Year 9 Maths: Personalised Learning Checklist (PLC) – Support

Learning Journey

9.1	Numbers & the Number System 3
9.2	Angles 3
9.3	Calculating 3
9.4	Manipulating 3
9.5	Measuring 3
9.6	Place Value 3
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9.18	Analysing 3
9.19	2D & 3D Shapes 3
9.20	Percentages 3

Unit 1 – Numbers & the Number System 3	**MathsWatch**
Find multiples and lowest common multiples of numbers	N11, N31b
Know whether a number divides by 2, 3, 4, 5, 9 or 10 Find factors and highest common factors of numbers	N10, N31a
Recognise the prime numbers 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, …	N30a
Find the prime factors of a number using a calculator or factor tree	N30b
Use Venn diagrams and prime factors to calculate HCF and LCM	N31a, N31b
Recognise and use square numbers 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, …	N25
Recognise and use cube numbers 1, 8, 27, 64, 125, …	N25
Read, write and evaluate powers & recognise powers of 2, 3, 4 and 5	
Find square roots, cube roots and other roots (using √ symbols)	N25
Use a scientific calculator to find powers and roots	N44
Know that a number to the power zero is 1	
Convert a root to a rough decimal value	
Convert numbers between standard form and ordinary form	N45a, N45b
Enter numbers in standard form on a calculator	

Key Vocabulary		**Careers**
Multiple Lowest Common Multiple (LCM) Factor Highest Common Factor (HCF) Divisible Prime Prime Factor Decomposition Product Factor Tree Venn diagram	Square Number Cube Number Index (Power) Base Exponent (Power) Indices (Powers) Square Root Cube Root Root Standard form Surds	• Cyber Security • Computer Programming • Construction • Distribution and Resource Management • Scientists  **Career Transferable Skill** **Problem Solving Skills.** Be flexible and approach the same problem from different points of view.

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Unit 2 – Angles 3	**MathsWatch**
Recognise and use angle rule: vertically opposite angles are equal	G13
Recognise and use angle rule: angles around a point add to 360°	G13
Recognise and use angle rule: angles at a point on a line add to 180°	G13
Recognise pairs of alternate or corresponding angles	G18
Work out missing angles in diagrams involving parallel lines	G18
Know that the angles in a triangle add to 180 degrees	G13, G17
Know and use angles in isosceles, equilateral and scalene triangles	G16, G17
Understand the proof of the angle sum of a triangle	G23
Know that the angles in a quadrilateral add to 360 degrees	
Know and use angles in special quadrilaterals	
Work out the angle sum for any polygon using triangles	G19
Work out interior and exterior angles in regular polygons	G19

Key Vocabulary		**Careers**
Angle Degree Full turn Vertically Opposite Adjacent Parallel Transversal Corresponding Angles Alternate Angles Co-interior Angles Supplementary Exterior	Triangle Equilateral triangle Isosceles triangle Scalene triangle Quadrilateral Polygon Regular Interior	• Architects including landscape • Construction work • Electrical and vehicle installation • Engineering • Games programmer and Visual Design • Sports  **Career Transferable Skill** **Analytical Skills.** Follow complex reasoning. Spatial awareness. Navigation skills

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Unit 3 – Calculating 3	**MathsWatch**
Add decimals	N13b
Subtract decimals	N14b
Multiply integers and decimals by a decimal	N15a, N28a N15b, N28b N40a
Divide a decimal by any integer	N16, N29a, N29b
Divide integers and decimals by a decimal	N40b
Add and subtract with negative numbers	N19a
Multiply and divide with negative numbers	N19b
Order of operations (BIDMAS)	N20

Key Vocabulary		**Careers**
Operation Add Sum Total Subtract Difference Multiply Product Divide Quotient Inverse operation Estimate	Order of operations Brackets Indices Evaluate Negative Positive Integer Decimal Increase Decrease Inequality Interval	• Sales including insurance and real estate • Finance and Human Resources • Airplane Pilots • Healthcare • Management  **Career Transferable Skill** **Good Working Habits.** Be thorough and painstaking in your work.

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Unit 4 – Manipulating 3	**MathsWatch**
Know the terms expression, equation, inequality, term, formulae, function Know and use basic algebra notation	A2, A4
Write expressions from words	A4
Simplify complex expressions by collecting like terms	A6
Simplify expressions using rules of indices for multiply and divide	A7a, A7b
Expand a single bracket	A8
Simplify an expression involving expanding a single bracket	A8
Expand and simplify two brackets	A18
Factorise with a single bracket	A9
Substitute into expressions and formulae	A10
Rearrange formulae	A13a

Key Vocabulary		**Careers**
Algebra Variable Expression Equation Inequality Formula Term Function Coefficient Constant	Simplify Collect Like Terms Like Terms Unlike Terms Indices Substitute Evaluate Expand Factorise Quadratic Input / output Rearrange Changing the subject	• Computer Programmers • Engineering (All types) • Finance – Economists, planner, accountants. • Scientists • Cooking (Substitution)  **Career Transferable Skill** **Useful Personality Traits** Intellectual rigour Clear communication skills and logical thinking

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Unit 5 – Measuring 3	**MathsWatch**
Understand labelling notation for lengths and angles	G10a G10b G10c
Use ruler and protractor to construct triangles	G15
Use ruler and compasses to construct triangles when 3 sides known	(GCSE) 147
Know congruent shapes have equal sides and equal angles	G31
Use the congruence criteria for triangles (SSS, SAS, ASA, RHS)	G31
Construct an angle bisector	G26c
Construct a perpendicular bisector of a line segment	G26a
Construct a perpendicular to a line or from a point	G26b
Know the perpendicular distance is the shortest distance	
Be familiar with locus/loci	G27
Understand, use and interpret scale factors and scale diagrams	R6, G15, R10

Key Vocabulary		**Careers**
Vertex Arm Degree Estimate Ruler Protractor Compasses Accurate Construct Measure Line Segment Parallel Equal Arc Congruent Identical	Hypotenuse Bisect Bisector Perpendicular Locus (loci) Scale Scale factor Multiplier Bearing Clockwise	• Architects • Visual Design • Construction and Installation • Production • Pilot/Air Traffic Controller • Artists  **Career Transferable Skill** **Analytical Skills** Follow complex reasoning. Be accurate and precise

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Unit 6 – Place Value 3	**MathsWatch**
Use the signs <, ≤, >, ≥, =, ≠ to compare numbers < (less than) ≤ (less than or equal to) > greater than ≥ greater than or equal to = equal to ≠ not equal to Use a compound inequality (e.g. -1 < 0.5 < 4)	N9, A20a
Read and write numbers, and identify values of given digits	N1a, N1b
Order a set of integers and decimals	N2a, N2b
Round a number to a specified number of decimal places	N27b
Round a number to a specified number of significant figures	N38
Estimate calculations by rounding to one significant figure	N43a, N43b
Estimate and check if solutions to problems are the correct size	
Decide is an estimate is an overestimate or underestimate	
Understand error interval notation a ≤ x < b and express rounding errors using a ≤ x < b	(GCSE) 155a
Understand the concept of upper and lower bounds	G29

Key Vocabulary		**Careers**
Inequality Compound inequality Greater than (>) Less than (<) Greater than or equal to (≥) Less than or equal to (≤) Not equal to (≠) Between Digit Place value Units or ones Ten Hundred Thousand Ten thousand Hundred thousand	Million Tenths Hundredths Thousandths Decimal point Order Compare Ascending/descending Round (up/down) Nearest Decimal place Significant figure Estimate, approximate Error interval Upper/Lower bound Maximum/minimum	• Business and Finance • Management • Sports • Data Science  **Career Transferable Skill** **Analytical Skills.** Pay attention to detail

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Unit 7 – Representing 3	**MathsWatch**
Know that discrete data is data which can be listed or counted, and continuous data is measured data	(GCSE) 63
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	S3, S4
Construct and interpret bar charts Construct and interpret comparative bar charts	S2a, S2b, S5
Compare data using appropriate representations	
Construct and interpret pie charts	S9
Plot bivariate data on a scatter graph Understand positive and negative correlation Draw and use a line of best fit on a scatter graph	S8
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	

Key Vocabulary		**Careers**
Data Sample Discrete, Continuous Primary, Secondary Qualitative, Quantitative Interpret Frequency Frequency table Tally chart Scale Label Plot Pictogram Key Bar chart Width, height	Dual/multiple bar chart Compound/composite bar chart Pie chart Sector Category Proportion Bivariate Scatter graph Correlation Positive/negative correlation Line of best fit Interpolation, extrapolation Reliable/unreliable Cumulative frequency Interquartile range Median, quartiles	• Marketing • Business and Finance • Social Science • Sports • Media including journalism • And many more….



Career Transferable Skill

Analytical Skills

Construct logical arguments and expose illogical ones.

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Unit 8 – Fractions 5	**MathsWatch**
Shade or interpret fraction diagrams Construct fractions	N23a, R3
Convert between improper and mixed numbers	N35
Equivalent fractions	N23b
Simplify fractions	N23c
Order fractions using common denominators or by writing as decimals	N34
Find a number between two fractions or integers	
Know fractions represent division & decide if a fraction is terminating or recurring	
Convert between fractions and decimals with or without a calculator	N32 (GCSE) 84
Convert fractions to recurring decimals	
Convert recurring decimals to fractions on a calculator and use recurring decimal notation	(GCSE) 177
Find a fraction of an amount with or without a calculator	N33
Find the original amount from a fraction	
Write one quantity as a fraction of another	R3

Key Vocabulary		**Careers**
Fraction Whole Part Equal parts Numerator Denominator Proper fraction Improper fraction Mixed number Unit fraction Equivalent Simplify Cancel Factor Highest common factor (HCF) Lowest terms	Compare Order Common denominator Convert Decimal Terminating decimal Recurring decimal Quotient Reciprocal	• Healthcare • Sales • Food related careers • Agriculture • Construction and Vehicle Maintenance



Career Transferable Skill

Analytical Skills.

Manipulate precise and intricate ideas.

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Unit 9 – Equations 3	**MathsWatch**
Solve equations with one step, or two or more steps	A12
Solve equations when the solution is a positive or negative integer, or fraction	A12
Solve equations involving brackets	A19a
Solve equations where the unknown is the numerator of a fraction	A19a
Solve equations where the unknown appears on both sides	A19b
Use expressions, equations or formulae to represent and solve problems	A4, A17

Key Vocabulary		**Careers**
Algebraic expression Represent Variable Unknown Term Coefficient Constant Operation Inverse operation Equation Linear equation Equal Balance Solve Step	Solution Value Expand Simplify Check Simultaneous equation Inequality Inequalities Number line	• Engineering (all types) • Finance and Accounting • Computer Programming • Scientist • Operational Research • Business  **Career Transferable Skill** **Problem Solving Skills** Present a solution clearly, making your assumptions explicit.

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Unit 10 – Fractions 6	**MathsWatch**
Add and subtract fractions with different denominators	N36, N41
Add and subtract mixed fractions	N41
Multiply an integer by a fraction Multiply two fractions together	N37a, N42a
Multiply by a mixed fraction	N42a
Divide an integer by a fraction Divide a fraction by an integer Divide a fraction by a fraction	N37b, N42b
Divide with mixed fractions	N42b
Use a calculator to complete fraction or mixed fraction calculations	N44
Solve fraction problems in the context of shape/geometry	

Key Vocabulary		**Careers**
Fraction Proper fraction Improper fraction Mixed number Numerator Denominator Common denominator Equivalent fraction Simplify Cancel Factor Highest common factor Lowest terms Product Reciprocal		• Healthcare • Sales • Business • Agriculture • Construction and Vehicle Maintenance  **Career Transferable Skill** **Problem Solving Skills** Tackle a problem with confidence, even when the solution is not obvious.

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Unit 11 – Probability 3	**MathsWatch**
Understand probability phrases	P1
Understand the 0 – 1 probability scale Understand randomness, fairness and bias Understand equally or unequally likely events	P1
Calculate probability and write it as a fraction, decimal or percentage	P2a
Sample space diagrams	P2b
Know mutually exclusive events can't happen at the same time, and the sum of their probabilities is 1 Probability of mutually exclusive events	P3
Expected results from repeated experiments	P7
Calculating experimental probabilities	P7
Use a table or frequency tree to list outcomes	P5 (GCSE) 57
Represent outcomes using a Venn diagram	P6
Probability from Venn diagrams	(GCSE) 186
Venn diagrams set notation: recognise the symbols { } for sets, ∩ for intersection and ∪ for union	(GCSE) 127b

Key Vocabulary		**Careers**
Chance Likelihood Impossible Unlikely Likely Even chance Certain Random Fair Biased Event Outcome Frequency Equally likely Mutually exclusive Combined	Sample space Expected, expectation Experiment Trial Theoretical probability Experimental probability Relative frequency Frequency tree Probability tree diagram Independent events Dependent events Venn diagram Set Union Intersection Complement	• Scientists • Market Research • Finance • Statisticians • And many more!  **Career Transferable Skill** **Analytical Skills.** Construct logical arguments and expose illogical ones

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Unit 12 – Perimeter, Area & Volume 3	**MathsWatch**
Find the perimeter of a shape or composite shape	G8a, G8b
Area of a rectangle = length x width	G20a
Area of a triangle = $\frac{1}{2}$ x base x height	G20c
Area of a parallelogram = base x height	G20b
Area of a trapezium = $\frac{1}{2}$ (a + b) x height	G20d
Circumference of a circle = π x diameter	G22a
Area of a circle = πr^2	G22b
Volume of a cuboid = length x width x height	G21a
Find the surface area of a cuboid	G21b
Volume of a prism = area of cross-section x height Volume of a cylinder = πr^2 x height	G25a

Key Vocabulary		**Careers**
Perimeter Length Width Side Distance Units Base Height Dimensions Formula Area Square units Perpendicular Compound shape Volume Surface area	Cubic units Cross-section Radius Diameter Circumference Arc Sector Segment Chord Tangent	• Construction • Dentist • Surveyor • Architect • Animation and art-based careers  **Career Transferable Skill** **Critical thinking** Observation, analysis and inference

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Unit 13 – Compound Units 1	**MathsWatch**
Calculate speed, distance or time (Speed = Distance ÷ Time)	R11a
Know and use the correct units for speed (eg mph, km/h, m/s)	R11a
Calculate density, mass or volume (Density = Mass ÷ Volume)	R11b
Know and use the correct units for density (eg g/cm^3, kg/m^3)	R11b
Solve problems involving compound units	

Key Vocabulary		**Careers**
Compound unit Rate Measure Unit Conversion Speed Distance Time Miles per hour Metres per second Kilometres per hour Average speed	Density Mass Volume Grams per cubic centimetre Kilograms per cubic metre Pressure Force Area Newtons per square metre Pascal Population density Cost per item Pay rate Flow rate	• Healthcare • Scientist • Engineer including vehicle • Human Geography • Construction and Production  **Career Transferable Skill** **Analytical Skills** Think clearly

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Unit 14 – Ratio 3	**MathsWatch**
Use ratio notation to describe the comparison of quantities	R1a, R1b
Simplify ratios, including those with units	R5a
Convert between ratios and fractions	
Be familiar with a ratio table and multipliers	
Find missing values when given a ratio and the whole or one part	R5b
Divide a quantity into parts using a given ratio	R5b
Use ratios in real contexts such as map scales, conversions, recipes	R6 (GCSE) 39
Solve problems involving unit pricing	
Solve problems involving direct proportion Solve problems involving inverse proportion	R8 R13
Recognise when quantities are in direct proportion	

Key Vocabulary		**Careers**
Ratio Part Whole Equivalent Simplify Scale factor Proportion Fraction Convert Multiplier Share Divide Scale Scale factor Recipe Quantity	Proportion Proportional Direct proportion Inverse proportion	• Finance including bank, stocks and shares • Design including graphic, art and interior • Cookery • Construction  **Career Transferable Skill** **Information Ordering** The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules

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Unit 15 – Pythagoras & Trigonometry 1	**MathsWatch**
Identify the hypotenuse in a right-angled triangle (the longest side, opposite the right-angle)	G30
Know the formula for Pythagoras' Theorem: $c^2 = a^2 + b^2$ where c is the hypotenuse	G30
Use the formula for Pythagoras' Theorem to find lengths in right-angled triangles	G30
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)	G35a, G35b
Know that the ratio O/H is sine/sin of the angle	G35a, G35b
Know that the ratio A/H is cosine/cos of the angle	G35a, G35b
Know that the ratio O/A is tangent/tan of the angle	G35a, G35b

Key Vocabulary		**Careers**
Pythagoras' Theorem Hypotenuse Square Square root Trigonometry Trigonometric ratio Opposite side Adjacent side Sine (sin) Cosine (cos) Tangent (tan) Angle Side length Degree		• Engineers • Astronomy • Surveyors • Forensic Science • Ecology  **Career Transferable Skill** **Information Ordering** The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules

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Unit 16 – Graphs 2	**MathsWatch**
Plot graphs of linear functions written in the form: $y = ax + b$ or $ax + by + c = 0$	A14a, A14c
Read values for x or y from a graph	
Approximate solutions to simultaneous equations graphically	A24a
Identify and interpret intercept and gradient graphically	A14b
Use the form $y = mx + c$ to identify gradient and intercept algebraically	A14c
Use $y = mx + c$ to identify parallel lines	
Use graphs of functions including conversion graphs, distance-time, exponential and reciprocal	A21b
Using distance-time graphs	A21a
Draw the graph of quadratic functions of the form $y = ax^2 + bx + c$	A15

Key Vocabulary		**Careers**
Coordinate Plot Axes x-axis y-axis Linear Equation Function Substitute Intercept Gradient Slope Positive gradient Negative gradient	Parallel Perpendicular Conversion Distance-time Curve Exponential Reciprocal Quadratic Root Turning point Vertex Intercept	• Business including advertising, real estate and purchasing • Finance and Economics • Research including science, engineering and computing • Healthcare  **Career Transferable Skill** **Deductive Reasoning** The ability to apply general rules to specific problems to produce answers that make sense.

Year 9 Maths: Personalised Learning Checklist (PLC) – Support

Learning Journey

9.1	Numbers & the 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 Shapes 3
9.20	Percentages 3

Unit 17 – Symmetry & Transformations 3	**MathsWatch**
Draw and describe reflections of 2D shapes	G4a, G4b
Draw and describe translations of 2D shapes using vectors	G5
Draw and describe rotations of 2D shapes	G6
Solve problems involving rotations, reflections, translations or combinations of them	
Know that a point is 'invariant' if it doesn't move after a transformation	
Know that translation, reflection and rotation produce congruent images (same shape and size)	
Enlarge 2D shapes: - Without a grid or centre of enlargement - Using a centre of enlargement - On a coordinate grid Using a fraction scale factor	G28
Describe enlargements by giving the centre and scale factor	G28

Key Vocabulary		**Careers**
Coordinate	Clockwise, anticlockwise	• Computer Games Design
Plot	Angle of rotation	• Animation
Horizontal	Translation, translate	• Art related careers
Vertical	Right	• Architecture
Diagonal	Left	• Advertising
Equation	Up	
Graph	Down	
Reflection	Vector, column vector	
Reflect	Invariant	**Career Transferable Skill**
Symmetrical	Enlargement, enlarge	**Useful Personality Traits.**
Object	Centre of enlargement	Creativity
Image	Similar	
Congruent	Scale factor	
Rotation	Scalar	
Rotate		

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Unit 18 – Analysing 3	**MathsWatch**
Understand that averages offer a summary of a set of data	S6
Find the mode of a list of data Mode = value that occurs the most frequently	S6
Find the mode from a bar chart or pictogram	
Find the median of a list of data Median = middle value when data is in order	S6
Calculate the mean of a list of data Mean = total of all values divided by number of values	S7
Understand the range measures spread of data (or consistency)	S6
Calculate the range from a set of data Range = largest value – lowest value	S6
Calculate the range from a bar chart or pictogram	
Be familiar with the term outlier and the effect on range Outlier = value much larger or smaller than the others	
Compare sets of data, appreciating the limitations of different statistics	
Calculate the mode, range or mean from a discrete frequency table	S10a
Calculate an estimated mean from a grouped frequency table	S10b
Find the modal group from a grouped frequency table	

Key Vocabulary		**Careers**
Data	Mean	• Marketing
Sample	Total	• Business and Finance
Statistics	Sum	• Social Science
Distribution	Range	• Sports
Frequency	Spread	• Media including journalism
Average	Consistent, consistency	• And many more….
Typical	Maximum	
Representative	Minimum	
Mode	Difference	
Modal value	Compare	**Career Transferable Skill**
Most frequent value	Outlier	**Analytical Skills**
No mode	Limitation	Construct logical arguments and expose illogical ones.
Median	Grouped data	
Ordered	Estimate	
Middle value	Midpoint	

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Unit 19 – 2D & 3D Shapes 3	**MathsWatch**
Line symmetry	G3
Rotational symmetry	G7
Properties of scalene/isosceles/equilateral triangles	G16
Names and properties of different quadrilaterals	G14
Names of 2D shapes based on the number of sides	G1
Vocabulary for circle parts	G2
Know the names and properties of 3D shapes	G12a
Planes of symmetry in 3D shapes (these cut a 3D shape into 2 equal and symmetrical halves)	
Number of faces, edges and vertices of a 3D shape	G12a, G12b
Know the link between faces, edges and vertices in a 3D shape	
Nets of 3D shapes (identify shapes from nets or draw nets)	G12c
Construct and interpret plans and elevations of 3D shapes	(GCSE) 51
Use isometric paper to interpret or draw 3D shapes	

Key Vocabulary		**Careers**
Line of symmetry Rotational symmetry Order Scalene triangle Isosceles triangle Equilateral triangle Equal Square Rectangle Parallelogram Rhombus Trapezium Kite Opposite Parallel Adjacent Arc	Circumference Radius Diameter Sector Chord Segment Tangent Face, edge, vertex (vertices) Net Cube Cuboid Prism Cylinder Pyramid Cone Sphere	• Construction • Games Design including illustration and animation • Engineers • Architects including Interior Design • Marketing including advertising • Fashion  **Career Transferable Skill** **Useful Personality Traits.** Creativity

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Unit 20 – Percentages 3	**MathsWatch**
Write a percentage as a fraction and decimal	N24a
Convert between fractions, decimals and percentages with or without a calculator	N32
Know the calculator converter function keys	
Find a percentage of an amount without a calculator	N24b
Calculate the percentage of an amount with a calculator using a decimal or fraction multiplier	
Increase or decrease by a percentage without a calculator	R9a
Use fraction/decimal multipliers to increase or decrease by a percentage	R9b
Work with percentages over 100% and decimal percentages	
Express one number/quantity as a percentage of another	N39a
Compare quantities using percentages	N39b
Find the percentage an amount has changed by (percentage change = actual ÷ original or percentage change = finish ÷ start)	R12
Solve simple interest problems	R7
Find the original value in percentage problems	R12

Key Vocabulary		**Careers**
Percentage Per cent Whole Part Value Proportion Fraction Decimal Convert Equivalent Multiplier Scale factor Multiply Divide Calculate	Increase Decrease Original Profit Loss Discount Sale Interest Simple interest Compound interest	• Finance including bank accounts! • Fashion and Sports • Sales including retail, real estate and travel • Administration – Data, Human Resources and office work  **Career Transferable Skill** **Communication Skills.** Develop your capacity to assimilate and communicate highly technical information.