	Year 13 Mathematics					
	Autumn Term 1	**Autumn Term 2**	**Spring Term 1**	**Spring Term 2**	**Summer Term 1**	**S Term 2**
BIG Q **Content** Students should be able to log onto Uplearn to help with the topics of year 13 Pure, Statistics and Mechanics.	***Can we apply binomial expansion rules to terms with negative and fractional powers?*** • Extend knowledge on sequences and series • Understand recurrence relations and the link to iteration. • To perform binomial expansion in the form $(a + bx)^n$ • Apply knowledge of partial fractions to help solve binomial expansions	***Can we find new identities to further our trigonometric solving capabilities?*** • Apply our knowledge on arcs and sectors in degrees to radians. • Understand the concept of small-angle approximations • Understand new trigonometry (secant, Cosecant and Cotangent) and the new identities that go with them. • Prove the new identities by using the year 12 knowledge.	***Can we solve trigonometric equations when they have coefficients on the angle?*** • Learn the compound angle rule to enable us to look further at coefficients with angles. • Understand how to apply this to find the double and triple angle rules. • Understand Harmonic Form • Understand parametric equations • Create and solve cartesian equations	***Can we differentiate more complex terms we couldn't in year 12, such as trigonometry?*** • Learn to differentiate sine, cosine, $e^{f(x)}$, $\log(f$, and more • Differentiate terms attached to each other, through chain, product and quotient rules. • Differentiate parametric equations, and implicit equations. • Locate roots through iteration and Newton-Raphson method.	***Can we integrate more complex terms such as composite functions?*** • Apply the knowledge of differentiation in reverse to solve integrations • Integrate with trigonometry, and by substitution of values. • Integrate by parts and through partial fractions • Solve a differential equations problem through integration • Apply year 12 knowledge of vectors to a 3d space.	Revision based on the QLA from mocks in readiness for the exams
Vocabulary; Key words for each half term.	• Arithmetic • Geometric • Sequence • Series • Infinity • Recurrence • Binomial • Coefficient	• Arcs • Sectors • Radians • Segment • Chord • Secant • Cosecant • Cotangent • Identity • Arc(cos/sin/tan)	• Compound • Double-angle • Harmonic • Parametric • Cartesian • Domain • Range • Intersection	• Differentiate • Product • Quotient • Chain • Parametric • Implicit • Iteration • Converge • Diverge • Newton-Raphson	• Integrate • Inverse • Substitution • Partial • Trapezium • Magnitude	
Catholic Link	- René Descartes was a devout Catholic philosopher and mathematician, and the Cartesian coordinate system, was named directly after him - Pierre de Fermat was a lay Catholic who worked closely with religious orders, when you differentiate a function and set f'(x) = 0 to find a stationary point, you are utilizing Fermat's direct contribution to early calculus. - The concepts of an infinite series and limits was advanced by Jesuit priests like Gregory St. Vincent and André Tacquet, who used geometric series to solve problems of area, effectively laying the groundwork for integration					
Careers Link	Actuarial Analyst, Data Scientist, Astronomer/Astrophysicist, Forensic Accountant, Operations Research Analyst					

Ways to enrich the year 13 curriculum at home.

- Find the perfect temperature for a cup of tea! From Newton's Laws of cooling, it will follow this specific exponential model; $T(t) = T_s + (T_0 - T_s)\, e^{-kt}$.
- T(t) = Temperature at time, T_s = room temperature T_0 = Initial temperature of the drink at t = 0, k = The cooling constant (dependant on the mug, so we need to find this!)
- Measure the temperature in the room T_s, then the temperature as you make the cup of tea T_0. After 3 minutes, measure the Temperature again. Use these 3 values in the model above, and rearrange to find k.
- Now, apparently the perfect temperature is 60ºC, so now you know k, sub this for T(t), and use your T_s and T_0 values to rearrange for t, and that's when you should drink your cup of tea!