KS4 3 Year scheme of Work – Year 10 Higher

Year 10, 2018 - CHS Higher 3 Year …. . Newest

September						October					November		December	
Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15
Review: solving linear equations and basic algebra	Review: fractions	Perimeter and area	Circumference and area	Volume		Yr10 term 1 test	Holiday	Review: Indices	Algebra: introduction to quadratics and rearranging formulae		Completing the square	Drawing graphs and recognising their shapes	Compound measures and bounds	Yr10 term 2 test

December		January						February					March	
Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Wk 22	Wk 23	Wk 24	Wk 25	Wk 26	Wk 27	Wk 28	Wk 29	Wk 30
Holiday		Straight line graphs		Transformations	Simultaneous equations	Inequalities	Yr10 term 3 test	Holiday	Basic probability	Probability	Review: Percentages	Growth and decay	Ratio and proportion	Summer examinations and revision

April			May					June				July	
Wk 31	Wk 32	Wk 33	Wk 34	Wk 35	Wk 36	Wk 37	Wk 38	Wk 39	Wk 40	Wk 41	Wk 42	Wk 43	Wk 44	Wk 45
Holiday		Review: sequences plus quadratic and geometric	Statistical measures	Further Statistics			Review: Surds	Holiday	Trigonometry and Pythagoras recap and extension		Constructions and loci	2D representations of 3D shapes	Scale diagrams and bearings	Review or new

July			
Wk 46	Wk 47	Wk 48	
Review or new	Enrichment week	w/b 29/7 w/e 4/8	

Review: Equations

A2	Substitute numerical values into formulae and expressions, including scientific formulae	unfamiliar formulae will be given in the question
A17	Solve linear equations in one unknown algebraically <u>including those with the unknown on both sides of the equation</u> ==Worth linking with review of basic fractions and including solving equations that involve fractional coefficients etc…==	including use of brackets

Review: Formulae

A5	Understand and use standard mathematical formulae; rearrange formulae to change the subject	

Review: Basic fractions

N1	Order positive and negative fractions	
N2	Apply the four operations, including formal written methods, to simple fractions (proper and improper) and mixed numbers - both positive and negative	
N8	Calculate exactly with fractions	

Perimeter and area

G12	Identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres	
G17	Calculate the perimeter of a 2D shapes and composite shapes Find the surface area of pyramids composite shapes	
G16	Know and apply formulae to calculate area of: • triangles • parallelograms • trapezia	

Circumference and area

G9	Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment	

G17	Know and use the formulae:
	  • Circumference of a circle = 2πr = πd
	  • Area of a circle =πr^2
	Calculate the perimeters of 2D shapes including circles and composite shapes
	Calculate areas of circles and composite shapes
	<u>Calculate surface area of spheres, cones and composite solids</u>
		solutions in terms of π may be asked for
		
		May be worth teaching density here if time although appears later on in the SOW and could use that as a revision of volume

G18	<u>Calculate arc lengths, angles and areas of sectors of circles</u>	

Volume

R12	Compare lengths, areas and volumes using ratio notation Scale factors <u>Make links to similarity (will be covered in Year 11)</u>	Similar shapes (plus area and volume) is not covered until Year 11
G16	Know and apply the formulae to calculate the volume of cuboids and other right prisms (including cylinders)	
G17	<u>Calculate the volume of spheres, pyramids, cones and composite solids</u>	including frustums
N8	<u>Calculate exactly with multiples of π</u>	

Term 1 Test

Review: Indices

N6	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**	including square numbers up to 15 x 15 know that $1000=10^3$ and 1 million $=10^6$
N7	<u>Calculate with roots, and with integer **and fractional** indices</u>	

Algebra: introduction to quadratics and rearranging formulae

A4	Simplify and manipulate algebraic expressions by: • expanding products of two and three binomials • factorising quadratic expressions of the form x^2+bx+c including the difference of two squares • simplifying expressions involving sums, products and powers, including the laws of indices • <mark>Include factorising non-unitary quadratics</mark>	
A5	Understand and use standard mathematical formulae Rearrange formulae to change the subject including where the subject appears twice	including use of formulae from other subjects in words and using symbols

Completing the square

A18	Completing the square; only unitary quadratics required. Greatest or least values (turning points/vertex) to be found and then used to sketch graph of quadratic find approximate solutions using a graph	

Plotting and drawing graphs

<mark>Use this opportunity to review drawing lots of different types of graphs: quadratic, cubic, reciprocal, exponential and perhaps circle and cover sketching and recognising (next topic) together with this</mark>

A14	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	including problems requiring a graphical solution
R14	Interpret the gradient of a straight-line graph as a rate of change	

Sketching graphs

A12	Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions and the reciprocal function $y = \dfrac{1}{x}$ with $x \neq 0$	including using the symmetry of functions

Measures

<mark>Main teaching here is bounds in calculations and compound measures, speed, density and pressure (pressure formula given in exam paper if needed)</mark>

N16	<u>Apply and interpret limits of accuracy</u> **including upper and lower bounds**	<mark>Include bounds in calculations</mark>
G14	Use standard units of measure and related concepts (length, area, volume / capacity, mass, time, money etc)	
N13	Use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate	know and use metric conversion factors for length, area, volume and capacity. Imperial / metric conversions will be given in the question
R1	Use compound units such as speed, rates of pay, unit pricing, <u>density and pressure</u>	including making comparisons

Term 2 Test

Coordinates and linear graphs

G11	Solve geometrical problems on co-ordinate axes	
A9	Plot graphs of equations that correspond to straight line graphs in the co-ordinate plane <u>Use the form</u> $y = mx + c$ <u>to identify parallel lines</u> **and perpendicular lines** <u>Find the equation of the line through two given points, or through one point with a given gradient</u>	<mark>Take as far as you can but again will appear later in SOW</mark>
A10	Identify and interpret gradients and intercepts of linear functions graphically and algebraically	

Review: Transformations – covered in Year 9 so should be quick review

G7	Identify, describe and construct congruent and similar shapes, including on co-ordinate axes, by considering rotation, reflection, translation and enlargement (<u>including fractional</u> **and negative** <u>scale factors</u>)	
G24	Describe translations as 2D vectors	

G8	**Describe the changes and invariance achieved by combinations of rotations, reflections and translations**	including using column vector notation for translations

Simultaneous equations

A19	Solve two simultaneous equations in two variables (linear / linear **or linear/quadratic**) algebraically Find approximate solutions using a graph	NOT Quadratic yet – see in Year 11
A21	Translate simple situations or procedures into algebraic expressions or formulae Derive two simultaneous equations Solve the equations and interpret the solution	including the solution of geometrical problems and problems set in context

Inequalities

A22	Solve linear inequalities in one **or two** variables **and quadratic inequalities in one variable** Represent the solution set on a number line, **using set notation and on a graph**	Quadratic inequalities in Year 11 Know the conventions of an open circle on a number line for a strict inequality and a closed circle for an included boundary In graphical work the convention of a dashed line for strict inequalities and a solid line for an included inequality will be required

Term 3 Test

Basic probability

P1	Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees.	probabilities should be written as fractions, decimals or percentages
P4	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	
P7	Construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities	

Probability

==Include in this section the product rule for counting eg, number of ways==

P2	Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes or multiple future experiments	
P3	Relate relative expected frequencies to theoretical probability, using appropriate language and the 0 – 1 probability scale	
P5	Understand that empirical unbiased samples tend towards theoretical probability distributions with increasing sample size	
P6	Enumerate sets and combinations of sets systematically using tables, grids, Venn diagrams and tree diagrams	
P8	Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions	know when to add and when to multiply two or more probabilities
P9	**Calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams**	

Review plus: Calculating with percentages

R9	Solve problems involving percentage change, including: • percentage increase / decrease problems • original value problems • simple interest, including in financial mathematics • Percentage multipliers • Reverse percentages • Compound interest	problems may be set in context using a multiplier

Growth and decay

R16	Set up, solve and interpret the answers in growth and decay problems, including compound interest **and work with general iterative processes**	==Iterations are in Year 11 SOW==

Ratio and Proportion

R5	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)	**Review work done in year 9 and include combined ratios – exam style**
R6	Express a multiplicative relationship between two quantities as a ratio or a fraction	
R10	Solve problems involving direct and inverse proportion, including graphical and algebraic representations	

Review plus: Sequences (quadratic and geometric)

A24	Recognise and use: • sequences of triangular, square and cube numbers • simple arithmetic progression • Fibonacci type sequences • quadratic sequences • and simple geometric progressions (r^n where n is an integer and r is a rational number > 0) • **other sequences**	other recursive sequences will be defined in the question link geometric sequence to compound interest
A25	Deduce expressions to calculate the nth term of linear **and quadratic** sequences	

Review plus: Data – some completed in Year 9 and some new content

Start with Averages and spread (S4) including from frequency tables (inc. grouped).

S2	Interpret and construct tables, charts and diagrams including, for categorical data: • ==pie charts== • ==Stem and leaf diagrams== • ==tables and line graphs for time series data== know their appropriate use	including choosing suitable statistical diagrams ==yellow highlighted means completed in Year 9== Green highlighted means new in Year 10 and not necessarily seen in Year 9
S4	Interpret, analyse and compare distributions of data sets from univariate empirical distributions through: • appropriate graphical representation involving discrete, continuous and grouped data, **including boxplots** • appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, ==including consideration of outliers==)	know and understand the terms primary data, secondary data, discrete data and continuous data
S3	**Construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use**	

Statistical measures

S4	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) • spread (range, including consideration of outliers, **quartiles and inter-quartile range**)	students should know and understand the terms: primary data, secondary data, discrete data and continuous data
S5	Apply statistics to describe a population	
S1	Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling	

S3	**Construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use**	
S4	Interpret, analyse and compare distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data, **including box plots** interpret, analyse and compare the distributions of data sets from univariate empirical distributions through consideration of outliers, **quartiles and inter-quartile range**	

| S6 | Draw estimated lines of best fit
Make predictions
Interpolate and extrapolate apparent trends whilst knowing the dangers of doing so | |

Review: Surds

N8	**Calculate exactly with surds** **Simplify surd expressions involving squares (eg $\sqrt{12} = \sqrt{(4\times3)} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$) and rationalise denominators**	
A24	Recognise and use simple geometric progressions (r^n where n is an integer and **r is a surd**) *NOTE* this should/could've been covered in the sequences section	

Review: Trigonometry recap and extension (Learning of the exact values and problems in 3D)

G20	Know the formula for Pythagoras' Theorem $a^2 + b^2 = c^2$ Apply it to find length in right angled triangles **and, where possible, general triangles** in two **and three** dimensional figures Know and use the trigonometric ratios $$\sin\theta = \frac{opposite}{hypotenuse}, \quad \cos\theta = \frac{adjacent}{hypotenuse} \text{ and } \tan\theta = \frac{opposite}{adjacent}$$ Apply them to find angles and lengths in right-angled triangles **and, where possible, general triangles** in two **and three** dimensional figures	**Recap of work done in year 9**
G21	Know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta =$ 0°, 30° 45°, 60° and 90° Know the exact value of $\tan\theta$ for $\theta =$ 0°, 30°, 45° and 60°	**Recap of work done in year 9**
G6	Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides including Pythagoras' Theorem, use known results to obtain simple proofs	**Recap of work done in year 9**
R12	Compare lengths using ratio notation; Make links to trigonometric ratios	

Constructions and loci

G2	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 Know that the perpendicular distance from a point to a line is the shortest distance to the line Use these to construct given figures and solve loci problems	including constructing an angle of 60°

Scale diagrams and bearings

R2	Use scale factors, scale diagrams and maps	including geometrical problems

G15	Measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings	including the eight compass point bearings and three-figure bearings

2D representations of 3D shapes

G13	Construct and interpret plans and elevations of 3D shapes	

End of Year