MATHEMATICS
**CORE SUBJECT: Across Four Semesters**

Mathematics is important to all of us: in our homes, workplaces and recreational activities. Learning mathematics creates opportunities for, and enriches the lives of all Australians. It develops the numeracy capabilities that all students need in their personal, work and civic life, and provides the fundamentals on which mathematical specialties and professional applications of mathematics are built.

Mathematics aims to instill in students an appreciation of the elegance and power of mathematical reasoning. It ensures that the links between the various components of mathematics, as well as the relationship between mathematics and other disciplines, are made clear.

Mathematics is composed of multiple but interrelated and interdependent concepts and systems which students apply beyond the mathematics classroom. It provides the necessary skills and understanding of other subject areas needed for present roles in society; a technological society; further studies in mathematics; and communication. It encourages students to become self-motivated, confident learners through inquiry and active participation in challenging and engaging experiences. Mathematics today emphasises developing a student's positive attitude towards the student's involvement in the subject through working systematically and logically, and communicating with and about mathematics.
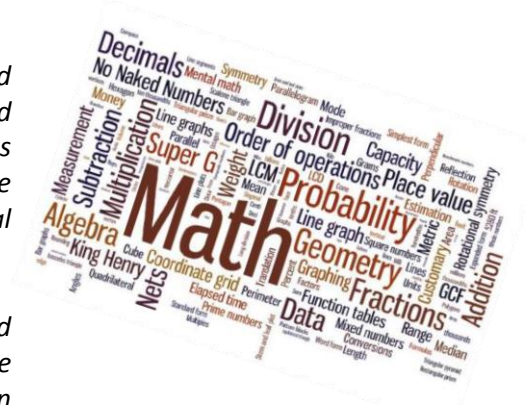
**COURSE AIMS:**

Mathematics aims to ensure that students:

- *are confident, creative users and communicators of mathematics, able to investigate, represent and interpret situations in their personal and work lives, and as active citizens.*

- *develop an increasingly sophisticated understanding of mathematical concepts and fluency with processes and are able to pose and solve problems and reason in Number and Algebra, Measurement and Geometry, and Statistics and Probability.*

- *recognise connections between the areas of mathematics and other disciplines and appreciate mathematics as an accessible and enjoyable discipline to study.*

COURSE ORGANISATION:

The study of Mathematics in Year 10 is a two semester program. Using the Australian Curriculum, Mathematics is organised around the interaction of three content strands and four proficiency strands.

In Year 10 at Mercy College Mackay we offer **Mathematics Methods, General Mathematics and Essential Mathematics.** These 3 units are studied across the whole year and each unit leads directly to the student's Senior Mathematics Study.

Students should choose the highest level of mathematics they think they can achieve at. There will be opportunities to drop to a lower unit during the year if they are struggling. **Students cannot move up to a higher unit**
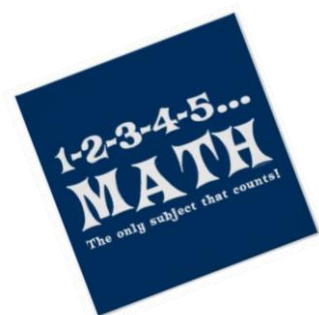
The **content strands** are

❖ Number and Algebra,
❖ Measurement and Geometry,
❖ Statistics and Probability.

They describe **what is to be taught and learnt**.

The **proficiency strands** are

❖ Understanding,
❖ Fluency,
❖ Problem Solving,
❖ Reasoning.

They describe **how** content is explored or developed. **The thinking and doing of mathematics.** They provide the **language to build in the developmental aspects of the learning of mathematics**

OPTION 1

MATHEMATICS METHODS

Mathematics Methods is designed for students whose future pathways involve the application of mathematics and statistics in a range of disciplines at the tertiary level. This includes natural and physical sciences (especially physics and chemistry), mathematics and science education, medical and health sciences (including human biology, biomedical science, nanoscience and forensics), engineering (including chemical, civil, electrical and mechanical engineering, avionics, communications and mining) and computer science (including electronics and software design).
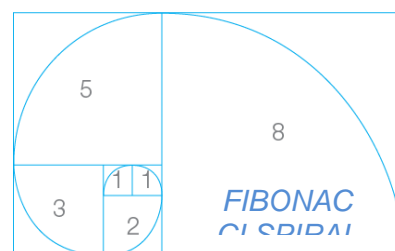
This unit includes all the content areas of the Year 10 and 10A Australian Curriculum.

Semester 1 - MA723 Mathematics Methods

In the **Number component** students will define rational and irrational numbers, perform operations with surds and connect the compound interest formula to repeated applications of simple interest.

In the **Algebra component** students will apply the four operations to simple algebraic fractions, solve problems involving linear equations, simple algebraic fractions & linear inequalities and graph their solutions on a number line. They will also solve problems involving parallel and perpendicular lines. Finally they will substitute values into formulas and solve linear simultaneous equations both graphically and algebraically.

In the **Measurement & Geometry component** students will solve problems associated with surface area and volume of prisms, cylinders, right pyramids, right cones, spheres, and related composite solids. They will formulate proofs and apply logical reasoning to congruent and similar figures. Students will solve right angled triangle problems including direction and angles of elevation and depression. The sine, cosine and area rules will be established and used to solve problems. The unit circle will be used to define trigonometric functions and graph them. Students will also solve simple trigonometric equations and apply Pythagoras' theorem and trigonometry to three dimensional problems in right angled triangles. Finally they will prove and apply angle and chord properties of circles.

In the **Number component** students will establish and apply the laws of logarithms. They will investigate the concept of a polynomial and apply the remainder and factor theorems to solve problems.

In the **Algebra component** students will factorise algebraic expressions by taking out a common factor. They will factorise both monic and non-monic quadratics expressions and solve a range of quadratic and simple exponential equations. They will sketch parabolas, hyperbolas, circles, exponential functions and their transformations. They will describe the features of a range of curves. They will explore the connection between algebraic and graphical representations of relations such as simple quadratics, circles and exponentials.

In the **Statistics and Probability component** of the unit the students will calculate and interpret the mean and standard deviation of data and use these to compare data sets. They will also use information technologies to investigate bivariate numerical data sets and where appropriate use a straight line to describe the relationship, allowing for variation. Students will describe the results of two and three step chance experiments, both with and without replacement, assign probabilities to outcomes and determine probabilities of events. They will investigate the concept of independence. Students will use conditional statements and identify common mistakes with these statements. They will determine quartiles and interquartile range and construct and interpret box plots and use them to compare data sets. Students will compare shapes of box plots to corresponding histograms and dot plots. They will use scatter plots to investigate and describe bivariate numerical data where the independent variable is time. Finally, they will evaluate statistical reports in the media by linking claims to displays, statistics and representative data.

OPTION 2

MATHEMATICS GENERAL

General Mathematics is designed for students who want to extend their mathematical skills beyond Year 10 but whose future studies or employment pathways do not require knowledge of calculus. This including trades and further educational training or university courses in areas such as economics, psychology, business and the arts.

This unit includes all the content areas of the Year 10 Australian Curriculum.

Semester 1 - MA722 Mathematics General

In the **Number component** students connect the compound interest formula to repeated applications of simple interest.

In the **Algebra component** students factorise algebraic expressions by taking out a common factor, applying the four operations to simple algebraic fractions with numerical denominators, solve problems involving linear equations, simple algebraic fractions & linear inequalities and graph their solutions on a number line. They will also solve problems involving parallel and perpendicular lines.

In the **Measurement & Geometry component** students will solve problems associated with surface area and volume of prisms, cylinders and composite solids. They will formulate proofs and apply logical reasoning to congruent and similar figures. Students will solve right angled triangle problems including direction and angles of elevation and depression.

In the **Algebra component** students will expand binomial products and factorise and solve monic quadratic expressions. They will substitute values into formulas and solve linear simultaneous equations both graphically and algebraically. They will explore the connection between algebraic and graphical representations of relations such as simple quadratics, circles and exponentials.
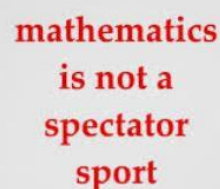
In the **Statistics and Probability component** students will describe the results of two and three step chance experiments, both with and without replacement, assign probabilities to outcomes and determine probabilities of events. They will investigate the concept of independence. Students will use conditional statements and identify common mistakes with these statements. They will determine quartiles and interquartile range and construct and interpret box plots and use them to compare data sets. Students will compare shapes of box plots to corresponding histograms and dot plots. They will use scatter plots to investigate and describe bivariate numerical data where the independent variable is time. Finally they will evaluate statistical reports in the media by linking claims to displays, statistics and representative data.

OPTION 3

MATHEMATICS ESSENTIAL

Mathematics Essential is designed for students with a wide range of needs and aspirations. It provides students with access to authentic trade, industry and business environments and community connections. Students learn within a practical context related to general employment and successful participation in society, drawing on mathematics used by various professional and industry groups.

mathematics is not a spectator sport

The benefit of Mathematics Essential is that it goes beyond traditional ideas of numeracy, requiring greater emphasis on estimation, problem solving and reasoning, with the aim of developing thinking citizens who interpret the world mathematically and use mathematics to make informed predictions and decisions about personal and financial priorities. Students will see mathematics as applicable to their employability and lifestyles, developing leadership skills through self-direction and productivity. They will show curiosity and imagination and appreciate the benefits of technology. Through this students will gain an appreciation that there is rarely one way of doing things and that real world mathematics requires adaptability and flexibility.

Semester 1 - MA721 Mathematics Essential

In the **Number component** students connect review rates, ratios and percentages, apply these in real life situations. They will calculate income, learn about budgeting, calculate simple interest, compound interest and look at investments and loans. They will use technology to compare interest rates.

In the **Measurement & Geometry component** students will convert units of measure, calculate the perimeter, circumference and area of 2 dimensional shapes, calculate surface area and volume of prisms and cylinders. They will use Pythagoras's Theorem and trigonometry to find the sides and angles in right angle triangles.

Semester 2 - MA731 Mathematics Essential

In the **Algebra component** students will simplify and expand simple algebraic expressions, solve linear equations, use formulas and solve simultaneous equations graphically. They will interpret straight line and distance-time graphs. They will plot straight lines and calculate rates from graphs.

In the **Measurement & Geometry component** students will use the properties of parallel Lines, triangles, quadrilaterals and polygons to find the size of angles.

In the **Statistics and Probability component** students will sort data using frequency tables, column graphs, histograms dot plots stem and leaf diagrams. They will calculate the range and measures of centre, quartiles and outliers and draw boxplots using a five number summary. Students will use time series data, bivariate data, scatter plots and line of best fit to analyse data. They will review probability, draw and use Venn diagrams and two way tables, calculate conditional probability, calculate probability for multiple events using tables and tree diagrams and finally find the probability of independent events.

Assessment

The assessment for each unit is in line with the new Senior Assessment, 4 Pieces of Assessment over the year. Each unit has different requirements.

MA723/MA733 Mathematics Methods

Semester 1
Week 10 exam over 2 lessons (50% semester grade; 15% yearly Grade)
Week 19 exam over 2 lessons (50% semester grade; 15% yearly Grade)

Semester 2
Week 3 in class task (20% of yearly grade)
Week 14 Exam over 2 lessons (50% of yearly grade) Content from whole year to be examined

MA722/MA732 Mathematics General

Semester 1
Week 8 in class task (50% semester grade; 20% yearly grade)
Week 18 exam over 1 lesson (50% semester grade; 10% yearly grade)

Semester 2
Week 9 exam over 2 lessons (20% of yearly grade)
Week 15/16 Exam over 2 lessons (50% of yearly grade) Content from whole year to be examined

MA721/MA731 Mathematics Essential

Semester 1
Week 10 exam over 2 lessons (50% semester grade; 25% yearly grade)
Week 16 (Part A 40%) and Week 20 (part B 10%) In class task (50% semester grade; 25% yearly grade)

Semester 2
Week 5 in class task (25% yearly grade)
Week 17Exam over 2 lessons (25% of yearly grade) Content from semester 2 to be examined