

Higher

Crossover

Foundation

Autumn 1	Unit A10 - Advanced Linear Graphs, Equations and Inequalities How do I calculate the gradient of a line and identify if lines are parallel? Can I solve simultaneous equations? How do I find approximate solutions of two equations using two straight lines graphs? How do I solve two simultaneous equations, where one is linear and the other quadratic? Maritime: Marine Navigation Officer Uses gradients and simultaneous equations to calculate course corrections, tidal effects, and collision-avoidance paths when plotting straight-line routes on nautical charts. Careers: Civil Engineer Uses linear graphs and simultaneous equations to model load distributions, road gradients, and structural alignment. Unit GM4-6 Essentials How do I construct congruent shapes by considering translation, reflection and rotation? Can I enlarge a shape by whole, fractional and negative scale factors? What is the formula for Pythagoras' theorem? Can I apply the formula to find missing lengths in 2D triangles presented in a variety of real-life contexts? What are the trigonometric ratios? Can I recall the exact values of sine, cosine and tangent for 0°, 30°, 45°,60° and 90°? Can I apply the trigonometric ratios to find unknown angles and lengths? What formulae do I use to calculate the area of triangles, circles, parallelograms and trapeziums? How do I find the circumference or arc length of a circle? What do I know about the angle between a radius and a tangent? Can I draw a diagram to represent the alternate segment theorem? Maritime: Naval Architect Uses trigonometry and Pythagoras to calculate hull angles, stability triangles, and cross-sections of ship designs. Careers: Architect Uses transformations, area formulae, and trigonometry to design buildings, roofs, and structural layouts.	NP 4-9 Indices Order of operations, Directed number, FDP, Estimation Can I use positive integer powers and associated real roots (square, cube and higher), and recognise powers of 2, 3, 4, 5? Can I estimate powers and roots of any given positive number? Can I calculate with roots, and with integer and fractional indices? Can I use the correct order for operations? Can I calculate with negative numbers? How do I order positive and negative fractions? How do I apply the four operations, including formal written methods, to simple fractions (proper and improper) and mixed numbers - both positive and negative? How do I calculate exactly with fractions? Can I define percentage as 'number of parts per hundred'? Can I interpret percentages and percentage changes as a fraction or a decimal and interpret these multiplicatively? Can I express one quantity as a percentage of another? How do I solve problems involving direct and inverse proportion, including graphical and algebraic representations? Maritime: Navigation Officer uses these skills to calculate position, speed, and direction accurately at sea Careers: Scientist uses powers, standard form, and calculations when working with very large/small values and formulas	NP 1-3 - Basic Number, Factors, and Multiples Can I apply the four operations, including formal written methods, to integers both positive and negative? Do I recognise and use relationships between operations including inverse operations? Can I estimate answers and use approximation? Do I know the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem? Can I apply systematic listing strategies? Maritime: Marine Engineer uses these skills when working with engines, fuel systems, and maintenance calculations Careers: Electrician uses factors and multiples to safely calculate circuits and loads NP 4-7 - Indices Order of operations, directed number Can I use positive integer powers and associated real roots (square, cube and higher), and recognise powers of 2, 3, 4, 5? Can I estimate powers and roots of any given positive number? Can I calculate with roots, and with integer and fractional indices? Can I use the correct order for operations? Can I calculate with negative numbers? Maritime: Navigation Officer uses calculations involving direction, depth, and coordinates (including negatives and scaling) Career: Scientist (e.g. chemist/physicist) uses powers, roots, and negatives in formulas and measurements
Autumn 2	Unit NP13 - Advanced Proportion and Rates of Change Can I calculate reverse percentages finding the original amount? How do I calculate compound interest? Can I solve problems involving growth, decay and repeated percentage change? How do I solve problems involving direct and inverse proportion, including graphical and algebraic representations? Do I understand that X is inversely proportional to Y is equivalent to X is proportional to $\frac{1}{Y}$? Maritime: Marine Logistics Planner Uses proportion and rates of change to calculate fuel consumption, cargo loading efficiency, and supply chain cost changes. Careers: Financial Analyst Uses compound interest and proportional reasoning to model investments, depreciation, and economic growth. Unit GM7 - Advanced Drawing, Measuring and Constructing Can I understand diagrams and draw front and side elevations and plans of shapes made from simple solids? Do I know how to draw 3D shapes on isometric paper? Maritime: Ship CAD Technician Creates detailed 3D models of ship components using elevations and isometric drawings. Careers: Product Designer Uses technical drawings and 3D representations to design consumer products and prototypes.	A3-8 - Manipulating and Simplifying Expressions, Linear Equations, Formula, Cartesian Grid, Sequences, Inequalities Can I expand and factorise a single bracket? Can I solve equations with an unknown on both sides? Can I solve equations containing brackets? Can I solve simple equations containing fractions? Can I form and solve equations? Can I substitute into a formula to find an unknown variable? Can I form formulae and use them to find unknowns? Can I rearrange linear formulae? Can I find the midpoint of a line segment? Can I plot a linear graph? Can I understand and use $y = mx + c$? Can I find the equation of a line from the gradient and y-intercept? Can I identify parallel lines from their equations? Can I plot a quadratic graph? Can I generate terms of a sequence? Can I find the nth term of a sequence? Can I recognise common sequences? Can I represent inequalities on a number line? Can I solve linear inequalities? Can I represent inequalities involving x or y by shading on a graph? Maritime: Naval Architect uses algebra and graphs to design ships and ensure they are stable and efficient Careers: Civil Engineer uses algebra and graphs to design structures and solve real-world problems	A 1-5 - Manipulating expressions, Linear equations, Formulae Can I substitute numerical values into formulae and expressions, including scientific formulae? Can I solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation)? Can I use conventional notation for priority of operations, including brackets, powers, roots and reciprocals? Can I understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors? How do I simplify and manipulate algebraic expressions by: collecting like terms, multiplying a single term over a bracket, and taking out common factors? Maritime: Naval Architect uses algebra to design ships and calculate forces, stability, and materials Careers: Civil Engineer uses algebra to design structures and solve real-world problems GM 1-3 - Drawing, measuring and construction, Polygons and angles, Area Can I use conventional terms and notations? For example: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries. Can I apply the properties of: angles at a point, angles at a point on a straight line, vertically opposite angles? Do I understand and can you use alternate and corresponding angles on parallel lines? Can I identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres? Can you find the surface area of pyramids and composite solids? Do you know and can you apply formulae to calculate area of triangles, parallelograms, and trapezia? Area of a circle = πr^2? Can I calculate surface area of spheres, cones and composite solids? Maritime: Deck Officer uses angles and geometry for navigation, bearings, and positioning ships Careers: Architect uses angles, shapes, and area to design buildings
Spring 1	Unit SP4 - Continuous Data Can I plot a cumulative frequency graph given a table of data? How do I estimate the median from a cumulative frequency graph? What are the five main values needed to draw a box plot? How do you calculate an estimate for the mean of a grouped frequency distribution? Maritime: Marine Environmental Scientist Uses cumulative frequency graphs and box plots to analyse ocean temperature data, pollution levels, and species population trends. Careers: Data Analyst Uses continuous data techniques to summarise customer behaviour, manufacturing output, or health statistics. Unit SP5 - Set Theory and Logic Can I explain the difference between P(A U B) and P(A ∩ B)? Can I shade given areas and solve problems using Venn Diagrams where the diagrams may or may not be given? Maritime: Port Operations Manager Uses logic and Venn diagrams to organise cargo categories, berth availability, and overlapping safety zones. Careers: Computer Programmer Uses set theory and logic to design algorithms, manage data structures, and build decision-making systems.	NP 10-11 - Proportional Reasoning, Ratio How do I solve problems involving direct and inverse proportion, including graphical and algebraic representations? Do I understand that X is inversely proportional to Y is equivalent to X is proportional to $\frac{1}{Y}$? Can I apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing and concentrations)? Do I know how to express a multiplicative relationship between two quantities as a ratio or fraction? Do I understand and use proportion as equality of ratios? Maritime: Marine Engineer uses ratios for fuel mixtures, pressure systems, and mechanical efficiency Careers: Chef uses ratios for recipes and scaling ingredients GM 1-3 - Drawing, measuring and construction, Polygons and angles, Area Can I use conventional terms and notations? For example: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries. Can I apply the properties of: angles at a point, angles at a point on a straight line, vertically opposite angles? Do I understand and can you use alternate and corresponding angles on parallel lines? Can I identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres? Can you find the surface area of pyramids and composite solids? Do you know and can you apply formulae to calculate area of triangles, parallelograms, and trapezia? Area of a circle= πr^2? Can I calculate surface area of spheres, cones and composite solids? Maritime: Deck Officer uses angles and geometry for navigation, bearings, and positioning ships Careers: Architect uses angles, shapes, and area to design buildings	SP 1-2 - Discrete Data and Bivariate data Can I interpret and construct tables, charts and diagrams, including: frequency tables, bar charts, pie charts and pictograms for categorical data? Can I interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: appropriate measures of central tendency (median, mean, mode and modal class); or spread (range, including consideration of outliers)? Can I apply your understanding of statistics to describe a population? Can I infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling? Can I draw estimated lines of best fit? Can I interpolate and extrapolate apparent trends whilst knowing the dangers of doing so? Maritime: Port Operations Manager analyses shipping data, cargo trends, and logistics performance Careers: Data Analyst interprets trends and patterns in data NP 8-10 - FDP, Estimation and proportional reasoning How do I order positive and negative fractions? How do I apply the four operations, including formal written methods, to simple fractions (proper and improper) and mixed numbers - both positive and negative? How do I calculate exactly with fractions? Can I define percentage as 'number of parts per hundred'? Can I interpret percentages and percentage changes as a fraction or a decimal and interpret these multiplicatively? Can I express one quantity as a percentage of another? How do I solve problems involving direct and inverse proportion, including graphical and algebraic representations? Do I understand that X is inversely proportional to Y is equivalent to X is proportional to $\frac{1}{Y}$? Maritime: Marine Catering Officer / Logistics Officer uses proportions for food supplies, fuel, and cargo distribution Career: Pharmacist uses ratios, percentages, and proportions to measure medication accurately
Spring 2	Unit NP14 - Number Theory & Error Can I change recurring decimals into their corresponding fractions and vice versa? How do I apply and interpret limits of accuracy, including upper and lower bounds? How do I use inequality symbols to specify error intervals due to truncation or rounding to decimal places and significant figures? Maritime: Hydrographic Surveyor Uses bounds and error intervals when measuring seabed depth, sonar readings, and GPS accuracy. Careers: Quality Control Technician Uses limits of accuracy to ensure manufactured parts meet tolerance specifications. Unit A11 - Advanced Manipulating and Simplifying Expressions Can I multiply out two and three brackets? What does the term factorise mean? Can I simplify algebraic fractions by cancelling common factors and using index laws? How do I factorise quadratic expressions of the form $ax^2 + bx + c$? Maritime: Marine Engineer Uses algebraic manipulation to model engine performance, fuel efficiency equations, and pressure-flow relationships. Careers: Pharmacist Uses algebraic expressions to calculate drug dosages, concentration ratios, and chemical reaction equations.	NP 12-13 - Standard Form, Advanced Proportion and Rates of Change Can I write large numbers? Can I write small numbers? Can I write both large and small numbers accurately? Can I convert numbers into standard form? Can I multiply and divide numbers in standard form? Can I add and subtract numbers in standard form? Can I find the whole from a given amount? Can I find the whole after an increase or decrease? Can I calculate simple interest? Can I solve problems involving direct proportion? Can I interpret and draw graphs of direct proportion? Can I form and use algebraic direct proportion equations? Can I solve problems involving inverse proportion? Can I interpret and draw graphs of inverse proportion? Can I form and use algebraic inverse proportion equations? Can I calculate density? Can I calculate pressure? Can I calculate speed? Can I convert compound units? Can I solve problems involving ratio? Maritime: Marine Engineer uses rates (speed, pressure, density) and calculations to keep ship systems running safely Career: Pharmacist uses standard form, ratios, and rates to measure and calculate accurate doses	A 6-8 - The cartesian grid, sequences and inequalities Can I work with coordinates in all four quadrants? How do I solve geometrical problems on coordinate axes? How do I use the form $y = mx + c$ to identify parallel lines? How do I recognise and use the following: sequences of triangular, square and cube numbers, simple arithmetic, regression, Fibonacci-type sequences? How do I deduce expressions to calculate the nth term of linear sequences? How do I solve linear inequalities in one variable? How do I represent the solution set on a number line? Maritime: Marine Navigation Systems Technician uses coordinate grids (GPS) and patterns for route planning Careers: Software Developer uses coordinate systems and patterns (sequences) in coding and graphics
Summer 1	Unit A12 - Quadratic Graphs and Equations Can I factorise quadratic expressions? How do I solve quadratic equations using the quadratic formulae? Can I recall the quadratic formula? What does a completed square look like? How do I identify roots from a graph? Maritime: Offshore Structural Engineer Uses quadratic modelling to predict stress curves, wave impact forces, and bending moments on offshore platforms. Careers: Automotive Engineer Uses quadratics to model braking distances, suspension curves, and acceleration profiles. Unit GM8 - Surface Area and Volume What does the term surface area mean? How do I find the surface area of a cylinder? Do I know how to apply formulae to calculate volume of: spheres, pyramids, cones and composite solids? Given the volume, can I find other missing measurements of 3D shapes? Can I use ratios to solve problems with similar shapes? Maritime: Submarine Designer Uses surface area and volume calculations to design pressure hulls, ballast tanks, and buoyancy systems. Careers: Packaging Engineer Uses volume and surface area to design efficient containers, bottles, and storage solutions.	GM 4 - Area Can I identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres? Can you find the surface area of pyramids and composite solids? Do you know and can you apply formulae to calculate area of triangles, parallelograms, and trapezia? Maritime: Shipbuilder calculates surface areas for materials, coatings, and structural design Careers: Quantity Surveyor calculates area and surface area for cost estimates A 9-10 - Contextual graphs, Advanced Linear Graphs, and Equations Can I read and interpret contextual graphs? Can I draw contextual graphs? Can I calculate and interpret speed? Can I recall and apply my knowledge of linear graphs? Can I work with more complex equations? Can I calculate the gradient of a line? Can I identify and work with perpendicular lines? Can I solve simultaneous equations using graphs? Can I combine and scale equations? Can I solve simultaneous equations algebraically? Can I solve linear inequalities (recap skills)? Can I solve linear inequalities in two dimensions? Maritime: Port Operations Manager uses graphs to track ship movements, cargo, and efficiency in ports Careers: Data Analyst uses graphs to interpret trends and make decisions	GM 4 - Area Can I identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres? Can you find the surface area of pyramids and composite solids? Do you know and can you apply formulae to calculate area of triangles, parallelograms, and trapezia? Maritime: Shipbuilder calculates surface areas for materials, coatings, and structural design Careers: Quantity Surveyor calculates area and surface area for cost estimates SP3 - Probability How do I record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees? How do I apply the property that the probabilities of an exhaustive set of outcomes sum to 1? How do I construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities? Maritime: Maritime Safety Officer assesses risks (weather, collisions, equipment failure) using probability Careers: Risk Analyst / Insurance calculates likelihood of outcomes and risk
Summer 2	Unit A13 - Advanced Sequences Can I recognise different number patterns and identify different types of sequences? How do I deduce expressions to calculate the nth term of a sequence? Maritime: Oceanographer Uses sequences and patterns to model tidal cycles, wave patterns, and seasonal ocean changes. Careers: Software Developer Uses sequences to design algorithms, loops, and predictive models. Unit GM9 - Advanced Length and Area Can I apply the Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ to find unknown lengths and angles? How do I apply the Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$ to find unknown lengths and angles? What is the formula to find the area of a non-right angled triangle? How do I use ratio scales to solve problems involving maps and scale drawings? Can I solve problems involving measuring and drawing bearings? Maritime: Marine Pilot uses bearings and trigonometric rules to navigate ships through channels, harbours, and open sea routes. Careers: Surveyor uses Sine and Cosine rules to measure land boundaries, building plots, and triangulated distances.	SP 3 - Probability How do I record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees? How do I apply the property that the probabilities of an exhaustive set of outcomes sum to 1? How do I construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities? Maritime: Maritime Safety Officer assesses risks (weather, collisions, equipment failure) using probability Careers: Risk Analyst / Insurance calculates likelihood of outcomes and risk GM 5-6 -Right Angled Triangles, Circles Can I use Pythagoras' Theorem in 2D to find missing sides? Can I use Pythagoras' Theorem to prove a triangle is right-angled? Can I use Pythagoras' Theorem to find the distance between two points? Can I use trigonometric ratios to find missing sides in right-angled triangles? Can I use trigonometric ratios to find missing angles in right-angled triangles? Can I recall the exact values of $\sin \theta$, $\cos \theta$ and $\tan \theta$ for 0°, 30°, 45°, 60° and 90°? Can I identify the parts and properties of a circle? Can I find the circumference of a circle and the perimeter of semicircles and quadrants (in terms of π and as a decimal)? Can I find the area of a circle and the area of semicircles and quadrants (in terms of π and as a decimal)? Can I solve problems involving the circumference and area of a circle? Can I find the length of an arc and the area of a sector? Can I identify and use circle theorems? Maritime: Navigation Officer uses trigonometry and bearings to calculate distances and positions at sea Careers: Surveyor uses trigonometry and geometry to measure land distances and angles	NP11 - Ratio Can I apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing and concentrations)? Do I know how to express a multiplicative relationship between two quantities as a ratio or fraction? Do I understand and use proportion as equality of ratios? Maritime: Marine Engineer uses ratios for fuel mixtures, pressure systems, and mechanical efficiency Career: Chef uses ratios for recipes and scaling ingredients