Hampshire Services
HIAS SCHOOL IMPROVEMENT

HIAS Maths Team

Year 9 Autumn Term 2020 Scheme of Learning

An outline plan designed to take account of the national school closures between March 2020 and June 2020.

May 2020
Final version

Introduction

This learning schedule is based on the Hampshire Mathematics Scheme of Learning and is designed to take account of the national school closures between March 2020 and July 2020. Learners will begin a new academic year in need of catch-up and consolidation, together with some new learning from the previous academic year that has been missed. This document focusses on the core skills , knowledge and understanding that an 'on-track' learner would be expected to bring to the next stage of their learning and acknowledges that, for many, the habits of learning and the facility to recall previously embedded knowledge will need attention. For this reason, the first elements of this Autumn Term plan address the end of year objectives from the previous year. As the term progresses, the plan seeks to integrate expected prior learning, previously assumed and now no longer can be, into the standard units from the original scheme. In this way, the aim is to build on what is known and recalled in a moderately accelerated way to help learners get back on track for the end of the 20/21 academic year.

Teachers will need to adapt this schedule to the needs of their learners and to the number of hours study allocated in the timetable to mathematics.

The Hampshire Mathematics team full scheme of learning for KS3 (Y7-Y9) offers long and medium-term maps plus linked units of work with key tasks and teaching points. This is available to schools subscribing to Moodle Plus (for further information, please click here).

Year 9

Week commencing	Unit	Area of study	Objectives	Key teaching points/ facts focus/ 'Big Ideas'
Thurs 03-09-2020	**START OF NEW ACADEMIC YEAR**			
Mon 07-09-2020	**8.10** **9.1**	**Number:** **Standard form**	**Interpret and compare numbers in standard form A x 10^n, 1≤ A < 10 where n is a positive or negative integer or zero** **Apply appropriate calculation strategies and degrees of accuracy to increasingly complex problems**	Know how to represent powers of 10, including negative powers such as tenths and hundredths in index form and as an ordinary number. Know how to interpret numbers expressed in standard form on a calculator Use problems that explore very large and very small numbers to develop a sense of the magnitude of a number. Model with Gattegno chart.
Mon 14-09-2020	**8.10** **8.17** **9.1**	**Number: Prime factorisations** **HCF and LCM** **Roots, powers and reciprocals**	**Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2)** **Express numbers as products of primes** **Use prime factorisation, including using product notation**	A factor is a natural number (whole, positive), that divides exactly into another natural number, leaving no remainder. Factors come in pairs such that a x b = ab Factors can come in identical pairs a x a = a^2 and their product is a square number.

			and the unique factorisation property **Use prime numbers, factors, multiples, common factors and multiples, HCF and LCM to solve problems** **Select and use appropriate calculation strategies to sole increasingly complex problems** **Use conventional notation for powers, roots and reciprocals** **Use integer powers and associated real roots when solving problems**	A prime number has exactly two factors, 1 and itself such as 13, with factors 1 and 13 only. Natural numbers that are not prime are composite. i.e. have more than two factors such as 6, which has factors 1,2,3 and 6 Every integer greater than 1 either is a **prime** number itself or can be represented as the product of **prime** numbers and that, moreover, this representation is unique The highest common factor (HCF) is the highest number that can be divided exactly into two or more numbers. The HCF is the product of the common prime factors of two or more numbers. The lowest common multiple (LCM) is the lowest quantity that is a multiple of two or more numbers Introduce the use of Venn diagrams to calculate LCM, HCF as appropriate Know how to represent numbers in ordinary form and index form ($3^4 = 3 \times 3 \times 3 \times 3 = 81$) Explore reciprocals in ordinary form and index form ($3^{-1} = \frac{1}{3}$ and $3^{-2} = \frac{1}{9}$)

				Explore roots in ordinary form and index form ($4^{1/2} = \sqrt{4} = 2$)
Mon 21-09-2020	**8.12**	**Geometry:** **Constructions and scale drawings**	**Draw and measure line segments and angles in geometric figures, including interpreting scale drawings**	Apply scales to real and to scaled measurements Solve problems involving area and perimeter given a scale drawing Link the ideas of scale drawing and enlargement Use the ratio notation for scales (:) Construct regular polygons Construct angle and line (perpendicular) bisectors
Mon 28-09-2020	**8.12** **9.5**	**Geometry:** **Similarity and congruence**	**Identify and construct congruent triangles, and construct similar shapes by enlargement, with or without coordinate grids**	Know and apply the criteria for congruent triangles Know that enlargements are the only transformations where the object and image are not congruent. Know that lengths change with the size of the scale factor, but angles remain unchanged. Know that the centre of enlargement positions the enlargement relative to the original object.

Mon 05-10-2020	**8.13** **9.4**	**Probability:** **Theoretical** **Sample spaces** **Tree diagrams**	**Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities** **Introduce tree diagrams for independent events**	Ensure that the language of probability is understood and used accurately. Know that the probabilities of all possible outcomes sum to 1. Know that mutually exclusive means that two events cannot happen at the same time The sample space represents ALL possible outcomes from an event (order matters) Represent tree diagrams as frequency trees and with probability represented as a fraction. Show where the probabilities sum to 1. Ensure the idea of 'x' means and, and '+' means or, is understood when calculating probabilities from a tree.
Mon 12-10-2020	**8.14**	**Statistics:** **Scatter graphs**	**Describe simple mathematical relationships between two variables (bi-variate data) in observational and experimental contexts and illustrate using scatter graphs**	Develop the language of statistical comparison (strong/weak positive, negative or no correlation) Ensure students can describe the relationship between two variables in terms of comparing relative increase and decrease and relate this to a line of best fit.

			Identify and interpret correlation	Identify correlation from graphs where the variables are unknown and suggest possible real-life scenarios
Mon 19-10-2020	**8.15**	**Number:** **Decimals and fractions** **Ratio**	**Work interchangeably with terminating, recurring and non-terminating decimals and their corresponding fractions as appropriate** **Relate the language of ratios and the associated calculations with the arithmetic of fractions**	Change decimals to fractions and vice versa Know families of fractions and their decimal equivalences such as thirds and eighths Use bar models to represent ratios and use this to work out the fractions of the whole For example 3 : 11 represents $\frac{3}{14}$ and $\frac{11}{14}$ of the whole
Mon 26-10-2020	**HALF TERM**			
Mon 02-11-2020	**8.16** **9.3**	**Algebra and statistics:** **Different graphs** **Graphs and charts**	**Explore cubic, exponential, reciprocal and piece-wise linear graphs** **Find approximate solutions to contextual problems using these graphs** **Construct and interpret pie charts and line graphs** **Describe, interpret and compare measures of central tendency**	Construct line graphs from real-life contexts. Include examples where there is an initial charge before a standard rate Consolidate the use of ratio and angles for constructing pie charts. Interpret the results in terms of proportion Interpret charts and graphs using measures of central tendency and spread. Recognise that some values are not defined for some functions. This is shown with the exponential and reciprocal graphs as asymptotes (also the graph of tan x)

				Piece-wise linear graphs do not follow one rule but are made up of several rules that change over intervals of x Use graphing or dynamic software to explore and model different graphs. Identify what is the same and what is different about the functions. Use matching activities to develop the link between the visual graph and the written function.
Mon 09-11-2020	**8.11** **8.16**	**Algebra and graphs:** **Simultaneous equations** **Modelling**	**Interpret mathematical relationships both algebraically and graphically** **Use linear graphs to find approximate solutions of simultaneous linear equations** **Model situations by translating them into algebraic expressions or formulae and the associated graphs** **Move freely between different numerical, algebraic, graphical and diagrammatic representations.**	Use spreadsheets and other technology to explore what happens when function values and parameters change. Translate word problems into algebraic representations Know that for some graphs the value that is found will be approximate, particularly where the exact value is not an integer, or the graph represents a real-life scenario. When finding a solution to simultaneous linear equations, the outcome is where the two lines cross and the value of x and y that meet the requirements of both equations. Know that the results of solving simultaneous equations gives a unique pair of values that are the solution to the problem.

			Develop algebraic and graphical fluency when solving problems	
Mon 16-11-2020	**8.17** **9.1**	**Rates of change:** **Percentage change and original values** **Compound measure**	**Solve problems involving percentage change, including percentage increase, decrease and original value problems** **Solve problems involving simple interest in financial mathematics** **Use compound units such as speed and unit pricing to solve problems**	Know that is a price as been reduced by x% then the remaining part is (1-x) % of the original amount. For example, given a sale price of £50 after a reduction of 20% means that £50 is 80% of the original price. Use bar models to demonstrate and secure an understanding of % change. Explore simple interest using real-life examples such as borrowing money. Solve 'best buy' problems involving unit pricing Solve problems involving speed/distance/time
Mon 23-11-2020	**9.2**	**Geometry:** **Area and perimeter** **Properties of shape**	**Calculate and solve problems involving the perimeters and areas of 2-D shapes including circles, areas of circles and composite shapes** **Draw and measure line segments and angles in geometric figures**	Consolidate methods for finding perimeters and formulae for calculating the area of common plane figures. Develop use of formulae to more complex problems involving compound plane figures, including where the side lengths or area are given in algebraic form.

			Derive and illustrate properties of triangles, quadrilaterals, circles and other plane figures using appropriate language and technology.	Use Carroll and Venn diagrams to classify and sort shapes according to more complex properties such as diagonals in quadrilaterals or internal and external angles. Use decision trees to sort and classify shapes, including 'yes'/'no' loops where appropriate. Use different tangrams to construct shapes from other shapes and reason about linked properties. Ensure labelling conventions and notations are used appropriately and accurately.
Mon 30-11-2020	**8.11** **9.3**	**Algebra:** **Linear and quadratic graphs**	**Model situation or procedures by translating them into algebraic expressions or formulae or by using graphs** **Interpret mathematical relationships both algebraically and graphically** **Use linear and quadratic graphs to estimate values for y for given values of x and vice versa** **Find approximate solutions to contextual problems from given graphs for a variety of functions**	Use technology to explore families of linear and quadratic functions as graphs. Ensure that substituting values and hence and evaluating a formula is secure. Use this to generate tables of values from a function of x for linear and quadratic functions. Consolidate rearranging a formula and link this to reducing a linear equation to the form y=mx+c Plot graphs from tables of values, deciding on scales for the x and y axis.

			Recognise, sketch and produce graphs of linear and quadratic functions in one variable with appropriate scaling, using equations in x and y in the Cartesian plane **Reduce a given linear equation in two variables to the standard form y=mx+c**	Explore the impact of squaring a number. What would the graph look like? (this can be extended to cubing and square rooting)
Mon 07-12-2020	**9.5**	**Congruence and similarity** **Pythagoras** **Trigonometry (basic)**	**Know and use the criteria for congruence of triangles** **Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides, including Pythagoras' Theorem.** **Use known results to obtain simple proofs** **Introduce trigonometric ratios in similar triangles**	Know that for congruent triangles, all corresponding sides and angles are equal. Explore what minimum information is required to define congruence ('the conditions for congruence') SSS, SAS, ASA, AAS and HL ~ hypotenuse/leg. Use congruent triangles to build other shapes (these will be regular polygons) through dynamic software or pencil and paper. Develop this to link to internal angles and angles at the centre of regular polygons. Model visual geometric proofs for Pythagoras' theorem. Label right angled triangles with angle θ and sides as hypotenuse, opposite and adjacent. Link this to labelling sides for Pythagoras' theorem. Explore what happens to the ratios of the sides as θ changes.

				Explore what happens to the ratio of the sides is θ remains constant. Introduce the ratios of the sides as sine, cosine and tangent. Develop the use of these functions on a calculator. Use *SoHCaHToA* to decide which function to use when finding an angle or side length (of a right-angles triangle)
Mon 14-12-2020	**9.5**	**Geometry** **Prisms and cylinders**	**Derive and apply formulae to calculate and solve problems involving prisms including cylinders**	Revise and secure formulae for the area of the cross sections Construct prisms as nets to consolidate the link between the cross section and the length of a prism to find the volume. Include dimensions that are integers, fractions and in algebraic form Give surface areas or volume and calculate dimensions
Mon 21-12-2020	**CHRISTMAS**			

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