850, £4.25
				MD Y6 2.27
Ratio and Proportion				□ solve problems involving the relative sizes of two quantities where missing values can be found by using

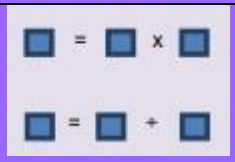
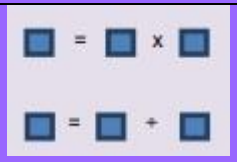
				integer multiplication and division facts • solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison • solve problems involving similar shapes where the scale factor is known or can be found • solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. Spring 2
Year	3	4	5	6

Big Ideas **NCETM** **Algebra**				A linear sequence of numbers is where the difference between the values of neighbouring terms is constant. The relationship can be generated in two ways: the sequence-generating rule can be recursive, i.e. one number in the sequence is generated from the preceding number (e.g. by adding 3 to the preceding number), or ordinal, i.e. the position of the number in the sequence generates the number (e.g. by multiplying the position by 3, and then subtracting 2). Sometimes sequence generating rules that seem different can

				generate the same sequence: the ordinal rule ‘one more than each of the even numbers, starting with 2’ generates the same sequence as the recursive rule ‘start at 1 and add on 2, then another 2, then another 2, and so on’. Sequences can arise from naturally occurring patterns in mathematics and it is exciting for pupils to discover and generalise these. For example adding successive odd numbers will generate a sequence of square numbers. Letters or symbols are used to represent unknown numbers in a symbol sentence (i.e. an equation) or instruction. Usually, but not necessarily, in any one symbol sentence (equation) or instruction, different letters or different symbols represent different unknown numbers. A value is said to solve a symbol sentence (or an equation) if substituting the value into the sentence (equation) satisfies it, i.e. results in a true statement. For example, we can say that 4 solves the symbol sentence (equation) 9 – = + 1 (or 9 – x = x + 1) because it is a true statement

				that 9 – 4 = 4 + 1. We say that 4 satisfies the symbol sentence

				(equation) 9 – = + 1 (or 9 – x = x + 1).
NCETM Spine				AS Y6 1.31
Algebra	solve problems including missing number problems			• 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. Spring 2
NRich				Two and Two https://nrich.maths.org/781 Holes https://nrich.maths.org/6529 Button-up Some More https://nrich.maths.org/7350 Break It Up https://nrich.maths.org/2284

Progression in Reasoning **NCETM** **Algebra**	Connected Calculations Put the numbers 3, 12, 36 in the boxes to make the number sentences correct.	Put the numbers 7.2, 8, 0.9 in the boxes to make the number sentences correct.	Connected Calculations The number sentence below represents the angles in degrees of an isosceles triangle. A + B + C = 180 degrees A and B are equal and are	Connected Calculations p and q each stand for whole numbers. p + q = 1000 and p is 150 greater than q. Work out the values of p and q.
	 	 Undoing If the longer length of a rectangle is 13cm and the perimeter is 36cm, what is the length of the shorter side? Explain how you got your answer.	multiples of 5. Give an example of what the 3 angles could be. Write down 3 more examples Undoing The perimeter of a rectangular garden is between 40 and 50 metres. What could the dimensions of the garden be?	The diagram below represents two rectangular fields that are next to each other.  Field A is twice as long as field B but their widths are the same and are 7.6 metres. If the perimeter of the small field is 23m what is the perimeter of the entire shape containing both fields? If y stands for a number complete the table below. What is the largest value of y if the greatest number in the table was 163?  Generalising Write a formula for the 10th, 100th and nth terms of the sequences below. 4, 8, 12, 16 …… and 0.4, 0.8, 1.2, 1.6

Year	3	4	5	6
Big Ideas NCETM Measurement	*Developing benchmarks to support estimation skills is important as pupils become confident in their use of standard measures. The*	*The smaller the unit, the greater the number of units needed to measure (that is, there is an inverse relationship*	*The relationship between area and perimeter is not a simple one. Increasing or decreasing area does not necessarily mean the perimeter increases*	*To read a scale, first work out how much each mark or division on the scale represents. The unit of measure must be identified*
	height of a door frame, for example, is approximately 2 metres, and a bag of sugar weighs approximately 1 kilogram.	*between size of unit and measure).*	*or decreases respectively, or vice versa.* *Area is measured in square units. For rectangles, measuring the length and breadth is a shortcut to finding out how many squares would fit into each of these dimensions.*	*before measuring. Selecting a unit will depend on the size and nature of the item to be measured and the degree of accuracy required.*
NCETM Spine				MD Y6 2.29

Measures: Using Measures	measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) Spring 2 Summer 2	• convert between different units of measure [for example, kilometre to metre; hour to minute] • estimate, compare and calculate different measures, including money in pounds and pence Autumn 2 Spring 2 Summer 2	• convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre) • understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints • use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling. Summer 1 Summer 2	• solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate • use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places • convert between miles and kilometres Spring
NRich	Car Journey https://nrich.maths.org/10350 Olympic Starters	Discuss and Choose https://nrich.maths.org/7449		

	https://nrich.maths.org/8170 Oh Harry! https://nrich.maths.org/5979			

Progression in Reasoning NCETM Measures	Top Tips Put these measurements in order starting with the largest. Explain your thinking Half a litre, Quarter of a litre, 300 ml Position the symbols Place the correct symbol between the measurements > or < 306cm Half a metre 930 ml 1 litre Write more statements If there are 630ml of water in a jug. How much water do you need to add to end up with a litre of water? What if there was 450 ml to start with? Testing conditions A square has sides of a whole number of centimetres. Which of the following measurements could represent its perimeter?8cm 18cm 24cm 25cm	Put these amounts in order starting with the largest. Explain your thinking Half of three litres; Quarter of two litres; 300 ml Write more statements One battery weighs the same as 60 paperclips; One pencil sharpener weighs the same as 20 paperclips. Write down some more things you know. How many pencil sharpeners weigh the same as a battery? The answer is ….225 metres What is the question?	Put these amounts in order starting with the largest. 130000cm2 1.2 m2 13 m2 Explain your thinking The answer is …. 0.3km What is the question? Write more statements Mr Smith needs to fill buckets of water. A large bucket holds 6 litres and a small bucket holds 4 litres. If a jug holds 250 ml and a bottle holds 500 ml suggest some ways of using the jug and bottle to fill the buckets.	Put these amounts in order starting with the largest. Explain your thinking 100 cm3 1000000 mm3 1 m3 What do you notice? 8 km = 5 miles 16km = miles 4 km = miles Fill in the missing number of miles. Write down some more facts connecting kilometres and miles. Write more statements Chen, Megan and Sam have parcels. Megan's parcel weighs 1.2kg and Chen's parcel is 1500g and Sam's parcel is half the weight of Megan's parcel. Write down some other statements about the parcels. How much heavier is Megan's parcel than Chen's parcel?
Measurement: Money	add and subtract amounts of money to give change, using both £ and p in practical contexts Spring 2	estimate, compare and calculate different measures, including money in pounds and pence	use all four operations to solve problems involving measure [for example, money] Summer 1	

		Summer 2		

NRich		Discuss and Choose https://nrich.maths.org/7449		
Progression in Reasoning NCETM	Position the symbols Place the correct symbols between the measurements > or < Expl your thinking £23.60 2326p 2623p ain			
Measurement: Time **Telling the time is not taught in lessons but referred to continuously.**	tell and write the time from an analogue cloc k, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks estimate and read tim e with increasing accura cy to the nearest minute; r and cord compare time in t erms of seconds, minutes a nd hours; use such vocabulary as o'clock, a.m./p.m., morning, afternoon, n oon and midnight know the number of seconds in a minute a nd the number of days in month, each year and leap year compare durations of events [for example to calculate the time tak en by particular events or ta sks]. Summer	read, write and convert time between analogue our and digital 12- and 24-clocks solve problems involving converting from hours to minutes; minutes to second years to months; weeks to days. Summer	solve problems involving converting between units of time	use, read, write and convert between standard units, converting measurements of time from a smaller unit of measure to a larger unit, and vice versa.

NRich	5 on the Clock		□	□

	https://nrich.maths.org/1981 The Time Is … https://nrich.maths.org/7384 Clocks https://nrich.maths.org/1812 Watch the Clock https://nrich.maths.org/980			

Progression in Reasoning NCETM Time	Undoing A programme lasting 45 minutes finishes at 5.20. At what time did it start? Draw the clock at the start and finish time. Explain thinking Salha says that 100 minutes is the same as 1 hour. Is Salha right? Explain why. Working backwards Tom's bus journey takes half an hour. He arrives at his destination at 9:25. At what time did his bus leave? 9:05 8:55 8:45 The answer is …. 25 minutes What is the question? What do you notice? What do you notice? 1 minute = 60 seconds 2 minutes = 120 seconds Continue the pattern Write down some more time facts like these	Undoing Imran's swimming lesson lasts 50 minutes and it takes 15 minutes to change and get ready for the lesson. What time does Imran need to arrive if his lesson finishes at 6.15pm? Explain thinking The time is 10:35 am. Jack says that the time is closer to 11:00am than to 10:00am. Is Jack right? Explain why. Working backwards Put these times of the day in order, starting with the earliest time. A: Quarter to four in the afternoon B: 07:56 C: six minutes to nine in the evening D: 14:36 What do you notice? What do you notice?	Undoing A school play ends at 6.45pm. The play lasted 2 hours and 35 minutes. What time did it start? Working backwards Put these lengths of time in order starting with the longest time. 105 minutes 1 hour 51 minutes 6360 seconds What do you notice? What do you notice here? 1 minute = 60 seconds 60 minutes = seconds Fill in the missing number of seconds Write down some more time facts like this.	Undoing A film lasting 200 minutes finished at 17:45. At what time did it start?

		1:00pm = 13:00 2:00pm = 14:00 Continue the pattern		
NCETM Spine		MD Y4 2.16	MD Y5 2.20	MD Y6 2.30

Measurement: Perimeter, Area and Volume	measure the perimeter of simple 2-D shapes Spring 4	• measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres • find the area of rectilinear shapes by counting squares Autumn 3 Spring 2	• measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres • calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes • estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water] Autumn 5 Summer 5	• recognise that shapes with the same areas can have different perimeters and vice versa • recognise when it is possible to use formulae for area and volume of shapes • calculate the area of parallelograms and triangles • calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm3) and cubic metres (m3), and extending to other units [for example, mm3 and km3]. Spring 5
NRich		Twice As Big https://nrich.maths.org/5561 Torn Shapes https://nrich.maths.org/4963	Through the Window https://nrich.maths.org/10344 Area and Perimeter https://nrich.maths.org/7280 Ribbon Squares https://nrich.maths.org/9939 Making Boxes https://nrich.maths.org/89 Brush Loads https://nrich.maths.org/4911	Next Size Up https://nrich.maths.org/6931

			Fitted https://nrich.maths.org/1854 Cubes https://nrich.maths.org/42 Shaping It https://nrich.maths.org/7301 Numerically Equal https://nrich.maths.org/1045 A Day With Grandpa https://nrich.maths.org/5983	
Progression in Reasoning NCETM	Testing conditions A square has sides of a whole number of centimetres. Which of the following measurements could represent its perimeter?8cm 18cm 24cm 25cm	Testing conditions If the width of a rectangle is 3 metres less than the length and the perimeter is between 20 and 30 metres, what could the dimensions of the rectangle be? Convince me. Always, sometimes, never? If you double the area of a rectangle, you double the perimeter.	Shape A is a rectangle that is 4m long & 3m wide. Shape B is a square with sides 3m. The rectangles and squares are put together side by side to make a path which has perimeter between 20 & 30m. e.g.  Can you draw some other arrangements where the perimeter is between 20 &30m? Always, sometimes, never? When you cut off a piece of a shape you reduce its area and perimeter. Other possibilities A cuboid is made up of 36 smaller cubes. If the cuboid has the length of two of its sides the same what could the dimensions be?	Testing conditions A square has the perimeter of 12 cm. When 4 squares are put together, the perimeter of the new shape can be calculated. e.g. What arrangements will give the maximum perimeter?  Always, sometimes, never? The area of a triangle is half the area of the rectangle that encloses it Other possibilities A cuboid has a volume between 200 and 250 cm cubed. Each edge is at least 4cm long. List four possibilities for the dimensions of the cuboid. The answer is …. 24 metres cubed, What is the question?

Year	3	4	5	6

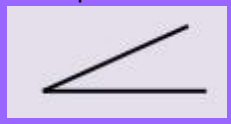
Big Ideas NCETM Geometry	*During this year there is an increasing range of shapes that pupils are familiar with. The introduction of symmetrical and nonsymmetrical polygons and the requirement that pupils should be able to draw them will give rise to discussions about lengths of sides and sizes of angles. Pupils need to appreciate these features as properties of shapes as well as the number of sides and vertices. Pupils recognise that angles are about the amount of turn – the lengths of the lines used to represent angles do not affect the size of the angle. Pupils recognise that relationships are at the heart of properties of shapes, not particular measurements. For example, the opposite sides of any rectangle will always be equal, not that rectangles have a pair of long sides and a pair of short sides.*	*During this year, pupils increase the range of 2-D and 3-D shapes that they are familiar with. They know the correct names for these shapes, but, more importantly, they are able to say why certain shapes are what they are by referring to their properties, including lengths of sides, size of angles and number of lines of symmetry. The naming of shapes sometimes focuses on angle properties (e.g. a rectangle is right-angled), and sometimes on properties of sides (e.g. an equilateral triangle is an equal sided triangle). Shapes can belong to more than one classification. For example, a square is a rectangle, a parallelogram, a rhombus and a quadrilateral.*	*During this year, pupils increase the range of 2-D and 3-D shapes that they are familiar with. With 3-D shapes they think about the faces as well as the number of vertices and through considering nets think about the 2-D shapes that define the 3-D shapes. Pupils learn about a range of angle facts and use them to describe certain shapes and derive facts about them. Regular shapes have to have all sides and all angles the same. Although non-square rectangles have four equal angles, the fact that they do not have four equal sides means that they are not regular. Some properties of shapes are dependent upon other properties. For example, a rectangle has opposite sides equal*	*Variance and invariance are important ideas in mathematics, particularly in geometry. A set of quadrilaterals for example may vary in many ways in terms of area, length of sides and the size of individual angles. However there are a set of invariant properties which remain common to all quadrilaterals, namely they have four sides and their internal angles sum to 360 degrees. Some of these properties emerge from naturally occurring constraints, for example the sum of the internal angles will always sum to 360 degrees and they can do nothing else! The questions 'What's the same?' and 'What's different?' can draw pupils' attention to variance and invariance. Shapes can be alike in essentially two different ways: congruent and similar. Congruent shapes are alike in all ways: they could occupy exactly the same space. Similar shapes share identical geometrical properties but can*

			because it has four right angles. A rectangle is defined as a quadrilateral with four right angles. It does not have to be defined as a quadrilateral with four right angles and two pairs of equal sides.	*differ in size. All equilateral triangles are similar, but only identically sized ones are congruent. Not all isosceles triangles are similar. Angle properties are a mix of necessary conditions and conventions. It is a necessary condition that angles on a straight line combine to a complete half turn. That we measure the half turn as 180 degrees is conventional.*
Geometry: 2d shapes	draw 2-D shapes Summer 3	compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes identify lines of symmetry in 2-D shapes presented in different orientations Summer 5	• distinguish between regular and irregular polygons based on reasoning about equal sides and angles. • use the properties of rectangles to deduce related facts and find missing lengths and angles Summer 2	• draw 2-D shapes using given dimensions and angles • compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons • illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius Summer 1
Geometry: 3d shapes	make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them		identify 3-D shapes, including cubes and other cuboids, from 2-D representations Summer 2	recognise, describe and build simple 3-D shapes, including making nets Summer 1

	Summer 3			
NRich	Board Block Challenge https://nrich.maths.org/2872 Stick Images https://nrich.maths.org/6980 Shapes on the Playground https://nrich.maths.org/1054 Sorting Logic Blocks https://nrich.maths.org/7192	Shapes on the Playground https://nrich.maths.org/1054 Sorting Logic Blocks https://nrich.maths.org/7192 Cut It Out https://nrich.maths.org/720 Nine Pin Triangles https://nrich.maths.org/2852		Making Cuboids https://nrich.maths.org/90

Progression in reasoning – Geometry **Properties of shape** **NCETM**	What's the same, what's different? What is the same and different about these three 2D shapes?  Visualising I am thinking of a 3dimensional shape which has faces that are triangles and squares. What could my shape be? Other possibilities One face of a 3-D shape looks like this. What could it be? Are there any other possibilities? Always, sometimes, never Is it always, sometimes or never that all sides of a hexagon are the same length? Other possibilities	What's the same, what's different about the diagonals of these 2-D shapes?  Visualising Imagine a square cut along the diagonal to make two triangles. Describe the triangles. Join the triangles on different sides to make new shapes. Describe them. (you couldsketch them). Are any of the shapes symmetrical? Convince me.	What's the same, what's different about the net of a cube and the net of a cuboid? Visualising I look at a large cube which is made up of smaller cubes. If the larger cube is made up of between 50 and 200 smaller cubes what might it look like?	What's the same, what's different about the nets of a triangular prism and a square based pyramid? Visualising Jess has 24 cubes which she builds to make a cuboid. Write the dimensions of cuboids that she could make. List all the possibilities.
	Can you find shapes that can go with the set with this label? "Have straight sides that are different lengths." Convince me Which capital letters have perpendicular and / or parallel lines? Convince me			

Geometry: Angles and Lines	• recognise angles as a property of shape or a description of a turn • identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle • identify horizontal and vertical lines and pairs of perpendicular and parallel lines. Summer 3	identify acute and obtuse angles and compare and order angles up to two right angles by size identify lines of symmetry in 2-D shapes presented in different orientations complete a simple symmetric figure with respect to a specific line of symmetry. Summer 5	• know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles • draw given angles, and measure them in degrees identify: • angles at a point and one whole turn (total 360) • angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180) • other multiples of 90 Summer 2	• find unknown angles in any triangles, quadrilaterals, and regular polygons • recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. Summer 1
NRich	Square It https://nrich.maths.org/2526		Olympic Turns https://nrich.maths.org/8191 How Safe Are You? https://nrich.maths.org/5647 Six Places to Visit https://nrich.maths.org/5655 The Numbers Give the Design https://nrich.maths.org/6919	Baravelle https://nrich.maths.org/6522 Shape Draw https://nrich.maths.org/10368 Quadrilaterals https://nrich.maths.org/962 Round A Hexagon https://nrich.maths.org/8095

Progression in Reasoning **NCETM** **Angles**	Always, sometimes, never Is it always, sometimes or never that all sides of a hexagon are the same length? Other possibilities Can you find shapes that can go with the set with this label? “Have straight sides that are different lengths.” Convince me Which capital letters have perpendicular and /or parallel lines? Convince me.	Always, sometimes, never Is it always, sometimes or never true that the two diagonals of a rectangle meet at right angles? Other possibilities Can you show or draw a polygon that fits both of these criteria? What do you look for? ”Has exactly two equal sides.” ”Has exactly two parallel sides.”	Always, sometimes, never Is it always, sometimes or never true that the number of lines of reflective symmetry in a regular polygon is equal to the number of its sides? Other possibilities A rectangular field has a perimeter between 14 and 20 metres . What could its dimensions be? Other possibilities Here is one angle of an isosceles triangle. You will need to measure the angle accurately. What could the other angles of the triangle be? Are there any other possibilities?  Convince me What is the angle between the hands of a clock at four o clock? At what other times is the angle between the hands the same? Convince me	Always, sometimes, never Is it always, sometimes or never true that, in a polyhedron, the number of vertices plus the number of faces equals the number of edges? Other possibilities  The angle at the top of this isosceles triangle is 110 degrees. What are the other angles in the triangle? Convince me  One angle at the point where the diagonals of a rectangle meet is 36 degrees. What could the other angles be? Convince me

Geometry: Position and Direction		• describe positions on a 2-D grid as coordinates in the first quadrant • describe movements between positions as translations of a given unit to the left/right and up/down • plot specified points and draw sides to complete a given polygon. Summer 6	identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed. Summer 3	• describe positions on the full coordinate grid (all four quadrants) • draw and translate simple shapes on the coordinate plane, and reflect them in the axes. Summer
NRich		A Cartesian Puzzle https://nrich.maths.org/1110 Eight Hidden Squares https://nrich.maths.org/6280 Coordinate Challenge https://nrich.maths.org/5038 Counters in the Middle https://nrich.maths.org/6978 Stringy Quades https://nrich.maths.org/2913 Let Us Reflect https://nrich.maths.org/1873 School Fair Necklaces https://nrich.maths.org/9692	Transformations On A Peg Board https://nrich.maths.org/1813 More Transformations On A Peg Board https://nrich.maths.org/4901	Ten Hidden Squares https://nrich.maths.org/2654 Coordinate Tan https://nrich.maths.org/1109
Progression in Reasoning NCETM Geometry: Position and Direction		Other possibilities Can you draw a non-right angled triangle with a line of symmetry? Are there other possibilities? Convince me Ayub says that he can draw a right angled triangle which has another angle which is obtuse. Is he right? Explain why.		

Year	3	4	5	6
Statistics NCETM Big Ideas	Data needs to be collected with a question or purpose in mind. Tally charts are used to collect data over time(cars passing the school, birds on the bird table). They can also be used to keep track of counting.	In mathematics the focus is on numerical data. These can be discrete or continuous. Discrete data are counted and have fixed values, for example the number of children who chose red as their favourite colour (this has to be a whole number and cannot be anything in between). Continuous data are measured, for example at what time did each child finish the race? (Theoretically this could be any time: 67·3 seconds, 67·33 seconds or 67·333 seconds, depending on the degree of accuracy that is applied.) Continuous data are best represented with a line graph where every point on the line has a potential value.	Different representations highlight different aspects of data. It is important to be able to answer questions about data using inference and deduction, not just direct retrieval.	Pie charts visually display relative proportions, for example, that the proportion of pupils at School A liking reading is greater than the proportion at School B.
NCETM Spine				MD Y6 2.26
Statistics: Present and Interpret	▯ interpret and present data using bar charts, pictograms and tables Spring 3	▯ interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs. Summer 4	▯ complete, read and interpret information in tables, including timetables.	▯ interpret and construct pie charts and line graphs and use these to solve problems Autumn Summer

Statistics: Solving Problems	▯ solve one-step and twostep questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables. Spring 3	▯ solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs. Summer 4	▯ solve comparison, sum and difference problems using information presented in a line graph	▯ calculate and interpret the mean as an average. Autumn
NRich	Class 5's names https://nrich.maths.org/7522 Going For Gold https://nrich.maths.org/7800 The Domesday Project https://nrich.maths.org/7554 The Car That Passes https://nrich.maths.org/7249 Now and Then https://nrich.maths.org/8171 Real Statistics https://nrich.maths.org/4938 Our Sports https://nrich.maths.org/7779 How Big Are Classes 5, 6 and 7? https://nrich.maths.org/2399			Match the Matches https://nrich.maths.org/4937

NCETM reasoning	True or false? (Looking at a bar chart) "Twice as many people like strawberry than lime". Is this true or false? Convince me. Make up your own 'true/false' statement about the bar chart. What's the same, what's different?	True or false? (Looking at a graph showing how the class sunflower is growing over time) "Our sunflower grew the fastest in July". Is this true or false? Convince me. Make up your own 'true/false' statement about the graph. What's the same, what's different? Pupils identify similarities and differences between different	True or false? (Looking at a train time table) "If I want to get to Exeter by 4 o'clock this afternoon, I will need to get to Taunton station before midday". Is this true or false? Convince me. Make up your own 'true/false' statement about a journey using the timetable.	True or false? (Looking at a pie chart) "More than twice the number of people say their favourite type of T.V. programme is soaps than any other" Is this true or false? Convince me. Make up your own 'true/false' statement about the pie chart. What's the same, what's different?
	Pupils identify similarities and differences between different representations and explain them to each other. Create a question Pupils ask (and answer) questions about different statistical representations using key vocabulary relevant to the objectives.	representations and explain them to each other Create a question Pupils ask (and answer) questions about different statistical representations using key vocabulary relevant to the objectives.	What's the same, what's different? Pupils identify similarities and differences between different representations and explain them to each other. Create a question Pupils ask (and answer) questions about different statistical representations using key vocabulary relevant to the objectives	Pupils identify similarities and differences between different representations and explain them to each other Create a question Make up a set of five numbers with a mean of 2.7 Missing information The mean score in six test papers in a spelling test of 20 questions is 15. Five of the scores were 13 12 17 18 16 What was the missing score?

NRich problem solving		Venn diagrams https://nrich.maths.org/6290 Plants https://nrich.maths.org/36		Birdwatch https://nrich.maths.org/7553
Statistics **NCETM Big Ideas**	Y3 Data needs to be collected with a question or purpose in mind. Tally charts are used to collect data over time(cars passing the school, birds on the bird table). They can also be used to keep track of counting.	Y4 In mathematics the focus is on numerical data. These can be discrete or continuous. Discrete data are counted and have fixed values, for example the number of children who chose red as their favourite colour (this has to be a whole number and cannot be anything in between). Continuous data are measured, for example at what time did each child finish the race? (Theoretically this could be any time: 67·3 seconds, 67·33	Y5 Different representations highlight different aspects of data. It is important to be able to answer questions about data using inference and deduction, not just direct retrieval.	Y6 Pie charts visually display relative proportions, for example, that the proportion of pupils at School A liking reading is greater than the proportion at School B.
		seconds or 67·333 seconds, depending on the degree of accuracy that is applied.) Continuous data are best represented with a line graph where every point on the line has a potential value.		
NCETM Spine				MD Y6 2.26