**Y9 – Mathematics programme of study**

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|  | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
| Big Ideas | Handling Data:  Statistical enquiry, interpretation and representation.  Number:  Integers powers and roots.  Geometry:  Lines, angles and shapes. | Geometry:  Pythagoras and trigonometry  Algebra:  Manipulation of expressions and forming & solving equations | Number:  Fractions, decimals, ratio and percentage  Handling data:  Probability | Geometry:  Measurement of circles  Number:  Proportional relationships | Geometry:  Transformations, compound measures and scale | Number: review of year based on progress  Algebra: review of year based on progress |
| Topics | Collect or sample data; find averages from lists and grouped data; draw and interpret frequency polygons, scatter graphs and time series graphs.  Use and evaluate positive, negative and fractional indices; convert to and calculate with numbers in standard form.  Calculate interior and exterior angles of polygons; Recognise similarity and congruence. | Find the missing side of a right angled triangle using Pythagoras’ Theorem and apply this in a range of contexts; use trigonometry in right angled triangles to find missing sides or angles.  Expand pairs of brackets; solve a range of linear equations; form equations from geometric contexts; rearrange linear formulae to change the subject. | Calculate with mixed numbers; calculate percentage changes including interest.  Draw and use probability tree diagrams for successive independent events; draw and use Venn diagrams to calculate probabilities. | Calculate the area and circumference of whole and part circles.  Use proportional reasoning to solve problems including interpreting exchange rates as a ratio. | Rotate, reflect, enlarge and translate shapes; calculate and use speed and density, draw and interpret distance/time graphs; use scale factors to find missing lengths in similar shapes. | A selection of content from previous half terms. |
| Skills | **Use of equipment:** use of mathematical equipment, tracing paper, graph paper; efficient use of a scientific calculator.  **Problem solving:** apply techniques in a range of contexts, interpret and solve multi stage problems.  **Critical thinking:** Make conclusions, identify errors in own and others working or answers.  **Construction and use of diagrams and graphical representation:** correct use of axes, selection of diagram is appropriate to the data. | | | | | |
| Assessment | Formative assessment every lesson.  Range of learning & skill-based homework.  Half term assessment | Formative assessment every lesson.  Range of learning & skill-based homework.  Half term assessment | Formative assessment every lesson.  Range of learning & skill-based homework.  Half term assessment | Formative assessment every lesson.  Range of learning & skill-based homework.  Half term assessment | Formative assessment every lesson.  Range of learning & skill-based homework. | Formative assessment every lesson.  Range of learning & skill-based homework.  Synoptic end of unit assessments  END OF YEAR ASSESSMENT |
| Linked learning | **Number:** The content taught in Year 9 builds on and reinforces the students’ clear and accurate calculation, knowledge and understanding of the number skills and relationships developed through their prior learning and is a critical underpinning to study of mathematics at KS4.  Wider Links: Secure foundations in number are critical to the study of all subjects and to the basic numeracy skills needed in life.  **Algebra:** At earlier stages in their learning students will have started to generalise but are unlikely to have formalised this into algebraic statements. Therefore, during KS3 students are developing the foundations of their understanding of algebra, these are central to study of mathematics at KS4 if a student is to progress to higher grades.  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:** The content taught in Year 9 builds on and reinforces the students’ understanding of concepts developed in prior learning and is developed further and applied to increasingly complex problems and contexts in KS4.  Wider Links: Appreciation and application of geometric rules and relationships have particular importance in DT, Art, Science and Geography.  **Handling Data:** The content taught in Year 9 builds on and reinforces the students’ understanding of concepts developed in prior learning and is developed further and applied to increasingly complex problems and contexts in KS4.  Wider Links: The interpretation of data and its measures are skills used in a 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 9 groups (Toucan, Hawk, Robin, Kestrel) take part in the UKMT Intermediate Maths Challenge and some students take part in the Olympiad or Kangaroo rounds.  Count Me In.  Visiting STEM ambassadors. | | | | | |
| 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. |