Number: Number and Place Value with Reasoning

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+COUNTING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number			count backwards through zero to include negative numbers	interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero	use negative numbers in context, and calculate intervals across zero
count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward	count from 0 in multiples of 4, 8, 50 and 100;	count in multiples of 6, 7, 9, 25 and 1000	count forwards or backwards in steps of powers of 10 for any given number up to 1000 000	
given a number, identify one more and one less		find 10 or 100 more or less than a given number	find 1000 more or less than a given number		
Spot the mistake: 5,6,8,9 What is wrong with this sequence of numbers? **True or False?** I start at 2 and count in twos. I will say 9 **What comes next?** 10+1 = 11 11+1= 12 12+1 = 13 ……..	**Spot the mistake**: 45,40,35,25 What is wrong with this sequence of numbers? **True or False?** I start at 3 and count in threes. I will say 13? **What comes next?** 41+5=46 46+5=51 51+5=56 ……	**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?

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COMPARING NUMBERS					
use the language of: equal to, more than, less than (fewer), most, least	compare and order numbers from 0 up to 100; use <, > and = signs	compare and order numbers up to 1000	order and compare numbers beyond 1000 *compare numbers with the same number of decimal places up to two decimal places* (copied from Fractions)	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers)	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers)
Do, then explain Look at the objects. (in a collection). Are there more of one type than another? How can you find out?	**Do, then explain** 37 13 73 33 3 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** 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** 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** 747014 774014 747017 774077 744444 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** Find out the populations in five countries. Order the populations starting with the largest. Explain how you ordered the countries and their populations.
IDENTIFYING, REPRESENTING AND ESTIMATING NUMBERS					
identify and represent numbers using objects and pictorial representations including the number line	identify, represent and estimate numbers using different representations, including the number line	identify, represent and estimate numbers using different representations	identify, represent and estimate numbers using different representations		

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READING AND WRITING NUMBERS (including Roman Numerals					
read and write numbers from 1 to 20 in numerals and words.	read and write numbers to at least 100 in numerals and in words	read and write numbers up to 1000 in numerals and in words *tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks* (copied from Measurement)	read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit (appears also in Comparing Numbers) read Roman numerals to 1000 (M) and recognise years written in Roman numerals.	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (appears also in Understanding Place Value)
UNDERSTANDING PLACE VALUE					
	recognise the place value of each digit in a two-digit number (tens, ones)	recognise the place value of each digit in a three-digit number (hundreds, tens, ones)	recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) *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 units, tenths and hundredths* (copied from Fractions)	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers) *recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents* (copied from Fractions)	read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers) *identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places* (copied from Fractions)
	Do, then explain Show the value of the digit 2 in these numbers? 32 27 92 Explain how you know.	**Do, then explain** Show the3 value of the digit 3 in these numbers? 341 503 937 Explain how you know.	**Do, then explain** Show the value of the digit 4 in these numbers? 3041 4321 5497 Explain how you know.	**Do, then explain** Show the value of the digit 5 in these numbers? 350114 567432 985376 Explain how you know.	**Do, then explain** Show the value of the digit 6 in these numbers? 6787555 95467754 Expalin how you know.

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	Make up an example Create numbers where the units digit is one less than the tens digit. What is the largest/smallest number?	**Make up an example** Create numbers where the digit sum is three. Eg 120, 300, 210 What is the largest/smallest number?	**Make up an example** Create four digit numbers where the digit sum is four and the tens digit is one. Eg 1210, 2110, 3010 What is the largest/smallest number?	**Make up an example Give further examples** Create six digit numbers where the digit sum is five and the thousands digit is two. Eg 3002000 2102000 What is the largest/smallest number?	**Make up an example** Create seven digit numbers where the digit sum is six and the tens of thousands digit is two. Eg 4020000 What is the largest/smallest number?
ROUNDING					
			round any number to the nearest 10, 100 or 1 000	round any number up to 1 000 000 to the nearest 10, 100, 1 000, 10 000 and 100 000	round any whole number to a required degree of accuracy
			round decimals with one decimal place to the nearest whole number (copied from Fractions)	*round decimals with two decimal places to the nearest whole number and to one decimal place* (copied from Fractions)	*solve problems which require answers to be rounded to specified degrees of accuracy* (copied from Fractions)
			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 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?	**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

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PROBLEM SOLVING					
	use place value and number facts to solve problems	solve number problems and practical problems involving these ideas.	solve number and practical problems that involve all of the above and with increasingly large positive numbers	solve number problems and practical problems that involve all of the above	solve number and practical problems that involve all of the above

Number: Addition and Subtraction with Reasoning

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NUMBER BONDS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
represent and use number bonds and related subtraction facts within 20	recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100				
Continue the pattern 10 + 8 = 18 11 + 7 = 18 Can you make up a similar pattern for the number 17? How would this pattern look if it included subtraction? **Missing numbers** 9 + ☐ = 10 10 - ☐ = 9 What number goes in the missing box?	**Continue the pattern** 90 = 100 – 10 80 = 100 – 20 Can you make up a similar pattern starting with the numbers 74, 26 and 100? **Missing numbers** 91 + ☐ = 100 100 - ☐ = 89 What number goes in the missing box?				

Number: Addition and Subtraction with Reasoning

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MENTAL CALCULATION					
add and subtract one-digit and two-digit numbers to 20, including zero	add and subtract numbers using concrete objects, pictorial representations, and mentally, including: * a two-digit number and ones * a two-digit number and tens * two two-digit numbers * adding three one-digit numbers	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 mentally with increasingly large numbers	perform mental calculations, including with mixed operations and large numbers
Working backwards Through practical games on number tracks and lines ask questions such as "where have you landed?" and "what numbers would you need to throw to land on other given numbers?" **What do you notice?** 11 – 1 = 10 11 – 10 = 1 Can you make up some other number sentences like this involving 3 different numbers?	**True or false?** Are these number sentences true or false?73 + 40 = 113 98 – 18 = 70 46 + 77 = 123 92 – 67 = 35 Give your reasons. **Hard and easy questions** Which questions are easy / hard? 23 + 10 = 93 + 10 = 54 + 9 = 54 + 1 = Explain why you think the hard questions are hard?	**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 = Explain why you think the hard questions are hard?	**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?

Number: Addition and Subtraction with Reasoning

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	Other possibilities □ + □ + □ = 14 What single digit numbers could go in the boxes? How many different ways can you do this?				
read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Written Methods)	show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot				use their knowledge of the order of operations to carry out calculations involving the four operations

Number: Addition and Subtraction with Reasoning

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Fact families Which four number sentences link these numbers? 12, 15, 3 **What else do you know?** If you know this: 12 – 9 = 3 what other facts do you know? **Missing symbols** Write the missing symbols (+ - =) in these number sentences: 17 □ 3 □ 20 18 □ 20 □ 2	**Fact families** Which four number sentences link these numbers? 100, 67, 33 **What else do you know?** If you know this: 87 = 100 – 13 what other facts do you know? **Missing symbols** Write the missing symbols (+ - =) in these number sentences: 80 □ 20 □ 100 100 □ 70 □ 30 87 □ 13 □ 100				**Missing symbols** 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?

Number: Addition and Subtraction with Reasoning

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WRITTEN METHODS					
read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Mental Calculation)		add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	
Convince me In my head I have two odd numbers with a difference of 2. What could they be? Convince me **Missing numbers** Fill in the missing numbers (using a range of practical resources to support) 12 + □ = 19 20 - □ = 3	**Convince me** What digits could go in the boxes? 7□ - 2□ = 46 Try to find all of the possible answers. How do you know you have got them all? Convince me	**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	**Convince me** □ - 666 = 8□5 What is the largest possible number that will go in the rectangular box? What is the smallest? Convince me	**Convince me** □ + 1475 = 6□24 What numbers go in the boxes? What different answers are there? Convince me	**Convince me** Three four digit numbers total 12435. What could they be? Convince me

Number: Addition and Subtraction with Reasoning

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INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS					
	recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	estimate the answer to a calculation and use inverse operations to check answers	estimate and use inverse operations to check answers to a calculation	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
Making an estimate Pick (from a selection of number sentences) the ones where the answer is 8 or 9. **Is it true that?** Is it true that 3+4 = 4 + 3?	**Making an estimate** Which of these number sentences have the answer that is between 50 and 60 74 - 13 55 + 17 87 – 34 **Always, sometimes, never** Is it always, sometimes or never true that if you add three numbers less than 10 the answer will be an odd number	**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. Is it always, sometimes or never true that when you add two numbers together you will get an even number	**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

Number: Addition and Subtraction with Reasoning

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PROBLEM SOLVING					
solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ - 9	solve problems with addition and subtraction: * using concrete objects and pictorial representations, including those involving numbers, quantities and measures * applying their increasing knowledge of mental and written methods	solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction	solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
	solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change (copied from Measurement)				Solve problems involving addition, subtraction, multiplication and division

Number: Multiplication and Division with Reasoning

MULTIPLICATION & DIVISION FACTS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
count in multiples of twos, fives and tens (copied from Number and Place Value)	*count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward* (copied from Number and Place Value)	*count from 0 in multiples of 4, 8, 50 and 100* (copied from Number and Place Value)	*count in multiples of 6, 7, 9, 25 and 1 000* (copied from Number and Place Value)	*count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000* (copied from Number and Place Value)	
	recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	recall multiplication and division facts for multiplication tables up to 12 × 12		
	Missing numbers 10 = 5 x □ What number could be written in the box? **Making links** I have 30p in my pocket in 5p coins. How many coins do I have?	**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?	**Missing numbers** 72 = □ x □ Which pairs of numbers could be written in the boxes? **Making links** Eggs are bought in boxes of 12. I need 140 eggs; how many boxes will I need to buy?	**Missing numbers** 6 x 0.9 = □ x 0.03 6 x 0.04 = 0.008 x □ Which numbers could be written in the boxes? **Making links** Apples weigh about 170 g each. How many apples would you expect to get in a 2 kg bag?	**Missing numbers** 2.4 ÷ 0.3 = □ x 1.25 Which number could be written in the box? **Making links**
MENTAL CALCULATION					
		write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for	use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying	multiply and divide numbers mentally drawing upon known facts	perform mental calculations, including with mixed operations and large numbers

Number: Multiplication and Division with Reasoning

		two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Written Methods)	together three numbers		
		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 =	**Use a fact** 63 ÷ 9 = 7 Use this fact to work out 126 ÷ 9 = 252 ÷ 7 =	**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 48 x 25 78 x 25 4.6 x 25	**Use a fact** 12 x 1.1 = 13.2 Use this fact to work out 15.4 ÷ 1.1 = 27.5 ÷ 1.1 =
	show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot		recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers)	multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	*associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$)* (copied from Fractions)
Making links If one teddy has two apples, how many apples will three teddies have? Here are 10 lego people If 2 people fit into the train carriage, how many carriages do we need?	**Making links** Write the multiplication number sentences to describe this array X X X X X X What do you notice?	**Making links** 4 × 6 = 24 How does this fact help you to solve these calculations?	**Making links** How can you use factor pairs to solve this calculation? 13 x 12 (13 x 3 x 4, 13 x 3 x 2 x 2, 13 x 2 x 6)	**Making links** 7 x 8 = 56 How can you use this fact to solve these calculations? 0.7 x 0.8 = 5.6 ÷ 8 =	**Making links** 0.7 x 8 = 5.6 How can you use this fact to solve these calculations? 0.7 x 0.08 = 0.56 ÷ 8 =

Number: Multiplication and Division with Reasoning

	Write the division sentences.	40 x 6 = 20 x 6 = 24 x 6 =			
WRITTEN CALCULATION					
	calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs	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 (appears also in Mental Methods)	multiply two-digit and three-digit numbers by a one-digit number using formal written layout	multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers	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 one-digit number using the formal written method of short division and interpret remainders appropriately for the context	divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
					use written division methods

Number: Multiplication and Division with Reasoning

					in cases where the answer has up to two decimal places (copied from Fractions (including decimals))
Practical If we put two pencils in each pencil pot how many pencils will we need?	**Prove It** Which four number sentences link these numbers? 3, 5, 15? Prove it.	**Prove It** What goes in the missing box? x ? ? 4 80 12 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 product?	**Prove It** What goes in the missing box? 6 □ x 4 = 512 Prove it. **How close can you get?** □□□ 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?	**Prove It** What goes in the missing box? 12 □2 ÷ 6 = 212 14 □4 ÷ 7 = 212 22 □3 ÷ 7 = 321 r 6 323 x □1 = 13243 Prove it.	**Prove It** What goes in the missing box? 18 □4 ÷ 12 = 157 38 □5 ÷ 18 = 212.5 33 □2 ÷ 8 = 421.5 38 x □.7 = 178.6 Prove it. **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?
PROPERTIES OF NUMBERS: MULTIPLES, FACTORS, PRIMES, SQUARE AND CUBE NUMBERS					
			recognise and use factor pairs and commutativity in mental calculations (repeated)	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	identify common factors, common multiples and prime numbers *use common factors to simplify fractions; use common multiples to express*

Number: Multiplication and Division with Reasoning

				and composite (non-prime) numbers establish whether a number up to 100 is prime and recall prime numbers up to 19	*fractions in the same denomination* (copied from Fractions)
				recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})	*calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3* (copied from Measures)
Spot the mistake Use a puppet to count but make some deliberate mistakes. e.g. 2 4 5 6 10 9 8 6 See if the pupils can spot the deliberate mistake and correct the puppet	**True or false?** When you count up in tens starting at 5 there will always be 5 units.	**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.	**Always, sometimes, never?** Is it always, sometimes or never true that an even number that is divisible by 3 is also divisible by 6. Is it always, sometimes or never true that the sum of four even numbers is divisible by 4.	**Always, sometimes, never?** Is it always, sometimes or never true that multiplying a number always makes it bigger Is it always, sometimes or never true that prime numbers are odd. Is it always, sometimes or never true that when you multiply a whole number by 9, the sum of its digits is also a multiple of 9 Is it always, sometimes or	**Always, sometimes, never?** Is it always, sometimes or never true that dividing a whole number by a half makes the answer twice as big. Is it always, sometimes or never true that when you square an even number, the result is divisible by 4 Is it always, sometimes or never true that multiples of 7 are 1 more or 1 less than prime numbers.

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				never true that a square number has an even number of factors.	
ORDER OF OPERATIONS					
					use their knowledge of the order of operations to carry out calculations involving the four operations
					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
INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS					
		estimate the answer to a calculation and use inverse operations to check answers (copied from Addition and Subtraction)	*estimate and use inverse operations to check answers to a calculation* (copied from Addition and Subtraction)		use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
	Use the inverse Use the inverse to check if the following calculations are correct: 12 ÷ 3 = 4 3 x 5 = 14	**Use the inverse** Use the inverse to check if the following calculations are correct 23 x 4 = 82 117 ÷ 9 = 14	**Use the inverse** Use the inverse to check if the following calculations are correct: 23 x 4 = 92 117 ÷ 9 = 14	**Use the inverse** Use the inverse to check if the following calculations are correct: 4321 x 12 = 51852 507 ÷ 9 = 4563	**Use the inverse** Use the inverse to check if the following calculations are correct: 2346 x 46 = 332796 27.74 ÷ 19 = 1.46

Number: Multiplication and Division with Reasoning

		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=	**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 =	**Size of an answer** The product of a two digit and three digit number is approximately 6500. What could the numbers be?	**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?
PROBLEM SOLVING					
solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts	solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	solve problems involving multiplying and adding, including using the 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	solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes	solve problems involving addition, subtraction, multiplication and division
				solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign	
				solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates	*solve problems involving similar shapes where the scale factor is known or can be found* (copied from Ratio and Proportion)

Number: Fractions (including Decimals and Percentages) Reasoning

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
COUNTING IN FRACTIONAL STEPS					
	Pupils should count in fractions up to 10, starting from any number and using the1/2 and 2/4 equivalence on the number line (Non Statutory Guidance)	count up and down in tenths	count up and down in hundredths		
	Spot the mistake 7, 7 ½ , 8, 9, 10 8 ½, 8, 7, 6 ½, … and correct it **What comes next?** 5 ½, 6 ½ , 7 ½ , …., …. 9 ½, 9, 8 ½, ……, …..	**Spot the mistake** six tenths, seven tenths, eight tenths, nine tenths, eleven tenths … and correct it. **What comes next?** 6/10, 7/10, 8/10, ….., …. 12/10, 11/10, ….., ….., …..	**Spot the mistake** sixty tenths, seventy tenths, eighty tenths, ninety tenths, twenty tenths … and correct it. **What comes next?** 83/100, 82/100, 81/100, ….., ….., ….. 31/100, 41/100, 51/100, ….., …..,	**Spot the mistake** 0.088, 0.089, 1.0 **What comes next?** 1.173, 1.183, 1.193	**Spot the mistake** Identify and explain mistakes when counting in more complex fractional steps

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Number: Fractions (including Decimals and Percentages) Reasoning

RECOGNISING FRACTIONS					
recognise, find and name a half as one of two equal parts of an object, shape or quantity	recognise, find, name and write fractions $^{1}/_{3}$, $^{1}/_{4}$, $^{2}/_{4}$ and $^{3}/_{4}$ of a length, shape, set of objects or quantity	recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators recognise that tenths arise from dividing an object into 10 equal parts and in dividing one – digit numbers or quantities by 10.	recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten	recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents (appears also in Equivalence)	
What do you notice? Choose a number of counters. Place them onto 2 plates so that there is the same number on each half. When can you do this and when can't you? What do you notice?	**What do you notice?** ¼ of 4 = 1 ¼ of 8 = 2 ¼ of 12 = 3 Continue the pattern What do you notice?	**What do you notice?** 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?** 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?	**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.	**What do you notice?** One thousandth of my money is 31p. How much do I have?

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Number: Fractions (including Decimals and Percentages) Reasoning

recognise, find and name a quarter as one of four equal parts of an object, shape or quantity		recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators			
True or false? Sharing 8 apples between 4 children means each child has 1 apple.	**True or false?** Half of 20cm = 5cm ¾ of 12cm = 9cm	**True or false?** 2/10 of 20cm = 2cm 4/10 of 40cm = 4cm 3/5 of 20cm = 12cm	**True or false?** 1/20 of a metre= 20cm 4/100 of 2 metres = 40cm	**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	**True or false?** 25% of 23km is longer than 0.2 of 20km. Convince me.

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Number: Fractions (including Decimals and Percentages) Reasoning

COMPARING FRACTIONS					
		compare and order unit fractions, and fractions with the same denominators		compare and order fractions whose denominators are all multiples of the same number	compare and order fractions, including fractions >1
		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) Ben put these fractions in order starting with the smallest. Are they in the correct order? One fifth, one seventh, one sixth	Give an example of a fraction that is more than a half but less than a whole. Now 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)	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. 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?	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. Sam put these fractions in order starting with the smallest. Are they in the correct order? Thirty three fifths Twenty three thirds Forty five sevenths How do you know?

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Number: Fractions (including Decimals and Percentages) Reasoning

COMPARING DECIMALS					
			compare numbers with the same number of decimal places up to two decimal places	read, write, order and compare numbers with up to three decimal places	identify the value of each digit in numbers given to three decimal places
			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?	**Missing symbol** Put the correct symbol < or > in each box 4.627 ☐ 4.06 12.317 ☐ 12.31 What needs tobe added to 3.63 to give 3.13? What needs to be added to 4.652 to give 4.1?	**True or false?** In all of the numbers below, the digit 6 is worth <u>more than</u> 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 tobe adde3d 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

Number: Fractions (including Decimals and Percentages) Reasoning

ROUNDING INCLUDING DECIMALS					
			round decimals with one decimal place to the nearest whole number	round decimals with two decimal places to the nearest whole number and to one decimal place	solve problems which require answers to be rounded to specified degrees of accuracy
			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? *Also see rounding in place value*	**Do, then explain** 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? *Also see rounding in place value*	**Do, then explain** 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? *Also see rounding in place value*

Number: Fractions (including Decimals and Percentages) Reasoning

EQUIVALENCE (INCLUDING FRACTIONS, DECIMALS AND PERCENTAGES)					
	write simple fractions e.g. $^{1}/_{2}$ of 6 = 3 and recognise the equivalence of $^{2}/_{4}$ and $^{1}/_{2}$.	recognise and show, using diagrams, equivalent fractions with small denominators	recognise and show, using diagrams, families of common equivalent fractions	identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths	use common factors to simplify fractions; use common multiples to express fractions in the same denomination
	Odd one out. Which is the odd one out in this trio: ½ 2/4 ¼ Why? **What do you notice?** Find ½ of 8. Find 2/4 of 8 What do you notice?	**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? **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?	**Odd one out.** Which is the odd one out in each of these trio s¾ 9/12 4/6 9/12 10/15 2/3 Why? **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?	**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 Why? **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?	**Odd one out**. Which is the odd one out in each of these collections of 4 fraction s¾ 9/12 26/36 18/24 4/20 1/5 6/25 6/30 Why? **What do you notice?** 8/5 of 25 = 40 5/4 of 16 = 20 7/6 of 36 - 42 Can you write similar statements?
			recognise and write decimal equivalents of any number of tenths or hundredths	read and write decimal numbers as fractions (e.g. 0.71 = $^{71}/_{100}$) recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents	associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^{3}/_{8}$)

Number: Fractions (including Decimals and Percentages) Reasoning

			Complete the pattern by filling in the blank cells in this table: $\frac{1}{10}$ | $\frac{2}{10}$ | $\frac{3}{10}$ | $\frac{10}{100}$ | $\frac{20}{100}$ | | $\frac{40}{100}$ 0.1 | | 0.3 | **Another and another** Write a decimal numbers (to one decimal place) which lies between a half and three quarters? … and another, … and another, …	**Complete the pattern** $\frac{71}{100}$ | $\frac{??}{100}$ | $\frac{??}{100}$ | $\frac{??}{100}$ 0.71 | 0.81 | ??? | ??? Complete the table. **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, …	**Complete the pattern** $\frac{1}{8}$ | $\frac{2}{8}$ | $\frac{3}{8}$ | $\frac{4}{8}$ 0.375 | ??? | ??? | ??? Complete the table. **Another and another** Write a unit fraction which has a value of less than 0.5? … and another, … and another, …
			recognise and write decimal equivalents to $^1/_4$; $^1/_2$; $^3/_4$	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 as a decimal fraction	recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.
	Ordering Put these fractions in the correct order, starting with the smallest. ½ ¼ 1/3	**Ordering** Put these fractions in the correct order, starting with the smallest. 4/8 ¾ 1/4	**Ordering** Put these numbers in the correct order, starting with the smallest. ¼ 0.75 5/10 Explain your thinking	**Ordering** Put these numbers in the correct order, starting with the largest. 7/10, 0.73, 7/100, 0.073 71%	**Ordering** Which is larger, $^1/_3$ or $^2/_5$? Explain how you know. Put the following amounts in order,

Number: Fractions (including Decimals and Percentages) Reasoning

				Explain your thinking Which is more: 20% of 200 or 25% of 180? Explain your reasoning.	starting with the largest. 23%, 5/8, 3/5, 0.8
ADDITION AND SUBTRACTION OF FRACTIONS					
		add and subtract fractions with the same denominator within one whole (e.g. $^{5}/_{7} + {}^{1}/_{7} = {}^{6}/_{7}$)	add and subtract fractions with the same denominator	add and subtract fractions with the same denominator and multiples of the same number recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (e.g. $^{2}/_{5} + {}^{4}/_{5} = {}^{6}/_{5} = 1\,{}^{1}/_{5}$)	add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
		What do you notice? 1/10 + 9/10 = 1 2/10 + 8/10 = 1 3/10 + 7/10 = 1	**What do you notice?** 5/5 – 1/5 = 4/5 4/5 – 1/5 = 3/5	**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	**Another and another** Write down two fractions which have a difference of 1 2/… and another, … and another, …

Number: Fractions (including Decimals and Percentages) Reasoning

		Continue the pattern Can you make up a similar pattern for eighths? The answer is 5/10, what is the question? (involving fractions / operations)	**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? 11/100 + 89/100 = 1 12/100 + 88/100 = 1 13/100 + 87/100 = 1 Continue the pattern for the next five number sentences	Continue the pattern up to the total of 2. Can you make up a similar pattern for subtraction? The answer is 1 2/5 , what is the question	**Another and another** Write down 2 fractionswith a total of 3 4/5. … and another, … and another, …
MULTIPLICATION AND DIVISION OF FRACTIONS					
				multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $^1/_4 \times {}^1/_2 = {}^1/_8$)
					multiply one-digit numbers with up to two decimal places by whole numbers
					divide proper fractions by whole numbers (e.g. $^1/_3 \div 2 = {}^1/_6$)

Number: Fractions (including Decimals and Percentages) Reasoning

				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.	**Continue the pattern** 1/3 ÷ 2 = 1/6 1/6 ÷ 2 = 1/12 1/12 ÷ 2 = 1/24 What do you notice? ½ x ¼ = The answer is 1/8 , what is the question (involving fractions / operations) Give your top tips for dividing fractions.
MULTIPLICATION AND DIVISION OF DECIMALS					
					multiply one-digit numbers with up to two decimal places by whole numbers
			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		multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places
					identify the value of each digit to three decimal

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Number: Fractions (including Decimals and Percentages) Reasoning

					places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places
					associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^{3}/_{8}$)
					use written division methods in cases where the answer has up to two decimal places
			Undoing I divide a number by 100 and the answer is 0.3. What number did I start with? **Another and another** Write down a number with one decimal place which when multiplied by 10 gives an answer between 120 and 130. ... and another, … and another, …	**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, …	**Undoing** I multiply a number with three decimal places by a multiple of 10. The answer is approximately 3.21 What was my number and what did I multiply buy? When I divide a number by 1000 the resulting number has the digit 6 in the units and tenths and the other digits are 3 and 2 in the tens and

Number: Fractions (including Decimals and Percentages) Reasoning

					hundreds columns. What could my number have been?
PROBLEM SOLVING					
		solve problems that involve all of the above	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	solve problems involving numbers up to three decimal places	
			solve simple measure and money problems involving fractions and decimals to two decimal places.	solve problems which require knowing percentage and decimal equivalents of $^{1}/_{2}$, $^{1}/_{4}$, $^{1}/_{5}$, $^{2}/_{5}$, $^{4}/_{5}$ and those with a denominator of a multiple of 10 or 25.	

Ratio and Proportion with Reasoning

Statements only appear in Year 6 but should be connected to previous learning, particularly fractions and multiplication and division					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
					solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
					What else do you know? In a flower bed a gardener plants 3 red bulbs for every 4 white bulbs. How many red and white bulbs might he plant? If she has 100 white bulbs, how many red bulbs does she need to buy? If she has 75 red bulbs, how many white bulbs does she need to buy? If she wants to plant 140 bulbs altogether, how many of each colour should she buy? **Do, then explain** Purple paint is made from read and blue paint in the ratio of 3:5. To make 40 litres of purple paint how much would I need of each colour? Explain your thinking.
					solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison
					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. £255, £850, £4.25 What was the original selling price?
					solve problems involving similar shapes where the scale factor is known or can be found
					Unpicking A recipe needs to include three times as much apple than peach. The total weight of apples and peaches in a recipe is 700 grammes. How much apple do I need?

Ratio and Proportion with Reasoning

					solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.
					Other possibilities A 50 seater coach travels to the match. Most of the seats are taken. Junior tickets cost £13 and Adult tickets cost £23. The only people on the coach are Juniors and Adults. The total amount paid for tickets is approximately £900 How many people on the coach were adults and how many were juniors?

Algebra with Reasoning

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Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
EQUATIONS					
solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and ***missing number problems*** *such as* *7 = □ - 9* (copied from Addition and Subtraction)	*recognise and use the inverse relationship between addition and subtraction and use this to check calculations and* ***missing number*** *problems.* (copied from Addition and Subtraction)	solve problems, *including* ***missing number*** *problems, using number facts, place value, and more complex addition and subtraction.* (copied from Addition and Subtraction) *solve problems, including* ***missing number*** *problems, involving multiplication and division, including integer scaling* (copied from Multiplication and Division)		*use the properties of rectangles to deduce related facts and find* ***missing lengths and angles*** (copied from Geometry: Properties of Shapes)	express missing number problems algebraically
	recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 (copied from Addition and Subtraction)				find pairs of numbers that satisfy number sentences involving two unknowns
represent and use number bonds and related subtraction facts within 20 (copied from Addition and Subtraction)					enumerate all possibilities of combinations of two variables

Algebra with Reasoning

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Connected Calculations	**Connected Calculations**	**Connected Calculations**	**Connected Calculations**	**Connected Calculations**	**Connected Calculations**
11 = 3 + 8 12 = 4 + 8 13 = ☐ + 8 14 = ☐ + 8 What numbers go in the boxes? Can you continue this sequence of calculations?	Put the numbers 19, 15 and 4 in the boxes to make the number sentences correct. ☐ = ☐ - ☐ ☐ = ☐ + ☐	Put the numbers 3, 12, 36 in the boxes to make the number sentences correct. ☐ = ☐ x ☐ ☐ = ☐ ÷ ☐	Put the numbers 7.2, 8, 0.9 in the boxes to make the number sentences correct. ☐ = ☐ x ☐ ☐ = ☐ ÷ ☐	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 multiples of 5. Give an example of what the 3 angles could be. Write down 3 more examples	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.
FORMULAE					
			Perimeter can be expressed algebraically as 2(a + b) where a and b are the dimensions in the same unit. (Copied from NSG measurement)		use simple formulae *recognise when it is possible to use **formulae** for area and volume of shapes* (copied from Measurement)
			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	**Undoing** The perimeter of a rectangular garden is between 40 and 50 metres. What could the dimensions of the garden	**Undoing** The diagram below represents two rectangular fields that are next to each other. Field A | Field B

Algebra with Reasoning

<table>
<tr><td></td><td></td><td></td><td>answer.</td><td>be?</td><td>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
<table><tr><td>y</td><td>3y</td><td>3y + 1</td></tr><tr><td>25</td><td></td><td></td></tr><tr><td></td><td></td><td>28</td></tr></table>What is the largest value of y if the greatest number in the table was 163?</td></tr>
<tr><td colspan="6">SEQUENCES</td></tr>
<tr><td>sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening
(copied from Measurement)</td><td>compare and sequence intervals of time
(copied from Measurement)

order and arrange combinations of mathematical objects in patterns
(copied from Geometry: position and direction)</td><td></td><td></td><td></td><td>generate and describe linear number sequences</td></tr>
<tr><td></td><td>True or false?
Explain
The largest three digit number that can be made from the digits 2, 4 and 6 is 264. Is this true or false? Explain your thinking.</td><td></td><td></td><td></td><td>Generalising

Write a formula for the 10th, 100th and nth terms of the sequences below.
4, 8, 12, 16 ……
0.4, 0.8, 1.2, 1.6, ……..</td></tr>
</table>

Algebra with Reasoning

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Measurement with Reasoning

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Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
COMPARING AND ESTIMATING					
compare, describe and solve practical problems for: * lengths and heights [e.g. long/short, longer/shorter, tall/short, double/half] * mass/weight [e.g. heavy/light, heavier than, lighter than] * capacity and volume [e.g. full/empty, more than, less than, half, half full, quarter] * time [e.g. quicker, slower, earlier, later]	compare and order lengths, mass, volume/capacity and record the results using >, < and =		estimate, compare and calculate different measures, including money in pounds and pence (also included in Measuring)	calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes (also included in measuring) estimate volume (e.g. using 1 cm^3 blocks to build cubes and cuboids) and capacity (e.g. using water)	calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3.
Top tips How do you know that this (object) is heavier / longer / taller than this one? Explain how you know.	**Top tips** Put these measurements in order starting with the smallest. 75 grammes 85 grammes 100 grammes Explain your thinking **Position the symbols** Place the correct symbol between the measurements > or < 36cm ▭ 63cm	**Top Tips** Put these measurements in order starting with the largest. Half a litre Quarter of a litre 300 ml Explain your thinking **Position the symbols** Place the correct symbol between the measurements > or <	**Top Tips** Put these amounts in order starting with the largest. Half of three litres Quarter of two litres 300 ml Explain your thinking **Position the symbols** Place the correct symbols between the measurements > or <	**Top Tips** Put these amounts in order starting with the largest. 130000cm^2 1.2 m^2 13 m^2 Explain your thinking	**Top Tips** Put these amounts in order starting with the largest. 100 cm^3 1000000 mm^3 1 m^3 Explain your thinking

Measurement with Reasoning

	130ml ☐ 103ml Explain your thinking	306cm ☐ Half a metre 930 ml ☐ 1 litre Explain your thinking	£23.61 2326p 2623p Explain your thinking		
sequence events in chronological order using language [e.g. before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]	compare and sequence intervals of time	compare durations of events, for example to calculate the time taken by particular events or tasks			
		estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight (appears also in Telling the Time)			
Explain thinking Ask pupils to reason and make statements about to the order of daily routines in school e.g. daily timetable e.g. we go to PE **after** we go to lunch. Is this true or false?	**Undoing** The film finishes two hours after it starts. It finishes at 4.30. What time did it start? Draw the clock at the start and the finish of the film.	**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.	**Undoing** Imran's swimming lesson lasts 50 mins and it takes 15 mins to change and get ready for the lesson. What time does Imran need to arrive if his lesson finishes at 6.15pm?	**Undoing** A school play ends at 6.45pm. The play lasted 2 hours and 35 minutes. What time did it start?	**Undoing** A film lasting 200 minutes finished at 17:45. At what time did it start?

Measurement with Reasoning

What do we do before break time? etc.	**Explain thinking** The time is 3:15pm. Kate says that in two hours she will be at her football game which starts at 4:15. Is Kate right? Explain why.	**Explain thinking** Salha says that 100 minutes is the same as 1 hour. Is Salha right? Explain why.	**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.	**Other possibilities** (links with geometry, shape and space) 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? Convince me	**Other possibilities** (links with geometry, shape and space) 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..
MEASURING and CALCULATING					
measure and begin to record the following: * **lengths and heights** * **mass/weight** * **capacity and volume** * **time** (hours, minutes, seconds**)**	choose and use appropriate standard units to estimate and measure **length/height** in any direction (m/cm); **mass** (kg/g); **temperature** (°C); **capacity** (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels	measure, compare, add and subtract: **lengths** (m/cm/mm); **mass** (kg/g); **volume/capacity** (l/ml)	estimate, compare and calculate **different measures,** including **money in pounds and pence** (appears also in Comparing)	use all four operations to solve problems involving measure (e.g. **length, mass, volume, money**) using decimal notation including scaling.	solve problems involving the calculation and conversion of **units of measure**, using decimal notation up to three decimal places where appropriate (appears also in Converting)
Application (Can be practical) Which two pieces of string are the same length as this book?	**Application** (Practical) Draw two lines whose lengths differ by 4cm.	**Write more statements** (You may choose to consider this practically) 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	**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	**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	**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

Measurement with Reasoning

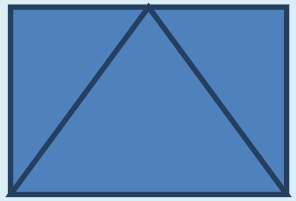
		to start with? Make up some more questions like this	sharpeners weigh the same as a battery?	fill the buckets.	parcels. How much heavier is Megan's parcel than Chen's parcel?
		measure the **perimeter** of simple 2-D shapes	measure and calculate the **perimeter** of a rectilinear figure (including squares) in centimetres and metres	measure and calculate the **perimeter** of composite rectilinear shapes in centimetres and metres	recognise that shapes with the same areas can have different **perimeters** and vice versa
		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 lobe? Convince me.	**Testing conditions** Shape A is a rectangle that is 4m long and 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 and 30 m. For example  Can you draw some other arrangements where the perimeter is between 20 and 30 metres?	**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. For example:  What arrangements will give the maximum perimeter?
recognise and know the value of different denominations of **coins and notes**	recognise and use symbols for pounds **(£) and pence (p)**; combine amounts to make a particular value	add and subtract amounts of **money** to give change, using both £ and p in practical contexts			

Measurement with Reasoning

	find different combinations of coins that equal the same amounts of money **solve simple problems** in a practical context involving addition and subtraction of money of the same unit, including giving change				
Possibilities Ella has two silver coins. How much money might she have?	**Possibilities** How many different ways can you make 63p using only 20p, 10p and 1p coins?	**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?	**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?		

Measurement with Reasoning

National Centre for Excellence in the Teaching of Mathematics

			find the area of rectilinear shapes by counting squares	calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes *recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})* (copied from Multiplication and Division)	calculate the area of parallelograms and triangles calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [e.g. mm^3 and km^3]. recognise when it is possible to use formulae for area and volume of shapes
			Always, sometimes, never If you double the area of a rectangle, you double the perimeter. *See also Geometry Properties of Shape*	**Always, sometimes, never** When you cut off a piece of a shape you reduce its area and perimeter. *See also Geometry Properties of Shape*	**Always, sometimes, never** The area of a triangle is half the area of the rectangle that encloses it: 

Measurement with Reasoning

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					See also Geometry Properties of Shape
TELLING THE TIME					
tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times.	tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks	read, write and convert time between analogue and digital 12 and 24-hour clocks (appears also in Converting)		
recognise and use language relating to dates, including days of the week, weeks, months and years	know the number of minutes in an hour and the number of hours in a day. (appears also in Converting)	estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight (appears also in Comparing and Estimating)			
			solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days (appears also in Converting)	solve problems involving converting between units of time	

Measurement with Reasoning

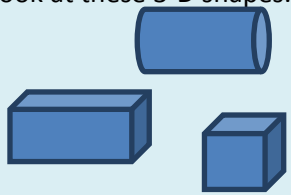
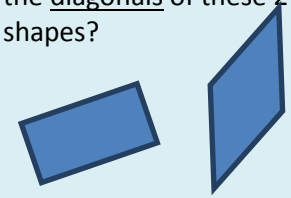
	Working backwards Draw hands on the clock faces to show when break started and when it finished 15 minutes later at 10:35.	**Working backwards** Tom's bus journeytakes half an hour. He arrives at his destination at 9:25. At what time did his bus leave? 9:05 8:55 8:45	**Working backwards** Put these times 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	**Working backwards** Put these lengths of time in order starting with the longest time. 105 minutes 1 hour 51 minutes 6360 seconds	
CONVERTING					
	know the number of minutes in an hour and the number of hours in a day. (appears also in Telling the Time)	know the number of seconds in a minute and the number of days in each month, year and leap year	convert between different units of measure (e.g. kilometre to metre; hour to minute)	convert between different units of metric measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)	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
			read, write and convert time between analogue and digital 12 and 24-hour clocks (appears also in Converting)	solve problems involving converting between units of time	solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate (appears also in Measuring and Calculating)
			solve problems involving converting from hours to	understand and use equivalences between	convert between miles and kilometres

Measurement with Reasoning

			minutes; minutes to seconds; years to months; weeks to days (appears also in Telling the Time)	metric units and common imperial units such as inches, pounds and pints	
	The answer is …. 3 hours What is the question? **What do you notice?** What do you notice? 1 hour = 60 minutes ½ hour = 30 minutes ¼ hour = 15 minutes Write down some more time facts like these	**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	**The answer is ….** 225 metres What is the question? **What do you notice?** What do you notice? 1:00pm = 13:00 2:00pm = 14:00 Continue the pattern	**The answer is ….** 0.3km What is the question? **What do you notice?**What do you notice? 1 minute = 60 seconds 60 minutes = ☐ seconds Fill in the missing number of seconds down some more time facts like this.	**The answer is ….** 24 metres cubed What is the question? **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.

Geometry: Properties of Shapes with Reasoning

National Centre for Excellence in the Teaching of Mathematics

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
IDENTIFYING SHAPES AND THIER PROPERTIES					
recognise and name common 2-D and 3-D shapes, including: * 2-D shapes [e.g. rectangles (including squares), circles and triangles] * 3-D shapes [e.g. cuboids (including cubes), pyramids and spheres].	identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]		identify lines of symmetry in 2-D shapes presented in different orientations	identify 3-D shapes, including cubes and other cuboids, from 2-D representations	recognise, describe and build simple 3-D shapes, including making nets (appears also in Drawing and Constructing) illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
What's the same, what's different? Find a rectangle and a triangle in this set of shapes. Tell me one thing that's the same about them. Tell me one thing that is different about them.	**What's the same, what's different?** Pick up and look at these 3-D shapes.  Do they all have straight edges and flat faces? What is the same and what is different about these shapes?	**What's the same, what's different?** What is the same and different about these three2-D shapes? 	**What's the same, what's different?** What is the same and what is different about the diagonals of these 2-D shapes? 	**What's the same, what's different?** What is the same and what is different about the net of a cube and the net of a cuboid?	**What's the same, what's different?** What is the same and what is different about the nets of a triangular prism and a square based pyramid?

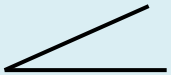
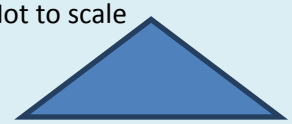
Geometry: Properties of Shapes with Reasoning

National Centre for Excellence in the Teaching of Mathematics

Visualising Put some shapes in a bag. Find me a shape that has more than three edges.	**Visualising** In your head picture a rectangle that is twice as long as it is wide. What could its measurements be?	**Visualising** I am thinking of a 3-dimensional shape which has faces that are triangles and squares. What could my shape be?	**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 could sketch them) Are any of the shapes symmetrical? Convince me.	**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?	**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.
DRAWING AND CONSTRUCTING					
		draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them	complete a simple symmetric figure with respect to a specific line of symmetry	draw given angles, and measure them in degrees (^{o})	draw 2-D shapes using given dimensions and angles recognise, describe and build simple 3-D shapes, including making nets (appears also in Identifying Shapes and Their Properties)
		Other possibilities Oneface of a 3-D shape looks like this.  What could it be? Are there any other possibilities?	**Other possibilities** Can you draw a non-right angled triangle with a line of symmetry? Are there other possibilities.	**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?	**Other possibilities** If one angle of an isosceles triangle is 36 degrees. What could the triangle look like – draw it. Are there other possibilities . Draw a net for a cuboid that has a volume of 24 cm^3.

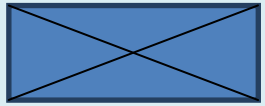
Geometry: Properties of Shapes with Reasoning

National Centre for Excellence in the Teaching of Mathematics

					
COMPARING AND CLASSIFYING					
	compare and sort common 2-D and 3-D shapes and everyday objects		compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes	use the properties of rectangles to deduce related facts and find missing lengths and angles distinguish between regular and irregular polygons based on reasoning about equal sides and angles	compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
True or false? All 2-D shapes have at least 4 sides **Other possibilities** Can you find shapes that can go with the set with this label?	**Always, sometimes, never** Is it always, sometimes or nerver true that when you fold a square in half you get a rectangle. **Other possibilities** Can you find shapes that can go with the set with this label?	**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?	**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?	**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 n. **Other possibilities** A rectangular field has a perimeter between 14 and 20 metres . What could its dimensions	**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** Not to scale 

Geometry: Properties of Shapes with Reasoning

National Centre for Excellence in the Teaching of Mathematics

"Have straight sides"	"Have straight sides and all sides are the same length"	"Have straight sides that are different lengths."	"Has exactly two equal sides." "Has exactly two parallel sides."	be?	The angle at the top of this isosceles triangle is 110 degrees. What are the other angles in the triangle?
ANGLES					
		recognise angles as a property of shape or a description of a turn		know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles	
		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 acute and obtuse angles and compare and order angles up to two right angles by size	identify: * angles at a point and one whole turn (total 360^{o}) * angles at a point on a straight line and ½ a turn (total 180^{o}) * other multiples of 90^{o}	recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles
		identify horizontal and vertical lines and pairs of perpendicular and parallel lines			
		Convince me Which capital letters have perpendicular and / or parallel lines? Convince me.	**Convince me** Ayub says that he can draw a right angled triangle which has another angle which is obtuse.	**Convince me** What is the angle between the hands of a clock at four o clock? At what other times is the	**Convince me** 

Geometry: Properties of Shapes with Reasoning

National Centre for Excellence in the Teaching of Mathematics

			Is he right? Explain why.	angle between the hands the same? 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 with Reasoning

National Centre for Excellence in the Teaching of Mathematics

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
POSITION, DIRECTION AND MOVEMENT					
describe position, direction and movement, including half, quarter and three-quarter turns.	use mathematical vocabulary to describe position, direction and movement including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)		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	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	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.
			plot specified points and draw sides to complete a given polygon		
Working backwards The shape below was turned three quarter of a full turn and ended up looking like this.  What did it look like when it started? (practical)	**Working backwards** If I face forwards and turn three quarter turns clockwise then a quarter turn anti-clockwise describe my finishing position.	**Working backwards** If I make the two opposite sides of a square 5 cm longer the new lengths of those sides are 27cm. What was the size of my original square? What is the name and size of my new shape?	**Working backwards** Here are the co-ordinates of corners of a rectangle which has width of 5. (7, 3) and (27, 3) What are the other two co-ordinates?	**Working backwards** A square is translated 3 squares down and one square to the right. Three of the coordinates of the translated square are: (3, 6) (8, 11) (8, 6) What are the co-ordinates of the original square?	**Working backwards** Two triangles have the following co-ordinates: Triangle A: (3, 5) (7, 5) (4, 7) Triangle B: (3, 1) (7, 1) (4, 3) Describe the translation of triangle A to B and then from B to A.

Geometry: Position and Direction with Reasoning

National Centre for Excellence in the Teaching of Mathematics

PATTERN					
	order and arrange combinations of mathematical objects in patterns and sequences				
	What comes next?  **Explain why**				

Statistics with Reasoning

National Centre for Excellence in the Teaching of Mathematics

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
INTERPRETING, CONSTRUCTING AND PRESENTING DATA					
	interpret and construct simple pictograms, tally charts, block diagrams and simple tables	interpret and present data using bar charts, pictograms and tables	interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs	complete, read and interpret information in tables, including timetables	interpret and construct pie charts and line graphs and use these to solve problems
	ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity				
	ask and answer questions about totalling and comparing categorical data				
	True or false? (Looking at a simple pictogram) "More people travel to work in a car than on a bicycle". **Is this true or false? Convince me.** Make up you own 'true/false' statement about the pictogram	**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.	**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.	**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.

Statistics with Reasoning

	What's the same, what's different? Pupils identify similarities and differences between different representations and explain them to each other	**What's the same, what's different?** Pupils identify similarities and differences between different representations and explain them to each other	**What's the same, what's different?** Pupils identify similarities and differences between different representations and explain them to each other	**What's the same, what's different?** Pupils identify similarities and differences between different representations and explain them to each other	**What's the same, what's different?** Pupils identify similarities and differences between different representations and explain them to each other
SOLVING PROBLEMS					
		solve one-step and two-step questions [e.g. 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.	solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.	solve comparison, sum and difference problems using information presented in a line graph	calculate and interpret the mean as an average
	Create a questions Pupils ask (and answer) questions about different statistical representations using key vocabulary relevant to the objectives.	**Create a questions** Pupils ask (and answer) questions about different statistical representations using key vocabulary relevant to the objectives. (see above)	**Create a questions** Pupils ask (and answer) questions about different statistical representations using key vocabulary relevant to the objectives. (see above)	**Create a questions** Pupils ask (and answer) questions about different statistical representations using key vocabulary relevant to the objectives. (see above)	**Create a questions** 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?