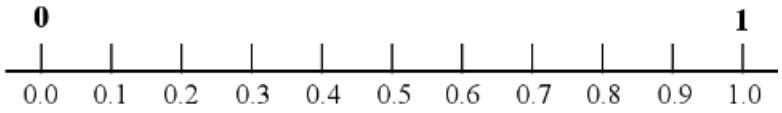
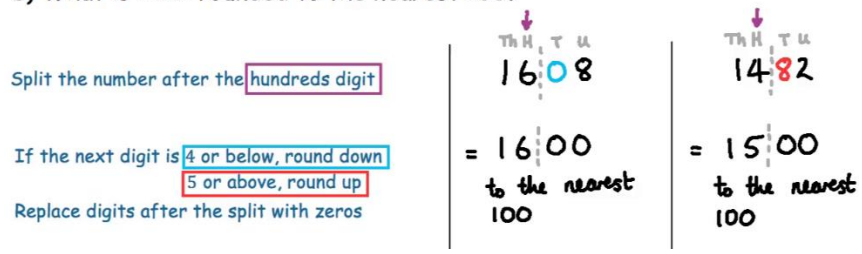
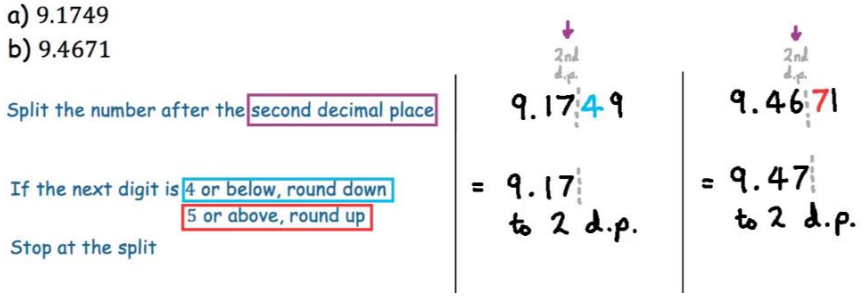
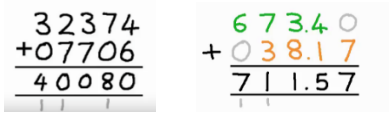
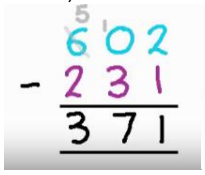
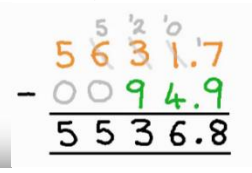
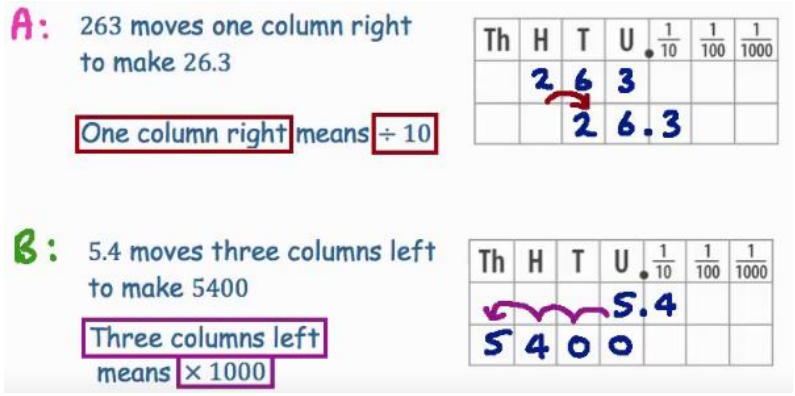
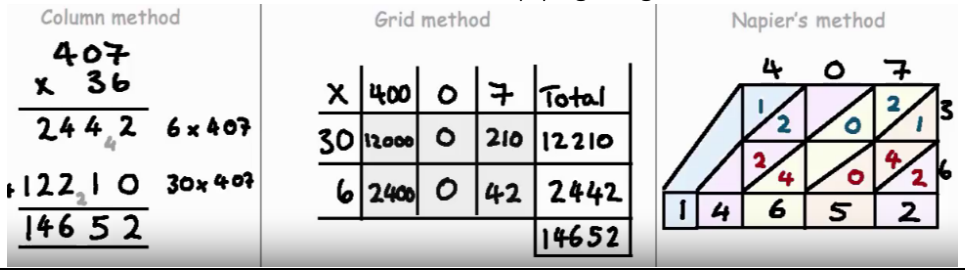
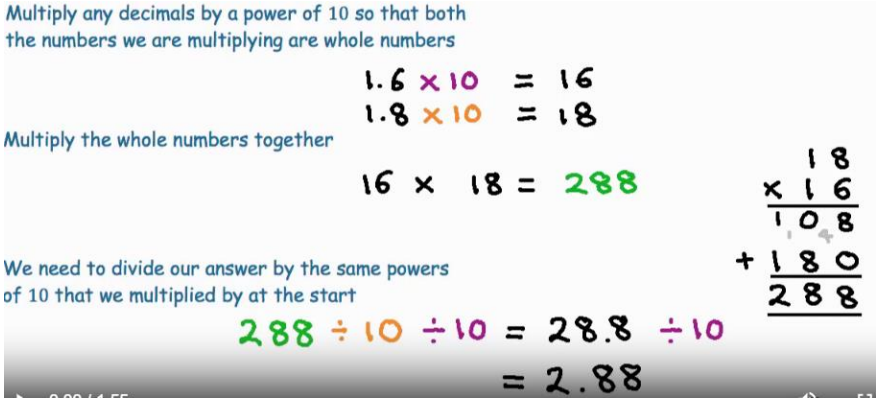
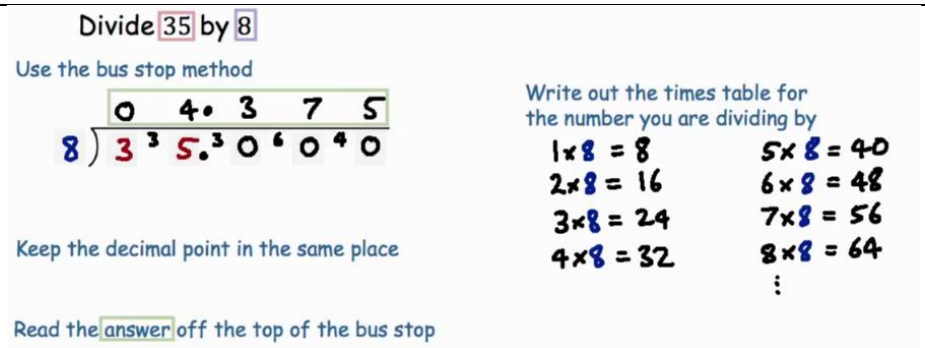
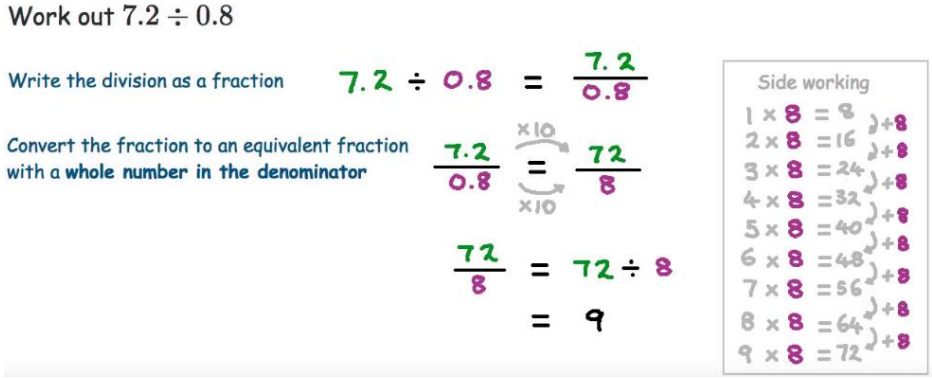
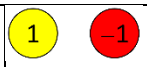
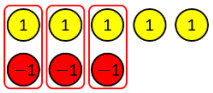
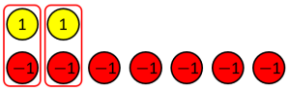
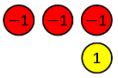
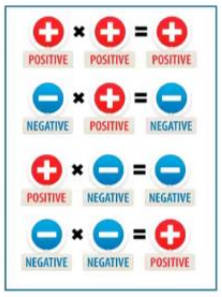
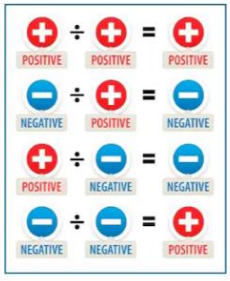
Year 7 Knowledge Organiser – Term 1 – Number Sense and Calculations

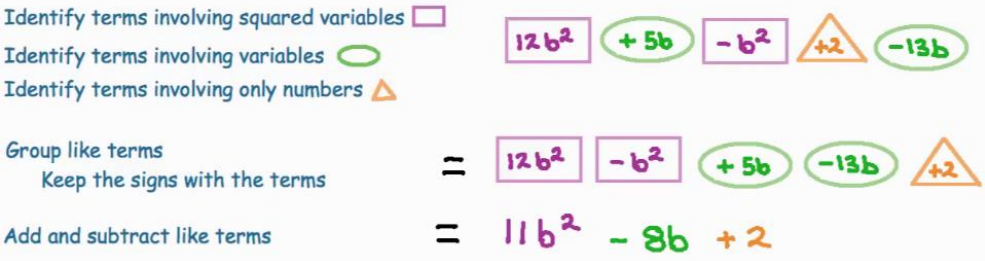
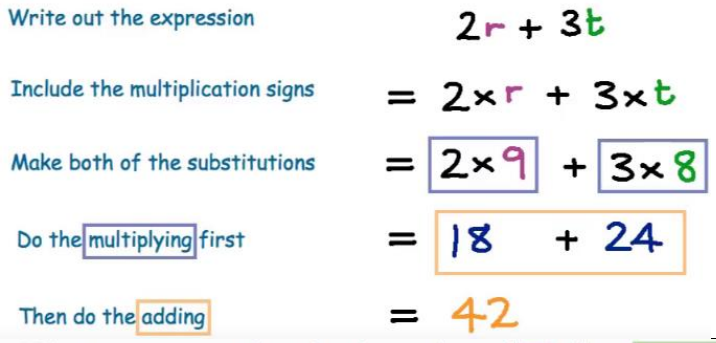
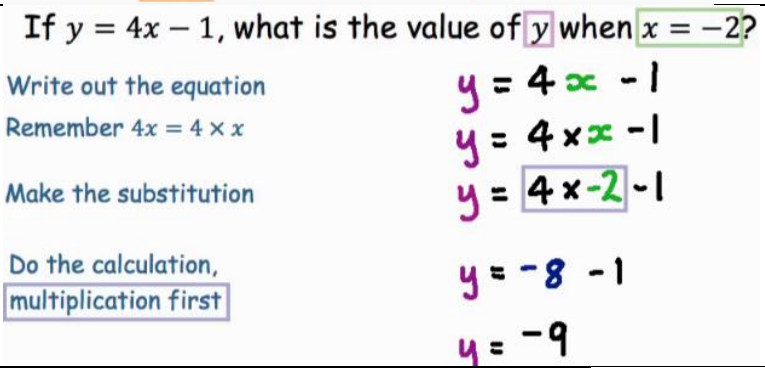
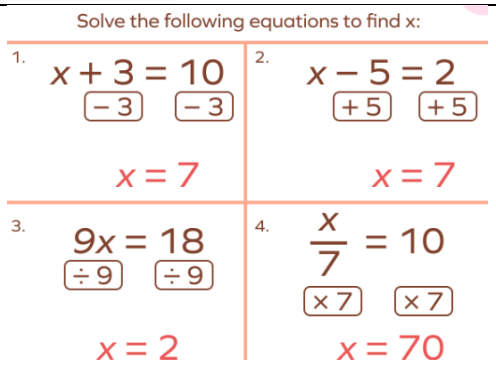
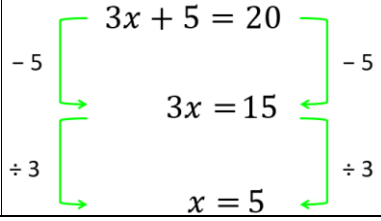
Topic	Definition / Example	Sparx code
Integer	A whole number. Examples: 5, 18, 2356, -67	M704
Decimal Number	A decimal is a way of writing a number that is not whole. Examples: 10.4 , 0.006, -5.7987 	M522
Negative Number	A number less than 0. Examples: -7, -12.9, $-\frac{2}{3}$ 	M572
Rounding integers	a) What is 1608 rounded to the nearest 100? b) What is 1482 rounded to the nearest 100?  a) 1600 b) 1500	M111
Rounding to decimal places	Round each number to 2 decimal places. a) 9.1749 b) 9.4671  a) 9.17 b) 9.47	M431
Adding integers and decimals	Use the column method being careful to line up the numbers in place value. With decimals, ensure that the decimal points line up. Examples: a) $32374 + 7706$ b) $673.4g + 38.17g$  Answers: a) $40{,}080$ b) $711.57g$	M928 M429
Subtracting integers and decimals	a) $602 - 231$ b) $5631.7 - 94.9$   Answers: a) 371 b) 5536.8	M347 M152

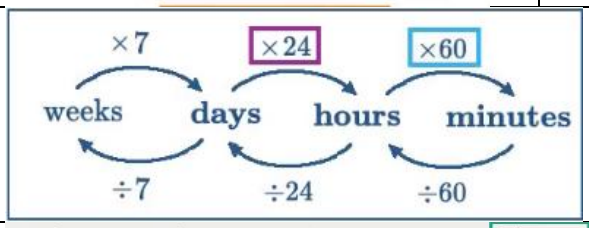
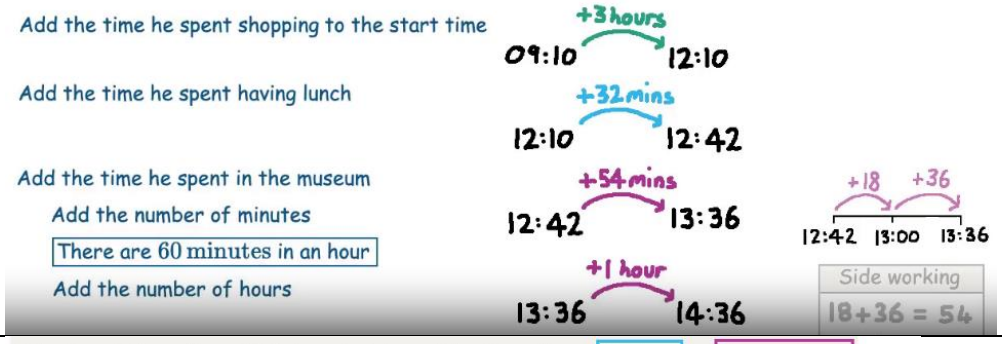
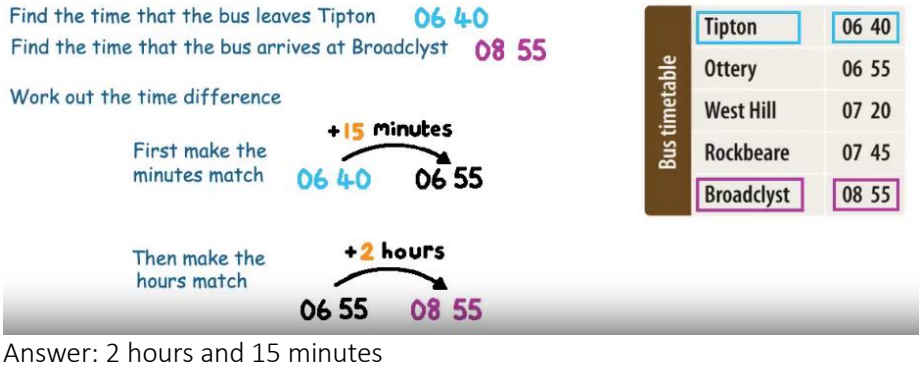
Multiply and divide by 10, 100 and 1000	a) $263 \div 10$ b) 5.4×1000  Answesr: a)26.4 b) 5400	M113
Multiplying integers	There are 3 main written methods for multiplying integers: 	M187
Multiplying Decimals	Work out 1.6 x 1.8  Answer: 2.88	M803
Dividing integers		M106
Dividing Decimals	Work out $7.2 \div 0.8$  You might need to use the bus stop method to complete the whole number division	M288

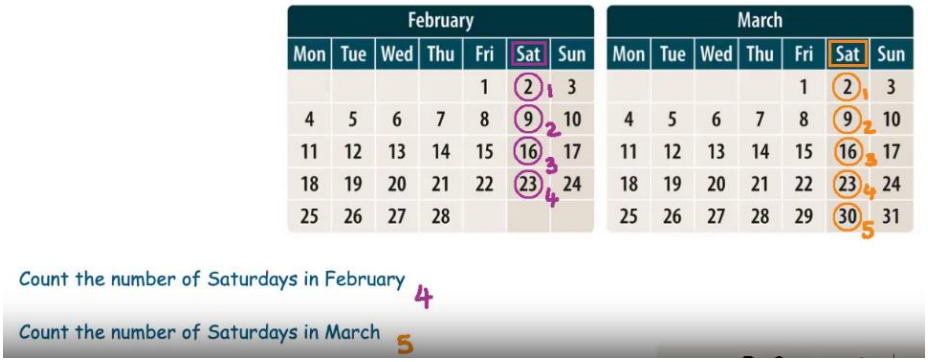
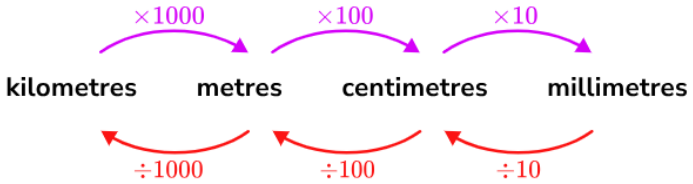
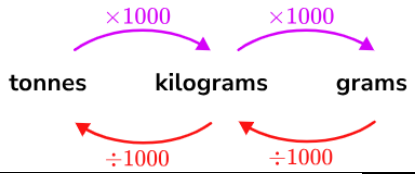
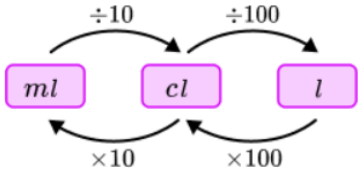
Zero Pairs	 A yellow counter symbolises +1 and a red counter symbolises -1, together they make zero.	
Adding a negative number	$5 + -3 = 2$ 	$2 + -7 = -5$ 	M106
Subtracting a negative number	$-5 - (-3) = -2$  Start with 5 red counters and remove three of them	$-2 - (-3) = 1$  Start with 2 red counters and then add a zero pair so that we can remove 3 red counters	M106
Multiplying negative numbers	**Work out** a) 5×-11 b) -5×-11 Remember the rules of multiplying negative and positive numbers a) $5 \times -11 = -55$ b) $-5 \times -11 = 55$ 		M288
Dividing Negative numbers	**Work out** a) $-54 \div 9$ b) $-54 \div -9$ Remember the rules of dividing negative and positive numbers a) $-54 \div 9 = -6$ b) $-54 \div -9 = 6$ 		M288
Powers	A positive index tells you how many copies of the base number to multiply together $a \times a = a^2$ $a \times a \times a = a^3$ $12 \times 12 \times 12 \times 12 \times 12 \times 12 \times 12 = 12^7$ (7)		M135
Square root	The $\sqrt{}$ symbol means "square root" Follow the correct order of operations by working out the **square roots**, before doing the **subtraction** Finding the square root is the inverse of squaring $9^2 = 81$ $\quad$ $4^2 = 16$ $\sqrt{81} = 9$ $\quad$ $\sqrt{16} = 4$		M135
Order of Operations	brackets ⇩ powers or indices ⇩ multiplication (including 'of') and division ⇩ addition and subtraction	Calculate $6 \times 7 - 9 \div 3$ Remember to do the operations in the correct order $6 \times 7 - 9 \div 3$ First do the multiplying and dividing working from left to right $= 42 - 3$ Now do the subtracting $= 39$	M521

Year 7 Knowledge Organiser – Term 2 – Algebra and Expressions, Measures

Topic	Definition / Example	Sparx code
Algebraic notation	In algebra we use lower case letters to represent unknown numbers. We can simplify statements involving operations with unknown numbers using algebraic notation: ab in place of $a \times b$ $3y$ in place of $y + y + y$ and $3 \times y$ a^2 in place of $a \times a$ ab in place of $a \times b$ $\frac{a}{b}$ in place of $a \div b$	M813
Variable	A letter that is being used to represent an unknown number Examples: x, y, z, b	M830
Term	Either a single number, a variable, or the product of several numbers or variables Examples: x, $2xy$, $-3x^4z$, $\frac{3b}{5}$	M830
Expressions	A mathematical statement containing at least 2 terms, variables or numbers with a mathematical operator between them Examples: $2xy + 3$, $2x^2 + 2x - 7$	M830
Equations	A statement showing that two expressions are equal An equation uses the symbol: = Examples: $15 = 2x + 4$ $x^2 + 7x + 12 = 0$ $\frac{x+3}{2} = 10$	M830
Identities	A Statement that is true for all values of the variables An identity uses the symbol: ≡ Examples: $2x + x \equiv 3x$ $x^3 \equiv x \times x \times x$ $2(x + 3) \equiv 2x + 6$	M830
Formula	Shows the relationship between two or more variables The plural of formula is formulae A formula often uses upper case letters and always contains the symbol = $A = W \times L$ $C = \pi r^2$ $P = 2(W + L)$	M830
Simplifying expressions: Single variable	**Simplify** $13 + 9x - 7x + 8x$ Collect like terms (those with variables first) $= 9x - 7x + 8x + 13$ $= 10x + 13$ Answer: $10x + 13$	M795
Simplifying expressions: Multiple variables	**Simplify** $13r + 8p - 17r + 19$ Mark terms that go together: pure numbers, terms with the same variable Collect like terms (those with variables first) $= 8p + 13r - 17r + 19$ Add and subtract like terms $= 8p - 4r + 19$ Answer: $8p - 4r + 19$	M531

Simplifying expressions: Non-linear variables	**Fully simplify** $12b^2 + 5b - b^2 + 2 - 13b$ 	M949
Substituting into expressions	When substituting we replace each variable with a number and then complete the calculation. Always follow the Order of Operations. **What is the value of** $2r + 3t$ **when** $r = 9$ **and** $t = 8$**?** 	M417 M327
Substitute into formulae	**If** $y = 4x - 1$**, what is the value of** y **when** $x = -2$**?** 	M208 M979
Solving equations: One step	We can solve equations to find out what number the letter represents. We usually use inverse operations to solve equations 	M707
Solving equations: Two step	 x has been multiplied by 3 and then 5 has been added. We solve the equation in reverse order by subtracting 5 from 20 and then dividing by 3	M634

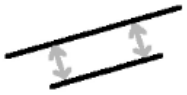
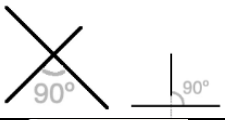
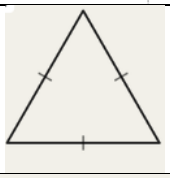
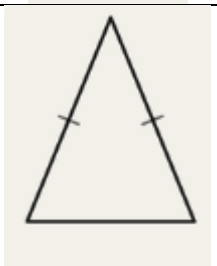
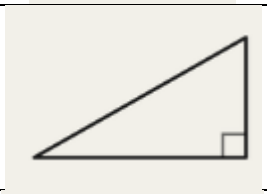
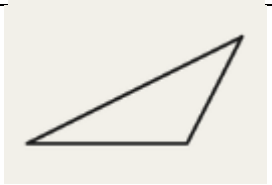
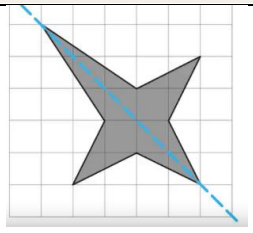
Solving equations: Two step with division	$\frac{x}{5} - 2 = 1.7$ +2 ↓ ↑ +2 $\frac{x}{5} = 3.7$ ×5 ↓ ↑ ×5 $x = 18.5$	x has been divided by 5 and then 2 has been subtracted. We solve the equation in reverse order by adding 2 to 1.7 and then multiplying by 5	M647
Using clocks	The longer hand represents the minutes The shorter hand represents the hours 	 Blue clock: Quarter past nine Pink clock: Quarter to two Yellow clock: Quarter past six	M892
Converting with time			M515
Calculating with time	Joshua arrived in town at 09:10. He spent 3 hours shopping, then spent 32 minutes having lunch, and then went to the museum for 1 hour and 54 minutes. When did he leave the museum? Give your answer using the 24 hour clock. 	M627
Using timetables	Work out how long it takes to travel by bus from Tipton to Broadclyst. Give your answer in hours and minutes.  Answer: 2 hours and 15 minutes	M963

Using calendars	According to the calendar below, how many Saturdays are there in total in February and March?  Answer: $4 + 5 = 9$ saturdays	M747
Length	Length is the measurement that describes how long an object is. It is the distance from end to end. Metric units of length include: kilometres (km) metres (m) centimetres (cm) and millimetres (mm) to measure length. Imperial units of length include: miles, yards and inches	M828
Mass	Mass is the quantity of matter that makes up a given object. Mass and weight are not the same thing. Mass deals with matter. Weight deals with the gravitational pull the Earth has on an object. Common metric units of mass are: Tonnes (T), kilograms (kg), grams (g) and milligrams (mg)	M828
Capacity / volume	Capacity is the maximum amount that something can contain; volume is the amount of space that a substance or object occupies. The two terms are interchangeable and can refer to the same calculation or measurement. Common metric units of capacity / volume are: cubic metres (m^3) , cubic centimetres (cm^3) litres (l), centilitres (cl) and millilitres (ml)	M828
Converting units of length	 	M774
Converting units of mass	 	M774
Converting units of volume / capacity	 	M774

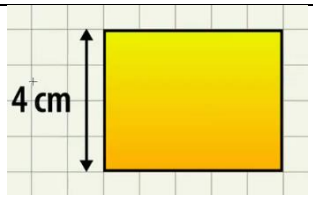
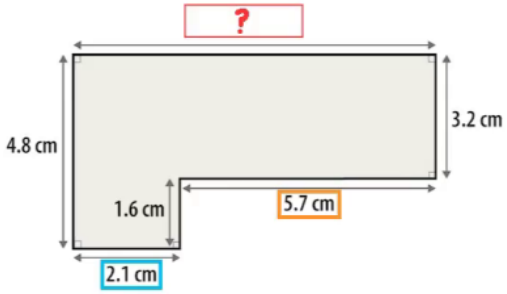
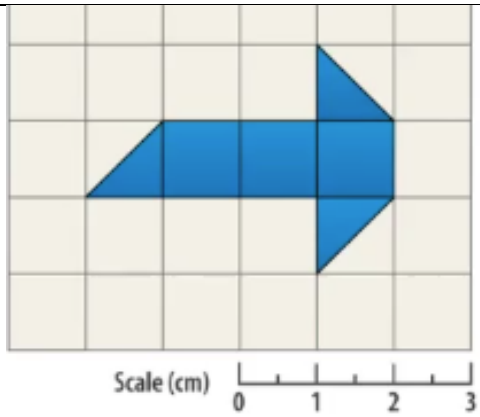
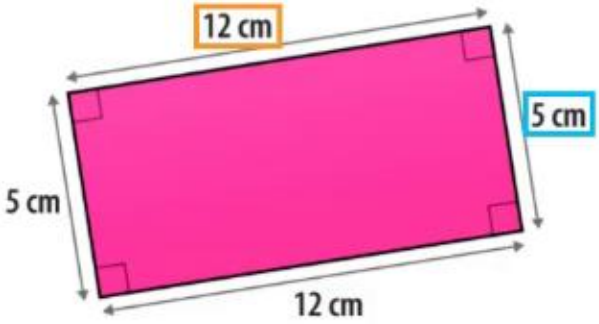
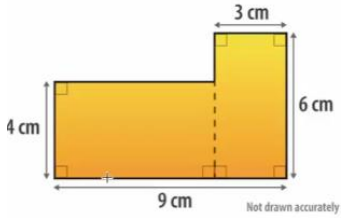
Maths Knowledge Organiser

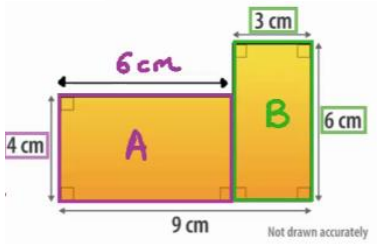
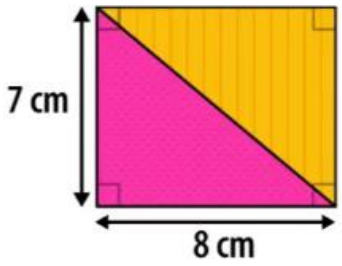
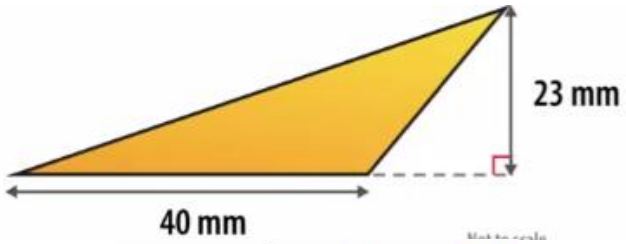
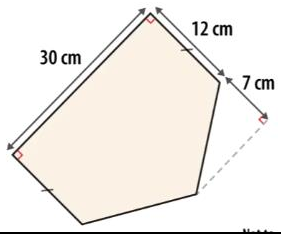
Year: 7 Term: Spring 1 and 2 (terms 3 and 4)

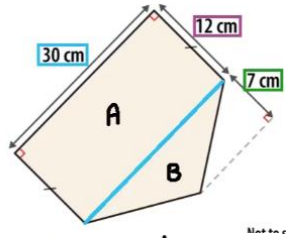
Line Properties

Topic/Skill	Definition/Tips	Example	Sparx Code
Parallel lines	Parallel lines are always the same distance apart and never meet		M814
Perpendicular lines	Perpendicular lines are at right angles or would meet at right angles if extended		M814
Triangle Properties	Equilateral Triangles – 3 equal sides and 3 equal angles		M276
	Isosceles Triangles – 2 qual sides and 2 equal angles		M276
	Right Angled Triangle – one 90° angle		M276
	Scalene Triangle – no equal sides or angles		M276
Symmetry	A shape is symmetrical if one half is a mirror image of the other half	 This shape has a diagonal line of symmetry.	M523

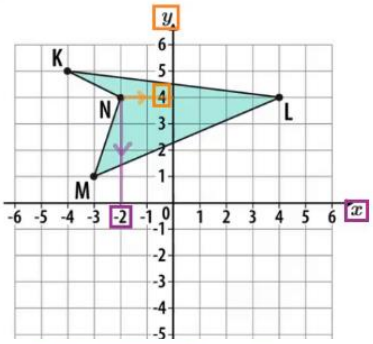
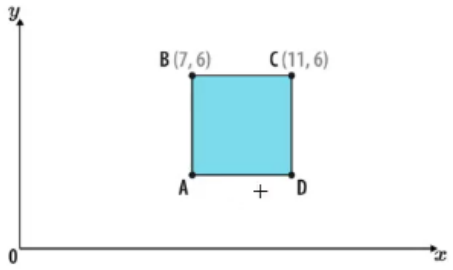
Perimeter and Area

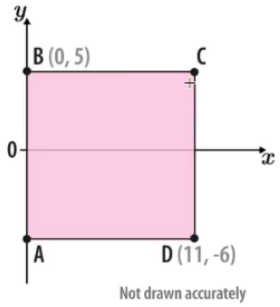
Topic/Skill	Definition/Tips	Example	Sparx Code
Perimeter of simple shapes	Perimeter is the distance around the edge of a shape. Add the lengths of all the sides.	 Perimeter = 4 + 5 + 4 + 5 = 18cm	M920 M635
Perimeter of compound shapes	Calculate missing side lengths. Then add the lengths of ALL the sides	 Missing side = 2.1cm+5.7cm = 7.8cm Perimeter = 4.8+2.1+5.7+3.2+7.8 = 23.6cm	M690
Area	Area is the amount of space a shape takes up	 Area = 3 whole squares + 3 half squares = 4.5cm^2	M900
Are of rectangles	Area of a rectangle = length x width	 **Area = 12 x 5 = 60cm^2**	
Area of compound shapes	Split into simple shapes Find missing lengths Calculate the area of each simple shape Add the areas		

		9 - 3 = 6  area of A = 6 x 4 = 24 cm² area of B = 3 x 6 = 18 cm² total area = 24 + 18 = 42 cm²	
Area of a Triangle	Triangle area = ½ of base x perpendicular height	 Area of the pink triangle = 7 x 8 ÷ 2 = 56 ÷ 2 = 28 cm²  area = ½ x 40 x 23 = ½ x 920 = 920 ÷ 2 = 460 = 460mm²	M610
Area of compound shapes containing triangles	Split into rectangles & triangles Find missing lengths Calculate the area of each simple shape Add the areas	 	M996

		 area of A = 30 × 12 = 360 area of B = ½ × 30 × 7 = 105 A + B = 360 + 105 = 465 **Total area = 465 cm²**	

Coordinates

Topic/Skill	Definition/Tips	Example	Sparx Code
Plotting and Reading Coordinates	Coordinates are written as (**x**, **y**)	What is the coordinate of the point N?  Read the x-coordinate −2 Read the y-coordinate 4 Write down the coordinates (−2, 4)	M618
Solve perimeter and area problems involving coordinates	Use shape properties to step along the x and y axis. Work out the lengths of shapes. Use these to find perimeter & area	What is the area of the square ABCD shown below? 	M230 (1st set of questions)

		Calculate the side length of the square Find the difference between the x-coordinates of two points that have the same y-coordinate side length 7 ⟷ 11 B (7, 6) C (11, 6) 11 − 7 = 4 area = 4^2 = 16 **= 16 square units**	
Solving shape problems involving coordinates	Use shape properties to step along the x and y axis.	Points B and D are diagonally opposite vertices of a square. What are the coordinates of point C?  Point C is above point D so will have the same x coordinate (11) Point C is in line with point B so it will have the same y coordinate (5) **C = (11, 5)**	M230 (2nd set of questions)

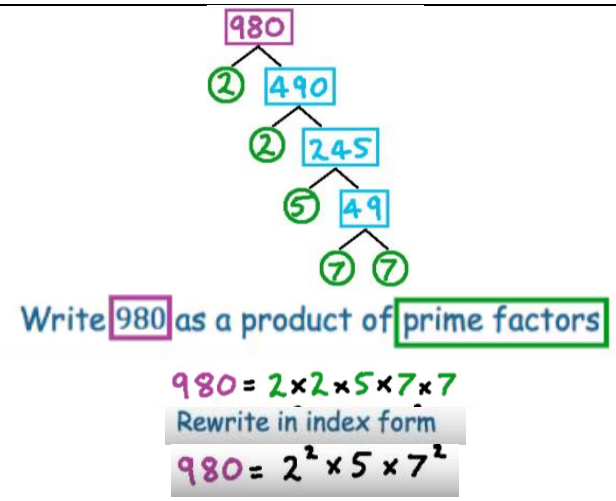
Factors and Multiples

Topic/Skill	Definition/Tips	Example	Sparx Code
Finding the lowest common multiple	Multiples are in a number's times table. e.g. multiples of 4 are: 4, 8, 12, etc	Find the lowest common multiple (LCM) of 39 and 13. Write out a list of multiples for each number +39 +39 multiples of 39 | 39, 78, 117, 156 multiples of 13 | 13, 26, 39, 52 The LCM is the **lowest** number that appears in both lists 39	M227
Finding Factors of numbers	A factor is a number that divides into another number with no remainder e.g. 3 x 4 = 12 12 ÷3 = 4 So 3 and 4 are factors of 12	Find all the factors of 36. Find factor pairs that multiply together to give 36 Try each whole number, starting with 1 36 = 1 × 36 36 = 2 × 18 36 = 3 × 12 36 = 4 × 9 36 = 5 × (5 does not divide into 36 exactly) 36 = 6 × 6 Factors of 36:	M823

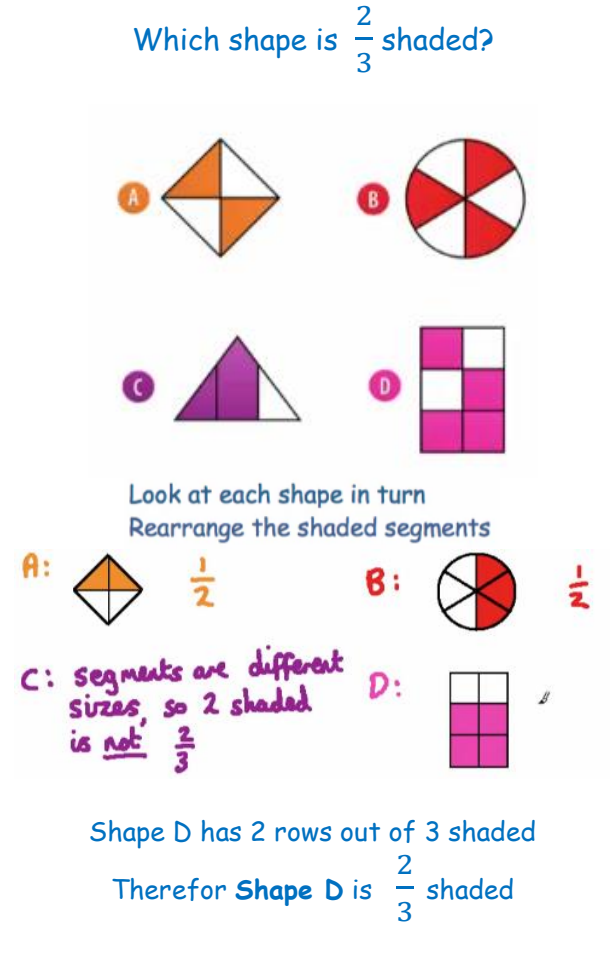
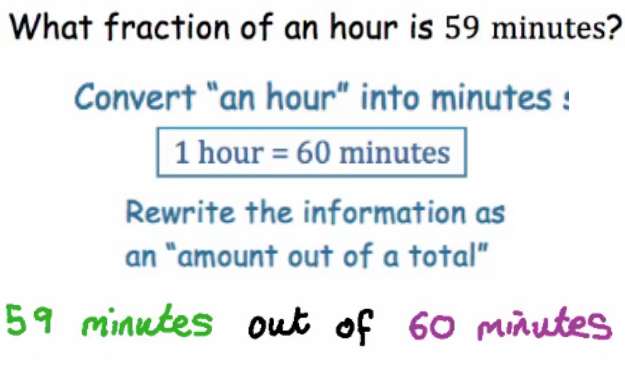
		1, 2, 3, 4, 6, 9, 12, 18, 36	
Finding the Highest Common Factor	Common factors are factors that appear in both lists of factors	What is the highest common factor (HCF) of 20 and 4? factors of 20: 1, 2, 4, 5, 10, 20 factors of 4 : 1, 2, 4 Common factors are factors in both lists 1, 2, 4 The Highest Common Factor = **4**	M698

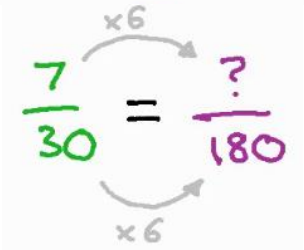
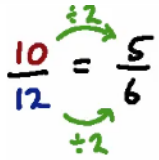
Primes

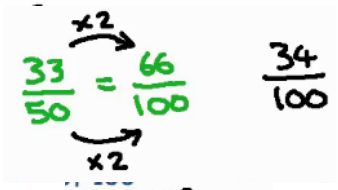
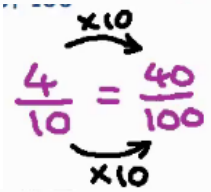
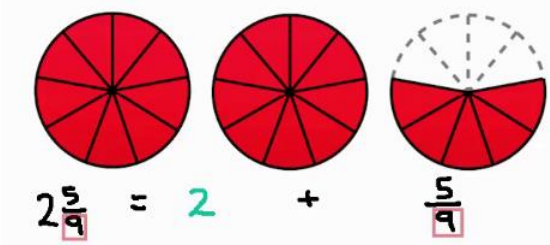
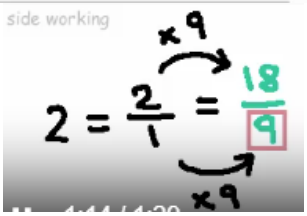
Topic/Skill	Definition/Tips	Example	Sparx Code
Finding Prime Numbers	Prime numbers have exactly two factors: They can only be divided by themselves and 1	Which **two** of the following numbers are prime numbers? 2 16 23 25 4 1 1 is not a prime number Cross off any numbers that divide exactly by a number other than themselves and 1 divides exactly by 5 2, 16, 23, 25, 4, 1 divide exactly by 2 The numbers left are 2 and 23. These are prime numbers	M322
Prime Factor Decomposition	The prime decomposition of a number is written as the product of all of its prime factors	Write the prime decomposition of 980 in index form. List of primes: 2, 3, 5, 7, 11, 13, 17, 19, 23, ... Draw a prime factor tree for 980 Divide 980 by a prime to get a factor pair and add this to the tree If the end of a branch is not prime, divide it by a prime and add the factor pair to the tree Keep going until all of the branches end with a prime number	

Writing and Comparing Fractions

Topic/Skill	Definition/Tips	Example	Sparx Code
Finding fractions of Shapes	Divide the shape into EQUAL parts. The fraction of a shape shaded $= \frac{number\ of\ shaded\ parts}{Total\ number\ of\ equal\ parts}$		M158
Constructing Fractions	To write a number as a fraction of another, write the information as 'amount' out of total. Then simplify. Ensure both have the same units first.		M393

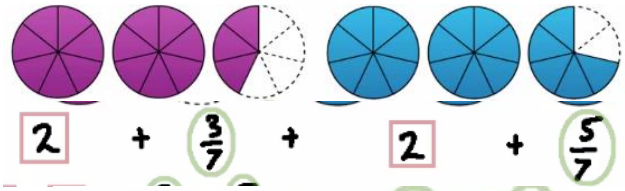
		$\frac{59}{60}$	
Finding Equivalent Fractions	To find an equivalent fraction, multiply or divide the numerator and denominator by the same number	Find the missing number in these equivalent fractions: $\frac{7}{30} = \frac{?}{180}$ How do we get from one denominator (bottom number) to the other? $30 \times 6 = 180$ Do the same thing to the numerator (top number)  The missing number is 42	M410
Simplifying Fractions	A fully simplified fraction is an equivalent fraction with the smallest whole numbers	Simplify $\frac{10}{12}$ Which numbers divide into 10? 1, 2, 5, 10 Which numbers divide into 12? 1, 2, 3, 4, 6, 12 Find the largest value in both lists 2 Divide both numerator and denominator by this value  Check whether it will simply further The answer is $\frac{5}{6}$	M671
Ordering Fractions	Write all the fractions as equivalent fractions with the same denominator	Put these three fractions into ascending order:	M335

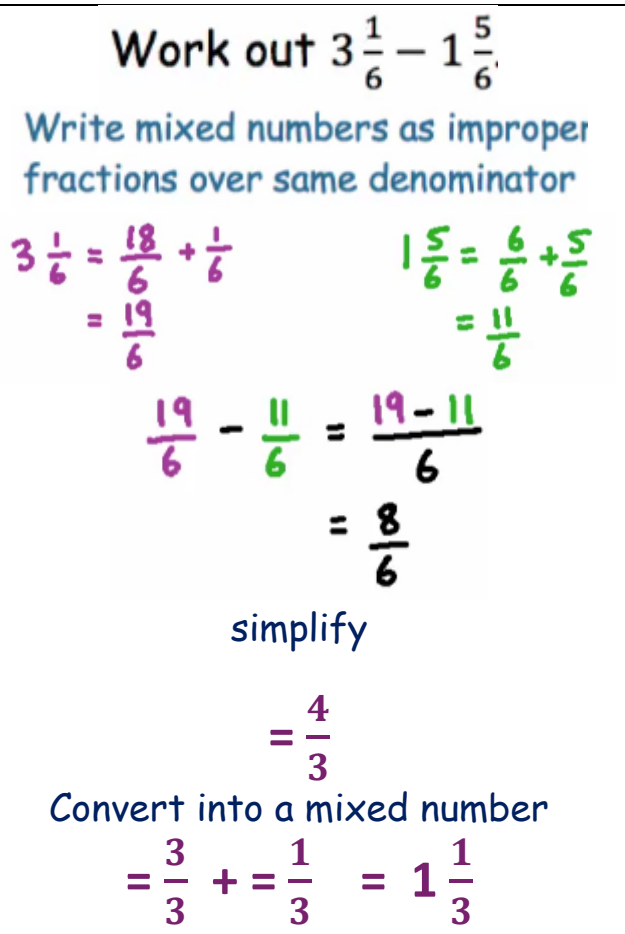
	Then put them in order	$\frac{33}{50}, \quad \frac{34}{100}, \quad \frac{4}{10}$ Rewrite as equivalent fractions with the same denominator Use 100 as all the denominators are factors of 100   Use the numerators to put into order $\frac{34}{100}, \frac{40}{100}, \frac{66}{100}$ Convert back to original fractions $\frac{34}{100}, \frac{4}{10}, \frac{33}{50}$	
Convert from mixed numbers to improper fractions	A mixed number is a whole number and a proper fraction An improper fraction has a numerator that is larger than the denominator	How can $2\frac{5}{9}$ be written as an improper fraction? Split the mixed number into the whole number plus the fraction  Write the whole number as a fraction with the same denominator  Add the fractions $\frac{18}{9} + \frac{5}{9}$	M601 1st set of questions

		$= \frac{18+5}{9}$ $= \frac{23}{9}$ ans	
Convert improper fractions to mixed numbers		Write $\frac{24}{18}$ as a mixed number in its simplest form. How many times does 18 go into 24? $1 \times 18 = 18$ $2 \times 18 = 36$ × $\frac{24}{18} = \frac{18}{18} + ?$ Work out the remaining fraction $\frac{24}{18} = \frac{18}{18} + \frac{6}{18}$ Simplify if possible $= 1 + \frac{1}{3}$ Write out the mixed number $= 1\frac{1}{3}$	M601 2nd set of questions

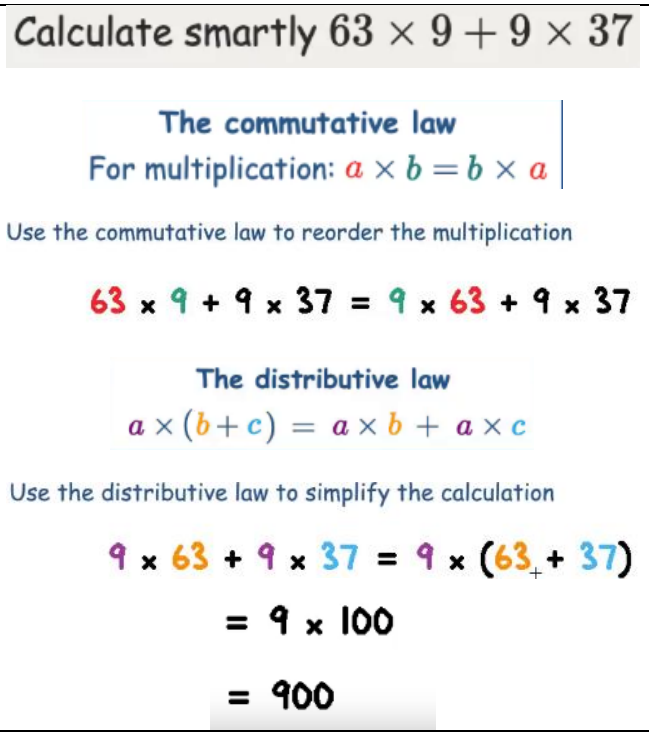
Adding and Subtracting Fractions

Topic/Skill	Definition/Tips	Example	Sparx Code
Adding and subtracting fractions	Convert into equivalent fractions with the same denominator Add or subtract the numerators Keep the denominators the same Simplify the answer	What is $\frac{19}{20} - \frac{3}{5}$ Check if the denominators are the same Convert the fractions to equivalent fractions with the same denominator Use the lowest common multiple 20 Side working $\frac{3}{5} = \frac{12}{20}$ (×4) $\frac{19}{20} - \frac{3}{5} = \frac{19}{20} - \frac{12}{20}$	M835

		$= \frac{19-12}{20}$ $= \frac{7}{20}$ The answer is already simplified	
Adding mixed numbers	Add the whole numbers Add the fractions and convert into a mixed number if needed Add the results	$2\frac{3}{7} + 2\frac{5}{7}$  $= 2 + 2 + \frac{3}{7} + \frac{5}{7}$ $= 2 + 2 + \frac{8}{7}$ $\quad \frac{8}{7} = \frac{7+1}{7} = \frac{7}{7} + \frac{1}{7}$ $= 2 + 2 + 1 + \frac{1}{7}$ $= 5 + \frac{1}{7}$ $= 5\frac{1}{7}$	M931
Subtracting Mixed Numbers	If the first fraction is bigger than the second one, subtract the numbers then subtract the fractions and add the results	Work out $4\frac{5}{9} - 2\frac{4}{9}$ Check that the first fraction is bigger than the second fraction $\frac{5}{9}$ is bigger than $\frac{4}{9}$ ✓ Subtract the whole numbers $4 - 2 = 2$ Subtract the fractions $\frac{5}{9} - \frac{4}{9} = \frac{5-4}{9}$ $= \frac{1}{9}$ Write the answer as a mixed number $= 2\frac{1}{9}$	M931

	If the second fraction is bigger than the first, convert both into improper fractions then subtract as normal, simplify then convert back into a mixed number		M931

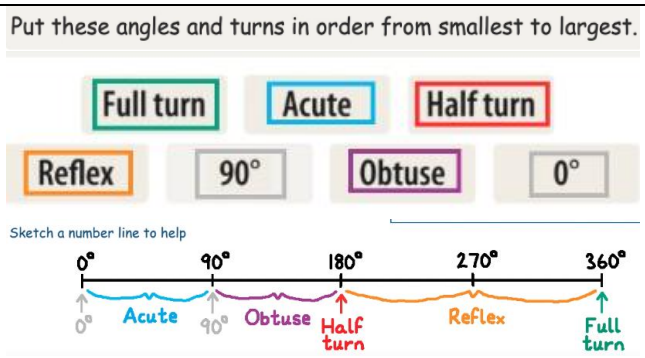
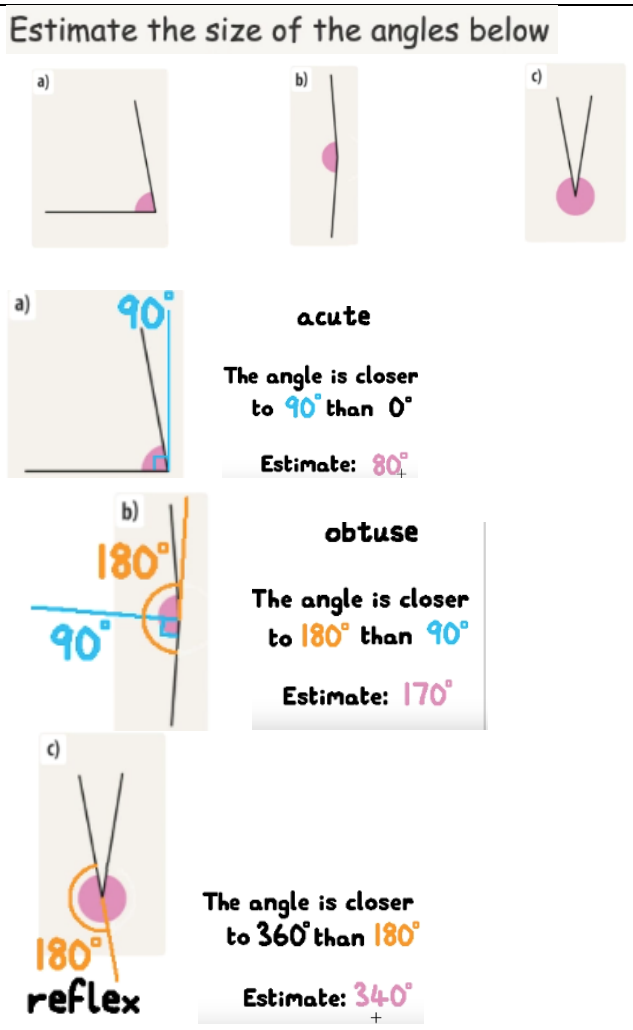
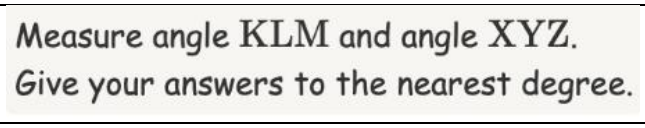
Single Brackets

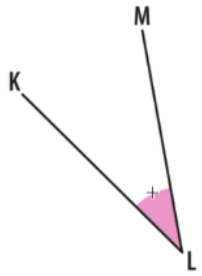
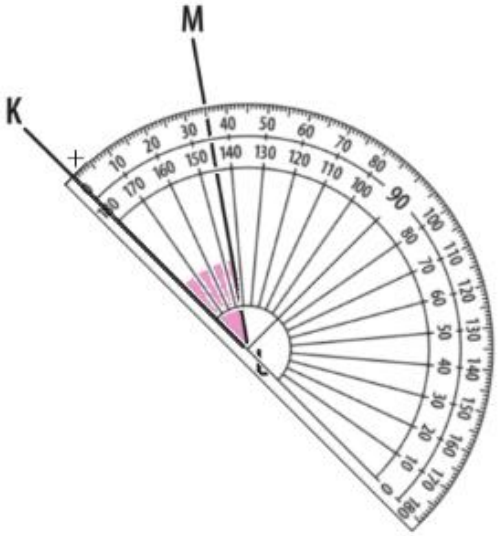
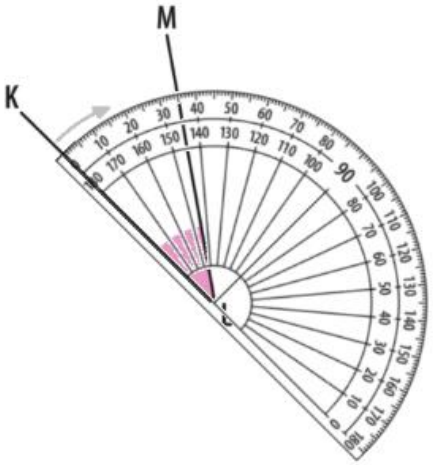
Topic/Skill	Definition/Tips	Example	Sparx Code
Using the distributive law	The commutative law For multiplication: $a \times b = b \times a$ e.g. 3 x 4 = 4 x 3 The distributive law $a \times (b + c) = a \times b + a \times c$ e.g. 2 x (1 + 3) = 2 x 1 + 2 x 3		M637

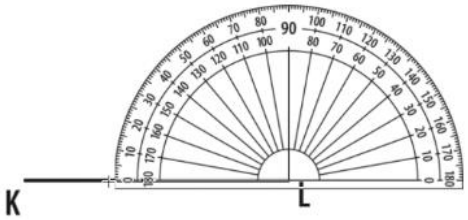
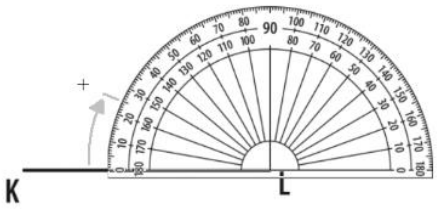
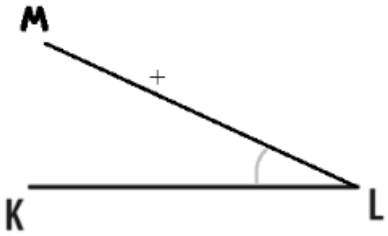
Expand Single brackets	Multiply the term outside the bracket with every term inside the bracket	Expand $12(w+y)$ $12(w+y)$ $= 12 \times w + 12 \times y$ $= 12w + 12y$	M237
Expand single brackets and simplifying expressions	Expand each bracket then collect like terms to simplify	Expand and simplify $8(k+5)+7(6k+9)$ Expand each set of brackets $8(k+5) + 7(6k+9)$ $= 8 \times k + 8 \times 5 + 7 \times 6k + 7 \times 9$ $= 8k + 40 + 42k + 63$ Collect like terms $= 50k + 10$	M792
Factorise into one bracket	Factorising is the opposite of expanding. Find the highest common factor to put outside the bracket first.	Factorise $24x + 6$ Find the factors of each term factors of 24 : 1, 2, 3, 4, 6, 8, 12, 24 factors of 6 : 1, 2, 3, 6 Choose the highest common factor (HCF) HCF = 6 Rewrite each term as a multiplication $24x = 6 \times 4x$ | $6 = 6 \times 1$ $24x + 6 = 6 \times 4x + 6 \times 1$ Factorise $= 6(4x + 1)$	M100

Angles

Types of Angle

Topic/Skill	Definition/Tips	Example	Sparx Code
Types of Angles	A full turn is 360 ° A half turn is 180 ° An acute angle is between 0 ° and 90 ° A right angle 90 ° An obtuse angle is between 90 ° and 180 ° A reflex angle is between 180° and 360°	 0 ° , Acute, Obtuse, Half turn, Reflex, Full turn	M502
Estimating Angles	Decide on the type of angle e.g. an acute angle is between 0° and 90 ° Use this knowledge to estimate the size of the angle		M541
Measuring Angles	Line the protractor 0 to 180 line up with one side of the angle		M780

	Ensure that the centre of this line is on the vertex (corner) of the angle. Count around from 0 to find the measurement	 Carefully line up the protractor with the line KL, ensure the centre is at point L  Count round from 0° on the KL line  answer: **Angle KLM = 35°**	
Drawing Angles	Use a protractor and a pencil	Draw angle KLM which is 25° Draw a line KL  Place the centre of the protractor on L and 0° on line KL	M331

		 Start at 0° (on the outer scale this time) and mark 25° using a pencil  Draw a line from L through the mark to create line LM 	

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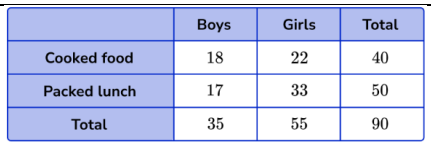
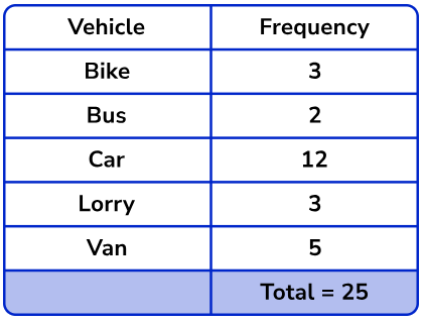
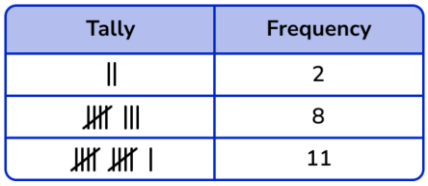
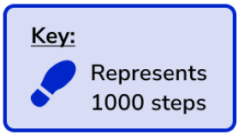
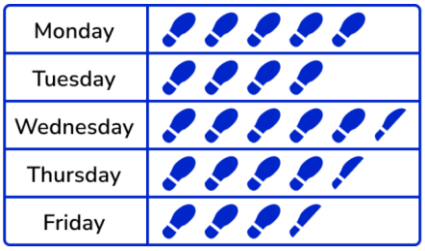
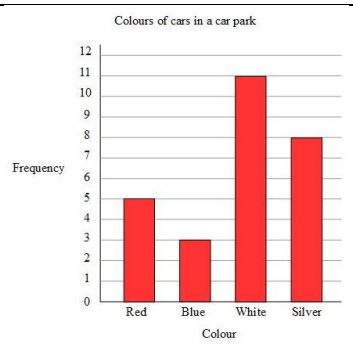
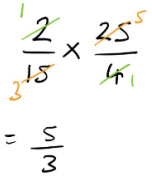
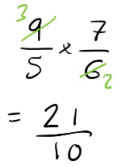
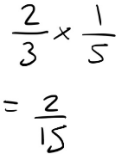
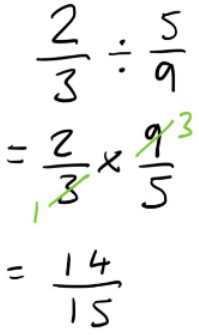
Maths Knowledge Organiser

Year: 7 Term: Summer

Topic/Skill	Definition/Tips	Example	Sparx Code
Range (a measure of spread)	The difference between the largest and smallest piece of data.	$2, 8, 8, 2, 9, 3, 5$ Range $= 9 - 2$ $= 7$	M328
Mean (an average)	The sum of your data divided by the number of pieces of data.	$2 + 8 + 8 + 3 + 9$ Mean $= \frac{2 + 8 + 8 + 3 + 9}{5}$ $= 6$	M940
Median (an average)	The middle of your data set. You need to order your data. You can cross a number off from each end to locate the middle. You can also locate the middle by adding 1 to the number of pieces of data and dividing by 2. In the first example $\frac{7+1}{2} = 4$ so it is the 4th piece of data In the second example $\frac{6+1}{2} = 3.5$ so it in the middle of the 3rd and 4th pieces of data	When there is middle number: $2, 8, 8, 2, 9, 3, 5$ Ordered: $2, 2, 3, 5, 8, 8, 9$ Median $= 5$ When there are two middle numbers: $2, 8, 8, 2, 9, 3$ Ordered: $2, 2, 3, 8, 8, 9$ Median $= \frac{3+8}{2}$ $= 5.5$	M934
Mode (an average)	Most common piece of data. There can be more than one mode. There can be no mode.	$4, 5, 6, 6, 9, 9, 9$ Mode$= 9$ $3, 3, 4, 7, 8, 10, 10$ Mode$= 3$ and 10 $4, 6, 7, 9, 11, 20$ No Mode	M841
Two Way Table	Two-way tables organise data where		M899

	there are two different categories.		
Frequency Tables	Frequency tables show the total number of pieces of data in each category.		M899
Tally charts	Tally charts help us count more quickly and accurately by grouping into 5s. Single vertical lines represent 1 Four vertical lines with a diagonal line through them represents 5.		M597
Pictograms	Pictograms use diagrams to visually represent the frequency of data. A key is required to state the value of each picture. Half of a picture represents half as many pieces of data. This is also true for other fractions such as a quarter.	  e.g. on Friday there are three whole pictures (1000 each), and one half picture (500). So, the total steps on Friday is 3500	M644
Bar charts	The height of a bar represents the		M460 M738

	frequency of that piece of data. The bars must not touch and should have even widths. The frequency axis must start at zero.	 e.g. there were 5 red cars	
Mean from frequency tables	The mean is still the sum of the data divided by the number of pieces of data. The number of pieces of is the total frequency. For the sum of our data we can speed the calculation up by multiplying the data by the frequency and adding together the results.	<table><tr><th>Age</th><th>Frequency</th></tr><tr><td>18</td><td>15</td></tr><tr><td>19</td><td>6</td></tr><tr><td>20</td><td>4</td></tr><tr><td></td><td>Total = 25</td></tr></table> When finding the sum of the data we would sum 18 fifteen times. To speed this up we use 18×15 Mean $= \frac{18 \times 15 + 19 \times 6 + 20 \times 4}{25}$ $= 18.56$	M127
Solving proportion problems	If values are in proportion with each other, they get smaller or larger at the same rate. E.g. if one doubles, the other doubles E.g. if one halves, the other halves	<table><tr><th>Bags of sweets</th><th>Price</th></tr><tr><td>1</td><td>£3</td></tr><tr><td>2</td><td>£6</td></tr><tr><td>20</td><td>£60</td></tr></table>	M478
Reciprocal	The reciprocal of a number is the result of	$1 \div 2 = \frac{1}{2}$	M216

	doing 1 divided by that number. The reciprocal of a number is always that number inverted. Inverted means the numerator and denominator have been swapped (often called flipped).	So the reciprocal of 2 is $\frac{1}{2}$ The reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$	
Multiplying fractions	To multiply fractions, first check for cross cancelling, which is where we cancel out common factors on the diagonals. Then multiply the numerators together and the denominators together, simplify if possible. Sometimes both diagonals will cancel, sometimes just one of them, or sometimes none.	Both diagonals:  One diagonal:  No diagonals: 	M157
Dividing fractions	To divide fractions, you multiply by the reciprocal of the second fraction. Cross cancel as normal when multiplying, this **cannot** be done on the division line. Simplify if possible.		M110

<table>
<tr>
<td>Multiplying and dividing mixed numbers</td>
<td>Mixed numbers must be converted to improper fractions before multiplying or dividing.</td>
<td>$1\frac{1}{2} \times 3\frac{2}{3}$
$= \frac{3}{2} \times \frac{11}{3}$
$= \frac{11}{2}$</td>
<td>M197
M265</td>
</tr>
<tr>
<td>Fraction of an amount</td>
<td>(Without a calculator)
Divide by the denominator then multiply by the numerator.

(With a calculator)
Just multiply the numbers together.</td>
<td>$\frac{3}{4}\ of\ 20$

$20 \div 4 = 5$
$5 \times 3 = 15$

$\frac{3}{4}\ of\ 20$

$\frac{3}{4} \times 20 = 15$</td>
<td>M695
M684</td>
</tr>
<tr>
<td>Converting decimals to fractions</td>
<td>You should know some conversions from memory.

For others use the lowest the lowest place value to create an equivalent fraction and simplify where possible.</td>
<td>You should know $\frac{1}{5} = 0.2$
So $0.6 = 3 \times 0.2$
$= \frac{3}{5}$

0.015
The 5 is in the $\frac{1}{1000}^{th}$ column.
So $0.015 = \frac{15}{1000}$
$= \frac{3}{200}$</td>
<td>M958</td>
</tr>
<tr>
<td>Equivalent decimals and fractions</td>
<td>You should memorise these fraction and decimal conversions.</td>
<td>
<table>
<tr><td>$\frac{1}{2}$</td><td>0.5</td></tr>
<tr><td>$\frac{1}{3}$</td><td>$0.\dot{3}$</td></tr>
<tr><td>$\frac{1}{4}$</td><td>0.25</td></tr>
<tr><td>$\frac{1}{5}$</td><td>0.2</td></tr>
<tr><td>$\frac{1}{8}$</td><td>0.125</td></tr>
<tr><td>$\frac{1}{10}$</td><td>0.1</td></tr>
<tr><td>$\frac{1}{100}$</td><td>0.01</td></tr>
<tr><td>$\frac{1}{1000}$</td><td>0.001</td></tr>
</table>
</td>
<td>M958</td>
</tr>
</table>

Converting fractions to decimals	You should be able to convert some decimals from memory. All fractions can be converted to decimals by dividing the numerator by the denominator. You may need bus stop for this. If the denominator can become multiple of 10, this can make the division stage much easier.	You should know $\frac{1}{4} = 0.25$ So $\frac{3}{4} = 3 \times 0.25$ $= 0.75$ $\frac{4}{9} = 4 \div 9$ $= 0.\dot{4}$ $\frac{3}{400} = \frac{0.75}{100}$ $= 0.075$ Both the numerator and denominator were divided by four to get 100 in the denominator.	M958
Converting decimals to fractions	You should know some conversions from memory. For others use the lowest the lowest place value to create an equivalent fraction and simplify where possible.	You should know $\frac{1}{5} = 0.2$ So $0.6 = 3 \times 0.2$ $= \frac{3}{5}$ 0.015 The 5 is in the $\frac{1}{1000}^{th}$ column. So $0.015 = \frac{15}{1000}$ $= \frac{3}{200}$	M958
Converting decimals and percentages	To convert from a decimal to a percentage, times by 100. To convert from a percentage to a decimal, divide by 100.	$0.3 \times 100 = 30$ So, $0.3 = 30\%$ $6 \div 100 = 0.06$ So, $6\% = 0.06$	M958
Converting Fractions to percentages	If you can make the denominator 100, the	$\frac{3}{25} = \frac{12}{100}$ $= 12\%$	M958

	numerator will be the percentage. Otherwise, convert to a decimal and multiply by 100. This can be done on a calculator by doing the fraction times 100.	$\frac{1}{8} = 0.125$ $= 12.5\%$ $\frac{3}{8} \times 100 = 37.5$ So, $\frac{3}{4} = 37.5\%$	
Writing a number as a percentage of another	Write as a fraction where the original or total amount is the denominator, then convert to a percentage. On a calculator you can type in the fraction and times by 100.	A class has 25 students. 6 of the students like tea. What percentage of students like tea? $\frac{6}{25} = \frac{24}{100}$ $= 24\%$	M235
Using probability phrases	You need to know probability phrases.	Impossible, unlikely, even chance, likely, certain.	M655
Writing probabilities as fractions, decimals, and percentages.	You should know some basic values. Values between impossible and even chance are unlikely. Values between even chance and certain are likely. You can find a simple probability as a fraction. This can be converted to a decimal or fraction if required.	Impossible: $0\ or\ 0\%$ Even chance: $0.5, 50\%, or \frac{1}{2}$ Certain: $1\ or\ 100\%$ I have 8 tickets for a raffle. Each ticket has the same chance of being selected. There are 120 tickets. What is the probability that I win? $\frac{8}{120}$	M941 M938
Probability of mutually exclusive events	Mutually exclusive events cannot occur at the same time.	I roll a fair die. Rolling a 6 and rolling a 5 are mutually exclusive as they cannot both occur at the same time.	M755

<table>
<tr>
<td></td>
<td>The probabilities of mutually exclusive events can be added together to find the probability of one or the other occurring.</td>
<td>Rolling a 2 and rolling an even number are not mutually exclusive. If I roll a 2, I have also rolled an even number.

The probability of rolling a 1 is $\frac{1}{6}$

The probability of rolling 3, or a 5 is also $\frac{1}{6}$

So the probability of rolling an odd number is:
$\frac{1}{6}+\frac{1}{6}+\frac{1}{6}=\frac{3}{6}$
$=\frac{1}{2}$</td>
<td></td>
</tr>
<tr>
<td>Sample space diagrams</td>
<td>Sample space diagrams are used to organise outcomes.

If the probability of each outcome is the same, the probability can be found through dividing the number of suitable outcomes by the total number of possible outcomes.</td>
<td>A fair spinner labelled 1 to 3 is spun twice. The outcomes are added together.

<table>
<tr><th>+</th><th>1</th><th>2</th><th>3</th></tr>
<tr><th>1</th><td>2</td><td>3</td><td>4</td></tr>
<tr><th>2</th><td>3</td><td>4</td><td>5</td></tr>
<tr><th>3</th><td>4</td><td>5</td><td>6</td></tr>
</table>

Find the probability that the sum of the two spinners is an even number.
There are 9 possible outcomes and 5 are even.
The probability is $\frac{5}{9}$</td>
<td>M718</td>
</tr>
</table>