VCEedgeonline exam/study tip # 7

VCE Exam Advice – Units 3 & 4 Further Mathematics

- Further Maths revision should start with a careful review of the Study Design to ensure that all topics are covered. The Study Design should be used as headings for revision. Summary notes should be made using notes taken in class and also using summaries from your textbook. The course material should be summarised down to approximately two A4 pages for each of the subsections of Data Analysis (Univariate Data, Bivariate Data, Time Series), two A4 pages for Recursion and Fiancial Modelling, and two A4 pages for each of the two module studied. The summaries should include simple definitions, formulas and examples of common questions, as well as 'watchouts' such as 'ensure calculator in degrees'.

- Further Maths students are able to take a bound book of notes into the exam, and it can be tempting to not prepare summaries in the belief that they are not required. This is simply untrue. Students who prepare summaries often learn as they do so and summary sheets allow a quick reference to formulas during the exam. Many students spend far too long during the course of the exams locating a section of notes to assist them, wasting valuable exam time. Don't be tempted to use someone else's summary sheet; it may emphasise the wrong aspects of the course for you and the actual writing of the sheet is a learning experience.

- As soon as possible students should be using commercially prepared revision books, such as the A+ revision books, that work through individual sections of the course. These books are particularly helpful in that you can revise a section such as Univariate Data and then complete questions on just that material. Remember the first step is always revision; completing practice books comes second! Revision should involve reading through notes, and actually writing your summary as you do so. This is a good method to ensure that you are taking in the information that you are reading. After completing the section in the practice book, your summary should be considered again. Ask yourself questions such as "did it cover all the sections?", "were the notes clear?", "do I need to add any specific examples?" and, having noted any deficiencies, rewrite the summary. Of course attending prepared revision lectures with notes such as those provided by TSFX will make much of the revision process easier and ensure that your revision is appropriately focussed.

- Once all sections have been revised commercial exam papers such as the TSFX trial exams, the MAV trial exams, Heffernan Exams and the A+ exams are useful. These resources have consistently been well written and appropriate to the course materials for a number of years. Be aware that some other commercial exams are not always appropriate to the course or pitched at the correct level, so if you find anything unexpected or that you are unsure about in other papers, check with the study design and/or your teacher!

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- In the weeks leading up to the exam it is important for students to complete as many practice exam questions as possible and to constantly review the material on their summary sheet. Please be aware that a new study design was introduced this year, and it is important when completing past exams to know which questions are still relevant (more on later in this document).

- The structure of exams has changed this year. Any commercially produced 2016 practice exams will reflect this, however past year's exams will be set out quite differently. Here is a summary of the new exam structure:

  Exam 1: Multiple Choice - 40 questions

Core:	Data Analysis: 16 questions	Recursion & Financial Modelling: 8 questions
Modules:	Module X: 8 questions	Module Y: 8 questioins

  Exam 2: Written Examination – 60 marks

Core:	Data Analysis: 24 marks	Recursion & Financial Modelling: 12 marks
Modules:	Module X: 12 marks	Module Y: 12 marks

- Exams from 2006 onwards will have many relevant questions, as long as the course changes have been noted, and you are aware of which questions are no longer relevant, and which new concepts they don't cover. The questions from these exams can be used as an ongoing revision resource through the year as the core and each module is completed.

- Exams from 2000 – 2005 (two study designs back) will also have some relevant questions and can be used for extra practice, but again you need to be aware of what is no longer relevant. If in doubt, refer to the study design, or ask your teacher.

- When completing exams work to an exam schedule, allow yourself 15 minutes reading time and then complete questions in the allowed 90 minutes. It is just as important to practise reading time as it is to practise writing time. Reading time should be used to read questions carefully and to think about how to approach each question. Remember you may access your notes during reading time, but you may not write or use your calculator.

- Make sure that you answer exactly what is being asked. Mark the exams using the VCAA assessment reports as a guide and carefully review any section that you have not completed well. Don't be tempted to refer to answers during the course of a practice exam. The exam should be completed as a normal exam would and you need to practise the skill of being able to continue in a question even when you are unsure that you have the first part correct.

- Keeping to time during practice exams is very important. Don't be concerned if the first exams you do seem quite long and you are unable to complete them in the allowed time. This is normal and the more you practise, the faster you will become. If you have not completed the entire exam in the allotted time it may be useful to continue after the set time using a different coloured pen. This way you get the experience of all questions, but you can evaluate how much of the exam you completed in the allotted time.

- Many questions in exams are repeated in another form from year to year and you should be looking out for these questions.

- Both exams have 90 minutes of writing time, and the Data Analysis section of the core is weighted more heavily in both exams. In each exam you should aim for 32 minutes for the core, 16 minutes for recursion and 16 minutes for each module. This timeframe will allow 10 minutes at the end for checking your work. Genereally speaking, the earlier questions in each section will require less work and time than the later questions in each section.

- While you should aim to complete the exam within the time frame, you should also allow enough time to do each question properly. A common mistake is to rush through and assume that then you will be able to find any errors in review as you will have additional time available. Often students do not check thoroughly when they review and do not pick up mistakes they have made. Once a question has been misinterpreted once, it is often read incorrectly again in review.

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- You do not have to complete the exam in sequential order. If there is a particular section of the course that you are more confident with, or feel you can complete quickly, then feel free to tackle it first. If you run out of time, you don't want to have missed a section that you think you could have done well.

- The VCAA website is an absolute must and reading the Examiner's reports when marking past papers will make sure that you answer questions in the expected manner. These reports clearly list what was an acceptable answer for each question in that year. They also highlight commone errors.

- Also on the VCAA website are the rules for bound notes, the cover sheets for the exams you will be doing and sample multiple choice answer sheets(cover sheets and answer sheets are usually added during October). Using the multiple choice answer sheets during your practice exams is useful. You should be fully conversant with the allowed equipment in the exam, the times that the exams start and how to successfully complete the answer sheet. Note that the bound notes rules do not allow the use of removable tabs, but you can divide your notes into sections by using dividers, color coding or indented tabs. Note that Officeworks will bind your notes on-the-spot for a relatively small fee.

- Even though working is not marked in a multiple choice exam, if you show some working beside each question in the exam booklet, you will find it easier to check your work when you go back to that question.

- A trend that has appeared in the examinations in recent years is requiring students to demonstrate an answer to a question rather than just giving an answer. These 'show that' questions are appearing more regularly in all sections of the examination. These questions require all steps of working to be sure of full marks. Remember that a 'show that' question must involve proof, so quoting any rules used is useful and you must not assume anything. If a particular rule is asked for, then you cannot solve this question another way. A 'show that' question must work through the problem towards the expected result. You cannot use the answer to demonstrate the concept by working backwards.

- The given number in a 'show that' question is somethimes needed in a following question. Note that you can attempt the following question using this number, even if you can't complete the 'show that' part of the question.

- During the exam, note the marks available for each question. These should give you an idea of how much is expected in the answers. Questions worth two or more marks have method marks, so you should show at least the basics of your working for each question. Most questions in current examinations are worth only 1 mark and there are no half marks. A few questions are worth 2 marks. The examiner's reports clearly state that organised setting out is essential for high marks. They note that many students write answers without calculations for 2 mark questions, even though an incorrect answer could still be eligible method marks or consequential marks if correct working is shown.

- In multi-part questions if you get the answer to the first part wrong, and use this in a subsequent part, you may still be eligible for consequential marks ONLY if you show that you used your previous incorrect answer. Of course your incocrrect answer must still lie within a reasonably expected range to earn the consequential mark. It is often wise to estimate answers where possible to exclude absurd calculation results.

- Don't waste time writing your answer in a sentence; it is not usually expected unless that question asks you to explain, but do make your answer clear to the examiner by highlighting it or underlining it, particularly if your working is untidy. A recent complaint made by examiners has been a lack of legibility of answers. If the marker cannot be sure what is written then they are obliged to mark the answer incorrect, so make sure that your answers are legible.

- Recent examiners' reports have indicated that students are not reading questions correctly and they are not answering what has been asked. Practise reading carefully during reading time and using a highlighter during writing time. Other issues have included checking that answers are sensible in the context given and making sure that a ruler is used for graphs. Lines drawn free-hand in a graphical situation will not be marked correct.

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- Other comments in recent examiner's reports have made clear points about the way that rounding errors are approached. Be aware that while rounding errors are only punished once per paper, writing an answer to a lesser level of detail than required without the unrounded version initially given is NOT a rounding error and marks will be lost every time that this happens. You should ALWAYS write down the unrounded answer first, and then round to the required number of decimal places or significant figures. This way, if you make a second or third rounding error, it may not impact on your mark.

- Suggestions have also made that students compile a glossary of terms because many students misinterpret questions due to a lack of understanding of basic terminology.

- **Specific concerns** to note in recent examiner's reports (but presented below pertaining to the new study design) are:

  - **Data Analysis:**

    - Determining explanatory and response variables.
    - Noting whether answers should be given as a number or a percentage.
    - Interpreting the slope of a regression line in terms of the two variables.
    - Plotting a regression line on a graph from a given or found equation.
    - Understanding that outliers in a boxplot must still be considered when determining maximum and minimum values.

  - **Recursion and Financial Modelling**

    - Two-step problems using the financial solver, where you must first calculate one answer, and then use that answer to form part of the next calculation.
    - Incorrectly assuming that you should round to the nearest 5c or nearest dollar.
    - Understanding how interest is calculated at each stage in a reducing balance loan.

  - **Module 1 Matrices:**

    - Correctly drawing a transition matrix from given information.
    - Values in a matrix need to be extracted to answer a question; just writing the matrix is insufficient.
    - Understanding that rules in the form $S_{N+1} = TS_n + B$ must be worked through state by state; there is no simple rule using powers.

  - **Module 2 Networks:**

    - Recognising a planar graph when drawn in non-planar form.
    - Finding a minimum spanning tree using Prim's algorithm.
    - Identifying the minimum cut in a practrical flow problem with more than one source.
    - Criteria for a critical path and reducing this time (crashing) needs more attention.

  - **Module 3 Geometry:**

    - Solving problems using length, area and volume scale factors.
    - Solutions are often poorly set out and method marks can't be allocated.
    - Rounding answers too early in questions requiring more than one calculation.

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- **Module 4 Graphs:**

    - Consideration of whether to round up or down to an integer needs to be considered in context.
    - The use of the sliding line to understand maximising or minimising feasible regions.
    - Being able to write a constraint in a mathematical form, when it is given in everyday language.
    - Shading outside of the required region rather than inside IS acceptable, but ONLY if you clearly label which is the feasible region.

- This year's exam is likely to reflect concepts that have been poorly handled over the last few year's exams. As in the past the use of your calculator is expected, but many questions will test your underlying understanding of concepts rather than just relying on the calculator. In all modules you should expect to demonstrate solutions rather than just give a calculated answer as this method of testing is becoming increasingly evident. All modules might ask for explanation of why a situation exists and students need to avoid rote replies from their notes that do not directly address the context of the question.

- This year's exams may also target concepts that are new to the 2016 Study Design:

    New Concepts

    Data Analysis:

    - Categorical variables being described as either nominal or categorical
    - Use of a logarithmic scale on histograms
    - Explanatory and response variables (rather than independent and dependent)
    - Non-causal explanations for an association (common response, confounding or coincidence)

    Recursion & Financial Modelling:

    - Entirely new!

    Module 1 Matrices:

    - Communication matrices
    - Dominance matrices

    Module 2 Networks:

    - Walks, trails, paths, circuits and cycles
    - Dijkstra's algorithm

    Module 3 Geometry:

    - Arc lenth, area of sectors and segments
    - Distances between places on the same line of latitude or longitude
    - Time Zones

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Module 4: Graphs

- Same as the old course.
- You should expect the majority of questions in this year's papers to be worth only one mark each, as this has been an increasing trend, with a small number of two mark questions. You should expect questions to have a range of levels of difficulty so that students will be able to be separated in terms of ability. With this in mind you must revise ALL concepts in order to be fully prepared, rather than just concentrating on aspects of the course likely to be more problematic.
- One final piece of advice that is advantageous in both exams – after every question, ask yourself two things:

  Have I answered the question?
  Does my answer make sense?

More subject specific advice will be issued to students at our "VCE Essentials – Final Exam Revision Lectures".

Good luck with your exam preparations!
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