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| **Year 8 – Mathematics – 2024-25**  |
| **Curriculum intent** | Through mathematics lessons we promote mathematical thinking to allow all students to achieve their mathematical potential and engage in the study of mathematics. Using a mastery style approach to mathematics allows all students to develop their fluency, reasoning and problem-solving using representations of mathematical ideas. As students progress through their learning, topics from previous learning will be interleaved into future learning so students develop application and skill links between different areas of mathematicsIn Year 8, students start their journey using directed numbers in a variety of numerical and algebraic applications to form a solid basis for further learning. Linking back to previous work on addition and subtraction from Year 7, students will further their knowledge using fractions and applying this to a variety of number types and using algebraic fractions. To complete the autumn term, students will move on to ratio and proportion.As Year 8 continues, students will further their understanding of multiplying and dividing fractions. Students will study the Cartesian Plane to notice the proportional relationships of line graphs and line segments. Different types of data and some statistical representations including scatter graphs and tables will be studied before moving on to studying probability.In term 3, students will build upon their knowledge and apply it to standard index form before moving on to geometry and statistical calculations and applications continually linking each mathematical concept to previous learning. |
| **Term** | **Autumn 1** | **Autumn 2** | **Spring 1** | **Spring 2** | **Summer 1** | **Summer 2** |
| **Knowledge** | * Operations and Equations with Directed Number
* Addition and Subtraction of Fractions
 | * Ratio and Scale
* Multiplying and Dividing Fractions
 | * Working in the Cartesian Plane
* Tables and Probability
* Representing Data
 | * Brackets, Equations, and Inequalities
* Fractions and Percentages
 | * Standard Index Form
* Angles in Parallel Lines and Polygons
 | * Area of Trapezia and Circles
* Measures of Location
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| **Term** | **Autumn 1** | **Autumn 2** | **Spring 1** | **Spring 2** | **Summer 1** | **Summer 2** |
| **Skills** | * Understand and use multiple representations of directed numbers.
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* Perform calculations that cross zero.
* Complete calculations using all four operators involving directed numbers.
* Use of a calculator with directed numbers.
* Evaluate algebraic expressions involving directed numbers.
* Understand and use two step equations.
* Explore powers and roots.
* Understand representations of fractions.
* Understand and use equivalent fractions.
* Convert between mixed numbers and fractions.
* Add and subtract proper fractions in any form.
* Add and subtract improper fractions and mixed numbers.
* Use fractions in algebraic contexts.
* Use equivalence to add and subtract decimals, percentages and fractions.
* Add and subtract simple algebraic fractions.
 | * Understand the meaning and representation of ratio and its notation.
* Solve problems involving the form 1:n or n:1.
* Solve proportional problems with two-part ratios.
* Divide a value into given ratios.
* Simplify ratios.
* Express ratios in the form 1:n.
* Compare ratios and related fractions.
* Understand $π$ as the ratio between diameter and circumference.
* Understand the gradient of a line as a ratio.
* Interpret maps using scale factors and ratios.
* Multiply a fraction by an integer.
* Find the product of a pair of fractions.
* Divide an integer by a fraction.
* Understand and use the reciprocal.
* Divide any pair of fractions.
* Multiply and divide improper and mixed fractions.
 | * Work with coordinates in all four quadrants.
* Identify and draw line that are parallel to the axes.
* Recognise and use the line $y=x$
* Recognise and use lines in the form $y=kx$
* Link $y=kx$ to direct proportion problems.
* Explore the gradient of the line $y=kx$
* Recognise and use lines of the form: $y=x+a$
* Explore graphs with negative gradient.
* Link graphs to linear sequences.
* Plot graphs of the form $y=mx+c$
* Explore non-linear graphs.
* Find the midpoint of a line segment.
* Draw and interpret scatter graphs.
* Understand and describe linear correlation.
* Draw and use a line of best fit.
* Identify non-linear relationships.
* Identify different types of data.
* Read and interpret ungrouped and grouped frequency tables.
* Represent grouped discrete data.
* Represent continuous data grouped into equal classes.
* Represent data in two-way tables.
* Construct and find probabilities from sample space diagrams.
* Find probabilities from two-way tables and Venn diagrams.
 | * Form algebraic expressions.
* Use directed number with algebra.
* Multiply out a single bracket.
* Factorise into a single bracket.
* Expand multiple single brackets and simplify.
* Expand a pair of binomials.
* Solve equations including brackets.
* Form and solve equations with brackets.
* Understand and solve simple inequalities.
* Form and solve inequalities.
* Solve equations and inequalities with unknowns on both sides.
* Form and solve equations and inequalities with unknowns on both sides.
* Convert fluently between key fractions, decimals and percentages.
* Calculate key fractions, decimals and percentages of an amount with and without a calculator.
* Convert between decimals and percentages greater than 100%.
* Calculate percentage increase and decrease with a multiplier.
* Express one number as a fraction or percentage of another with and without a calculator.
* Work out percentage change.
* Choose appropriate methods to solve percentage problems.
* Find the original amount given a percentage.
 | * Investigate positive powers of 10.
* Work with numbers greater than 1 in standard form.
* Investigate negative powers of 10.
* Compare and order numbers in standard form.
* Calculate with numbers in standard form.
* Understand and use negative and fractional indices.
* Understand angle rules and notation.
* Identify, calculate and solve parallel line problems involving: alternate, corresponding and co-interior angles.
* Calculate angles in quadrilaterals.
* Calculate interior angles in polygons.
 | * Calculate the area and perimeter of triangles, rectangles, parallelograms, trapezia, compound shapes and circles.
* Calculate parts of a circle.
* Understand the mean, median and mode.
* Choose the most appropriate average.
* Find the mean from grouped and ungrouped frequency tables.
* Identify outliers.
* Compare distributions using averages and range.
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| **Assessment** | In class assessments.End of topic tests. | In class assessments.End of topic tests. | In class assessments.End of topic tests. | In class assessments.End of topic tests. | In class assessments.End of topic tests. | In class assessments.End of topic tests. |
| **Enrichment** | * Make a how to use your calculator guide! It will come in helpful for future learning.
* You’re planning an epic journey, use Google Earth to figure out where you will travel, and how far in total you will travel. Can you give distances in cm, m and km?
* Can you investigate average temperatures across the world, can you find very cold cities/places and compare them to very warm cities/places? Work out the differences.
 | * Can you design a board game which tests your fraction arithmetic?
* Try to keep practising your negative number skills! https://www.cimt.org.uk/projects/mepres/book7/bk7i15/bk7\_15i1.htm & https://www.cimt.org.uk/projects/mepres/book7/bk7i15/bk7\_15i2.htm
 | * Looking at a newspaper or magazine, how many times do you see data displayed / represented?
* Learn about the Archimedean spiral and its links to the coordinates we have been learning about. https://nrich.maths.org/13746
* Have you tried Desmos graphing tool? https://www.desmos.com/calculator Experiment with different equations to see how they appear on a Cartesian Plane.
 | * How did the machine guess your number? Can you work out the process it used? https://nrich.maths.org/7216
* Can you write a restaurant order for at least 8 friends using algebra and brackets? How could this help the waiting staff? Are there any other real-life uses of brackets and algebraic expressions?
 | * Go shopping. Look around at the reductions in any shop – can you work out the percentage change?
* Can you design a poster to explain the laws of indices and standard form?
* Can you find the value of n using your knowledge of indices and algebra? https://nrich.maths.org/847
 | * Looking at a magazine or newspaper, how many times do you see the word average? Can you decide which average has been used?
* Which of the four examples have the greatest area shaded. https://nrich.maths.org/809
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