Year 13
Course Outline for Mathematics

		Students have 8 lessons per fortnight Homework is set a minimum 4 times a fortnight to be found on Firefly. One independent study task will be set each week and should take an hour to complete.		
	Topic and approximate duration	**Key Learning Areas**	**Independent study task to be completed by student**	**Consolidation Tasks**
Autumn First Half Term	**Sequence and series**	Students will: Know the nth term for arithmetic and geometric sequences and find the sum of n terms and be able to prove them. They will know the difference between convergent and divergent. They will know the sigma notation and the recurrence relation.	1 Polynomials and binomials 2 Trigonometry 3 Differentiation 4 Trigonometry 5 Algebra 6 Exponentials and Logs Calculus	Will either be to complete exercises from the text book, or use mymaths to consolidate the topics taught in class.
	Binomial Theorem	Students will: Find the binomial expansion for fractional and negative values of n. They will also know the values of x for which these are valid. They will use the theorem to find approximations and apply this skill to partial fractions.		
	Differentiation	Students will: Be able to differentiate exponentials and logarithms. Be able to use the chain rule, quotient rule, product rule and implicit differentiation.		
	Functions and modelling	Students will: be able to draw and understand the modulus function. Be able to solve equations and inequalities involving the modulus function. To know the range and domains of functions as well as be able to calculate and draw inverse and composite functions. To know transformations of graphs and to model using functions.		
	Trigonometry	Students will: use radians, find the arc length and area of a sector, understand and be able to use the standard small angle approximations for sine, cosine and tangent. Know, draw and solve equations involving sec, cosec and cot. Know their inverse graphs and be able to use the compound angle formulae.		

	Nature of Landmark Assessment	One 15 minute test and one hour test per teacher

	Topic and approximate duration	**Key Learning Areas**	**Independent study to be completed by student**	**Non-Assessed home work will be set by class teacher.**
Autumn Second Half Term	**Numerical Methods** **Differentiation** **Trigonometry** **MOCKS**	Students will: Use iteration and understand the change of sign to find roots. Know the staircase and cobweb diagrams for convergence. Know and use Newton-Raphson Method. Use the trapezium Rule. Differentiate the trig functions and their inverses. To use small values for the trig functions and differentiate from first principles. To find stationary points and rates of change. Solve trigonometry equations. Write in the form Rcos(x + a) . To construct proofs and know the trigonometric identities.	8. Trigonometry 9 Integration 10 Partial Fractions 11 Sequences 12 Functions and modelling 13 Numerical methods 14 Kinematics 15 Binomial theorem	Will either be to complete exercises from the text book, or use mymaths to consolidate the topics taught in class.
	Nature of Landmark Assessment	You will have two mock exams this half term that you will have preparation for in lessons.		

	Topic and approximate duration	Key Learning Areas	Independent study to be completed by student	Essential Homework Additional homework will be set by class teacher.
Spring First Half Term	**Integration**	To be able to integrate trigonometric functions. Integration by substitution. Integration by parts. Integration of partial fractions. Integrate to find the area between two curves.	16. Forces and Newton's Laws 17. Probability 18 Further Proof 19 Differentiation 20 Trigonometric Identities 21 Numerical Methods	Will either be to complete exercises from the text book, or use mymaths to consolidate the topics taught in class.
	Normal Distribution **Parametric Equations**	To find probabilities using normal distribution and understand its properties. To know and use the standardisation formula. Find the mean and variance from a binomial distribution. understand and be able to apply a continuity correction**;** be able to use the Normal distribution as an approximation to the binomial distribution. Conduct a statistical **hypothesis test** for the mean of the Normal distribution and interpret the results in context		
	Vectors	To know the difference between parametric and Cartesian equations and be able to convert between them, including involving trigonometric functions. To plot and sketch parametric curves. To differentiate parametric equations and find the normals and tangents to curves.		
	Moments	To extend the knowledge from year 12 and apply it to 3D vectors i.e. find the magnitude, add, subtract. Moments are found by working out force x perpendicular distance. To understand and solve problems involving equilibrium and non-uniform rods and tilting.		
	Nature of Landmark Assessment	One 15 minute test and one hour test per teacher		

	Topic and approximate duration	Key Learning Areas	Independent study to be completed by student	Essential Homework Additional homework will be set by class teacher.
Spring Second Half Term	**Probability**	Use tree and venn diagrams. Be familiar with the notation fro probability. To know the P(A') to know and apply the addition rule and conditional probability. To model situations and be able to critique them.	22 Variable acceleration 23 Integration 24 Vectors 25 Hypothesis testing 26 Moments 27 Normal Distibution 28 Motions in 2 dimensions	Will either be to complete exercises from the text book, or use mymaths to consolidate the topics taught in class.
	Regression and correlation	Calculate and interpret the PMCC. conduct a hypothesis test for a correlation coefficient.		
	Forces at an angle	Identify the forces acting on a particle and represent them in a force diagram; understand how to find the **resultant force** (magnitude and direction); Understand friction and be able to coefficient of friction. understand and be able to use the formula $F \leq \mu R$.		
	Appplications of Kinematics	Horizontal projection and projection at an angle.		
	Applications of Forces	understand that a body is in **equilibrium** under a set of concurrent (acting through the same point) forces is if their resultant is zero; know that vectors representing forces in equilibrium form a closed polygon; understand how to solve problems involving equilibrium of a particle under **coplanar** forces, including particles on **inclined** planes and 2D vectors be able to solve statics problems for a system of forces which are **not concurrent** (e.g. ladder problems), thus applying the **principle of moments** for forces at any angle. Newton's second law. Use the suvat equations. Know and work out variable acceleration.		
	Nature of Landmark Assessment	One 15 minute test and one hour test per teacher		