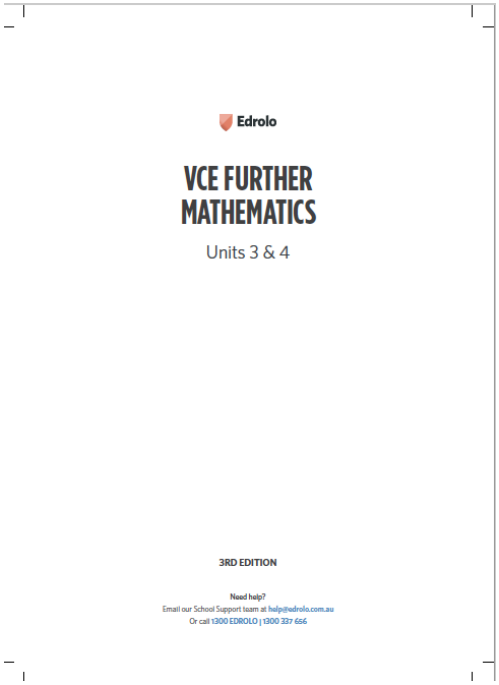
SWINBURNE
SENIOR SECONDARY COLLEGE

Further Mathematics HOLIDAY HOMEWORK 2019



Teacher/Subject Coordinator

menegas.roy.r@edumail.gov.au
jory.clark@sssc.vic.edu.au

Contacts:

Roy Menegas & Jory Clark

Key Links:

EDROLO
https://edrolo.com.au/account/login/?next=/account/courses/

VCAA
http://www.vcaa.vic.edu.au/Pages/vce/studies/mathematics/further/exams.aspx

ITUTE
http://www.itute.com/

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Further Mathematics 2020

Work required in preparation for start of 2020.

VCE Further Mathematics Semester 1 2020

EDROLO VCE Further Mathematics Unit 3&4

	Chapter 1: Univariate data				
1A	1.A Data types	2	Holiday	Hwk	
1B	1.B Displaying and interpreting distributions of categorical data	6	Holiday	Hwk	
1C	1.C Displaying and interpreting distributions of numerical data	14	Holiday	Hwk	
1D	1.D Displaying data with log scales	24	Holiday	Hwk	
1E	1.E Finding median and IQR from dot and stem plots	33	Holiday	Hwk	
1F	1.F Five-number summaries and box plots	41	Holiday	Hwk	
1G	1.G Interpreting the shape of a distribution from a box plot	51	Holiday	Hwk	
1H	1.H Comparing data sets using box plots	58	Holiday	Hwk	
1I	1.I Centre, spread and symmetric distributions	64	Holiday	Hwk	
1J	1.J The normal distribution	74	Feb-03	wk	2
1K	1.K z-scores	82	Feb-07	wk	2
Ch 1	REVISION		Feb-10	wk	3
SAC 1A	**Chapter 1: Univariate data**		Feb-13	wk	3

Due date 31/01/2020

INTRODUCTION TO FURTHER MATHEMATICS

Course Content

Unlike Methods and Specialist, which both feature higher level mathematical concepts such as calculus, Further Mathematics is focused primarily on math that can be used in everyday life. Consequently, it is accessible to almost all VCE students, irrespective of their mathematical background. Further Mathematics extends simple arithmetic skills developed in Year 9 and 10 by applying them to new contexts, which divide the course into two sections.

The first two of these sections are known as the “core modules”. All students undertake these sections, which consist of **Data analysis** and **Recursion and financial modelling**. These modules are studied in Unit 3.
Data analysis: Covers a range of methods to categorise, analyse, present and interpret data sets.
Recursion and financial modelling: Involves basic financial concepts, including depreciation, interest, interest rates, annuities and perpetuities.
The last two sections are known as the “application modules”. Unlike the core modules, there are four. However, each student will only complete two in the exam – usually the two that their school has elected to teach. These modules are studied in Unit 4, and are:

1. **Matrices:** Matrices are constructs used to store and manipulate information. This module covers the definition of a matrix, different types of matrices, matrix operations, transition matrices and the use of recurrence relations to model matrix-related problems.
2. **Networks and decision mathematics:** A network is a set of objects that are connected. This module covers the definition and representation of various types of networks, and the use of networks to solve travel, connection, and optimisation problems.
3. **Geometry and measurement:** Focuses on the use of measurement, geometry and trigonometry to solve problems involving angles, lengths, areas and volumes.
4. **Graphs and relations:** Involves the study of linear relations and non-linear relations to model a range of practical situations.
   Although the content of these modules will probably sound unfamiliar, the mathematical operations required all rely only upon mathematics learned in earlier years, applied to these new concepts.

Assessment

SACs

Although SAC structure may vary from school to school, most SACs are in the form of a standard test, with the exception of the Data analysis SAC, which is rather an extended application task.

Unit 3:

1. An **application task** assessing **Data analysis** module, spanning 4 to 6 hours over a period of 1 to 2 weeks. At my school, this took the form of an analysis task broken up into 5 tests, which were taken under test conditions. Contributes to 13% of final study score.
2. A **problem-solving** task assessing the **Recursion and financial modelling** module, spanning a duration of 2 to 3 hours. In my case, this was in the form of a standard test. Contributes to 7% of final study score.
   Total Contribution: 20% of final study score.

Unit 4:

1. A **problem-solving** task assessing the **first module elected by your school**, spanning a duration of 2 to 3 hours. In my case, this was in the form of a standard test. Contributes to 7% of final study score.
2. A **problem-solving** task assessing the **second module elected by your school**, spanning a duration of 2 to 3 hours. In my case, this was in the form of a standard test. Contributes to 7% of final study score.
   Total Contribution: 14% of final study score.

Exams
Further Mathematics has two examinations.

1. **Exam 1** consists of 40 multiple choice questions worth one mark each. The exam is divided into four sections: 16 questions examining knowledge of the Data analysis module, and 8 questions on Recursion and financial modelling and the two selected applications modules. A bound reference and CAS calculator are permitted. Students are allowed 15 minutes reading time and 90 minutes writing time. Exam 1 contributes 33% towards your final study score.
2. **Exam 2** consists of 60 marks worth of short answer questions. The exam is again divided into sections by modules. A bound reference and CAS calculator are permitted. Students are allowed 15 minutes reading time and 90 minutes writing time. Exam 2 contributes 33% towards your final study score.
Total Contribution: 66% of final study score.

WHY CHOOSE FURTHER MATHEMATICS?

Universal, real world application:
Whilst all mathematical subjects have strong links to real world application, Further Mathematics is unique in that the skills learned pertain not only to STEM jobs, but to everybody's everyday life. Although not all portions are equally useful, being able to critically analyse, interpret and represent data is not only a skill required for many jobs, but also an important tool to assist in day-to-day decision making. The financial modelling skills provide a foundational understanding of interest rates – an important part of everyday banking.

Relatively low workload:
Further is often criticised for being 'shallow' in terms of content, relative to other subjects. Whilst this is undoubtedly true, the other side of the coin instead presents the subject as one with a lower workload than most other VCE courses. Let's be honest, Year 12 is pretty hectic, so it can be nice to have one or two subjects that don't leave you drowning in concepts to wrap your head around. Additionally, this is also why I believe it is a great choice to complete as a 3/4 subject in Year 11. The relatively low workload is a nice way to steadily transition into the increased pressure and expectations of Year 12, whilst also leaving you with ample time to also provide attention to your Year 11 subjects. The extra time available to you as a Year 11 student will also allow for the completion of many practice papers, which leads on to my next point.

Hard work is almost always rewarded:
From my experiences, Further Mathematics is one of those subjects where you can almost assure yourself of an amazing result with the correct preparation. Exam questions tend to be quite repetitive, and whilst this kind of constant repetition may be monotonous, those that are able to master the kind of questions VCAA likes to ask and identify common tricks are almost always rewarded for their efforts.

Improves examination techniques:
The consequence of narrow scope of the course, however, is that at the very top end, results are not so much determined by knowledge, but exam preparation. Whilst this may not be necessarily the 'fairest' way to construct an exam, the subject forces you to refine your understanding of not only the content covered, but to really figure out how individually, you can best approach an examination. This is beneficial not only for your Further Mathematics studies, but any study you undertake with an exam.

WHO SHOULD (AND WHO SHOULDN'T) UNDERTAKE FURTHER MATHEMATICS?

I would strongly recommend considering Further Mathematics if:

1. You feel as if you would benefit from the type of 'real world' math covered in the subject, and don't entertain the idea of tackling the more difficult topics covered in Methods or Specialist.
2. You want to do a Unit 3/4 subject in Year 11. The extra time you have available will allow you to meticulously refine your knowledge and put a lot of effort into the subject, provide an opportunity to refine your examination technique and potentially achieve a great study score to provide yourself a nice platform to enter your final year upon.
3. You want a subject that will help you develop strong examination techniques. As long as you keep yourself motivated, and pay the subject a sufficient amount of your time and effort, you can really figure out a routine that works for you.

I would recommend hesitantly approaching Further Mathematics if:

1. You want to do an 'easy' subject and get an 'easy' high score. Whilst the course in Further Maths is easier than both Methods and Specialist, it is easier for everyone. This mindset will invariably lead to complacency and boredom, in what is potentially one of the most competitive subjects (due to the large enrolment), and consequently, a resulting waste of time.
2. You are in Year 12 and are already doing Methods and Specialist. Since only 2 out of 3 mathematics subjects can contribute to your top 4 subjects, if you have a strong foundation in mathematics you'll be more rewarded placing all your efforts into Methods and Specialist, instead of trying to divide your attention between three mathematics subjects.
3. You are contemplating Further for the sole purpose of saying you completed a math subject. If you don't think that learning this kind of math would benefit you, and have no interest in math, you may be better off picking a subject you'd enjoy instead. But check university prerequisites.

MISCONCEPTIONS

From what I've heard conversing with fellow peers and through reading ATAR Notes, there are several common misconceptions surrounding Further Mathematics that are worth clearing up.

"A strong Methods/Specialist student won't need to study to get a high score in Further."

Being a strong Methods/Specialist student **does not** directly imply you will be successful in Further Mathematics, and vice versa. Although they are all maths subjects, their varying focuses leave little overlap. Of course, that is not to stay a student can't do well in all three subjects, but it is important to realise being good at one does not directly translate to being good at another without any effort.

"Further doesn't require any extra work to get a high study score."

Although the content in Further is easier than that of Specialist or Methods, the consequences for making mistakes are much higher. Hence, almost all students that receive the highest study scores are those that have worked hard to ensure they have complete understanding of every concept, completed many practice questions to identify the tricks VCAA may use, and a solid exam strategy to minimise mistakes, all of which require extra work.

"It is impossible to score highly in Further; it is too competitive."

Although Further Maths is very competitive, it is **not impossible** to score well in. Rather, as previously detailed, hard work will almost always pay off in this subject; it is very possible to receive a high study score with the appropriate preparation.

"You must ace all SACs and be rank 1 to score highly."

Although ranking does play a part in your final study score, especially in a weaker cohort, a high ranking is not necessary for a solid score. Personally, I wasn't even ranked within the top 5 of my cohort, after a disastrous SAC result in Unit 3. So, don't give up after a tough SAC; instead, use it for motivation to ensure you don't make the same mistakes again.