Preparing to Teach the Class of 2020

Katherine A. Seaton
Department of Mathematics and Statistics,
La Trobe University, Victoria 3086

Anthony Morphett
School of Mathematics and Statistics,
University of Melbourne, Victoria 3010

November 2, 2020

Abstract

When the high school graduates of 2020 arrive in our first year maths courses in 2021 (a gap year not really being on the cards), what should we expect? All Australian students experienced some level of disruption to their studies in 2020 due to COVID-19, though the impact of the pandemic was greatest in Victoria. This note summarises what we see as the most relevant changes to senior secondary mathematics in 2020 for Australian tertiary mathematics educators.

1 Introduction

The COVID-19 pandemic disrupted many aspects of our lives, and of course mathematics teaching and learning at schools was no exception. Students and teachers had to rapidly adapt to online learning, and in some cases, state/territory curriculum authorities made temporary changes to mathematics subject content and assessment in response to the pandemic. For some states, this occurred on top of planned curriculum changes as a result of the Australian Curriculum roll-out. Together, these changes mean that many students will be entering university in 2021 with a considerably different experience of school mathematics than in the past. This note summarises what we see as the most relevant changes to senior secondary mathematics for Australian tertiary mathematics educators in 2021.

This note addresses only the experiences of (the vast majority of) Year 12 students who undertake the examinations of their state/territory authorities; the International Baccalaureate is not considered. For an overview of the state/territory syllabi, a good reference is Nazim Khan and Michael Jennings' presentation at a recent FYiMaths workshop [**?**].

Of course, the level of disruption experienced by individual students varied, so even when there were no 'official' changes to syllabi, students may have found

their study of particular topics to be more heavily disrupted than other topics. They may therefore have a weaker understanding of some topics than in a normal year, or at least, might have lower confidence in their abilities. Resources to support students' transition to university study, such as revision materials and diagnostic skills tests, are therefore likely to be even more valuable in 2021.

Many students will have become proficient with online learning technologies during 2020, but there was no 'standard' technological platform for remote learning in schools. It was often up to each school to select which tools to use, and Zoom, Microsoft Teams and Google Meet were popular choices. We will also have students in 2021 who did not experience remote learning in 2020, such as those returning to study after a gap year. Therefore we should not assume all our students are proficient with any particular online learning technologies in 2021.

2   School-based assessments modified

In most states and territories, the content of senior mathematics subjects was not changed, but changes were made to the school-based assessment. It is simplest to say that the number of **school-based summative tasks** was reduced by the relevant state authority, or principals were given discretion to modify them in number and possibly nature. The details, including whether or not weightings could be changed, can be found at the relevant authority websites listed below. This applies to the ACT, NSW, Queensland, South Australia and Western Australia. (The Northern Territory Certificate of Education and Training (NTCET) is based on and administered by SACE.)

3   Tasmania: external exams streamlined

Tasmania's **external exams** for mathematics were adjusted. In 2020, the number and complexity of the questions was modified, effectively giving students more working time in the exam. Previously, across the three hours of exams there were question items worth 180 marks in total; in 2020 that total is 150 marks. However, the syllabus of the mathematics subjects has not been reduced, the reduction of marks being spread across all content.

4   Victoria: temporary changes to study designs

School students in Victoria experienced much longer periods of learning from home than in the other states. Even during times when lock-down was more restrictive in Melbourne than the rest of the state, the state government did not want metropolitan Year 12 students to be studying under substantially different conditions from regional students, so all VCE students continued learning remotely. In view of the disruptions, and to provide some certainty going forward, modifications to the study designs of many subjects were announced for 2020

only, in early May. Since students were well into the study of the first part of the year, the modifications were all to material designated as Unit Four (that is, the second half of the second year of the two year VCE programme). This is probably the most important information for University lecturers to know — topics that have *not* been studied by the Victorian class of 2020.

Beginning with the subject most often required for first year university mathematics:

Mathematical Methods: the content removed is all taken from the *Probability and Statistics* area of study. Rather than covering discrete and continuous random variables in generality, only binomial and normal distributions are specified (but all the features usually explored in the more general context are still to be covered for these representatives). Also, the topic of statistical inference for sample proportions is removed. The unchanged areas of study are: *Functions and graphs*, *Algebra*, and *Calculus*.

Specialist Mathematics: The entire area of study *Probability and Statistics* is removed.[1] The other areas of study are unchanged: *Functions and graphs*, *Algebra (Complex Numbers)*, *Calculus*, *Vectors* and *Mechanics*.

Note that students studying VCE Specialist Mathematics must also take VCE Mathematical Methods, though it is not unusual for accelerated students to take Mathematical Methods in year 11 and Specialist Mathematics in year 12.

Finally, students in some service courses at university may have this (non-calculus) background:

Further Mathematics: No change to the core which comprises: *Data analysis* and *Recursion and financial modelling* areas of study. In the other areas of study, instead of having studied two modules from four (*Matrices*, *Networks and decision mathematics*, *Geometry and measurement*, *Graphs and relations*), **only one** will have been studied.

Despite the lockdown, VCE mathematics exams were held in-person at schools as usual.

The accreditation period of the current (unmodified) study designs in Victoria has been extended to the end of 2022, with the scheduled review cycle paused in 2020 and expected to recommence in 2021.

5   Coincidentally, at the same time...

NSW

You may have seen the extensive media interest in a question about crickets chirping in NSW! Some of this interest has been generated by the incorporation of **common questions** across the various HSC mathematics subjects; this was such a question. More generally, common questions between the Mathematics Standard 1 and 2 examination papers were introduced from 2019, and between

---

[1]Topics covered in this area of study are linear combinations of random variables, sample means, confidence intervals for means, and hypothesis testing for means.

Mathematics Standard 2 and Mathematics Advanced[2] examinations this year (2020).

Queensland

2020 was also the first year of new arrangements for the QCE. This cohort of year 12 students were the first to study a revised suite of study designs and to be assessed by **external exams** as well as the school-based tasks that had previously been the sole form of assessment in Queensland. Thus Queensland teachers and students were implementing these changes with the overlay of the disruptions of COVID-19 as an additional complexity. It won't be possible, of course, to disentangle the effects of the two circumstances in 2021. So far there is only anecdotal evidence about how the changes to assessment have influenced the emphases teachers may have given to areas of the curriculum.

6   Finding state information

The most up-to-date versions of each state or territory's mathematics curricula will always be found at the website of the relevant body in your state or territory:

ACT: ACT Board of Senior Studies (BSSS)

http://www.bsss.act.edu.au/curriculum

NSW: NSW Education Standards Authority (NESA)

https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/Understanding-the-curriculum/syllabuses-a-z

Qld: Queensland Curriculum and Assessment Authority (QCAA)

https://www.qcaa.qld.edu.au/senior/senior-subjects/mathematics

SA: South Australian Certificate of Education (SACE) Board

https://www.sace.sa.edu.au/

Tas: Office of Tasmanian Assessment, Standards and Certification (TASC)

https://www.tasc.tas.gov.au/students/courses/

Vic: Victorian Curriculum and Assessment Authority (VCAA)

https://www.vcaa.vic.edu.au/curriculum/vce/vce-study-designs/

WA: School Curriculum and Standards Authority (SCSA)

https://senior-secondary.scsa.wa.edu.au/syllabus-and-support-materials/mathematics

These websites are the source of much of the information incorporated into this Classroom Note.

---

[2]NSW's Mathematics Standard is a non-calculus course, broadly comparable to Further Mathematics (Vic), General Mathematics (Qld, SA, Tas) or Mathematical Applications (ACT, WA). NSW's Mathematics Advanced is an intermediate calculus-based course broadly equivalent to other states' Mathematical Methods subjects.

Acknowledgements

References

[1] Khan, R. N. & Jennings, M. (2019). *Survey of High School Mathematics Syllabus and University Mathematics Units.* Seventh First Year in Maths (FYiMaths) Workshop, Melbourne, July 2019. Slides available at https://fyimaths.files.wordpress.com/2019/07/fyi-nkhanmjennings.pdf