

Towards Tertiary

Prepared by Lola Sleep for MathsMeet 2018, MTANT annual conference.

As teachers of Senior Maths courses how can we prepare our students to be successful in their Year 12 Mathematics subjects and also in their mathematical studies at university?

The SACE assessment advice (formerly chief assessors' reports) and some research done by the Melbourne Graduate School of Education, The University of Melbourne highlight common areas that we should focus on in order for our students to be successful in Year 12 maths and university maths. Hopefully, we are already doing most, if not all of these things.

SACE Assessment Advice

Common themes across all Year 12 Mathematics subjects for *successful* students

- ✓ Showing correct working out with all steps clearly shown
- ✓ Used mathematical language (symbols) to answer questions instead of long wordy explanations
- ✓ Demonstrated a clear depth of understanding of underlying concepts

Go to www.sace.sa.edu.au and follow the links:

Teaching the SACE → Subjects

(go to the appropriate Year 12 maths subject – Essential Mathematics, General Mathematics, Mathematical Methods, Specialist Mathematics)

Subject assessment advice and exam papers → Subject assessment advice and open the previous year's document.

Also note comments regarding the least successful responses.

Melbourne Graduate School of Education, University of Melbourne Reports

Common themes found with first year University students

- ✗ Poor understanding of the language of Maths
- ✗ Incorrect use of = sign
- ✗ Lack of depth of understanding of the link between concepts - eg. Pythagoras Rule, Distance formula, Trig Identity

Documents provided:

mgse-1-communication-like-a-mathematician.pdf

mgse-2-met-before.pdf

mgse-3-symbolic-synonyms.pdf

mgse-SuggestionsForStudents.pdf

Some Things I Do

- ✓ Greek Alphabet – copy of the sheet I give to my Year 11 students is provided. (GreekAlphabetSmall2toPage.pdf) This sheet includes lower and upper case, how to write, how to say and I have included a column for students to check when they have used the symbol.
Use a range of these symbols for angles not just always θ and other symbols as appropriate e.g I used QED, \forall , \exists . I clearly explain $\sqrt{\quad}$ means +ve square root only. Hence the need to sometimes use $\pm\sqrt{\quad}$
- ✓ Correcting students early on if they mispronounce Maths words. eg. $\sin x$ as 'sin' x instead of sine x.
- ✓ Reinforce often the use of Pythagoras' Rule in different contexts - relate to the way brain learns. The brain likes to make connections between information instead of storing a lot of disconnected pieces of information. Pythagoras' Rule is used in many different contexts to develop other relationships/formulae. e.g. Distance Between Two Points, Equation of a Circle, $\cos^2 x + \sin^2 x = 1$.
- ✓ Correct students incorrect use of maths language **every** time and show 'correct' method
- ✓ Provide full solutions to text book questions so that students have a model of how to set their work out.
- ✓ Never use synthetic division. I teach polynomial long division. Most of the time these days this means teaching arithmetic long division first.
See the free pdf book *Nix The Tricks* for more 'tricks' we should **not** be using.
<https://nixthetricks.com/>

Pleasingly a parent of one of my 2017 Year 12 students passed on to me that her daughter credited my teaching her Maths in Year 11 and 12 as the main reason for her being one of only 52 students accepted into Monash Universities' Advanced Science Research Honours Degree course. The students enter at second year and need to maintain an 80% average to stay in the course.