

Dear Margaret

My name is Matthew Bell. I have a daughter who attends Wellington Girls College and sat the Year 11 NCEA Algebra exam on Tuesday 13 September. I wanted you to be aware of the complaint I was putting in to NZQA, both to support your efforts to do something about what, in my opinion, was a poorly set exam and also because, due to my qualifications in the area, what I write might be helpful to you to use in any follow-up action. I am more than happy for you to quote me, if you think that would help your case.

I have a Master of Science (with Distinction) in Mathematics from the University of Auckland and I taught mathematics at Taranaki Polytechnic (now Western Institute of Technology or WITT) in New Plymouth for nine years. I do not note this in any way to be immodest, but simply to back up the fact that I am very familiar with the subject of algebra and I have also set and marked numerous maths and statistics tests and exams at various levels.

After the derived test that the students sat in preparation for their exam I spent many hours over the ensuing nights and weekends tutoring my daughter and going over old exams. It was encouraging to see her progress, especially in terms of learning to set out logical working in solving a problem and break the problem down into manageable sections. By the time the final exam came around, I felt she was more prepared and might well even manage a pass with merit. Hence it was disappointing to hear that the exam was so much harder than past versions, and my daughter did not seem overly confident after sitting it.

Despite that, I did not wish to comment until I had had a chance to see the exam myself. Now I have gone on-line and done so and I fully understand what the concerns are about. A large number of the questions have a twist in them that makes them considerably harder than past years' versions and Question 3 (d) is beyond belief. It took me about 10 minutes of fiddling around just to understand the point they were trying to make. I suspect many students would just have abandoned this one altogether as it would have been totally incomprehensible to them.

Other examples : 1(d) $4 \times 2^x = 2^{6x+3}$ comes out to have the answer $x = -0.2$ or $-1/5$

That is hardly comparable to last year's problem of solving $10 \times 2^{n-1} = 160$ where you could work it out in your head to get $n-1 = 4$ so $n = 5$.

Or to the 2014 version of this question, $3 \times 2^{a-1} = 96$, where again it doesn't take much to work out $a-1 = 5$ so $a = 6$.

Question 1 (b) Not too bad, but still more to it than past years' versions testing a similar theme of setting up two algebraic equations and substituting in one for the other.

For this year's version you really had to nominate two variables (Ranee's money as x , Hone's as y) and then two equations $x - 20 = y + 20$ and $x + 22 = 2(y - 22)$

Compare that with question 3(e) in 2014 or 3(e) in 2015 where you can largely just set one variable as x (James' hours in 2014, or the distance they meet from Jake's house in 2015) and easily set up the other (Mark's hours or the distance from Sam's house) in terms of the same variable, before substituting and solving.

One last example is Question 2(f) (ii)

To solve this, candidates had to work out an inverted parabola's x -intercepts (taking care not to make a mistake with the double negative term), find these occurred at $x = 0$ and $x = 4$, then solve this equation again for $-(x^2 - 4x) \geq 3$ to get that $1 \leq x \leq 3$ so it is at or above 3 metres for $(3-1)/(4-0) = 2/4 = 0.5$ or 50% of the time.

There is quite a bit more going on there than in 2014's Question 3(d)(iv) if $T = n^2 - n + 1 = 91$ solve for n , or in 2015's Question 2(c) if $y = x^2 + 3x - 10$ find the values of x for which y is negative.

I would be happy to discuss this further with you, but my main point is that I support you and Wellington Girls College in expressing your disappointment with this exam and calling for NZQA to address the problems that it has caused.

Mathematics is a very important subject and students need to be encouraged to understand how useful it is and hopefully to enjoy studying it. I am afraid that this exam is likely to have had the opposite effects. This is even more unfortunate given it will have been many of these students' first experience of sitting an external exam.

Regards
Matthew Bell