

Personalised Learning Checklist (PLC): Year 9 Extension

- 9.1: Numbers & Number System 3
- 9.2: Angles 3
- 9.3: Calculating 3
- 9.4: Manipulating 3
- 9.5: Measuring 3
- 9.6: Place Value 3
- 9.7: Representing 3
- 9.8: Fractions 5
- 9.9: Equations 3
- 9.10: Fractions 6
- 9.11: Probability 3
- 9.12: Perimeter, Area & Volume 3
- 9.13: Compound Units 1
- 9.14: Ratio 3
- 9.15: Pythagoras & Trigonometry 1
- 9.16: Graphs 2
- 9.17: Symmetry & Transformations 3
- 9.18: Analysing 3
- 9.19: 2D & 3D Shape
- 9.20: Percentages 3

Unit 1 – Numbers and the Number System	Sparx Codes
Find multiples and lowest common multiples of numbers	M227
Know whether a number divides by 2, 3, 4, 5, 9 or 10 Find factors and highest common factors of numbers	M823 M698
Recognise the prime numbers 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, ...	M322
Find the prime factors of a number using a calculator or factor tree	M108
Use Venn diagrams with prime factors to calculate HCF and LCM	M365
Recognise and use square numbers 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, ...	M135
Recognise and use cube numbers 1, 8, 27, 64, 125, ...	M135
Read, write and evaluate powers & recognise powers of 2, 3, 4 and 5	M135
Find square roots, cube roots and other roots (using $\sqrt{\quad}$ symbols)	M135
Use a scientific calculator to find powers and roots	M135
Know that a number to the power zero is 1	M135
Convert a root to a rough decimal value	
Convert numbers between standard form and ordinary form	M719 M678
Enter numbers in standard form on a calculator	
Use surds and be able to simplify with surds	U338 (GCSE)



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Unit 2 – Angles 3	Sparx Codes
Recognise and use angle rule: vertically opposite angles are equal	M163
Recognise and use angle rule: angles around a point add to 360°	M818
Recognise and use angle rule: angles at a point on a line add to 180°	M818
Recognise pairs of alternate or corresponding angles	M606
Work out missing angles in diagrams involving parallel lines	M606
Know that the angles in a triangle add to 180 degrees	M351
Know and use angles in isosceles, equilateral and scalene triangles	M351
Understand the proof of the angle sum of a triangle	M351
Know that the angles in a quadrilateral add to 360 degrees	M679
Know and use angles in special quadrilaterals	M679
Work out the angle sum for any polygon using triangles	M653
Work out interior and exterior angles in regular polygons	M653



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Unit 3 – Calculating 3	Sparx Codes
Add decimals	M429
Subtract decimals	M152
Multiply integers and decimals by a decimal	M803
Divide a decimal by any integer	M262
Divide integers and decimals by a decimal	M491
Add and subtract with negative numbers	M106
Multiply and divide with negative numbers	M288
BIDMAS	M521



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Unit 4 – Manipulating 3	Sparx Codes
Know the terms expression, equation, inequality, term, formulae, function	M813 M830
Write expressions from words	
Simplify complex expressions by collecting like terms	M795 M531 M949
Simplify expressions using rules of indices for multiply and divide	M120
Expand a single bracket	M237
Simplify an expression involving expanding a single bracket	M792
Expand and simplify two brackets	M960
Expand and simplify three brackets	U606 (GCSE)
Factorise with a single bracket	M100
Factorise quadratic expressions with two brackets	M908
Substitute into expressions and formulae	M417 M327 M208 M979
Rearrange formulae	M184



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9.1: Numbers & Number System 3	Unit 5 – Measuring 3	Sparx Codes
9.2: Angles 3		
9.3: Calculating 3		
9.4: Manipulating 3		
9.5: Measuring 3		
9.6: Place Value 3		
9.7: Representing 3		
9.8: Fractions 5		
9.9: Equations 3		
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9.11: Probability 3		
9.12: Perimeter, Area & Volume 3		
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9.1: Numbers & Number System 3	Unit 6 – Place Value 3	Sparx Codes
9.2: Angles 3		
9.3: Calculating 3		
9.4: Manipulating 3		
9.5: Measuring 3		
9.6: Place Value 3		
9.7: Representing 3		
9.8: Fractions 5		
9.9: Equations 3		
9.10: Fractions 6		
9.11: Probability 3		
9.12: Perimeter, Area & Volume 3		
9.13: Compound Units 1		
9.14: Ratio 3		
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Use the signs $<$, \leq , $>$, \geq , $=$, \neq to compare numbers
 Use a compound inequality to compare numbers (e.g. $-1 < 0.5 < 4$)
 $<$ (less than) \leq (less than or equal to)
 $>$ greater than \geq greater than or equal to
 $=$ equal to \neq not equal to



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9.1: Numbers & Number System 3	Unit 7 – Representing 3 Know that discrete data is data which can be listed or counted, and continuous data is measured data Know that primary data is data you have collected yourself and secondary data has been collected by someone else Know that qualitative data is descriptive and quantitative data is numerical Construct and interpret frequency tables Construct and interpret bar charts Construct and interpret comparative bar charts Compare data using appropriate representations Construct and interpret pie charts Plot bivariate data on a scatter graph Understand positive and negative correlation Draw and use a line of best fit on a scatter graph Know interpolation is estimating within data values on a graph and this is generally reliable Know extrapolation is estimating outside data values on a graph and this is unreliable Plot a cumulative frequency graph Use a cumulative frequency graph to estimate median and interquartile range	Sparx Codes U322 (GCSE) U322 (GCSE) U322 (GCSE) M899 M441 M460 M738 U520 (GCSE) M574 M165 M769 M596 U182 (GCSE) U642 (GCSE)
9.2: Angles 3		
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9.1: Numbers & Number System 3	Unit 8 – Fractions 5 Shade or interpret fraction diagrams Construct fractions Convert between improper and mixed numbers Equivalent fractions Simplify fractions Order fractions using common denominators or by writing as decimals Find a number between two fractions or integers Know fractions represent division with decimal answers Convert between fractions and decimals with or without a calculator Decide if a fraction is terminating or recurring Convert recurring decimals to fractions on a calculator and use recurring decimal notation Convert recurring decimals to fractions using algebra Find a fraction of an amount with or without a calculator Find the original amount from a fraction Write one quantity as a fraction of another	Sparx Codes M158 M939 M601 M410 M671 M335 M958 M701 U689 (GCSE) M695 M684
9.2: Angles 3		
9.3: Calculating 3		
9.4: Manipulating 3		
9.5: Measuring 3		
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9.1: Numbers & Number System 3	Unit 9 – Equations 3	Sparx Codes
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9.3: Calculating 3		
9.4: Manipulating 3		
9.5: Measuring 3		
9.6: Place Value 3		
9.7: Representing 3		
9.8: Fractions 5		
9.9: Equations 3		
9.10: Fractions 6		
9.11: Probability 3	Solve equations with one step, or two or more steps	M707 M509
9.12: Perimeter, Area & Volume 3	Solve equations when the solution is a positive or negative integer, or fraction	
9.13: Compound Units 1	Solve equations involving brackets	M387
9.14: Ratio 3	Solve equations where the unknown is the numerator of a fraction	
9.15: Pythagoras & Trigonometry 1	Solve equations where the unknown is the denominator of a fraction	M554
9.16: Graphs 2	Solve equations where the unknown appears on both sides	
9.17: Symmetry & Transformations 3	Use expressions, equations or formulae to represent and solve problems	M813 M957
9.18: Analysing 3	Solve two simultaneous equations using an elimination method	M852
9.19: 2D & 3D Shape	Solve inequalities	M118 M732
9.20: Percentages 3	Represent a solution on a number line	M384



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9.1: Numbers & Number System 3	Unit 10 – Fractions 6	Sparx Codes
9.2: Angles 3		
9.3: Calculating 3		
9.4: Manipulating 3		
9.5: Measuring 3		
9.6: Place Value 3		
9.7: Representing 3		
9.8: Fractions 5		
9.9: Equations 3		
9.10: Fractions 6		
9.11: Probability 3	Add and subtract fractions with different denominators	M835
9.12: Perimeter, Area & Volume 3	Add and subtract mixed fractions	M931
9.13: Compound Units 1	Multiply an integer by a fraction Multiply two fractions together	M157
9.14: Ratio 3	Multiply by a mixed fraction	M197
9.15: Pythagoras & Trigonometry 1	Divide an integer by a fraction Divide a fraction by an integer Divide a fraction by a fraction	M110
9.16: Graphs 2	Divide with mixed fractions	
9.17: Symmetry & Transformations 3	Use a calculator to complete fraction or mixed fraction calculations	M265
9.18: Analysing 3	Solve fraction problems in the context of shape/geometry	
9.19: 2D & 3D Shape		
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9.1: Numbers & Number System 3	Unit 11 – Probability 3	Sparx Codes
9.2: Angles 3		
9.3: Calculating 3	Understand the 0 – 1 probability scale	
9.4: Manipulating 3	Understand randomness, fairness and bias	
9.5: Measuring 3	Understand equally or unequally likely events	
9.6: Place Value 3	Calculate probability and write it as a fraction, decimal or percentage	M941 M938
9.7: Representing 3	Sample space diagrams	M718
9.8: Fractions 5	Know mutually exclusive events can't happen at the same time, and the sum of their probabilities is 1	M755
9.9: Equations 3	Probability of mutually exclusive events	
9.10: Fractions 6	Expected results from repeated experiments	M206
9.11: Probability 3	Calculating experimental probabilities	M332
9.12: Perimeter, Area & Volume 3	Use a table or frequency tree to list outcomes	
9.13: Compound Units 1	Represent outcomes using a Venn diagram	M829
9.14: Ratio 3	Probability from Venn diagrams	M419
9.15: Pythagoras & Trigonometry 1	Venn diagrams set notation: recognise the symbols { } for sets, \cap for intersection and \cup for union	M834
9.16: Graphs 2	Know the multiplication law for independent events: $P(A \& B) = P(A) \times P(B)$	
9.17: Symmetry & Transformations 3	Know the addition law for mutually exclusive events: $P(A \text{ or } B) = P(A) + P(B)$	
9.18: Analysing 3	Tree diagrams for independent events	M299
9.19: 2D & 3D Shape	Tree diagrams for dependent events	M572
9.20: Percentages 3		



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9.1: Numbers & Number System 3	Unit 12 – Perimeter, Area & Volume 3	Sparx Codes
9.2: Angles 3		
9.3: Calculating 3	Find the perimeter of a shape or composite shape	M920 M635 M690
9.4: Manipulating 3	Area of a rectangle (Area = length x width)	M390
9.5: Measuring 3	Area of a triangle (Area = $\frac{1}{2}$ x base x height)	M610
9.6: Place Value 3	Area of a parallelogram (Area = base x height)	M291
9.7: Representing 3	Area of a trapezium (Area = $\frac{1}{2}(a + b)$ x height)	M705
9.8: Fractions 5	Circumference of a circle ($C = \pi$ x diameter)	M169
9.9: Equations 3	Area of a circle (Area = πr^2)	M231
9.10: Fractions 6	Arc length or perimeter of sectors	M280
9.11: Probability 3	Area of sectors	M430
9.12: Perimeter, Area & Volume 3	Area of compound shapes involving triangles and rectangles (or parts of circles)	M269 M996
9.13: Compound Units 1	Calculate exactly with multiples of π	
9.14: Ratio 3	Volume of a cuboid ($V = \text{length} \times \text{width} \times \text{height}$)	M765
9.15: Pythagoras & Trigonometry 1	Find the surface area of a cuboid	M884 M534
9.16: Graphs 2	Volume of a prism ($V = \text{area of cross-section} \times \text{height}$), including cylinders ($V = \pi r^2 \times \text{height}$)	M722 M697
9.17: Symmetry & Transformations 3	Calculate the surface area of a prism	M661 M697
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Unit 13 – Compound Units 1	Sparx Codes
Calculate speed, distance or time (Speed = Distance ÷ Time)	(GCSE) U151
Know and use the correct units for speed (eg mph, km/h, m/s)	(GCSE) U151
Calculate density, mass or volume (Density = Mass ÷ Volume)	(GCSE) U910
Know and use the correct units for density (eg g/cm ³ , kg/m ³)	(GCSE) U910
Calculate pressure, force or area (Pressure = Force ÷ Area)	(GCSE) U527
Know and use the correct units for pressure (eg N/m ²)	(GCSE) U527
Understand and calculate population density	
Solve problems involving compound units	(GCSE) U842



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Unit 14 – Ratio 3	Sparx Codes
Use ratio notation to describe the comparison of quantities	M885
Simplify ratios, including those with units	M885
Write a ratio in the form 1 : n or n : 1	M543
Convert between ratios and fractions	M267
Be familiar with a ratio table and multipliers	
Find missing values when given a ratio and the whole or one part	M801
Divide a quantity into parts using a given ratio	M525
Use ratios in real contexts such as map scales, conversions, recipes	
Solve problems involving unit pricing	
Solve problems involving direct proportion Solve problems involving inverse proportion	M478
Identify the graphs of direct and inverse proportion	M448
Identify the equations relating to direct and inverse proportion	M472 M665
Recognise when quantities are in direct or inverse proportion	



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9.1: Numbers & Number System 3	Unit 15 – Pythagoras & Trigonometry 1 Identify the hypotenuse in a right-angled triangle (the longest side, opposite the right-angle) Know the formula for Pythagoras' Theorem: $c^2 = a^2 + b^2$ where c is the hypotenuse Use the formula for Pythagoras' Theorem to find lengths in right-angled triangles Know the term surd and give exact answers in surd form when required (eg $\sqrt{10}$) Label a right-angled triangle with hypotenuse (H), opposite (O) and adjacent (A) Know that the ratio O/H is sine/sin of the angle Know that the ratio A/H is cosine/cos of the angle Know that the ratio O/A is tangent/tan of the angle Know the trigonometric ratios SOH CAH TOA Use trigonometry to calculate missing lengths in right-angled triangles Use trigonometry to calculate missing angles in right-angled triangles	Sparx Codes
9.2: Angles 3		
9.3: Calculating 3		
9.4: Manipulating 3		M677
9.5: Measuring 3		
9.6: Place Value 3		
9.7: Representing 3		
9.8: Fractions 5		
9.9: Equations 3		
9.10: Fractions 6		U605 (GCSE)
9.11: Probability 3		
9.12: Perimeter, Area & Volume 3		
9.13: Compound Units 1		U283 (GCSE)
9.14: Ratio 3		U545 (GCSE)
9.15: Pythagoras & Trigonometry 1		
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9.1: Numbers & Number System 3	Unit 16 – Graphs 2 Plot graphs of linear functions written in the form: $y = ax + b$ or $ax + by + c = 0$ Read values for x or y from a graph Approximate solutions to simultaneous equations graphically Identify and interpret intercept and gradient graphically Use the form $y = mx + c$ to identify gradient and intercept algebraically Use $y = mx + c$ to identify parallel lines Use $y = mx + c$ to identify perpendicular lines Use graphs of functions including conversion graphs, distance-time, exponential and reciprocal Using distance-time graphs Draw the graph of quadratic functions of the form $y = ax^2 + bx + c$ Identify & interpret roots, intercepts and turning points graphically	Sparx Codes
9.2: Angles 3		M932
9.3: Calculating 3		
9.4: Manipulating 3		
9.5: Measuring 3		GCSE U836
9.6: Place Value 3		M544
9.7: Representing 3		GCSE U477
9.8: Fractions 5		GCSE U377
9.9: Equations 3		
9.10: Fractions 6		GCSE U898
9.11: Probability 3		M843
9.12: Perimeter, Area & Volume 3		M771 M205 M751
9.13: Compound Units 1		M551 M581 M247 M221
9.14: Ratio 3		
9.15: Pythagoras & Trigonometry 1		
9.16: Graphs 2	GCSE U989	
9.17: Symmetry & Transformations 3		
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9.1: Numbers & Number System 3	Unit 17 – Symmetry & Transformations 3	Sparx Codes		
9.2: Angles 3				
9.3: Calculating 3			Draw and describe reflections of 2D shapes	M290
9.4: Manipulating 3			Draw and describe translations of 2D shapes using vectors	M139
9.5: Measuring 3			Draw and describe rotations of 2D shapes	M910
9.6: Place Value 3			Solve problems involving rotations, reflections, translations or combinations of them	M881
9.7: Representing 3			Describe the resultant of multiple transformations using a single transformation	
9.8: Fractions 5			Know that a point is 'invariant' if it doesn't move after a transformation	
9.9: Equations 3			Know that translation, reflection and rotation produce congruent images (same shape and size)	
9.10: Fractions 6			Enlarge 2D shapes:	M178
9.11: Probability 3			<ul style="list-style-type: none"> - Without a grid or centre of enlargement - Using a centre of enlargement - On a coordinate grid - Using a fraction scale factor 	
9.12: Perimeter, Area & Volume 3			Describe enlargements by giving the centre and scale factor	
9.13: Compound Units 1			Understand and use column vectors	U632 (GCSE)
9.14: Ratio 3			Add and subtract column vectors	U903 (GCSE)
9.15: Pythagoras & Trigonometry 1			Multiply a column vector by a scalar	U564 (GCSE)
9.16: Graphs 2				
9.17: Symmetry & Transformations 3				
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9.1: Numbers & Number System 3	Unit 18 – Analysing 3	Sparx Codes		
9.2: Angles 3				
9.3: Calculating 3			Understand that measures of central tendency (averages) offer a summary of a set of data	
9.4: Manipulating 3			Find the mode of a list of data	M841
9.5: Measuring 3			Find the mode from a bar chart or pictogram	
9.6: Place Value 3			Find the median of a list of n values, where n can be odd or even	M934
9.7: Representing 3			Calculate the mean of a list of data values	M940
9.8: Fractions 5			Understand the range as a measure of spread (or consistency)	M328
9.9: Equations 3			Calculate the range from a set of data	
9.10: Fractions 6			Calculate the range from a bar chart or pictogram	
9.11: Probability 3			Be familiar with the term outlier and the effect on range	
9.12: Perimeter, Area & Volume 3			Compare sets of data, appreciating the limitations of different statistics	
9.13: Compound Units 1			Calculate the mode, median, range or mean from a discrete frequency table	M127
9.14: Ratio 3			Calculate an estimated mean from a grouped frequency table	M287
9.15: Pythagoras & Trigonometry 1			Find the modal group from a grouped frequency table	
9.16: Graphs 2			Find the group the median lies in, from a grouped frequency table	
9.17: Symmetry & Transformations 3				
9.18: Analysing 3				
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9.2: Angles 3		
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9.5: Measuring 3		
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9.7: Representing 3		
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9.13: Compound Units 1		
9.14: Ratio 3		
9.15: Pythagoras & Trigonometry 1		
9.16: Graphs 2		
9.17: Symmetry & Transformations 3		
9.18: Analysing 3		
9.19: 2D & 3D Shape	Line symmetry	M523
	Rotational symmetry	M523
	Properties of scalene/isosceles/equilateral triangles	M276
	Names and properties of different quadrilaterals	M276
	Names of 2D shapes based on the number of sides	
	Vocabulary for circle parts	M595
	Know the names and properties of 3D shapes	M767
	Planes of symmetry in 3D shapes (these cut a 3D shape into 2 equal and symmetrical halves)	M767
	Number of faces, edges and vertices of a 3D shape	M767
	Know the link between faces, edges and vertices in a 3D shape	M767
	Nets of 3D shapes (identify shapes from nets or draw nets)	M518
	Construct and interpret plans and elevations of 3D shapes	M229
	Use isometric paper to interpret or draw 3D shapes	
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9.2: Angles 3		
9.3: Calculating 3		
9.4: Manipulating 3		
9.5: Measuring 3		
9.6: Place Value 3		
9.7: Representing 3		
9.8: Fractions 5		
9.9: Equations 3		
9.10: Fractions 6		
9.11: Probability 3		
9.12: Perimeter, Area & Volume 3		
9.13: Compound Units 1		
9.14: Ratio 3		
9.15: Pythagoras & Trigonometry 1		
9.16: Graphs 2		
9.17: Symmetry & Transformations 3		
9.18: Analysing 3		
9.19: 2D & 3D Shape	Write a percentage as a fraction and decimal	M264
	Convert between fractions, decimals and percentages with or without a calculator	M264
	Know the calculator converter function keys	
	Find a percentage of an amount without a calculator	M437
	Calculate the percentage of an amount with a calculator using a decimal or fraction multiplier	M905
	Increase or decrease by a percentage without a calculator	M476
	Use fraction/decimal multipliers to increase or decrease by a percentage	M533
	Work with percentages over 100% and decimal percentages	
	Express one number/quantity as a percentage of another	M235
	Compare quantities using percentages	
	Find the percentage an amount has changed by (percentage change = $\frac{\text{actual} - \text{original}}{\text{original}} \times 100$ or percentage change = $\frac{\text{finish} - \text{start}}{\text{start}} \times 100$)	U278 (GCSE)
	Solve simple interest problems	U533 (GCSE)
	Solve compound interest problems	U332 (GCSE)
	Find the original value in percentage problems	M528
9.20: Percentages 3		



Notes