Senior Specialist Mathematics (General)
Learning and Assessment Overview 2021

Year 11		Year 12	
MAS Unit 1 **Combinatorics, vectors and proof**	**MAS Unit 2** **Complex numbers, trigonometry, functions and matrices**	**MAS Unit 3** **Mathematical induction, and further vectors, matrices and complex numbers**	**MAS Unit 4** **Further calculus and statistical inference**
In Unit 1, students will develop the mathematical understandings and skills to solve problems relating to the topics listed below. Combinatorics provides techniques that are useful in many areas of mathematics, including probability and algebra. Vectors in the plane provides new perspectives for working with two-dimensional space, and serves as an introduction to techniques that will extend to three-dimensional space in Unit 3. Introduction to proof provides the opportunity to summarise and extend students' studies in deductive Euclidean geometry, and is of great benefit in the study of other topics in the course, including vectors and complex numbers. These three topics considerably broaden students' mathematical experience and enhance their awareness of the breadth and utility of the subject. They contain procedures and processes that will be required for later topics. All these topics develop students' ability to construct mathematical arguments and enable students to increase their mathematical flexibility and versatility.	In Unit 2, students will develop the mathematical understandings and skills to solve problems relating to the topics listed below. Complex numbers 1 introduces the complex plane, complex arithmetic and complex algebra. Trigonometry and functions builds on the nature of proof and models periodic phenomena. Matrices introduces basic operations and extends to transformations in the plane. These topics further develop the thinking techniques and mathematical rigour introduced in Unit 1, and provide opportunities to further nurture curiosity about the nature and utility of mathematics.	In Unit 3, students will develop the mathematical understandings and skills to solve problems relating to the topics listed below. Proof by mathematical induction continues the developmental concept of proof from Units 1 and 2. Unit 1 introduced a study of vectors with a focus on vectors in two-dimensional space. Unit 2 introduced complex numbers; Unit 3 extends the study of complex numbers to include complex arithmetic using polar form. In this unit, students explore applications of matrices, study three-dimensional vectors, and are introduced to vector equations and vector calculus, with the latter extending students' knowledge of calculus from Mathematical Methods. Cartesian equations and vector equations, together with equations of planes, enable students to solve geometric problems and problems involving motion in three-dimensional space. These topics build on prior knowledge to enable a greater depth of analytical thinking and metacognition.	In Unit 4, students will develop the mathematical understandings and skills to solve problems relating to the topics listed below. The study of Integration and applications of integration and Rates of change and differential equations examine the complex processes of integration techniques. In this unit, students' previous experience working with statistics in Mathematical Methods is drawn together in the study of statistical inference for the distribution of sample means and confidence intervals for sample means. The study of differentiation and integration of functions continues, and the calculus techniques developed in this and previous topics are applied to simple differential equations in contexts found in areas such as biology and kinematics. Learning in this unit reinforces the real-world applications of the mathematics used throughout Specialist Mathematics. These topics build on the critical and creative thinking techniques introduced in the previous units to facilitate the transition to further studies.
Topics	**Topics**	**Topics**	**Topics**
1. Combinatorics 2. Vectors in the plane 3. Introduction to proof.	1. Complex numbers 1 2. Trigonometry and functions 3. Matrices.	1. Proof by mathematical induction 2. Vectors and matrices 3. Complex numbers 2.	1. Integration and applications of integration 2. Rates of change and differential equations 3. Statistical inference.
Unit Duration	**Unit Duration**	**Unit Duration**	**Unit Duration**
Yr 11 Weeks 1 - 16 (16 weeks)	Yr 11 Weeks 17 - 32 (16 weeks)	Yr 11 Weeks 33-38, Year 12 Weeks 1 - 10 (16 weeks)	Yr 12 Weeks 11-26, Revision 27-33, External Exam Weeks 34-37 (22 weeks)
Assessment Task/s	**Assessment Task/s**	**Assessment Task/s**	**Assessment Task/s**

FIA1	FIA2	FIA3	FIA4	IA1	IA2	IA3	EA4
Problem-solving and modelling task *Weighting:* 20%	**Examination** *Weighting:* 25%	**Examination** *Weighting:* 15%	**Examination** *Weighting:* 40%	**Problem-solving and modelling task** *Weighting:* 20%	**Examination** *Weighting:* 15%	**Examination** *Weighting:* 15%	**External Examination** *Weighting:* 50%
Conditions: up to 10 pages, maximum of 2000 words, 4 weeks including 3 hours of classtime	*Conditions:* 120 mins + 5 mins perusal short response items	*Conditions:* 120 mins + 5 mins perusal short response items	*Conditions:* 2 papers short response items	*Conditions:* up to 10 pages, maximum of 2000 words, 4 weeks including 3 hours of classtime	*Conditions:* 120 mins + 5 mins perusal short response items	*Conditions:* 120 mins + 5 mins perusal short response items	*Conditions:* 2 papers short response items
Issued: T 1 Week 5 *Due: T 1* Week 8	*Issued:* n/a *Due: T 2* Week 6	*Issued:* n/a *Due: T 3* Week 4	*Issued:* n/a *Due: T 4* Week 2	*Issued: T 1* Week 5 *Due: T 1* Week 8	*Issued:* n/a *Due: T 2* Week 6	*Issued:* n/a *Due: T 3* Week 5	*Issued:* n/a *Due: T 4* Week 4