

Year: 12

Subject: A-level Further Maths

Spring Term			
What has come before and what comes later:	GCSE		
	Core	Decision	Further Statistics
The Big Questions (What questions will students be able to answer upon mastery of the topic?)	<ul style="list-style-type: none"> Can you identify the size of a matrix? Can you add and subtract matrices? Can you multiply a matrix by a scalar? Do you know when and how to multiply matrices together? Do you understand the importance of order of multiplying matrices? Can you calculate the determinant of a matrix for a 2x2 and a 3x3 matrix? Do you understand when a matrix is singular and non-singular? Can you find the inverse of a 2x2 matrix? Do you know the identity matrix? Can you write proofs for matrices? Can you find the inverse of a 3x3 matrix? Can you solve systems of equations using matrices? Can you transform a point using a matrix? Do you understand when a transformation matrix is linear or not? Can you recognise transformation matrices which represent rotations and reflections? Can you use transformation matrices to transform vertices of a shape? Can you describe transformations from the matrix? Can you use transformation matrices to perform rotations through angles θ Can you write transformation matrices to represent enlargements? Can you write transformation matrices to represent stretches? Can you solve problems involving area scale factors and enlargement transformation matrices? Can you write multiple transformations as one matrix? Can you represent reflection and rotation matrices in 3D? Can you use inverse matrices to reverse a linear transformation? 	<ul style="list-style-type: none"> Do you know the definition of a graph? Do you understand the definition of a weighted graph? Do you know what a vertex is? Do you know what an edge is? Can you identify subgraphs? Can you calculate the valency of a vertex? Can you define a walk? Can you define a path? Can you define a trail? Can you define a cycle? Can you define a Hamiltonian cycle? Can you define a loop? Can you define a simple graph? Do you know Euler's handshaking lemma? Can you define a tree? Can you define a complete graph? Can you define isomorphic graphs? Can you represent a graph using a matrix? Do you understand what a spanning tree is? Can you use Kruskal's algorithm to find a minimum spanning tree? Can you use Prim's algorithm to find a minimum spanning tree? Can you apply Prim's algorithm to a distance matrix? Can you use Dijkstra's algorithm to find the shortest path for a network? Can you use Floyd's algorithm to find the shortest path between every pair of vertices in a network? 	<ul style="list-style-type: none"> Can you use the Poisson distribution to model real-world definitions? Can you use the additive property of the Poisson distribution? Can you understand and use the mean and variance of the Poisson distribution? Can you understand and use the mean and variance of the binomial distribution? Can you use the Poisson distribution as an approximation to the binomial distribution? Can you understand and use the geometric distribution? Can you calculate and use the mean and variance of the geometric distribution? Can you understand and use the negative binomial distribution? Can you calculate and use the mean and variance of a negative binomial distribution?