Subject	Y13 Core Knowledge – Autumn/Spring/Summer term	How to support students' learning
Maths	**Autumn Term** **Trigonometry -** 1. Solve a trigonometric equation where the angle is given in radians. **Sequences and series -** 2. Identify the common ratio and find the sum to infinity of a geometric series. 3. Solve problems involving arithmetic series in context. **Algebra -** 4. Divide a polynomial by a linear expression. 5. Write an expression as partial fractions and use this to find the first three terms of the related binomial expansion stating the values for which the expansion is valid. **Functions -** 6. Sketch and solve using the modulus function. 7. Find composite and inverse functions; identify the domain and range. 8. Sketch transformed graphs (stretches and translations). **Differentiation -** 9. Differentiate functions using the chain rule and product rule. **Trigonometric Functions -** 10. Solve a trigonometric equation involving a reciprocal trigonometric function. **Trigonometric Identities -** 11. Write a trigonometric expression in the form Rcos(θ+α) and use this to solve an equation. **Differentiation -** 12. Find the gradient of a quotient function at a particular point. **Trigonometric functions -** 13. Prove a trigonometric identity involving reciprocal trigonometric functions. **Differentiation -** 14. Find connected rates of change in the context of a cylinder.	• Integral – Notes, videos and exercises for each topic https://integralmaths.org/ • Physics & Maths Tutor – Past exam papers available online. Plus, exam revision materials. https://www.physicsandmathstutor.com/ • Exam Solutions – Past exam papers available online. Plus, exam revision materials. • https://www.examsolutions.net/as-maths/ocr/ • Desmos – A graphing app for plotting all types of equations. • https://www.desmos.com/calculator • Geogebra – A program that allows you to explore all kinds of geometry, algebra, and graphs https://www.geogebra.org/ • NRICH – This website aims to enrich the mathematical experiences of all learners https://nrich.maths.org/post-16 • Math Centre – Includes revision and learning tools • https://www.mathcentre.ac.uk/ • Maths Careers – Provides a range of resources, information, and signposting to help those working in mathematics https://www.mathscareers.org.uk/ • AMSP – Provides a range of resources, information and maths events. https://amsp.org.uk/students/a-level/resources

	Spring Term **Forces and motion -** 15. Resolve a force into components. 16. Formulate and solve equations of a particle in equilibrium. 17. Formulate the equation of motion for a particle moving in a straight line or plane. **Moments -** 18. Calculate the moment of a force about a point or axis. 19. Know the conditions for equilibrium of a rigid body. 20. Solve problems involving equilibrium of a rigid body. **Projectiles -** 21. Model motion under gravity in a vertical plane using vectors. 22. Find the position and velocity of a projectile at any time. 23. Find the range and maximum height of a projectile. 24. Formulate the equations of motion of a projectile using vectors. 25. Find the equation of the trajectory of a projectile. **Probability -** 26. Know what is meant by mutually exclusive and independent events. 27. Calculate probabilities for two events which are not mutually exclusive. 28. Use Venn diagrams in probability calculations. 29. Calculate conditional probabilities using formula, tree diagrams, two-way tables, Venn diagrams or sample space diagrams. **Statistical distributions -** 30. Recognise situations that give rise to a binomial distribution. 31. Calculate probabilities using the binomial distribution. 32. Find the mean of a binomial distribution. 33. Use a probability function given algebraically or in a table. 34. Use the discrete uniform distribution. 35. Use the Normal distribution as a model. 36. Know the shape of a normal curve and the location of its line of symmetry and points of inflection.	• Numberphile – Contains videos and podcasts about numbers. Topics range from the sublime to the ridiculous… from historic discoveries to latest breakthroughs. • https://www.numberphile.com/ • Birmingham Popular Maths Lectures - The Birmingham Popular Mathematics Lectures are open to all members of the public and the University who are interested in the study of Mathematics. They are particularly suitable for those studying Mathematics at A Level. The lectures are free of charge and run on the last Wednesday of each month, between October and March, at 7pm. https://www.birmingham.ac.uk/schools/mathematics/news-and-events/birmingham-popular-maths-lecture.aspx • Maths Library – While not a necessity for success in the course, if your child is interested in mathematics they can explore our maths library, ask them to see Miss Griffiths in E5 if they would like to browse through the interesting reads we have in our collection.

	37. Standardise a normal variable. 38. Calculate probabilities from a normal distribution. 39. Understand how and why a continuity correction is applied when the Normal distribution is used to model the distribution of discrete data including the binomial distribution. 40. Know that a linear transformation of a normal variable gives another Normal variable. 41. Know the effect of a transformation on the mean and standard deviation. **Summer term** **Friction** 42. Draw force diagrams including frictional force and normal contact force between surfaces. 43. Model the frictional force as F<= uR. 44. Model friction using F=uR when sliding occurs. 45. Apply Newton's laws of motion to problems involving friction. **Statistical hypothesis testing -** 46. Carry out a hypothesis test for the proportion, p, of a binomial distribution. 47. Know the distribution of the mean of samples of size n from a normal distribution. 48. Carry out a hypothesis test for a single mean using the Normal distribution. 49. Identify the critical and acceptance regions for a hypothesis test. 50. Understand the meaning of correlation, association and rank correlation. 51. Use a given correlation coefficient for a sample to make an inference about correlation or association in the population for a given p-value or critical value.	