



FREMANTLE
COLLEGE

Mathematics

Course Selections for Year 11

Your options...

❖ Mathematics Methods ATAR

Recommended for students who have excellent algebra skills and will utilise and combine skills learnt and apply them to solve mathematical problems.

❖ Mathematics Specialist ATAR

Recommended for those with a strong interest in mathematics and want to develop mathematical arguments and proofs.

❖ Mathematics Applications ATAR

Prerequisite for many university courses and desirable by most. Also recommended for students who are considering TAFE entry for science or computing certificates.

❖ Mathematics Essential General

Heavy focus on solving problems in real contexts to prepare students for further training or employment.

ATAR Subjects, Course Outlines Expectations and Pathways



What do SCSA say about Mathematics Methods ?

The **Mathematics Methods ATAR** course focuses on the use of calculus and statistical analysis. The study of calculus provides a basis for **understanding rates of change in the physical world**, and includes the use of functions, their derivatives and integrals, in **modelling physical processes**. The study of statistics **develops students' ability to describe and analyse phenomena** that involve uncertainty and variation.

This course is **also advantageous for further studies in the health and social sciences** and in summary is designed for students whose **future pathways may involve mathematics and statistics** and their applications in a range of disciplines at the tertiary level.



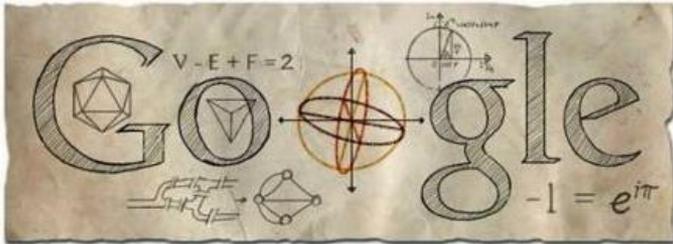
Course outline extract for Maths Methods

Timeline	Content	Resources	Assessment
Term 2 Wk 1 19/04/2021 Week 10	Inverse proportion: <ul style="list-style-type: none"> 1.1.13 Examine examples of inverse proportion 1.1.14 Recognise features and determine equations of the graphs of $y=\frac{1}{x}$ and $y = \frac{a}{x-b}$, including their hyperbolic shapes, and their asymptotes. Graphs of relations: <ul style="list-style-type: none"> 1.1.21 Recognise features of the graphs of $x^2+y^2=r^2$ and $(x-a)^2+(y-b)^2=r^2$, including their circular shapes, their centres and their radii 1.1.22 Recognise features of the graph of $y^2=x$ including its parabolic shape and its axis of symmetry. 	MM 1 Chapter 7	Task 3 Test 2 – Linear & Quadratic Relationships, Powers, Polynomials and Inverse Proportion T2 Wk1
Wk 2 26/04/2021 Week 11	Public Holiday 26/04/2021 Trigonometric functions: <ul style="list-style-type: none"> 1.2.7 Understand the unit circle definition of $\cos\theta$, $\sin\theta$ and $\tan\theta$ and periodicity using radians 1.2.8 Recognise the exact values of $\sin\theta$, $\cos\theta$ and $\tan\theta$ at integer multiples of $\frac{\pi}{6}$ and $\frac{\pi}{4}$ 1.2.9 Recognise the graphs of $y=\sin x$, $y=\cos x$, and $y=\tan x$ on extended domains 	MM 1 Chapter 8	
Wk 3 03/05/2021 Week 12	Revision: Term 1 Trigonometric functions: cont... <ul style="list-style-type: none"> 1.2.10 Examine amplitude changes and the graphs of $y=asin x$ and $y=acos x$ 1.2.11 Examine period changes and the graphs of $y=\sin bx$, $y=\cos bx$, and $y=\tan bx$ 1.2.12 Examine phase changes and the graphs of $y=\sin(x-c)$, $y=\cos(x-c)$ and $y=\tan(x-c)$ 1.2.13 Examine the relationships $\sin(x+\frac{\pi}{2})=\cos x$ and $\cos(x-\frac{\pi}{2})=\sin x$ 1.2.14 Prove and apply the angle sum and difference identities 1.2.15 Identify contexts suitable for modelling by trigonometric functions and use them to solve practical problems 1.2.16 Solve equations involving trigonometric functions using technology, and algebraically in simple cases. 	MM 1 Chapter 8	Task 4 Investigation 2 - Trigonometric Functions Week 2 (TH) Validation Week 3
Wk 4 10/05/2021 Week 13-14	Language of events and sets: <ul style="list-style-type: none"> 1.3.6 Review the concepts and language of outcomes, sample spaces and events as sets of outcomes 1.3.7 Use set language and notation for events, including: <ol style="list-style-type: none"> A (or A') for the complement of an event A $A \cap B$ and $A \cup B$ for the intersection and union of events A and B, respectively $A \cap B \cap C$ and $A \cup B \cup C$ for the intersection and union of the three events A, B and C respectively recognise mutually exclusive events 1.3.8 Use everyday occurrences to illustrate set descriptions and representations of events, and set operations. Review of the fundamentals of probability: <ul style="list-style-type: none"> 1.3.9 Review probability as a measure of 'the likelihood of occurrence' of an event 1.3.10 Review the probability scale: $0 \leq P(A) \leq 1$ for each event A, with $P(A)=0$ if A is an impossibility and $P(A)=1$ if A is a certainty 1.3.11 Review the rules: $P(\bar{A})=1-P(A)$ and $P(A \cup B)=P(A)+P(B)-P(A \cap B)$ 1.3.12 Use relative frequencies obtained from data as point estimates of probabilities. 	MM 1 Chapter 9	



Careers related to Mathematics Methods

Computer Science - Algorithms are used every day by major search engine companies to help refine searches.

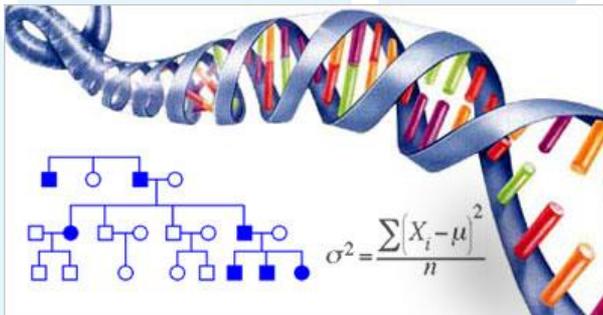


Architecture - Calculus is used to improve the architecture of buildings and other infrastructure such as bridges.



<https://www.perthnow.com.au/news/wa/lighting-on-matagarup-bridge-to-optus-stadium-passes-first-test-ng-b88871031z>

Public Health - Epidemiology, the mathematical study of the spread of infectious disease.



Meteorology - Weather Models with computer technology that use calculus are able to more accurately predict upcoming weather.



What do SCSA say about Mathematics Specialist

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The **Mathematics Specialist ATAR** course provides opportunities to **develop rigorous mathematical arguments and proofs**, and to use mathematical models more extensively. It contains topics in functions and calculus that **build on and deepen the ideas** presented in the Mathematics Methods course, as well as **demonstrate their application in many areas**. The course also extends understanding and knowledge of statistics and introduces the topics of vectors, complex numbers and matrices.

This course **has to be studied in conjunction with the Mathematics Methods** course as preparation for entry to specialised university courses such as **engineering, physical sciences and mathematics**.



Course outline extract for Maths Specialist

Term & Week	Week starting	Hours	Content	Resources	Assessment
T1W7 (7)	15-Mar	4	1.2.10 define and use scalar (dot) product 1.2.11 apply the scalar product to vectors expressed in component form 1.2.12 examine properties of parallel and perpendicular vectors and determine if two vectors are parallel or perpendicular	Chapter 8 (A&B)– Scalar Product	Task 3 Investigation 2 Geometry 5%
T1W8 (8)	22-Mar	4	Topic 1.3: Geometry (22 hours) The nature of proof 1.3.1 use implication, converse, equivalence, negation, inverse, contrapositive 1.3.2 use proof by contradiction 1.3.3 use the symbols for implication (\Rightarrow), equivalence (\Leftrightarrow) 1.3.4 use the quantifiers 'for all' \forall and 'there exists' \exists . 1.3.5 use examples and counter-examples	Chapter 1 – True or false?	Task 3 Investigation 2 Validation
T1W9 (9)	29-Mar	3 2 Apr PH	Geometric vectors in the plane, including proof and use 1.3.16 the diagonals of a parallelogram intersect at right angles if, and only if, it is a rhombus 1.3.17 the midpoints of the sides of a quadrilateral join to form a parallelogram 1.3.18 the sum of the squares of the lengths of the diagonals of a parallelogram is equal to the sum of the squares of the lengths of the sides	Chapter 7 – Proofs using vectors	
T2W1 (10)	19-Apr	4	Geometric vectors in the plane, including proof and use 1.3.16 the diagonals of a parallelogram intersect at right angles if, and only if, it is a rhombus 1.3.17 the midpoints of the sides of a quadrilateral join to form a parallelogram 1.3.18 the sum of the squares of the lengths of the diagonals of a parallelogram is equal to the sum of the squares of the lengths of the sides	Chapter 8C – Scalar Product	Task 4 Test 2 Vectors & Geometry 7%



Careers related to Mathematics Specialist

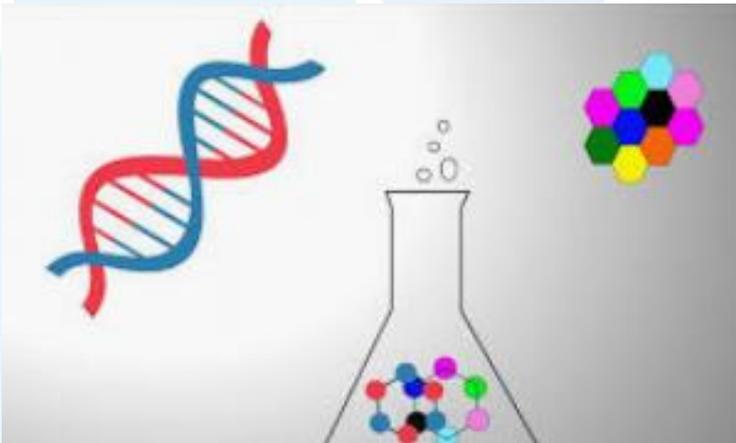
Engineering - apply the principles of science and mathematics to develop economical solutions to technical problems



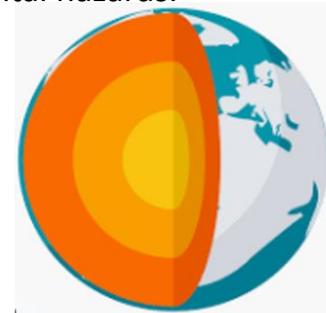
Computer Science- use of programming languages to build **software** products, develop computer games, and run network control systems.



Biochemistry exploration of chemical processes and chemical transformations in living organisms



Geophysics – the study the Earth's interior, finding natural resources and identifying environmental hazards.



What do SCSA say about Mathematics Applications

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The **Mathematics Applications ATAR** course focuses on the **use of mathematics to solve problems in contexts** that involve financial modelling, geometric and trigonometric analysis, graphical and network analysis, and growth and decay in sequences. It also provides opportunities for students to **develop systematic strategies based on the statistical investigation process** for answering statistical questions that involve analysing univariate and bivariate data, including time series data.

It is designed for **students who want to extend their mathematical skills beyond Year 10 level**, but do not require knowledge of calculus. It accommodates **students who have a wide range of educational and employment aspirations**, including continuing their studies at university or TAFE.



Course outline extract for Maths Applications

Timeline	Content	Resources	Assessment
Term 1 Wk 1 01/02/2021	Start of Unit 1 General Administration Review Preliminary work	Sadler Bk 1 Pg 7 – 12 Worksheets to supplement	
	Percentages/Inflation/Discounts/Commission/Profit & Loss 1.1.5 - apply percentage increase or decrease in contexts, including determining the impact of inflation on costs and wages over time, calculating percentage mark-ups and discounts, calculating GST, calculating profit or loss in absolute and percentage terms, and calculating simple and compound interest	Sadler Bk 1 Chap 2 Pg 23 – 36	
Wk 2 08/02/2021	Simple Interest/Minimum Balances/Borrowing Money 1.1.5 - apply percentage increase or decrease in contexts, including determining the impact of inflation on costs and wages over time, calculating percentage mark-ups and discounts, calculating GST, calculating profit or loss in absolute and percentage terms, and calculating simple and compound interest	Sadler Bk 1 Chap 3 Pg 39 - 48	
Wk 3 15/02/2021	Compound Interest/Inflation/Depreciation 1.1.5 - apply percentage increase or decrease in contexts, including determining the impact of inflation on costs and wages over time, calculating percentage mark-ups and discounts, calculating GST, calculating profit or loss in absolute and percentage terms, and calculating simple and compound interest	Sadler Bk 1 Chap 4 Pg 50 - 58	Task 1 - Investigation 1 T1 Wk3 Preparation activity with in-class validation: Consumer Arithmetic
Wk 4 22/02/2021 Wk 5 01/03/2021	Labour Day Public Holiday Mon 01/03/2021 Wages/Comparing prices/Foreign money/Shares/Allowances and Pensions/Budgeting 1.1.1 - calculate weekly or monthly wage from an annual salary, wages from an hourly rate, including situations involving overtime and other allowances, and earnings based on commission or piecework 1.1.8 - use a spreadsheet to display examples of the above computations when multiple or repeated computations are required; for example, preparing a wage-sheet displaying the weekly earnings of workers in a fast food store where hours of employment and hourly rates of pay may differ, preparing a budget, or investigating the potential cost of owning and operating a car over a year 1.1.4 - compare prices and values using the unit cost method 1.1.6 - use currency exchange rates to determine the cost in Australian dollars of purchasing a given amount of a foreign currency, or the value of a given amount of foreign currency, when converted to Australian dollars 1.1.7 - calculate the dividend paid on a portfolio of shares given the percentage dividend or dividend paid for each share, and compare share values by calculating a price-to earnings ratio 1.1.2 - calculate payments based on government allowances and pensions 1.1.3 - prepare a personal budget for a given income taking into account fixed and discretionary spending	Sadler Bk 1 Chap 5 Pg 61 - 82	Task 2- Test 1 T1 Wk5 Consumer arithmetic and spreadsheets



Assessment Types for ATAR Courses

- **Response** include tests, assignments, quizzes and observation checklists.
- **Investigation** - use the mathematical thinking process and the statistical investigation process to plan, research, conduct and communicate the findings of an investigation.
- **Exams** – Sem 1 and Sem 2 (Yr 12 Sem 2 External)

Assessment outline example

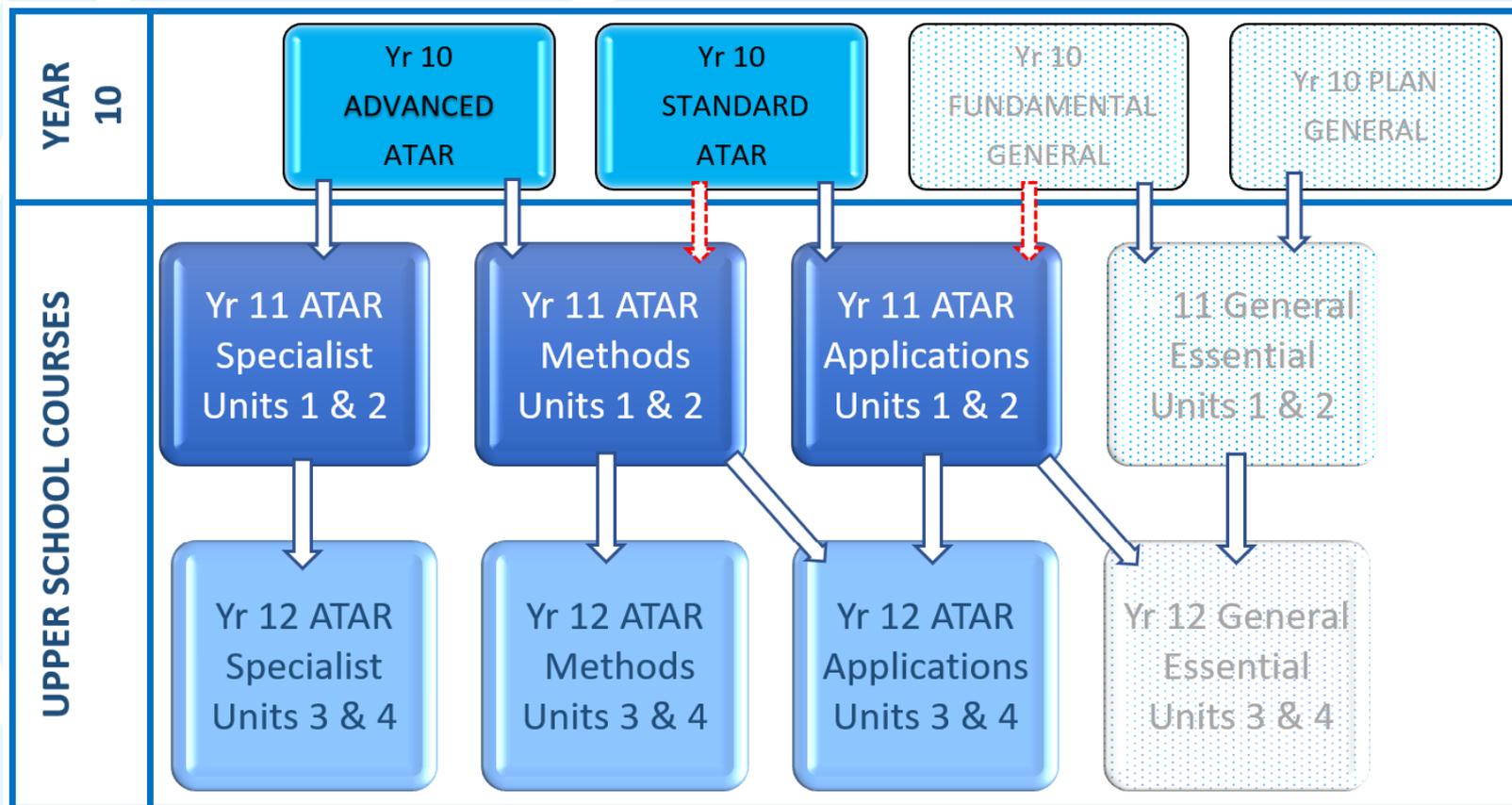


Mathematics Applications Assessment Outline 2021

Task	Task Description and Content	When	Task Marks	
			Max Score	% Weight
1	Investigation Investigation 1 Consumer Arithmetic (1.1.1-1.1.7) Preparation activity with in-class validation	T1 Wk 3	50.0	5
2	Response Test 1 Consumer arithmetic and spread sheets (1.1.1-1.1.8)	T1 Wk 5	50.0	6.5
3	Response Test 2 Linear and non-linear expressions, matrices and matrix arithmetic (1.2.1-1.2.7)	T1 Wk 9	50.0	6
4	Investigation Investigation 2 Pythagoras Theorem - Preparation activity with in-class investigation. (1.3.1)	T2 Wk 1	50.0	5
5	Response Test 3 Shape and measurement (1.3.2-1.3.8)	T2 Wk 5	45.0	6.5
6	Examination (School Examination) Semester 1 Exam Section One: calculator-free (35%), Section Two: calculator-assumed (65%). Questions selection from Unit 1 content knowledge, skills and processes.	T2 Wk 7	150.0	15
7	Investigation Investigation 3 Statistical Investigation (2.1.1-2.1.12) Preparation activity with in-class validation:	T3 Wk 2	24.0	5
8	Response Test 4 Univariate data (2.1.2- 2.1.5, 2.1.10 - 2.1.11)	T3 Wk 4	50.0	7
9	Response Test 5 Linear equations and graphs (2.3.1-2.3.8)	T3 Wk 7	58.0	7
10	Investigation Investigation 4 Piecewise linear graphs and step graphs (2.3.9-2.3.10) Preparation application activity with in-class validation:	T3 Wk 9	50.0	5
11	Response Test 6 Comparing data and trigonometric applications (2.1.2-2.1.9, 2.2.1-2.2.4)	T4 Wk 3	52.0	7
12	Examination (School Examination) Semester 2 Exam Section One: calculator-free (35%), Section Two: calculator-assumed (65%). Questions selection from Unit 1 and Unit 2 content knowledge, skills and processes	T4 Wk 5	150.0	25
Total/Cumulative Mark				100.0



ATAR Subject Specific Pathways



ATAR Course suggested minimum requirements

Methods &
Specialist

- “A” grade in Yr 10 ATAR course

Methods

- “A” or high “B” grade in Yr 10 ATAR course

Applications

- Minimum “C” grade in Yr 10 ATAR course or solid “B” in Yr 10 General course

General Subjects, Expectations and Pathways



What do SCSA say about Mathematics Essential ?

The **Mathematics Essential General** course focuses on **using mathematics** effectively, efficiently and critically to **make informed decisions**.

It provides students with the mathematical **knowledge, skills and understanding to solve problems in real contexts** for a range of workplace, personal, further learning and community settings.

This course provides the opportunity for **students to prepare for post-school options of employment and further training**.



Course outline extract for Maths Essential

T1W7 Mon 15 Mar (4 hours)	1.2 Using formulas for practical purposes Substitute values to evaluate algebraic expressions, apply formulas to practical situations, complete tables of values using formulas.	<i>Formulas</i> 1.2.1-1.2.2	Chapter 4 Using Formulas	E-worksheet sets 22-23 MAWA chapters 7 ME chapter 4	Task 2 T1 Wk7 Test 2 8%
T1W8 Mon 15 Mar T1W9 Mon 29 Mar (PH: 2 Apr) (8 hours)	1.1 Basic calculations, percentages and rates & 1.3 Measurement Review the mathematical thinking process Identify and simplify rates, convert and use kilojoules and calories. Solve problems involving food, exercise and electricity, Measure and calculate heart rates.	<i>Rates (no inverse proportion)</i> 1.1.16-1.1.18 <i>Units of energy</i> 1.3.15-1.3.18	Chapter 6 Healthy Figures	E-worksheet sets 8-9, 20-12 MAWA chapters 5 – 10 ME chapter 2	Task 3 Practical Application1 12.5%
Term 1 Break					
T2W1 Mon 19 Apr T2W2 (PH: 26 Apr) Tue 27 Apr (8 hours)	1.4 Graphs Interpret information from: two-way tables, picture, column, line, step & pie graphs. Determine which graph is best to use, identify misleading graphs and use technology to create graphs.	<i>Reading and interpreting graphs</i> 1.4.1-1.4.3 <i>Drawing graphs</i> 1.4.4-1.4.6	Chapter 5 Show Me the Graph	E-worksheet sets 24-25 MAWA chapters 23-25 ME chapter 5	
T2W3 Mon 3 May T2W4 Mon 10 May (8 hours)	1.1 Basic calculations, percentages and rates Calculate wages, salaries, overtime payments, annual leave loading, bonuses and allowances. Determine payments from commission, piecework and royalties. Understand government allowances and pensions. Budgeting.	<i>Basic calculations</i> 1.1.4, 1.1.6, 1.1.10 <i>Percentages</i> 1.1.13-1.1.15	Chapter 8 Earning Money	E-worksheet sets 6-7 MAWA chapters 14, 16, 17, 18 ME chapter 2	Task 4 Test 3 9%
T2W5 Mon 17 May T2W6 Mon 24 May (8 hours)	1.3 Measurement Review the mathematical thinking process Estimate, use and convert metric units of mass, volume and capacity. Read information from food labels and use rates to solve problems. Calculate the volume and capacity of prisms. Measure the volume of food items and capacity of containers	<i>Mass</i> 1.3.9-1.3.10 <i>Volume and capacity</i> 1.3.11-1.3.14	Chapter 7 Turn up the Volume	E-worksheet sets 16-19 MAWA chapters 12, 13 ME chapter 3	Task 5 Practical Application 2 12.5%



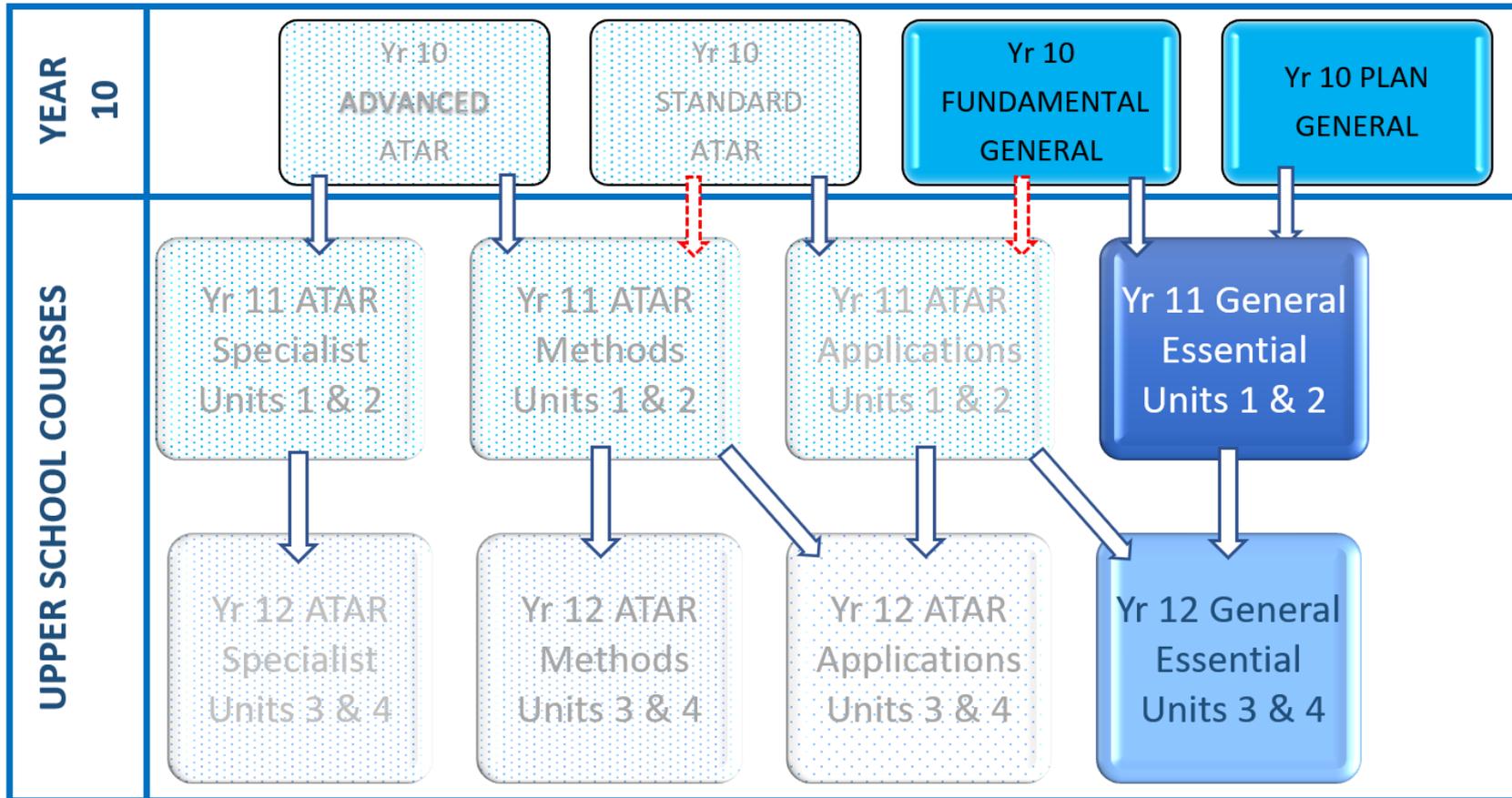
Assessment Types for Mathematics Essential

- **Response** – include tests, assignments, quizzes and observation checklists.
- **Practical Applications** - demonstrate understanding and skills using the mathematical thinking process.
- **Statistical Investigations** – provide evidence which include data collection, statistical analysis and a written conclusion.
- **Externally Set Task (EST)** in Year 12

Careers related to Mathematics Essential



General Subjects Specific Pathways



QUESTIONS?

- Talk to your teacher. Get their recommendation for YOU.
- Talk to students who are in Year 11 and 12.
- Do some research into your post-school options, what's on offer and how you can get in.
- Ask Mr Kennington/Ms Walker about university/TAFE courses and their pre-requisites.



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