Maths

Year 9

ALDER Community High School

Autumn			
Algebra 4	A4a. Straight line graphs	• Interpret straight line graphs • Find and use the equation of a straight line • Explore real-life inverse proportion graphs	**Key Vocabulary** Asymptote A straight line that a graph will never meet. Gradient The steepness of a line. Intercept The point where two lines cross. Linear Has a constant additive difference. Parallel Two straight lines that never intersect that are always the same distance apart (the same gradient). Perpendicular Two straight lines that intersect at a right angle (at 90°). Plot To use exact coordinates to produce a graph. Reciprocal A pair of numbers that multiply together to give 1 - a multiplicative inverse. Y-intercept The point at which the line crosses the y-axis. Co-ordinate A set of values that show an exact position on a graph - looks like (x,y).
	A4b. Mathematical relationships 2	• Revisit and extend to equations and inequalities with unknowns on both sides using all previous contexts: angles, probability, area, etc. • Change the subject of a formula • Reduce equations to the form y=mx+c	**Key Vocabulary** Subject The isolated variable. Inequality A mathematical relationship that compares two expressions showing if one is greater than, less than or equal to another. Inverse A mathematical opposite. Rearrange Change the way an equation is displayed using inverses. Solve Find a numerical value that satisfies a mathematical relationship (makes it true). Substitute Replace a variable with a numerical value. Variable A letter than represents an unknown number or a changeable quantity.
	A4c. Testing conjectures	• Test conjectures in a wide range of contexts • Sums and products of odd and even numbers • Is a given number in a sequence? • Is this a shape? • Are these lines parallel?	**Key Vocabulary** Binomial An expression of the sum or difference of two terms. Expand To multiply each term in the bracket by the coefficient. Factor An integer that divides into a number without leaving a remainder, or, integers that multiply to make a specific number. HCF Highest common factor - the biggest factor that two or more numbers/terms share. LCM Lowest common multiple - the smallest multiple that two or more numbers/terms share. Multiple The result of multiplying a number by a positive integer. Prime An integer with exactly 2 factors. Proof A logical, sequential mathematical argument used to show that a statement is true. Quadratic expression An expression with four terms (often simplified to three terms) in which the highest exponent is 2. Verify To make sure a solution is correct using substitution.

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Spring

Geometry 3	G3a. 3D shapes	• Understand the language of faces, edges and vertices • Know the names of common prisms and non-prisms • Identify 2-D shapes within 3-D shapes using nets • To view 3D shapes using a plan view and front and side elevations • Work out the volume and surface area of cuboids and cylinders • Work out the volume of any prism • Work out missing lengths given area and/or volume	**Key Vocabulary** Face — A flat surface on a solid object. Prism — A 3D shape with a constant cross-section and straight edges. Plan — A drawing of something from directly above (sometimes birds eye view). Sketch — To use key pieces of information to produce a drawing. Vertex — A point where two or more line segments meet (a corner). 2D — Two dimensions to the shape e.g. length and width. 3D — Three dimensions to the shape e.g. length, width and height. Cross-section — A view inside a solid shape made by cutting through it Edge — A line joining two vertices or faces. Surface area — The sum of the areas of the faces of a 3D shape. Unit — The standard way of expressing a measurement (e.g. cm, kg, ml). Perspective — A way to give illustration of a 3D shape when drawn on a flat surface.
	G3b. Constructions & congruency	• Construct and use scale drawings • Construct perpendicular and bisectors • Understand congruency	**Key Vocabulary** Arc — Part of a curve. Bisector — A line that divides something into two equal parts. Congruent — The same shape and size Locus — A set of points with a common property. Perpendicular — Two straight lines that intersect at a right angle (at 90º). Perpendicular bisector — A line that intersects another line at 90˚, dividing it into two equal parts. Equidistant — The same distance. Protractor — A piece of equipment used to measure and draw angles.
Number 8	N8a. Solving number problems	• Extend knowledge of HCF and LCM • Explore surds and fractional indices	**Key Vocabulary** Factor — An integer that divides into a number without leaving a remainder, or, integers that multiply to make a specific number. Irrational — A number that cannot be made by dividing two integers Multiple — The result of multiplying a number by a positive integer. Inverse — A mathematical opposite. Product — The result of a multiplication. Quotient — The result of a division Rational — A number that can be made by dividing two integers. Index form — Writing numbers as powers. Surd — An irrational root. Integer — A whole number that is positive, negative or zero.

	N8b. Using percentages	• Revisit percentage increase and decrease • Use percentages over 100% • Find percentage changes • Solve "reverse percentage" problems • Use multipliers in a variety of contexts	**Key Vocabulary** Growth The process of increasing/growing. Integer A whole number that is positive, negative or zero. Invest Use money with the goal of it increasing in value over time (usually in a bank). Percent Parts per 100 – written using the % symbol. Profit Money made after expenditure and taxes. Reduce To make smaller in value. Depreciate To decrease in value. Tax A compulsory contribution to the government Time and a half A rate of pay 50% higher than the usual rate. VAT Value added tax - tax added onto products (usually 20%). Equivalent Of equal value for all values of a variable. Multiplier A value to multiply by (multiplier more than 1 = increasing effect, less than 1 = decreasing effect). Decimal A base ten number with a decimal point used to separate ones, tenths, hundredths etc. Fraction A type of number that represents how many parts of a whole we have. A fraction represents a division.
Summer			
Number 8	N8c. Maths and money	• Explore financial mathematics (incl. bills and bank statements, interest, unit pricing (best buys)	**Key Vocabulary** Multiplier A value to multiply by (multiplier more than 1 = increasing effect, less than 1 = decreasing effect). Balance The amount of money in a bank account Credit Money that goes into a bank account Debit Money that leaves a bank account. Currency A system of money used in a particular country. Deposit An initial payment (often a way of securing an item you will later pay for). Expense A cost or outgoing. Per Annum Each year. Tax A compulsory contribution to the government Interest The cost of borrowed money or money paid for saving. Unitary A single item (one of).
Geometry 4	G4a. Angles 2	• Revisit angle rules, including within special quadrilaterals • Find angles using algebraic methods • Use chains of reasoning to evaluate angles	**Key Vocabulary** Conjecture A mathematical statement that has not been rigorously proven. Counterexample An example that disproves a statement Equation A mathematical relationship stating two expressions are equal. Parallel Two straight lines that never intersect that are always the same distance apart (the same gradient). Parallelogram A quadrilateral with two pairs of parallel sides of the same length. Perpendicular Two straight lines that intersect at a right angle (at 90º). Polygon A 2D closed shape made with straight lines. Sketch To use key pieces of information to produce a drawing. Sum The result of an addition (the total). Transversal A straight line that intersects two or more other (normally parallel) lines Trapezium A quadrilateral with one pair of parallel sides

	G4b. Rotation & translation	• Identify the order of rotational symmetry of a shape • Find the result of rotating a shape • Translate points and shapes by a given vector • Compare rotation and reflection	**Key Vocabulary** Invariant — A point that does not move after a transformation. Regular — A shape that has angles of equal size and sides of equal lengths. Vertex — A point where two or more line segments meet (a corner). Horizontal — A straight line from left to right (parallel to the x axis). Rotate — Transform with a circular movement. Symmetry — One shape is identical to another shape when it is moved, rotated or flipped. Vertical — A straight line from top to bottom (parallel to the y axis).
	G4c. Pythagoras' Theorem	• Identify the hypotenuse of a right-angled triangle • Calculate missing sides in right-angled triangles • Distance between two points • Midpoint of a line segment • Determine whether a triangle is right-angled	**Key Vocabulary** Adjacent — The side next to the angle of interest. Hypotenuse — The longest side on a right-angled triangle. It is always opposite the right angle. Sketch — To use key pieces of information to produce a drawing. Square number — The output of a number multiplied by itself. Square root — A number that when multiplied by itself gives the value (symbol √).
Ratio & Proportion 2	R2a. Enlargement & similarity	• Enlarged shapes by a positive scale factor, including from a given point (extend to negative scale factor to interleave directed number) • Calculate the lengths of missing sides in similar shapes	**Key Vocabulary** Corresponding — Objects (or sides) that appear in the same place in two similar situations. Enlarge — To change the size of a shape (enlargement is not always making a shape bigger. Scale Factor — A multiplier describing a change in size (SF more than 1 = increased size, SF less than 1 = decreased size). Similar Shapes — Shapes of different sizes that have corresponding sides in equal proportion and identical corresponding angles. Image — The picture or visual representation.
	R3b. Solving ratio problems	• Direct proportion problems and graphs • Conversion graphs • Solve ratio problems given the whole or part • Simple inverse proportion • Unit pricing problems ('best buys')	**Key Vocabulary** Direct proportion — As one variable is multiplied by a scale factor the other variable is multiplied by the same scale factor. Inverse proportion — As one variable is multiplied by a scale factor the other is divided by the same scale factor. Ratio — A multiplicative relationship describing how two numbers or variables compare. Proportion — A numerical relationship that compares the size of a part to the size of a whole.
	R2c. Rates	• Work with speed, distance and time • Solve problems involving density • Work with compound units	**Key Vocabulary** Origin — (0,0) on a graph - the point where the two axes intersect. Substitute — Replace a variable with a numerical value. Volume — The amount of space inside a 3D shape (the capacity of a container). Proportion — A numerical relationship that compares the size of a part to the size of a whole
Probability & Statistics 4	P4. Probability 3	• Relative frequency • Expected number of outcomes • Independent events	**Key Vocabulary** Bias — A built-in error that makes all values wrong (unequal) by a certain amount, e.g. a weighted dice. Event — The outcome of a probability – a set of possible outcomes. Independent event — An event that is not effected by any other events. Relative Frequency — How often something happens divided by the total number of outcomes. Chance — The likelihood of a particular outcome. Probability — The likelihood of an event happening.

Algebra 5	**A5. Algebraic representations**	• Drawing and reading from quadratics • Interpreting other graphs e.g. reciprocal, piece-wise • Representing inequalities • Solve simultaneous equations graphically	**Key Vocabulary** Cubic A curved graph with the highest power being 3 (cubed). Inequality A mathematical relationship that compares two expressions showing if one is greater than, less than or equal to another. Origin (0,0) on a graph - the point where the two axes intersect. Parabola A 'u' shaped curve that has mirror symmetry. Quadratic Graph A U-shaped graph with a quadratic equation. Reciprocal A pair of numbers that multiply together to give 1 - a multiplicative inverse. Sketch To use key pieces of information to produce a drawing.
Number 9	**N9. Standard index form 2**	• Calculate with numbers given in standard form, with and without a calculator	**Key Vocabulary** Base The number being repeatedly multiplied. Exponent The number of repeats in the multiplication (synonym of index/indices). Index The number of repeats in the multiplication (synonym of exponent). Leading digit The left-most non-zero digit in a number. Power A base with an exponent/index. Sometimes used as a synonym for exponent/index. Standard (Index) Form A system of writing very big or very small numbers.