

12 October 2016

To: The New Zealand Qualifications Authority and the Ministry of Education,

CC: Year 11 students at Wā Ora Montessori School, their parents, Jan Gaffney (principal at Wā Ora Montessori School), Chris Hipkins (Labour spokesperson for education), maths teachers around New Zealand, the media

Subject: 16% is not a passing grade

I am writing a letter of complaint about the 2016 MCAT exam, though many of my colleagues from around the country have already done so, as well as year 11 students, their parents, maths associations, and principals. Over 20 schools in Wellington alone have concerns about the exam.

Why have so many people complained? The same reason as why many maths teachers have put a huge amount of effort, unpaid and in their spare time: to convince NZQA that there is a problem.

NZQA haven't yet said that there is a problem with the 2016 MCAT exam. So I will add my own voice in the hope that it helps resolve this increasingly ridiculous and drawn-out situation. **I think the biggest problem with the 2016 MCAT is that 16% is a passing grade.** But there are other problems too.

Unfair examination questions

Many other teachers have given a question-by-question analysis of the 2016 MCAT exams and are unanimously critical of them. I echo a few key points here.

Do you realise that there was only one linear equation question in the entire exam? And even then, it involved the use of simultaneous equations. And even then(!), it was wrapped up in a word problem that made it inaccessible to most students. Appropriately, it was an excellence question. But for most students, there were effectively *no* linear equations questions. The hours that students spent revising linear equations were wasted. I find it interesting to note that the standard requires that any simultaneous equations questions are restricted to using linear equations only, meaning that the only time a linear equations question was asked was when it had to be. This exam had literally as few linear equation questions as possible.

The flipside of this is that there were far too many quadratic questions. Other maths teachers have already pointed out that 11 of the 19 questions required knowledge of quadratics. I agree that every year 11 student should know how to work with quadratics. But not every student understands each concept perfectly, otherwise there'd be a 100% excellence rate. This stunning lack of diversity unfairly punishes students who are not strong with quadratics and minimises their strengths in other (equally valid) concepts that the standard requires. The 2016 MCAT could be accurately described as a quadratics exam. No examiners should be allowed to weight a single concept so heavily.

The exponential questions were significantly flawed. Other teachers have pointed this out but in NZQA's responses, you say it is inappropriate for you to comment on specific questions. **Can NZQA please explain how it is acceptable for the assessment questions to differ so wildly from the standard?** The standard states that "students need to be familiar with procedures related to solving simple equations involving exponents such as $x^3 = 8$ or $5^x = 125$ "¹. Whereas the exam asked

¹ <http://www.nzqa.govt.nz/nqfdocs/ncea-resource/achievements/2014/as91027.pdf>

students for what value of x will $4 \times 2^x = 2^{6x+3}$ and for what values of n is $6 \times 2^{n+1} > 123$. Exponential inequations aren't even in the curriculum! Can you please explain how this is not a problem? Appropriately, both of these questions were excellence-level but that doesn't change the fact that there were *no* simple exponential questions. Again, hours of wasted study for the majority of students who are capable of solving "simple equations involving exponents" but are unable to solve the complicated exponential equations and exponential inequations presented in the exam.

This is not an exhaustive list. In lieu of going through the remaining issues, I instead say that I agree with the comments sent in by other maths teachers around the country. I have read complaints from four different regional maths associations and over a dozen teachers and principals and their criticisms are fair, valid, and as yet, unresolved.²

Unhelpful interpretation of the standard

I am concerned at the interpretation of the standard shown by the assessment specifications. The standard for level 1 algebra states that it requires "selecting and using procedures". This has controversially led to the interpretation that "no part of any question will direct the candidate to perform a specific procedure"³. This has led to the vague and unclear instructions found in the 2016 exam. For example: "The area of a rectangle is $x^2 - x - 2$. If one side has length $x + 1$ metres, give the second side in terms of x ." How convoluted. Whereas the question *could* read: "Factorise $x^2 - x - 2$." which is a much clearer instruction (and a reasonable instruction) if it weren't for this ridiculous self-imposed restriction. Interestingly, the level 2 algebra standard also involves "selecting and using procedures" but the assessment specifications for level 2 algebra make no mention of banning direct instructions and the level 2 exams are quite happy to use clear instructions. **Why is this?** For example, this is a question taken from the 2015 level 2 algebra exam⁴: Simplify $\frac{2x^2+7x-4}{2x^2-32}$. I understand that there is an unspoken instruction to factorise before simplifying but it remains that the level 2 question is much clearer and easier to understand than the level 1 question.

It doesn't have to be like this. The instruction to "factorise" doesn't specify how to factorise (common factor, quadratics, grouping, etc.) so the students are still selecting a method. Similarly, the instruction to "simplify" doesn't specify how to simply (collect like terms, factorise common factors, etc.).

Scaling the grades

This is probably the trickiest problem with the 2016 MCAT. NZQA has the ability to change the number of correct questions required to gain each level of achievement to ensure that a similar number of students pass at each level of achievement. This could be useful to align slightly varying assessments. **But when the exam is so hard that a student only needs 3 out of 19 questions correct to pass, something is seriously wrong.** I expect that this will be the trickiest problem with the MCAT because NZQA could claim that nothing is wrong based on a similar number of students passing compared to previous years. But with 16% being a passing grade, something *is* wrong.

NZQA has said that "It would be unusual for a schedule not to be amended through this process as students always provide a wider range of appropriate responses than are covered in the draft

² This is not to say that NZQA has not responded. They have. But only to say that they'll pass on the feedback to the 2017 MCAT development team rather than addressing the harm caused this year.

³ <http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/assessment-specifications/mathematics-l1/#first>

⁴ <http://www.nzqa.govt.nz/nqfdocs/ncea-resource/exams/2015/91261-exm-2015.pdf>

schedule. The extent of the adjustments to the schedules for the 2016 MCats (sic.) is consistent with previous years."⁵ **Is NZQA saying that 16% is a good passing grade to be aiming for in future years?**

If the exam is so difficult that 16% is a passing grade,
then something is seriously wrong.

Not only does it mean the exam is unnecessarily stressful and disempowering (who would feel empowered after scoring 16% on an exam, even if they passed?), but it means that I and other maths teachers are unable to get a broad picture of our students' algebraic abilities. An assessment like this is a waste of time except for the credits it's worth. In terms of being a valuable assessment that helps inform our teaching practice, the 2016 MCAT was not fit for purpose.

What I would like from NZQA

Labour's education spokesperson Chris Hipkins has suggested that a nation-wide resit be considered and I agree with NZQA ruling it out. There is no time for NZQA to develop a new assessment and no time for students to sit it. However, solutions must be found and NZQA's current response (admitting a failure in communication only) is inadequate.

I would like NZQA to:

- Realise that the 2016 MCAT was poorly set and apologise to year 11 students, their parents, and their teachers. This is not 'business as usual'.
- Allow schools to select the higher grade out of the MCAT or the mock exam for each student.
- Bring forward the review of the standard to now and include maths teacher input.
- Provide sample exam papers for any external maths standards that are different from past exam papers. If there is only one change (like including an investigation question), some sample investigation questions would suffice. Past exam papers are an important indicator to both teachers and students as to the sort of questions that will be asked. If they are no longer similar to the current year's exam, they should either be removed or have a notice saying that they are unsuitable for revision material. These changes can be no later than March, otherwise these changes could happen during or after the unit has been taught.
- Promise that the 2017 will not be so hard that a passing grade is as low as 16%.

Along with other maths teachers around Wellington and with my principal's support, I will be withholding my students' results for this year's MCAT until NZQA responds reasonably to our concerns. I have marked all of my students' exams and the results are comparable to previous years. But that's not what I'm concerned about.

I am pleased that NZQA has confirmed that currently practicing teachers at the relevant level are a part of writing the exams⁶. But clearly something has gone wrong with the process. I agree with one

⁵ http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11714229

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family's suggestion that the ministry of education look into "the processes at NZQA that allowed this exam to pass all of the requisite checks and balances for its appropriateness"⁷.

The Ministry's point of view so far has been that it's not their problem. "'We are going to leave it to NZQA,' Parata's media spokeswoman said... 'It's not really a matter for the minister'"⁸.

I would like the Ministry of Education to:

- Not remain on the side-lines and help NZQA resolve the situation.
- Inquire into the processes at NZQA that allowed this exam to pass all of the requisite checks and balances for its appropriateness.

I would like to finish with an offer to do anything I can to make the 2017 MCAT better than this year and last year. I am sure that many maths teachers would be happy to offer the same. It seems that both teachers and NZQA stand on opposite ends of a great chasm hurling blame and frustration at one another. No one wants this to continue and many would do all that they could to address this difference, including myself. Let's get this right so that students can prepare for the 2017 MCAT without fear of being set up for a devastating and disheartening experience.

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⁷ <https://www.mathsnz.com/mcat/TheGardnerFamily.pdf>

⁸ <http://www.stuff.co.nz/national/education/84397641/maths-teachers-shell-shocked-after-exam-fighting-back-against-nzqa>