Curriculum: Mathematics

Excellence. No Excuses.

Year	Topic Detail and Sequence	Pre-requisite Knowledge	Key Vocabulary	Demonstrable Skills
7	**FDP** Conversions Comparisons What is a percentage? Percentages in shape **Algebra 3** Coordinates in 1 and 4 quadrants Shape using coordinates Midpoints Application of coordinates **Probability** Probability scale Basic probability – equally likely Relative frequency – (inc. experiments) Comparison and why Understand mutually exclusive (two events, finding correct probabilities) P(a) = 1 – p(not a)	Number work in AC1 and AC2. Coordinates (1st quadrant) Shapes, properties of. Right angles in shapes. Number scale Basic fractions and decimals	Fraction Denominator Numerator Percentage Axes Quadrant Coordinate Vertex Midpoint Probability Bias Unbiased Equally likely Outcome Relative Frequency Estimate Theoretical probability Mutually exclusive	**FDP** • Convert between fractions and decimals using place value • Compare the value of fractions and decimals • Interpret percentage as the operator 'so many hundredths of • Work out the percentage of a shape that is shaded • Shade a given percentage of a shape **Algebra 3** • Plot points in all four quadrants • Find and use coordinates of points identified by geometrical information, for example the fourth vertex of a rectangle given the other three vertices • Find coordinates of a midpoint, for example on the diagonal of a rhombus • Identify and use cells in 2D contexts, relating coordinates to applications such as Battleships and Connect 4 • Show step-by-step deduction in solving a geometrical problem – solving problems on a coordinate grid **Probability** • Probability scale • Recall that an ordinary fair dice is an unbiased dice numbered 1, 2, 3, 4, 5 and 6 with equally Likely outcomes • Understand and use the term relative frequency • Consider differences where they exist between the theoretical probability of an outcome and its relative frequency in a practical situation • Estimate probabilities by considering relative frequency • Understand when outcomes can or cannot happen at the same time • Use this understanding to calculate probabilities • Appreciate that the sum of the probabilities of all possible mutually exclusive outcomes must be 1 • Find the probability of a single outcome from knowing the probability of all other outcomes.

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8	**FDP** Conversions Comparisons **FDP of quantities** **FDP of shapes - inc length/area/volume** **Calculations with FDP** **Work out one quantity as a % or fraction of another** **FDP in proportion** **Algebra 3** Coordinates in 1 and 4 quadrants Shape using coordinates Midpoints Application of coordinates **Table of vales of $y = mx + c$** **Probability** Probability scale Basic probability – equally likely Relative frequency – (inc. experiments) Comparison and why Understand mutually exclusive (two events, finding correct probabilities) P(a) = 1 – p(not a) **Listing outcomes** **Two way tables** **Frequency trees** **Sample space diagrams**	Conversions fractions/decimals/percentages Comparisons fractions/decimals/percentages Number work in year 7 AC1/2 Coordinates in 1 and 4 quadrants Shape using coordinates Midpoints Application of coordinates Probability scale Basic probability – equally likely Relative frequency – (inc. experiments) Comparison and why Understand mutually exclusive (two events, finding correct probabilities) P(a) = 1 – p(not a)	Proportion Integer Proportion Straight line graph Gradient Intercept Random Fair Two way table Frequency tree	**FDP** • Use fractions, decimals or percentages to find quantities • Use fractions, decimals or percentages to calculate proportions of shapes that are shaded • Use fractions, decimals or percentages to calculate lengths, areas or volumes • Understand and use unit fractions as multiplicative inverses • Multiply and divide a fraction by an integer, by a unit fraction and by a general fraction • Interpret a fraction, decimal or percentage as a multiplier when solving problems • Work out one quantity as a percentage/fraction of another quantity • Use percentages, decimals or fractions to calculate proportions Algebra 3 • Recognise that equations of the form y = mx + c correspond to straight-line graphs in the coordinate plane with gradient m and y-intercept at (0, c). Probability • Use lists or tables to find probabilities • Understand that experiments rarely give the same results when there is a random process involved • Appreciate the 'lack of memory' in a random situation, for example a fair coin is still equally likely to give heads or tails even after five heads in a row • List all the outcomes for a single event in a systematic way • List all the outcomes for two events in a systematic way • Design and use two-way tables • Complete a two-way table from given information • Design and use frequency trees • Work out probabilities by counting or listing equally likely outcomes

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9	**FDP** Conversions Comparisons FDP of quantities FDP of shapes - inc length/area/volume Calculations with FDP **Conversions to find most efficient calculation** **Use of FPD in stats** **Real life percentages** **Simple interest (increasing decreasing by a %)** **Reverse percentage** **Algebra 3** Coordinates in 1 and 4 quadrants Shape using coordinates Midpoints Application of coordinates $y = mx + c$, finding grad and y intercept **Plotting functions (inc. straight line)** **Grad from two points** **Recognise (inc rearranging) lines that are parallel** **Find eqn of line (two points or 1 pt and grad)** **Probability** Probability scale Basic probability – equally likely Relative frequency – (inc. experiments) Comparison and why Understand mutually exclusive (two events, finding correct probabilities) P(a) = 1 – p(not a) Listing outcomes Two way tables Frequency trees Sample space diagrams **Convert between FDP for prob calcs** **Design/use two way tables** **Experimental probability design and use tables** **Comparisons between TP and RF** **Frequency Trees and other tables for prob** **Tree diagrams – basic** Pythagoras and Trigonometry **Pythagoras** **Trigonometry**	Conversions and comparisons : fractions/decimals/percentages FDP of quantities FDP of shapes - inc length/area/volume Calculations with FDP Coordinates in 1 and 4 quadrants Shape using coordinates Midpoints Application of coordinates y = mx + c, finding grad and y intercept Basic probability, fractions, decimals percentages. Triangles, angles in. Lengths. Ratio.	Data set Interest Reverse percentage Intersection Parallel Convert Equivalent Reliability Trial Tree diagram Pythagoras P Theorem Trigonometry Trigonometric ratios	**FDP** • Convert between fractions, decimals and percentages to find the most appropriate method of calculation in a question; for example, 62% of £80 is 0.62 x £80 and 25% of £80 is £80 ÷ 4 • Use fractions, decimals or percentages to interpret or compare statistical diagrams or data sets • convert values between percentages, fractions and decimals in order to compare them, for example with probabilities • Use percentages in real-life situations • Solve simple interest problems • Calculate reverse percentages **Algebra 3** • Work out the gradient and the intersection with the axes. • Draw graphs of functions in which y is given explicitly or implicitly in terms of x • Complete tables of values for straight-line graphs • Calculate the gradient of a given straight-line given two points or from an equation • Manipulate the equations of straight lines so that it is possible to tell whether lines are parallel or not • Work out the equation of a line, given two points on the line or given one point and the gradient **Probability** • Convert values between percentages, fractions and decimals in order to compare them, for example with probabilities • Design and use two-way tables • Complete a two-way table from given information • Complete a frequency table for the outcomes of an experiment • Understand and use the term relative frequency • Consider differences, where they exist, between the theoretical probability of an outcome and its relative frequency in a practical situation • Understand that the greater the number of trials in an experiment, the more reliable the results are likely to be • Understand how a relative frequency diagram may show a settling down as sample size increases, enabling an estimate of a probability to be reliably made; and that if an estimate of a probability is required, the relative frequency of the largest number of trials available should be used. • Complete a frequency tree from given information • Use a frequency tree to compare frequencies of outcomes • Complete tables and/or grids to show outcomes and probabilities • Complete a tree diagram to show outcomes and probabilities **Pythagoras and Trigonometry** • Understand, recall and use Pythagoras' theorem in 2D problems • Understand, recall and use trigonometric ratios in right-angled triangles • Use the trigonometric ratios in right-angled triangles to solve problems

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10	**FDP** Conversions Comparisons FDP of quantities FDP of shapes - inc length/area/volume Calculations with FDP Conversions to find most efficient calculation Use of FPD in stats **% inc/dec (using a multiplier)** **Repeated proportional change** **Exponential growth as a multiplier/power – (inc problems (H*))** **Algebra 3** Coordinates in 1 and 4 quadrants Shape using coordinates Midpoints Application of coordinates y = mx + c, finding grad and y intercept Table of vales of y = mx + c Plotting functions (inc. straight line) Grad from two points Recognise (inc rearranging) lines that are parallel Find eqn of line (two points or 1 pt and grad) **Show lines are parallel/perp (neg reciprocal) (H*)** **Quadratic graphs – finding features of** **QTS and use for turning point (H*)** **Plot graphs –inc linear/quad/reciprocal – finding approx. values** **Trig graphs (H*)** **Eqn of a circle (H*)** **Intersection circle/straight line, eqn tangent to graph (H*)** **Probability** Probability scale Basic probability – equally likely Relative frequency – (inc. experiments) Comparison and why Understand mutually exclusive (two events, finding correct probabilities) P(a) = 1 – p(not a) Listing outcomes Two way tables Frequency trees Sample space diagrams Design/use two way tables Experimental probability design and use tables Comparisons between TP and RF Frequency Trees Tree diagrams – basic **Set theory (venn diagrams and notation)** **Tree diagrams** **Conditional probability** Pythagoras and Trigonometry Pythagoras – **bearings** **Pythagoras - 3D (H*)** Trigonometry **Trigonometry –bearings, exact values** **Trigonometry 3D (H*)** **Sine and cosine (inc 3D) (H*)** **Area of non right-angle triangles (H*)**	Conversions and comparisons : fractions/decimals/percentages FDP of quantities FDP of shapes - inc length/area/volume Calculations with FDP Coordinates in 1 and 4 quadrants Shape using coordinates Midpoints Application of coordinates y = mx + c, finding grad and y intercept Basic probability, fractions, decimals percentages. Triangles, angles in. Lengths. Ratio. Pythagoras and Trigonometry from year 9 AC3	Percentage increase Percentage decrease Exponential growth Exponential decay Compound interest Perpendicular Reciprocal Negative reciprocal Quadratic graph Parabola Roots Turning point Linear Cubic Function Sine/cosine/tangent Set theory Venn Diagram Independent Dependent Conditional Bearing Exact values Sine rule for area	**FDP** • Calculate a percentage increase or decrease • Solve percentage increase and decrease problems, for example, use 1.12 Q to calculate a 12% increase in the value of Q and 0.88 x Q to calculate a 12% decrease in the value of Q • Solve problems involving repeated proportional change • Use calculators to explore exponential growth and decay using a multiplier and the power • Solve compound interest problems • Model growth and decay problems mathematically • Solve growth and decay problems, for example using multipliers or iterative processes **Algebra 3** • Work out/show that the gradients of lines that are parallel and perpendicular to a given line • Manipulate the equations of straight lines so that it is possible to tell whether lines are perpendicular • Know that the gradients of perpendicular lines are the negative reciprocal of each other • Draw and interpret quadratic graphs by finding roots, intercepts and turning points • Complete the square and deduce turning points • Draw, sketch, recognise and interpret linear/quadratic/ cubic functions/reciprocal • Find an approximate values of functions (x given y, y given x) • Draw, sketch, recognise and interpret graphs of the form y = kx for positive values of k • Know the shapes of the graphs of functions y = sin$x$, y = cos$x$ and y = tan$x$ • Recognise /write down the equation of a circle, centre (0, 0), radius r • Work out coordinates of points of intersection of a given circle and a given straight line • Use the fact that the angle between the tangent and radius is 90° to work out the gradient of a tangent and hence the equation of a tangent at a given point **Probability** • Complete a tree diagram to show outcomes and probabilities • Understand that P(A) , P(A/), P(A ∪ B) and P(A ∩ B) • Venn diagrams for probability • Know when it is appropriate to add / multiply probabilities • Understand the meaning of independence for events and calculate probabilities when events are dependent • Understand the implications of with or without replacement problems for the probabilities obtained • Complete a tree diagram to show outcomes and probabilities • Use a tree diagram as a method for calculating probabilities for independent or dependent events • Understand conditional probability • Understand the implications of with or without replacement problems for the probabilities obtained • Complete a tree diagram to show outcomes and probabilities • Use a tree diagram as a method for calculating conditional probabilities • Use a Venn diagram as a method for calculating conditional probabilities **Pythagoras and Trigonometry** • Use the trigonometric ratios in right-angled triangles to solve problems, including those involving bearings • Understand, recall and use Pythagoras' theorem in 3D problems • Understand, recall and use trigonometric ratios in 3D problems • Use these ratios in 3D contexts, including finding the angles between a line and a plane • Recall exact values of sine, cosine and tangent for 0°, 30°, 45° and 60° - recall that sin90°=1 and cos90°=0 • Solve right-angled triangles with angles of 30°, 45° or 60° without using a calculator • Use the sine and cosine rules to solve 2D and 3D problems • Calculate the area of a triangle using ½ ab sin C • Calculate the area of a triangle given the length of two sides and the included angle.