**Y8 – Mathematics programme of study**

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|  | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
| Big Ideas | Number:  Directed number calculations.  Ratio and Proportion:  Multiplicative relationships and ratio tables.  Algebra:  Linear equations, sequences and graphs. | Geometry:  Transformations  Handling data:  Averages and Range. Representation of data | Number:  Fraction calculations  Algebra:  Solving equations  Handling data: Probability | Geometry:  Perimeter, area and volume | Number: Integers, powers and roots.  Algebra: Problem solving and proof | Geometry: Measures and compound measures.  Problem Solving and consolidation of topics. |
| Topics | Addition, subtraction, multiplication and division with positive and negative numbers.  Calculate multipliers for given number pairs. Use ratio tables to represent multiplicative relationships. Use graphs and ratio tables together to represent multiplicative relationships.  Linear equations, sequences, coordinates and graphs. | Line and rotational symmetry. Reflection and Enlargement.  Mean, median, mode and range.  Construct and interpret tally charts, bar charts, pictograms, Venn diagrams, two-way tables, stem and leaf diagrams, pie charts and scatter graphs. | Addition, subtraction, multiplication and division with fractions.  Solving equations using function machines and from worded problems. Unknowns on one side including brackets.  Calculations will include negatives and fractions and application in angle questions.  Listing outcomes, express probabilities as fractions, relative frequency, fractions of amounts. | Calculate the perimeter and area of rectangle, squares, triangles, parallelograms and kites.  Calculate the area and perimeter or compound shapes.  Calculate the area of trapezia.  Solve problems with area and perimeter, including equations.  Volume and surface area of cubes and cuboids. | Use index notation. Index laws for multiplication, division and brackets.  Reciprocals.  Algebra problems to apply prior learning including simplifying, expanding and factorising, substitution and inequalities. | Reading scales. Metric conversions. Time, time calculations and using timetables.  Speed, distance, time.  A selection of content from previous half terms. |
| Skills | **Use of equipment:** use of double-sided counters, algebra tiles, rulers, protractors, graph paper, tracing paper, efficient use of a scientific calculator.  **Problem solving:** application of skills, processes and representations in a range of contexts, interpret and solve multi stage problems.  **Critical thinking:** Reasoning, making connections, spotting patters, forming conclusions, exploring misconceptions, evaluating to aid identification of errors in own and others working or answers.  **Construction and use of diagrams and graphical representation:** diagrams for double sided counters in directed number calculations, ratio tables, algebra discs for simplifying, algebra tiles for expanding and factorising. Correct use of axes and coordinates. Handling data construction of various representations of data. | | | | | |
| Assessment | Formative assessment every lesson.  Range of learning & skill-based homework.  Peer and self-assessment tasks.  End of unit assessments | Formative assessment every lesson.  Range of learning & skill-based homework.  Peer and self-assessment tasks.  End of Term Assessment | Formative assessment every lesson.  Range of learning & skill-based homework.  Peer and self-assessment tasks.  End of unit assessments | Formative assessment every lesson.  Range of learning & skill-based homework.  Peer and self-assessment tasks.  End of Term Assessment | Formative assessment every lesson.  Range of learning & skill-based homework.  Peer and self-assessment tasks.  End of unit assessments | Formative assessment every lesson.  Range of learning & skill-based homework.  Peer and self-assessment tasks.  END OF YEAR EXAM |
| Linked learning | **Number:** Directed number and fraction calculations have been taught in Year 7. Directed numbers will be revisited and consolidated before application in multiplicative relationships, equations and substitutions. Fraction calculations will be revisited before application in equations and probability.  Wider Links: Secure foundations in calculation are critical to the study of all subjects and to the basic numeracy skills needed in life.  **Algebra:** In Year 7, students are introduced to algebra, simplifying expressions and expanding brackets. Year 8 introduces the concept of an unknown as a variable and the different linked representations of linear equations, straight line graphs and arithmetic sequences. Students will apply their number skills to solve equations and then use equations as a tool to solve problems in geometry.  Wider Links: The use of formulae, graphs of functions and the formation and solution of equations arise in a wide range of subjects and contexts but is particularly likely in Science, Geography, ICT, Business, DT, Food and PE.  **Geometry:** Angle facts are taught in Year 7 and will be applied whilst solving equations. Equations of straight-line graphs will be followed by reflections, linking to the equation of mirror lines. Enlargements links to the prior learning in Year 8 of multiplicative relationships and how ratio tables can represent the lengths of similar shapes. Function machines will be used to find unknowns in the formulae used during the unit of work on perimeter, area and volume, along with forming and solving equations when edges are labelled with expressions.  Wider Links: Appreciation and application of geometric rules and relationships have particular importance in DT, Art, Science and Geography. An understanding of time and timetables will be important for daily life.  **Handling Data:** Averages will be applied in context to link to sporting and/or entertainment completions (eg Football World Cup or Strictly Come Dancing). Different representations of data have links between them but also to the context of the data.  Wider Links: The interpretation of data and its measures are skills used in almost all subjects and are pivotal to our ability to understand and analyse the world around us and think critically about evidence or conclusions we are presented with.  Learning components at the start of lessons remind students of prior learning and emphasis links to prior topics | | | | | |
| Literacy | Mathematical vocabulary, terminology, and definitions.  Interpretation and conclusions based on graphs and statistics.  Construction and communication of argument and proof. | | | | | |
| Enrichment | Year 8 groups (Rome, Oslo, Budapest, Dublin) take part in the UKMT Junior Maths Challenge and some students take part in the Junior Kangaroo.  Multicultural maths is part of the last half term of the year. This is sometimes delivered through a Crystal Maze style competition. Topics include: Egyptian fractions, Sudoku, Japanese multiplication, Russian multiplication, Arabic numbers, Mandalas, Islamic tessellations, Tamil sand drawings and Kolam. | | | | | |
| SMSC Links | **Spiritual Development within Mathematics**  Developing a logical approach and the ability to recall and reason, along with questioning the way in which the world works promotes the spiritual growth of our students. In maths lessons, pupils are always encouraged to delve deeper into their understanding of Mathematics and how it relates and can be used to explain the world around them.  We are enthusiastic about the subject and to use a range of teaching strategies that allow pupils to be creative (i.e. tessellating shapes) or imaginative (i.e. designing exam questions) whilst offering opportunities for students to working through the “don’t get it” moments and experience the satisfaction of that “eureka” when an idea is understood.  Mathematics, as the science of numbers can be used to   * Explain naturally occurring patterns/sequences or symmetry such as is seen in a snowflake, or the seeds in a sunflower. * Consider the concept of infinity (and beyond), the golden ratio and pi to convey the “beauty in the maths”.   **Moral Development within Mathematics**  The moral development of pupils is evident in much of the curriculum where maths is used in real life contexts and the students are able to apply the skills required to solve various problems and understand how decisions are made dependent upon the outcomes of the problem. Through these scenarios, students understand that certain choices may have different consequences and outcomes. We believe and hope to develop an awareness that maths is not strictly limited to problems that result in right/wrong solutions.  An obvious topic for this theme will develop when looking at percentages, more specifically in comparing rates of interest on borrowing money where the role of “loan sharks” could be explored and discussed. Additionally, many “data handling” topics lend themselves to developing this theme further:   * The importance of understanding which “average” is used by different forms of media and why they may have made that choice? * The use of misleading graphs and the interpretation of data to support or refute a claim. * Stereotypical bias when teaching questionnaires and samples.   **Social Development within Mathematics**  Using and applying maths involves being able to solve problems and being able to do this individually, as part of a team or pair when a task requires it, is fundamental. Students are encouraged to communicate mathematically when discussing, explaining and presenting ideas, through which they are able to develop their mathematical reasoning skills.  Developing self-awareness and the ability to support other students allows effective use of self and peer reviewing to be used, which enables students to have an accurate understanding of their strengths and weaknesses. It is therefore essential that seating plans are used that support each other’s learning and teachers use their professional judgment ensuring the most effective classroom layout is used to support different activities.  We enable our students to enjoy their success in maths and will celebrate accordingly whilst supporting any short-term failure through interventions as and when required. Social development is aided further by fostering a problem-solving approach to any work set that encourages students to breaking tasks into smaller manageable parts, often with the assistance of other students.  **Cultural Development within Mathematics**  Mathematics is the universal language of the world and we aim to develop a realization that many topics we learn today have travelled across the world and are used internationally. Inevitably when introducing many topics, discussions will take place about their origins and the cultural influences that influenced the development of these topics i.e. Ancient Greece and the birth of geometry or tessellations in Rangoli patterns. | | | | | |
| Impact | Basic numeracy is an essential life skill that allows students to operate in society and understand the world around them. Students are required to master techniques and develop sufficient understanding to apply them correctly in a range of contexts. Students develop cognitive recall as they must memorise key formulae and recall them accurately. They develop resilience and problem-solving skills through questions that require a combination of techniques to be applied or introduces novel contexts. Critical thinking and analysis is developed throughout the data handling aspects of the curriculum and through error checking of others’ work. Maths requires and develops systematic and logical thinking and communication. | | | | | |

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| Ways to support student learning in this subject |
| * Encourage the completion of homework. * Discuss maths lessons and their progress. * Involve and engage students with maths in their everyday life. * Encourage a positive attitude towards maths. * Encourage the use of online platforms to allow students to take increasing responsibility for their own learning and progress and for revision prior to assessments. |