Curriculum Overview Year 8

19 Number: Four Operations II

Support	Core	Extension
• use apply four operations, including formal written methods, to integers, • Calculate with positive indices (roots) using written methods • Use a calculator to evaluate numerical expressions involving powers (roots) • Use inequalities to describe the range of values for a rounded value • Know and apply the order of operations BODMAS • Estimation • Negative numbers • To be able to multiply and divide decimals • Worded integer and decimal problems • Enter negative numbers into a calculator • Negative number worded problems	• use apply four operations, including formal written methods, to integers, decimals, proper/improper fractions and mixed numbers – all both positive and negative • Worded decimal problems	• Solve problems with maximum and minimum values of a rounded quantity • Interpret scientific calculator display for standard form. Identify the min/max values of a rounded quantity (d.p. and s.f.)

Unit 20 Number: Number Properties II

Support	Core	Extension
• Calculate with positive indices (roots) using written methods • Use a calculator to evaluate numerical expressions involving powers (roots) • Understand what factors, multiples and prime numbers are • Recall prime numbers up to 50 • Know how to test if a number up to 150 is prime • identify first 10 triangular numbers • Know the meaning of a common multiple (factor) of two numbers • Identify common multiples (factors) of two numbers • Index powers • Square roots	• Prime factorisations • HCF and LCM • Indices	• Write a large/(small) number in standard form • Interpret a small number written in standard form • Convert index form into standard form e.g. 23×10^7 • Enter into a scientific calculator a standard form calculation • Calculate with negative indices in the context of standard form • Add/subtract numbers written in standard form • Multiply/divide numbers written in standard form •

Unit 21 Number: Fractions, Decimals & Percentages

Support	Core	Extension
• Convert between mixed numbers and top-heavy fractions • compare and order fractions, including fractions > 1, use common factors to simplify fractions; use common multiples to find a common denominator • associate a fraction with division and calculate decimal fraction equivalents for a simple fraction [for example, 0.375 for $^3/_8$] • Use the equivalence between fractions, decimals and percentages when solving problems • recall and use equivalences between simple fractions, decimals and percentages, including in different contexts • solve problems involving the calculation of percentages and the use percentages for comparison [for example 15% of 360 vs 12% of 400] • Write a percentage as a fraction • Convert a fraction to a decimal by scaling (when possible) • Write a decimal as a percentage • Write percentage as a decimal • Write a fraction as a percentage • Write a decimal as a fraction • Order fractions, decimals and percentages	• Write one quantity as a fraction of another where the fraction is less than 1 • Write one quantity as a fraction of another where the fraction is greater than 1 • Write a quantity as a percentage of another • Ordering fractions, decimals and percentages • Converting between fractions, decimals and percentages • Percentage increases and decreases • Use a calculator to change any fraction to a decimal • Use calculators to find a percentage of an amount and percentage increases/decreases • Worded percentage problems • Identify whether a fraction is terminating or recurring	• Identify the multiplier for a percentage increase or decrease when the percentage is greater than 100% • Use calculators to increase an amount by a percentage greater than 100% • Solve original value problems when working with percentages • Solve financial problems including simple interest •

Unit 22 Geometry: Properties of Angles II

Support	Core	Extension
• Establish the fact that angles in a triangle must total 180° • Recall and apply angle properties: angles at a point; angles on a straight line; vertically opposite angles • Identify and apply known angle facts in more complex geometrical diagrams • Use knowledge of angles to calculate missing angles in geometrical diagrams • Know that angles sums for angles in a triangle, quadrilateral, point and a straight line • Find missing angles in triangles, quadrilateral, point and a straight line	• Find missing angles in isosceles triangles • Explain reasoning using vocabulary of angles • To be able to recognise vertically opposite angles • Identify alternate angles and know that they are equal • Identify corresponding angles and know that they are equal • Use knowledge of alternate and corresponding angles to calculate missing angles in geometrical diagrams	• Use the fact that angles in a triangle total 180° to work out the total of the angles in any polygon • Find an interior angle in a regular polygon • Know exterior angle sum in any polygon • Establish the size of an exterior angle in a regular polygon • Measure and state a specified bearing Construct a scale diagram involving bearings • Use bearings to solve geometrical problems •

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Unit 23 Geometry: Construction II

Support	Core	Extension
- Construct angles using a protractor - Construct line segments using a ruler - Construct 2D shapes - Use compasses to construct clean arcs - interpret plans and elevations of 3D shapes	- Use ruler and compasses to construct the perpendicular bisector of a line segment - Use ruler and compasses to bisect an angle - Use a ruler and compasses to construct a perpendicular to a line from a point (at a point) - Construct a shape from its plans and elevations - Construct the plan and elevations of a given shape - Understand the meaning of locus (loci) - Know how to construct the locus of points a fixed distance from a point (from a line)	- Identify when to use the locus of points a fixed distance from a point (from a line) - Identify when a perpendicular bisector is needed to solve a loci problem - Identify when an angle bisector is needed to solve a loci problem - Use techniques to solve more complex loci

Unit 24 Geometry: Perimeter and Area II

Support	Core	Extension
• Know the vocabulary of circles • To be able to calculate the area and perimeter of 2D shapes	• To be able to calculate the area and perimeter of compound shapes • Calculate the area of a trapezium • recognise that shapes with the same areas can have different perimeters and vice versa • Know that the number π (pi) ≈ 3.1415926535. • Know the formula circumference of a circle: $C = \pi d = 2\pi r$ • Calculate the circumference of a circle when radius (diameter) is given • Know the formula area of a circle: $A = \pi r^2$	Calculate the area of composite shapes that include sections of a circle • Calculate the perimeter of composite shapes that include sections of a circle • Know the formula for finding the volume of a right prism (cylinder) • Calculate the volume of a cylinder

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Unit 25 Algebra: Algebraic Manipulation II

Support	Core	Extension
• use and interpret algebraic notation, including: ab instead of a × b; 3y instead of y + y + y and 3 × y; a^2 instead of a × a; a^3 instead of a × a × a; a/b instead of a ÷ b, brackets • To be able to expand and simplify brackets and more than 1 more bracket • Use fractions when working in algebraic situations • Substitute positive numbers into formulae	• To be able to identify inequalities, equations, formulae and identities • Identify common factors of terms (numerical and algebraic) in an expression • Substitute negative numbers, decimals and fractions into expressions • Factorise an expression by taking out common factors • Simplify expressions including terms with combinations of variables e.g. $3a^2b + 4ab^2 + 2a^2 – a^2b$	• Simplifying expressions involving perimeters, areas and angles • Expand and simplify double brackets • Index laws • Factorise double brackets

Unit 26 Algebra: Solving Equations II

Support	Core	Extension
• Identify the correct order of undoing the operations in an equation • Solve linear equations with the unknown on one side when the solution is a negative number • Check solution to an equation by substitution • use the symbols =, ≠, <, >, ≤, ≥ • Solve three-step equations (including the use of brackets) when the solution is a whole number • Solve three-step equations (including the use of brackets) when the solution is a fraction	• Solve linear equations with the unknown on both sides when the solution is a whole number, negative number and fraction/decimal • Solve linear equations with the unknown on both sides when the equation involves brackets • Solve equations involving perimeters, areas and angles • Solve linear equations from worded problems • Know the multiplication law of indices (division, power, zero)	• To be able to solve linear inequalities • To be represent inequalities on a number line • Know the meaning of the 'subject' of a formula • Change the subject of a formula when one step is required • Change the subject of a formula when a two steps are required

Unit 27 Algebra: Sequences and Graphs II

Support	Core	Extension
- Generate a sequence from a term-to-term rule - generate terms of a sequence from a term-to-term rule - recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions - To be able to work with coordinates in all four quadrants	- Understand the meaning of a position-to-term rule - To find the nth term of a sequence - Use the nth term of a sequence to deduce if a given number is in a sequence - To determine whether a number is in a sequence using the nth term - To create the Nth term from patterns/shapes - To be able to draw and recognise the equations of horizontal and vertical lines - Plot straight line graphs in the form y = mx + c	- Use the form y = mx + c to identify parallel lines - To be able to recognise gradients and intercepts - Recognise that the point of intersection of two graphs corresponds to the solution of a connected equation

Unit 28 Ratio: Ratio and Proportion II

Support	Core	Extension
• Identify ratio in a real-life context • Write a ratio to describe a situation • Understand the connections between ratios and fractions • Identify proportion in a situation • use ratio notation, including reduction to simplest form • Basic proportion, unit costs to solve problems (value for moneY •	• divide a given quantity into two parts in a given ratio in the form part : part or part : whole • Divide a quantity in two parts in a given part : part ratio • Divide a quantity in two parts in a given part : whole ratio • Express correctly the solution to a division in a ratio problem • Unitary method • Find a relevant multiplier in a situation involving proportion • Proportion problems - adapting recipes and value for money	• Understand the meaning of a compound unit • Identify when it is necessary to convert quantities in order to use a sensible unit of measure •

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Unit 29 Ratio: Speed

Support	Core	Extension
• Converting between units of time and distance • 12 and 24 hour clock • Km/h, miles/hour • Calculations involving time	• Know the connection between speed, distance and time • Solve problems involving speed • Find a relevant multiplier in a situation involving proportion • Time-distance graphs – interpreting and drawing • To be able to plot and interpret graphs involving speed, distance and acceleration.	• Understand the meaning of a compound unit • Identify when it is necessary to convert quantities in order to use a sensible unit of measure • To be able to recognise and plot real-life graphs •

Unit 30 Ratio: Proportional Reasoning

Support	Core	Extension
• Use known facts to derive further information about lines and angles in geometrical situations • Scale factors • Scale diagrams and maps	• Know the meaning of congruent shapes • Know the meaning of similar shapes • Identify similar shapes in a range of situations • Identify the information required to solve a problem involving similar shapes • Finding missing lengths in similar shapes • apply ratio to real life problems (conversions/comparisons/scaling/mixing); use scale factors, scale diagrams and maps •	• Know the criteria for triangles to be congruent (SSS, SAS, ASA, RHS) • Identify congruent shapes in a range of situations • Direct and inverse proportion • Know the structure of a simple mathematical proof; use known facts to create simple proofs • express a multiplicative relationship between two quantities as a ratio or a fraction; understand and use proportion as equality of ratios • To calculate scale factors for areas and volumes and find missing lengths

Unit 31 Statistics: Representing Data II

Support	Core	Extension
• Interpret and construct frequency tables • Know the meaning of categorical data • Know the meaning of discrete data • Construct and interpret bar charts and comparative bar charts • Construct simple pie charts when the total frequency is a factor of 360 •	• Interpret pie charts and know their appropriate use • Construct pie charts when the total frequency is not a factor of 360 • Choose appropriate graphs or charts to represent data • Plot a scatter diagram of bivariate data • Understand the meaning of 'correlation' • Interpret a scatter diagram using understanding of correlation	• To be able to draw a line of best fit by eye • To be able to estimate from scatter diagrams • Know when it is appropriate to use a line of best fit to estimate values • To understand that correlation doesn't necessary imply 'causation' • Interpret a scatter diagram using understanding of correlation • Interpret a wider range of non-standard graphs and charts • Construct graphs of time series • Interpret graphs of time series

Unit 32: Statistics: Averages and Range II

Support	Core	Extension
• Calculate and interpret the mean as an average • Find the median of a set of data when there are an even number of numbers in the data set • Understand the range as a measure of spread (or consistency) • Calculate the range of a set of data • Choose an appropriate approximation when required • Interpret a grouped frequency table for continuous data • Construct a grouped frequency table for continuous data	• Use the mean to find a missing number in a set of data • Know the meaning of continuous data • Find the mode from a frequency table • Find the median from a frequency table • Calculate the mean from a frequency table • Find the modal class of set of grouped data • Estimate the range from a grouped frequency table • Calculate an estimate of the mean from a grouped frequency table •	• Find the class containing the median of a set of data • Appreciate the pros and cons of different statistics (mean, median, mode, range) • Choose appropriate statistics to describe a set of data • Justify choice of statistics to describe data set • Analyse and compare sets of data •

Unit 33 Statistics: Probability II

Support	Core	Extension
• Identify equally likely outcomes	• Use experimental probability to calculate expected outcomes	• Know when to add two or more probabilities
• List outcomes of an event systematically	• Work out theoretical probabilities for equally likely outcomes	• Know when to multiply two or more probabilities
• Know how to represent probability as F/D/P	• Recognise when it is not possible to work out a theoretical probability for an event	• List outcomes of combined events using a tree diagram
• Know and apply fact that sum of probabilities for all outcomes = 1	• Use frequency trees to record outcomes of probability experiments	• Label a tree diagram with probabilities when events are dependent
• Use a table to list all outcomes of an event	• Make inferences about probabilities in frequency trees (not tree diagrams)	• Use a tree diagram to calculate probabilities of independent combined events
• Use theoretical probability to calculate expected outcomes	•	• Use a tree diagram to calculate probabilities of dependent combined events
• List outcomes using Carroll diagram (aka two-way table)		• List all elements in sets using a Venn diagram
• Calculate probabilities using possibility space		• Understand that relative frequency tends towards theoretical probability as sample size increases
• List all the outcomes for an experiment		
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Unit 34: Geometry: Volume and Surface Area II

Support	Core	Extension
- To be able to recognise nets of 3D shapes - To be able to calculate the volume of cubes and cuboids by counting cubes - To be able to recognise and draw plans and elevations - Understand the meaning of surface area	- To be able to calculate the volume and surface area of cubes, cuboids and triangular prisms. - To be able to find the volume and surface area of cylinders - Find the surface area of cubes/cuboids when lengths are known - Find missing lengths in 3D shapes when the volume or surface area is know	To be able to find the volume and surface area of composite solids

Unit 35: Geometry: Transformations

Support	Core	Extension
- To be able to recognise and carry out line and rotational symmetry - Find the scale factor of an enlargement	- To be able to carry out reflections, translations and rotations. - To be able to carry out reflections, translations and rotations on a coordinate axes - To be able to use vector notation for translations - To be able to enlarge shapes using a given scale factors - Use the centre and scale factor to carry out an enlargement with positive integer scale factor	- Use the centre and scale factor to carry out an enlargement with fractional scale factor - Find the centre of enlargement - identify, describe and construct congruent shapes, including on coordinate axes, by considering rotation, reflection and translation - To be able to carry out a combination of transformations