Sherborne International

Subject	Mathematics	Year	11	Key stage	4	Hours/week	4h 30m

Mathematics GCSE in 1 year Maths sets H & S

H		
	GCSE Maths 4th Edition FOUNDATION	9780008113827
	GCSE Maths 4th Edition HIGHER	9780008113810

Week	Syllabus identifier	Detail: F H *Detail in blue is material that will be tested across both tiers* *Detail in green is material tested at Higher Tier ONLY.* *Detail that is underlined is material that could be given as independent learning tasks, pre-prepared as a 'flipped' lessons*	Textbook F H	Key vocabulary
1 05/09/2016	**Number: N1, 2, 3, 4, 10** *Integers, decimals and fractions* **Ratio, Proportion and rates of change: R3** *Fractional amounts* **Algebra: A17, 18** *Solving equations*	Order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥; apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals); recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals; use 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; work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $^7/_2$ or 0.375 or $^3/_8$); **Change recurring decimals into their corresponding fractions and vice versa**; express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1; solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation); solve quadratic equations (**including those that require rearrangement**) algebraically by factorising, **by completing the square and by using the quadratic formula.**		
2 12/09/2016	**Number: N6, 7, 8** *Roots, powers and surds* **Number: N9** *Standard form* **Number: N14, 15** *Estimating, accuracy* **Algebra: A22** *Inequalities*	Use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5; **estimate powers and roots of any given positive number;** calculate with roots, and with integer **and fractional** indices; calculate exactly with fractions, **surds** and multiples of π; **simplify surd expressions involving squares (e.g. √12 = √(4 × 3) = √4 × √3 = 2√3) and rationalise denominators**; calculate with and interpret standard form $A \times 10^n$, where $1 ≤ A < 10$ and n is an integer Estimate answers; check calculations using approximation and estimation, including answers obtained using technology; round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); solve linear inequalities in one **or two** variable**(s)**, **and quadratic inequalities in one variable;** represent the solution set on a number line, **using set notation and on a graph;** use inequality notation to specify simple error intervals due to truncation or rounding		
3 19/09/2016	**Algebra: A1, 2, 3, 4** *Simple formulae. Substitution into simple formulae.* *Rearranging formulae* **Algebra 19, 20**	use and interpret algebraic manipulation, including: ab in place of $a × b$, $3y$ in place of $y + y + y$ and $3 × y$, a^2 in place of $a × a$, a^3 in place of $a × a × a$, a^2b in place of $a × a × b$, $^a/_b$ in place of $a ÷ b$, coefficients written as fractions rather than as decimals, brackets; substitute numerical values into formulae and expressions, including scientific formulae; understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors; simplify and manipulate algebraic expressions (including those involving surds **and algebraic fractions**)		

	Simultaneous equations, iteration	by: collecting like terms, multiplying a single term over a bracket, taking out common factors, expanding products of two **or more** binomials, factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares; **factorising quadratic expressions of the form $ax^2 + bx + c$**, simplifying expressions involving sums, products and powers, including the laws of indices; Solve two simultaneous equations in two variables (linear/linear **or linear/quadratic**) algebraically; find approximate solutions using a graph; **find approximate solutions to equations numerically using iteration**		
4 26/10/2016	**Number: N16** *Accuracy* **Number: N5** *Systematic listing strategies* **Algebra: A5, 6, 7** *Equations, expressions, functions, identities and proofs*	Apply and interpret limits of accuracy, **including upper and lower bounds;** apply systematic listing strategies, **including use of the product rule for counting (i.e. if there are m ways of doing one task and for each of these, there are n ways of doing another task, then the total number of ways the two tasks can be done is $m \times n$ ways)** Understand and use standard mathematical formulae; rearrange formulae to change the subject; know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments **and proofs;** where appropriate, interpret simple expressions as functions with inputs and outputs; **interpret the reverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function' (the use of formal function notation is expected)**		
5 03/10/2016	**Algebra: A8, 9, 10, 11, 17** *Cartesian co-ordinates; Plotting and interpreting graphs.* **Algebra: A12, 14** *Plotting and interpreting graphs*	Work with coordinates in all four quadrants. *3D; Co-ordinates of a midpoint of a line segment* Plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form $y = mx + c$ to identify parallel lines **and perpendicular lines**; *Conversion graphs;* find the equation of the line through two given points or through one point with a given gradient; identify and interpret gradients and intercepts of linear functions graphically and algebraically; Identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically **and turning points by completing the square**; find approximate solutions using a graph. Plot, recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function $y = \frac{1}{x}$ with $x \neq 0$, **exponential functions $y = kx$ for positive values of k, and the trigonometric functions (with arguments in degrees) $y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size**; plot and interpret graphs (including reciprocal graphs **and exponential graphs**) and graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration		
6 10/10/2016	**Geometry: G12, 16** *Area, Terminology of 3D objects* **Algebra: A13, 15, 16** *Areas under a curve, graphs of function and circles*	Identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres; know and apply formulae to calculate: area of triangles, parallelograms, trapezia; **Sketch translations and reflections of a given function; calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs), and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts (this does not include calculus); recognise and use the equation of a circle with centre at the origin; find the equation of a tangent to a circle at a given point**		
7 17/10/2016	**Geometry: G1, 3, 4** *Simple angle properties, geometrical properties of triangles, quadrilaterals and polygons* **Geometry: G16** *Volume of right prism,*	Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description; apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons); derive and apply the properties and definitions of: special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language Know and apply formulae to calculate volume (and surface area) of cuboids and other right prisms.		
24/10/2016	**Half Term holiday**			

8 31/10/2016	**Geometry: G20, 21, 22, 23** *Pythagoras, trigonometry* **Geometry: G9, 17, 18** *Circles: areas and volumes of shapes and solids*	Know the formulae for: Pythagoras' theorem $a^2 + b^2 = c^2$, and the trigonometric ratios, $\sin \theta = $ opposite/hypotenuse, $\cos \theta = $ adjacent/hypotenuse and $\tan \theta = $ opposite/adjacent ; apply them to find angles and lengths in right-angled triangles **and, where possible, general triangles** in two **and three** dimensional figures; know the exact values of $\sin \theta$ and $\cos \theta$ for θ = 0°, 30°, 45°, 60° and 90°; know the exact value of $\tan \theta$ for θ = 0°, 30°, 45° and 60°; **know and apply the sine rule $a/_{\sin A} = b/_{\sin B} = c/_{\sin C}$, and cosine rule $a^2 = b^2 + c^2 - 2bc \cos(A)$, to find unknown lengths and angles; know and apply Area = ½ $ab \sin(C)$ to calculate the area, sides or angles of any triangle**; Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment Know the formulae: circumference of a circle = $2\pi r = \pi d$, area of a circle = πr^2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids; calculate arc lengths, angles and areas of sectors of circles		
9 07/11/2016	**Geometry: G5, 6** *Similarity and congruence* **Geometry: 7, 8** *Transformations*	Use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS); apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs Identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional **and negative** scale factors); **describe the changes and invariance achieved by combinations of rotations, reflections and translations**		
10 14/11/2016	**Ratio, Proportion and rates of change: R10, 11** *Proportion and compound units* **Geometry: G10,11** *Circle theorems and geometrical problems*	Solve problems involving direct and inverse proportion, including graphical and algebraic representations; use compound units such as speed, rates of pay, unit pricing, density and pressure **Apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results**; solve geometrical problems on coordinate axes		
11 21/11/2016 **12** 28/11/2016	**Ratio, Proportion and rates of change: R4, 5, 6, 7, 8, 9, 16** *Ratios and percentages*	Use ratio notation, including reduction to simplest form; divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations); express a multiplicative relationship between two quantities as a ratio or a fraction; understand and use proportion as equality of ratios; relate ratios to fractions and to linear functions; define percentage as 'number of parts per hundred'; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease and original value problems, simple and compound interest including in financial mathematics		
13 05/12/2016	**Ratio, Proportion and rates of change: R2** *Scale factors, diagrams and maps* **Geometry 13, 15, 19** *Plans and elevations, bearings, similarity* **Ratio, Proportion and rates of change: R12, 13** *Length:area:volume ratio, proportion*	Use scale factors, scale diagrams and maps; construct and interpret plans and elevations of 3D shapes Measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings; compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors; apply the concepts of congruence and similarity, including the relationships between lengths, **areas and volumes** in similar figures; understand that X is inversely proportional to Y is the same as $X = 1/_Y$; **construct and** interpret equations that describe direct and inverse proportion		

12/12/2016 19/12/2016 26/12/2016	**Christmas holiday**			
14 02/01/2017	**Revision for mock examinations**	*Individual revision programme/ revision of holiday work*		
15 09/01/2017	**Mock examinations**			
16 16/01/2017 **17** 23/01/2017	**Statistics: S1, 2, 3** *Populations and samples, tables and charts; Cumulative frequency and histograms*	Infer properties of populations or distributions from a sample, while knowing the limitations of sampling; *Fairness; Test hypothesis, taking into account possible bias* Interpret and construct tables, charts and diagrams, including *tally methods, 2-way tables*, frequency tables, <u>bar charts, pie charts and pictograms for categorical data</u>, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their appropriate use; **Construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and <u>cumulative frequency graphs</u>, and know their appropriate use**		
18 30/01/2017 **19** 06/02/2017	**Statistics: S4, 5, 6** *Analysis and comparison of data sets; Averages and range; Scatter graphs*	Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: appropriate graphical representation involving discrete, continuous and grouped data **including <u>box plots</u>,** *frequency polygons*<u>; Appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers) **quartiles and inter-quartile range**</u>); apply statistics to describe a population; <u>Use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends while knowing the dangers of so doing.</u>		
13/02/2017	**Half term holiday**			
20 20/02/2017	**Algebra: A23, 24, 25** *Sequences*	Generate terms of a sequence from either a term-to-term or a position-to-term rule; recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer, and r is a rational number > 0 **or a surd**) **and other sequences;** deduce expressions to calculate the nth term of linear **and quadratic** sequences		
21 27/02/2017	**Ratio, Proportion and rates of change: R14, 15, 16** *Rates of change in graphs, rates of growth and decay, iteration*	Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion; **interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts (this does not include calculus);** set up, solve and interpret the answers in growth and decay problems, including compound interest **and work with general iterative processes**		
22 06/03/2017	**Geometry: G24, 25** *Vectors*	Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; **use vectors to construct geometric arguments and proofs**		
23 13/03/2017	**Probability: P1, 2, 3, 4** *Application of basic probability*	Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees; apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments; relate relative expected frequencies to theoretical probability, using appropriate language and the 0-1 probability scale; apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one		
24	**Probability: P5, 6, 7, 8**	Understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size; enumerate sets and combinations of sets systematically, using tables,		

20/03/2017	*Recording and calculating probability*	grids, Venn diagrams and tree diagrams; construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities; calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions.		
25 27/03/2017	**Probability: P9** *Conditional probability*	**Calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams**		
03/04/2017 10/04/2017	**Holy Week/ Easter holiday**			
26 17/04/2017	**Geometry: G2** *Constructions and loci*	Use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); use these to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line		
27 24/04/2017				
28 01/05/2017				
29 08/05/2017 **30** 15/05/2017				
31 23/05/2017				
29/05/2017	**Half term holiday**			
	Examinations **Paper 1: Thursday 25 May 2017** **Paper 2: Thursday 08 June 2017** **Paper 3: Tuesday 13 June 2017**			