

Plan Of Learning For The Year

Half Term 1

- Pure Mathematics: algebraic manipulation including quadratics, surds and indices; equations and inequalities; coordinate geometry with lines and circles; graphs and transformations; polynomials; methods of proof; binomial expansion

Half Term 2

- Pure Mathematics: further development of binomial expansion and graph transformations; trigonometry skills including graph work, exact values, and simple trigonometric identities; vectors; differentiation skills and application; integration skills and application

Half Term 3

- Pure Mathematics: further development of vectors; exponential and logarithmic functions; further development of integration skills.
- Applied Mathematics: introduction to mechanics

Half Term 4

- Pure Mathematics: further development of exponential and logarithmic function skills
- Applied Mathematics: displacement and velocity time graphs; constant acceleration formulae; using force diagrams; Newton’s laws of motion; introduction to Statistics and the Large Data Set; statistical terminology; measures of variation and measures of central location.

Half Term 5

- Applied Mathematics: further development of Newton’s laws of motion; variable acceleration; statistical diagrams including histograms, box plots, cumulative frequency diagrams; correlation and linear regression models; probability skills including use of Venn diagrams, tree diagrams and working with conditional probability; probability distributions including the Binomial distribution; hypothesis testing

Half Term 6

- Preparation for mock examination
- Pure Mathematics from Year 13 course: partial fractions; further development of the use of the binomial expansion; iterative numerical methods for solving non-standard equations

Feedback, Retrieval & Assessment

- Self and peer assessment in class and independently
- On-going formative assessment during lessons by teacher
- Student/teacher one-to-one discussions
- Dr Frost maths weekly independent work on skills and exam questions provides instant feedback to the work you do and highlights gaps to close
- (Approximately) Termly formal assessments
- Extended Exit Ticket every three weeks (approximately one/two per half term)
- Throughout, a **focus on closing gaps** after each assessment with the focus being on understanding the gap, rather than copying worked solutions

Super curriculum opportunities / extra-curricular activities

- <https://plus.maths.org/content/>
- <https://www.newscientist.com/>
- <https://nrich.maths.org/post-16>
- <http://www.undergroundmathematics.org> super curriculum problems, often from entry exams from the prestigious universities Cambridge and Oxford
- www.cambridgemaths.org
- <http://desmos.com/> online graphing software
- <http://geogebra.org> online graphing software
- www.amsp.org.uk hub for maths resources and links to future career options
- www.Drfrostmaths.com (has resources linked to Further Maths curriculum or “just because” maths)
- <https://www.youtube.com/c/BicenMaths/videos> a great resource for online lessons in case you miss any content

Cultural Capital, SMSC, Careers and Futures

- Teamwork within the class.
- Regular independent problem solving opportunities
- Understanding the real-life situations that mechanics can be used for.
- Opportunities to discuss with teachers about careers linked to mathematics or engineering
- Use of technology and how it is used in science and technological sectors
- Development of strong independent learning and organisational skills, preparing you for further study at university level
- Recommended Wider Reading:
 “Alex’s Adventures in Numberland” Alex Bellos [a chance to read deeper into mathematics and its applications in the real world]

Common misconceptions	Connecting New Knowledge	Challenge for all
<ul style="list-style-type: none"> • Working with indices – negative or fractional powers applied incorrectly • Completing the square incorrectly (use your calculator to check the accuracy of your work) • Equation of a circle quotes radius incorrectly • Using the binomial expansion for $(a + bx)^n$ but forgetting to raise b to the power n • Carrying out differentiation and integration processes the wrong way around • Solving a trigonometric equation: finding the principal value but not listing all of the other possible values before carrying out any necessary transformations • ...and many others! 	<ul style="list-style-type: none"> • Understand why the formulas are used. • Regular opportunities to use proof • Opportunities to explore theories and issues in further depth are signposted in lessons. • Developing an appreciation of how different areas of mathematics link together e.g. equations and graphs; differentiation and optimisation problems • Using technology to enhance learning 	<ul style="list-style-type: none"> • Proof used throughout the course to underpin why particular statements or approaches are true • Knowledge Organisers used to give an overview of the learning that will take place and a chance to review the learning that has taken place prior to assessments • A focus on quality of presentation of solutions rather than getting the correct answer • Model solutions made available after assessments • Regular use of scaffolds and structured practice • Clearly defined success criteria and use of clear feedback model to show next steps to improve • Stretch activities built into each lesson