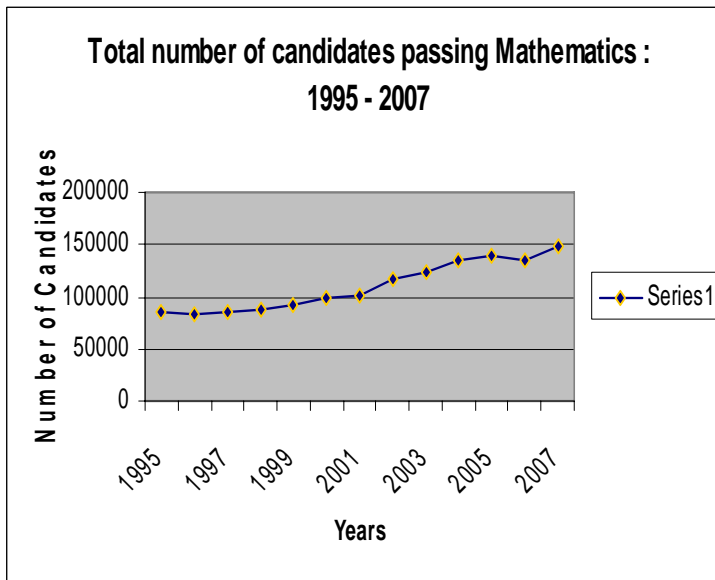


The Great Maths Debate

The 2008 mathematics matric exam has attracted considerable attention and debate. This short article seeks to contribute to the debate.

Over the last ten years there has been sustained growth in the number of learners in South African schools taking mathematics as a subject. This is best illustrated and verified by the number of learners writing and passing Grade 12 mathematics examinations. The graph below shows this growth from 80 000 passing maths in 1996 to 150 000 passing in 2007.



However, the numbers shown do not delineate those passing higher grade and standard grade mathematics. These figures are provided in the table below. The table shows that there has been little growth in the higher grade numbers but a significant growth in the standard grade numbers passing mathematics from 1996 to 2007.

Table1: Number passing maths HG and SG 1996 to 2007

Year	M HG	M SG	Total maths passes
1996	22 416	59 614	82 030
1997	19 575	65 580	85 155
1998	20 130	68 315	88 445
1999	19 854	72 179	92 033
2000	19 327	79 631	98 958
2001	19 504	82 301	101 805
2002	20 528	96 302	116 830
2003	23 412	99 426	122 838
2004	24 143	109 664	133 807
2005	26 383	112 279	138 662
2006	25 217	110 452	135 669
2007	25 415	123 813	149 228

In the new curriculum introduced into Grades 10, 11 and 12 in the period 2006 to 2008, there is no longer higher grade or standard grade and so in November 2008 all Grade 12 learners wrote the same grade of question papers. Only in mathematics, which is now a compulsory subject, is there a choice between mathematics and mathematical literacy.

In December 2008 the DoE announced the results of the NSC examinations and reported that: 136 515 candidates passed maths and 207 260 passed mathematical literacy. This means that a total of 343 775 passed some form of mathematics. This large increase from the 149 228 maths passes of 2007 is a consequence of the new requirement that all candidates offer either mathematics or mathematics literacy.

But how does one compare these results with past results? This is difficult. However, to provide some guidance the Department of Education requested the mathematics examination panel to set the 2008 examination papers so that 30% of the marks were of similar difficulty to a former standard grade level pass and to make 50% on the two mathematics papers in 2008 similar or equivalent in difficulty to a pass at the old higher grade level.

In 2008 63 040 candidates passed with more than 50% or equivalent to higher grade mathematics. A number of critics have raised concerns and eyebrows about the rise in numbers from 25 000 higher grade maths passes in 2007 to 63 000 in 2008. But is this so surprising?

Higher education practices and procedures as well as CDE research on the Senior Certificate results provide some assistance here.

Higher Education Admission Points

At the University of Pretoria, an 'A' on Standard Grade was awarded the same number of points for admission to degree study as a 'B' on Higher Grade; a 'B' on Standard Grade the same as 'C' on Higher Grade and a 'C' on the Standard Grade as a 'D' on Higher Grade. At some other universities an 'A' on the Standard Grade was awarded the same as 'C' on the Standard Grade and so on.

University A	University B
A SG = B HG	A SG = C HG
B SG = C HG	B SG = D HG
C SG = D HG	C SG = E HG
D SG = E HG	

By this logic A, B and C on Standard Grade could be regarded as having the potential to achieve higher grade passes if the learners were exposed to a higher grade curriculum and examination.

In 2006 and 2007, over 28 000 students obtained either A, B or C on Standard Grade Mathematics as the table below shows. In other words we could expect, all things being equal and the candidates not being less able than in 2006 and 2007, that the number of candidates passing mathematics in 2008 at the 50% level would be at least equal to the number passing higher grade maths plus the number passing standard grade maths with A, B or C symbols. In 2007 this total would have been 54 305 passes (HG (25 415) + SG A (7 458) + SG B (7 488) + SG C (13 944)). This means we could have expected, by higher education admission signals, in 2008 approximately 54 000 passes in the mathematics papers above 50%. An increase from 54 000 which is what could have expected to 63 000 which is what we got is not as surprising as an increase from 25 000 actual HG passes to 63 000 passes.

SG passes in 2006 and 2007 by symbol

	A	B	C	D	E
2006	6 616	6 823	12 590	19 418	27 386
2007	7 458	7 488	13 944	21 941	31 561

CDE Report

This expectation is supported by the CDE Report on mathematics and science of 2002 *From Laggard to World Class*. The report states that 'Our research shows that a surprisingly large number of learners who could succeed at HG maths and science do not enrol for these subjects at all or enrol in the SG when their marks indicate they could succeed in the HG'. The CDE report indicates that their analysis of Senior Certificate results shows that in 1998 41% of learners that passed SG maths could have passed HG maths and in 2000 56% of SG passing learners could have passed HG maths. In numbers of candidates this means that in 1998 over 28 000 more learners could have passed HG maths based on their Senior Certificate results and in 2000 44 500 more learners.

If one takes the 1998 figure of 40% and applies this to SG maths passes in 2007, then 49 000 candidates could be added to the 25 000 HG passes of 2007. In other words there were, in CDE terms, 64 000 potential passes in 2007 at the higher grade level. This is slightly higher than the number of 63 034 that passed with above 50% in 2008.

Other considerations

Although the statistics provide useful ways of understanding the changes in numbers passing high level mathematics, there are two other important considerations in judging the numbers passing mathematics in 2008. First, we must consider any evidence that links particular improved passing numbers to particular interventions or strategies in 2006 to 2008 by schools, teachers and learners.

There were in 2008 many dedicated interventions aimed at improving mathematics passes. More learners had maths textbooks than ever before. The Department of Education and the main media houses provided additional mathematics material. Higher education institutions, NGOs, private individuals and companies and the SABC all provided additional tuition. However, these interventions need to be linked to particular examples of improvement.

Second, we must consider detailed evidence that shows changes in the standard of the mathematics examinations of 2008 compared to the Higher Grade level of 2006 and 2007. Opinions are very varied. This matter requires systematic investigation by expert mathematics teachers.