FRAMEWORK FOR LEARNING

CHS South

CREATIVE — An education where imagination, curiosity and resilience enable us to ignite our learning.

HAPPY — A shared belief that optimism, empathy and responsibility are the foundations for a respectful, safe and inclusive community.

SUCCESSFUL — Individuals who are ready to learn, practise being reflective, and are motivated to become champions.

SUBJECT

Maths

INTENT

"Without mathematics, there's nothing you can do. Everything around you is mathematics. Everything around you is numbers." - **Shakuntala Devi**

Maths is a universal language that explains the world around us. The study of Mathematics enables you to make sense of everyday situations, forge links between topics and establish connections to real life context. Maths fosters curiosity, equipping students with various strategies to tackle problems; it empowers students with resilience to take risks, get it wrong, form a new strategy and start again, with determination and drive to reach the final answer. Maths is logical thinking, reasoning, intuition, analysis, construction, generalisation and beauty.

YEAR GROUP	YEAR 8

RATIONAL / NARRATIVE	In Year 8, students develop their skills in multiplicative reasoning, working on topics such as percentages, ratio and proportion. Many real-life situations encountered are connected by the idea of proportionality. Recognising how these areas of Maths are connected by proportionality and the same underlying mathematics of multiplicative reasoning can help deepen students' understanding of these topics. Knowledge of basic algebra skills are revisited and then deepened, encountering topics such as quadratics and rearranging formulae.

TERM	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
KNOWLEDGE	Ratio & Scale • Understand ratio and its link to multiplication. • Use ratio notation. • Reduce ratios to simplest form. • Solve ratio problems. • Calculate the circumference of a circle. Multiplicative Change • Use scale factors, linking to ratio, solve simple direct proportion problems. • Convert between currencies, including using graphs. • Draw and interpret scale diagrams and maps. Multiplying and dividing fractions • Multiply and divide fractions by integers. • Multiply and divide fractions by fractions. • Understand and use reciprocals.	Working in the Cartesian plane • Plot and interpret straight line graphs. • Understand and use equations of a straight line, including lines parallel to the axes. • Make links between direct proportion and straight lines of the form y = kx. • Model situations by translating them into expressions, formulae and graphs. Representing Data • Draw and interpret scatter graphs. • Understand correlation. • Draw and use lines of best fit. • Understand grouped, ungrouped, discrete and continuous data. • Design and use one and two way tables. Tables & Probability	Brackets, equations and inequalities (cont'd) Sequences • Generate sequences using more complex rules, e.g. with brackets, squared terms, both in words and algebraically. Indices • Form expressions, using indices. • Understand and use addition and subtraction rules. Fractions and Percentages • Develop understanding of fractions, decimals and percentages. • Evaluate percentages increases and decreases. • Use multipliers to solve percentage problems. • Express one number as a percentage of another.	Fractions and Percentages (cont'd) Standard Index Form • Convert between numbers in ordinary and standard form. • Calculate with numbers given in standard form, with and without a calculator. Number Sense • Developmental strategies. • Convert between metric measures and units. • Estimation including rounding to a given number of decimal places. • Use the order of operations.	Angles in parallel lines and polygons • Review Year 7 angles rules. • Understand and use angles in parallel lines. • Revisit geometric notation. • Work angles in special quadrilaterals. • Find and use the sum of the interior angles of a polygon. • Prove simple geometric facts. Area of trapezia and circles • Review area of shapes covered in Year 7. • Calculate the area of a trapezium. • Calculate the area of a circle and the areas of parts of a circle. • Use significant figures. • Calculate the area of compound shapes. Line symmetry and reflection	The data handling cycle • Understand and use primary and secondary sources of data. • Collect data, including questionnaires. • Interpret and construct statistical diagrams, including multiple bar charts. • Identify misleading graphs. Measure of location and dispersion • Revisit the median and mean, including finding the total given the mean. • Find the mean of grouped data. • Work out the mode and modal class. • Choose the appropriate average. • Comparing distributions using measures.

- List outcomes using sample space diagrams for one and two events
- Find probabilities using tables and Venn diagrams.

Brackets, equations and inequalities
- Expand, and factorise into single brackets.
- Form and use expressions, formulae and identities.
- Form and solve equations and inequalities with and without brackets.
- Distinguish between equations, expressions, formulae and identities.

- Recognise line symmetry in polygons and other shapes.
- Reflect shapes in horizontal, vertical and diagonal lines.

SKILLS

Ratio, proportion and rates of change
Change freely between related standard units [for example time, length, area, volume/capacity, mass]

Use ratio notation, including reduction to simplest form.
Divide a given quantity into two or more parts.
Understand that a relationship between two quantities can be expressed as a ratio or a fraction.

Multiplicative Change
Solve problems involving direct and inverse proportion, including

Working in the Cartesian plane
Move freely between numerical, algebraic, graphical and diagrammatic representations.
Make connections between number relationships and their algebraic and graphical representations.
Substitute numerical values into formulae and expressions.
Recognise, sketch and produce graphs of linear functions in the Cartesian plane.

Representing Data
Construct and interpret appropriate tables charts

Brackets Equations and Inequalities (Cont'd)
Understand and use the vocabulary of inequalities.
Use a variety of methods to solve linear equations in one variable (including all forms that require rearrangement), including those with brackets and fractions.

Sequences
Generating Sequences from a written rule
Nth Term rules

Indices
Operations with Indices
Simplifying Indices

Fraction and Percentages

Fractions and Percentages (cont'd)
Percentage increase decrease and original value problems and simple interest in financial mathematics.
Making use of fractions and decimal conversions.

Standard Form
Powers of 10.
Standard Form.
Operations with standard form.
Using a calculator with standard form.

Number Sense
Rounding to powers 10, significant figures and decimal places.
Estimation and bounds

Angles in Parallel Lines and polygons
Apply the properties if angles at a point, angles on a straight line and vertically opposite angles.
Understand and use the relationship between parallel lines and alternate and corresponding angles.
Derive and use the sum of the angles in a triangle and use it to deduce the angle sum in any polygon.
Use standard conventions for labelling sides and angles.

Area of trapezia and circles
Derive and apply formulae to calculate and

The Data Handling Cycle
Describe, interpret and compare data.
Construct and interpret appropriate tables, charts and diagrams.

Measures of Location
Describe, interpret and compare observed through appropriate measures of central tendency, such as the mean, mode, median and spread (range and outliers).

graphical and algebraic representations.
Examples may include:
- Recipe problems
- Best buy problems
- Exchange rates

Fractions
Use a variety of representations to multiply and divide fractions including proper and improper fractions. Understanding of the reciprocal and its uses.

and diagrams including frequency tables, bar charts, pie charts and pictograms.
Describe mathematical relationships for bivariate data.

Tables & Probability
Record, describe and analyse the frequency of outcomes of simple probability experiments, involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale. Generate theoretical sample spaces for single or combined events.

Brackets, equations and inequalities
Substitute numerical values into formulae and expressions, including scientific formulae.

Using a variety of representations to simplify and manipulate algebraic expressions to maintain equivalence by:
- multiplying a single term over a bracket
- taking out common factors
- expanding products of two or more binomials.
simplifying expressions involving sums, products

Define percentage as 'number of parts per hundred'.
Interpret diagrams as percentages and vice versa.
Find a percentage of an amount with or without a calculator.
Interpret percentages as a fraction or decimal.
Compare two quantities using percentages, and work with percentages greater than 100%.

Monetary maths.
Metrics units and conversions.
Calculating with different units of time.

solve problems involving perimeter and area of triangles, parallelograms, trapezia and circles. Efficient use of a calculator.

Line symmetry and reflection
Describe, sketch and draw using conventional terms and notations, point, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that reflectively and rotationally symmetric. Identify properties of and describe the results of reflections applied to given figures.

		and powers, including the laws of indices.				
ASSESSMENT	Ratio & Scale Assessment Multiplicative Change Assessment Multiplying & Dividing Fractions assessment	Cartesian Plane Assessment Data or tables and probability assessment	Brackets, Equations & Inequalities Assessment Spring Progress Test Sequences/Indices Unit Assessment	Fractions & Percentages Unit Assessment Standard Form Assessment	Number Sense Assessment Angles Unit Assessment Circles Unit Assessment	Summer Progress Test Topic assessment OR Progress Test Extension
HOME LEARNING	Weekly assessments set on Sparx Maths VLE based on Y7 expected topics	Weekly assessments set on Sparx Maths VLE based on previous half term topics	Weekly assessments set on Sparx Maths VLE based on previous half term topics	Weekly assessments set on Sparx Maths VLE based on previous half term topics	Weekly assessments set on Sparx Maths VLE based on previous half term topics	Weekly assessments set on Sparx Maths VLE based on previous half term topics
READING, WRITING, TALK, NUMERACY	During 'Anchor Tasks' students are asked to write a journal to document their methods and evaluate other students' methods, describing the limitations of each. Students are encouraged to discuss and present their methods for their Anchor Task, both to their partner and also the rest of the class and through participation in class discussion. Developing students' ability to spot the correct methods to use when solving a ratio question, for example when dividing into a ratio, which parts of the sentence define how a bar model representation will look.	Use of the reading strategy 'Predict' - Allow students to read one paragraph / exam style question. Based on what they have read, ask them it identify key words Predict which methods are going to be useful to answer the question.	Developing students' confidence with worded questions, for example when forming and solving equations, how does a worded question translate into a mathematical sentence (equation) which can then be solved.	Use of the reading strategy 'Empathise'. Use class discussions to focus emotional topics and themes that could be incorporated within this topic, such as money, debt, loans, interest rates, mortgages.	Use of the reading strategy 'Visualisation' Give students an image from a topics question. Ask them to write down three things that it makes them think or imagine. Get them to share with a partner.	Encouraging students to discuss the various averages – which average should you use for a given set of data and why – students to debate these.
TIER 2 VOCABULARY	Increase, Decrease, Fraction, parts, proportion	Scale, co-ordinate, Increase, Decrease,	Ascending, Descending, Describe	Sequence, Rule, Term Bounds, Round	Corresponding, Vertically, opposite, co-interior	Primary, Secondary, Frequency, Data, Mode,

TIER 3 VOCABULARY	Improper, Calculate	Negative, Positive, Strong, Weak, Draw Expressions, Substitute, rearrange	Power, Base Change, Interest, Multiplier, Simple, Reverse, Increase, Decrease, Percent, Principle	Calculate, Significant	Area, shape, arc, sector, compound	Mean, Continuous, Discrete, Range, Outlier
	Ratio, directly proportional. Integer, mixed numbers, reciprocal	Axis, line of best fit, outlier, extrapolate, correlation. Equations, formulae, factorise, binomial, indices, inequalities	Linear, Non-Linear, Geometric Index, Exponent, Indices Numerator, denominator	Standard Form, index, nth term. Metres, Litres, Grams, estimation, error interval	Alternate, Parallel, polygon, transversal equilateral, isosceles, scalene, kite, parallelogram, rhombus, rectangle, square, trapezium, regular polygon. Trapezium, radius, diameter.	Grouped frequency, median
PSPSMC, BRITISH VALUES AND DIVERSITY	Cultural Coordinates were thought up one day in the 1600's while Descartes lying in bed as a sick child watching a fly crawl on the ceiling. He wanted to find a way of stating exactly where the fly was positioned. He started off by drawing two lines at right angles to each other. Cultural The effects of a change in exchange rate on the value of the pound when going on holiday. Personal Looking at buying identical products in bulk and whether it is better value for money. Personal Understand that certain jobs such architects,	British Values are promoted through the nature of our lesson structure. Students are encouraged to share their views and listen attentively and respectfully to that of others. Values are re-iterated through classroom rules. Personal Use of formulae in everyday life such as calculating the cost of calling out a plumber with a fixed charge and hourly rate and taxi rates with a fixed charge and rate per mile. Social Through a topic introduction, students' study which careers use probability and statistics,	Personal Looking at percentage discount in shop sales. Cultural Why standard form was developed, in order to say big and small numbers. Problems relating to astronomy and microbiology.	Social Awareness of the rick of borrowing money with a high interest rate and what this means for repayments. Personal Being able to use metric units when talking about height, weight or capacity when at doctors, or similar. Personal Being able to estimate to quickly solve calculations in real life situations like splitting a bill between 9 people. Diversity Katherine Johnson – NASA engineer. Link in to metric units and engineering.	Social Through a topic intro, parallel lines are explored in where they appear in the world around us and which careers would use them. Personal Wherever possible, questions are linked to contextual problems such as finding the area of a garden to then calculate how much grass seed to buy or how the area of a wall to calculate the amount of paint required.	Moral Discussion on how the media/politicians use statistics to promote their side of an argument.

	product designers, map makers, etc. have to work with scale drawings of products and places.	such as financial analysts, statistician, cost estimators.				