Year 4 Maths

Counting	
Objectives	count backwards through zero to include negative numbers
	count in multiples of 6, 7, 9, 25 and 1000
	find 1000 more or less than a given number
Reasoning	**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 ……
Vocabulary	ten thousand hundred thousand million sixes sevens nines twenty-fives next consecutive integer positive negative above/below zero minus negative numbers
Resources / models	Number line Colour in number squares greater than 100

Comparing numbers	
Objectives	order and compare numbers beyond 1000
	compare numbers with the same number of decimal places up to two decimal places (copied from Fractions)

Reasoning	**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.

IDENTIFYING, REPRESENTING AND ESTIMATING NUMBERS	
Objectives	identify, represent and estimate numbers using different representations
Resources / models	Dienes, numicon, number lines, counters, part part whole model

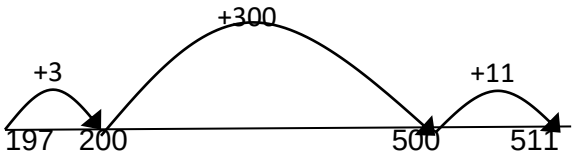
READING AND WRITING NUMBERS (including Roman Numerals)	
Objectives	read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.
Vocabulary	Roman numeral, digit, zero, place value
Resources / models	Clock face with Roman Numerals

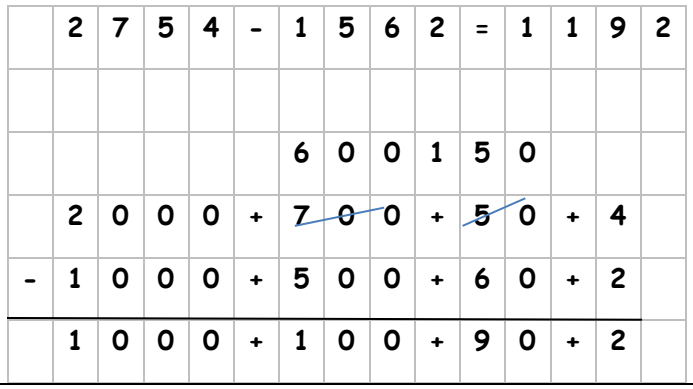
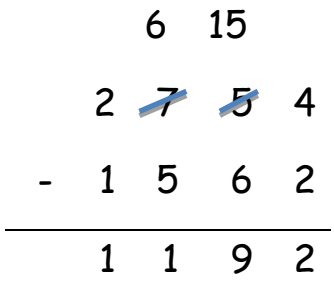
UNDERSTANDING PLACE VALUE	
Objectives	recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
	find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as units, tenths and hundredths (copied from Fractions)
Reasoning	**Do, then explain** Show the value of the digit 4 in these numbers? 3041 4321 5497 Explain how you know.
	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?
Vocabulary	Place value, Digit Numeral figures
Resources / models	Place value cards / counters Dienes Place value grids / counters

	Digit cards Place value slider
Objectives	round any number to the nearest 10, 100 or 1 000
	round decimals with one decimal place to the nearest whole number (copied from Fractions)
Reasoning	**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?
Resources / Models	Number lines Empty number lines
Objective – Problem Solving	solve number and practical problems that involve all of the above and with increasingly large positive numbers

Addition and Subtraction	
Objectives – Mental Calculation	**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?
Objectives - **WRITTEN METHODS**	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
Reasoning	**Convince me** □ - 666 = 8□5 What is the largest possible number that will go in the rectangular box? What is the smallest? Convince me
Vocabulary - addition	add, more, plus, and, make, altogether, total, equal to,, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column ,tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact thousands, hundreds, digits, inverse

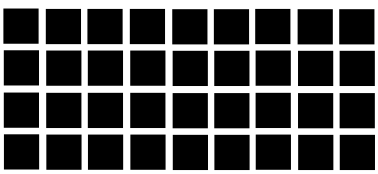
<table>
<tr><td rowspan="4">Resources / models</td><td colspan="2">Manipulatives used to model and check work – Dienes, place value cards / counters</td></tr>
<tr><td>346+ 238 = 585

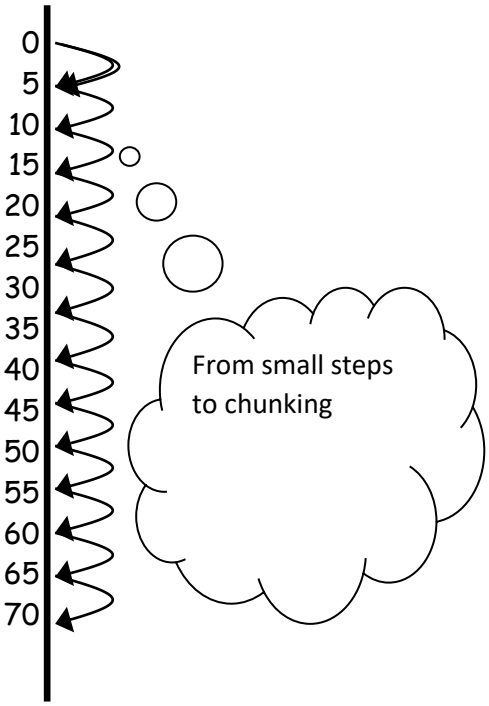
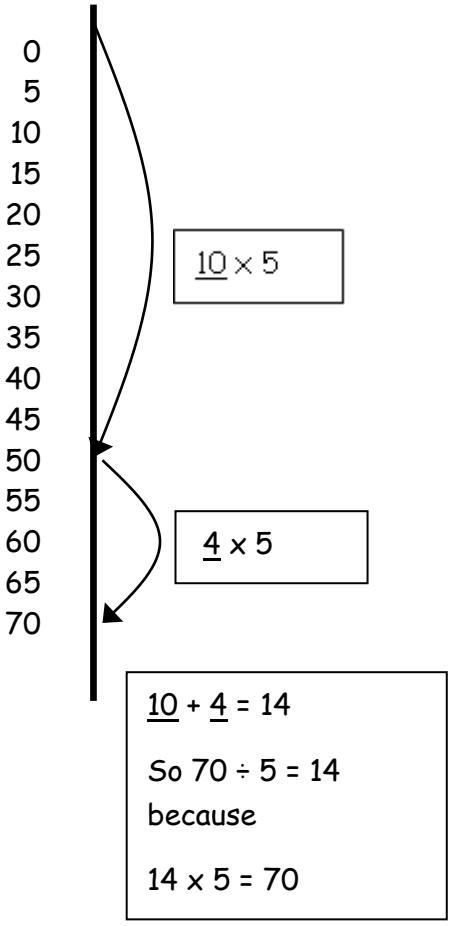
300 + 40 + 6
200 + 30 + 8
500 + 70 + 14 = 584</td><td>Children will move onto the expanded columnar addition method. They will initially be supported in this by using practical equipment.</td></tr>
<tr><td>2 6 7
+ 3 2 4
1 1 (7 +4)
80 (60 +20)
+ 5 0 0 (200 + 300)
5 9 1</td><td>The children will quickly move on to adding the least significant digit first.
As children begin to understand the value of number they will move on from the expanded method.</td></tr>
<tr><td>3 6 7
+ 8 5
4 5 2
1 1</td><td>When the children show a good understanding of number they will move on to the compact column method with carrying. The carried over number is written below the line. Also they can add a different number of digits together.</td></tr>
<tr><td>Vocabulary - Subtraction</td><td colspan="2">equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is__?, difference, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit, inverse</td></tr>
<tr><td></td><td>511 – 197 = 314
 
</td><td>Counting on. If the numbers in a calculation are close together or near to a multiple of 10, 100 etc. children can use the counting on method. Starting from the smallest number and counting up to the largest number. Finding out how many are in between.</td></tr>
</table>

		Children will use **partitioning**. They will use place value cards and Thousands, Hundreds, tens and units practical apparatus to help them see the numbers. Children will not exchange at first.
		This leads to **decomposition**.
Objective	estimate and use inverse operations to check answers to a calculation	
Reasoning	**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.	
Objective – Problem Solving	solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	

MULTIPLICATION & DIVISION FACTS	
Objectives - facts	*count in multiples of 6, 7, 9, 25 and 1 000* (copied from Number and Place Value)
	recall multiplication and division facts for multiplication tables up to 12 × 12
Reasoning	**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?
MULTIPLICATION & DIVISION Mental calculations	

Objectives	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 (appears also in Properties of Numbers)
Reasoning	**Use a fact** 63 ÷ 9 = 7 Use this fact to work out 126 ÷ 9 = 252 ÷ 7 =
	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)

MULTIPLICATION & DIVISION Written Calculations		
Objectives	multiply two-digit and three-digit numbers by a one-digit number using formal written layout	
Reasoning	**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?	
Vocabulary	groups of, lots of, times, array, altogether, multiply, total, count up in, multiplied by, column, row, repeated addition, commutative, sets of, equal groups, _ times as big as, once, twice, three times etc. partition, grid method, multiple, product, tens, units, value square, factor, integer, decimal, short / long multiplication, 'carry'	
Resources / Models	 **4 x 9 = 36** **9 x 4 = 36**	Arrays are still useful.

<table>
<tr><td rowspan="2"></td><td>38 x 5 = (30 x 5) + (8 x 5)
= 150 + 40
= 190</td><td>Children will multiply larger numbers using their times tables knowledge and partitioning the numbers.</td></tr>
<tr><td>x 300 40 6
9 | 2700 | 360 | 54 | = 3114</td><td>This will lead onto the children using the grid method for multiplication.</td></tr>
<tr><td>Vocabulary - Division</td><td colspan="2">share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'carry', remainder, multiple
divisible by, factor</td></tr>
<tr><td>Models / resources</td><td> 
</td><td> 
</td></tr>
<tr><td rowspan="2"></td><td>2 1 8
4) 8 7 2
- 8 0 0 (200 x 4)
0 7 0
- 4 0 (10 x 4)
3 2
- 3 2 (8 x 4)
0</td><td>This leads to a vertical recording of chunking.
Top tip: Children to subtract chunks they are most comfortable with
Work out 2x
5x
10x</td></tr>
<tr><td>218 ÷ 4
2 1 8</td><td>This will lead to short division but only when the children have a good</td></tr>
</table>

	$4\overline{)\,8\,7^{3}2}$	understanding of the numbers. E.g. how many 3's are in 70. A link to multiplication would be beneficial here.
PROPERTIES OF NUMBERS: MULTIPLES, FACTORS, PRIMES, SQUARE AND CUBE NUMBERS		
Reasoning	**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.	
INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS		
Objective	*estimate and use inverse operations to check answers to a calculation* (copied from Addition and Subtraction)	
Reasoning	**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 =	
PROBLEM SOLVING		
Objective	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	

COUNTING IN FRACTIONAL STEPS	
Objectives	count up and down in hundredths
Reasoning	**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, ….., …..,
Vocabulary	Hundredths Decimal Decimal fraction Decimal point Decimal place Decimal equivalent

	Proportion

RECOGNISING FRACTIONS	
Objectives	recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten
Reasoning	**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
Reasoning – comparing fractions	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)

Comparing DECIMALS	
Objectives	compare numbers with the same number of decimal places up to two decimal places
Reasoning	**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?

Rounding including DECIMALS	
Objectives	round decimals with one decimal place to the nearest whole number
Reasoning	**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*

<table>
<tr><th colspan="2">EQUIVALENCE (INCLUDING FRACTIONS, DECIMALS AND PERCENTAGES)</th></tr>
<tr><td rowspan="3">Objectives</td><td>recognise and show, using diagrams, families of common equivalent fractions</td></tr>
<tr><td>recognise and write decimal equivalents of any number of tenths or hundredths</td></tr>
<tr><td>recognise and write decimal equivalents to $^{1}/_{4}$; $^{1}/_{2}$; $^{3}/_{4}$</td></tr>
<tr><td rowspan="5">Reasoning</td><td>Odd one out.
Which is the odd one out in each of these trio
s$\frac{3}{4}$ 9/12 4/6
9/12 10/15 2/3
Why?</td></tr>
<tr><td>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?</td></tr>
<tr><td>Complete the pattern by filling in the blank cells in this table:
<table>
<tr><td>$\frac{1}{10}$</td><td>$\frac{2}{10}$</td><td>$\frac{3}{10}$</td><td></td></tr>
<tr><td>$\frac{10}{100}$</td><td>$\frac{20}{100}$</td><td></td><td>$\frac{40}{100}$</td></tr>
<tr><td>0.1</td><td></td><td>0.3</td><td></td></tr>
</table></td></tr>
<tr><td>Another and another
Write a decimal numbers (to one decimal place) which lies between a half and three quarters?
… and another, … and another, …</td></tr>
<tr><td>Ordering
Put these numbers in the correct order, starting with the smallest.
$\frac{1}{4}$ 0.75 5/10
Explain your thinking</td></tr>
<tr><td>Resources / Models</td><td><u>Common equivalent fractions</u>
<table>
<tr><td colspan="8">1</td><td>$\frac{1}{2}$</td></tr>
<tr><td colspan="4">$\frac{1}{2}$</td><td colspan="4">$\frac{1}{2}$</td><td>$\frac{2}{4}$</td></tr>
<tr><td colspan="2">$\frac{1}{4}$</td><td colspan="2">$\frac{1}{4}$</td><td colspan="2">$\frac{1}{4}$</td><td colspan="2">$\frac{1}{4}$</td><td>$\frac{3}{6}$</td></tr>
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<tr><td>$\frac{1}{8}$</td><td>$\frac{1}{8}$</td><td>$\frac{1}{8}$</td><td>$\frac{1}{8}$</td><td>$\frac{1}{8}$</td><td>$\frac{1}{8}$</td><td>$\frac{1}{8}$</td><td>$\frac{1}{8}$</td><td></td></tr>
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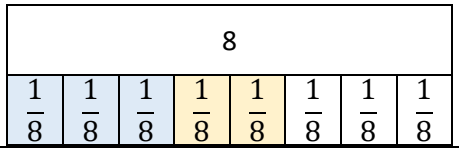
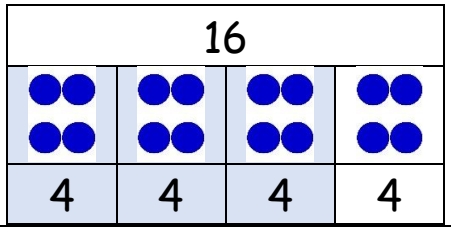
</table>

ADDITION AND SUBTRACTION OF FRACTIONS	
Objectives	add and subtract fractions with the same denominator
Reasoning	**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? 11/100 + 89/100 = 1 12/100 + 88/100 = 1 13/100 + 87/100 = 1 Continue the pattern for the next five number sentences
Resources / Models	**Add and subtract fractions with a common denominator** $\frac{3}{8}+\frac{2}{8}=\frac{5}{8}$ 

MULTIPLICATION AND DIVISION OF DECIMALS	
Objectives	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
Reasoning	**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, …
Resources / Models	

Problem Solving – Fractions, decimals, percentages

Objectives	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
Reasoning	solve simple measure and money problems involving fractions and decimals to two decimal places.
Resources / Models	**Calculate quantities** $\frac{3}{4}$ of 16 = 12 

EQUATIONS	
Reasoning	**Connected Calculations** Put the numbers 7.2, 8, 0.9 in the boxes to make the number sentences correct. □ = □ x □ □ = □ ÷ □
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)*
Reasoning	**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.

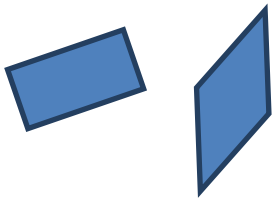
COMPARING AND ESTIMATING	
Objective	estimate, compare and calculate different measures, including money in pounds and pence (also included in Measuring)
Reasoning	**Top Tips** Put these amounts in order starting with the largest. Half of three litres

	Quarter of two litres 300 ml Explain your thinking
	Position the symbols Place the correct symbols between the measurements > or < £23.61 2326p 2623p Explain your thinking.
	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?
	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.

MEASURING and CALCULATING	
Objective	estimate, compare and calculate **different measures,** including **money in pounds and pence** (appears also in Comparing)
	measure and calculate the **perimeter** of a rectilinear figure (including squares) in centimetres and metres
Reasoning	**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?
	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.
	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?
Objective	find the area of rectilinear shapes by counting squares
Reasoning	**Always, sometimes, never** If you double the area of a rectangle, you double the perimeter. *See also Geometry Properties of Shape*

TELLING THE TIME	
Objectives	read, write and convert time between analogue and digital 12 and 24-hour clocks (appears also in Converting)
	solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days (appears also in Converting)
Reasoning	**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
Vocabulary	Leap year Millennium Noon Date of birth Timetable, arrive, depart

CONVERTING	
Objectives	convert between different units of measure (e.g. kilometre to metre; hour to minute)
	read, write and convert time between analogue and digital 12 and 24-hour clocks (appears also in Converting)
	solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days (appears also in Telling the Time)
Reasoning	**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

IDENTIFYING SHAPES AND THIER PROPERTIES	
Objective	identify lines of symmetry in 2-D shapes presented in different orientations
Reasoning	**What's the same, what's different?** What is the same and what is 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 could sketch them) Are any of the shapes symmetrical? Convince me.
Vocabulary	Line Construct Sketch Centre Angle, right-angled Base, square-based Reflect, reflection Regular, irregular 2-D, two-dimensional Oblong Equilateral triangle Isosceles triangle Scalene triangle Heptagon Parallelogram Rhombus Trapezium Polygon 3-D, three-dimensional Spherical Cylindrical Tetrahedron Polyhedron

DRAWING AND CONSTRUCTING	
Objective	complete a simple symmetric figure with respect to a specific line of symmetry
Reasoning	**Other possibilities** Can you draw a non-right angled triangle with a line of symmetry? Are there other possibilities.

COMPARING AND CLASSIFYING	
Objectives	compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes
Reasoning	**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."

Angles	
Objectives	identify acute and obtuse angles and compare and order angles up to two right angles by size
Reasoning	**Convince me** Ayub says that he can draw a right angled triangle which has another angle which is obtuse. Is he right? Explain why.
Vocabulary	acute, obtuse, right angle, estimate, order

POSITION, DIRECTION AND MOVEMENT	
Objectives	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
Reasoning	**Working backwards** Here are the co-ordinates of the corners of a rectangle, which has a width of 5. (7, 3) and (27, 3) What are the other two co-ordinates?
Vocabulary	North-east, north-west South-east, south-west NE, NW, SE, SW Translate, translation Rotate, rotation Degree Reflection Ruler, set square Angle measurer Compass

INTERPRETING, CONSTRUCTING AND PRESENTING DATA	
Objectives	interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs
	solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.
Reasoning	**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 representations and explain them to each other
	Create a questions Pupils ask (and answer) questions about different statistical representations using key vocabulary relevant to the objectives. (see above)
Vocabulary	survey, questionnaire, data