Key Stage 3 Progression Mapping

Year 8 – Summer Term

Objective	Emerging	Developing	Secure	Mastered
Unit#1: Proportional Problem Solving				
DfE: RPR9: I can… "solve problems involving direct and inverse proportion, including graphical and algebraic representations"	• recognise the difference between ratio and proportion • express a proportion as a fraction or a percentage • understand proportion (e.g. using rectangles & enlargement) • solve problems involving simple direct proportion	For situations that are directly proportional: • solve problems algebraically [e.g. recipe problems] • write formulae representing them • draw and recognise graphs of them (e.g. currency exchange rates)	Use graphs to solve problems involving *direct* proportion For *inverse* proportion: • understand it (e.g. using area of rectangle) • write a formula to express it • use algebra to solve problems involving it (possibly use rectangle "model")	For an *inversely* proportional relationship: • sketch a graph representing it • recognise a graph representing it • solve problems involving it *by* using a graph
Unit#2: Spatial Problem Solving				
DfE: GM13: I can… "apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides, including Pythagoras' Theorem, and use known results to obtain simple proofs"	Identify 2D shapes that are • similar • congruent (including using triangle rules) For congruent & similar triangles, find missing: • lengths of sides • angles	Identify six basic quadrilateral types using angle, side & diagonal facts For quadrilaterals, find missing: • angles • lengths of sides For hypotenuse of a right-angled triangle, identify it	From mathematical diagrams, give geometrical proof for missing • lengths of sides • angles Recognise proofs of Pythagoras' theorem; noting $x^2+y^2=r^2$ within a circle & algebraic links	Find missing angles and lengths of sides based upon knowledge of Pythagoras' Theorem
DfE: GM14: I can… "use Pythagoras' Theorem and trigonometric ratios in similar triangles to solve problems involving right-angled triangles"	For hypotenuse of a right-angled triangle, identify it (where two side-lengths are given or otherwise) State Pythagoras' Theorem as a formula Label the sides of a right-angled triangle with trigonometric names where a non-90^o angle is given	For Pythagorean Triples • explain them • use their multiples to solve problems • test whether three numbers form a triple • recall the first two triples In a right-angled triangle problem, calculate the missing length of • the hypotenuse • a shorter side	Calculate length of a line segment between two coordinates Answer problems needing missing lengths: • for an isosceles triangle, by forming two congruent right angled triangles • for a right-angled triangle, by forming two smaller (mathematically similar) right-angled triangles	Calculate the ratios for the sine, cosine and tangent functions Distinguish problems where trigonometry rather than Pythagoras' theorem is needed and: • Identify which trigonometric function is needed • Use it to find a solution

DfE: GM15: I can… "use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to solve problems in 3-D"	Create & solve simple counting / identification problems (e.g. using faces, edges, vertices) for single solids in 3D (e.g. a regular solid has 8 vertices, how many faces does it have?) + Euler's formula	Create & solve simple counting / identification problems (e.g. using faces, edges, vertices) for compound shapes in 3D (e.g. a regular solid has 8 vertices, how many faces does it have?)	Use knowledge of properties of individual and compound 3D solids to solve "real life" problems (e.g. pathway over / around /through solids on an obstacle course; wrapping / painting; filling)	Further problem solving incorporating: • Complex pathways (e.g. diagonal around a cylinder) • Pythagoras in full 3D • More complex volumes (e.g. pyramids/cones)
Unit#3: Chance				
DfE: P3: I can… "enumerate sets and unions/intersections of sets systematically, using tables, grids and Venn diagrams"	Use a Carroll diagram (two-way table) to sort data into two sets: understanding that data in both sets is counted only once Find the data for the intersection of two sets (e.g. by creating then solving equation)	Transfer data from a Carroll diagram (two-way table) into its appropriate regions on a Venn diagram Understand (highlight / name / quantify) initial ideas of Venn Diagrams: • union of sets • intersection • universal set	Understand (highlight / name / quantify) further ideas of Venn Diagrams: • complement • element • n(A) for set A Draw Venn diagram representing "real life" data showing: • 2 intersecting sets • 3 intersecting sets	Understand importance of first finding the intersection when completing a Venn Diagram (e.g. using algebra to find it) Extract data from parts/whole of Venn diagram Read a problem and when possible, solve it by using a Venn diagram
DfE: P4: I can… "generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities"	Use the probability scale confidently	Create a sample space to: • represent a situation • calculate the theoretical probability of a particular outcome	Draw & use a sample space to: • show all possible outcomes in a given situation • calculate theoretical probability in a given situation • discuss how probability can change when more information is known about a situation	Understand how probability helps to predict trends in large numbers of events (convergence of *experimental probability* with *theoretical probability*) . Apply theoretical probability to number of experiments. Interpret probabilities in order to understand and make decisions around risk and uncertainty (e.g. financial maths)
Unit#4: Interpreting Relationships				
DfE: GM16: I can… "interpret mathematical relationships both algebraically and geometrically"	Assess algebraic relationships for truth: are identities valid? Distinguish expressions, equations & formulae.	Identify different ways (& related formulae) to calculate to/from perimeter & area of 2D shapes such as: • quadrilaterals • regular polygons • circles • gradients	Explore and explain algebraic relationships • within two or more proofs of Pythagoras' Theorem • within angle rules • between angles & gradients	Select the appropriate formula to use to solve problems Rearrange formulae to help solve 3D problems (e.g. finding height from volume & radius of cylinder)

Unit#5@ Precision & Competition				
DfE: RPR10: I can… "use compound units such as speed, unit pricing and density to solve problems"	Calculate speed from a given distance travelled and time taken Calculate distance travelled given an average speed and time taken Can calculate the time taken to complete a journey given a distance travelled and average speed	Calculate the density of an object given the mass and volume Calculate the mass of an object given the density and volume Calculate the volume of an object given the mass and density	Compare the value of two or more products using the unitary method to establish which offers the best Value for Money	Identify a range of different compound measures (e.g. population density) and related multiplication and division relationships Use compound measures to solve problems in context
DfE: N13: I can… "round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures]"	Round to the nearest whole unit Use decimal places: • to round a number • to round units of measure	Use the rules for rounding to significant figures • to round whole numbers • to round numbers with decimals • to round units of measure Identify the most significant figure in any number	Compare the results of rounding the same number to significant figures and decimal places at different stages of calculation comparing resulting approximations with the precise answer Recognise which type of rounding is the most appropriate to use at/in different stages/situations	Use significant figures to make estimations /approximations Round off amounts of money appropriately at different stages of calculations depending on purpose (estimation / approx. v. precision) Calculate costs based on amounts that have been rounded [noting lower & upper limits]
DfE: S3: I can… "describe simple mathematical relationships between 2 variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs"	Plot a neat and accurate scatter graph: • using a pencil and ruler • using an appropriate title and labels to show what the scatter graph represents	Read and interpret points on a scatter graphs Identify, describe and interpret correlation Describe the relationship between two variables	Draw a line of best fit on a scatter graph Make a prediction using a line of best fit For outliers: • notice them • identify possible causes of them	Find gradient of line of best fit Create equation for line of best fit Describe the risks of extrapolation compared to interpolation
DfE: N14: I can… "use approximation through rounding to estimate answers and calculate possible resulting errors expressed using inequality notation $a<x\leq b$"	Identify and explain inequality symbols Insert inequality notation into maths statements Convert sentences into mathematical notation using inequalities	Round quantities and amounts (incl. fractions) to • decimal places • significant figures Use rounded figures to make estimates	Use inequality notation to express the relative value of estimates (based on figures rounded at earlier stages) compared to precise solutions State lower & upper limits of accuracy	Make approximations using rounded figures (e.g. "answer is between 3 and 4") Express possible errors of approximation using inequality notation