Year 8 Maths: Personalised Learning Checklist (PLC) – Core & Extension

Learning Journey

8.1	Numbers & the Number System 2
8.2	Angles 2
8.3	Calculating 2
8.4	Manipulating 2
8.5	Measuring 2
8.6	Place Value 2
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8.18	Analysing 2
8.19	2D & 3D Shapes 2

Unit 1 – Numbers & the Number System 2	**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 or prime factors to calculate HCF and LCM	N31a, N31b
Recognise and use square numbers 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, …	N25
Recognise and use cube numbers 1, 8, 27, 64, 125, …	N25
Read, write and evaluate powers	
Find square roots, cube roots and other roots (using √ symbols)	N25
Use a scientific calculator to find powers and roots	N44
Recognise powers of 2, 3, 4 and 5	
Know that a number to the power zero is 1	

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	• 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 2	**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 that the angles in an equilateral triangle are 60 degrees	G16
Find missing angles in isosceles 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	
Work out the angle sum for any polygon using triangles	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.
Pay attention to detail.

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Unit 3 – Calculating 2	**MathsWatch**
Add whole numbers (integers) and decimals	N3b, N13a, N13b
Subtract whole numbers and decimals	N4b N14a, N14b
Multiply with whole numbers	N5 N15a, N28a
Multiply integers and decimals by a decimal	N15b, N28b N40a
Divide a whole number or decimal by a one or two digit number	N6, N16 N29a, N29b
Divide integers by a decimal	N40b
Add and subtract with negative numbers	N19a
Multiply and divide with negative numbers	N19b
Order of operations (BIDMAS)	N20
Use a scientific calculator	N44

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 2	**MathsWatch**
Recognise: expression, equation, inequality, term, formulae, function	A2
Know and use basic algebraic notation ('rules' of algebra): ab in place of a x b 3y in place of y + y + y and 3 x y a^2 in place of a x a a^3 in place of a x a x a $\frac{a}{b}$ in place of a ÷ b use of brackets a^2b in place of a x a x b	A4
Write simple expressions from words	A4
Simplify expressions by collecting like terms	A6
Simplify expressions using rules of indices for multiply and divide	A7a, A7b
Expand a single bracket	A8
Expand two brackets and simplify	A18
Factorise an expression with a single bracket using the HCF	A9
Substitute positive/negative numbers into expressions and formulae	A10
Use function machines to work out outputs and inputs	N26
Rearrange a formula by changing the subject	A13a, A13b

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 Input / output Rearrange Changing the subject	• Computer Programmers • Engineering (All types) • Finance – Economists, planner, accountants. • Scientists • Cooking (Substitution)  **Career Transferable Skill** **Useful Personality Traits** Determination

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Unit 5 – Measuring 2	**MathsWatch**
Understand and use labelling notation for angles Use a protractor to measure and draw angles	G10a G10b G10c
Understand and use labelling notation for lengths Use a ruler to measure and draw line segments	
Use compasses to draw arcs and circles	
Use ruler and protractor to construct a triangle from a description	G15
Know that congruent shapes have equal sides and equal angles	G31
Know and use the rules for congruent triangles (SSS, SAS, ASA, RHS)	G31
Use and interpret scale factors, scale diagrams and maps	R6, G15
Know that similar shapes are enlargements and angles are equal	R10
Understand enlargement	G28
Enlarge a shape	G28

Key Vocabulary		**Careers**
Acute Right Angle Obtuse Reflex Full Turn Vertex Arm Degree Estimate Ruler Protractor Compasses Accurate Construct Measure Line Segment Parallel Equal	Arc Congruent Identical Hypotenuse Scale Scale factor Multiplier Similar Enlarge Centre	• Architects • Visual Design • Construction and Installation • Production • Pilot/Air Traffic Controller • Artists  **Career Transferable Skill** Useful Personality Traits. Creativity

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Unit 6 – Place Value 2	**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, identify values of given digits	N1a, N1b
Order a set of integers and decimals	N2a, N2b
Round a number to the nearest 1000, 100, 10 or whole number	N27a
Round a number to a specified number of decimal places	N27b
Round numbers to a specified number of significant figures	N38
Estimate calculations by rounding to one significant figure	N43a, N43b
Estimate and check if solutions are the correct size	
Decide if answers will be an overestimate or underestimate	
Be familiar with 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 Decimal point Order Compare Ascending Descending Round Round up Round down Nearest Decimal place Significant figure Estimate Approximate Upper/Lower bound	• Business and Finance • Management • Sports • Data Science  **Career Transferable Skill** **Analytical Skills.** Pay attention to detail

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Unit 7 – Representing 2	**MathsWatch**
Construct and interpret frequency tables	S3, S4
Construct and interpret pictograms	S1a, S1b
Construct and interpret bar charts Construct and interpret comparative bar charts	S2a, S2b, S5
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	Width	• Marketing
Sample	Height	• Business and Finance
Discrete	Gap	• Social Science
Continuous	Dual/multiple bar chart	• Sports
Primary	Compound/composite bar chart	• Media including journalism
Secondary	Vertical line chart	• And many more….
Qualitative	Pie chart	
Quantitative	Sector	
Interpret	Category	
Frequency	Proportion	
Frequency table	Percentage	
Tally chart	Bivariate	
Scale	Scatter graph	
Label	Correlation	
Plot	Positive/negative correlation	
Pictogram	Line of best fit	
Key	Interpolation, extrapolation	
Bar chart	Reliable/unreliable	



Career Transferable Skill

Analytical Skills

Construct logical arguments and expose illogical ones.

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Unit 8 – Fractions 3	**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
Understand reciprocals and find the reciprocal of an integer or fraction	(GCSE) 75

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



Career Transferable Skill

Analytical Skills.

Manipulate precise and intricate ideas.

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Unit 9 – Equations 2	**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	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	• Engineering (all types) • Finance and Accounting • Computer Programming • Scientist • Operational Research • Business



Career Transferable Skill

Problem Solving Skills.

Formulate a problem in precise terms, identifying the key issues.

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Unit 10 – Probability 2	**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

Key Vocabulary		**Careers**
Probability Chance Likelihood Impossible Unlikely Likely Even chance Certain Random Fair Biased Event Outcome Frequency Equally likely Mutually exclusive Sample space Two-way table	Combined Expected Expectation Experiment Trial Theoretical probability Experimental probability Relative frequency Frequency tree	• 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 11 – Perimeter, Area & Volume 2	**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
Name parts of a circle: radius, diameter, circumference, arc, sector, segment, chord, tangent	G2
Circumference of a circle (C = π x diameter)	G22a
Area of a circle (Area = πr^2)	G22b
Area of compound shapes involving triangles and rectangles (or parts of circles)	G24
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
Use Pythagoras' Theorem to find lengths in a right-angled triangle ($c^2 = a^2 + b^2$ where c is the hypotenuse)	G30

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 Pythagoras's Theorem Hypotetuse Square	• Construction • Dentist • Surveyor • Architect • Animation and art-based careers  **Career Transferable Skill** **Critical thinking** Observation, analysis and inference

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Unit 12 – Ratio 2	**MathsWatch**
Use ratio notation to describe the comparison of quantities	R1a, R1b
Simplify ratios, including those with units	R5a
Write a ratio in the form 1 : n or n : 1	
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 direct proportion	R8

Key Vocabulary		**Careers**
Ratio Part Whole Equivalent Simplify Scale factor Proportion Fraction Convert Multiplier Share Divide Scale Scale factor Recipe Quantity Proportion Proportional		• 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 13 – Graphs 1	**MathsWatch**
Read and plot coordinates	A1a, A1b
Plot graphs of linear functions written in the form $y = ax + b$	A14a
Read values for x or y from a graph	
Know linear graphs have an intercept and rate of change (gradient)	A14b, A14c
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 Quadratic		• 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.

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Unit 14 – Percentages 2	**MathsWatch**
Know that percentage means parts per hundred	N24a
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%	
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 problems in context using a calculator, including percentage change problems	

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.

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Unit 15 – Sequences 2	**MathsWatch**
Use a term-to-term rule to generate a sequence	A11a
Identify a term-to-term rule and continue the sequence	N12, A11a
Understand that a sequence can be generated and described by a position-to-term rule	A11b
Substitute numbers into a position-to-term rule	A11b
Understand and recognise an arithmetic sequence (the term-to-term rule involves addition or subtraction)	
Find the nth term of an arithmetic progression	A11c
Determine whether a number is a term of a given arithmetic sequence	
Understand and recognise a geometric sequence (the term-to-term rule involves multiplying or dividing)	
Understand the features of, and recognise, number sequences for: Square numbers (1, 4, 9, 16, 25, 36, 49, 64, 81, 100…) Cube numbers (1, 8, 27, 64, 125, …) Triangle numbers (1, 3, 6, 10, 15, 21, 28, 36, …)	A22
Appreciate there are other sequences such as quadratic and Fibonacci (eg 1, 1, 2, 3, 5, 8, 13, …)	A22

Key Vocabulary		**Careers**
Sequence Term Pattern Rule Generate Continue Ascending Descending Difference Ratio Multiplier Rule Term-to-term rule Position Position-to-term rule Nth term Arithmetic sequence Common difference	Geometric sequence Common ratio Square numbers Cube numbers Triangle numbers Quadratic sequence Fibonacci sequence	• Finance and Business • Scientists • Production • Agriculture  **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 – Fractions 4	**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.

Year 8 Maths: Personalised Learning Checklist (PLC) – Core & Extension

Learning Journey

8.1	Numbers & the Number System 2
8.2	Angles 2
8.3	Calculating 2
8.4	Manipulating 2
8.5	Measuring 2
8.6	Place Value 2
8.7	Representing 2
8.8	Fractions 3
8.9	Equations 2
8.10	Probability 2
8.11	Perimeter, Area & Volume 2
8.12	Ratio 2
8.13	Graphs 1
8.14	Percentages 2
8.15	Sequences 2
8.16	Fractions 4
8.17	Symmetry & Transformations 2
8.18	Analysing 2
8.19	2D & 3D Shapes 2

Unit 17 – Symmetry & Transformations 2	**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	
Describe the resultant of multiple transformations using a single transformation	
Know that a point is 'invariant' if it doesn't move after a transformation	

Key Vocabulary		**Careers**
Coordinate Plot Horizontal Vertical Diagonal Equation Graph Reflection Reflect Symmetrical Object Image Congruent	Rotation Rotate Clockwise Anticlockwise Angle of rotation Translation Translate Right Left Up Down Vector Invariant	• Computer Games Design • Animation • Art related careers • Architecture • Advertising  **Career Transferable Skill** **Useful Personality Traits.** Creativity

Year 8 Maths: Personalised Learning Checklist (PLC) – Core & Extension

Learning Journey

8.1	Numbers & the Number System 2
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8.15	Sequences 2
8.16	Fractions 4
8.17	Symmetry & Transformations 2
8.18	Analysing 2
8.19	2D & 3D Shapes 2

Unit 18 – Analysing 2	**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

Key Vocabulary		**Careers**
Data Sample Statistics Distribution Frequency Average Typical Representative Mode Modal value Most frequent value No mode Median Ordered Middle value	Mean Total Sum Range Spread Consistent Consistency Maximum Minimum Difference Compare Outlier Limitation Grouped data Estimate Midpoint	• 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.

Year 8 Maths: Personalised Learning Checklist (PLC) – Core & Extension

Learning Journey

8.1	Numbers & the Number System 2
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8.12	Ratio 2
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8.17	Symmetry & Transformations 2
8.18	Analysing 2
8.19	2D & 3D Shapes 2

Unit 19 – 2D & 3D Shapes 2	**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	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

Key Vocabulary	
Line of symmetry	Circumference
Rotational symmetry	Radius
Rotate	Diameter
Order	Sector
Scalene triangle	Chord
Isosceles triangle	Segment
Equilateral triangle	Tangent
Equal	Face
Square	Edge
Rectangle	Vertex (vertices)
Parallelogram	Net
Rhombus	Cube
Trapezium	Cuboid
Kite	Prism
Opposite	Cylinder
Parallel	Pyramid
Adjacent	Cone
Arc	Sphere

Careers

- Construction
- Games Design including illustration and animation
- Engineers
- Architects including Interior Design
- Fashion
- Marketing including advertising



Career Transferable Skill

Useful Personality Traits.

Creativity