Higher Education outcomes for International Baccalaureate Diploma Programme mathematics higher level students – final report

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Executive summary

The key findings of this project are as follows:

- International Baccalaureate (IB) Diploma Programme (DP) mathematics Higher Level (HL) alumni have high levels of self-confidence across a range of mathematical topics (Figure 2). This is true for students going on to study a range of degrees, and not just mathematics.
- IB mathematics HL alumni also have high levels of mathematical self-efficacy (Figure 3). Again, this is true for students across a range of degrees.
- IB mathematics HL alumni typically have very positive attitudes towards mathematics as a subject, and strongly recognise its importance to their future careers (questions 7, 8 and 9 in Appendix 2).
- The most popular category of degree study for IB mathematics HL alumni is '*The professions*' (e.g. Medicine, Law…) with 37% of respondents given this as their field of study. Those going on to '*Mathematical Sciences'* made up 12% of respondents (question 18, Appendix 2).
- Secondary data on Higher Education (HE) outcomes from the UK indicates that students that did IB mathematics HL typically had better HE outcomes compared to students who had followed other pre-university mathematics courses (e.g. A-levels). This finding goes across all fields of study (Figures 8 and 9) and takes account of differing demographic and prior attainment profiles of students.
- There is no real evidence of an overall relationship between DP mathematics HL grades and degree outcomes. This is also true for some other pre-university mathematics courses, although the evidence is more mixed for these.
- A methodological finding is that obtaining access to HE admissions tutors for interviewing about the mathematical preparedness of students entering higher education is very difficult (see Appendix 5 for further details).

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Introduction

Previous research has suggested that IB DP students are well-prepared for degree study compared to students following other pre-university programmes (Bergeron, 2015; Conley, 2014; HESA, 2011; Saavedra, 2011). However, this work has not generally been focussed explicitly on mathematical preparedness and so there is a gap in the literature in this regard. Hence, the main objective of this study is to explore and document IB DP students' mathematical readiness for university in terms of academic and non-academic preparation. In particular, we assess IB DP mathematics students' views of their experiences of HL mathematics in the Diploma[1], their mathematical self-confidence and self-efficacy on completion of their Diploma, and their views on their readiness for the study of mathematics (and other subjects) at university - in both academic and non-academic terms.

Self-efficacy and self-confidence are a focus of this research since other work has shown that students' self-efficacy in mathematics is predictive of performance in further mathematical study, and is sometimes more predictive than is (prior) attainment in the subject itself (Hackett & Betz, 1989; Pajares & Miller, 1994). If we can find evidence that DP mathematics HL engenders strong levels of mathematical self-efficacy amongst its alumni, then this lends support to the argument that DP mathematics HL provides excellent preparation for university study, particularly in mathematically-related subjects.

The study includes a survey of recent IB DP mathematics HL alumni globally, and an analysis of secondary higher education data in the UK to estimate the value-added benefit of being studying HL mathematics in comparison to students who followed other pre-university mathematics courses.

The over-arching research questions the study aims to answer are as follows:

RQ1. What is the mathematical self-confidence and self-efficacy of former IB DP mathematics HL students?

RQ2. How does DP mathematics HL help prepare students for the chosen course of study, both academically and non-academically?

RQ3. What are typical university majors completed by former DP mathematics HL students?

RQ4. What is the relationship in the UK between DP mathematics HL examination and university mathematics course grades[2]?

RQ5. How do degree outcomes for university mathematics in the UK compare between IB DP students and similar non IB DP students?

[1] In the Diploma, most subjects can be taken at either standard level (SL) or higher level (HL) but students must take at least three subjects at HL. Both SL and HL courses are meant to span the two years of the DP. SL courses are recommended to have at least 150 hours of instructional time, and HL courses are recommended to have at least 240 instructional hours. HL courses usually include a range of additional elements covered in more depth compared to SL courses.

[2] Originally, this RQ also included mathematics and overall graduation rates, but this data was not available in the HESA data procured.

In addition, it was hoped that the data gathered would allow us to probe differences between national models of universities (e.g. the US vs. the UK), and to assess the extent to which IB DP mathematics HL prepares students for different types of degree study (e.g. maths vs. physics, or economics vs. engineering). However, the secondary data we had originally planned to use for this part of the study was not in an appropriate form for this kind of analysis.

In summary, we consider in this research what overall conclusions can be drawn about how well DP mathematics HL graduates are prepared for university study, and what implications there might be for further curriculum development for DP mathematics HL.

Research design and methodological approaches

The project consists of two main data collection strands as follows[3]:

- An IB DP mathematics HL alumni online survey focusing on views of the DP and mathematics HL in particular, progression to university and mathematical self-confidence and self-efficacy.
- A secondary data analysis of HE outcomes in the UK comparing degree outcomes for DP mathematics HL students with students who had studied for other high status pre-university mathematics qualifications prior to university (e.g. A-level mathematics[4]).

We briefly describe these two strands in more detail in turn.

IB DP mathematics HL alumni survey

This online survey was constructed using existing mathematical self-efficacy and self-confidence items (May, 2009; Pampaka & Williams, 2010) and additional items covering respondent demographics, view on DP HL mathematics and preparedness for university study. It was designed by the research team in conjunction with the IB. Given the constraints of the timing of the project it was not possible to pilot the survey. It was implemented in Bristol online surveys[5], and an invitation to respond was sent on 14/09/15 to 3,196 participants carefully selected from the maths HL IB alumni database (which itself contains around 6% of all mathematics HL alumni). The selection was random, but with the proviso that participants were not already being surveyed by the IB for other research purposes. The survey was open for three weeks with cut-off date for responses 05/10/15. There were 566 responses by this time (a 17.7% response rate).

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[3] We had planned to carry out interviews with mathematics admissions tutors in world leading universities asking them about their perceptions of the readiness of DP mathematics HL students to study mathematics at university. However, we received insufficient engagement to our initial approaches and so this was not possible. We give further details in Appendix 5.

[4] Formally, this is the General Certificate of Education (GCE) Advanced-Level.

[5] https://www.onlinesurveys.ac.uk/

We used pre-existing data[6] that the IB automatically collects from candidates to evaluate the representativeness of the responses to the survey by a range of characteristics (e.g. gender, country of study, private versus state schooling, and attainment level in mathematics HL).

The final version of the survey is shown in pdf form in Appendix 1.

UK data on pre-university mathematics students and their higher education outcomes
This data set consists of a single cohort of students in UK universities (n=97,558) who graduated in 2013/14, and had a mathematics qualification on entry to university (in broad terms these are IB HL mathematics, A-level mathematics, AS level mathematics, Scottish Highers or Scottish Advanced Highers[7]).

It was provided as secondary data by the Higher Education Statistics Agency (HESA) in the UK. We use these data to compare HE options and outcomes by these pre-university qualifications – both in raw and value-added terms – using the UCAS tariff points[8] as a common measure of attainment prior to university. To keep the analysis relatively straightforward, we take the highest points scoring of these qualifications in cases where students have more than one such qualification.

To give a more nuanced analysis, we also statistically model degree as a scale outcome[9] in terms of pre-university mathematics qualification on entry to university whilst controlling for gender, ethnicity, socio-economic status, state or private school (all treated as categorical variables), and age and pre-university attainment in mathematics[10] (treated as continuous variables). This gives us a better estimate of the differential progress over HE course made by students who studied each type of pre-university mathematics qualification before entry into HE.

Overall findings

We report the findings by the two data collection strands as previously outlined.

IB DP mathematics HL alumni online survey
In this section we analyse the responses to the alumni survey. The full details of the summary results for the closed questions from the survey are shown in Appendix 2, and Appendix 3 shows all responses for the main four open (i.e. free text) questions.

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[6] This is International Baccalaureate Information System (IBIS) data.

[7] Students progressing into higher education in England and Wales usually have 3 or 4 A-levels, and in addition possibly one or more AS-levels (which are half the size in qualification terms). Scottish Highers and Scottish Advanced Highers are the main qualifications for this purpose in Scotland, with Highers thought of as equivalent to AS-levels, and Advanced Highers are usually considered little 'larger' than a single A-level.

[8] The Universities and Colleges Admissions Service (UCAS) manages the application process for entry to most higher education in the UK. Entry qualifications are scored on a common scale using the UCAS tariff system – see Table 2 later.

[9] 1=First class honours, 2=Upper second class honours, 3=Lower second class honours, 4=Third class honours/pass, 5=Unclassified

[10] These are UCAS points which are explained in greater detail later.

Demographic overview of sample

The respondents are 61% male, typically born in 1995 with a median age of 18 when completing the IB diploma. The most commonly represented countries were USA (30%), Canada (8%) and the UK (7%). In total, 64 countries were represented in the sample. Respondents were evenly split between public and private schooling (49% and 50% respectively, with the remainder unsure on the nature of their school in this regard).

Compared to pre-existing IB data on DP mathematics HL alumni (i.e. the IBIS data), those responding to the survey are broadly representative by gender and country, but state educated students are slightly over-represented amongst respondents (49% vs. 43% respectively in the IBIS data).

HL mathematics and mathematical self-efficacy

In terms of self-reported attainment in the Diploma, respondents were awarded a mean mathematics HL grade of 5.2 which is slightly higher than that in the IBIS data provided (mean 4.5). In other words, this is evidence that those responding to the survey are more highly attaining than the average mathematics HL alumni. Grades in other areas are even higher (highest mean grade 6.0 for *Language Acquisition* to lowest grade 5.7 in *The Arts*). The median grade in the Core Requirements were both B.

Figure 1[11] gives mean scores for the frequency of types of activities that respondents reported being encouraged to do in DP mathematics HL lessons (1='never or almost never',…, 3='some of the time',…, 5='always or almost always' – see question 6 in Appendix 2 for full details). Responses vary a little across these with 'Making connections between different topics' having the highest mean (3.9), and 'Developing your own methods (3.2) the lowest. The overall mean response across these six items is 3.6. In short, these activities are typically reported as occurring between 'some of the time' and 'often'.

[11] This figure shows error bars, which display the mean within each category together with 95% confidence intervals for each mean. All other error bars in this report are the same in this respect, and all are ordered by highest to lowest mean response.

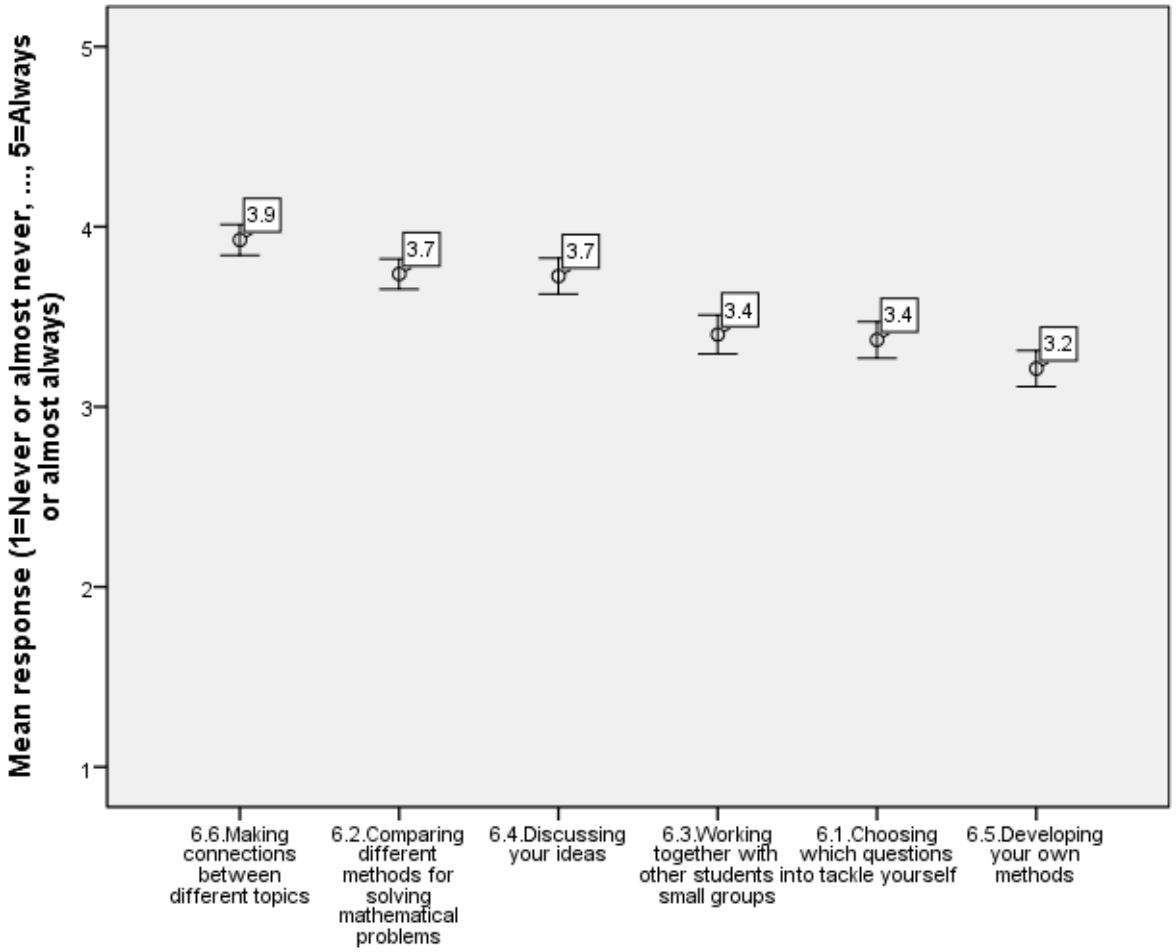

Figure 1: Mean response on activities in DP mathematics HL lessons

On completion of their DP mathematics HL, respondents were reportedly generally favourable about continuing with some mathematics in their degree study (only 10% reporting that they wanted to study 'As little maths as possible' in the future – see question 7 in Appendix 2).

Respondents were asked whether, on starting the Diploma, they had wanted to continue studying mathematics at that time. They were also asked the same question but regarding their views on this at the time of completion of the Diploma. Comparing the responses to these two items we see that over the course of their DP mathematics HL, there was little evidence of a significant overall shift in views towards studying mathematics (paired sample t-test, p=0.48 – compare questions 8.1 and 8.2 in Appendix 2). However, there is perhaps a slight polarisation with views on studying more mathematics more 'extreme' (i.e. more or less favourable) after completion of the Diploma compared to before. The majority of respondents were clear that mathematics is 'very important' to their future career (see question 9 in Appendix 2).

In terms of mathematical confidence on completion of the Diploma, Figure 2 shows that the highest level of confidence was in 'Manipulating algebraic expressions' (mean 3.7) and the lowest was on 'Proofs/proving' (2.7). These are mean scores across all respondents on a

scale from 1 ('not confident at all') to 4 ('very confident') – see question 10 in Appendix 2. The overall mean response across these 10 items is 3.2 (i.e. typically 'confident').

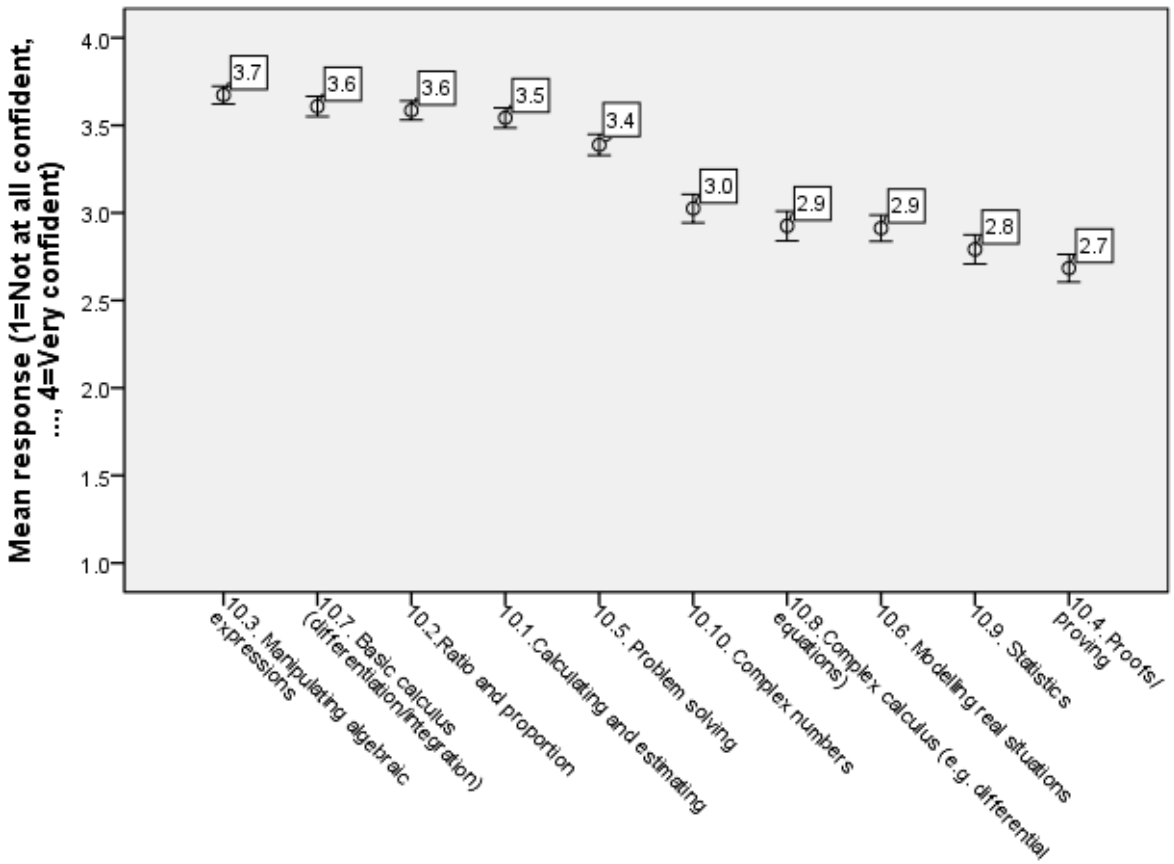

Figure 2: Mean response on confidence in mathematical topics on completion of DP mathematics HL

Additional psychometric analysis indicates that these 10 items measure a single underlying latent trait (e.g. 'mathematical confidence') with a good reliability (Cronbach's alpha=0.84, with no items detracting from this).

There was excellent engagement with the questions about what respondents liked and disliked about DP mathematics HL with 480 and 460 responses on these items respectively – see Appendix 3 (questions 11 and 12) for all responses. More work is needed to investigate these responses systematically but common themes from an initial analysis of the 'likes' as reported in the survey responses include:

- The range and depth of particular topics – particularly calculus and statistics, and the range of options available.
- The challenge, rigour, originality and stretch that the course involved, which led to a sense of achievement not always present in other subjects.
- The quality of the preparation for university that mathematics HL provides.
- The emphasis on problem-solving and connections between topic areas.

Some typical quotes include:

The challenge of having to figure things out on my own.

Having such a broad range of topics; something that proved to be very useful in my university studies.

Outstanding preparation to starting engineering at university level.

Learning how to problem solve.

How well connected topics and modules were.

I just liked how challenging the course was in general and the sense of achievement when I fully understood concepts (e.g. matrices and calculus).

Creative questions involving real-life problem solving.

In terms of 'dislikes', there were fewer common themes. The one thing that did get repeated several times was the Internal Assessment (IA). The following are typical:

The internal assessment task (exploration) is very vaguely defined and I had much trouble understanding what I was supposed to do.

The expected level of sophistication of IA is too high and it took a lot of efforts trying to come up with the right topic.

As one might expect, there were a few negative comments about the apparent difficulty of the material:

I didn't like the amount of difficulty it took me to grasp the mathematical concepts.

It was known as the "diploma killer," which was intimidating.

There were also comments regarding some topic areas that respondents felt they would like more time on – these included matrices and mechanics, although the comments on the latter were generally from UK respondents where mechanics is seen as part of mathematics, whereas in many other countries it is seen as part of physics. There were also a few comments about wanting a greater emphasis on proof.

Respondents were asked about their self-belief in terms of their mathematical ability (i.e. their mathematical self-efficacy) across a range of fourteen Likert scale items (1='never' to 5='usually') original devised by Diana May (May, 2009). These are summarised graphically in Figure 3 (see also question 13 in Appendix 2). The figure has been transposed so that the individual item labels can be more easily read.

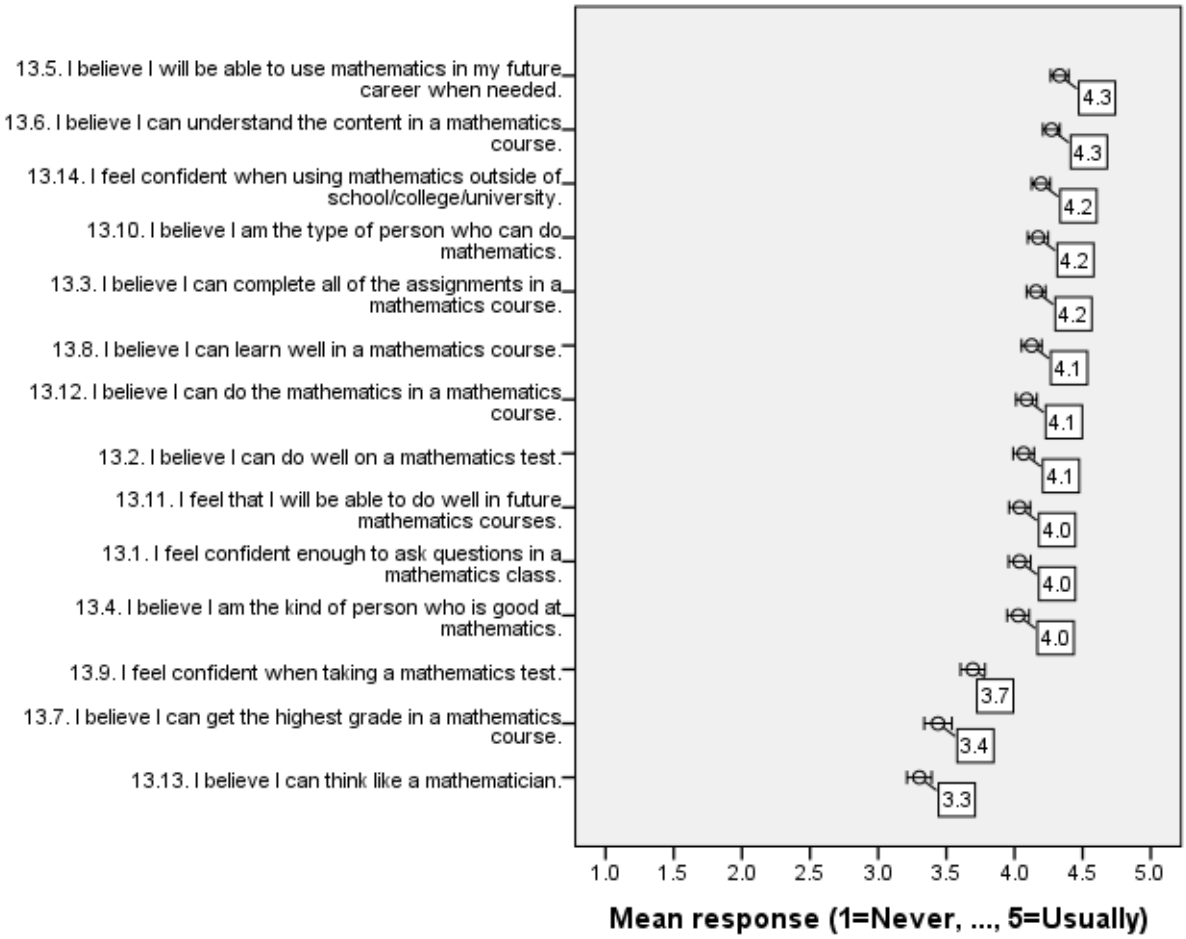

Figure 3: Mean response on mathematical self-efficacy

Self-efficacy was generally highest in the item related to 'using mathematics in my future career', whereas it was lowest in the item relating to 'thinking like a mathematician'. The overall scale mean across the 14 items is 4.0 (i.e. corresponding to 'often'). In May's study (May 2009), 183 non-mathematics students taking a pre-calculus course at the University of Georgia in the US had a mean score of 3.2 on a very similar set of items.

Again, additional psychometric analysis indicates that these items form a single uni-dimensional scale (i.e. 'mathematical self-efficacy') with good internal consistency reliability (Cronbach's alpha=0.95, with no items substantially detracting from this). Given the very high value of alpha, one might argue there is redundancy in this scale and that it could be easily shortened without loss of validity.

University study experiences

The vast majority of respondents (98.4%) reported that they were either just about to start a degree, were currently studying for a degree, or had already completed a degree (see question 17 in Appendix 2). In this section, we report on responses concerning degree study for this sub-group only.

In terms of broad classification of degrees, the most popular field is *The Professions* (37.1%) whereas *Mathematical Sciences* degrees were chosen by 11.7% - see question 18 in Appendix 2 for more details).

In terms of reasons for choosing particular areas of study, respondents reported that 'being good at mathematics', 'enjoying mathematics' and 'being interested in mathematics' were all very important in this choice (modal response 'very important' for all three of these items – see question 20 in Appendix 2). The highest mean response was for the first of these three - 'being good at mathematics', with the lowest mean for 'enjoying mathematics' – but these differences were not particularly large (mean 3.0 and 2.8 respectively on a scale from 1='not important at all' to 4='very important').

Respondents were asked how important a range of additional factors were in their degree choice – their responses are summarised in Figure 4 (see also question 21 in Appendix 2).

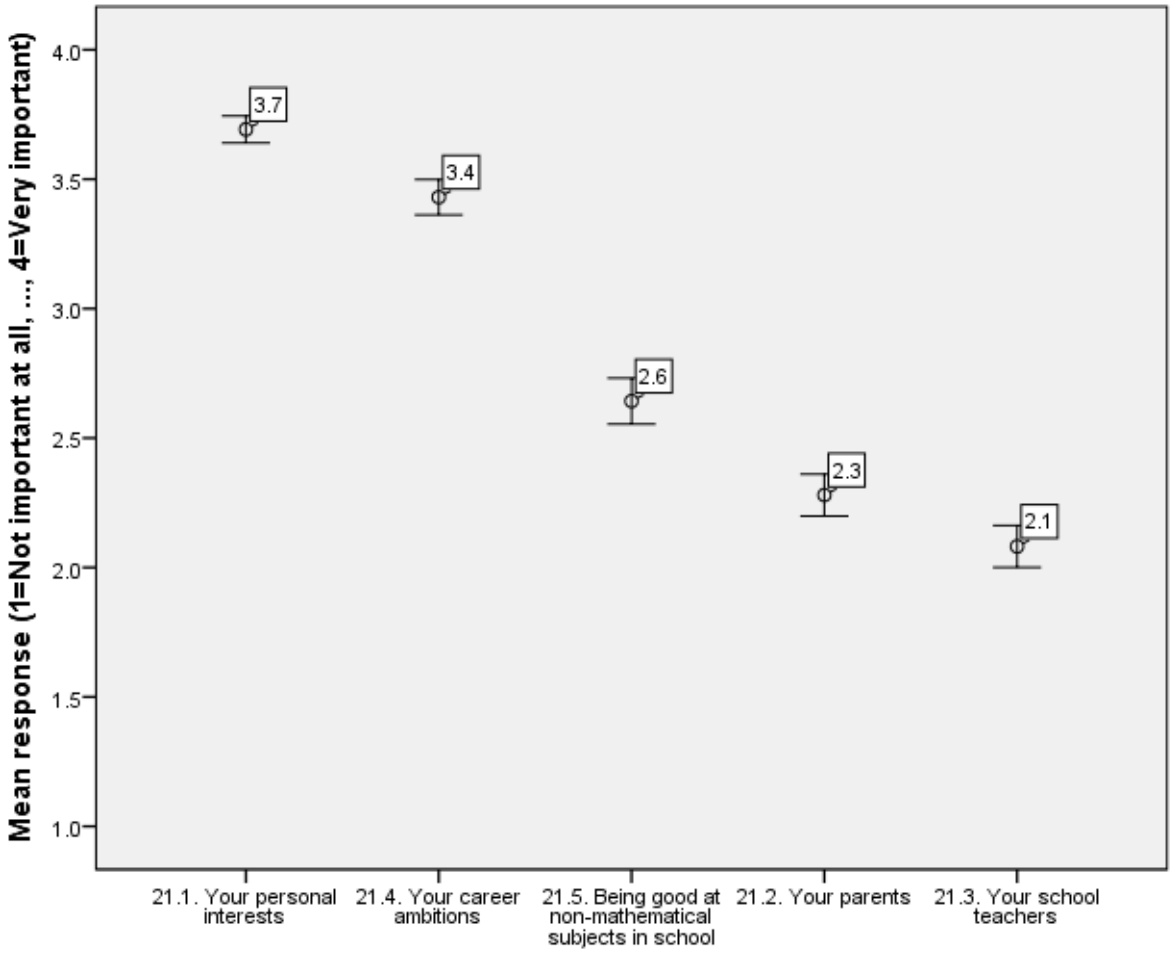

Figure 4: Mean response on factors in degree choice

Perhaps surprisingly, school teachers were the least important (typically rated 'somewhat important'), whereas personal interests were most important (typically 'very important').

When asked about how well DP mathematics HL had prepared them for university study across a range of general factors, respondents were generally positive – as Figure 5

confirms. They felt best prepared for studying on their own (typical response ‘prepared’), and least well prepared for computer-based learning (typically ‘somewhat prepared’). The overall mean response across these seven items is 2.8 (i.e. typically ‘prepared’). See question 22 in Appendix 2 for details of the summarized responses.

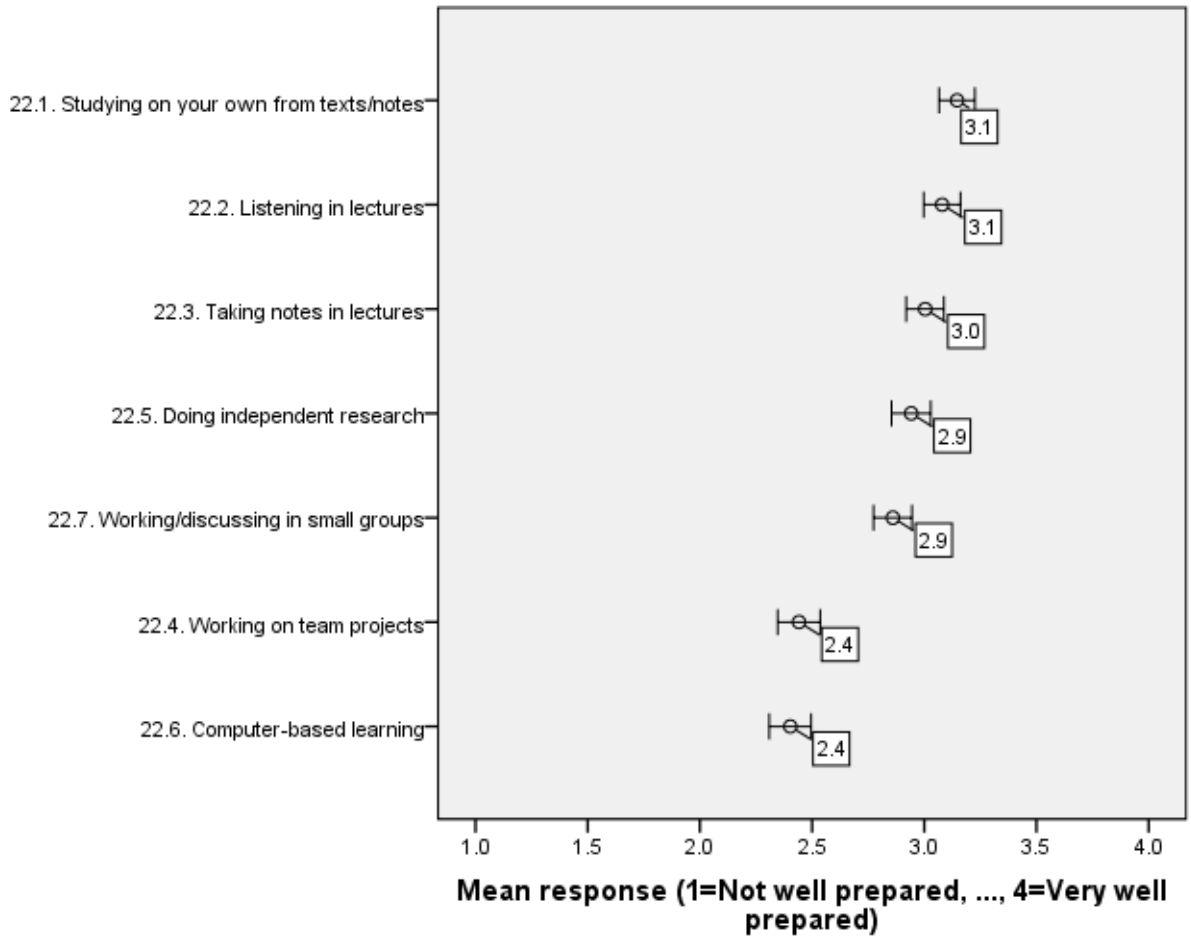

Figure 5: Mean response on general degree preparedness

Mathematical preparedness for degree study

When respondents were asked to assess the mathematical nature of their degree, they typically stated that it was ‘somewhat mathematical’ – see question 23 in Appendix 2 for more details. The remaining substantive questions in the survey, reported on in this section, were only asked of these who stated that their degree was at least ‘somewhat mathematical’ (n=409, 72.3% of all respondents).

Using the same range of mathematical topic areas as covered earlier (See Figure 2 on mathematical confidence), respondents were asked about how well prepared they felt DP mathematics HL had made them for university study in these. The results are summarised in Figure 6 where it is clear that generally alumni going onto degrees felt well prepared (at the very least) across all these mathematical areas. The overall mean response across these 10

items is 3.3 (i.e. between ‘prepared’ and ‘very prepared’). See question 24 in Appendix 2 for the full summarised responses.

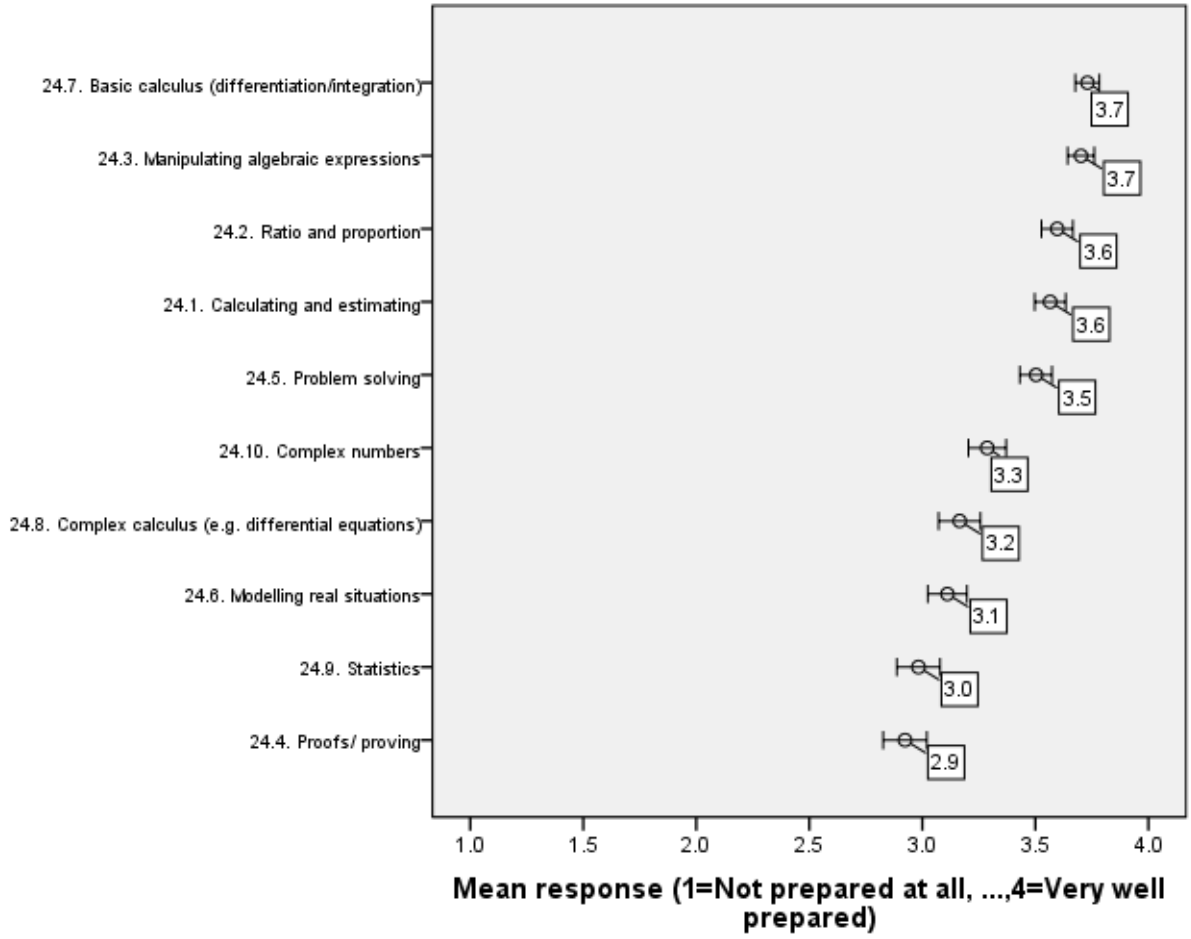

Figure 6: Mean response on preparedness for mathematical topics

As was the case with earlier ‘scale’ analysis, further investigation indicates that these 10 items measure a single underlying latent trait (e.g. ‘mathematical preparedness’) with a good reliability (Cronbach’s alpha=0.83, with no items detracting from this).

As a follow-up to this set of questions, respondents were asked an open question about possible improvements to DP mathematics HL as preparation for university-level mathematical study. There were 291 responses and these would benefit from additional analysis – see question 25 in Appendix 3 for each individual response. To summarise, there were a wide range of views across the responses, but in terms of common themes, there were perhaps two: a desire for a greater emphasis on proofs, and a request for matrices to be re-instated in the (core) curriculum:

> *More focus on proofs as opposed to calculation or memorisation would have been a better preparation for university-level maths.*
>
> *I dislike the fact that the IB has removed matrices from the core syllabus.*

The extent to which these responses are, in part, due to differences in teachers and schools, rather than the DP mathematics curriculum itself, is impossible to say.

The final substantive question on the survey asked respondents to compare how well they felt they were doing in their degree study. They generally responded that they felt they were doing ‘above average’ – see question 26 in Appendix 2 for the full summary of these responses.

Other comments

All respondents were asked if they had any other comments, and there were 132 responses. These are shown in detail in Appendix 3 (question 27). There were a wide range of positive and negative comments, but more of the former. These are not easy to summarise and need additional analysis but these quotes give a flavour:

> *HL Mathematics was the best preparation for my university career. Compared to others in my first year, I was advanced in my mathematics knowledge that carried over for about 3 terms!*
>
> *HL Mathematics prepared me well for my BSc in Mathematics, and it is a strong reason why I am currently pursuing an MSc in Mathematical Science.*
>
> *The IB (especially maths course) put an undue amount of pressure on students. I did not enjoy most of my time doing it.*
>
> *Although Maths HL was one of the hardest things I've done in my life, I thoroughly enjoyed the experience.*

UK data on pre-university mathematics students and their higher education outcomes
In this section we analyse the secondary data from students who followed mathematics courses prior to university study in the UK. We compare how well students from different pre-university 'routes' achieved in their degrees.

Table 1 summarises the range of pre-university mathematics qualifications in the higher education dataset. Note that these categories include a range of specific mathematical subjects but in this analysis we focus on the broad levels as shown in Table 1. Just over 1% of the students in this cohort had DP mathematics HL as their highest graded mathematics qualification on entry to higher education:

Pre-university mathematics qualification	Frequency	Percent
A-Level	66,765	68.4
AS-Level	16,884	17.3
Scottish Highers	11,273	11.6
Scottish Advanced Highers	1,547	1.6
IB Higher Level	1,089	1.1
Total	**97,558**	**100**

Table 1: Profile of sample in terms of highest scoring pre-university mathematics qualification

Attainment in all qualifications is put onto the same 'scale' using the UCAS tariff[12] although we note that the extent to which this is a genuine exercise in equivalence is open to debate. For IB Diploma subjects this is shown in Table 2:

Grade	Tariff points
7	130
6	110
5	80
4	50
3	20

Table 2: UCAS points tariff for IB Diploma subjects

By way of comparison, an A* grade at A-level is worth 140 points with each grade (A, B,…) worth 20 points less in turn[13].

[12] https://www.ucas.com/ucas/undergraduate/getting-started/entry-requirements/tariff/tariff-tables/1116

[13] https://www.ucas.com/ucas/undergraduate/getting-started/entry-requirements/tariff/tariff-tables/946

In terms of UCAS points, A-level mathematics students scored the most highly on average in their pre-university mathematics qualification across the sample – see Figure 7:

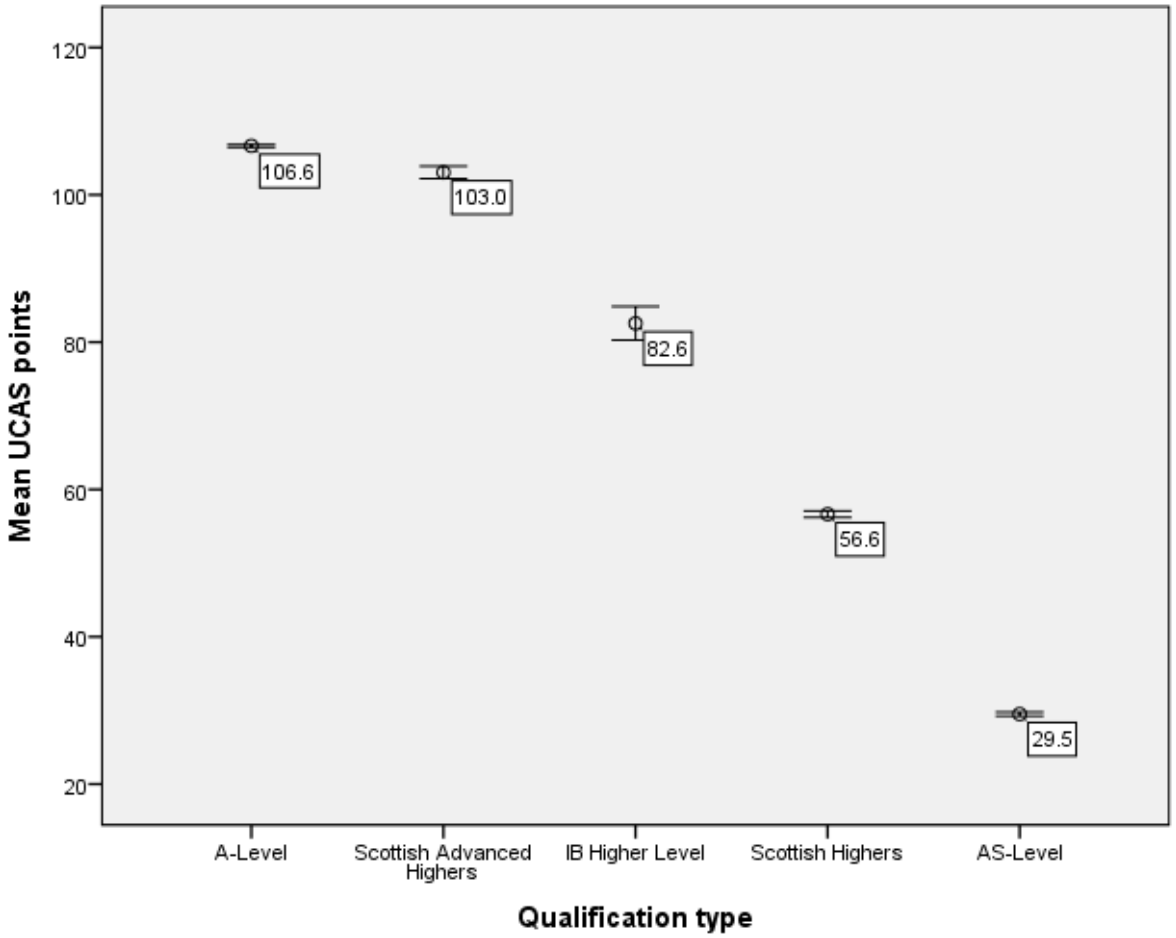

Figure 7: Mean UCAS points by pre-university qualification

However, in terms of HE outcomes, Table 3 shows that the IB students perform very well in comparison to the other qualifications listed – 33.9 % of the sample obtaining a first class degree – compared to 27.6% of those who had done A-level mathematics:

		Class of first degree				
		First class honours	**Upper second class honours**	**Lower second class honours**	**Third class honours /Pass**	**Unclas-sified**
Pre-university mathematics qualification type	A-Level	27.6%	46.6%	15.9%	3.0%	6.8%
	AS-Level	20.2%	53.5%	18.5%	3.1%	4.7%
	Scottish Advanced Highers	29.5%	40.0%	10.0%	2.2%	18.3%
	Scottish Highers	14.3%	43.1%	16.5%	1.8%	24.2%
	IB Higher level	33.9%	45.7%	10.7%	1.7%	8.0%
Total		24.9%	47.3%	16.3%	2.9%	8.7%

Table 3: Class of degree by pre-university mathematics qualification

A chi-square test shows that the profile of degree classifications shown in Table 3 varies significantly across the pre-university qualifications (chi-square=5126, df=16, p<0.001, phi=0.23) – in other words, the difference in degree classes (the pattern of percentages in the rows of Table 3) varies significantly between these qualifications.

In the modelling of HE outcomes controlling for demographic variables and prior attainment in mathematics, the variance explained is not particularly high (r-squared=0.08) indicating that this set of predictors does not explain degree classification particularly well. In addition, there were some technical problems with the modelling[14], but these do not essentially threaten the emerging findings as detailed below.

The largest effect in this model for degree outcomes is pre-university qualification (effect size: partial eta squared=0.03), but this is not a particularly strong effect in absolute terms. Figure 8 shows the estimated (adjusted) mean performance (i.e. degree classification) for each pre-university mathematics qualification:

[14] For example, Levene's test indicates that there is significant differences between the variances of degree classifications amongst the pre-university qualification types. However, this test itself if problematic given the large sample size. A descriptive analysis indicates that the differences in variances are not particularly large.

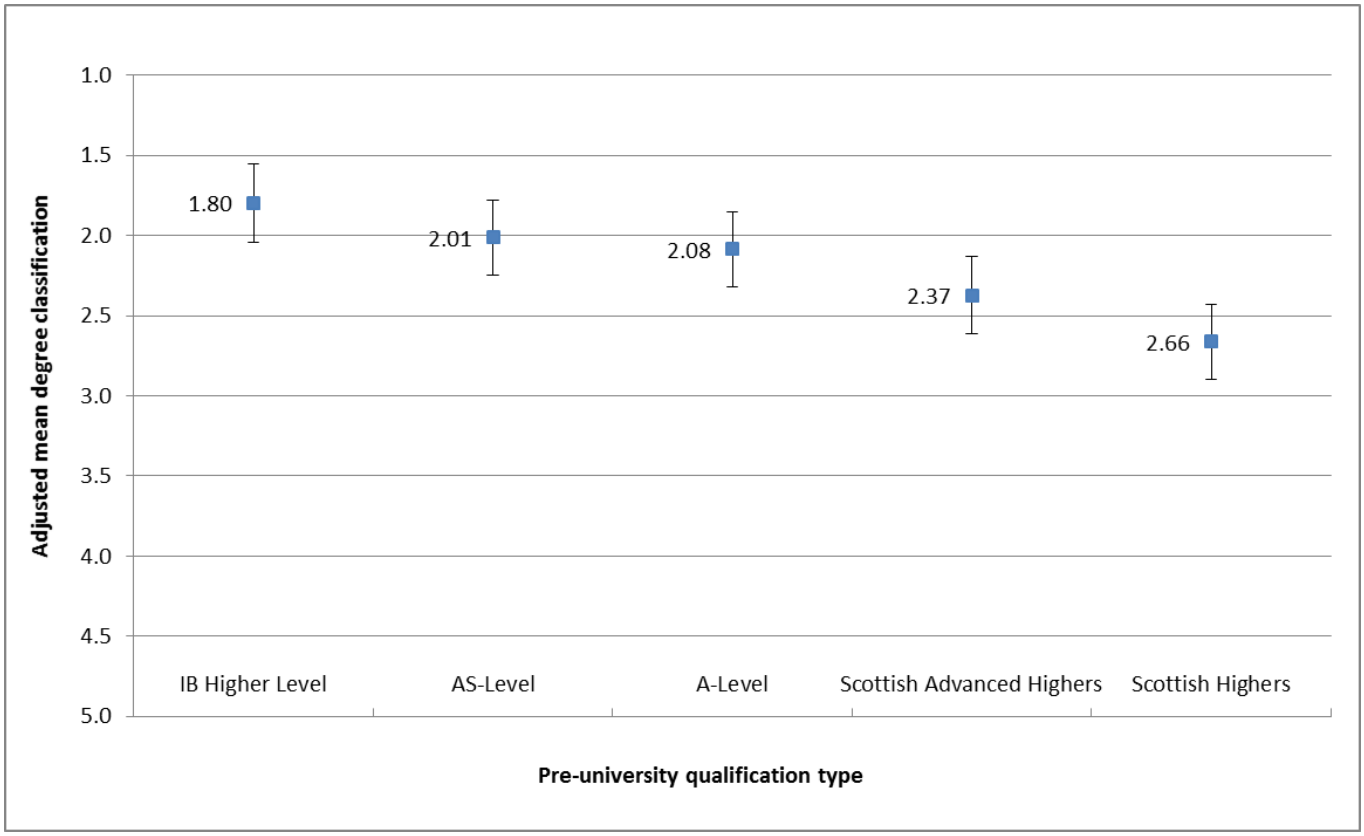

Figure 8: Adjusted mean degree classification by pre-university qualification

(on Y-axis: 1=First class, 2=Upper second, 3=Lower second, 4=Third class, 5=Unclassified)

This is a value-added analysis controlling for a range of key co-variates (including UCAS points scores). It indicates that once you account for different levels of qualifications on entry (and other demographics), IB students get the best degree classifications on average (recall that here 1=First class, 2=Upper second class degree and so on, so that lower scores correspond to better classes of degree).

Typically IB students get better than an Upper second class, whereas students taking other qualifications do not score as highly. We should note that this is still a crude analysis with some important limitations. For example, those students for whom AS-level is their highest mathematics qualification on entry are very likely to have other important A-levels that are not accounted for in this analysis. In addition, no account has been made of differing types of degree – so there are many students for whom (perhaps) their pre-university mathematics qualification is not directly relevant to their degree choice, and subsequent performance.

The principal degree subjects across the data are summarised in Table 4.

Principal degree subject	Frequency	Percent
Biological Sciences	11,170	11.4
Chemistry	2,820	2.9
Computer Sciences	3,993	4.1
Economics	6,282	6.4
Engineering	11,263	11.5
Mathematical Sciences	7,774	8
Physical Sciences	3,226	3.3
Physics	2,943	3
Other	48,087	49.3
Total	**97,558**	**100**

Table 4: Class of degree by pre-university mathematics qualification

If we add this to our model (both as a main effect and as an interaction term with pre-university mathematics qualification) we obtain Figure 9, which shows the adjusted mean degree performance by pre-university qualification **and** by principal degree subject.

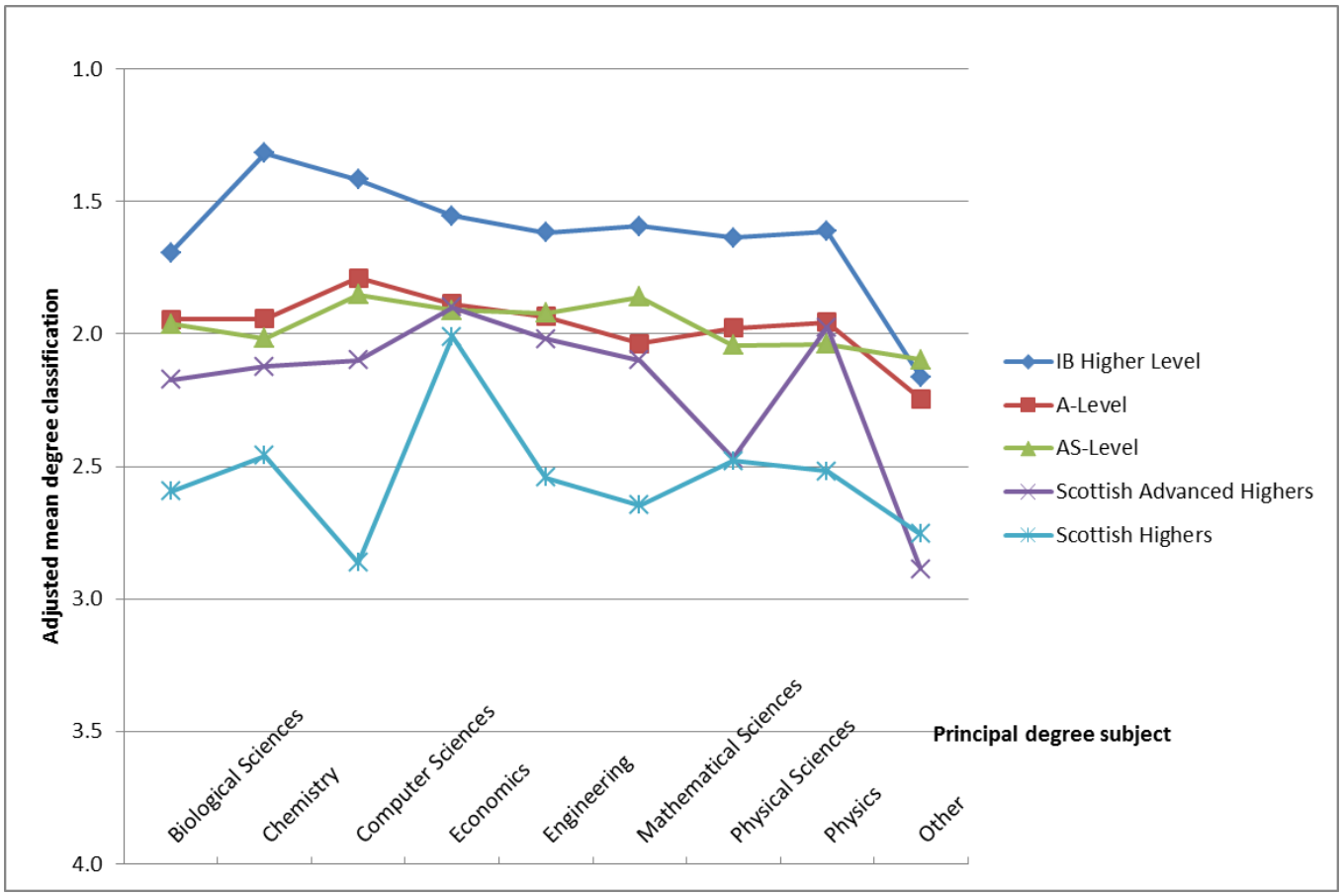

Figure 9: Adjusted mean class of degree by principal degree subject and pre-university mathematics qualification

Figure 9 indicates that the mathematics HL students are achieving better in value-added terms across the board in their degrees compared to students who followed other pre-university mathematics course pre-university. Perhaps surprisingly, the largest effect seems to be in Chemistry. However, there are only 34 Chemistry graduates in the dataset who had studied DP mathematics HL so the evidence here is somewhat limited and findings at this level of detail are really only tentative. For completeness, the details of numbers in each subject/pre-university mathematics course combination are shown in Appendix 4.

We have not included error bars in Figure 9 to keep the figure readable, but these bars would be relatively long for some data points, particularly for the IB given the small numbers in some sub-groups.

Further analysis and discussion

We structure this section by research question, drawing together the separate research strand, and complementing the relevant overall findings (as detailed above) with additional research-question specific analysis as appropriate.

RQ1: What is the mathematical self-confidence and self-efficacy of former IB DP mathematics HL students?

Typically, students' self-efficacy and self-confidence in mathematics is high amongst mathematics HL students. However, this finding would be strengthened with more comparative data from students from other pre-university mathematics courses. In the only comparative data available in the literature, the survey respondents do score higher in self-efficacy compared to data from May (2009) on non-mathematics undergraduates in the US.

When comparing self-efficacy and self-confidence responses by the chosen field of study (e.g. *Professions*, *Mathematical Sciences* …) we find little difference from the main findings (as shown in Figures 2 and 3). Those students studying *Mathematical Sciences* tend to score a little higher on most items but not by very much. As one might expect, there is some variation in self-confidence and self-efficacy with regard to certain aspects of their pre-university experience.

Methodologically, we find that both the self-confidence and self-efficacy scales work well and correlate reasonably strongly ($r=0.40$, $n=564$, $p<0.001$). However, the relationship between these two could be further investigated.

RQ2: How does mathematics HL help prepare students for the chosen course of study, both academically and non-academically?

Generally, the alumni survey indicates that students feel well-prepared for success in mathematics – this is clear from the self-confidence (Figure 2) and self-efficacy (Figure 3) data, as well as the open responses. Hence, we conclude that students generally regard themselves as very well prepared for studying at university, and this is particularly true for those going on to study *Mathematical Sciences*.

Survey respondents report being better prepared for some areas (algebra, calculus) compared to others (proof and statistics). The weakness of this analysis is that there is no comparator group. However, the HE outcomes data from the UK shows that IB mathematics students do very well in terms of degree outcomes compared to students from other pre-university mathematics courses, and this is particularly the case for those studying *Mathematical Sciences* degrees (Figure 9).

RQ3: What are typical university majors completed by former mathematics HL students?

Data from the alumni survey indicates that over a third of mathematics HL students (37%) go into the *'Professions'* (e.g. Medicine, Law). The second most popular field of study is the '*Natural Sciences*' (24%), then *'Social Sciences'* (17%) with 12% going into the *'Mathematical Sciences'* – see question 18 in Appendix 2 for more details.

The survey has more fine-grained data (e.g. degree titles - question 19) that would allow for additional investigation. However, we have carried out an initial analysis of this data, and the degree title for the 65 respondents to the alumni survey who were doing *'Mathematical Sciences*' are listed in Table 5.

Degree title	Frequency	Percentage
Mathematics	16	24.6
Computer Science	7	10.8
Dual Major: Mathematics and Computer Science	3	4.6
Actuarial Science	2	3.1
Applied Mathematics	2	3.1
BA in Mathematics	2	3.1
Mathematics and Computer Science	2	3.1
Actuarial Mathematics	1	1.5
Applied mathematics	1	1.5
Applied Mathematics and Nuclear Engineering	1	1.5
Bachelor of Commerce (Actuarial Studies)	1	1.5
Bachelor of mathematics (Computer science), bachelor of pure mathematics	1	1.5
Bachelor of Science	1	1.5
BEd & BSc	1	1.5
Computer Intelligence Systems	1	1.5
Computer science	1	1.5
Computer Science, Mathematics and Cognitive Science	1	1.5
Dual Major: Mathematics and Chemistry	1	1.5
Dual Major: Mathematics and Economics	1	1.5
Dual Major: Statistics & Computer Science	1	1.5
Information Networks	1	1.5
Marketing and Statistics	1	1.5
Master of mathematics	1	1.5
Mathematics and AI	1	1.5
Mathematics And Economics	1	1.5
Mathematics B.A or B.S.	1	1.5
Mathematics BSc	1	1.5
Mathematics with Specialization in Economics	1	1.5
Mathematics with Statistics specialization	1	1.5
Mathematics, Biology, and Computer Sciences	1	1.5
Mathematics, Statistics	1	1.5
MSci in Mathematics	1	1.5
MSci Master in Science in Mathematics	1	1.5
MSci Mathematics	1	1.5
Operations research and management science	1	1.5
Physics	1	1.5
Pure Mathematics	1	1.5
Missing	1	1.5
Total	**65**	**100**

Table 5: University degree titles for those IB mathematics HL students doing 'Mathematical Sciences'

There are also a range of degree classification variables in the HESA secondary data that could be analysed to investigate, for the UK only, what types of degree DP mathematics HL students go into.

RQ4: What is the relationship in the UK between DP mathematics HL examination and university mathematics course grades?

Additional analysis indicates that the overall correlation between prior attainment (as measured by UCAS points which are equivalent to IB grades) and HE outcomes is not statistically significant for IB students (either overall or just for those studying mathematically related courses in HE), whereas for other students this is significant, although usually quite weak. In fact, the strength of the relationship for IB students is at a similar level to A-level students (r=0.03) and the statistical significance of the latter relationship is an artefact of the much larger sample size for this qualification (see Table 1). For Scottish Highers and Advance Highers, the relationship is stronger (r=0.13 to 0.15). These findings are a little surprising and worthy of further investigation, but we should remember that this bi-variate analysis is quite crude given that we are relating degree outcomes to a single pre-university subject (mathematics), and doing this across the full range of degree subjects.

RQ5: How do degree outcomes for university mathematics in the UK compare between IB DP students and similar non IB DP students?

The modelling of HE outcomes using secondary data from the UK indicates that mathematics HL students perform well relative to students who had followed other pre-university mathematics courses (Figures 8 and 9). This is true for mathematics courses as well as other principal subjects. However, as one might expect, there is a lot of unexplained variation in HE outcomes since there are many additional unmeasured factors that are influencing degree outcomes – for example, pre-university attainment in subjects other than mathematics. In addition, degree study is inherently quite different to pre-university study and so one might expect a lot of unexplained variation based on such an analysis.

Recommendations

Based on the findings of the study, we make some cautious recommendations with regard to potential curriculum development areas for DP mathematics HL:

- There could be greater emphasis, or perhaps better support materials, for Proof – students don't seem to feel as confident in this type of mathematical activity compared to others. The open comments also suggest this topic area could be further developed.
- Statistics is another area that might benefit from review – based on some of the responses in the survey. Again self-confidence is relatively low in this area.
- As reported in the survey, there have been some 'teething' troubles with the introduction of the Internal Assessment. Again, this might need reviewing.

- There is some evidence that DP mathematics HL students don't appear as well-prepared for team-working or computer-based learning as they do in other modes of learning. Is there scope for the curriculum to be broadened to encourage more of these types of activities?
- The rigour required to be successful in DP mathematics HL was widely welcomed in the survey data. Any reform of the curriculum should not dilute or change this key characteristic of the subject.

Study limitations

As with all real world research, the study has a number of limitations. These include the following:

- *The representativeness of the survey data.* The list of IB alumni in the IBIS data is not necessarily representative of all alumni. Also, as with all survey research, we cannot be sure that those who replied are typical of all potential respondents.
- *There is a lack of comparison group in the survey data.* The alumni survey data would benefit from being complemented by data from 'alumni' from other pre-university programmes (e.g. A-levels etc).
- *Disentangling the teacher/school effects from the IB effects.* In the survey data, we cannot be sure that where criticism (or praise) of DP mathematics HL occurs, it is due to the efficacy of the teacher, school, DP mathematics curriculum or some other factor or factors.
- *The HESA data is by definition limited to the UK.* It was originally hoped that other secondary data would be available (e.g. from the US) but this was not possible.
- *The lack of good quality qualitative data from admissions tutors.* The very limited admissions data is disappointing. We feel there might be ways to reach this group but 'cold-calling' by email certainly does not work. We do, however, wonder the extent to which admissions tutors have sufficient experience/data to usefully make the comparisons between IB and non-IB students that we are interested in.

Whilst these limitations must be acknowledged, we have no reason to believe that the key findings are not generally valid.

Potential additional analyses

There are a number of additional analyses that could be carried out on the data gathered for this project. The following are some suggestions:

- In the alumni data, the open responses could be investigated more systematically (e.g. questions 11, 12, 19, 25 and 27). These cover alumni 'likes', 'dislikes' and suggestions for improvements with regard to the DP mathematics HL, as well as degree title and general comments. Once responses are coded further bi-variate (and other) analyses with other responses could be carried out.

- The relationship between the self-efficacy and self-confidence scales in the alumni responses could be further investigated.
- There are many other analyses of the alumni data that could be carried out – for example, differences in responses by demographic variables (e.g. country, gender, degree field of study).
- The lack of relationship between degree and pre-university mathematics outcomes in the HESA data could be further probed.
- The HESA data could be analysed in more detail – for example, investigating the types of degree that DP mathematics HL alumni go on to study compared to other pre-university courses in the UK.

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Appendices

Appendix 1 - Final version of the alumni survey
In a separate pdf document - Appendix1_Alumin_Survey.pdf

Appendix 2 - Alumni survey – closed responses
In separate pdf document - Appendix2_AlumniResponses_051015_Closed.pdf

Appendix 3 - Alumni survey – open responses
In separate pdf document - Appendix3_AlumniResponses_051015_Open.pdf

Appendix 4 - Numbers of students in each subject/pre-university mathematics course

	A-Level	AS-Level	Scottish Advanced Highers	Scottish Highers	IB Higher Level	Total
Biological Sciences	6,603	2,775	115	1,587	90	**11,170**
Chemistry	2,168	353	64	201	34	**2,820**
Computer Sciences	2,477	762	68	654	32	**3,993**
Economics	5,277	598	54	156	197	**6,282**
Engineering	8,928	673	357	1,119	186	**11,263**
Mathematical Sciences	7,326	46	191	131	80	**7,774**
Physical Sciences	2,007	795	46	357	21	**3,226**
Physics	2,617	52	92	136	46	**2,943**
Other	29,362	10,830	560	6,932	403	**48,087**
Total	**66,765**	**16,884**	**1,547**	**11,273**	**1,089**	**97,558**

Appendix 5 – Interviews with mathematics admissions tutors
We briefly outline here what happened in this strand of the research.

In pilot work for this project, we contacted and spoke to the Mathematics Department Admissions Tutor at the University of Leeds about the readiness of DP mathematics HL students for university maths. We were told that Leeds admitted relatively few such students, and that the tutor could not comment on readiness for university maths as they did not know who these students were individually. This led us to believe that our initial idea of approaching well known universities in a similar manner, in the UK and abroad, would be unlikely to be successful. Instead, we used a list of popular university destinations of IB DP mathematics students as provided to us by the IB. We combined this data with a 2015 list of 'top' universities[15] and then selected nine universities to approach – using the top three from

[15] http://www.topuniversities.com/university-rankings/university-subject-rankings/2015/mathematics#sorting=rank+region=+country=+faculty=+stars=false+search=

each of Canada, UK and USA - from this joint list. We identified an appropriate contact at each institution and sent each an initial email message – a template is shown in below. We then followed this email approach up with phone calls as appropriate.

Unfortunately, we received sufficient timely engagement to our initial approach from only one potential interviewee (out of nine), and this lead to a brief phone interview with the admissions tutor from a leading UK university. During the process of attempting to secure interviews, it became apparent that mathematics admissions tutors at leading universities receive a large volume number of unsolicited e-mails. These are often 'filtered' by someone other than the maths admissions tutors themselves (i.e. by administrative staff), and this is, perhaps, part of the explanation for our lack of success in securing more interviews.

Initial email to admissions tutors

Dear XXX,

I am, with Dr M Homer (http://www.education.leeds.ac.uk/people/academic/homer), conducting an investigation for the International Baccalaureate Organisation on the readiness of IB Higher Level Diploma students for the study of mathematics at university. A good deal of our work on this is quantitative but we would like to supplement our quantitative data with comments by mathematicians responsible for undergraduate students – hence this message to you.

I have selected nine universities to approach by cross-referencing the 2015 top universities with a list of the top universities where Mathematics IB Higher Level Diploma students enter. I would be most grateful if I could conduct a short telephone interview with you in which you tell me of your impressions of the readiness of these students for undergraduate study at your university. Please know that the names of the people (and universities) I interview will go no further than me. Further to this I will not record the interview but, instead, make notes as we talk.

I do hope that you are prepared to devote 10 minutes (maximum) of your time to talk to me and I look forward to your response. Please note that everyone who assists in this research will be informed of the outcomes once the IB has reviewed the final report.

Best wishes,
John Monaghan
Professor of Mathematics Education
http://www.education.leeds.ac.uk/people/academic/monaghan

Transcript of interview

The one successful interview did give us some tentative data. We paraphrase the key elements of the interview as follows:

John Monaghan (JM)	*What experience do you have of IB DP students?*
Admissions tutor (AT)	*My impression, from colleagues, is that IB students are very good students who are highly prepared for our undergraduate Mathematics degree course. But you must remember that all our UG students will have taken a special mathematics paper to gain admission to our department, the preparedness of IB students thus may not be on the IB programme itself but on the extra work the teachers of IB students do in preparing their students for this special mathematics paper.*
JM	*Are there any areas of mathematics where IB students are particularly proficient or not?*
AT	*Mechanics. A-level students from England generally come in with strengths in Mechanics but IB students (along with some others) have little background in this area.*[16]
JM	*What about IB students' proficiency at expected mathematical techniques and on problem solving*
AT	*Good on the whole on problem solving and also on techniques but one must remember, with techniques, that this may be partially due to their preparation for our special mathematics paper.*
JM	*What about IB students' confidence, both mathematically and socially) but the tutor felt she could not comment on this.*
AT	*I don't think I can comment on this*
JM	*What about IB students' study skills and independence as learners*
AT	*My impression on the whole is that they are very hard working students*

Unfortunately, there is little we can say definitively from this exchange about the preparedness of IB mathematics HL students.

[16] This is not surprising as including mechanics as part of the maths curriculum is largely a British phenomenon

Appendix 6 - Datasets

In separate files:

- Alumni survey data - results-for-ib-diploma-programme-alumni-survey-2015-10-05.sav
- HE data - HESA_SecondaryData.sav – due to conditions of the contractual agreement with HESA this cannot be shared with the IB.

IB Diploma Programme alumni survey

Welcome to this IB Diploma Programme alumni survey

This survey has been commissioned by the International Baccalaureate® (IB).

In it we are keen to get your views on how the IB Diploma Programme (DP), and the study of mathematics Higher Level (HL) in particular, prepared you for studying at degree level.

Your responses will be stored securely and you will not be identified in any reporting.

If you have any queries about our research please feel free to contact the main investigator on the project, Dr Matt Homer from the University of Leeds, UK: m.s.homer@leeds.ac.uk

About you

To begin with, we would like some basic information from you before going on to your experiences of the IB Diploma Programme.

Please tell us:

1 Your gender

- Female
- Male

2 Your year of birth (e.g. 1995).

3 Your age (in years) when you completed your IB Diploma Programme.

4 Your country of residence when doing your IB Diploma Programme.

4.a If you selected Other, please specify:

5 The type of school you attended when studying for the IB Diploma programme.

- Public (state funded)
- Private
- Don't know

The Diploma Programme and you

We are now going to ask some questions about your experiences of the IB Diploma Programme, mostly focussed on mathematics HL.

6 How often were you encouraged to do the following activities in your DP mathematics HL lessons?

	Never or almost never	Rarely	Some of the time	Often	Always or almost always	Don't know
Choosing which questions to tackle yourself	☐	☐	☐	☐	☐	☐
Comparing different methods for solving mathematical problems	☐	☐	☐	☐	☐	☐
Working together with other students in small groups	☐	☐	☐	☐	☐	☐
Discussing your ideas	☐	☐	☐	☐	☐	☐
Developing your own methods	☐	☐	☐	☐	☐	☐
Making connections between different topics	☐	☐	☐	☐	☐	☐

7 When you had completed your DP mathematics HL course, how much mathematics did you want your degree or future studies to consist of?

- ☐ As much mathematics as possible
- ☐ Quite a lot of mathematics
- ☐ A moderate amount of mathematics

- ☐ As little mathematics as possible
- ☐ Don't know

8 Please indicate your level of agreement with the following statements.

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Don't know
When I started the Diploma Programme, I wanted to continue studying mathematics at university.	☐	☐	☐	☐	☐	☐
When I finished the Diploma Programme, I wanted to continue studying mathematics at university.	☐	☐	☐	☐	☐	☐

9 How important do you think mathematics is for your career, either now or in the future?

- ☐ Not important at all
- ☐ Somewhat important
- ☐ Important
- ☐ Very important
- ☐ Don't know

10 When you had finished your DP mathematics HL, how confident were you with the following mathematical topics?

	Not confident at all	Somewhat confident	Confident	Very confident	Don't know
Calculating and estimating	☐	☐	☐	☐	☐
Ratio and proportion	☐	☐	☐	☐	☐
Manipulating algebraic expressions	☐	☐	☐	☐	☐
Proofs/ proving	☐	☐	☐	☐	☐
Problem solving	☐	☐	☐	☐	☐
Modelling real situations	☐	☐	☐	☐	☐
Basic calculus (differentiation/integration)	☐	☐	☐	☐	☐
Complex calculus (e.g. differential equations)	☐	☐	☐	☐	☐
Statistics	☐	☐	☐	☐	☐
Complex numbers	☐	☐	☐	☐	☐

11 What did you **like** in particular about DP mathematics HL?

12 What did you **dislike** in particular about DP mathematics HL?

13 Please answer these questions about how you think and feel about your mathematical ability.

	Never	Seldom	Sometimes	Often	Usually
I feel confident enough to ask questions in a mathematics class.	○	○	○	○	○
I believe I can do well on a mathematics test.	○	○	○	○	○
I believe I can complete all of the assignments in a mathematics course.	○	○	○	○	○
I believe I am the kind of person who is good at mathematics.	○	○	○	○	○
I believe I will be able to use mathematics in my future career when needed.	○	○	○	○	○
I believe I can understand the content in a mathematics course.	○	○	○	○	○
I believe I can get the highest grade in a mathematics course.	○	○	○	○	○
I believe I can learn well in a mathematics course.	○	○	○	○	○
I feel confident when taking a mathematics test.	○	○	○	○	○

I believe I am the type of person who can do mathematics.	○	○	○	○	○
I feel that I will be able to do well in future mathematics courses.	○	○	○	○	○
I believe I can do the mathematics in a mathematics course.	○	○	○	○	○
I believe I can think like a mathematician.	○	○	○	○	○
I feel confident when using mathematics outside of school/college/university.	○	○	○	○	○

Your achievement in the Diploma Programme

We would now like to know what grades you were awarded on the Diploma Programme.

14 What was your final grade in DP mathematics HL?

15 What (average) grades did you get in your other DP programme subject groups?

	(Average) grade *(please round up as appropriate)*
Group 1: Studies in Language and Literature	Please select
Group 2: Language Acquisition	Please select
Group 3: Individuals and Societies	Please select
Group 4: Sciences	Please select
Group 6: The Arts	Please select

16 What grades were you awarded in your DP programme core requirements?

	Grade
Theory of Knowledge (TOK)	Please select
The Extended Essay (EE)	Please select

To end this section, we would like to know about your plans for university.

17 What stage are you at in terms of your university degree course (BA/BSc)?

- I am not going to do a university degree
- I will be starting a university degree soon
- I am currently studying a university degree
- I have completed my university degree
- Other

17.a If you selected Other, please specify:

You and your degree

In this section we want to know about the choices you made for your degree (BA/BSc) and your motives for doing so.

Your choice of university and degree

18 The field of study of my degree is...

- ○ Humanities (e.g. Arts, History)
- ○ Social sciences (e.g. Sociology, Political science, Economics)
- ○ Natural sciences (e.g. Biology, Chemistry, Physics)
- ○ Mathematical sciences (e.g. Mathematics, Statistics)
- ○ Professions (e.g. Medicine, Law, Engineering)
- ○ Other

18.a If you selected Other, please specify:

19 What is the title of your degree course?

20 How important were the following factors in your degree choice at university?

	Not important at all	Somewhat important	Important	Very important	Don't know
Being good at mathematics	☐	☐	☐	☐	☐
Enjoying mathematics	☐	☐	☐	☐	☐
Being interested in mathematics	☐	☐	☐	☐	☐

21 How important were the following factors in your degree choice at university?

	Not important at all	Somewhat important	Important	Very important	Don't know
Your personal interests	☐	☐	☐	☐	☐
Your parents	☐	☐	☐	☐	☐
Your school teachers	☐	☐	☐	☐	☐
Your career ambitions	☐	☐	☐	☐	☐
Being good at non-mathematical subjects in school	☐	☐	☐	☐	☐

22 How well prepared do you think your DP mathematics HL made you for each of the following?

	Not well prepared	Somewhat prepared	Prepared	Well prepared	Don't know

Studying on your own from texts/notes	☐	☐	☐	☐	☐
Listening in lectures	☐	☐	☐	☐	☐
Taking notes in lectures	☐	☐	☐	☐	☐
Working on team projects	☐	☐	☐	☐	☐
Doing independent research	☐	☐	☐	☐	☐
Computer-based learning	☐	☐	☐	☐	☐
Working/discussing in small groups	☐	☐	☐	☐	☐

23 To what extent do you feel your degree is mathematical?

My degree is...

- ...strongly mathematical (e.g. maths, statistics,...)
- ...somewhat mathematical (e.g. physics, engineering,...)
- ...a little mathematical (e.g. general social science)
- ...not mathematical at all (e.g. English literature)

The mathematics in your degree

In this final section, we want to know how well studying mathematics HL has prepared you for university-level mathematics.

24 How well prepared do you think your DP mathematics HL made you for your university studies in the following mathematical areas:

	Not prepared at all	Somewhat prepared	Prepared	Very well prepared	Don't know/Not applicable
Calculating and estimating	☐	☐	☐	☐	☐
Ratio and proportion	☐	☐	☐	☐	☐
Manipulating algebraic expressions	☐	☐	☐	☐	☐
Proofs/ proving	☐	☐	☐	☐	☐
Problem solving	☐	☐	☐	☐	☐
Modelling real situations	☐	☐	☐	☐	☐
Basic calculus (differentiation/integration)	☐	☐	☐	☐	☐
Complex calculus (e.g. differential equations)	☐	☐	☐	☐	☐
Statistics	☐	☐	☐	☐	☐
Complex numbers	☐	☐	☐	☐	☐

25 How do you think DP mathematics HL could be improved to better prepare you for university-level mathematics?

26 Compared to other students, how well do you feel you are doing (or how well did you do) at university?

- Far below average
- Below average
- Average
- Above average
- Far above average
- Don't know

Any final comments

27 You have answered all our questions

If you have any other comments, please feel free to add them below.

Thanks

Thank you for completing our survey. All your responses have been saved.

Key for selection options

4 - Your country of residence when doing your IB Diploma Programme.

- Australia
- Canada
- China
- Germany
- Greece
- Hong Kong
- India
- Indonesia
- Malaysia
- Poland
- Singapore
- Spain
- Switzerland
- Turkey
- United Kingdom
- United States
- Other

14 - What was your final grade in DP mathematics HL?

- 1
- 2
- 3
- 4
- 5
- 6
- 7

15.1.a - (Average) grade

(please round up as appropriate)

1
2
3
4
5
6
7
Not applicable

15.2.a - (Average) grade

(please round up as appropriate)

1
2
3
4
5
6
7
Not applicable

15.3.a - (Average) grade

(please round up as appropriate)

1
2
3
4
5
6
7
Not applicable

15.4.a - (Average) grade

(please round up as appropriate)

1

2
3
4
5
6
7
Not applicable

15.5.a - (Average) grade

(please round up as appropriate)

1
2
3
4
5
6
7
Not applicable

16.1.a - Grade

A
B
C
D
E
Fail

16.2.a - Grade

A
B
C
D
E
Fail

bos

IB Diploma Programme alumni survey

Showing 566 of 574 responses

Restricted to responses given from **1 Jun 2015** to **5 Oct 2015**

Hiding questions **11**, **12**, **25** & **27**

1 Your gender

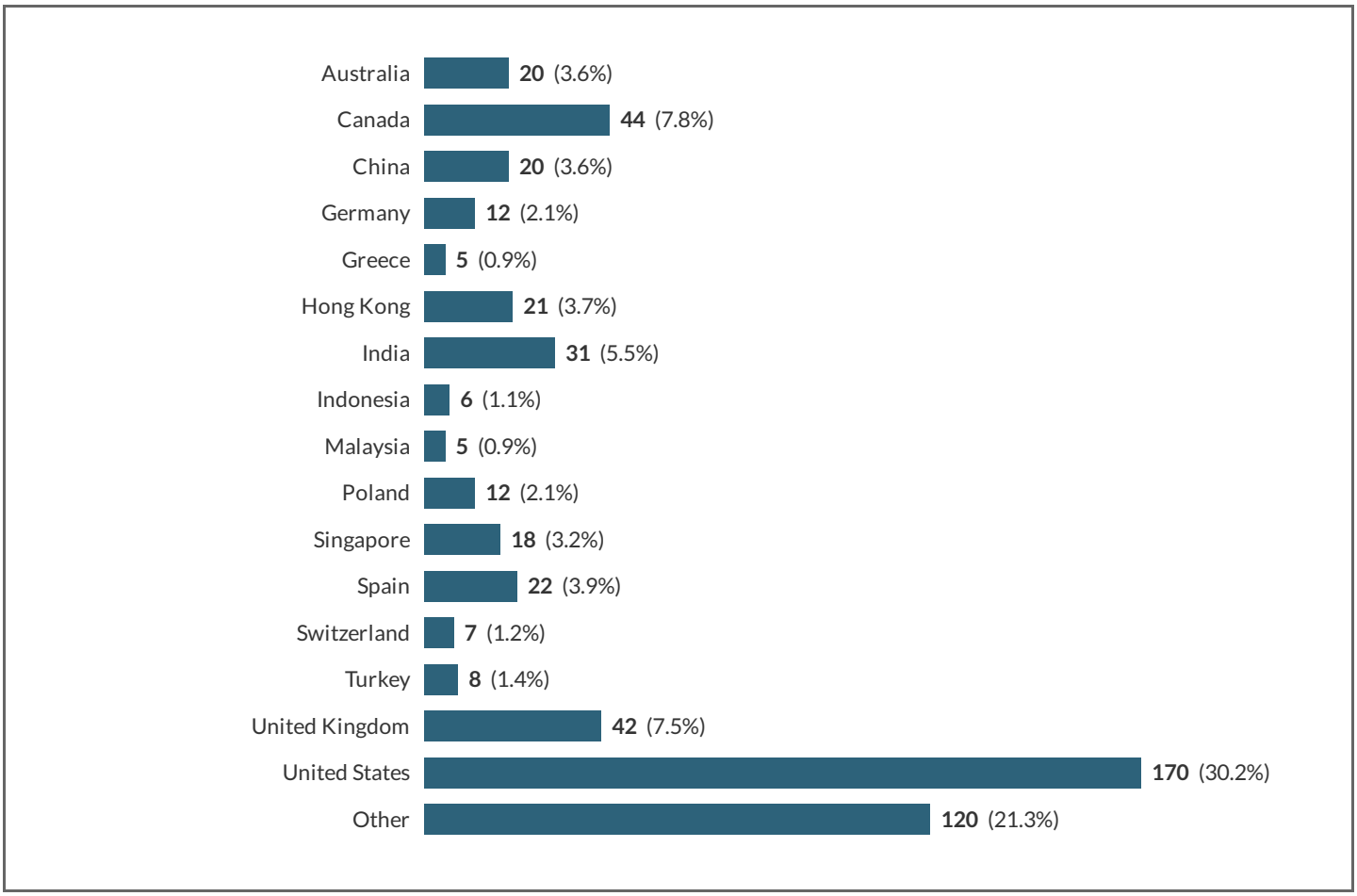
2 Your year of birth (e.g. 1995).

Showing 5 of 563 responses	
1993	154407-154401-9347981
1995	154407-154401-9347986
1993	154407-154401-9347994
1997	154407-154401-9348001
1996	154407-154401-9347990

3 Your age (in years) when you completed your IB Diploma Programme.

Showing 5 of 562 responses	
18	154407-154401-9347981
18	154407-154401-9347986
18	154407-154401-9347994
17	154407-154401-9348001
18	154407-154401-9347990

4 Your country of residence when doing your IB Diploma Programme.



4.a If you selected Other, please specify:

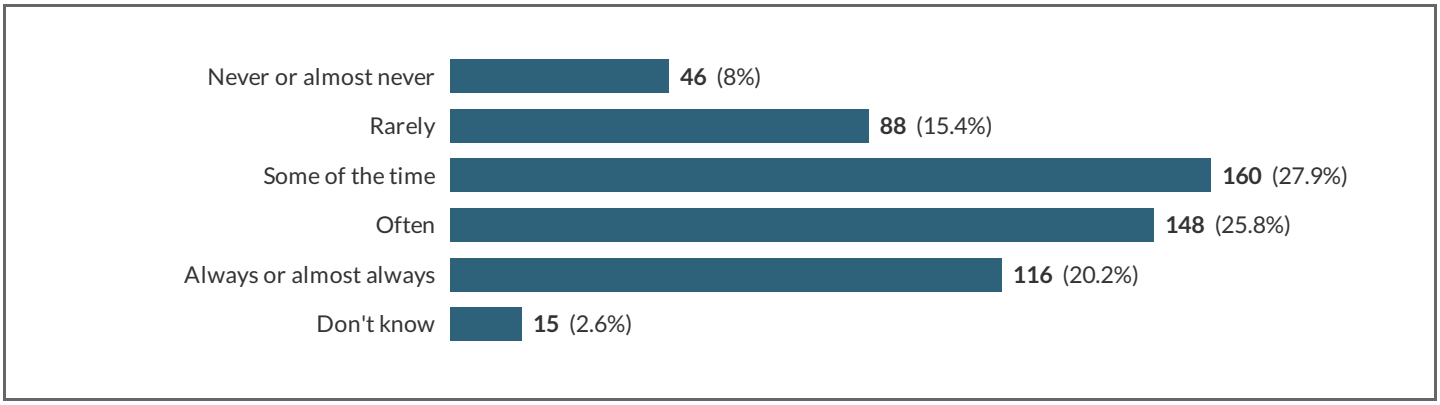
Showing 5 of 120 responses	
Mexico	154407-154401-9347995
Denmark	154407-154401-9348122
United Arab Emirates	154407-154401-9348018
Italy	154407-154401-9348027
Sweden	154407-154401-9348134

5 The type of school you attended when studying for the IB Diploma programme.

6 How often were you encouraged to do the following activities in your DP mathematics HL lessons?

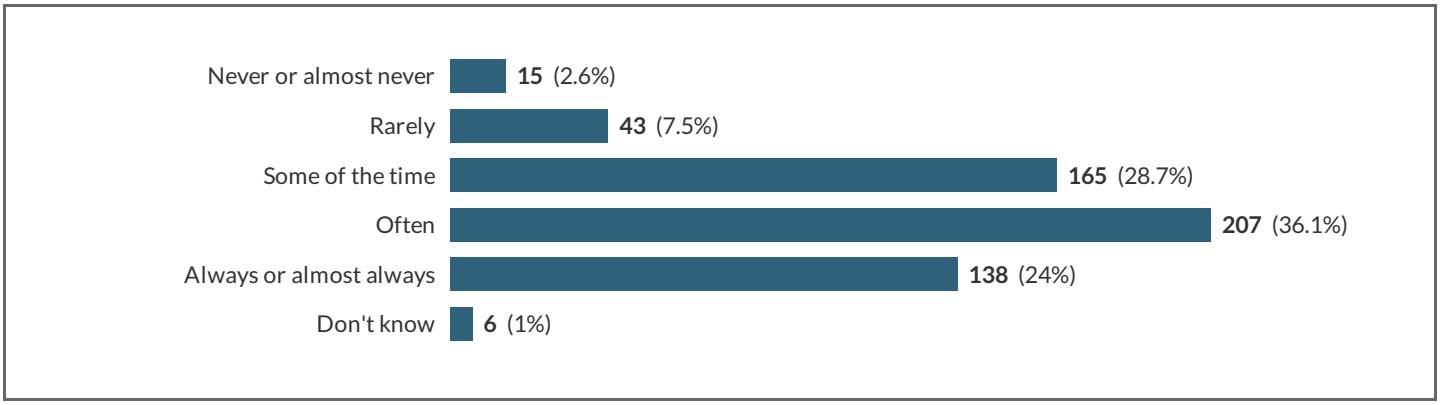
6.1 Choosing which questions to tackle yourself

6.1.a Choosing which questions to tackle yourself



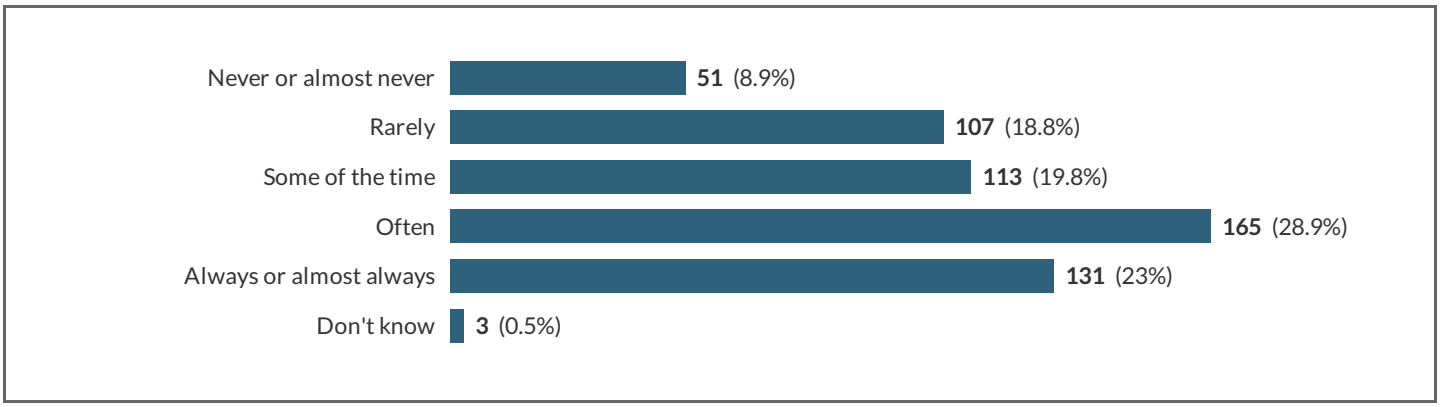
6.2 Comparing different methods for solving mathematical problems

6.2.a Comparing different methods for solving mathematical problems



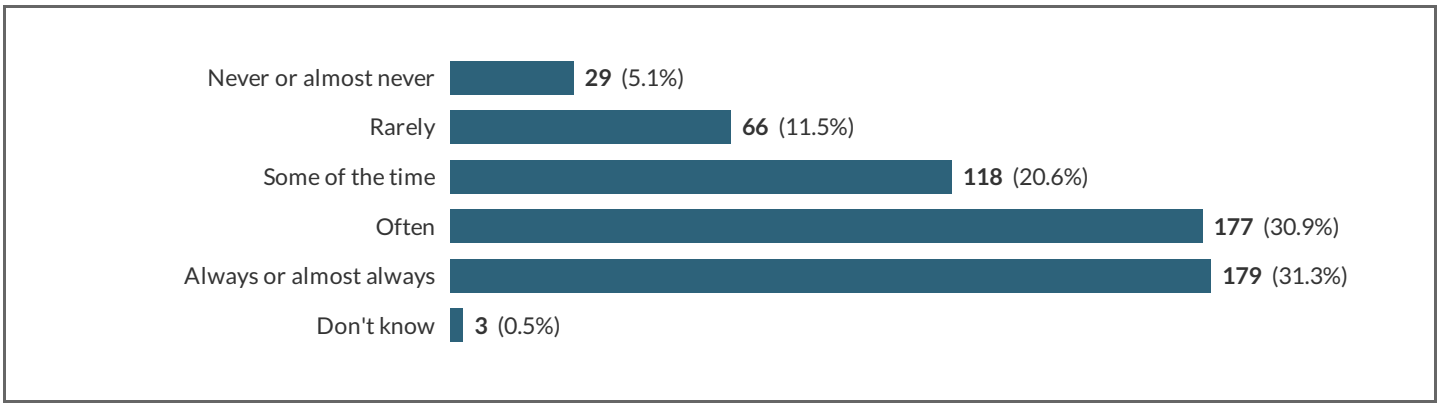
6.3 Working together with other students in small groups

6.3.a Working together with other students in small groups



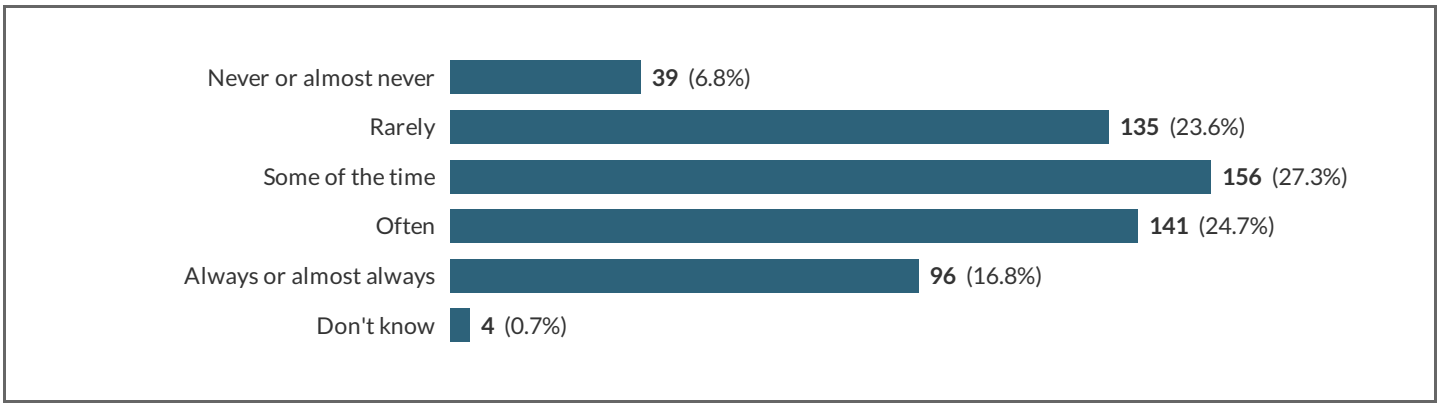
6.4 Discussing your ideas

6.4.a Discussing your ideas



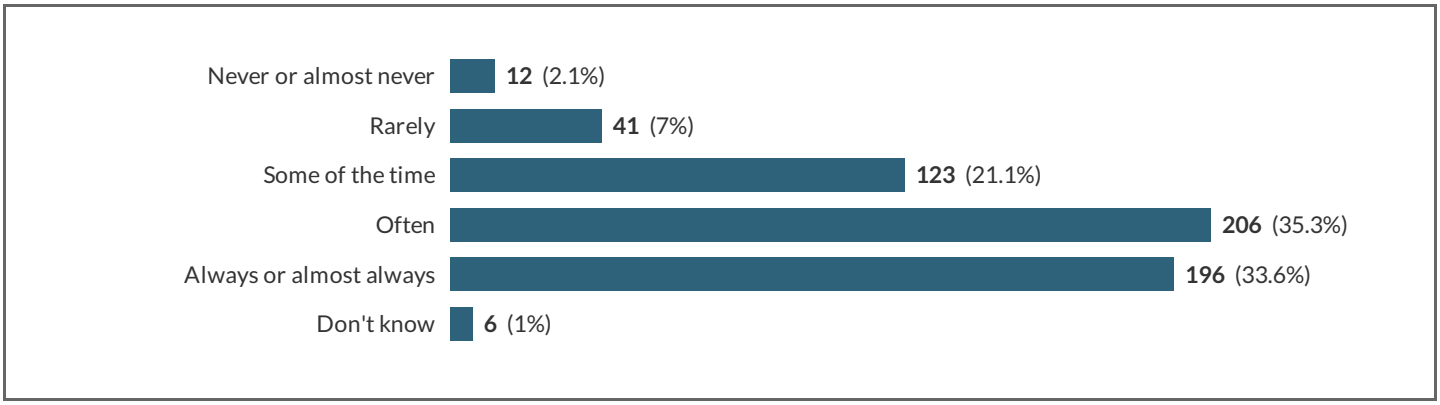
6.5 Developing your own methods

6.5.a Developing your own methods

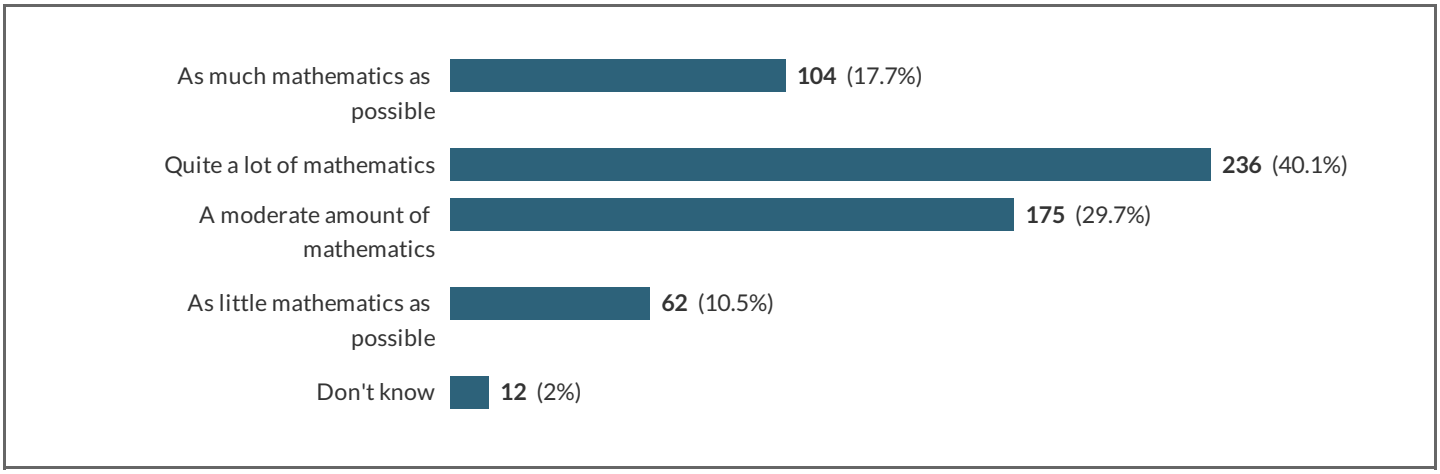


6.6 Making connections between different topics

6.6.a Making connections between different topics



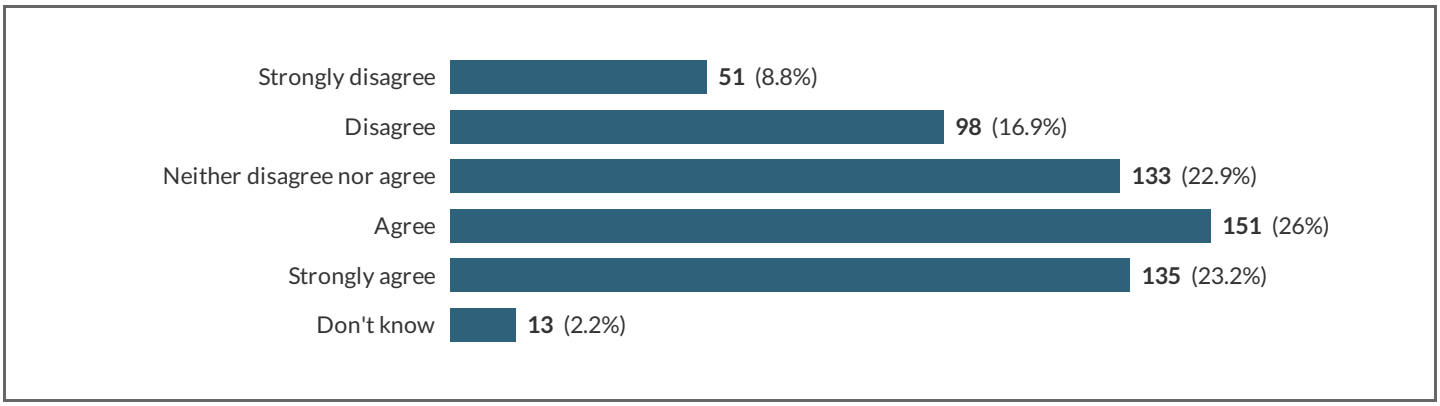
7 When you had completed your DP mathematics HL course, how much mathematics did you want your degree or future studies to consist of?



8 Please indicate your level of agreement with the following statements.

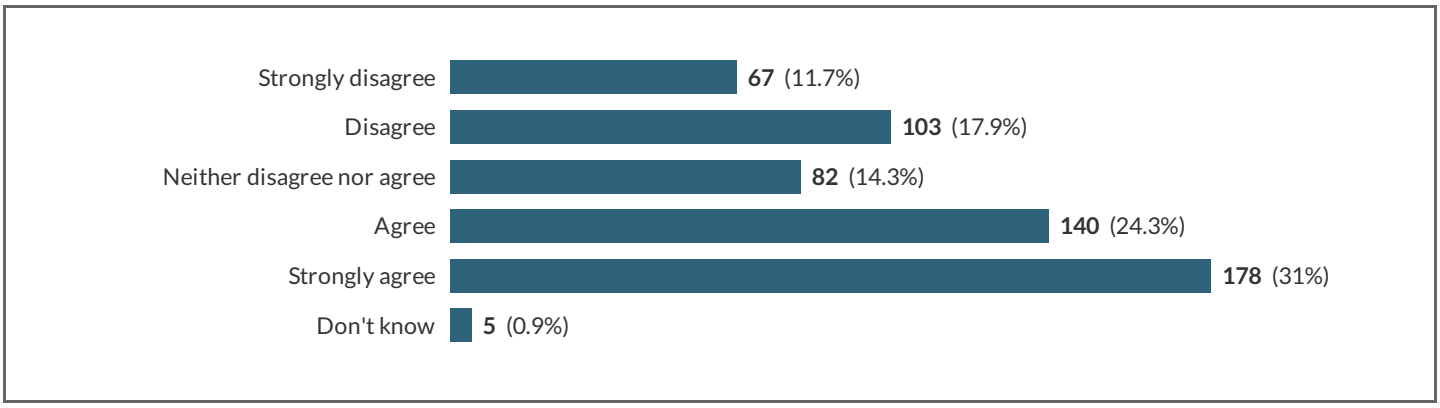
8.1 When I started the Diploma Programme, I wanted to continue studying mathematics at university.

8.1.a When I started the Diploma Programme, I wanted to continue studying mathematics at university.

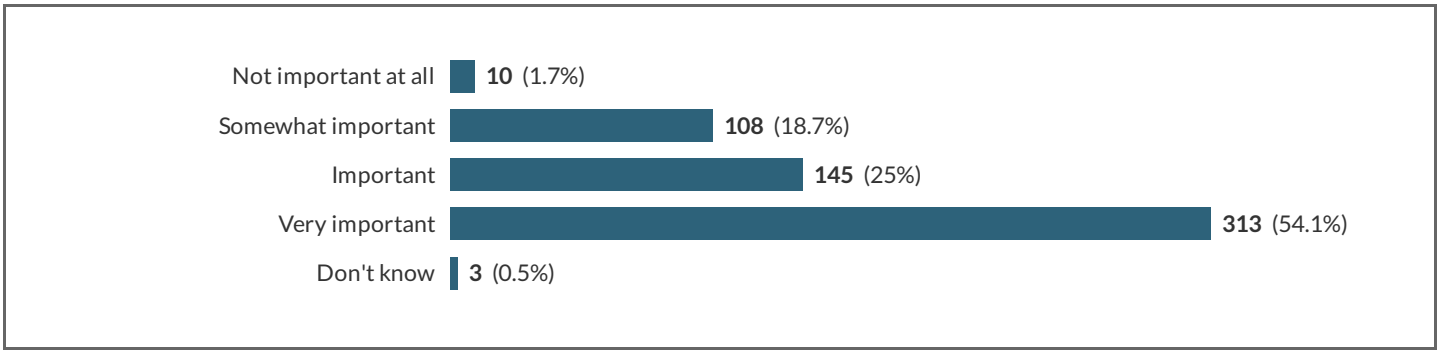


8.2 When I finished the Diploma Programme, I wanted to continue studying mathematics at university.

8.2.a When I finished the Diploma Programme, I wanted to continue studying mathematics at university.



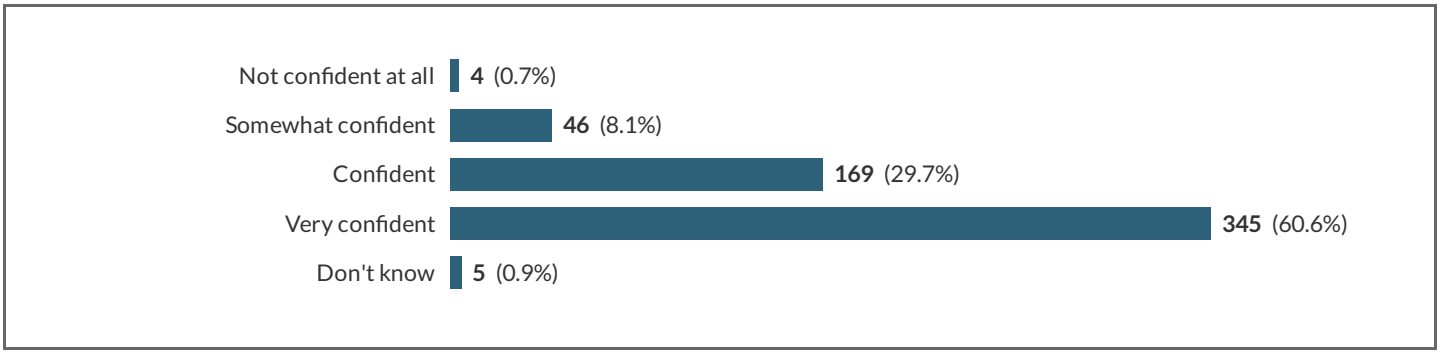
9 How important do you think mathematics is for your career, either now or in the future?



10 When you had finished your DP mathematics HL, how confident were you with the following mathematical topics?

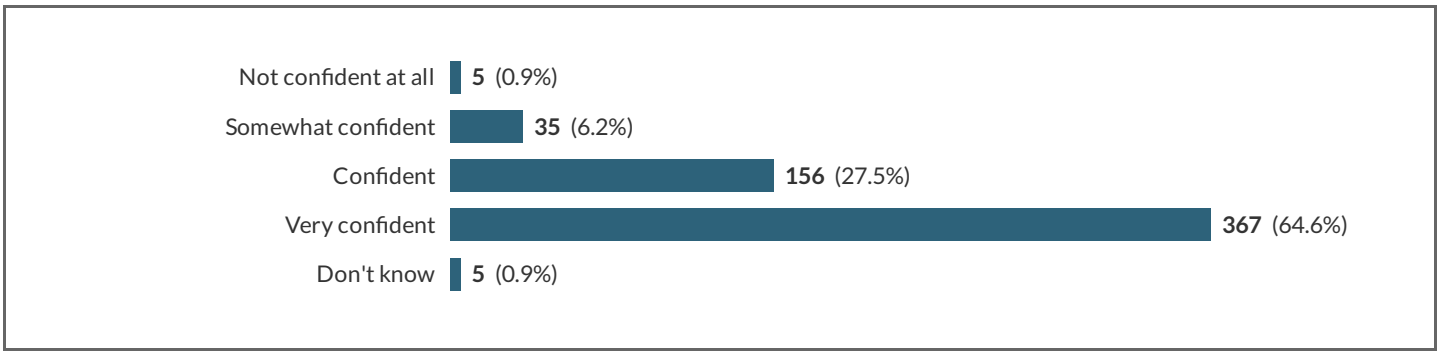
10.1 Calculating and estimating

10.1.a Calculating and estimating



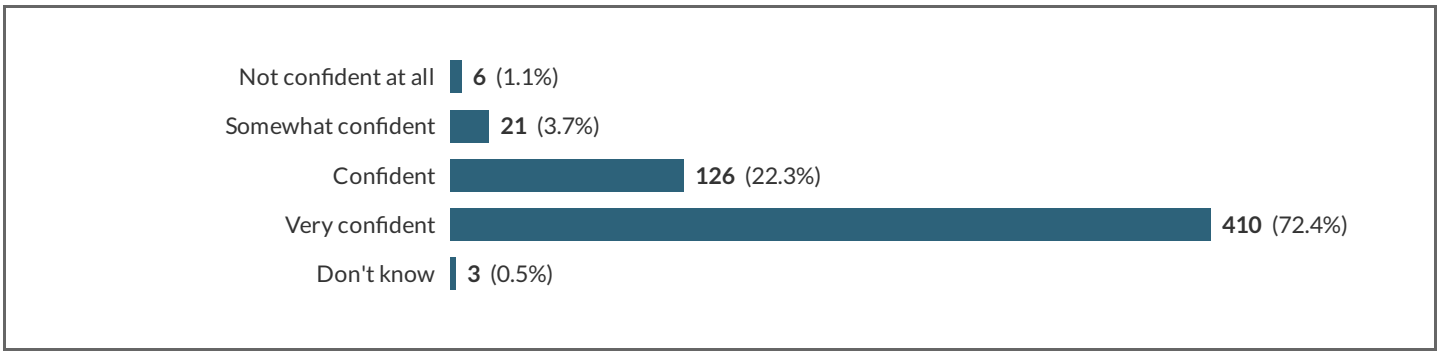
10.2 Ratio and proportion

10.2.a Ratio and proportion



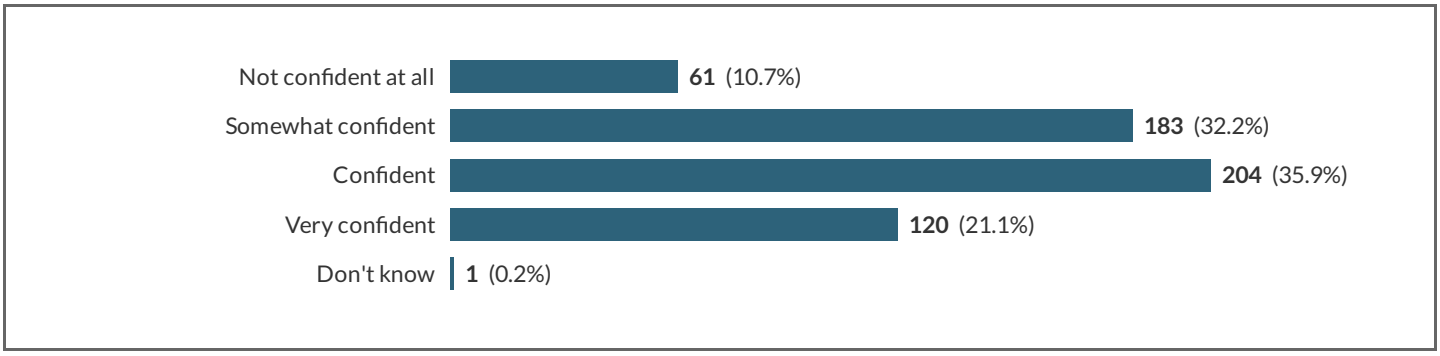
10.3 Manipulating algebraic expressions

10.3.a Manipulating algebraic expressions



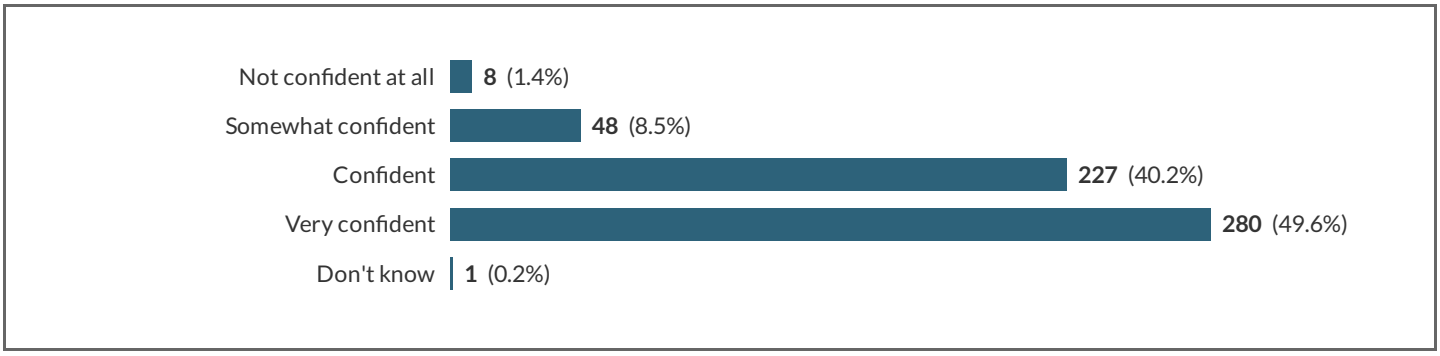
10.4 Proofs/ proving

10.4.a Proofs/ proving



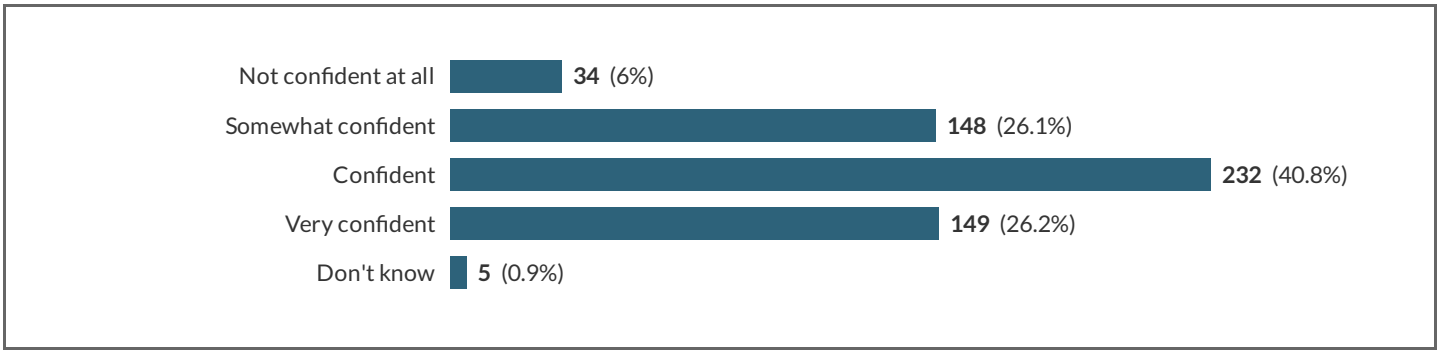
10.5 Problem solving

10.5.a Problem solving



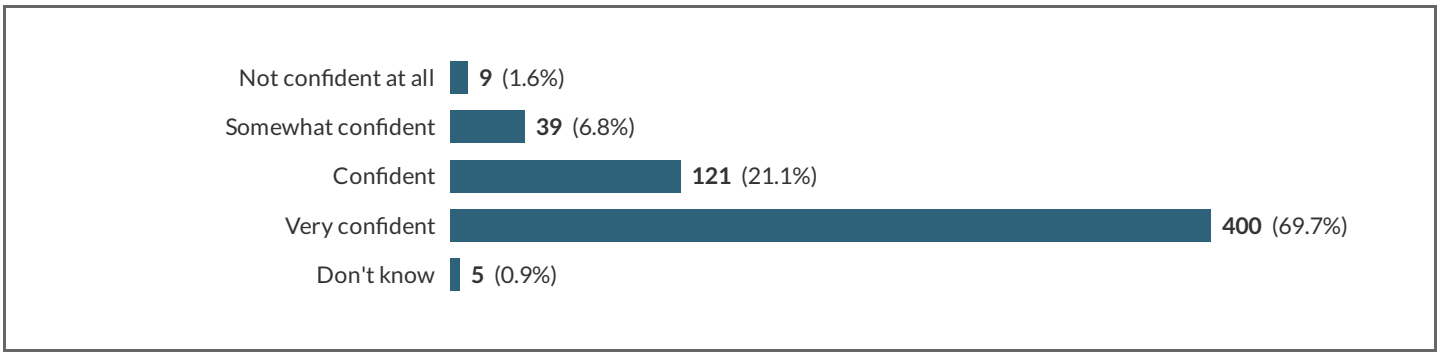
10.6 Modelling real situations

10.6.a Modelling real situations



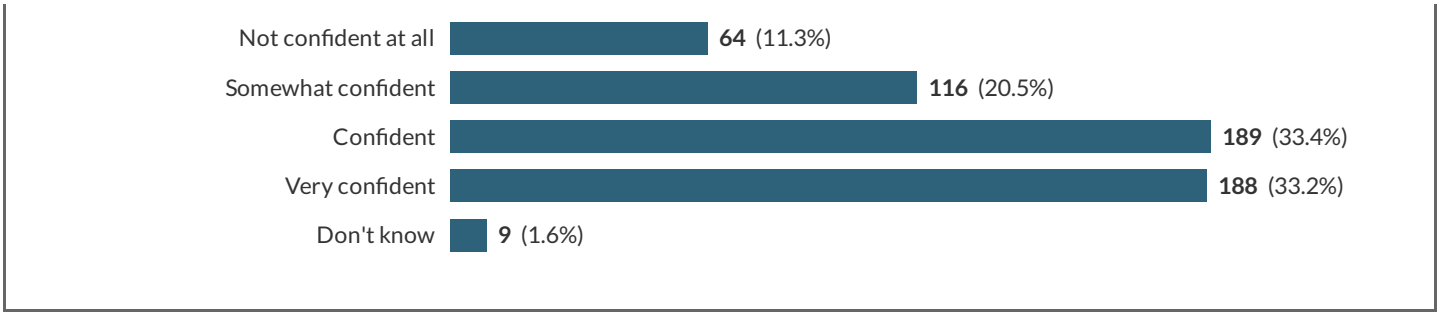
10.7 Basic calculus (differentiation/integration)

10.7.a Basic calculus (differentiation/integration)



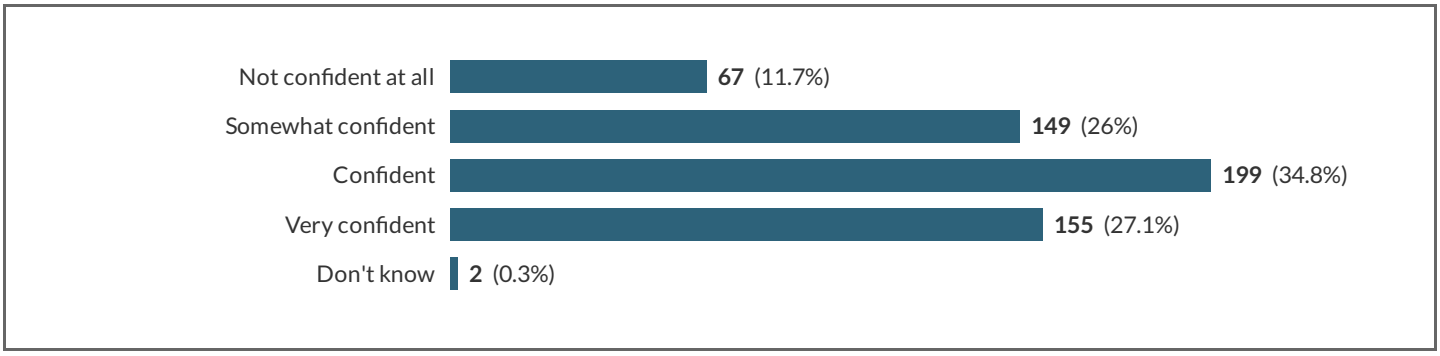
10.8 Complex calculus (e.g. differential equations)

10.8.a Complex calculus (e.g. differential equations)



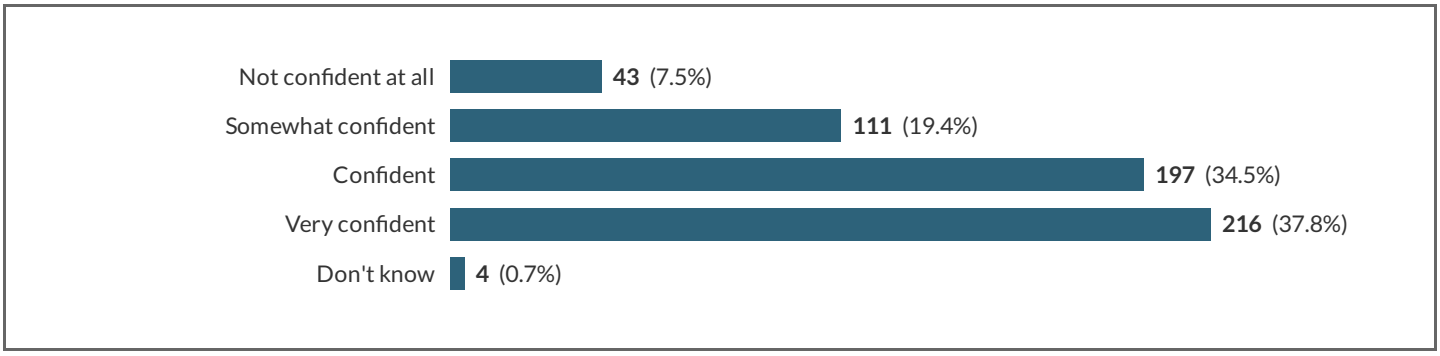
10.9 Statistics

10.9.a Statistics



10.10 Complex numbers

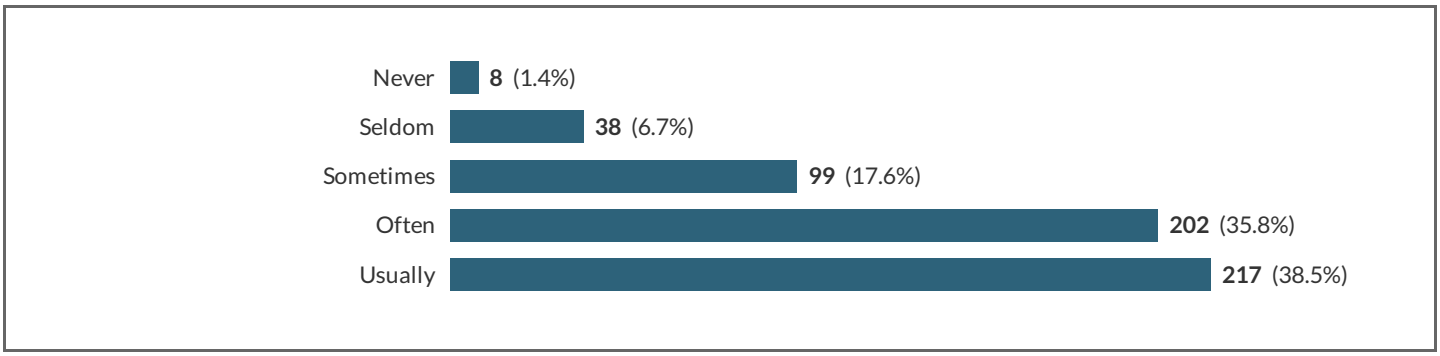
10.10.a Complex numbers



13 Please answer these questions about how you think and feel about your mathematical ability.

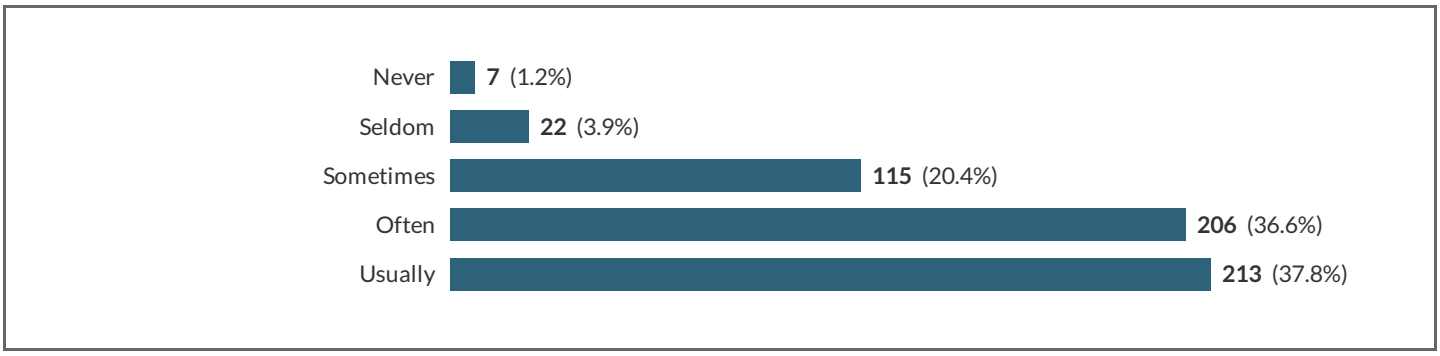
13.1 I feel confident enough to ask questions in a mathematics class.

13.1.a I feel confident enough to ask questions in a mathematics class.



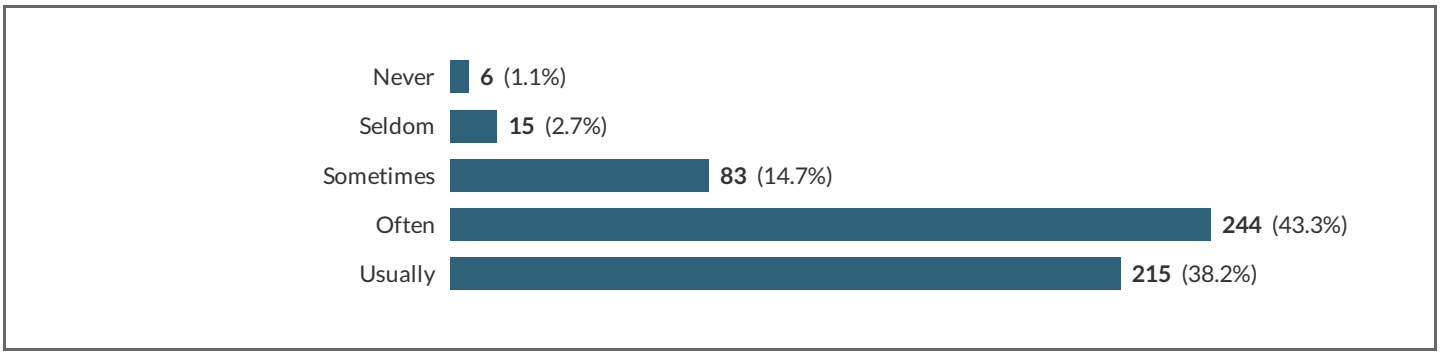
13.2 I believe I can do well on a mathematics test.

13.2.a I believe I can do well on a mathematics test.



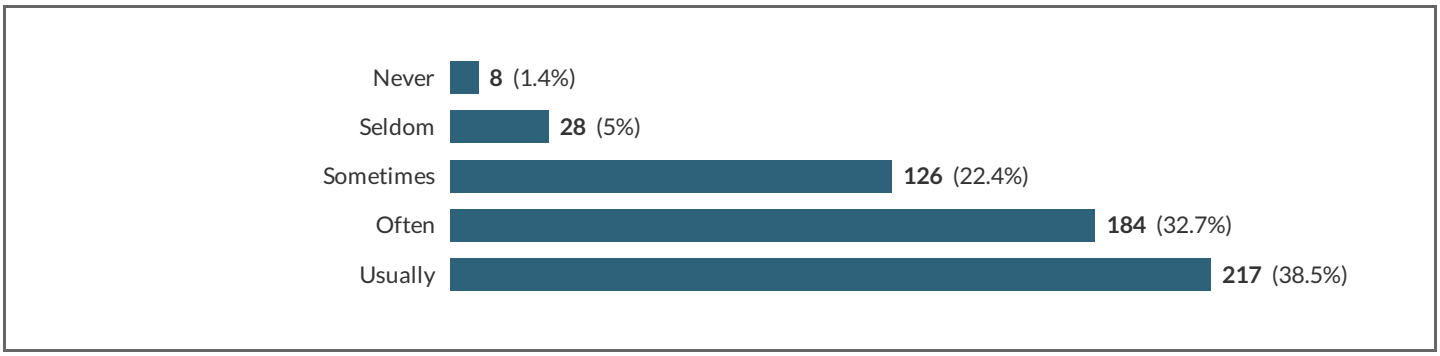
13.3 I believe I can complete all of the assignments in a mathematics course.

13.3.a I believe I can complete all of the assignments in a mathematics course.



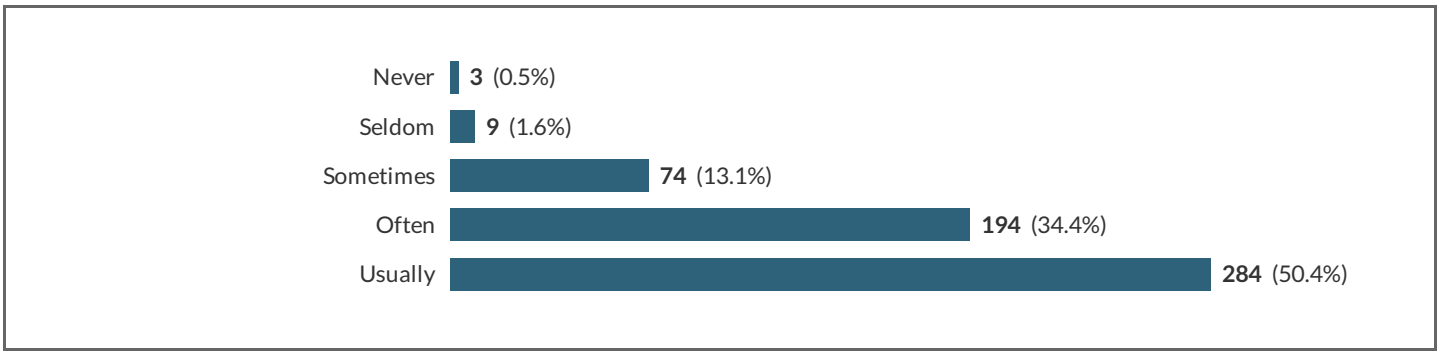
13.4 I believe I am the kind of person who is good at mathematics.

13.4.a I believe I am the kind of person who is good at mathematics.



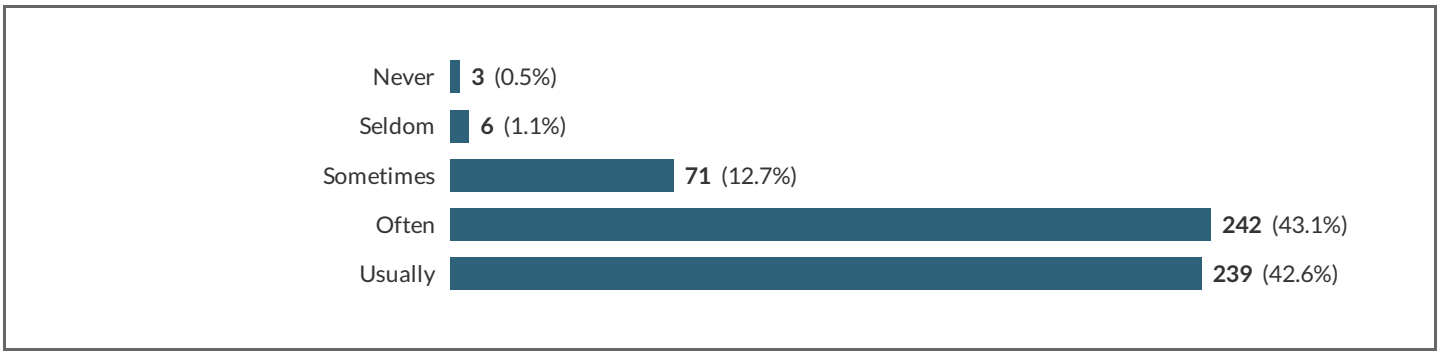
13.5 I believe I will be able to use mathematics in my future career when needed.

13.5.a I believe I will be able to use mathematics in my future career when needed.



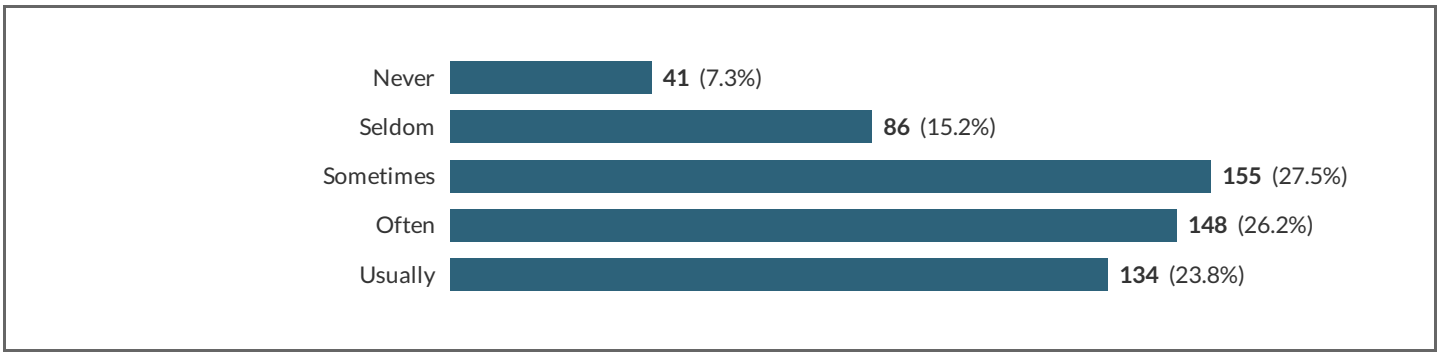
13.6 I believe I can understand the content in a mathematics course.

13.6.a I believe I can understand the content in a mathematics course.



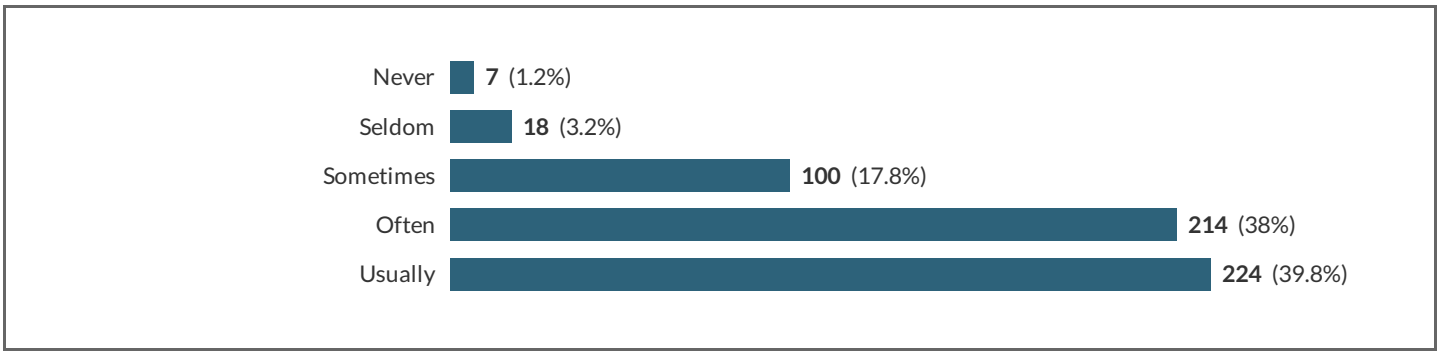
13.7 I believe I can get the highest grade in a mathematics course.

13.7.a I believe I can get the highest grade in a mathematics course.



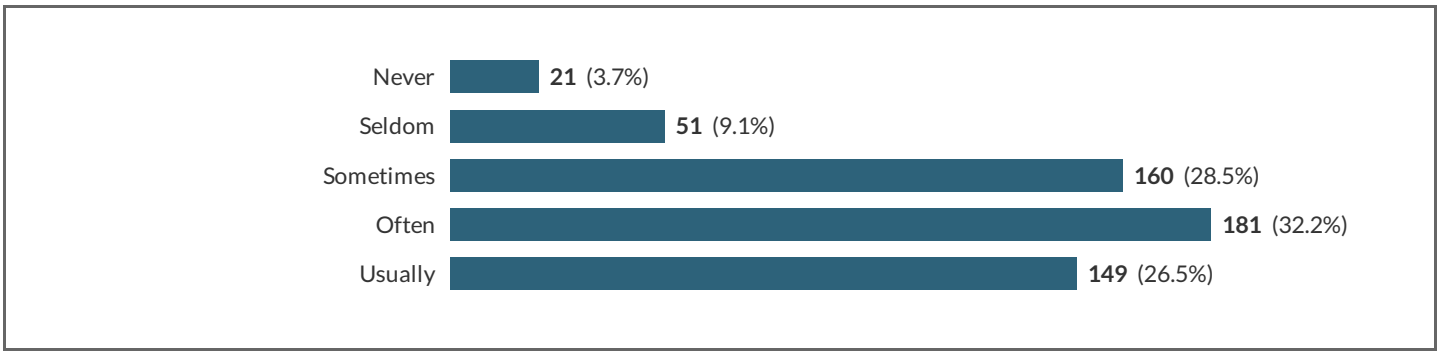
13.8 I believe I can learn well in a mathematics course.

13.8.a I believe I can learn well in a mathematics course.



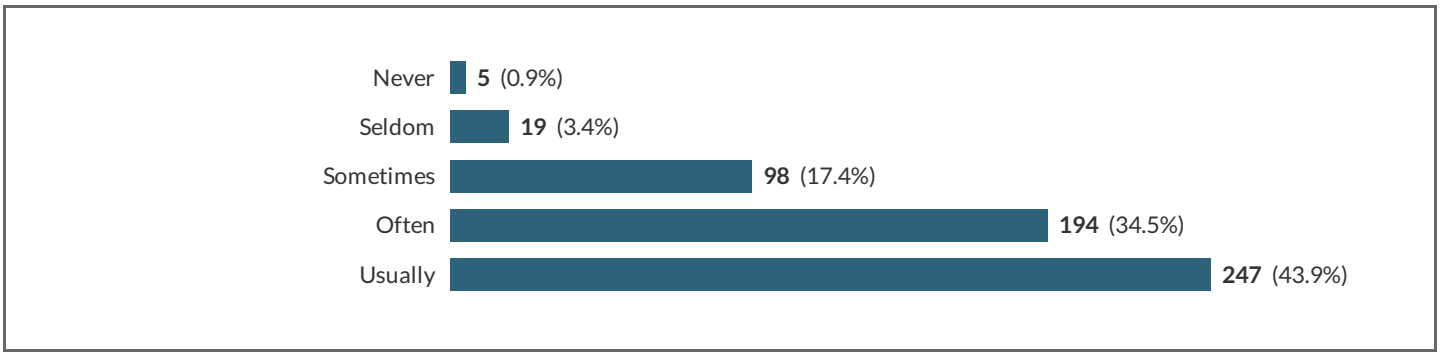
13.9 I feel confident when taking a mathematics test.

13.9.a I feel confident when taking a mathematics test.



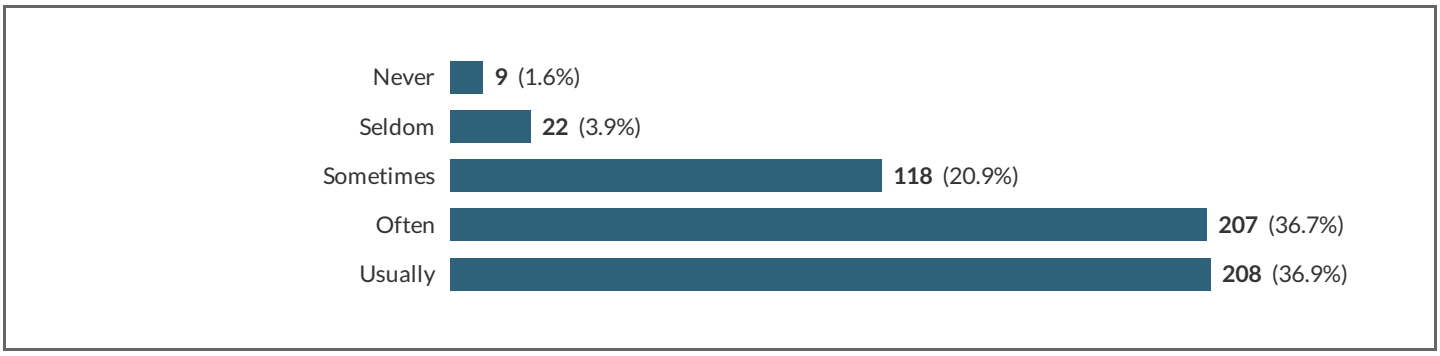
13.10 I believe I am the type of person who can do mathematics.

13.10.a I believe I am the type of person who can do mathematics.



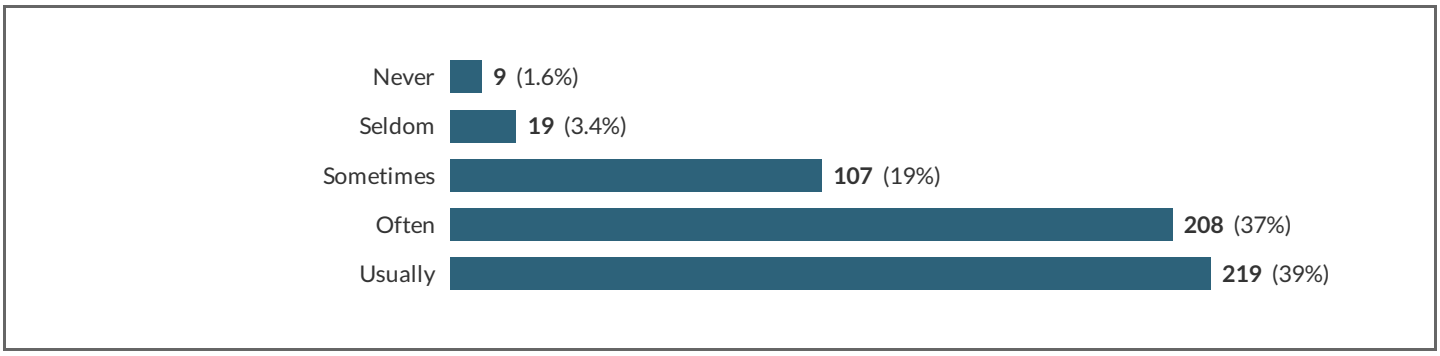
13.11 I feel that I will be able to do well in future mathematics courses.

13.11.a I feel that I will be able to do well in future mathematics courses.



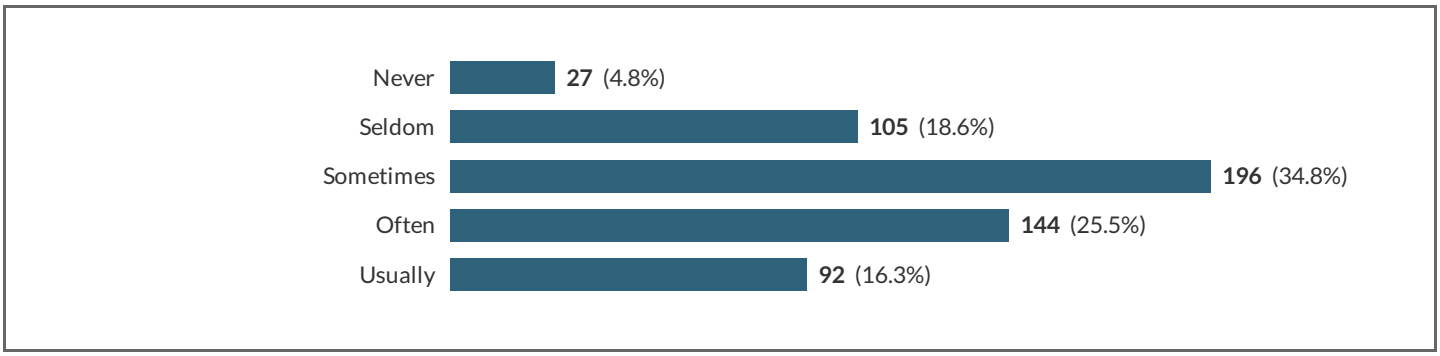
13.12 I believe I can do the mathematics in a mathematics course.

13.12.a I believe I can do the mathematics in a mathematics course.



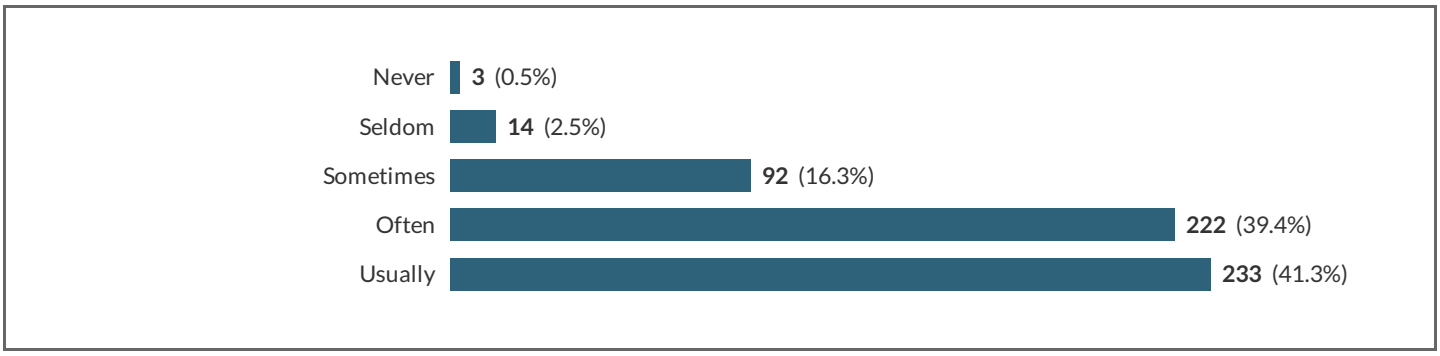
13.13 I believe I can think like a mathematician.

13.13.a I believe I can think like a mathematician.

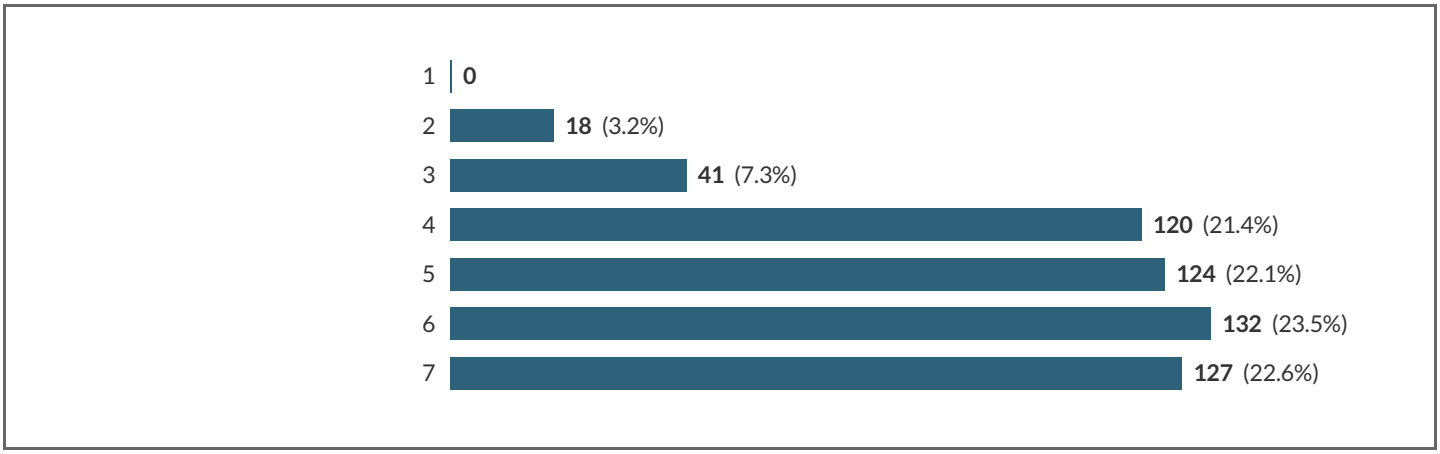


13.14 I feel confident when using mathematics outside of school/college/university.

13.14.a I feel confident when using mathematics outside of school/college/university.



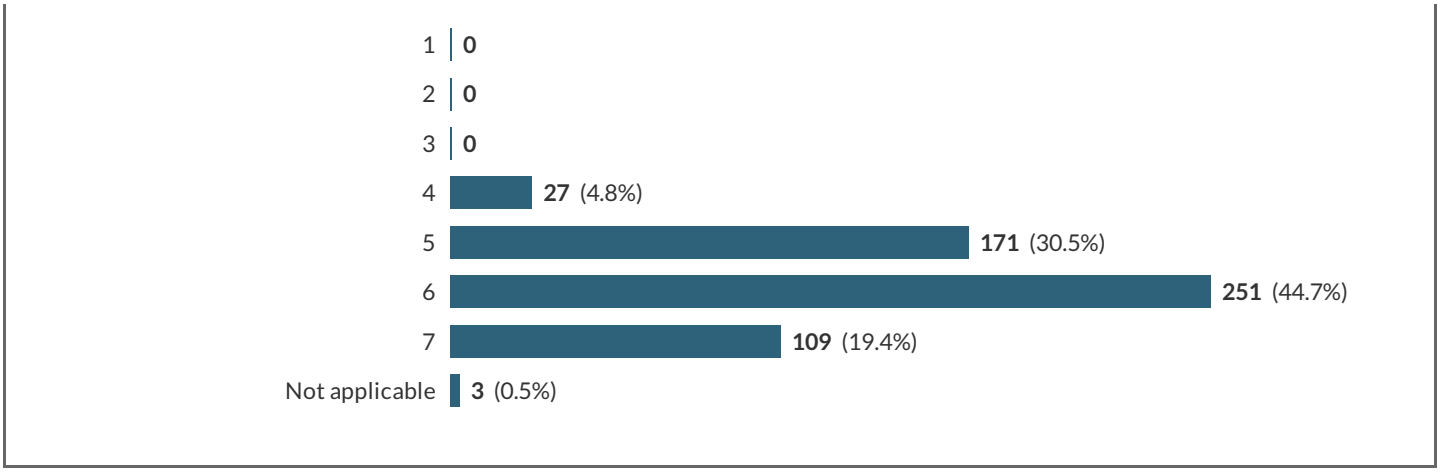
14 What was your final grade in DP mathematics HL?



15 What (average) grades did you get in your other DP programme subject groups?

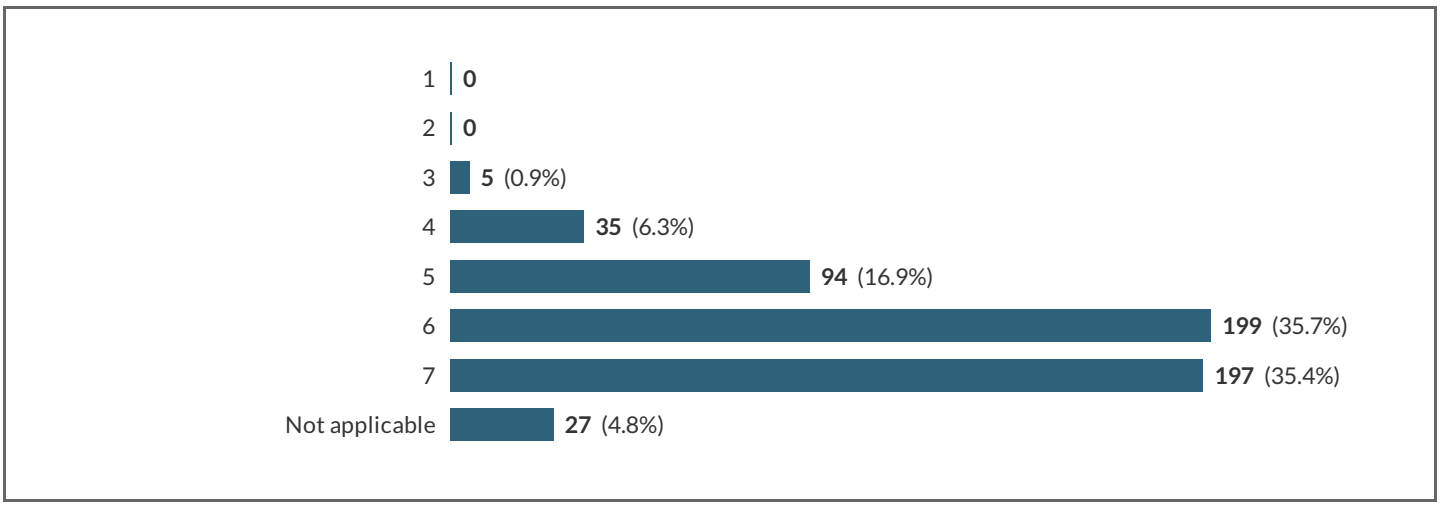
15.1 Group 1: Studies in Language and Literature

15.1.a Group 1: Studies in Language and Literature - (Average) grade (please round up as appropriate)



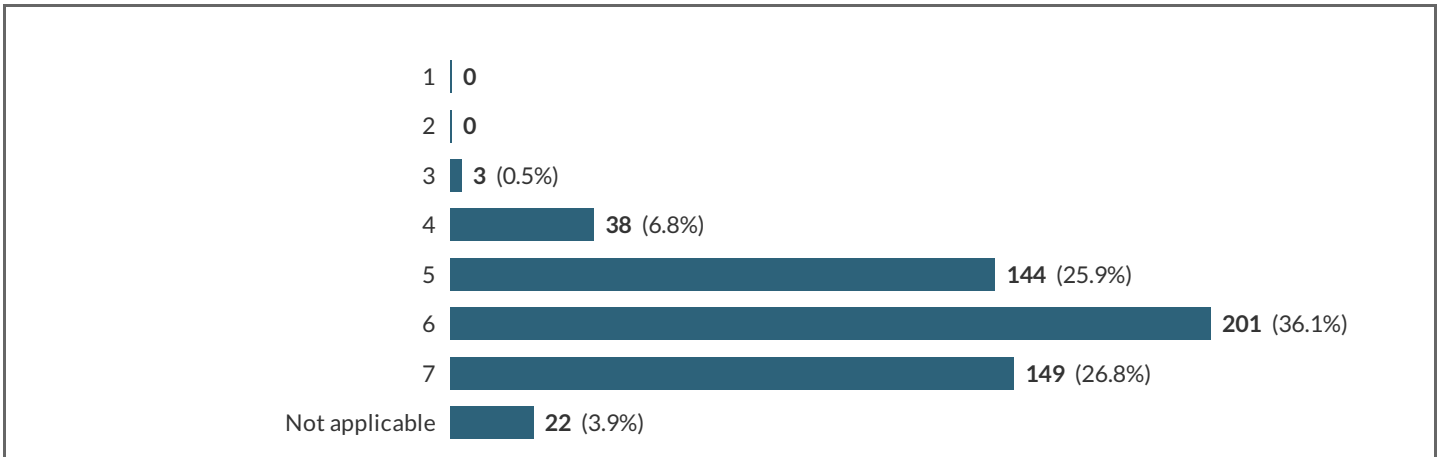
15.2 Group 2: Language Acquisition

15.2.a Group 2: Language Acquisition - (Average) grade (please round up as appropriate)



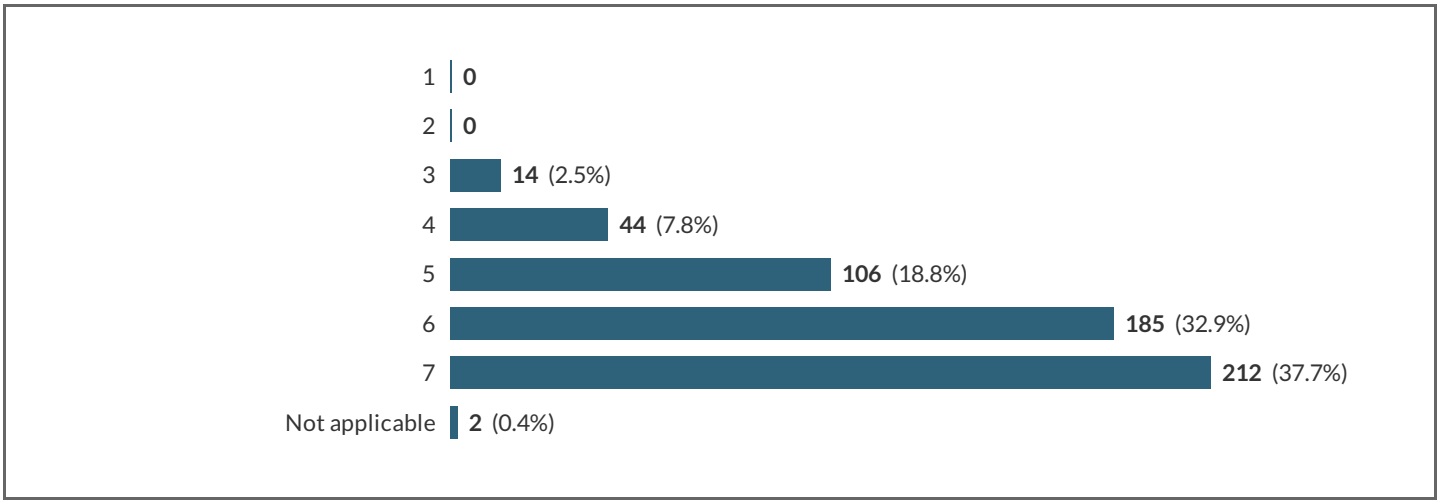
15.3 Group 3: Individuals and Societies

15.3.a Group 3: Individuals and Societies - (Average) grade (please round up as appropriate)



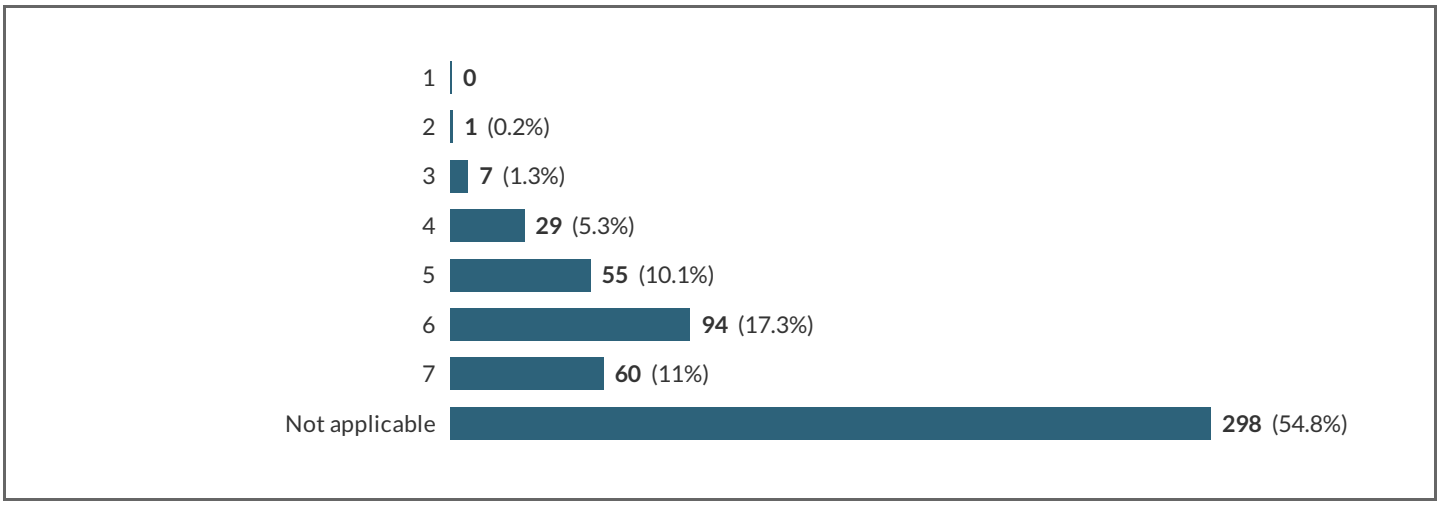
15.4 Group 4: Sciences

15.4.a Group 4: Sciences - (Average) grade (please round up as appropriate)



15.5 Group 6: The Arts

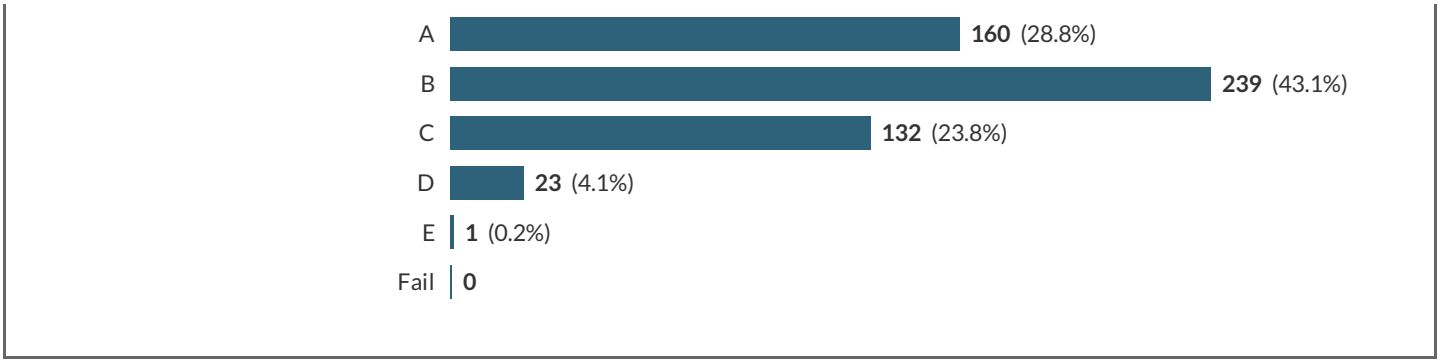
15.5.a Group 6: The Arts - (Average) grade (please round up as appropriate)



16 What grades were you awarded in your DP programme core requirements?

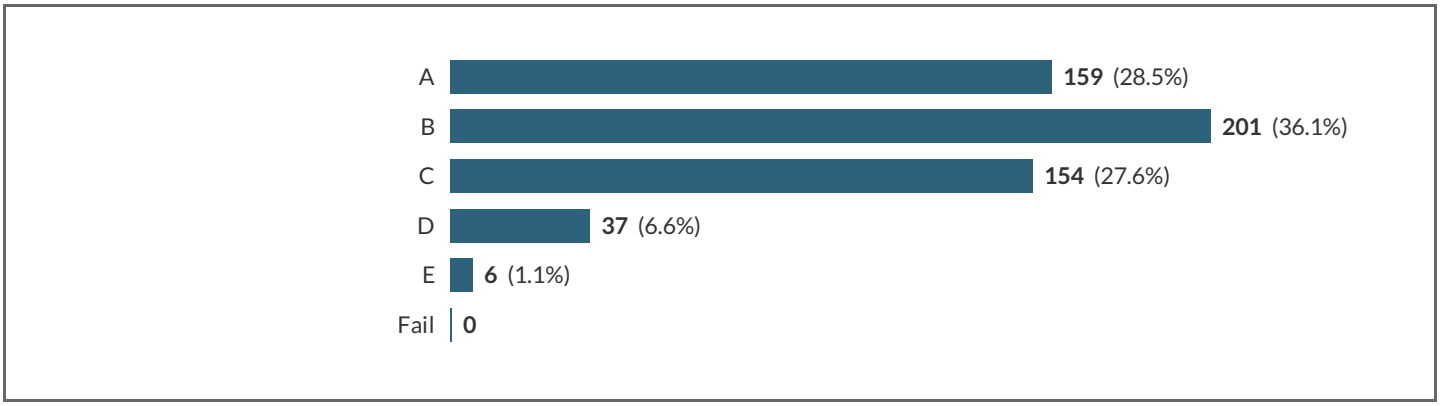
16.1 Theory of Knowledge (TOK)

16.1.a Theory of Knowledge (TOK) - Grade

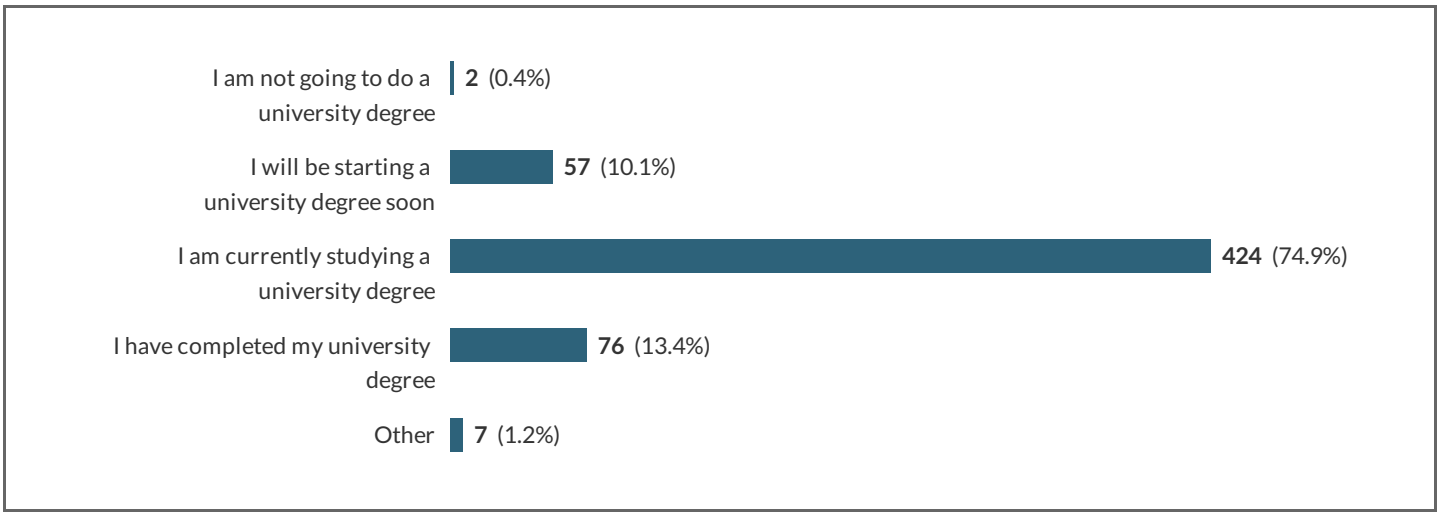


16.2 The Extended Essay (EE)

16.2.a The Extended Essay (EE) - Grade



17 What stage are you at in terms of your university degree course (BA/BSc)?

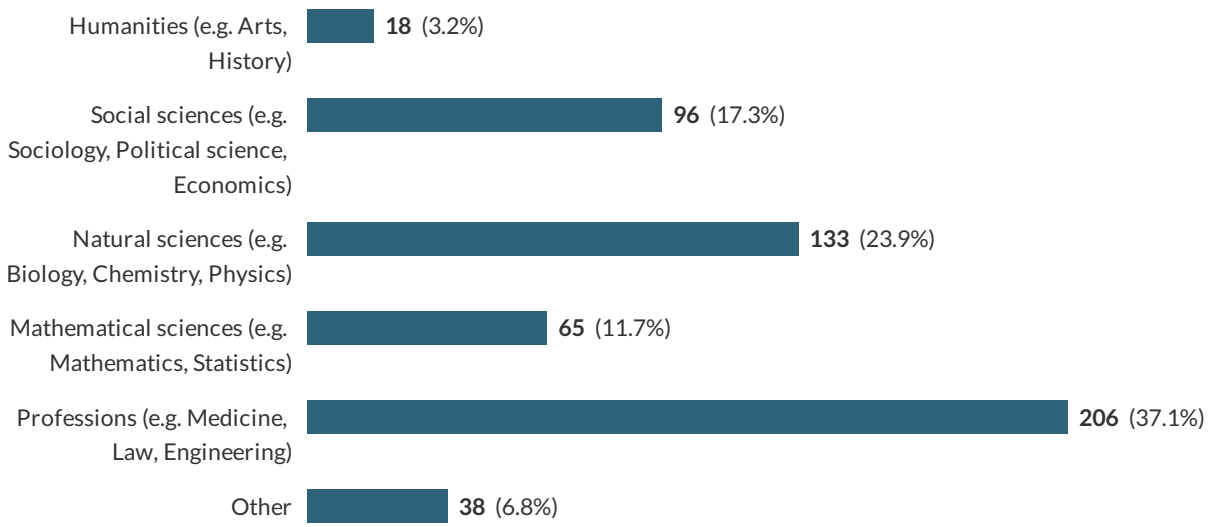


17.a If you selected Other, please specify:

Showing 5 of 7 responses	
I have finished my Bachelors and moved on to my professional degree in Veterinary Medicine	154407-154401-9349015
Currently in a MSc. program after completing B.Sc.Eng.	154407-154401-9349050
MSc Starting	154407-154401-9349879
I am applying to several universities	154407-154401-9350065
I didn't go to uni, and Im in my first year of studying towards the ACCA, another international qualification for accountants. Im passing all my exams so far, and loving the world of business. Would love to chat to someone more about this survey, as I loved the IB, and always happy for a chat.	154407-154401-9352461

Your choice of university and degree

18 The field of study of my degree is...



18.a If you selected Other, please specify:

Showing 5 of 38 responses	
Undecided	154407-154401-9347990
Psycholinguistics (a mixture of the humanities, social sciences, and natural sciences)	154407-154401-9348095
Human sciences	154407-154401-9348162
Pharmacy	154407-154401-9348350
Business	154407-154401-9348399

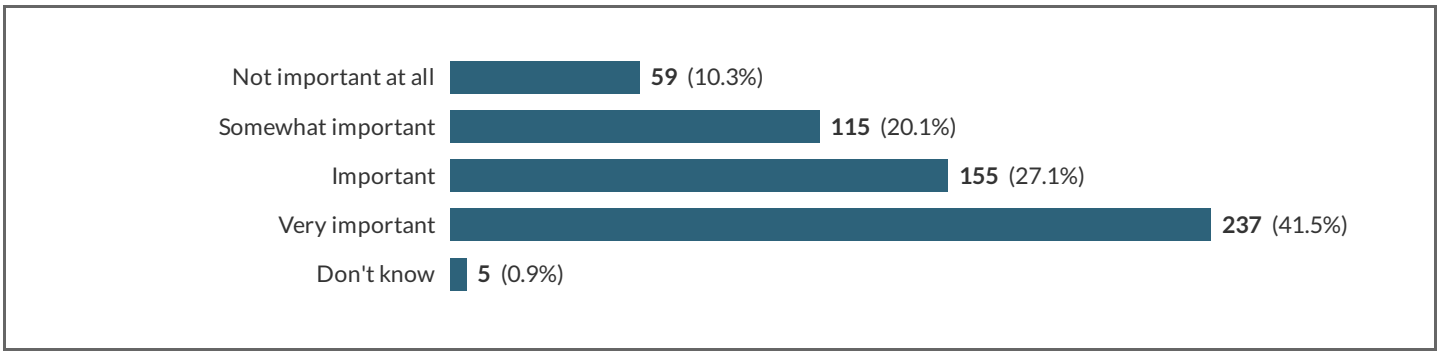
19 What is the title of your degree course?

Showing 5 of 545 responses	
English Literature	154407-154401-9347981
Biomedical Engineering	154407-154401-9347986
Finance	154407-154401-9347994
Biology and Health & Societies	154407-154401-9348001
Mechanical Engineering (MEng)	154407-154401-9347989

20 How important were the following factors in your degree choice at university?

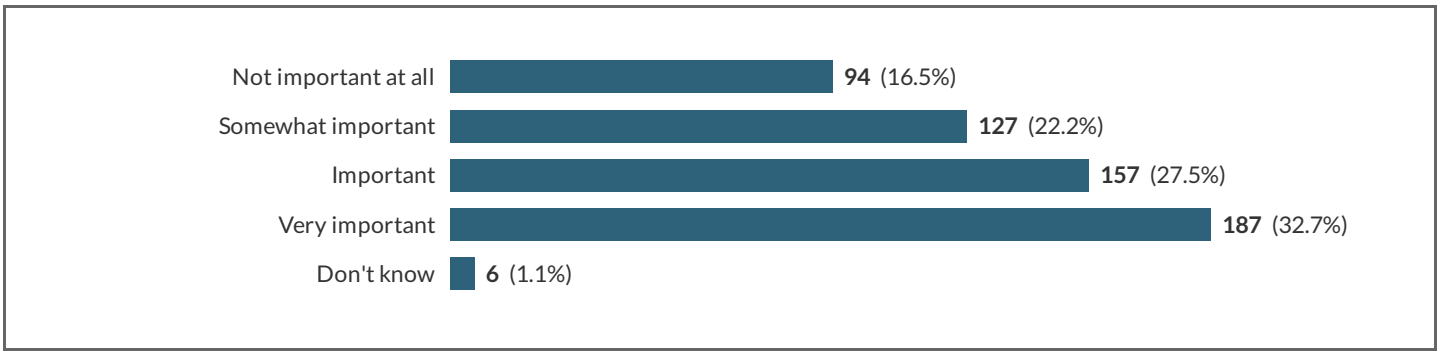
20.1 Being good at mathematics

20.1.a Being good at mathematics



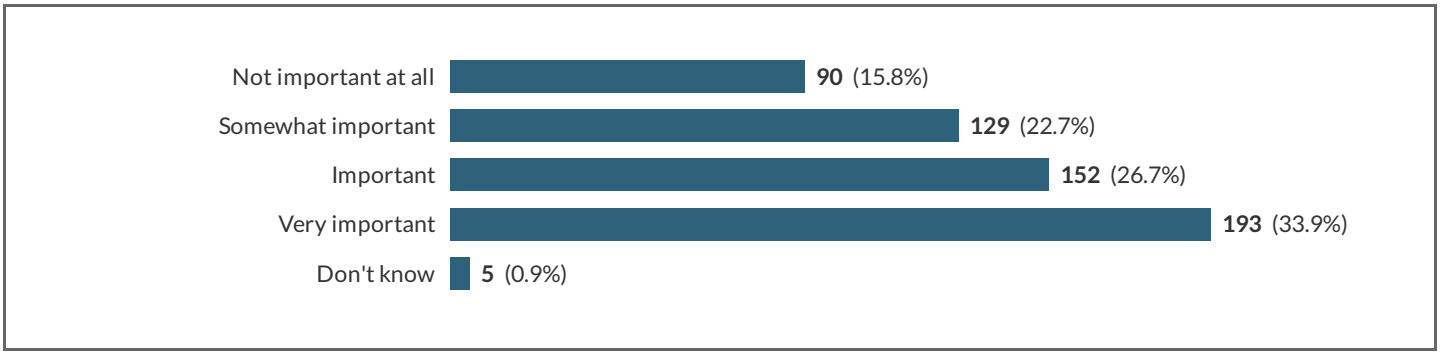
20.2 Enjoying mathematics

20.2.a Enjoying mathematics



20.3 Being interested in mathematics

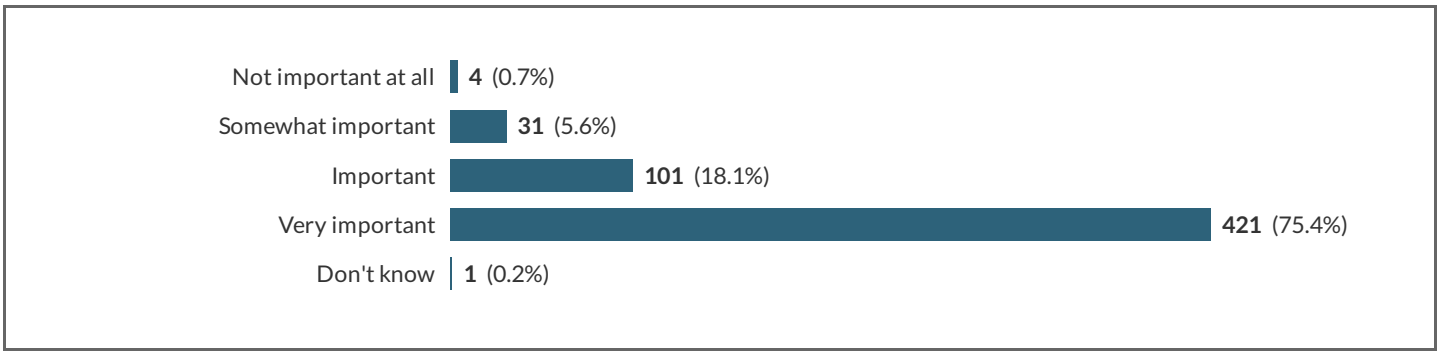
20.3.a Being interested in mathematics



21 How important were the following factors in your degree choice at university?

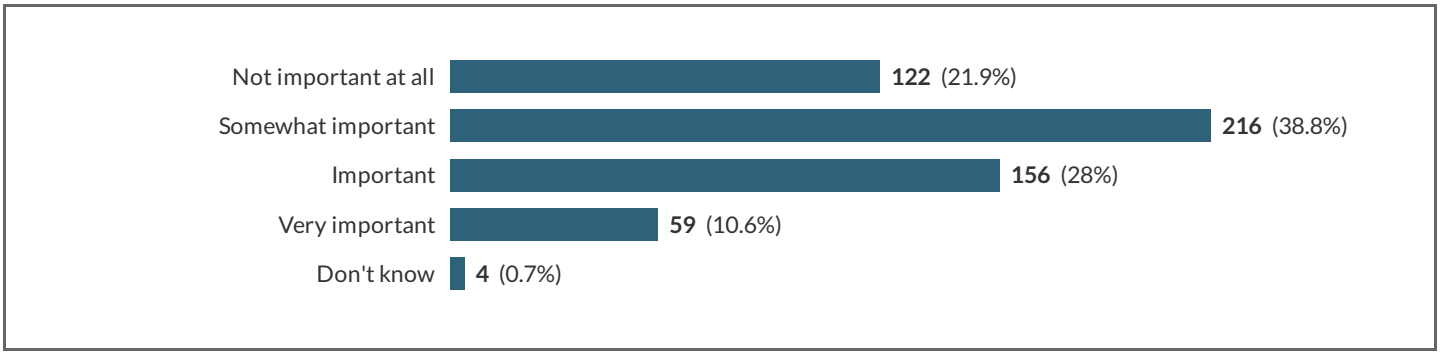
21.1 Your personal interests

21.1.a Your personal interests



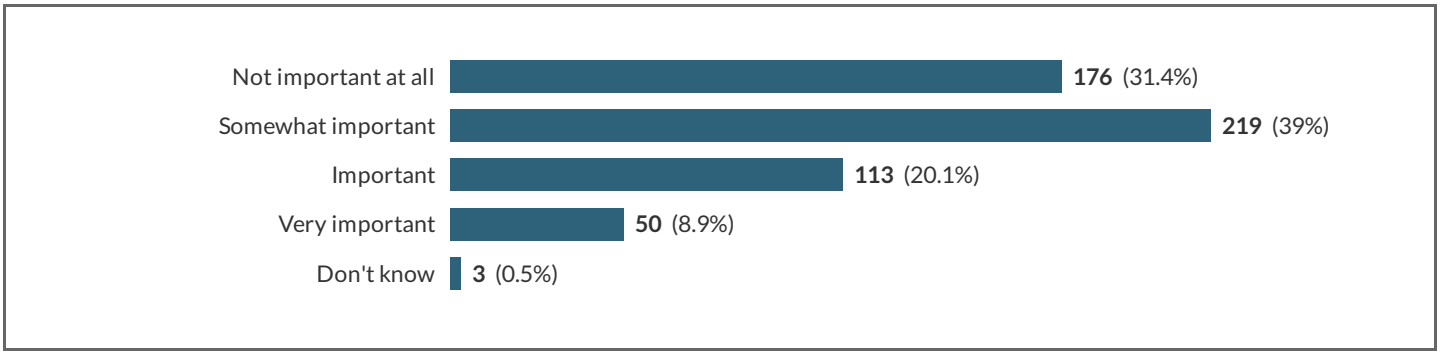
21.2 Your parents

21.2.a Your parents



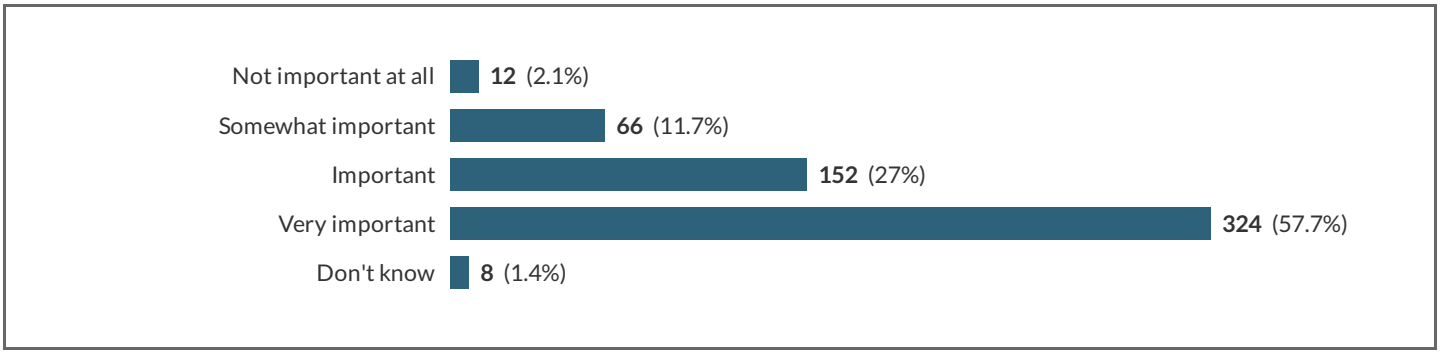
21.3 Your school teachers

21.3.a Your school teachers



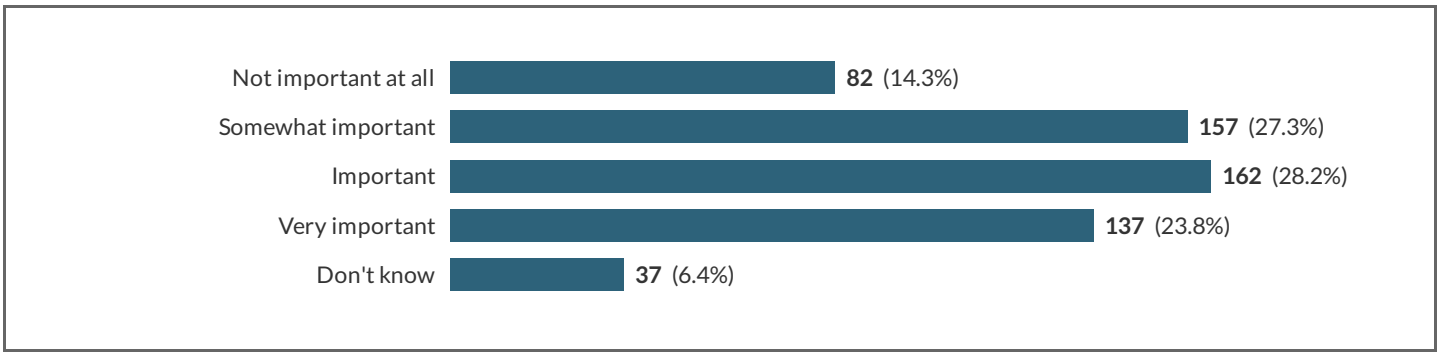
21.4 Your career ambitions

21.4.a Your career ambitions



21.5 Being good at non-mathematical subjects in school

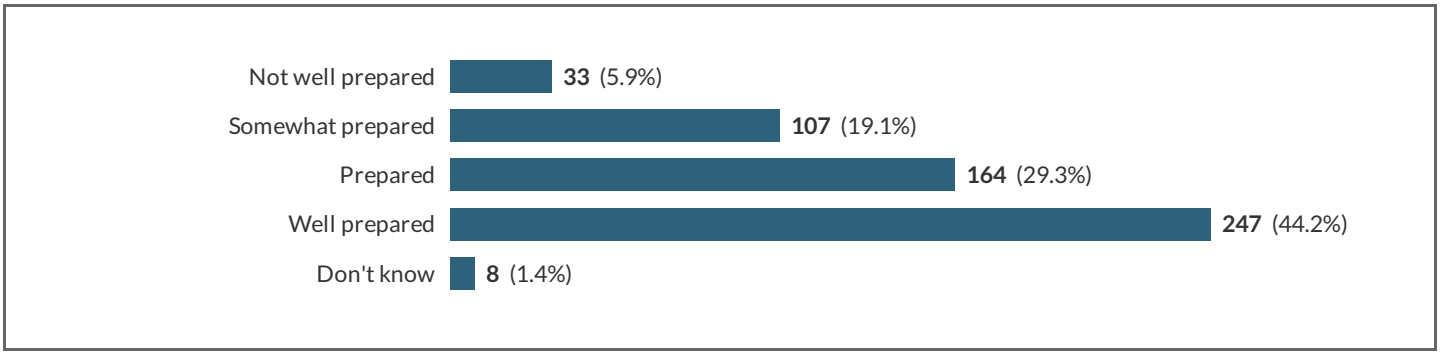
21.5.a Being good at non-mathematical subjects in school



22 How well prepared do you think your DP mathematics HL made you for each of the following?

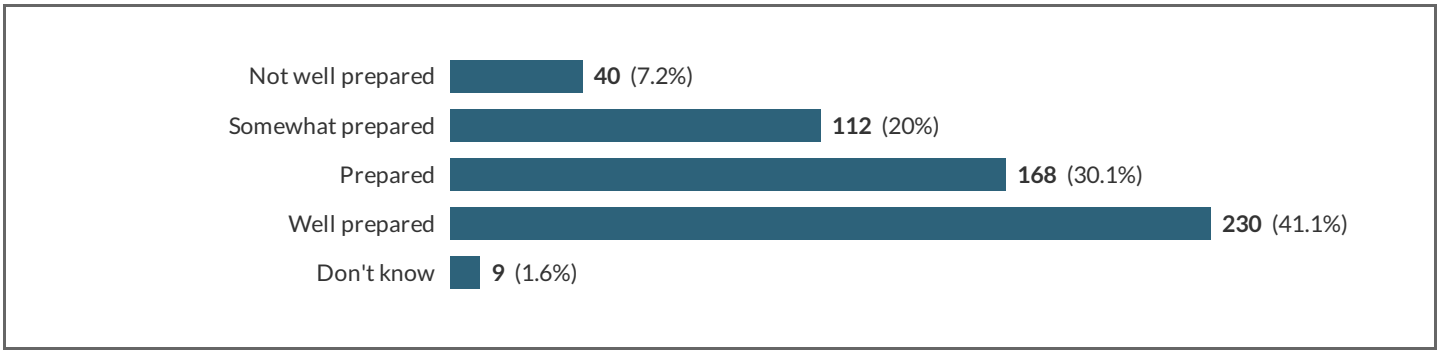
22.1 Studying on your own from texts/notes

22.1.a Studying on your own from texts/notes



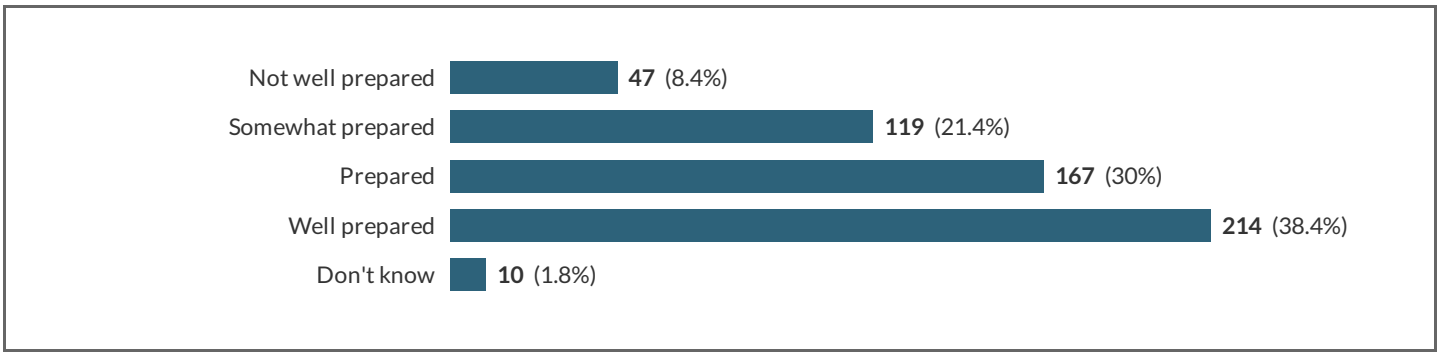
22.2 Listening in lectures

22.2.a Listening in lectures



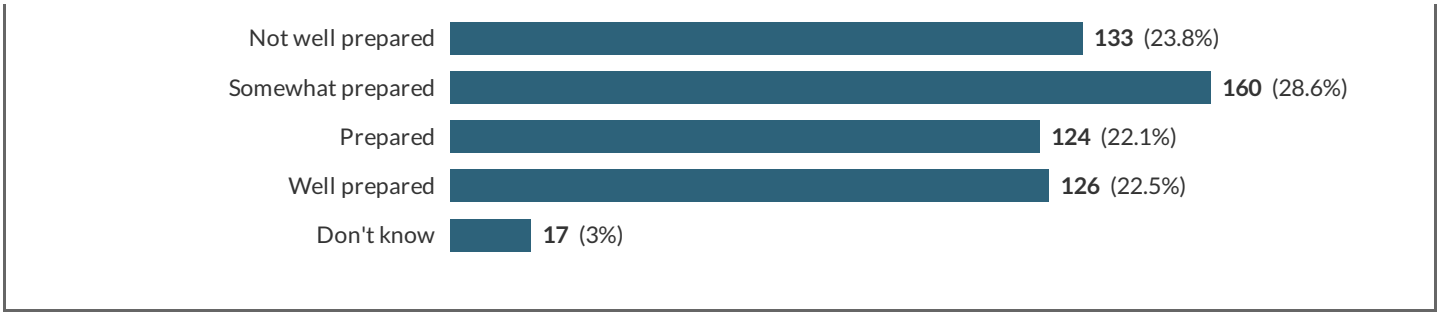
22.3 Taking notes in lectures

22.3.a Taking notes in lectures



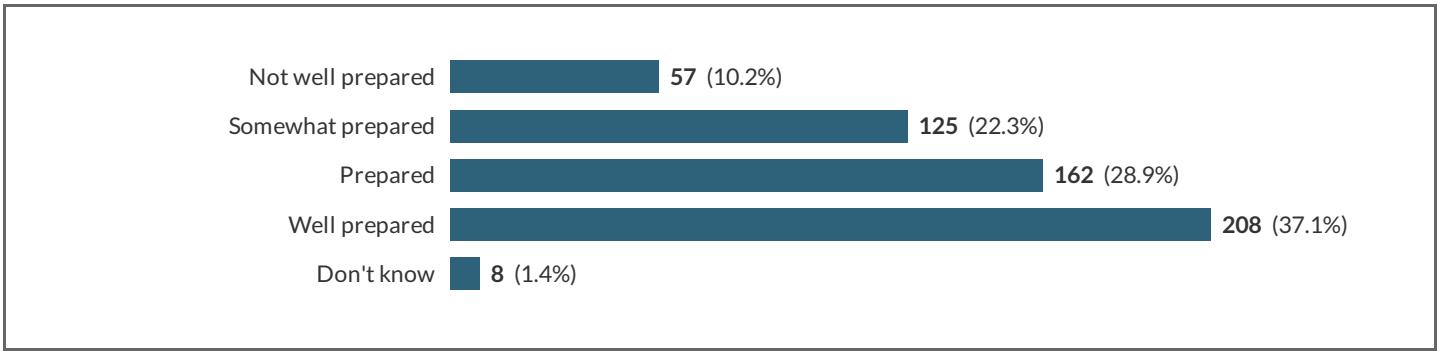
22.4 Working on team projects

22.4.a Working on team projects



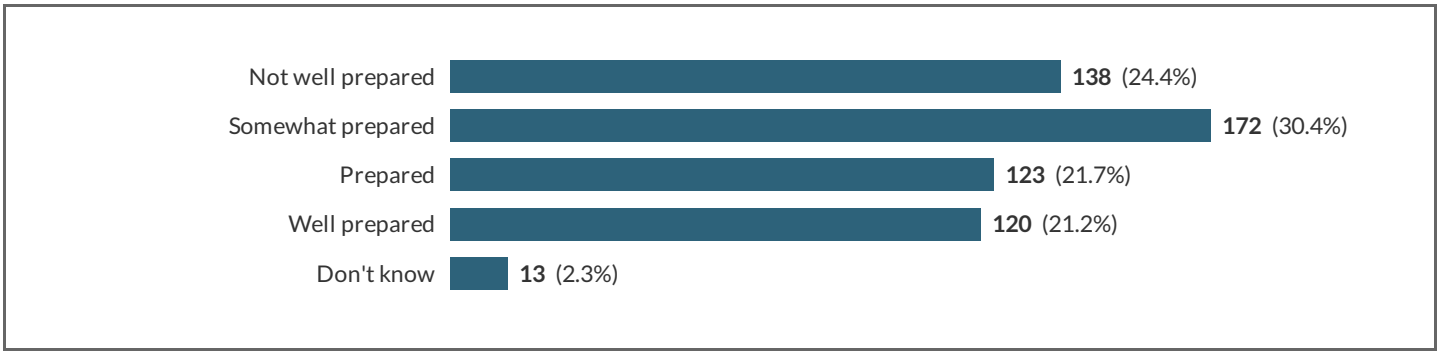
22.5 Doing independent research

22.5.a Doing independent research



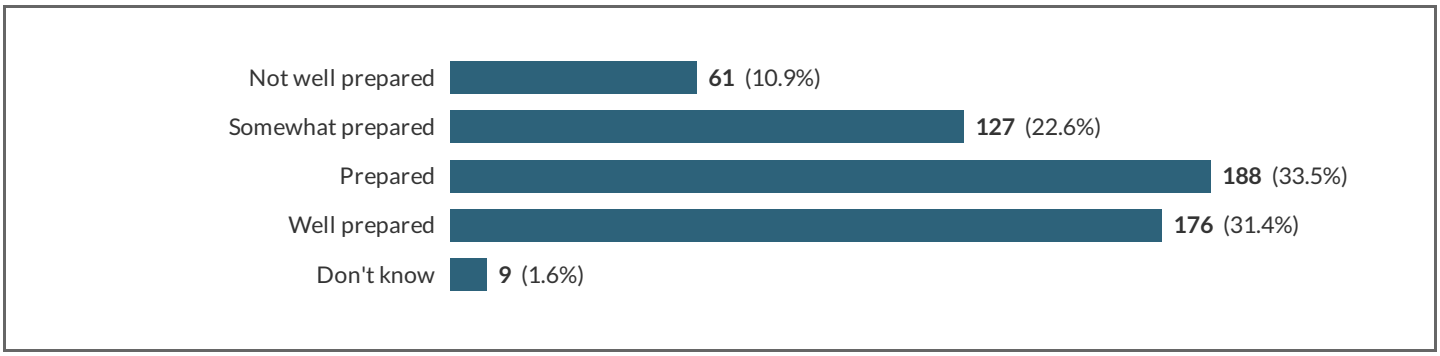
22.6 Computer-based learning

22.6.a Computer-based learning

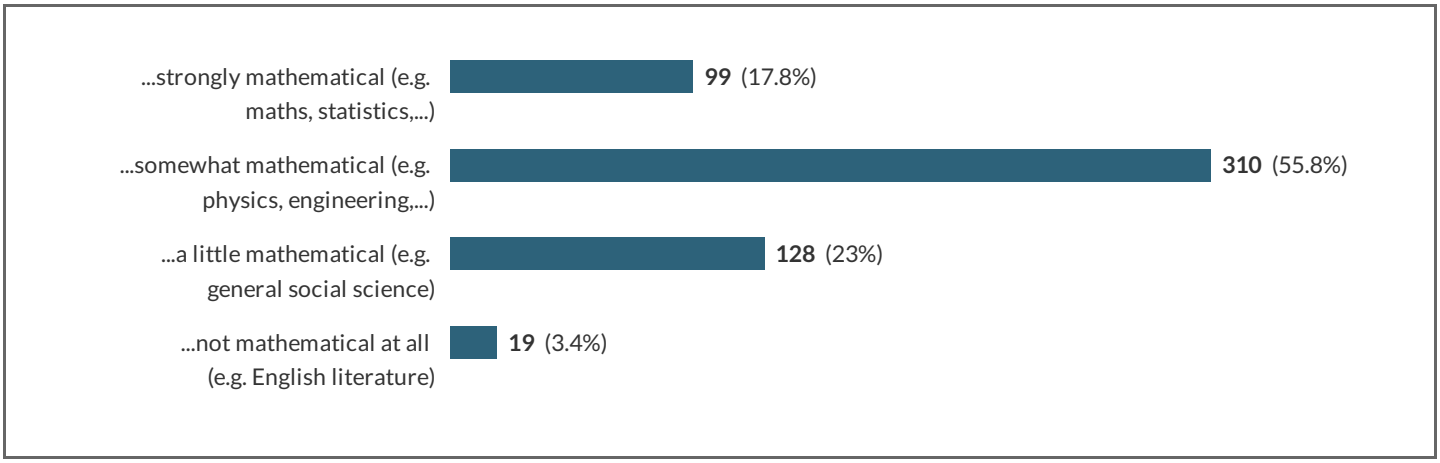


22.7 Working/discussing in small groups

22.7.a Working/discussing in small groups



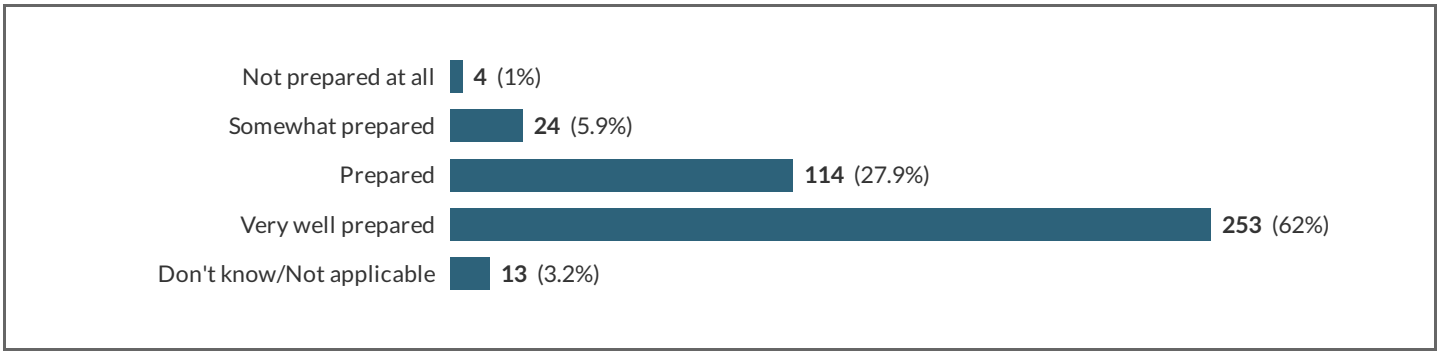
23 To what extent do you feel your degree is mathematical? My degree is...



24 How well prepared do you think your DP mathematics HL made you for your university studies in the following mathematical areas:

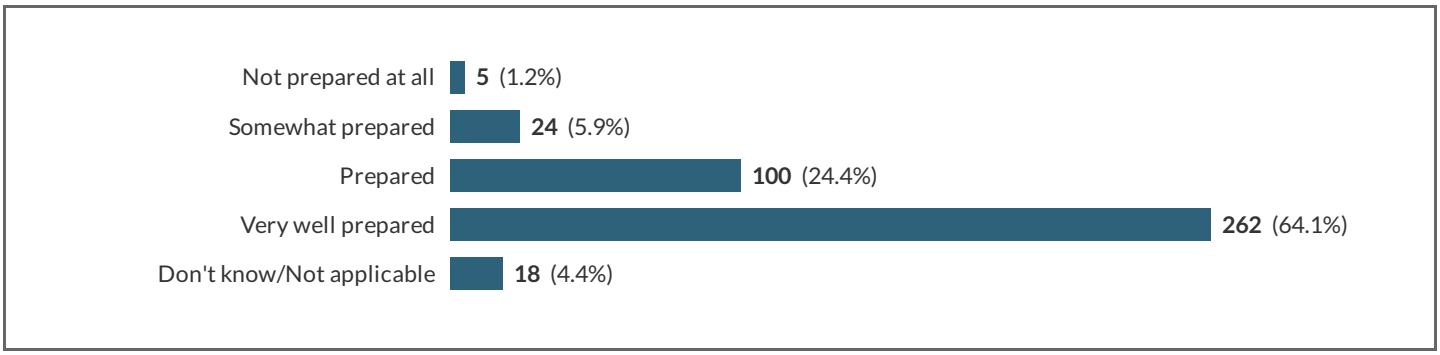
24.1 Calculating and estimating

24.1.a Calculating and estimating



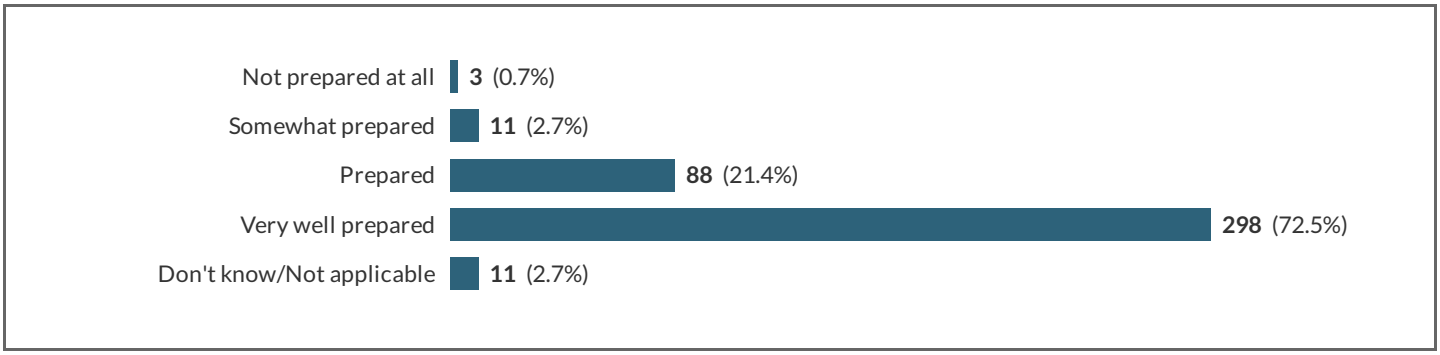
24.2 Ratio and proportion

24.2.a Ratio and proportion



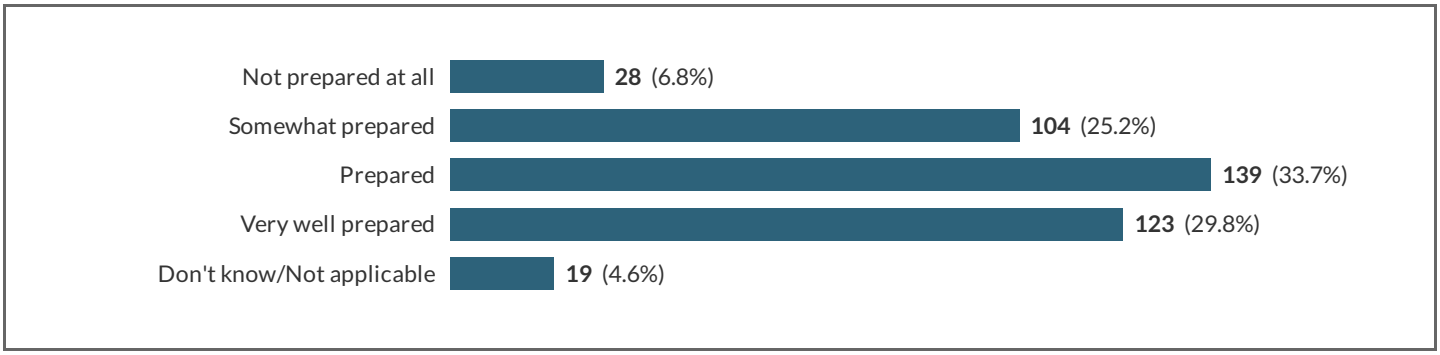
24.3 Manipulating algebraic expressions

24.3.a Manipulating algebraic expressions



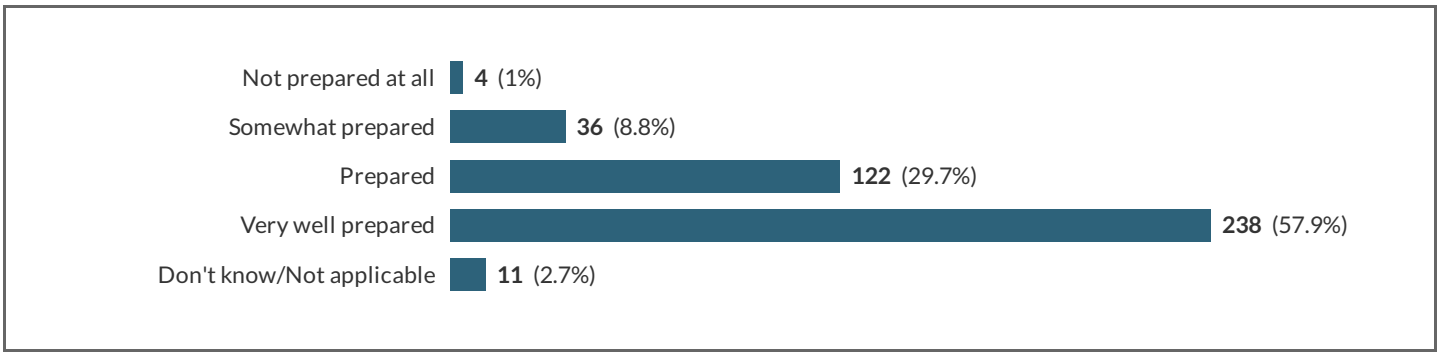
24.4 Proofs/ proving

24.4.a Proofs/ proving



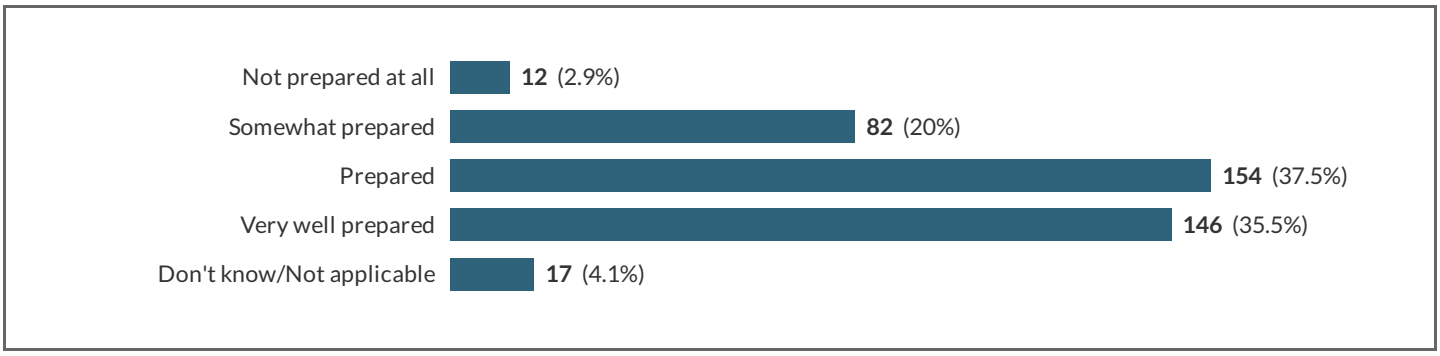
24.5 Problem solving

24.5.a Problem solving



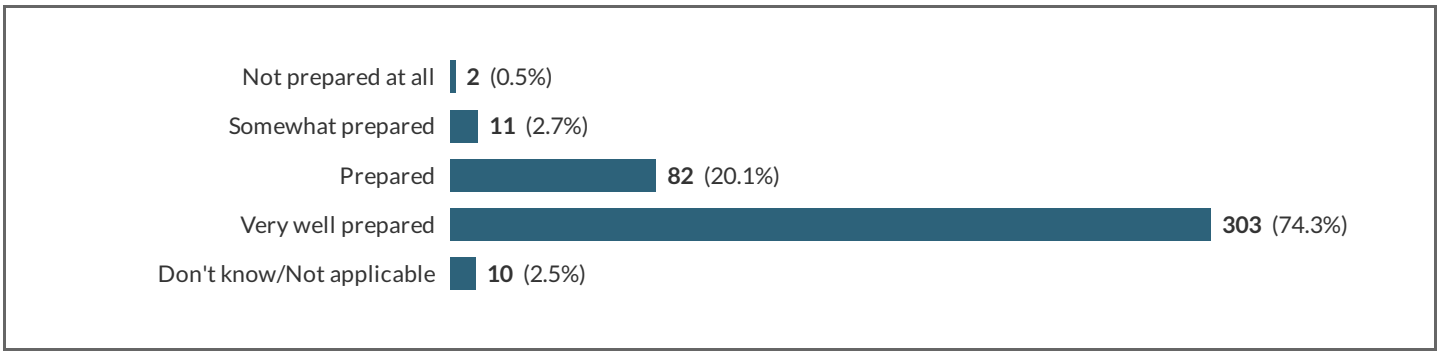
24.6 Modelling real situations

24.6.a Modelling real situations



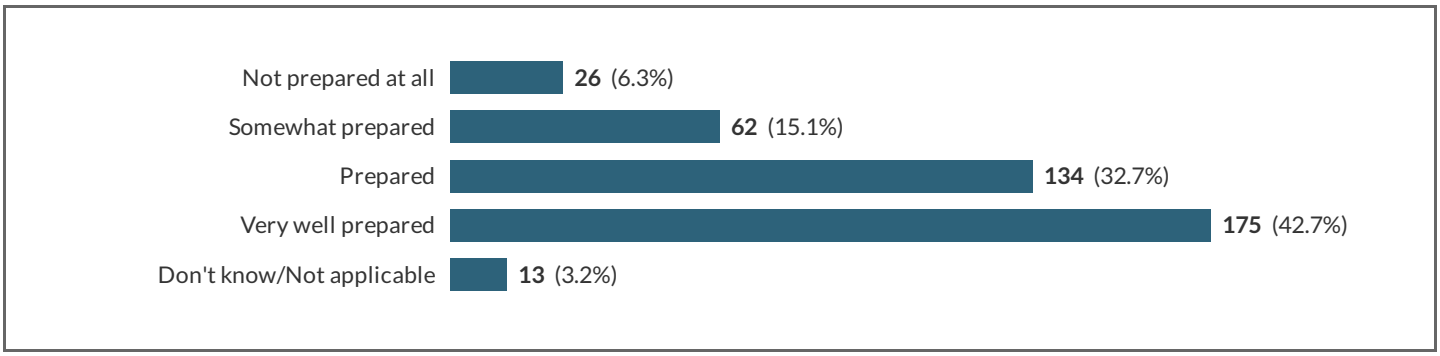
24.7 Basic calculus (differentiation/integration)

24.7.a Basic calculus (differentiation/integration)



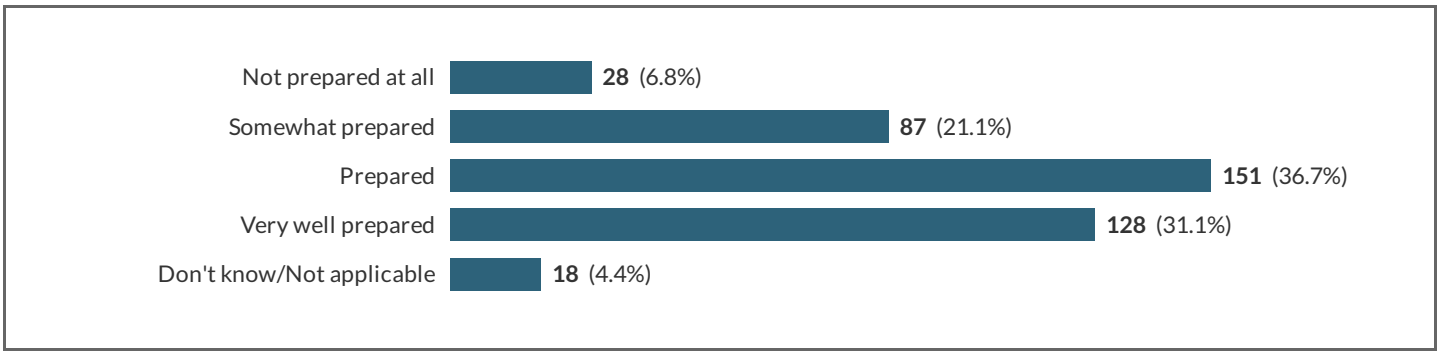
24.8 Complex calculus (e.g. differential equations)

24.8.a Complex calculus (e.g. differential equations)



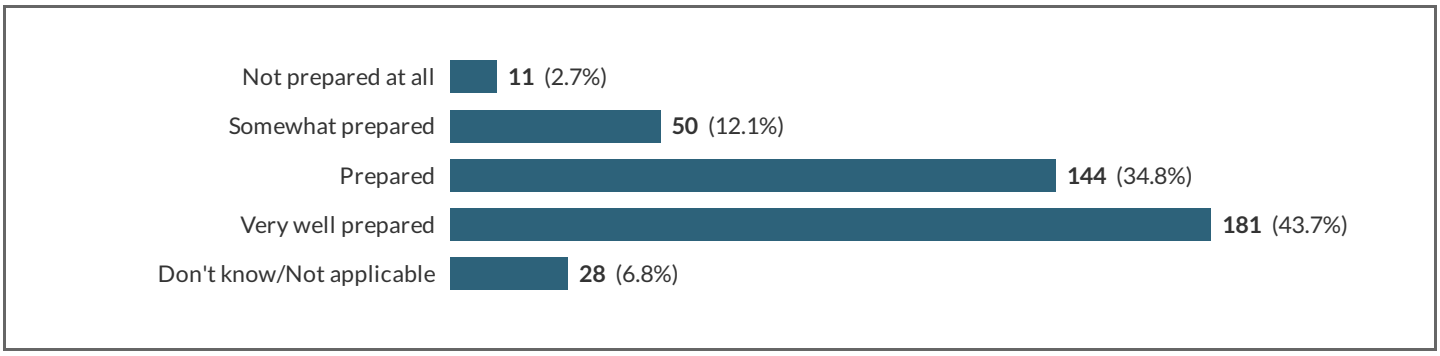
24.9 Statistics

24.9.a Statistics

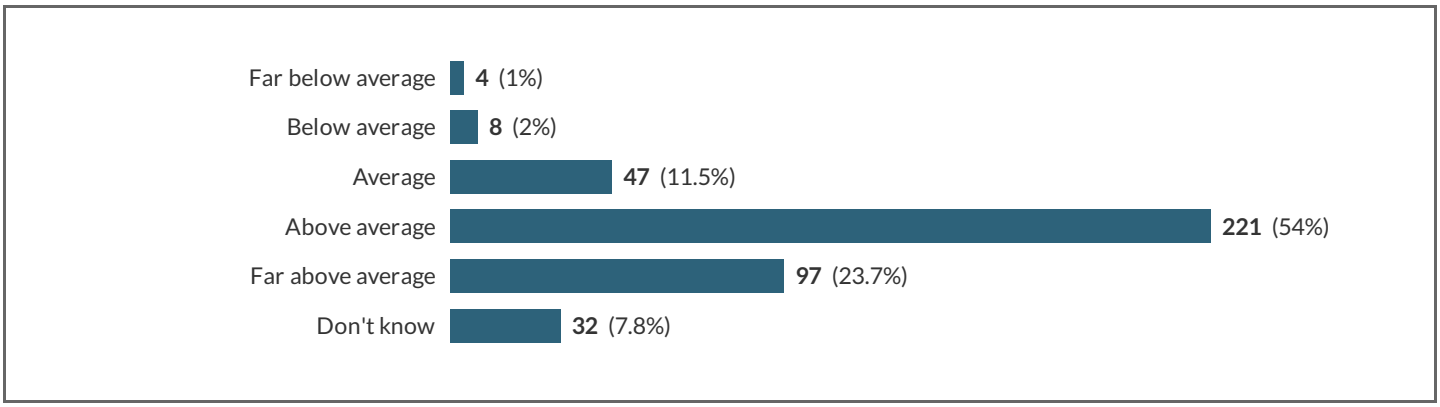


24.10 Complex numbers

24.10.a Complex numbers



26 Compared to other students, how well do you feel you are doing (or how well did you do) at university?


Far below average
4 (1%)
Below average
8 (2%)
Average
47 (11.5%)
Above average
221 (54%)
Far above average
97 (23.7%)
Don't know
32 (7.8%)

bos

IB Diploma Programme alumni survey

Showing 566 of 574 responses

Restricted to responses given from **1 Jun 2015** to **5 Oct 2015**

Hiding **23** questions

11 What did you like in particular about DP mathematics HL?

Showing all 480 responses	
I enjoyed the calculus parts in particular because they were interesting and fun to complete.	154407-154401-9347981
All of the different concepts	154407-154401-9347986
I liked the breadth of the curriculum, since it forced us to remember older topics in revision for the exam	154407-154401-9348001
Complex Numbers and Calculus	154407-154401-9347989
It covers a lot of areas of math, which helped me greatly in university	154407-154401-9348033
The depth to which we studied maths	154407-154401-9347966
The variety of topics.	154407-154401-9347995
I loved maths but my teacher ruined it for me. As did my sixth form college. Colchester Sixth Form College is a joke.	154407-154401-9348011
The calculus	154407-154401-9348122
Deeper understanding of math and proofs	154407-154401-9348067
Very engagin course, with very engaging problems overall	154407-154401-9348075
The challenging nature of the questions set	154407-154401-9348027
It covered a broad array of topics at a challenging level	154407-154401-9348090
I loved the breadth of the course. It allowed me to go into university with a better understanding of many different aspects of math, unlike AP calculus which only covers that one subject.	154407-154401-9348095
It is challenging but if you set your mind to it it is not overly complicated.	154407-154401-9348005
The emphasis on the use of the calculator in the calculator paper, the emphasis placed on statistics as a core component of the course and the use of the individual project, encouraging you to form links with real-life scenarios.	154407-154401-9348074
Challenging mathematics, especially liked the Calculus option.	154407-154401-9348134
Basic calculus	154407-154401-9348213
I thought the preparation for university in terms of calculus was excellent and the general	154407-154401-9348045

philosophy of the course - the formal proof-based approach - left me feeling like I understood concepts rather than just blindly applying methods.	
Strong focus on past papers	154407-154401-9348238
Small classes.	154407-154401-9348097
The internal assessment project. Learning calculus.	154407-154401-9348158
It was very challenging and I was pushed very hard	154407-154401-9348232
Being trusted to use solutions to help with my own learning while also being given the ability to choose topics that specifically draw my interest. I also enjoyed the variety of the course.	154407-154401-9348056
The course was really challenging and the questions in the final paper were thoughtful. It really sharpened my mathematical skills.	154407-154401-9348307
the constant challenge	154407-154401-9348093
The vast range of topics	154407-154401-9348234
The challenge.	154407-154401-9348244
Using a variety of methods to model or solve real-world problems, and seeing the interrelation of different mathematical branches	154407-154401-9348302
Competitive atmosphere and bonding due to small group	154407-154401-9348297
Many different fields of mathematics were covered, and options allowed integration with US AP programs. Also, the IA was thought-provoking and unlike other math projects.	154407-154401-9348299
covers a wide variety of topics. challenging	154407-154401-9348162
My teacher. Being able to work in small groups on complex stuff, and learning how there were practical applications of it. We integrated the surface area of a pan and found out it was already optimized for max volume at that surface area.	154407-154401-9348165
Differentiation	154407-154401-9348193
Challenging but not impossible	154407-154401-9348321
The range of topics	154407-154401-9348350
Nothing	154407-154401-9348399
It was very challenging and made the first 2 years of university very easy.	154407-154401-9348314
Complex numbers	154407-154401-9348081
I like the in depth analysis of multiple areas of math.	154407-154401-9348276
Outstanding preparation to starting engineering at university level	154407-154401-9348265
Learning a lot	154407-154401-9348325
Having such a broad range of topics; something that proved to be very useful in my university studies.	154407-154401-9348390
Fast pace, use of GDC	154407-154401-9348288
How easy it was.	154407-154401-9348410
The problem solving aspect.	154407-154401-9348289
i hate all the thing about it	154407-154401-9348145

I hate all the thing about it.	154407-154401-9348145
It was challenging but doable and also got me lots of college credit	154407-154401-9348425
Induction, proving different formulas and theorems, learn to Apply Maths in daily Life problems	154407-154401-9348413
Breadth and depth.	154407-154401-9348455
It really prepared me for college level calculus.	154407-154401-9348519
I liked the range of topics that the curriculum covered. The fact that I had knowledge of several different topics made expanding on them in college much easier.	154407-154401-9348433
The calculus option	154407-154401-9348544
Breadth and depth	154407-154401-9348602
Mathematical investigation paper was fun	154407-154401-9348587
Studying different interesting topics - the option we chose was Discrete Maths and I found that novel and interesting. Also exploring the other maths in interesting ways.	154407-154401-9348445
Challenging	154407-154401-9348201
Our teacher was great and of course, when you solve a difficult problem, it gives you some accomplishment. But math was never my prime objective or something to give me satisfaction.	154407-154401-9348514
There were lots of topics that I wouldn't have covered in an AP course e.g. imaginary numbers, stats, differential equations, and vectors. Going into a University, knowing these skills puts me ahead of lots of students.	154407-154401-9348635
The depth to which every topic is covered is amazing, and helps to broaden the mind.	154407-154401-9348722
Variety of topics.	154407-154401-9348593
The options are awesome, it's so cool that we got to learn about group theory!	154407-154401-9348611
calculus	154407-154401-9348549
You learn a lot about mathematics and it helps develop the way you reason.	154407-154401-9348240
I don't remember, but I do like that it was accepted as a first year calculus transfer credit at my university.	154407-154401-9348714
Nothing in particular but some topics were interesting.	154407-154401-9348753
I like the challenge of applying concepts to real life situations, and the community formed by classmates.	154407-154401-9348799
It addresses a very diverse set of topics in mathematics. My favorite topic was my option, Discrete math because this is a topic I enjoy and is difficult to find a course for anywhere else.	154407-154401-9348733
The exploration	154407-154401-9348856
Calculus	154407-154401-9348096
I love how the questions tackle real life application of mathematics.	154407-154401-9348167
Lessons went into a great detail of mathematics and constructs a strong base for uni, Subjects were varied and challenging.	154407-154401-9348852
The real-life application of many of the problems I was required to solve.	154407-154401-9348295
I was exposed to different areas of mathematics	154407-154401-9348926

I was exposed to different areas of mathematics.	154407-154401-9348936
The logical progression of topics and my wonderful teacher.	154407-154401-9348756
Challenging	154407-154401-9348998
It was very thorough for such a wide range of topics.	154407-154401-9349028
The rigor prepared me for my own studying in university in even higher levels of math.	154407-154401-9348879
The start of the program, calculus A, the problem solving aspect of the IA	154407-154401-9349015
differentiation and differential equations	154407-154401-9349014
Many questions were original or interesting; they weren't just repeated using different numbers.	154407-154401-9348827
How it allowed me to develop good problem solving skills.	154407-154401-9349051
I was challenged. My teacher was amazing.	154407-154401-9349022
Great perparation for university mathematics. Gave me a good boost for my engineering degree. I learned those topics in a smaller, high school classroom setting, and that helped make the concepts stick. I may have been a bit more lost in a university lecture if advanced topics like integration or complex numbers were introduced in a lecture hall of several hundred people.	154407-154401-9349050
Helping the SL and math Studies students, using a GDC, basic probability	154407-154401-9349011
The course was hard and that provoked my interest.	154407-154401-9349219
The projects had enough time for me to complete and understand why they are important.	154407-154401-9349222
The connections between different topics	154407-154401-9349228
The broad range of topics that were covered	154407-154401-9349223
It moved at a good pace and I didn't get bored.	154407-154401-9349325
I enjoyed the way the DP organized all of the topics and broke down the concepts.	154407-154401-9349209
The way it brought out the best in me by preparing me for the worst.	154407-154401-9349376
Challenging and rewarding	154407-154401-9349348
It made university math a lot easier because topics were repeated	154407-154401-9349377
Covers a wide breadth of material.	154407-154401-9349415
Great preparation for university, I am doing a chemistry major and I had to do multiple calculus courses that I succeeded easily thanks to the IB	154407-154401-9349398
I particularly enjoyed the calculus that appeared in mathematics HL	154407-154401-9348292
The option! Out of all topics in HL, "Sets, Relations and Groups" is the best and most useful preparation for my maths degree and in my opinion a great taster for what mathematics in university really is! Additionally when I did it, the investigation internal assessment (both the process and outcome) was challenging but rewarding and I consider that the best and my proudest piece of academic work in Maths HL. In terms of topics it has most stuff you need to prepare you for an engineering/science/maths degree but doesn't overburden you to cause you to neglect on other subjects as well, in my opinion.	154407-154401-9349478
Variety of topics; questions connected between topics; IAs and questions were challenging, interesting, and simulated tasks I've been faced with in the future	154407-154401-9349563

How certain questions required the use of knowledge from different units, thus requiring creative probleming solving.	154407-154401-9349634
Gets more into problem-solving than a typical math course; you have to apply skills instead of just practicing formulae. Good breadth of topics from a variety of areas.	154407-154401-9349685
The challenging coursework.	154407-154401-9349756
Probability and stats - it was our option and the teacher made it very enjoyable	154407-154401-9349551
the focus on number theory	154407-154401-9349495
The methodology used to teach the topics.	154407-154401-9349691
The relatively low grade boundary for a 7, which allows room for careless mistakes. I also liked the opportunity to choose your own option for paper 3. I also really liked the formula booklet, as it turns math from a subject that requires memorization to a subject that requires strategy.	154407-154401-9349696
The curriculum was arranged very well. I especially liked the inclusion of mathematical induction, a topic that most students are not introduced to until upper level college mathematics courses.	154407-154401-9348064
The statistics option was a great way to reinforce the core statistics content	154407-154401-9349740
A course which gives the possibility of exercising logic abilities.	154407-154401-9349283
Almost everything	154407-154401-9349723
The pace of the class and variety of topics	154407-154401-9349765
How there was a good overview of many calculus ideas/problems	154407-154401-9349886
Heavy Theory and Limits	154407-154401-9349879
Exposure to so many different topics. It really allowed my mathematical prowess to grow.	154407-154401-9349937
I was not taught the mathematics HL coursework for the options that the district chose for me. I was taught AP Calculus BC and my teacher taught us only that, and gave us an internal assessment and we did not know what was going to be on the test. Though, I did like that the material that showed up on the test was college level mathematics.	154407-154401-9349873
The challenge of having to figure things out on my own.	154407-154401-9349908
I loved the calculus aspects. The topics were well taught and very deep. Lessons were much more insightful due to the application of calculus to real life problems	154407-154401-9349995
I liked the higher level topic as well as the balance between linear algebra and calculus.	154407-154401-9349992
The breadth and depth of knowledge was very good	154407-154401-9350051
It challenged me more than any of my other HL classes.	154407-154401-9349960
Statistics	154407-154401-9350045
Nothing absolutely	154407-154401-9349837
Calculus Particular questions	154407-154401-9350065
I liked how we went in depth with regards to the various topics. It did not feel like just a superficial overview; we explored how it relates to real life, which led to a greater understanding.	154407-154401-9350105

Learning how to problem solve. This has helped me in many more classes in both high school and at university. Min mathematics HL, we were taught how to carefully consider the tools that we had and use them to solve a problem efficiently and correctly.	154407-154401-9350058
Depth in calculus	154407-154401-9350073
I liked being able to study a topic in-depth (in my case, calculus) for the paper 3 test, which is not part of the SL Math curriculum/test.	154407-154401-9350170
The broad body of knowledge gained throughout the course and its truly challenging nature	154407-154401-9349969
The range of important mathematical areas covered prepared me well for mathematical and statistical material at university level.	154407-154401-9350203
My particular likes about HL maths was specific to my school; great teacher, tiny class.	154407-154401-9350308
The range of topics that you study	154407-154401-9350282
Core Statistics	154407-154401-9349713
I liked the difficulty because it pushed me to improve my mathematical ability greatly	154407-154401-9350288
Taught us to think not just in terms of getting the correct answer, but in terms of why the answer was correct. Began a more rigorous inquiry of mathematics than what was available in other programmes.	154407-154401-9350247
It touched upon subject that typical highschool in my country did not discuss, such as plane intersection ect	154407-154401-9350303
The level of rigour and the spread of topics.	154407-154401-9350360
Challenging material in a variety of topics	154407-154401-9348800
Always thinking outside the box. Excellent Teacher	154407-154401-9350390
The statistics option was interesting.	154407-154401-9350391
The somewhat broad range of topics, including statistics and vectors as well as calculus, that introduced me to several key concepts I'm studying now for my engineering degree. Also having the third exam more than a week after the first two, which gave me more time to study.	154407-154401-9350398
The ability to explore a mathematical concept with complete freedom.	154407-154401-9350401
Being taught how to approach a problem, and understand the problem, rather than simply being given a 'recipe' to follow which would obtain the correct answer with little understanding required.	154407-154401-9350394
The topics covered, particularly in options were helpful for my engineering degree.	154407-154401-9350462
There was a wide range of topics in mathematics taught in the course. It was a fairly small group that did HL math as well so it was more personal.	154407-154401-9350419
it made me not learn but explore maths.	154407-154401-9350434
The small class of 17 people who are all driven and interested in math. The interactions with teacher and peers through out the courses are very enjoyable.	154407-154401-9350418
It was the first time I was taught matrix algebra actually, because all my previous teachers had skipped that topic although I've come to realize and matrices are very important in linear algebra and computer science.	154407-154401-9350416
My small class size allowed my teacher to be much more interactive with us as students and	154407-154401-9350431

spent lots of time discussing how various problems can be solved in different ways. Also, most of our class time was budgeted towards discussion of homework sets and exam problem practice, which prepared me more for the Exam.	
The breadth of subjects being explored	154407-154401-9350292
calsulus	154407-154401-9349018
Good Calculus and statistics programs	154407-154401-9350554
It teaches you how to study/ work hard; it challenges me; it interests me	154407-154401-9350567
the challenge and difficulty level	154407-154401-9350639
It was rigerous and got me ready for college	154407-154401-9350606
The teachers I had were amazing and made my experience in math what is probably my best experience of high school	154407-154401-9350677
The breadth of mathematics studied.	154407-154401-9350721
Developing the skills and ability to sincerely learn the meaning of content, rather than simply memorizing it.	154407-154401-9348393
Since I have entered university, I have found it extremely helpful to have been previously exposed to topics (such as vectors) covered in the DP mathematics HL curriculum.	154407-154401-9350682
good teacher, small class size	154407-154401-9350756
variety of topics	154407-154401-9350846
It gave me a great background in a lot of areas of mathematics. This made taking further math and physics courses at university much easier.	154407-154401-9350865
Gave a very good introduction into many different fields of math ie matrices vectors stats	154407-154401-9350851
Calculus was the most interesting topic of mathematics HL. The topic itself show you a totally different kind of mathematics from the one everyone learns up to that point.	154407-154401-9350908
By taking the course I was able to take my film class outside of the IB program.	154407-154401-9350884
Academic rigour and pace.	154407-154401-9350936
Covers a lot of topic	154407-154401-9350600
The teacher was great. I liked the challenge the HL math offered. I deeply enjoyed when math was visualized as graphs and pictures.	154407-154401-9351005
Exploring many different branches of mathematics.	154407-154401-9351125
Very rigorous and intellectually stimulating program. Even though I ended up studying in the humanities and social sciences and am now a law student, the course was beneficial to my education in that it required complex problem-solving skills.	154407-154401-9351110
inclusion of statistics, calculus, and proofs	154407-154401-9351062
I liked that it taught me new skills.	154407-154401-9348060
Basic calculus, series	154407-154401-9350465
The depth of the course compared to our national curriculum. Sadly many topics have now been removed or transfered to Further Mathematics	154407-154401-9351183
It wasn't like the simple textbook based math course. The questions we did actually had to	154407-154401-9351190

It wasn't like the simple textbook based math course. The questions we did actually had to make me think. Sometimes I had to combine multiple topics.	154407-154401-9351190
Real life applications of mathematical beauties	154407-154401-9348059
GDC	154407-154401-9351470
The challenge and the breadth of material covered	154407-154401-9351420
The projects are still some of my favorite math work completed to date after having done undergraduate studies in mathematics.	154407-154401-9351587
The projects and the options paper	154407-154401-9351610
hl topics are challenging	154407-154401-9351613
THE extent of THE option	154407-154401-9351619
I liked the interaction between HL Physics and HL Mathematics. They complemented each other perfectly.	154407-154401-9351742
Rigorous and challenging curriculum.	154407-154401-9351800
The amount of calculus (my teacher covered the Series and Differential Equations option). It came up repeatedly in my current studies - I am now a senior undergraduate physics major. The amount of statistics covered was also helpful. Overall, the best part was being pushed - it was the first time that I felt challenged in a math course, and I really benefited from it. I maintain that HL math is still the best course I've taken.	154407-154401-9351856
The teacher	154407-154401-9348124
Questions that place a "twist" on taught concepts	154407-154401-9351895
Fun problems to solve.	154407-154401-9351942
I liked the wide variety of different topics. The course was focused on applications and problem solving.	154407-154401-9351723
Calculus	154407-154401-9352022
idk our teacher was cool	154407-154401-9352051
It put me ahead in college math	154407-154401-9352067
The class was rather comfortable. Even as subjects grew difficult, the class functioned as one to keep everyone at an at least sufficient level of comprehension. The small size of the class also permitted for easy help with the more complex subjects and questions.	154407-154401-9351981
The different approaches to the same problem	154407-154401-9352122
Calculus	154407-154401-9352147
Vectors	154407-154401-9352135
I liked the variety of topics.	154407-154401-9349639
me gusto hacer la exploracion, por que tenia que buscar yo la informacion y tratarla, lo que me daba mayor autonomia a la hora de resolver las dudas y problemas.	154407-154401-9352149
Its comprehensiveness, depth and utility	154407-154401-9351605
Being in the hardest class that our high school had to offer gave me some sense of accomplishment.	154407-154401-9352322

The content that we learned was appropriate.	154407-154401-9352339
I had a great teacher who explained the concepts very well.	154407-154401-9351301
The independence and confidence gained from solving more advanced and interesting problems, and the fact that the material was taught without redundancy.	154407-154401-9352114
The questions at the end of the paper that actually made one think about the deeper concepts behind the problem. It was well-designed because it mixed two or more concepts too.	154407-154401-9352316
Complex numbers	154407-154401-9352350
Generally I enjoy mathematics and solving mathematical problems. My teacher was very good at showing us that maths can be fun and sometimes he gave us time to work around a set of problems ourself during which we could eat snacks etc. This set a very relaxing but productive athmosphere.	154407-154401-9352355
How well connected topics and modules were. it disappointed me that differential equations were not part of the syllabus, and i think if the chance was there, id have put vectors as an option topic and brought forward more core/pure maths into the main bulk ie. Maclaurin and taylor series that are in the calculus option. I wanted to take this topic, but could not, as our teacher chose for us to do decision instead, which i despise.	154407-154401-9352461
It was challenging, I liked the pace, and everything was explained well and made sense.	154407-154401-9350446
Real life applications of calculus	154407-154401-9352497
Covers a lot of topics. Ability to go deeper in options.	154407-154401-9351310
The breadth of mathematics that was covered. Also the real world applications and links to other subjects.	154407-154401-9352568
Internal Assessments. They presented real life cases, where we could use the knowledge acquired over years.	154407-154401-9352588
I liked how the complexity of the problems forced me to step back, analyze, and incorporate different mathematical areas, as opposed to blindly regurgitating formulas.	154407-154401-9352613
The variety of topics ensured that the course always remained fresh, challenging, thought-provoking and very interesting.	154407-154401-9352578
- Linear algebra (very useful foundation when I began learning to program in university) - Very rigorous calculus background	154407-154401-9352649
I like that it made college really easy (I'm an engineering major)	154407-154401-9352635
I like that they taught us differentiation and integration, which a very important topic in university	154407-154401-9352746
Learning and discovering new areas of maths e.g. calculus, complex numbers	154407-154401-9352758
It was rigorous and covered higher level topics	154407-154401-9352768
The wide breath of topics, and the self driven nature of portfolios	154407-154401-9350427
The fact that it covered a broad range of topic, which I could cover at my own pace.	154407-154401-9352849
I like how we learn a lot in a condense period of time. it helps in university!	154407-154401-9352857
It branched out into areas of math covered in 1st and 2nd year university. (Well our further DEs option did)	154407-154401-9349220

The wide range of mathematical topics covered and the emphasis on process, not answers.	154407-154401-9348528
integrated calculus and statistics	154407-154401-9352892
I really enjoyed topics such as calculus, and also calculus for my paper 3. I loved having the ability to work through past papers gradually as we covered more topics. I also really enjoyed the variety of calculator and non-calculator based questions.	154407-154401-9352819
The report one made as part of the assessment	154407-154401-9352962
I enjoyed the exposure to differential equations (for paper 3) as well as matrix and vector topics.	154407-154401-9353190
Math Portfolio	154407-154401-9353254
I liked some of the challenges, I used to really enjoy math before this class	154407-154401-9353252
The syllabus covers a wide range of topics.	154407-154401-9353294
It developed my skills to a level which enabled me to creatively solve mathematical problems and creatively think about real-life mathematical problems, rather than just use a particular method to solve a mathematics question.	154407-154401-9353296
I liked that we learned several methods of solving calculus problems and compared each method's efficiency to a particular problem. In addition, I loved the independence that the class gave me in solving my own math problems - especially in the Mathematics Exploration.	154407-154401-9353284
I liked the look at branches of Mathematics that I wouldn't usually get a chance to learn about.	154407-154401-9353331
I liked how it taught me to think differently, in unconventional ways.	154407-154401-9353330
I liked the multistep processes to answering questions in the papers. I also liked the acknowledgement of different strengths in the curriculum	154407-154401-9353325
The challenging structure	154407-154401-9353355
I like the scope and depth of the projects we had to complete.	154407-154401-9353376
I enjoy the complexity and problem solving, and being well ahead compared to other students in university.	154407-154401-9353323
I liked learning to solve multi-step problems.	154407-154401-9353385
The Internal Assignments	154407-154401-9353421
That concepts that were taught in my university were taught in HL. HL also introduced some form of formal mathematical proofs, such as mathematical induction.	154407-154401-9353424
A strong foundation in pure mathematics; encouragement to learn and think about different possible approaches and applications; formula booklet means tested material is not rote memorization but instead deeper concepts.	154407-154401-9353445
Very challenging	154407-154401-9353447
Great course encouraging students to think outside the box.	154407-154401-9353477
In terms of topics, I enjoyed learning about calculus, complex numbers. In terms of the course, I definitely enjoyed tackling problems from a unique and very different approach. I also really enjoyed learning all the new topics we covered and liked that we covered them in depth. HL Math was definitely a wonderful experience and a worthwhile challenging way to delve into my interest in mathematics.	154407-154401-9353465

Doing question banks Supportive and knowledgable teacher	154407-154401-9353425
The range of topics cover was very fascinating and focused more on building ability to utilize and manipulate equations for different situations rather than memorizing equation for particular functions	154407-154401-9353486
The freedom to use your own method and the great variety of material covered. Also the differential equation topic was interesting.	154407-154401-9353463
It was challenging, yet rewarding. It helped me immensely in my future studies of mathematics.	154407-154401-9353497
Discrete mathematics	154407-154401-9353518
Depth + introduction to a lot of different areas	154407-154401-9352798
Math HL is rigorous and intensive. The level of difficulty is good enough to cover most university intro math classes	154407-154401-9353530
Being able to study many different types of advanced mathematical topics.	154407-154401-9353531
Knowing more about the topic	154407-154401-9353545
New topics in a mature discussion	154407-154401-9350650
The cross-topic connections and the style of questioning. It wasn't a course solely based on asking questions from specific topics, but rather integrated many different topics together.	154407-154401-9353556
Our particular class had very few people	154407-154401-9353577
It was an intellectual challenge.	154407-154401-9353586
Differentials équations	154407-154401-9353595
I enjoyed the assignments.	154407-154401-9353458
I really enjoyed how we touched upon various topics of mathematics, and having a teacher who was really passionate about the subject further i	154407-154401-9353612
Vectors and matrices; Option: Sets, Relations and Groups; problem solving	154407-154401-9353616
I liked that there was an attempt to cover all the mathematics we have covered in high school.	154407-154401-9353657
Real life scenario based questions	154407-154401-9353452
I loved that it was such an independent class.	154407-154401-9352781
The freedom given in the classroom and the complexity of the problems.	154407-154401-9353688
Covers relevant material that has aided me in my university study.	154407-154401-9353723
It prepared me for University	154407-154401-9353879
work out	154407-154401-9353894
Breadth and depth of topics covered, including topics unique to the IB programme e.g. complex numbers	154407-154401-9350011
The project questions/problems were really interesting and I enjoyed solving them	154407-154401-9354186
I like the challenge the it offers students. I think that if taught correctly it could give one college credit, and they could really take a lot out.	154407-154401-9354214
Nothing really. More topics, more work, more home work, more papers!	154407-154401-9354135

I just liked how challenging the course was in general and the sense of achievement when i fully understood concepts (e.g. matrices and calculus). I only ended up with a grade of 4 but I was satisfied that I had passed and that i really managed to challenge myself enough in my final schooling year.	154407-154401-9355946
The collaborative environment I was in	154407-154401-9356676
The versatility of what the methods taught could be used for.	154407-154401-9356604
I liked the wide range and challenge of mathematics covered in the course.	154407-154401-9356618
The ability to choose a topic as an option, such as Calculus. The exploration was fun to do!	154407-154401-9356723
The IA- the ability to explore a topic of my choice in depth.	154407-154401-9357115
The courses ability to challenge students beyond their comfort zone	154407-154401-9355658
Very challenging, but completing it was rewarding.	154407-154401-9357781
When you can solve very difficult questions	154407-154401-9349803
The chance to develop your own methods	154407-154401-9358180
The problems were very interesting and the syllabus covered a broad range of topics such that it gave me the foundation necessary for university mathematics. Paper 1 does not allow the use of calculator so we had to learn how to solve problems by hand and not just rely on calculator completely.	154407-154401-9358188
How things were interconnected and that it was challenging and provided plenty of methods and "tools" for future math studies	154407-154401-9358862
How it encouraged me to connect the different topics to better understand mathematics as a cohesive unit. I went on to study bioengineering so being able to actually apply the methods I had learned has helped immensely.	154407-154401-9359305
It was a really interesting class where I could learn mathematics in a more abstract and interesting level	154407-154401-9359430
That it really covers a lot of depth in the topics it covers	154407-154401-9359438
Nothing in particular	154407-154401-9353722
I liked that many topics were covered, including some topics that were relevant in university, which gave me a huge advantage (eg. Complex numbers).	154407-154401-9359713
that everybody in the class were motivated, and that the focus was on problem solving and application, and not only learning how to do things from the black board	154407-154401-9353489
It was quite challenging but once I worked out how to solve the problems I quite enjoyed it.	154407-154401-9360134
It prepared me very well for university.	154407-154401-9360809
a lot of probability and statistics	154407-154401-9360974
Challenging	154407-154401-9361062
The option: it is a great way to explore a topic deeply.	154407-154401-9361090
The sheer amount of exploration, it prepared me well for my Mathematics Major at University	154407-154401-9361171
The math	154407-154401-9361562

The math.	154407-154401-9361563
Getting to know almost all areas of maths, even if mostly just on the surface	154407-154401-9361616
The challenging level of math that we had to do, which was beyond some first year university classes even	154407-154401-9361694
Comprehensive. Good teaching style.	154407-154401-9362061
The exploration aspect that was allowed in doing my internal assessments.	154407-154401-9362089
I enjoyed the connections between different topics. It was a great introduction to Further Math HL, and it made me think about how seemingly unrelated branches are intimately linked.	154407-154401-9362115
It touched on so many different areas in mathematics, but still at a very high level. I felt like it prepared me very well for higher level mathematics courses at university.	154407-154401-9362199
The variety of topics studied was excellent. It prepared me to at least be familiar with a variety of topics explored in greater detail during undergrad/university studies.	154407-154401-9362015
the different areas	154407-154401-9362548
Focus was on problem solving and learning, not on plugging numbers into equations and formulas.	154407-154401-9362568
I loved my option on statistics and probability.	154407-154401-9362716
calculus and vectors	154407-154401-9362719
Depth and breadth of study	154407-154401-9362778
The exploration I did in the Biological area using the mathematics	154407-154401-9362761
nothing.	154407-154401-9363232
optional topics: learn more so I know I still have much more to learn in the area of math	154407-154401-9363584
I liked that it covered a broad range of topics, and did not leave anything out. In addition, the HL options were covered in great depth and were of particular help in university. I liked how there were no repeated questions in the past papers, and so every single exam required actual knowledge not memorisation of the material.	154407-154401-9363653
The exposure to mathematical rigour and the small classes.	154407-154401-9363756
Calculus	154407-154401-9364186
The thing that I had to use creativity a lot in the process of solving exercises: some tasks had several different ways of how could they be solved	154407-154401-9364987
Internal Assessment	154407-154401-9366502
Our own reaearch project (IA)	154407-154401-9363892
I like that it consisted of calculus and statistics. It was a good combination. And I feel like it was different than what all of my classmates here at college did in high school.	154407-154401-9367516
The all-inclusiveness of subject matter	154407-154401-9368568
The final IB test did reflect my true ability in mathematics.	154407-154401-9370916
I liked that it was challenging. I had never been challenged by math so much before.	154407-154401-9370780
The option:Set, Relations and Groups	154407-154401-9371961

I've compared my mathematics HL experience with people I've met in college who took other advanced math classes. What set IB apart is that the curriculum covers a diverse range of maths, while some of my counterparts are only proficient in one area. I believe that this approach is more beneficial because it imbues a "big picture" approach to learning concepts, and facilitates connection between them. For example, learning standard distributions shortly after learning integration helped me to connect the concepts easily, for better comprehension.	154407-154401-9372136
How all-encompassing it was	154407-154401-9372522
Mathematics HL surveyed many topics in mathematics and students were exposed to many different ideas that would not have been found in an AP Calculus course.	154407-154401-9372603
The particular aspect of DP mathematics HL that I liked was the content which was covered which helped me in my undergraduate studies i.e in Engineering	154407-154401-9372697
- Understanding concepts using more than one topic/approach e.g. matrices and vectors to describe graphical transformations - Very much enjoyed the Group theory Option topic, interesting to explore some pure maths	154407-154401-9372853
The problem solving aspect.	154407-154401-9374068
Most interesting, and also most useful exercises were the mathematical investigations included in the diploma. I strongly encourage keeping these in the syllabus. Although experiments are abundant throughout the DP subjects, a mathematical investigation is of an utmost importance as it teaches the student with a set of skills not provided in the other subjects.	154407-154401-9374355
I was able to build a strong foundation for my engineering degrees.	154407-154401-9381833
The statistics and probability option	154407-154401-9382968
The way it challenged me	154407-154401-9382979
The challenge due to the difficulty of the course	154407-154401-9383984
I liked that is was really challenging. I also liked that it combined lots of different math topics into once course.	154407-154401-9384084
Set theory.	154407-154401-9384249
The level of problems and how they made me look up for a solution connecting different topics	154407-154401-9384359
Option paper	154407-154401-9384417
Focus on both, GDC and non-GDC parts. I believe it is an absolute necessity to work, tackle and ellaborate mathematical problems without the aid of technology (calculators) at first, in order to gain a profound understanding of the situation and mathematical questions arising. Once having understood the logics, I am certain that technology (calculators) can facilitate the process of solving, help to save time and calculate solutions to ever more complex problems.	154407-154401-9384618
Trigonometry proofs	154407-154401-9392393
Mostly the rigour; a lot of concepts that were previously covered were explored at a theoretical level which made it more interesting and increased my respect for topics.	154407-154401-9392640
Integration	154407-154401-9392654
Closely knit math community	154407-154401-9392670

Closely knit math community	154407-154401-9392[illegible]
Details to topics in options like Statistics	154407-154401-9392768
everything	154407-154401-9392773
working with others to tackle a difficult problem	154407-154401-9392784
I liked that we were encouraged to learn as much mathematics as we could. Ranging from calculus to statistics. I liked that we were challenged every week with a new topic that seemed to have a wide variety of applications in physics and other sciences, including social sciences.	154407-154401-9392756
The curriculum, that we can choose optional topic to study.	154407-154401-9392809
My teacher was fantastic and I loved learning the new concepts.	154407-154401-9392780
I enjoy mathematics a lot and so what I liked the most is the variety of topics we learned, from essential chapters for the future such as calculus, to interesting chapters such as complex numbers.	154407-154401-9392766
Doing the portfolio was a very good thing. My favourite topics in general were integral and differential calculus.	154407-154401-9392838
It provides you with intense math knowledge and experience	154407-154401-9392840
Rigour and broad range of material	154407-154401-9392857
I liked the opportunity to do a personal exploration on any mathematical topic.	154407-154401-9392805
Learning how to integrate different topics	154407-154401-9392839
Can't say many people really liked HL Maths, rather it was seen as a means to an end. I like how it has helped me reach my current position as a second-year engineering student. I would however compliment the internal assessment which forces students to see how mathematics affects everything around them, and isn't just useful for solving a particular problem put in front of them.	154407-154401-9392818
It's practical	154407-154401-9392906
The breadth of topics and how the syllabus pushed through basics into complex applications of eg differentiation	154407-154401-9392757
The depth of calculus covered	154407-154401-9392941
I liked how HL Math challenged me to use a variety of different mathematics tools to solve problems.	154407-154401-9392979
Style of questions is nice and challenging. Much of the syllabus is really interesting (e.g. complex numbers)	154407-154401-9393029
Sampling different areas of mathematics allowed me to see my strengths/interests and weaknesses/disinterests.	154407-154401-9393072
My teacher	154407-154401-9393123
the optional topics	154407-154401-9393202
The level of difficulty and rigour required to fully understand the more challenging questions. I like the broad number of topics and how in-depth the topics go and the emphasis on connecting all the different areas of maths together.	154407-154401-9393241
I liked the fact that there were many different topics that we had already learned so there was plenty of review.	154407-154401-9393264

The challenge	154407-154401-9393302
The variety in problems and types of math that could be covered.	154407-154401-9393253
not many tests	154407-154401-9393346
The Options of Discrete Mathematics.	154407-154401-9393093
Developed problem solving skills that really tested your understanding, rather than simple applications of formulae	154407-154401-9393320
It prepared me for university-level math much better than my colleagues who only took AP math.	154407-154401-9393564
versatility to solve problems	154407-154401-9393568
Calculus	154407-154401-9393681
My instructor because she was patient.	154407-154401-9393704
I liked the breadth of material that was covered.	154407-154401-9393708
The breadth and depth of the course.	154407-154401-9393727
It gave a varied and broad course.	154407-154401-9393729
Everything	154407-154401-9393747
The breadth of the topics	154407-154401-9393718
challenged me the most out of all my subjects	154407-154401-9393803
I liked the new problem solving strategies that we learned and the calculus.	154407-154401-9394016
to do a report with any topic we like	154407-154401-9394074
1. Lots of emphasis on proofs and derivations 2. Very deep coverage of probability and statistics 3. Creative questions involving real-life problem solving 4. The group theory option - I didn't use it in industrial engineering but found it really fun	154407-154401-9394083
I enjoyed the flexibility in topics and the way that it brought in many different ideas together. I enjoyed how we were able to go both in depth as well as in width, and how there was some amount of freedom in terms of the mathematics that we were able to study. I also appreciated the problem styles (as compared to the AP tests), which were more based on proof and understanding than pure calculation.	154407-154401-9394131
Calculus, in all levels.	154407-154401-9394153
It exposed me to a lot of different areas of mathematics, taught me better problem-solving skills, and was generally interesting and enjoyable.	154407-154401-9394178
The internal projects and wide range of topics covered	154407-154401-9394179
I liked the challenging aspects of mathematics HL and knowing more advanced concepts.	154407-154401-9394191
covers university maths	154407-154401-9394266
The curriculum really made you think about the problems, and I loved going through the puzzle of solving them. I also enjoyed that there was an option topic, and I liked the format of the questions in different parts.	154407-154401-9394262
How stretching and engaging it was in comparison to my other subjects.	154407-154401-9394288

The variety of topics offered in mathematical parlance.	154407-154401-9394295
It allowed freedom to choose whatever method a student was comfortable with.	154407-154401-9394562
I enjoyed maths, and i enjoyed challenging questions	154407-154401-9394572
The option was really stimulating and the proofs were rather interesting to solve.	154407-154401-9394832
The small classroom and using different "tools" to solve problems	154407-154401-9395585
The use of common and natural logarithms	154407-154401-9395712
El trabajo de Angie y Buddy. Disfruté como nunca hasta entonces en matemáticas	154407-154401-9396128
There was a variety of topics that were challenging.	154407-154401-9396745
I liked that it wasn't just geared towards one subject area. Taking geometry and trigonometry in Years 9 and 10, you weren't really allowed to see the other aspects of mathematics and see how they were related to one another, not only through technique but also through similar mathematical concepts.	154407-154401-9396819
Learning new methods to solve problems, specifically, methods that are better than or make up for a lack of algebraic methods.	154407-154401-9397136
Maths IA The fact that there were many approaches/ methods possible for most questions	154407-154401-9397206
Calculus	154407-154401-9397203
The opportunity to solve problems by yourself.	154407-154401-9397323
The Math portfolios	154407-154401-9397656
Math is awesome. Getting the pieces to fit together and understand the big picture is fantastic; learning how to apply difficult mathematics to other academic/real life problems feels like unlocking a whole new chapter of life, or like removing a veil from your face. I used to be an above-average math student that just did well in math, Before IB HL Mathematics, I had done AP Calculus AB/BC, and my entire paradigm changed. IB HL Mathematics helped me mature as a mathematician, and I had some great students alongside me to help me along the way. Eventually, I was even able to help other students! I think IB HL Mathematics is on the right track theoretically--it covers a healthy amount of important topics that are critical to success in university (and I think the entire IB Mathematics program is unmatched by any other advanced high school program in math... at least any program that does not incorporate college courses). If a few changes are enacted, then it will be about perfect.	154407-154401-9398576
I liked the development of calculus beyond simple differentials, and in particular the unit which explored infinite sequences and series	154407-154401-9396009
It was a very in depth treatment of various topics, not focusing just on the calculus track as many high school math programs do. I particularly loved the discrete mathematics option.	154407-154401-9398718
Variety of studied subjects	154407-154401-9398843
Approach	154407-154401-9399450
I absolutely hated every moment of it except for binomial theorem	154407-154401-9399162
Improved problem solving skills and thinking outside the box for certain questions	154407-154401-9400425

Challenging and engaging math. Still use much of what I learned and explored in second year engineering. It was fun to study so much math.	154407-154401-9400582
The rigor of the course and depth in mathematics topics covered compared to other mathematics courses.	154407-154401-9406097
Portfolios were great for exploration. It would've been nicer if we had more time for them or knew about computational tools (code/scripting) to explore further.	154407-154401-9406135
The program encouaraged open thought processes and taught multiple ways to solve the same problems. Focused a lot on real life applications to demonstrate the relevance of the material we were being taught.	154407-154401-9406217
I had statistics as my elective, and i think that was the most interesting part in the entire subject.	154407-154401-9406216
I enjoyed the fact that it was so challenging! I loved problem solving and working with others	154407-154401-9406255
The breadth and depth of topics we were able to explore. My teacher had us discuss Discrete Math at one point, which I have not used again even as an engineering major at a well-known engineering school. I also really liked proofs and IA's a chance to discover something on your own and relate it to a real problem. I still think about what I learned from the IA about the optimal design for an arch, even 4 years later	154407-154401-9406487
The material is applicable to many different fields in University.	154407-154401-9406738
Breath of topics covered.	154407-154401-9406678
I loved my teacher. There should be more HL mathematics teachers that care about their students.	154407-154401-9406886
Mathematics Exploration and the additional option to learn further subjects in depth.	154407-154401-9407120
Breadth of curriculum, challenging curriculum	154407-154401-9406071
Range of topics	154407-154401-9407496
Challenging, diverse	154407-154401-9407527
It's the only really challenging course in IB. It's not that the other classes are easy, but Maths HL really makes you think instead of doing repetitive work.	154407-154401-9407779
My teacher was clear and concise and always very helpful!	154407-154401-9408147
The depth in which we studied topics.	154407-154401-9408316
It was a very well taught class that fully explained complex mathematical concepts.	154407-154401-9408360
The novelty of the problems and the creativity often required to solve them.	154407-154401-9408503
It was for me a very challenging course however, it prepares you really well for University. It was the toughest course but I liked it.	154407-154401-9408619
I liked the application of calculus techniques and problem solving, as well as the ability to choose which questions we wanted to answer.	154407-154401-9408655
Its fast pace	154407-154401-9409429
The set up of the problems, the complexity of many problems. The method of grading based on points for method of each part. The subjects.	154407-154401-9409488
The fact that it prepared me well for my degree at university	154407-154401-9409513

interesting topics.	154407-154401-9409516
Wide range of topic coverage	154407-154401-9409758
Calculus background alongside the calc option.	154407-154401-9409962
it was always challenging in an interesting way	154407-154401-9410224
complex numbers and matrix	154407-154401-9410343
Topics that it covers, different methods for approaching a problem.	154407-154401-9410396
I liked the exposure to more complex math than I was used to.	154407-154401-9410427
Variety	154407-154401-9410044
Consist a lot of essential topics for future studies.	154407-154401-9410538
challenging, very interesting topics	154407-154401-9410669
Being able to do extra topics that were not taught in our country's curriculum (particularly further complex numbers, integration techniques and the series and differential equations option topic - now called calculus?)	154407-154401-9414038
The structure the course had made it a fairly manageable course	154407-154401-9414314
Systematic approaches and utilising various methods to solve a problem	154407-154401-9414678
That I had to do some kind of project in which I had to deal with real situations provided by the IB, and to do that I had to use a little bit my imagination (for instance, in my year this project was related to two cars that had to travel the same length, one of those drivers wanted to save a little bit of money buying fuel in a different station that wasn't on the way to the place he was driving to...).	154407-154401-9415173
Now, at the University, I study topics I have already seen on DP mathematics HL.	154407-154401-9416872
The long projects were the most interesting and different aspects.	154407-154401-9416950
I liked the challenging aspects and the topics covered.	154407-154401-9418028
Interesting variety of topics presented.	154407-154401-9418723
The broad approach	154407-154401-9419575
The extension topics (I completed Series and Differential Equations)	154407-154401-9419729
I really like the challenging problems and that every topic had its application	154407-154401-9419683
Rigorous	154407-154401-9419886
It was challenging and had many interesting problems. I could see my progress throughout the course.	154407-154401-9419930
The abstraction of the sets option	154407-154401-9419937
It was a challenge. Wide arrange of topics studied.	154407-154401-9424706
I liked the range of topics covered.	154407-154401-9425742
really enjoyed the modelling of real life scenarios for coursework	154407-154401-9430448
The challenge of the problems and the allowance of mutliple methodologies that could be used for solving out problems.	154407-154401-9434482

I liked the broad range of topics. For example, having studied probability distribution functions the normalization of a probability distribution function is a topic I am encountering when deriving Schrodinger's equation in Chemistry. I also liked that all people in class were interested in the subject and for that I appreciate the opportunity IB gives to choose subjects.	154407-154401-9434689
Everything, except for the newly restructured Internal Assessment (2014 version)	154407-154401-9437742
I liked the way differential equations were studied.	154407-154401-9444311
The math portfolios. It challenged me to think and also showed my how higher level math is used in real life situations. My math portfolio was about the probability of winning in a casino game, and I learned alot about how math is used in this industry.	154407-154401-9444618
Well organized	154407-154401-9450290
The way of thinking such as all the abstraction and the abilities that I learnt during the course. Also, the understanding of the reason being of everything when learning the bases and proofs.	154407-154401-9450314
very good preparation for university calculus, statistics, and other maths courses	154407-154401-9450640
thought me to never give up or get discouraged. and that numbers are only numbers, they dont reflect on your personality. You can be smart and still not do so well in HL Math, because even the smartest people fail at that.	154407-154401-9471137
The challenge.	154407-154401-9486485
The pace and variety of the program, though the material still managed to be cohesive.	154407-154401-9488697
The questions that come up on the exam paper are less predictable than in other exam boards, making it a fairer test of ability.	154407-154401-9500831
Questions divided into many steps	154407-154401-9513187
Being exposed to new and interesting areas of mathematics.	154407-154401-9530379
Broad view of Mathematics compared to the National Curriculum.	154407-154401-9530776

12 What did you dislike in particular about DP mathematics HL?

Showing all 460 responses	
i never fully understood how to represent a plane with vectors and matrices so I disliked that.	154407-154401-9347981
A little too hard HL exam and that universities don't give much credit for it.	154407-154401-9347986
The professor was terrible. The students cared more about learning than the professor cared to teach.	154407-154401-9347994
I disliked the extreme difficulty of the exam in comparison to the AP Calculus BC test.	154407-154401-9348001
The inconsitancy with other typical high school calculus curricula. Reaching university and having a different understanding and knowledge of calculus makes the first few weeks of courses considerably difficult.	154407-154401-9347990
Probability and Statistics	154407-154401-9347989
my school delivered the material in a way that all of the options were taught in the last 1 month of study, which made the study much more difficult.	154407-154401-9348033

The pressure - I was very aware that doing badly in HL maths could drag my total points down very easily	154407-154401-9347966
The problems are too mechanic, i.e. you only have to use a formula to solve it.	154407-154401-9347995
I was never taught WHY, only HOW. I like to know why things work, why a certain equation or formula is used and that wasn't taught to me. Instead from day one I was encouraged to quit the IB and never study maths despite receiving high grades at GCSE and early AS Level.	154407-154401-9348011
Stats	154407-154401-9348122
My teacher is the one who chose our option topic, as we the students were not given the choice. The topic in particular, which was Sets, Relations, and Groups, was disliked by the whole class, which ultimately led to a low average score in the final IB grade.	154407-154401-9348018
None	154407-154401-9348067
Sometimes problems were too far ahead of the level, however this led to a better understanding	154407-154401-9348075
The fact that the syllabus did not contain any mechanics	154407-154401-9348027
It was far too difficult. I felt extremely disillusioned and disadvantaged through doing the course in comparison to my a level peers. I believe it costed me university offers because the level of difficulty is misunderstood by those outside of IB	154407-154401-9348090
The Mathematical Exploration (the IA) was incredibly difficult to understand. I know that we were the first year to complete that form of the IA, but there were no clear guidelines or examples. It felt like we were being set up for failure.	154407-154401-9348095
The option I did, differential equations, I don't think there was a good introduction to that. Taylor series is a different approach to estimate functions but it was quite difficult for us to comprehend back then.	154407-154401-9348005
The Calculus optional course was horrendously difficult. When seeking a tutor it took a 3rd year Physics Student to be confident enough to try and help me get my head round some of the concepts in the course. Despite spending a great deal of time trying to get to grips with this area of the course I really struggled to score any points in the paper. I understood most of the theory but the questions made it difficult to apply the theory straight-forwardly.	154407-154401-9348074
Took up a lot of time.	154407-154401-9348134
Statistics and May 2015 Paper 2 Exam	154407-154401-9348213
I am doing Physics at university. I think there is a big gap in HL maths for mechanics - whilst I am ahead of my peers in many areas of maths, I found myself significantly behind those who did A-Levels in mechanics e.g. equations of motion, vectors, inertia etc.	154407-154401-9348045
Textbooks were not very exam-orientated	154407-154401-9348238
To much discussion. Mathematics is all about practice and learning on examples and I was lacking this at IB.	154407-154401-9348097
Statistics. In general, feeling like a failure at math because it was too difficult at the HL level.	154407-154401-9348158
I thought there was a lot of material being crammed in to the two years and with a different teacher I don't think we would have finished the syllabus on time.	154407-154401-9348232
The lack of matrices is an issue for me, and was specifically a problem as I needed to self study the topic for external exams such as the SAT in addition to the HL math course content.	154407-154401-9348056

The course can be a bit inaccesible for students who are not great in Math but who need a Math HL diploma to continue with their studies.	154407-154401-9348307
the really really tough questions which always gave me the feeling I could never manage to tackle them	154407-154401-9348093
the twisted questions which sometimes even our teachers would take time to solve	154407-154401-9348234
IAs were troublesome.	154407-154401-9348244
I'm not a big fan of statistics and dealing with data.	154407-154401-9348302
Harder course with no significant reward	154407-154401-9348297
Nothing in particular comes to mind. It is a particularly hard course, but I wouldn't want it to be easier.	154407-154401-9348299
too difficult. vague.	154407-154401-9348162
There's not enough time for any free exploration you theoretically want us to do, and those reporty things made no sense at all.	154407-154401-9348165
Statistics	154407-154401-9348193
the internal assessment	154407-154401-9348350
Our teacher was awful so we had to do everything ourselves and we rushed through the course.	154407-154401-9348399
It is a program that doesn't allow for different methods or choices in topics	154407-154401-9348314
Probability	154407-154401-9348081
Time limits, not everyone works at the same pace.	154407-154401-9348276
Not enough linear algebra and matrix manipulation	154407-154401-9348265
Work load and difficulty level	154407-154401-9348325
Proving	154407-154401-9348390
How badly it prepared you for university and real life mathematics.	154407-154401-9348410
The amount of content needed to cover towards the end of the course.	154407-154401-9348289
all	154407-154401-9348145
It was tough switching from European notation to American notation when I got to college	154407-154401-9348425
Statics	154407-154401-9348413
Could have covered more (I.e as much as a A-Level Further Mathematics).	154407-154401-9348455
I am not sure it was taught well. The book we used was very confusing, and the problems were difficult to understand.	154407-154401-9348519
I did not like how participation was graded in the online course. Often, it was difficult to find the time to participate in all the lessons.	154407-154401-9348433
Sometimes too rushed, didn't like statistics/complex numbers.	154407-154401-9348602
Did not like how the curriculum jumped everywhere and was not an in depth focus on any topic	154407-154401-9348587

There was a LOT to learn and in particular with the calculator paper I felt it was unfair on people who didn't know the best ways to use the calculator to make the questions easy - our teachers didn't know the tricks and we had to discover them ourselves, the IB should include it in their textbooks.	154407-154401-9348445
Hard	154407-154401-9348201
I have little to complain about. Though in my further studies, I wondered if I ever did differential calculus before. I'm not sure if this was covered in Math HL.	154407-154401-9348514
Our class did the optional calculus topic. It would be nice if that calculus topic became mandatory as part of the mandatory calculus topic and we could learn even more on top of that.	154407-154401-9348635
Breadth-wise, it is not super extensive. Perhaps 2 options to study should be considered.	154407-154401-9348722
The IA's were quite open ended on the maximum length that would be accepted. Perhaps, capping a certain level would improve quality of reports.	154407-154401-9348593
No matrixes. We could have done at least a little bit.	154407-154401-9348611
Lack of hyperbolic trig functions, exploration (IA)	154407-154401-9348549
The amount of exercises you have to complete in the given time frame in the exam can be quite difficult. The fact that you are not allowed a calculator in the first paper can make you lose valuable time during the exam.	154407-154401-9348240
It was probably hard, but it was doable.	154407-154401-9348714
Too difficult, too much time taken to learn the subject. Especially the Math Exploration. Too much extra stuff. Not all Mathematics HL students were passionate about Maths.	154407-154401-9348753
Nothing in particular.	154407-154401-9348799
There is not enough time to finish the exam papers and check them.	154407-154401-9348733
Sets as the option	154407-154401-9348856
Difficulty of exam questions	154407-154401-9348096
Certain topics are quite heavy, and took me lots of effort to learn it completely.	154407-154401-9348167
The amount of repetition that is required to internalize the lessons.	154407-154401-9348852
The nature of the exploration.	154407-154401-9348295
It was really discouraging. I thought I was decent in math, but after taking the course, I realized I knew very little.	154407-154401-9348936
The accelerated pace and difficulty of the topic made it difficult to guage my success during a testing situation.	154407-154401-9348756
Too mathematics oriented - not made for future economists, businessmen, scientists	154407-154401-9348998
It did not line up with the college curriculum so there were some concepts I had to learn on my own beforehand to catch up.	154407-154401-9349028
Too heavy focus on differential equations or obscure math university focuses too little on.	154407-154401-9348879
The large amount that felt like "teaching yourself"	154407-154401-9349015
too much demostration, someones inecessaries	154407-154401-9349014

The internal assessment task (exploration) is very vaguely defined and I had much trouble understanding what I was supposed to do.	154407-154401-9348827
The internal assessments.	154407-154401-9349051
I felt like it was too much information crammed in a small amount of time.	154407-154401-9349022
Very little treatment of geometry. In engineering disciplines like mine where spatial reasoning is important, the IB program left me quite weak in that area. Also, the statistics aspect was quite rushed, but that may have been due to my school administration falling behind on their teaching schedule, not a function of the curriculum.	154407-154401-9349050
The whole of paper 3,	154407-154401-9349011
Nothing. Just loved doing math!	154407-154401-9349219
The immense amount of topics covered, it was overwhelming and I could not handle all the concepts properly.	154407-154401-9349222
The expected level of sophistication of IA is too high and it took a lot of efforts trying to come up with the right topic.	154407-154401-9349228
The original style of exam questions	154407-154401-9349223
We didn't cover vectors until the very end.	154407-154401-9349325
I disliked the overwhelming number of concepts and lack of solid connection between some concepts.	154407-154401-9349209
No	154407-154401-9349376
feeling "rushed" / wanting more time to show what i know	154407-154401-9349348
Way too hard for high school. Discouraging. It made me want to not study math. Coming to university, I decided to take a few math courses which reignited my passion and now I'm pursuing a math minor.	154407-154401-9349377
Insufficient detail with regards to multivariable calculus and differential equations, connections between options topics not made, insufficient preparation for my chosen course of study in university.	154407-154401-9349415
I thought the statistics part was much more basic than the rest	154407-154401-9348292
Nothing!	154407-154401-9349478
I'm doing a chemistry degree at university in UK. I've noticed that students doing the further maths A level do more modules than what I did in the HL programme offered in 2013 (eg Taylor series and differential equations). Instead of having one long option, the options can be broken up to shorter options so students can explore a variety of different mathematical areas.	154407-154401-9349474
Felt the rigor was a little underwhelming - should go more in-depth when covering topics	154407-154401-9349685
Nothing.	154407-154401-9349756
The little information we had about our IA. I know it was new to our year so there wasnt much available, so it's not too bothersome	154407-154401-9349551
nothing	154407-154401-9349495
The amount of formulas we need to differentiate.	154407-154401-9349691
I dislike the fact that 7 mark questions tend to be harder than 8 mark questions. It does not	154407-154401-9349694

I dislike the fact that 7 mark questions tend to be harder than 8 mark questions. It does not make sense.	154407-154401-9349898
I thought the curriculum was very good; my only difficulty with the course was that I was the only student in my school enrolled in mathematics HL, making it difficult to collaborate/work outside of the classroom.	154407-154401-9348064
The exam was very difficult and the grade boundaries for my year group shifted, meaning I just missed out on a 7 which was annoying. There were just so many concepts to practice.	154407-154401-9349740
nothing specific.	154407-154401-9349283
I dislike the fact that the IB has removed matrices from the core syllabus. This topic is not only important for those who want to study computer science, but it's also important to understand some vector operations (such as cross product for example). Matrices should either be part of the core, or should be presented as an option.	154407-154401-9349723
The exam was incredibly difficult	154407-154401-9349765
Complex numbers and vectors	154407-154401-9349886
Statistics	154407-154401-9349879
I think there was too much emphasis on some basic stuff and not enough, or even at all, emphasis on more complicated topics.	154407-154401-9349937
I was not taught the mathematics HL coursework for the options that the district chose for me. I was taught AP Calculus BC and my teacher taught us only that, and gave us an internal assessment and we did not know what was going to be on the test. I was not properly taught in this subject area.	154407-154401-9349873
It was very difficult and stressful.	154407-154401-9349908
Statisitics	154407-154401-9349995
I think we should have been taught eigenvalues and eigenvectors. It's a very important concept.	154407-154401-9349992
I think that the options available were not well-suited to earn university credit. The only useful one was series and differential equations, as it would have helped me earn more credit for maths at university, but we chose discrete maths, which was somewhat interesting, but useful only to those pursuing maths as a university major.	154407-154401-9350051
I wish that I could've prepared for the tests better. None of the practices were even close to the exam.	154407-154401-9349960
Complex calculus and problems	154407-154401-9350045
Everything, the questions of exams , the question bank etc.	154407-154401-9349837
I did not feel like the written IA really encouraged a deep level of math. I would've preferred problem sets.	154407-154401-9350105
We went over a lot of topics and don't not delve particularly deeply into any of them. I would have liked more class time on differential equations, as these problems have countless applications to real life problems.	154407-154401-9350058
Internal assessment topic selection	154407-154401-9350073
TIme given for the exams/tests. If only I had 15 minues more, I would surely got 7, instead of 6.	154407-154401-9350164
The complexity of some of the question were at levels which are beyond those seen at university courses focusing on mathematics	154407-154401-9349969

university courses focusing on mathematics	
The topic on vectors was difficult to follow and intuitively most difficult to grasp.	154407-154401-9350203
I did not like how quickly we needed to move through the material to cover everything on the test. I felt I was only getting a cursory knowledge of some topics.	154407-154401-9350308
I think I was still immature at the time to apply myself fully. Maybe more preparation on how to tackle such a subject.	154407-154401-9350282
Proofs and purely theoretical stuff	154407-154401-9349713
The IA was not fun at all.	154407-154401-9350288
More focus on proofs as opposed to calculation or memorisation would have been a better preparation for university-level maths.	154407-154401-9350247
How the topica were taught. There was little undestanding of the theory behind excercises. We were in a qay driven to learn how to mechanically learn how to solve problem rathen than undestanding the resoning behaind the method.	154407-154401-9350303
We in England are not used to thinking in an IB style and so the jump from GCSE to IB level mathematics proved very challenging. Developing the right style of thinking seemed very challenging.	154407-154401-9350360
Sometimes too much work.	154407-154401-9348800
Frustrating at times.	154407-154401-9350390
The course work was badly marked and taught.	154407-154401-9350391
I wish my class in particular had gone over convergence tests of series more, but that's more with my individual class than the program itself.	154407-154401-9350398
The course itself, nothing. It should be emphasized at IB Trainings that mathematics teachers need to teach and show students how these tests are graded, and have them grade their own practice tests. By doing this, I was able to understand much more of my test than I would have without it.	154407-154401-9350401
The time allocated to more challenging topics was not much greater than the time spent covering less challenging topics; I felt more time should have been spent on the difficult material.	154407-154401-9350394
Few opportunities independent work.	154407-154401-9350419
the curriculum is not chosen by us. For ex, I was not able to choose my option at the exam and we didnt learn those topics. If I was able to choose it myself I would choose something we have had studied during the class.	154407-154401-9350434
The course content was too concentrated in the last term. The same course content should be spread out more.	154407-154401-9350418
Honestly I got nothing out of the IAs. I wish they were more like university upper division math proofs, so that they would actually be preparing us for something.	154407-154401-9350416
Many of the topics covered are either unnecessary (basic algebra concepts), or half-baked (statistics is a difficult concept to understand if you haven't had a formal course in it, and the way HL is structured the curriculum any statistics taught are more advanced than some students are capable of understanding). There is also a very broad coverage of topics, some of which are barely introduced before moving onto the next subject. Also, especially for students who plan to pursue collegiate studies in engineering, a higher emphasis on technology in the course would be extremely useful (e.g. an introduction to computer algebra systems like	154407-154401-9350431

MATLAB or Mathematica).	
The teaching at my school not being sufficiently supportive of my interest in the subject.	154407-154401-9350292
stat	154407-154401-9349018
Proofs are done rather poorly. Not formal enough	154407-154401-9350554
We did not have enough time to cover everything/ some things we just had to learn ourselves and I wish we had time to cover them in class (in more detail)	154407-154401-9350567
the amount of topics - too many topics allowed us to dive deep into none of them	154407-154401-9350639
The difficulty of the test compared to the SL.	154407-154401-9350606
The approachability. There was no real 'easing in' period beyond the prior learning.	154407-154401-9350721
The lack of direction for the Internal Assessment. The guidelines were unclear on what was needed to be successful in the IA.	154407-154401-9348393
I disliked the vague grading criteria for the Internal Assesment.	154407-154401-9350682
the level of difficulty	154407-154401-9350756
math ia guidelines are very vague	154407-154401-9350846
It was hard to correlate what we learned with what other students in the United States were learning. I did not realize that a good chunk of what we covered was called Linear Algebra in the US.	154407-154401-9350865
Overlaps with concepts learned in other previous math classes	154407-154401-9350851
Internal assesment was the worst thing about mathematics HL. I could not make sense as to why I had to do the work or if it would be actually useful.	154407-154401-9350908
Our school did not have the mathematics HL worked out yet, I barely studied calculus in the second year, even though that is the majority of the exam.	154407-154401-9350884
Our state education standards often got in the way of the IB curriculum. Aside from that, the lack of non-kinematic examples or applications for the coursework we undertook.	154407-154401-9350936
questions are similar	154407-154401-9350600
Trigonometric functions were annoying, but I know they are important.	154407-154401-9351005
Lack of enough complexity in calculus to equate to the level of Calc II in American curriculum.	154407-154401-9351125
The IBO has not been sufficiently active in advocating for U.S. universities to accept credit for HL math on terms competitive with AP credit. My university only awarded credit for a 6 or 7, so I received no credit for my score of 5. Students with a 4 or 5 on the comparable AP exam earned more credit than students with a 6 or 7 on the IB exam. I had to take an introductory calculus course as a prerequisite to other courses that would have been satisfied had I received credit; I learned nothing new in the course because HL math had covered all of the material and then some. Rather than focusing on its certificate programs, the IBO needs to improve its advocacy for proper recognition of the diploma program.	154407-154401-9351110
Nothing in particular comes to mind immediately.	154407-154401-9351062
Everything was terrible at my school in regard to HL Math. There was no qualified teacher ever.	154407-154401-9348060
How unorganized and difficult the textbook was, how much content there was to cover in 2 years, how uncertain the new curriculum was	154407-154401-9350465

years, how uncertain the new curriculum was.	
I personally dislike proofs.	154407-154401-9351183
It was time consuming.	154407-154401-9351190
Too much useless statistics,no matrices, too little trigonometry,	154407-154401-9348059
wasnt much about statistics in core	154407-154401-9351470
So much content	154407-154401-9351610
Paper 3 topics	154407-154401-9351613
Probability	154407-154401-9351619
I feel like we didn't do enough calculus: I had a little bit of a problem understanding the physics taught in the first year of medicine, simply because there were new mathematical concepts that I had not seen before. Eg. Surface integration.	154407-154401-9351742
Our faculty wasn't experienced teaching math HL.	154407-154401-9351800
Some more experience with proofs may have been beneficial, but I still got more exposure that I would have gotten otherwise. I also feel that at the high school level, proofs are not as important; there was lots of time to get these skills in first and second year.	154407-154401-9351856
Everything else	154407-154401-9348124
The discrepancy between teaching materials (e.g. textbooks) and the official questions on the exam.	154407-154401-9351895
Not as in-depth calculus as certain other courses (i.e. AP).	154407-154401-9351942
Lack of proofs or not very rigorous. Lack of concepts, in calculus, such as: limits, continuity,Riemann sums etc. Some theory about ordinary differential equations (i.e. not optional) was not included. We had not been introduced to eigenvalue/eigenvector problems (especially useful in physics).	154407-154401-9351723
Fast pacing and large amounts of content: difficult to catch up once one falls behind and teachers are unwilling to spend extra time on topics we are still having difficulties in.	154407-154401-9352016
Series	154407-154401-9352022
it was difficult QQ	154407-154401-9352051
Nothing really	154407-154401-9352067
A small portion of the formatting of certain questions and items in the IB Mathematics HL curriculum, in particular related to certain question types and requirements, felt vague or otherwise unclear, making some topics difficult to discuss for comprehensive purposes. The confusion on some topics thus was shared among the class as a whole, including the class teacher.	154407-154401-9351981
The typical Math HL questions which is too hard to translate the questions into mathematical statements. The time given and the questions are not proportionate whether the time should be longer or the questions should be less. Also about the statistics being included in Math HL.	154407-154401-9351915
My teacher	154407-154401-9352122
Nothing in particular	154407-154401-9352147
Probability	154407-154401-9352135
[illegible]	[illegible]

The Portfolio was not really educational. Felt more like an obligation rather than a learning experience.	154407-154401-9349639
en general no me gustaron las matematicas NS por que me resultan demasido especificas y complicadas.	154407-154401-9352149
The heavy coursework, extensive and complex mathematical applications	154407-154401-9351605
It was difficult to keep up.	154407-154401-9352322
The course felt overly challenging, especially during the exams in May.	154407-154401-9352339
The IB textbook was really not helpful for preparing for the actual exam. We had to rely on finding our own resources and question bank and it would be better if these resources are more available to us.	154407-154401-9351301
I disliked the fact that matrices were omitted from the syllabus. I also disliked that there wasn't enough time allocated to math so most of the work ended up being assigned as homework. It was easy to fall behind.	154407-154401-9352114
It lacked heavy rigour. I may have scored more than a 6 if I'd taken it seriously based on the course plan.	154407-154401-9352316
Statistics and distributions	154407-154401-9352350
The fact that I often understood the content very well and could even explain it to other people in class but was never able to perform that well in written tests. I often found myself running out of time and sometimes I was not able to solve problems in a test that I had encountered in class in a very similar way before.	154407-154401-9352355
Decision maths, and stuff like the pigeonhole principle and modulus numbers. Im not a fan of proofs, and i feel like the maths investigation is too broad, and there should at least be some format to what the criteria is for what a good one lools like.	154407-154401-9352461
Nothing in particular, but it might have been nice to learn about more than just basic statistics.	154407-154401-9350446
Statistics	154407-154401-9352497
Doesn't include multivariable calculus.	154407-154401-9351310
The stigma around the subject as an "impossible" subject seemed to deter many.	154407-154401-9352568
The option choice our teacher chose was one that no one ever needed later on in their futures. Additionally, too often there was a question to prove something, which I never encountered ever after leaving IB.	154407-154401-9352588
I disliked the tricky wording of the problems.	154407-154401-9352613
The exams felt unnecessarily challenging simply due to time constraints. Many of my fellow students felt trapped in an "if you don't know it, skip it" scenario because of this, meaning that their potential for abstract thinking and problem solving was perhaps underrepresented en lieu of speed-answering skills. Perhaps two-and-a-half or three hour exams could be considered. This could, however, be the unavoidable 'double-edge' of the large variety of topics, which otherwise is a very positive quality of the diploma.	154407-154401-9352578
- It would have been very useful to know a little bit about the mathematical tools used in science, data analysis, and engineering. For example, I'm glad that I have a very rigorous calculus background (it gives me good intuition for a lot of physics problems), but I wish I'd known that engineers usually solve calculus problems with Mathematica or numerical methods	154407-154401-9352649

calculus problems with Mathematic or numerical methods.	
I would have liked more guidance with some exercises because I was easy to get discouraged. And, also, I would have loved to have the chance to choose what to focus on during the last semester (my school only offered dif. eq.)	154407-154401-9352635
I did not like that sometimes the time was not enough to learn everything, and sometimes it was hard to conceive	154407-154401-9352746
Amount of material covered left very little time to revise each specific topic in depth	154407-154401-9352758
Our teacher seldom explained his process for certain questions	154407-154401-9352768
The amount of time it took to complete the portfolios, and it's emphasis on calculus as opposed to statistics	154407-154401-9350427
Glazed over some topics, especially in Calculus.	154407-154401-9352849
No matrixs :(	154407-154401-9352857
Mathematical Induction. Not needed in high school. It can be introduced, but should not be concentrated on that much.	154407-154401-9349220
The strange way the calculus curriculum seemed structured.	154407-154401-9348528
need more focus on preparation and learning basic calculus concepts beforehand; also, proofs are useless to me -- an engineering major	154407-154401-9352892
I disliked the pressure. Section B of Paper 1 was very difficult for me personally. I didn't enjoy doing my internal assesment either because we were given very little guidance and few examples of what suitable topics would be.	154407-154401-9352819
The workload	154407-154401-9352962
I would have enjoyed having some exposure to other areas, such as graph theory, to broaden my view of mathematics.	154407-154401-9353190
Nothing	154407-154401-9353254
I had a hard time learning from my teacher, his teaching style and delivery was a huge hinderence to learning the material, and the lack of feedback made it difficult to improve.	154407-154401-9353252
The coursework component was not well supervised by the teachers in my school due to different teachers having different standards, and some helping the weaker students too much.	154407-154401-9353294
It was a lot of work! But like anything, to get good at it, practice makes perfect. And I wouldn't have wanted it to be any different.	154407-154401-9353296
I disliked the pace of the course - I would rather learn deeply about certain topics (e.g. solving differential equation) than breeze through the entire calculus.	154407-154401-9353284
The exam was very stressful, as it covered material that was too difficult and not taught in the books or in class	154407-154401-9353331
I felt that what was taught was overly tough and irrelevant in today's contemporary society	154407-154401-9353330
I disliked the vagueness of the instructions of the internal assessments. The Internal Assessments were not as much a self test of understanding as they were problems that seemed not to relate to our curriculum.	154407-154401-9353325
The ridiculous problems	154407-154401-9353355

I dislike the difficulty of certain topics, lack of a dedicated HL Textbook, little help or learning resources, and spending too much time on topics not used / required in university (i.e.: matrices)	154407-154401-9353376
The absence of matrices and linear transformations, because I really enjoyed those topics in secondary school.	154407-154401-9353323
Not enough proof methods were introduced, too many problems were calculation based.	154407-154401-9353424
The guidelines provided for the exploration were somewhat vague but instructor assistance clarified somewhat.	154407-154401-9353445
IA	154407-154401-9353447
Nothing comes to mind.	154407-154401-9353477
There was nothing in particular that I disliked about this course. It's definitely a great one to be quite honest. It's challenging in the right ways and at the same time interesting. I guess what I disliked would have to be slight issues with notations corresponding, as well as the wording of certain problems which made it difficult to determine how one must approach the problem. I could say it was a difficult course (which it was), but to make it easier (in terms of concepts/topics) would defeat the purpose of the course.	154407-154401-9353465
Unclear internal assessment Paper 3 (Options) very hard to prepare & tough	154407-154401-9353425
Some aspects of the HL course delve into mathematics that are difficult to fully explain without the time to go in depth about the backing method, which is not always possibly given the wide range of topics studied.	154407-154401-9353486
I disliked the IA's. They were very challenging and open ended, yet require very specific answers	154407-154401-9353463
It was very difficult. The curriculum, even split over two years, is a lot to get through and requires a very quick pace.	154407-154401-9353497
We did not cover calculus thoroughly enough for me to be prepared for university calculus. I dropped the math major as a result.	154407-154401-9353518
To elaborate syllabus	154407-154401-9352798
N/A	154407-154401-9353530
Little to no connection between the different topics discussed.	154407-154401-9353531
Abstract concepts with poor application to reality.	154407-154401-9353545
Did not get to cover all topics in detail	154407-154401-9350650
The exploration didn't seem to complement the course.	154407-154401-9353556
The disparity in materials available for each topic.	154407-154401-9353586
Statistics	154407-154401-9353595
I was in the first year of IB at my school and I believe the teacher needed more training/expertise in helping us prepare for exams.	154407-154401-9353458
Primacy of calculus	154407-154401-9353616
I disliked how there was so much mathematics in the test. Also, writing in pen was difficult, since normally math is done in pencil.	154407-154401-9353657

Too many questions using graphic calculators	154407-154401-9353452
I dislike that we did no linear algebra	154407-154401-9352781
I disliked the period of time given during the exams to solve the given problems. I can solve all the problems given the necessary time but many problems in the question papers had a variety of approaches which could not all be covered within the given time frame of the question. Trig and calc questions especially.	154407-154401-9353688
The idea of paper 2 being focused on the use of a GDC was quite different to what I am doing in my university degree. In fact I haven't had a subject that allows the use of one yet.	154407-154401-9353723
nothing	154407-154401-9353879
too hard questions on the test. not being same with what was learned	154407-154401-9353894
Lack of reference materials to supplement learning	154407-154401-9350011
The teacher... he was not very supportive of me which damaged my confidence.	154407-154401-9354186
I didn't like the way it's an individual thing. What I mean is that you're on your own. Sure you can ask your teacher, but we never really talked to the other students.	154407-154401-9354214
The fact that Math HL students had to take an additional paper 3. :(	154407-154401-9354135
How I used to enjoy maths but then I hit Maths HL and I started to like it the least. I used to be a maths whiz and would constantly be achieving high standards but then the Maths HL course just hit me like a tonne of bricks and I felt completely lost. I had so much work to do in not just Maths but other courses that I struggled to catch-up in maths class.	154407-154401-9355946
n/a	154407-154401-9356676
The lack of explanation, and somewhat consequently practice, given in the further calculus topic (in both the textbook and in class).	154407-154401-9356604
My teacher was relatively new to the course so I did not like that.	154407-154401-9356618
The tests. I got a 5 in total, but at Uni, I got A:s only (in the math courses).	154407-154401-9356723
The ambiguous criteria for the IA (specifically personal engagement and reflection	154407-154401-9357115
Some highschool requisite mathematics like matrices were removed from the syllabus	154407-154401-9355658
Not enough teaching time allocated to HL Maths - didn't allow to appreciate, felt like a race to complete the syllabus.	154407-154401-9357781
Not enough practice	154407-154401-9349803
The lack of time on the exams	154407-154401-9358180
The math IA was quite dry.	154407-154401-9358188
We did not get enough teaching time due to our teacher having two classes simultaneously and severly lacking support and mistreatment by our school, resulting in falling behind roughly 70h by the time of revision. My classmates and I tried to talk both to coordinator and IB Ombudsman regarding the matter but were ignored and were treated condescendingly by both.	154407-154401-9358862
I did think it was too hard at times, I can say from experience that the level of difficulty exceeded that university level mathematics at some points. It can be a lot of work for high school level students.	154407-154401-9359305

The teacher sometimes was a bit rude	154407-154401-9359430
How little recognition it receives in American Universities. The university credits for HL Mathematics are often too few for the university credit HL mathematics deserves.	154407-154401-9359504
Sometimes the topics seem to be disconnected, though beautiful connections between the different areas of math exist and could be presented. This might just be due to my teacher.	154407-154401-9359438
Nothing in particular	154407-154401-9353722
I disliked, that the curriculum did not allow for real in-depth-study of topics. Also, I would change the way that statistics is tought.	154407-154401-9359713
that you were rushed in the exams. but it was ok enough	154407-154401-9353489
There wasn't enough time in exams.	154407-154401-9360134
Textbook was confusing, and it sometimes had wrong answers in the answer key.	154407-154401-9360475
I couldn't choose options, I had to learn an option I didn't like and didn't need	154407-154401-9360974
a little too challenging, Internal assessment	154407-154401-9361062
Excessively computational approach, not enough proofs and problem solving, too much statistics and not enough calculus and introduction to analysis. Generally, I found Math HL to just train you to solve problems by heart, as fast as possible, without ever requiring you to really think.	154407-154401-9361090
Never got the proof-writing education I needed until university level	154407-154401-9361171
I was too immature to take the class seriously	154407-154401-9361563
Very challenging to get to the level where the HL course picks you up - I initially had to catch up a lot of the basics	154407-154401-9361616
The fact that there was such a huge gap between what we did and what the SL class did	154407-154401-9361694
Differential equations should be mandatory (not an option).	154407-154401-9362061
N/A	154407-154401-9362089
The textbook was not useful for understanding, and I didn't think my instructor did well with facilitating my understanding of many of the topics studied.	154407-154401-9362015
at our high school it was not its own course	154407-154401-9362548
Statistics. Lots of formulas, and very confusing.	154407-154401-9362568
We didn't have quite enough time to study calculus because of the way our program was structured (we only started HL math in the second year) so that was quite difficult for me.	154407-154401-9362716
statistics and trigonometry	154407-154401-9362719
the internal assessment.	154407-154401-9363232
some questions only have one solution and it is very hard for people to think of	154407-154401-9363584
Nothing really. It's a great program.	154407-154401-9363653
Overload of content.	154407-154401-9363756
Math Exploration	154407-154401-9364186
That the teacher and not us (the students) was the one who decided which option we will be	154407-154401-9364987

studying	
No topics on linear algebra	154407-154401-9366502
My teacher's methods of teaching.	154407-154401-9363892
I'm not entirely sure. I just remember there being so much information to cover over the two years. It could've just been how it was set up at my school. But my classes was learning up until the day of the exam.	154407-154401-9367516
The lack of connection between subjects	154407-154401-9368568
The final IB test did not fully cover all smaller criterias of HL math knowledge and it was partial to several topics than the others.	154407-154401-9370916
IAs	154407-154401-9370780
Statistics	154407-154401-9371961
None	154407-154401-9372522
I believe that discrete mathematics deserves a spot in the HL curriculum and do not agree with 2013 reduction in emphasis on linear algebra.	154407-154401-9372603
Some of the chapter or content were not really helpful or applicable for my further studies although majority of the content was helpful	154407-154401-9372697
Exam format - not personally comfortable with doing a lot maths under a strict time constraint	154407-154401-9372853
That universities thought a 7 was equivalent to A* at A level maths.	154407-154401-9374068
What I didn't particularly enjoy back when completing my diploma, was working in groups, but I now recognise its value when facing challenging problems.	154407-154401-9374355
The HL exam had too many questions about less practical topics.	154407-154401-9381833
Complex numbers	154407-154401-9382968
nothing	154407-154401-9382979
Nothing in particular	154407-154401-9383984
It would be great if there were more opportunities to apply what we were learning in class to real-world problems.	154407-154401-9384084
Simplicity of the general curriculum, especially after Calculus BC. The curriculum generally lacked challenge.	154407-154401-9384249
Sometimes the level was to high for most students in the class	154407-154401-9384359
nothing	154407-154401-9384417
Binomial theorem	154407-154401-9392393
The course was very fast. Often times there wouldn't be time to explore areas of mathematics outside of the syllabus, which may have come in handy when it came time to write the Math IA.	154407-154401-9392640
Statistics	154407-154401-9392654
That i had to be put with AP Calculus because only 2 students in the entire school were taking it (me included)	154407-154401-9392670
Few options to choose from	154407-154401-9392768

I enjoyed all of it	154407-154401-9392773
too much work comparing to other subjects	154407-154401-9392784
In Mathematics HL we only saw one extra topic (for my class it was Further Calculus or something like that). I wanted to learn as many topics we could, in specific I was very intrigued with Group Theory, but unfortunately we did not touch this topic at all.	154407-154401-9392756
There are limited choices about which optional topic to choose at each school.	154407-154401-9392809
The year I took HL was the year that the IA format changed and I did not like that at all.	154407-154401-9392780
I disliked my experience with the internal assessment. I would have preferred the old idea of having a common topic rather than choosing my own.	154407-154401-9392766
My teacher. And statistics and probability.	154407-154401-9392838
I think it was just the options that were chosen for me weren't what I would have liked or that interested in, it would be nice if we got to choose our own options as a class	154407-154401-9392840
The fear and difficulty that everyone gives it	154407-154401-9392857
It's lack of matrices - which is important for higher level college math courses.	154407-154401-9392805
Math IA was completely useless as a learning experience. definitely not worth the 20% weightage.	154407-154401-9392839
Lack of adequate resources for the programme, ESPECIALLY the options. I still can't say I have any idea what a probability generating function is.	154407-154401-9392818
The stats option, and not having a choice of what to option to do	154407-154401-9392757
IA: Exploration	154407-154401-9392941
I had a difficult time completing my internal assessment because I did not know what topic to choose. Although I am grateful for the learning experience, I wish I was given the tools/guidance to craft a better IA.	154407-154401-9392979
The pure volume of the work and the difficulty of the questioning style makes the programme a challenge to almost all students. While I respect and agree with the IB's idea of making the HL Maths curriculum a rigorous programme which gets you to answer real problems rather than simply executing an algorithmic approach to answering questions, the programme is just very challenging and the difficulty is not commensurate with what would be expected at the 16-18 level. The difficulty of attaining a 7 at HL Maths is not on a par with any other subject that I know of in the IB. The disadvantage of this approach in my view is that it discourages some people from taking Maths who might otherwise do so, but it also results in some very poor grades achieved by people who are actually not bad at Maths (evidenced by decent Physics grades/acceptance onto mathematical courses at university). The lack of mechanics on the course is an issue for anyone looking to take on engineering or related careers and while I recognise that this is partly due to differing views on whether such material ought to be in the Physics or Maths curriculum, the reality is that it is absent from Physics also and therefore very little mechanics is ever taught to IB students.	154407-154401-9393029
Switching between various, unrelated topics means that each new unit does not build upon the last and this can make it more difficult to study. While there are advantages to having a "sampling" of university level mathematics, it is also difficult to translate this into the university level as there is no in-depth study of a particular topic.	154407-154401-9393072
Stats	154407-154401-9393123

I disliked the wording of the problems as it made it difficult to understand at times.	154407-154401-9393241
Vectors, both 2-D and 3-D. They were incredibly difficult to understand.	154407-154401-9393264
Proofs	154407-154401-9393302
There wasn't much time to learn our option.	154407-154401-9393253
had a bad teacher, was self-taught	154407-154401-9393346
N/A	154407-154401-9393093
Getting low grades on tests	154407-154401-9393320
The course had so much material that it was hard to fully grasp any one component of it by the time we were tested. I also disliked having our third paper several weeks after the first two.	154407-154401-9393564
too hard sometimes, but rewarding	154407-154401-9393568
Statistics	154407-154401-9393681
How difficult the exam was.	154407-154401-9393704
I really didn't care for the required knowledge of statistics.	154407-154401-9393708
How heavily weighted the projects and exam.	154407-154401-9393727
It was just so much harder than A-level and so it was pointless because if you follow a maths based course post IB you learn it all again. Needless stress.	154407-154401-9393729
Nothing	154407-154401-9393747
Was very challenging, hard examinations	154407-154401-9393718
workload was highly disproportionate to other hls	154407-154401-9393803
I did not like the emphasis on discrete mathematics. It seems extremely unnecessary.	154407-154401-9394016
it's a little too tough sometimes	154407-154401-9394074
1. I heard that matrices is now removed from Maths HL. This is unacceptable and may set back students studying engineering in university level. 2. There is little guidance given for the Internal Assessments, and sometimes there is only one real way of "modeling" the problems. Everything about it seems confusing and frustrating. 3. There is not enough time given to solve questions in exams. Paper 1 and 2 should be at least 2h30m: we want to encourage students to think, not rote memorization of problem types. Paper 3 should be given at least 1h15m.	154407-154401-9394083
At college now, I feel that the Math HL and FM programs have not prepared me adequetly within Multivariable Calculus. While the Vectors unit and the Calculus option of Math HL, along with additional information our teacher provided, has covered roughly 80% of the Multivariable Calculus curriculum here, it is missing some crucial parts regarding Stokes theorem and Green's Theorem. I wish the HL curriculum, or the FM curriculum, could have delved further into these topics.	154407-154401-9394131
Too much statistics.	154407-154401-9394153
nothing	154407-154401-9394178
I really enjoyed it. My issues with IB had nothing to do with HL Maths despite my average result	154407-154401-9394179
I did not really enjoy the internal assessment process.	154407-154401-9394191

Should have taught matrix	154407-154401-9394266
It was known as the "diploma killer," which was intimidating.	154407-154401-9394262
The sense of worry and uncertainty I felt about getting the requured grades theiught the course.	154407-154401-9394288
The lack of emphasis on proof-writing and proof-reading.	154407-154401-9394295
There was too much content to be covered in such limited time.	154407-154401-9394562
It was a lot of work and content	154407-154401-9394572
Some questions were overly dependent on calculators (i.e. graphing and probability) which at times seemed slightly mechanical	154407-154401-9394832
The huge gap from what the textbook teaches you to the questions you anwser. The feeling of failing and having no clue how to do a question. Also I found that you were often able to do very difficult question but the curriculum was so intensive that you never got a good base knowledge.	154407-154401-9395585
The need to be clever for solving integrations	154407-154401-9395712
El tema de rectas, planos y demás	154407-154401-9396128
The questions tended to be vague regarding what areas were being tested; there were no obvious links between the areas of maths during the course, only ones students made for themselves; A level courses tend to include more mathematical topics than the IB syllabus does.	154407-154401-9396745
I didn't like the amount of difficulty it took me to grasp the mathematical concepts. It made me realise that what I hoped I could do was not truly what I had the ability to do.	154407-154401-9396819
Difficulty in linking subject matter to other classes, especially for the Internal Assessment. Material was often too advanced to be related to other courses.	154407-154401-9397136
The big gap between HL and SL. That matrices were taken out	154407-154401-9397206
Complex numbers	154407-154401-9397203
The amount of methods in so little time.	154407-154401-9397323
Not sure	154407-154401-9397656
The assignments	154407-154401-9398320
It felt difficult to acquire resources that "connected the dots" or make the big picture make sense. I excelled in the calculus and the paper 3 calculus options, but I struggled immensely to become competent with complex numbers and vectors. In this regard, I wish there was more guidance. I had always been a history student at heart, but my love of problem solving led me to tackle difficult mathematics. I would also like a more elaborate approach towards proofing, i.e., the "professional" side of mathematics. It's hard to think in proofing, and many IB HL classes skip this (since many programs in the United States aim to pass, not to excel, since IB grades aren't important for university admission). High school is a perfect time to develop those skills, so I hope there can be better resources to inform students where local resources (teachers, materials, etc.) are lacking. I managed to struggle my way through thanks to some brilliant friends of mine whose brilliance partially rubbed off on me, but many others are not so lucky.	154407-154401-9398576

Finally, I was absolutely clueless on how to write my mathematical investigation, as all the subjects I was interested in involved multivariable calculus, and I didn't realize that my chosen topic wasn't even relevant to HL Mathematics (only Further Mathematics...) until it was too late to change. This is also overlooked in many programs.	
The lack of emphasis on the technique of proof. We weren't shown all the types of proofs and how we could apply them to arbitrary problems. We knew how to proof specific problems (which were the ones that could arise in the exam), but we were never taught how one could tackle any proof.	154407-154401-9396009
The amount of material - too much	154407-154401-9398843
Huge Syllabus Content	154407-154401-9399450
Everythiing else. Especially integral calculus and induction	154407-154401-9399162
1. Having constantly to worry about the grade/curve - a 7 in HL Maths was much more difficult to achieve in comparison to other HL subjects, i.e. HL Chemistry 2. Maths IAs were often very vague	154407-154401-9400425
Proof by induction did not make sense. Stats was not covered well (and so it happened that much of my paper 2 was stats).	154407-154401-9400582
Some of the concepts introduced in the syllabus do not require proof of their origins.	154407-154401-9406097
It made me slack off in University.	154407-154401-9406135
If abstract learning is not conducive to one's understanding of mathematics, it becomes difficult to comprehend and apply new advanced concepts. It's hard to catch up once you fall behind.	154407-154401-9406217
I felt that at some instances, the syllabus was too much. I would prefer it to be more in depth, than it is wide.	154407-154401-9406216
portfolios. Did not make any sense and not enough time. Should not be individual. should promote student interaction/discussion. although marks can be awarded separately.	154407-154401-9406356
The option that was chosen for us to do - series and differential equations was extremely heavy on memorisation rather than logical critical thinking and problem solving. I felt like it was unnecessarily difficult and of little use especially as it didn't take advantage of the skills necessary in other areas of math!	154407-154401-9406255
The test was either VERY hard or our teacher did not do a great job of preparing us for it. The thing is, he was an INCREDIBLE math teacher and we all learned a lot (when we returned from college on breaks we realized how much more prepared we were than other students in our classes). The thing is, the fact that the IB HL math test is so difficult, a 2.3 or so was the average in my class, and this means that colleges didn't give any credit, despite the fact that we learned much more than we would've in a different class. I don't think the test should be made any easier, but I think it would be valuable for the IB Program to express to Universities (at least in the US) how the test is not nearly as straightforward as the equivalent AP test, this way you have a more realistic shot at earning college credit. This is a big deal to many students who are paying for college per credit hour and would take IB Math at the High School level knowing that they had just as good a chance of earning college credit as a student taking the equivalent AP class.	154407-154401-9406487
Proofs	154407-154401-9406738
At times there was too little proofs and real understanding of concepts compensated with	154407-154401-9406678

At times there was too little proofs and real understanding of concepts compensated with GDC.	154407-154401-9406878
There was too much to learn. There was so much material to cover that we weren't able to solidly learn anything.	154407-154401-9406886
Mathematics exploration grading criterion was too little mathematics marks. More marks on reflection and writing. Seemed like a piece of writing journal rather than mathematics oriented. Options Paper 3 was disproportionate to the amount of material learnt.	154407-154401-9407120
Unclear scoring, not enough depth in some important areas, sometimes incompatible with further studies in Uni	154407-154401-9406071
Difference with respect to SL. SL learnt linear regression, HL did not.	154407-154401-9407496
Difficult with little support and guidence	154407-154401-9407527
Maybe a bit too rushed.	154407-154401-9407779
Difficulty, pace	154407-154401-9408147
Covering so many topics sometimes left some topics studied in less depth than preferred.	154407-154401-9408360
The vectors portion of the class was difficult and in retrospect the way it was taught differed from how it is taught at the university level.	154407-154401-9408503
Too many topics to cover.	154407-154401-9408619
The internal assignment had little to no guidance and it was extremely difficult to determine how to come up with a mathematical investigation, without the same sort of tactics the extended essay uses.	154407-154401-9408655
too much breadth not enough depth	154407-154401-9409429
Nothing	154407-154401-9409488
Everyone said it was really hard and no one focuses on how it was actually fun (for the people who actually will go on to do maths at university)	154407-154401-9409513
test taking made me dislike maths. if you miss a lesson, it's difficult to catch up.	154407-154401-9409516
Lack of depth. Some topics were not covered, such as matrix. Should include more calculus and put emphasis on proofs.	154407-154401-9409650
Next to nothing in linear algebra!	154407-154401-9409962
our option was on differential equations and was riddled with errors. It would be good if the IB verified textbooks	154407-154401-9410224
combinatorics and statistics	154407-154401-9410343
Some crucial topics were omitted, some methods of grading.	154407-154401-9410396
The pacing was rather quick, and I could not slow enough to explore fully what I was learning.	154407-154401-9410427
Speed at which the class moved	154407-154401-9410044
The HL options are too limited.	154407-154401-9410538
should include more interesting topics in the options.	154407-154401-9410669
I feel like some concepts were just too much to understand at a high school level (one I can recall is the epsilon-delta definition of a limit). Some concepts I only fully understood and appreciated after seeing a second or third time at university, so everything felt a bit rushed in	154407-154401-9414038

HL maths (though to be fair if I spent some more time on it I might've gotten it, and a challenge is always good).	
Wasn't taught well or clearly in class at all lots of content which you were expected to essential self teach	154407-154401-9414314
Did not feel relevant to my area of interest	154407-154401-9414678
I didn't like stadistics and differential equations, but I think that's my teacher's fault: we didn't really were tought any of those subjects durying the lessons, and I barely knew how could I go through the final test.	154407-154401-9415173
It was too much to learn for the time we had... We should have had more time.	154407-154401-9416872
It did not feel particularly practical at many stages. I regret not learning more statistics in particular.	154407-154401-9416950
Too difficult, should be easier.	154407-154401-9418028
The lack of time, the slow Maths group	154407-154401-9419575
Some topics had to be rush, because there was no time/ or adequate planning	154407-154401-9419683
Expectations (for IAs, exam, level of understanding) were not well-communicated. Some focus on process over understanding.	154407-154401-9419886
The lack of geometry particularly in calculus	154407-154401-9419937
Too abstract... Age old question of "when am I ever going to use this in real life?"	154407-154401-9424706
I disliked how we were "forced" to study the option that our teacher selects for us. In other words, we cannot study an option of our own choosing, as we can in the sciences.	154407-154401-9425742
found a lot of the topics very hard to grasp in the time allowed or this	154407-154401-9430448
The grading.	154407-154401-9434482
The book we were working with was not a good one and we had a PDF of the Pearson Math Book by Wazir and Garry. I also disliked how the school just bought books that were not so good, when they could have asked us and bought the Pearson ones, not just in Math, but all subjects. I disliked that teachers were often uncommitted and would rather waste time than reinforce what we had learned. I found myself in a class of people willing to learn. Our teacher started with Option: Calculus in January and we would only meet once in two weeks. We would ask him to meet in the afternoons and he would hesitate to meet for a real class in the afternoon. As a result, I had to cover two topics by myself.	154407-154401-9434689
The new structure of the 2014 Internal Assessment (IA); instructions/parameters for the project were slightly vague	154407-154401-9437742
I disliked learning the option mathematics a two weeks before the exam, I still do not understand the Taylor Series.	154407-154401-9444311
I did not dislike anything in particular. What I wish for was to learn a little bit more about the theory.	154407-154401-9444618
Content too.simple	154407-154401-9450290
The huge extension of topics and the lack of time to cover them.	154407-154401-9450314
compared to other HL courses, required far more time investment to achieve a satisfactory level of understanding	154407-154401-9450640

Too much syllabus and too tideous.	154407-154401-9471137
Classes not challenging enough compared to the exams.	154407-154401-9486485
The dissociation of limits as the option, as I feel that limits should have taken in as core as well, and then another advanced principle or theory could be added into the option in place of that to tie all of the units together. Also, probability. I don't understand probability, statistics (or at least, once it starts to get more complicated).	154407-154401-9488697
Back then I didn't see any connection between Complex numbers and other subjects	154407-154401-9513187
Not having enough time to practice individual topics to become confident at solving exam questions.	154407-154401-9530379
Not challenging enough. Preferred Further Maths over HL.	154407-154401-9530776

Your choice of university and degree

25 How do you think DP mathematics HL could be improved to better prepare you for university-level mathematics?

Showing all 291 responses	
Be more clear cut on concepts we need to know	154407-154401-9347986
Align more strongly with the calculus standards set out by other typical high school curricula. This is the knowledge that professors assume you have upon university entry.	154407-154401-9347990
It should include more proofs and demonstrations.	154407-154401-9347995
More focus on mechanics to bring it up to standard of A levels	154407-154401-9348122
Give students more freedom of choice regarding the option topic in Paper 3, in order to pursue their passions. Involve more applied mathematics involving calculus within the course (e.g. Kinematics using Calculus)	154407-154401-9348018
Some more differential equations and matrix computation	154407-154401-9348075
Include more proofs and rigour as is required in university-level mathematics	154407-154401-9348027
I think it depend what course you were doing. Few courses require a level of mathematics much higher than HL mathematics, at the beginning. I think HL mathematics prepared me well for engineering but not for actuarial studies which I did before engineering and dropped out of.	154407-154401-9348005
Don't Know	154407-154401-9348213
There should be far more mechanics in it for the physicists and engineers (which most of my HL maths class were), and other 'real life' mathematics that allows you to practise modelling with directly applied maths in areas like natural sciences and economics.	154407-154401-9348045
More practice included in the course.	154407-154401-9348097
More focus on basic calculus.	154407-154401-9348158
Expanding upon proofs in the course, such as by including formal writing in sentences (with proofs in set theory as an example) and at least some teaching time spent on matrices.	154407-154401-9348056

Having more class time; going more in-depth in the different topics, rather than just covering them superficially with the only goal being to do well in the exams	154407-154401-9348093
Be split up into more course related topics and discussion groups	154407-154401-9348234
More guidance on IAs.	154407-154401-9348244
More questions without solutions and more lecture based classes instead of problem solving	154407-154401-9348297
Perhaps make the IA into a series of papers. One that is research-based like it is now, and another on proofs or something else specific.	154407-154401-9348299
Based on the American system where I go to uni, it could try to include some things you're taught in AP, which IB doesn't do, but US schools expect you to know. Doing IB, I learned things that I only took in my second or third year of uni, but didn't learn some things I took in my first year course	154407-154401-9348165
More calculus	154407-154401-9348321
There should be some modelling involved, a computer based mathematical approach	154407-154401-9348314
Include linear algebra, especially matrices, in the core curriculum.	154407-154401-9348081
Keep doing the same thing the material excellently prepares one for university.	154407-154401-9348276
Increase level of linear algebra topic. Add topic on mathematics and computers	154407-154401-9348265
Slower pace	154407-154401-9348325
By incorporating more real-world (e.g. Mechanics) examples & exercises into the curriculum	154407-154401-9348390
Take onboard what university courses do and make all options in IB higher mathematics part of the core. It's a joke how big the gap between standard and higher is, and even still the fact that the IB is supposed to be more rigourous than A levels.	154407-154401-9348410
Pretty good.	154407-154401-9348289
It is as difficult as what I learn in university	154407-154401-9348145
Incorporate more differential equations and vector calculus	154407-154401-9348425
Include content that is included in A-level Further Mathematics.	154407-154401-9348455
I would like to see more group work opportunities.	154407-154401-9348433
With better algebraic techniques	154407-154401-9348544
Better teaching programs set specifically for teachers (we had a change in teachers which really hurt me)	154407-154401-9348602
Not really	154407-154401-9348445
It's fine as is. Giving a little taste of Calc III or Linear Algebra is also good.	154407-154401-9348635
By adding more creative types of real world applications of the concepts learned in HL math.	154407-154401-9348593
Don't know about math HL, I took Further Mathematics, which was much more instrumental in preparing me for university mathematics.	154407-154401-9348611
Include hyperbolic trigonometry, exclude option and exploration.	154407-154401-9348549
More assignments in groups.	154407-154401-9348240
Include more complex calculus in the core topics. Allow more time on the exam papers.	154407-154401-9348733

Its good enough	154407-154401-9348856
If the course was taught a little more slowly in order to fully grasp concepts explained	154407-154401-9348096
I think the syllabus is complete enough to cover necessary mathematical parts of my university degree.	154407-154401-9348167
Extra hours where students have time to focus solely on problem-solving.	154407-154401-9348852
The exploration could change to a form that is more student-friendly and allows the students to develop their mathematical knowledge to a greater extent.	154407-154401-9348295
I think for the most part it's already a very well oiled machine.	154407-154401-9348756
Better guidelines for teachers	154407-154401-9348998
Being American, a ciriculum that centers away from differential equations or vector spaces because the courses we test out of simply do not touch on these subjects.	154407-154401-9348879
Teach more multivariable calculus and differential equations.	154407-154401-9349022
I'm not in a place to answer this	154407-154401-9349011
Proofs	154407-154401-9349181
Hypothesis testing in stats	154407-154401-9349219
The textbooks need to be better and contain more layman language for easier understanding basic concepts. The questions in textbooks did not match the difficulty in the exams and caused problems when revising for the exam.	154407-154401-9349222
Matrices are very important tools that are very often used at university. I strongly believe that the DP Maths HL should include them again in its syllabus.	154407-154401-9349223
Introduce us to more topics so we have a wide range of knowledge.	154407-154401-9349325
Truthfully unsure.	154407-154401-9349209
Solution videos could be made available by professors for difficult questions.	154407-154401-9349376
I barely need to study in university because Math HL was so strong that I knew half of the stuff they teach here already	154407-154401-9349377
Include more proofs, introduce real analysis and abstract algebra	154407-154401-9349415
I think the fact that the "Sets groups and relations" option is offered is already good! And all options basically have university level maths inside!	154407-154401-9349478
I've answered this in a previous section.	154407-154401-9349474
A stronger emphasis on learning to write and read proofs, and generally to understand the importance and centrality of proofs to higher-level math	154407-154401-9349563
More intense teaching - we only really got a smattering of the various subjects	154407-154401-9349685
Include more proofs.	154407-154401-9349756
Bring back matrices to the syllabus. We learned it in grade 10 before it was removed from the syllabus for our 11 and 12th grade years, but even that little bit helped me in my courses	154407-154401-9349551
More pratical examples	154407-154401-9349691
More emphasis on statistics as well as applications of maths to real life situations e.g. drug	154407-154401-9349740

dosing in medicine	
Put linear algebra as part of the syllabus (either as the core, or as an option)	154407-154401-9349723
Add matrices back to the syllabus! Also, include more concepts related to American university education.	154407-154401-9349886
I think it did fine. A little more exposure in some of the more complicated topics would have been nice.	154407-154401-9349937
The problem with the test had to do with my preparation, I think it was a fair examination, but it would have been nice, if we had the choice on what we tested on.	154407-154401-9349873
Go more in depth with statistics	154407-154401-9349908
It's good already	154407-154401-9349995
Teach eigenvalues and eigenvectors. I really needed these a lot in university, and it was expected knowledge.	154407-154401-9349992
The course must cover more calculus in order to allow students to place out of the entire first year of a rigorous university calculus course. This must include series, differential equations, and some multivariable calculus, all of which are very much doable.	154407-154401-9350051
More topics regarding multivariable/differential equations	154407-154401-9349960
Train teachers better with guided materials for every chapter	154407-154401-9349837
More differential equation work. Differential equations are at the heart of my studies in engineering and were only glossed over in HL math.	154407-154401-9350058
One point that I noticed throughout university was the exclusion of matrices from the curriculum. Matrices are widely used in engineering classes that I attended, whether it being Numerical problem solving and multivariable calculus, the exclusion of this from the curriculum was the only thing that set me back to an extent,	154407-154401-9349969
More emphasis on understanding and applying statistics in the core syllabus.	154407-154401-9350203
I think it's pretty good the way it is, considering the number of topics.	154407-154401-9350308
Maybe have a bit more on mathematical proofs, as this was the only subject that aside from induction I do not remember studying in Math HL	154407-154401-9350282
Include some real problems from different university courses that could appear in the first year contents.	154407-154401-9349713
The only thing I can think of is enforcing good form and proper use of terminology to make the transition to university easier. Aside from that, all good.	154407-154401-9350288
More focus on proofs and rational thinking to see why concepts and theorems that we use are true, as opposed to just stating them and applying them.	154407-154401-9350247
Universities taking greater notice of the IB and considering it in course design. My course at university seemed tailored to those who had studied A level maths and further maths.	154407-154401-9350360
More proofs	154407-154401-9348800
More mechanics and differential equations.	154407-154401-9350391
Not as much emphasis on complex numbers is necessary.	154407-154401-9350398
N/A	154407-154401-9350401

Applications of mathematics to real problems in science and engineering, rather than just 'pure' mathematical problems	154407-154401-9350394
Encourage more independent learning. Get students to learn a to.opic and teach the class about it perhaps.	154407-154401-9350419
Well in university I also have exercises on some online portals and they are preparing me for the exam really good. I believe as we are now in a technological age IB Maths can also have some online portals. Also I believe formula booklet should be revised. Most of the formulas are unnecessary for a HL student and they are just taking time while turning the sheets.	154407-154401-9350434
Add more ordinary differential equation	154407-154401-9350418
Introduction to technology to assist in solving mathematical problems would be extremely useful (MATLAB or similar). A more narrowed focus on difficult topics (statistics, calculus, complex numbers) rather than basic / presumed knowledge (algebra) would be beneficial because of how in-depth university courses are.	154407-154401-9350431
More calculus should be added at the core of the course. More formal proofs could be considered.	154407-154401-9350292
cover more part of stat	154407-154401-9349018
More proofs	154407-154401-9350554
i think it prepared me really well	154407-154401-9350639
more differential calculus and linear algebra	154407-154401-9350606
I am not well equipped to learning from lecture-based mathematics after the self-directed and discovery-based IB system. I think the IB method is a stronger way to learn mathematics, but it isn't frequently how it is taught in the general college class, unfortunately.	154407-154401-9348393
N/a	154407-154401-9350682
Focus on fewer areas?	154407-154401-9350756
Other varieties of proofs	154407-154401-9350865
More emphasis on linear algebra concepts such as matrices and vectors	154407-154401-9350851
The vectors topic should be more complicated since the difference in level between school and university on that topic is ver high.	154407-154401-9350908
I don't know.	154407-154401-9350884
Focus on more group work and long-term projects based primarily in math.	154407-154401-9350936
Maybe talk about more calculus	154407-154401-9350600
Discrete mathematics, maybe...?	154407-154401-9351062
More organized course and stop making it too difficult to understand. Cramming lots of difficult information for high school students can be overwhelming and may result in much less learning and fulfillment than less content and better understanding.	154407-154401-9350465
What really helped me was taking Further Mathematics in addition. I share the sentiment of my maths teacher that simplifying the curriculum (e.g. throwing out matrices) is a mistake as people who take HL go on to do degrees involving maths, where better preparation is always welcome.	154407-154401-9351183
Multi variable caucus us should have been introduced	154407-154401-9351190

More stats & ODEs/PDEs	154407-154401-9351470
More emphasis on calculus alone.	154407-154401-9351420
Inclusion of more proofs, although abstract, are paramount at the undergraduate and graduate mathematics level.	154407-154401-9351587
Quicker learning	154407-154401-9351619
Try to make more links between maths HL and chemistry and physics.	154407-154401-9351742
Better faculty	154407-154401-9351800
Continue the emphasis on active learning strategies in the classroom, rather than standard lecturing - this is what I benefited the most from. The Internal Assessments felt like a lot of busy work when I did them, although I've heard that they've been revamped since the May 2012 session.	154407-154401-9351856
More focus on calculus and less on statistics. However this may only apply to people pursing an engineering degree. A math major specializing in number theory would appreciate more focus in discrete math.	154407-154401-9351895
Proofs	154407-154401-9352022
To better prepare me for university-level mathematics, perhaps the DP mathematics HL curriculum could be made more refined and topic-oriented, rather than being too malleable or vague in its intent, so that the topics being examined and prepared could be better addressed.	154407-154401-9351981
Personally, I think university-level mathematics is not as hard as IB mathematics HL. As a pre-uni programme, the topics covered in IB mathematics HL are appropriate and good in order to prepare the students for university-level mathematics. But my only concern about mathematics HL is, the way the questions being asked were far too hard and they could make the students lost confidence in mathematical abilities. But actually, it is just they(students) could not sometimes interpreted the questions like what exactly they are expected to do in order to answer the questions.So, besides testing the students' mathematical abilities, the questions type are more like to test the creativity of the students. I understand that, they are all related to the IB profile, but as a pre-uni programme, it should not be that hard.	154407-154401-9351915
More time	154407-154401-9352122
No	154407-154401-9352147
Spend more time on calculus.	154407-154401-9352135
Fewer Topics, No Math portfolio, and just one paper exam.	154407-154401-9349639
Be less irrational.	154407-154401-9352322
Adding matrices to the syllabus.	154407-154401-9352114
Indian universities have a horrible approach to teaching and testing mathematics, so no comment there. With regard to exams and assignments from universities such as MIT and Harvard, I believe the study of calculus requires a more rigorous treatment, as many people still treat it as the area under a curve instead of the limit of a sum.	154407-154401-9352316
Less statistics and distributions, more calculus and complex numbers. AN introduction to multi-variable calculus. More on algebra and vector spaces.	154407-154401-9352350
I'm not sure about what programs at other schools are like, but my university's Calculus 3 class has a heavy emphasis on 3D space.	154407-154401-9350446

By omitting the most useless subject of all times: statistics (total waste of time)	154407-154401-9352497
Include multivariable calculus	154407-154401-9351310
More emphasis on uni level topics in a basic format	154407-154401-9352568
Definitely. There should be more emphasis on statistics and matrices. Those two areas are the most important right now at my business degrees.	154407-154401-9352588
It could maybe be taught better.	154407-154401-9352613
More discussion of how to model real situations. Having a section of the statistics course where we worked with real data would have been fantastic. However, my understanding of probability was stronger than my peers' when I entered university, so I learned statistics quite easily.	154407-154401-9352649
More depth when studying calculus (as in the different methods of integration)	154407-154401-9352635
I believe it is quite good actually	154407-154401-9352746
perfectly adequate.	154407-154401-9352758
more statistics	154407-154401-9350427
The course could be more applied and less theoretical.	154407-154401-9352849
Concentrate more on further DEs (incorporate that option into the core program)	154407-154401-9349220
More three-dimensional work; more statistics.	154407-154401-9348528
completely overhaul the course; focus on rapidly advancing through application-focused calculus concepts, dip into differential equations, and include a unit on statistics GET RID OF PROOFS -- ONLY MATH MAJORS REQUIRE THEM	154407-154401-9352892
It was an amazingly well rounded course. We studied varieties of subjects in maths that may appear in different courses at university. However, sometimes I felt that we were just learning to pass the exams. I felt that we were studying mark schemes and pass methods occasionally. In other words, we could have definitely spent more time on real life applications of the math we were learning.	154407-154401-9352819
Some exposure to proofs of basic concepts in number theory could help students make the transition to proof-based courses more easily.	154407-154401-9353190
Make more study resources available, such as giving students access to questionbanks, or giving sample university-level mathematics questions for students to try out.	154407-154401-9353294
There should be a fine balance between studying the calculus and studying statistics.While I realize that having such balance is difficult, IB teachers should at least attempt to maintain that balance.	154407-154401-9353284
Better placement in math classes at University	154407-154401-9353355
I think that the difficulty level is perfect.	154407-154401-9353323
My professors expect me to know how to integrate using techniques such as trig substitutions that were not part of the curriculum.	154407-154401-9353385
More content about proofs, teach general theories instead of focusing on calculating specifics.	154407-154401-9353424

Done very well. Perhaps a little more probability and statistics in a research context?	154407-154401-9353445
Less emphasis on mathematical proofs More emphasis on calculus (& real-world applications) Clearer IA	154407-154401-9353425
Good, well explained examples of proof and some to work out that are not necessarily well known, but simple proofswould be helpful to impart a better understanding of how to write a proof, especially handy in the statistics section	154407-154401-9353486
N/A	154407-154401-9353530
Focus more on university-level mathematics such as linear algebra, multivariable calculus, and differential equations.	154407-154401-9353531
More higher level subjects	154407-154401-9350650
Introducing basic analytic geometry and maybe basic matrices back into the syllabus. It's quite doable in the 240 hours without moving content out.	154407-154401-9353556
I don't know	154407-154401-9353595
Linear algebra	154407-154401-9352781
The exam format is somewhat different to universty, however the individual assignments were largely different to anything I have to do in my degree.	154407-154401-9353723
make the test compatible with what is in the course	154407-154401-9353894
Greater emphasis on escalation of depth of understanding (i.e. understand A+B in lecture, be able to apply A+B to deduce A+B+C on exam)	154407-154401-9350011
For me it was good enough	154407-154401-9354186
I don't know yet	154407-154401-9354135
The core course should cover more about differential equations	154407-154401-9356270
More time for solving problems, more exercises.	154407-154401-9356325
Further practice with exam taking techniques would have been ideal (my class did not take a practice exam in full exam conditions at any point, ie. the exam papers were 2/3rds length or we had between an extra 1/3rd to double time for the practice)	154407-154401-9356604
More emphasis on calculus in the core study, rather than in paper 3.	154407-154401-9356618
Focus on proof techqniues. Encourage students to understand the proofs, such as Mean value thm, etc.	154407-154401-9356723
By covering previously required material such as differential equations and matrices	154407-154401-9355658
Inclusion of differential equations in core syllabus!!!	154407-154401-9357781
Reduce the syllabus, there is not enough time to prepare correctlly all the topics.	154407-154401-9358180
University-level mathematics requires very rigorous and systematic proving. Maybe the way proving is approached in mathematics HL can be more systematic and rigorous.	154407-154401-9358188
I think there should be less intensity in terms of the difficulty of the course and perhaps more coursework or ways to encourage less confident students. I used to be intimidated by my work load in DP maths HL and so did a lot of other school mates who dropped out within the first few months.	154407-154401-9359305

Well regarding the core I think is really good as it is. I think the schools have to prepare more their teachers	154407-154401-9359430
More applied mathematics into the core curriculum.	154407-154401-9359438
More independent work on problems	154407-154401-9360134
the possibility of choosing an option that is more useful for my university	154407-154401-9360974
Focus on more theoretical Math, teach students how to prove theorems ect., instead of teaching them how to compute exercises, have more time in the IB exam with more complicated problems so that students don't only have to apply their computation skills but also think.	154407-154401-9361090
Proofs! Please improve your proofs curriculum.	154407-154401-9361171
Have more statistics in the core (since I am taking information systems but in class, we did not do the statistics option)	154407-154401-9361694
More focus on proof-based equations.	154407-154401-9362061
The Stewart textbooks for Calculus should absolutely be adopted. I self taught myself Calculus from these textbooks in university and it served me very well. IB HL did not prepare me well at all for complex calculus, using the textbook that my school used.	154407-154401-9362015
I can't think of anything. It prepared me well.	154407-154401-9362568
More time spent on basic calculus (less time on algebra, learning about slope, etc)	154407-154401-9362716
Keep it the same.	154407-154401-9362778
I think different methods of explaining and solving certain classes of problems should be explored; the teacher should not only focus on his/her method, because in university a lot of methods are explored, adn though you might go into a lecture thinking that you're very confident with a certain concept, after the professor explains it in a different way, you sometimes feel that your knowledge of it is shaky. So what I'm trying to say it, explain the new concept from all different perspectives, to that the student actually understands the underlying theory.	154407-154401-9363653
This is difficult to say because Math HL and university math teaches similar concepts in a very different manner.	154407-154401-9363756
Having Logic and Matrix included in the syllabus	154407-154401-9364186
Don't know.	154407-154401-9364987
Differentiation equations	154407-154401-9366502
A better teacher.	154407-154401-9363892
No	154407-154401-9367516
Less Syllabus.	154407-154401-9370155
Nothing	154407-154401-9370916
No	154407-154401-9370780
The study of Linear Algebra and Matrix could be deeper	154407-154401-9371961
It could be more in-depth and all-encompassing	154407-154401-9372522
[illegible]	[illegible]

Discrete Mathematics, with emphasis on combinatorics and graph theory	154407-154401-9372603
It can be improved in parts where it focuses particularly on the content which will be taught in the university for the undergraduate studies	154407-154401-9372697
n/a	154407-154401-9374068
More problem-based learning (PBL) and mathematical investigations.	154407-154401-9374355
More discussion of differential equations.	154407-154401-9381833
No other way. I was fully prepared for university-level mathematics	154407-154401-9382979
Add higher level math, past calculus. E.g. ordinary/partial differential equations, linear algebra, combinatorics, probability.	154407-154401-9384249
Study calculus in a more profound way	154407-154401-9384359
I am convinced that apart from the 'technical' syllabus and theory (which I think is well chosen and shall be demanding) there should be as much focus as possible on tasks, ways and teaching methods that stimulate and help develop independent logical and analytical thinking and problem solving abilities.	154407-154401-9384618
No improvements, very well prepared	154407-154401-9392393
It could be slightly more in depth, as though a lot of topics are covered, there isn't as much detail as there is in theoretical math courses at the university level.	154407-154401-9392640
Expand the topics to include some important ideas like hyperbolic functions,...	154407-154401-9392768
More focused on basic calculus and complex calculus	154407-154401-9392773
More computer based studies	154407-154401-9392784
Including a topic on statistical calculus will improve the curriculum for DP mathematics HL greatly.	154407-154401-9392756
There should be more lessons on how to prove something, like prove that A\(BuC)=(AuB)\(AuC)	154407-154401-9392838
Laplace transforms, ODEs in core syllabus rather than just as an option.	154407-154401-9392818
Better coverage of differential equations (ubiquitous) and long form question solving I.e. Having to work through five or so steps by yourself for a 10 mark question rather than 5 2 mark questions	154407-154401-9392757
More empahasis should be provided on research and deriving the formulae used.	154407-154401-9392941
Inclusion of Mechanics Differential Equations	154407-154401-9393029
The introduction of more proof-based concepts would better prepare me for university mathematics, such as the Delta-Epsilon proof for limits, proof by contradiction, proof by strong induction (even though DP Maths HL had Proof by Induction), and possibly even touching on the topics of Real Analysis, such as introducing the ideas of "what is a number?" and possibly even touching on the topics of axioms and set theory.	154407-154401-9393241
Focus on skills necessary in most mathematical professions and not include things that are generally not used.	154407-154401-9393264
It could include more breadth. There seemed to be a lot of focus on mathematics for someone who would be interested in a Mathematics major as opposed to also including more Statistics, Engineering, or Business-related mathematics.	154407-154401-9393253

Engineering, or Business Related mathematics.	
Go through more proofs as opposed to just give definition/formula.	154407-154401-9393093
More more applications of calculus, especially in physics (e.g. integrating over object to find electric field)	154407-154401-9393320
It could be better to improve the univeristy-level...	154407-154401-9393568
More coursework feedback!	154407-154401-9393632
No comment.	154407-154401-9393704
I feel like the statistics portion should be a bit less rigorous because it is hard for some learners, like myself.	154407-154401-9393708
Demonstrating more links between topics and their real world applications.	154407-154401-9393727
It was good enough as it was	154407-154401-9393747
I think options need to be increased and the difficulty of the test to be decreased. And the students should get to choose which option they want to do by having all the options presented to them on the test, like in physics or chemistry.	154407-154401-9394016
perhaps we could focus on manual calculations for stats instead of always using GDC	154407-154401-9394074
1. Put back matrices, and add linear algebra contents. 2. Make teachers give better instructions regarding IAs. 3. Add the following topics: a.rolle's theorem and mean value theorem, b. deeper treatment of limits, c. linear independence/dependence, d. bivariate/multivariate probability distributions (both discrete and continuous as well as marginal distributions and treatment of independence) e. cofactor expansion for finding determinants. f. polar coordinates g. sampling distribution and central limit theorem, h. more distributions: hypergeometric, geometric, negative binomial, exponential, weibull, and gamma (all used in my engineering courses)	154407-154401-9394083
As mentioned previously, I would like to see a further multivariable calculus portion of the calculus option in HL and FM math. Instead of the confusing Differential Equations portion, which didn't seem to particularly correspond with the rest of the option, I would opt to have a stronger connection with the 3D vector curriculum.	154407-154401-9394131
Get closer to real world situations	154407-154401-9394153
It did a good job of preparing me.	154407-154401-9394178
Order of topics could have been more intuitive, but that's potentially due to the school's choices	154407-154401-9394179
More emphasis on problem solving	154407-154401-9394191
teaching matrix	154407-154401-9394266
More statistics	154407-154401-9394262
More of a focus on complex calculus, conics and hyperbolic functions.	154407-154401-9394288
A stronger emphasis on proving theorems, definitions, the study of axiomatic systems, and the logic/ontologies that go into forming axiomatic systems that govern proofs and proof-writing. This is what mathematics is and what students taking mathematics should strive to	154407-154401-9394295

This is what mathematics is, and what students studying mathematics should strive to understand.	
There should be more indicidual and gorup assignments, instead of most of the content taught to us.	154407-154401-9394562
Having a better base knowledge	154407-154401-9395585
Perhaps more exercises concerning integration	154407-154401-9395712
Include basic questions of topics that are relevant to degree courses e.g. differential equations, mechanics, etc.	154407-154401-9396745
I think it should be catered to the student's interests more. My HL mathematics lecture was full with many who wanted to go into mathematically challenging careers such as astrophysics and engineering. However, I was just an individual who just enjoyed working with numbers. Yes, I could have gone to SL mathematics, but it wouldn't have allowed me to work with numbers the way I wanted to work with them.	154407-154401-9396819
Offer Statistics SL as a Group 6 course and replace the statistics section in Mathematics HL with more vectors and three-dimensional calculus.	154407-154401-9397136
Unlike in the IB program, university level courses' grading doesn't revolve entirely on the tests/exams. A student's learning may not necessarily be always reflected in their test performance. Perhaps more group projects, or solo/research assignments done throughout the semesters to better prepare for the other types of assessments in university.	154407-154401-9397203
More focus on proofs and how to write an elegant, concise proof for higher level math.	154407-154401-9397656
More understanding of math instead of problem solving	154407-154401-9398320
Already completed earlier.	154407-154401-9398576
More emphasis on proofs. And also introduce students to ideas of linear and abstract algebra (in a simple fashion). Have the students understand the idea that although we usually study a specific type of algebra in a specific field, many others exist.	154407-154401-9396009
It's already good.	154407-154401-9399450
NA	154407-154401-9406097
IB Math HL for me was more difficult and rigorous than my college-equivalent math courses.	154407-154401-9406487
At university I went over most of the concepts taught in IB. The difference was that now I was supposed to provide many proofs, derive concepts etc. Also there was little emphasis on logic, which could be improved.	154407-154401-9406678
More depth in calculus	154407-154401-9406071
More support and encouragement to work together	154407-154401-9407527
They left out matrices in the curriculum!	154407-154401-9407779
Mimic how vectors are taught to mathematics and engineering students.	154407-154401-9408503
a greater focus on differential equations	154407-154401-9409429
Introduce a faster pace, or in some way prepare students for learning material at a faster pace.	154407-154401-9409488
Encourage more people not to be scared of it	154407-154401-9409513
Computer based mathematics, simulations, modelling, graphing, solving equations (i.e. Mathematica, Matlab) were at the crux of my engineering courses (as well as Economics	154407-154401-9409516

Degree courses). Other students were introduced to computer maths modelling programs in High School, I had not. So, I didn't have that leg-up advantage.	
Include more proofs and more in depth.	154407-154401-9409650
More differential equations	154407-154401-9409758
not really.	154407-154401-9410224
Slightly change the syllabus (e.g. add matrices and differential equations to Core). Provide with more models, e.g. real-life situations, instead of plain calculations.	154407-154401-9410396
The course was well made, I just didn't have a teacher who was bothered to help students with problems in a few basics. As an IGCSE student, there were certain things I didnt know, and he didn't teach me. I couldn't figure it out on my own.	154407-154401-9410402
I think it did pretty well, just more time to understand the concepts would have helped.	154407-154401-9410427
The issues tend to lie more in the approach to the course by the teaching institution than in its content. Closer observation of the attitudes and programs in place, with a specific focus on what is actually going on rather than what is being reported, is key. Many don't enjoy HL maths because of the apparent high-stress, low-benefit program my institution made it out to be. I loved it, despite my average result.	154407-154401-9410681
I do not know.	154407-154401-9416872
Include real life applications	154407-154401-9418035
No, and this should not be the focus, the course should be a scattergun approach to mathematics learning.	154407-154401-9419729
Fine as it is, University Mathematics is easy.	154407-154401-9419886
Introduce proofs	154407-154401-9419930
With more calculus, maybe even a part in multivariable calculus like the AP has.	154407-154401-9419937
I think that proofs need to be emphasized more: similarly to how the first calculus course for math majors is using the epsilon-delta method.	154407-154401-9425742
Although my grade might not reflect all the knowledge I gained from this class, this program has definitely prepared me for the mathematics that are used in my field of study and my other related interests.	154407-154401-9434482
Have better teacher and possibly help schools get better textbooks, such as the Pearson Mathematics textbook by Wazir and Garry. Also, have a greater support system, such as tutors. I owe a great part of my Paper 3 grade in Math HL (even though I got a 5) to Khan Academy.	154407-154401-9434689
Add matrices and the entire facet of linear algebra	154407-154401-9435685
The curriculum is already rigorous. Perhaps a little bit more into the proofs which I found to be interesting as well.	154407-154401-9444618
teach matrix	154407-154401-9450290
heavier emphasis on calculus, especially first year material	154407-154401-9450640
In my opinion DP Mathematics gives a good background. I am not sure if covering more topics or designing the program in a different way could actually improve something.	154407-154401-9513187

27 You have answered all our questions If you have any other comments, please feel free to add them below.

Showing all 132 responses	
Since graduating from my BA I am now completing my MSc in Economics in which the HL Maths knowledge has been absolutely crucial and I am so glad that I took HL Maths. I still occasionally use my textbook when I need to look up some of the basic maths..	154407-154401-9347966
My teacher ruined the maths course. He couldn't teach.	154407-154401-9348011
Please emphasise on giving students to choose with option they would like to do regarding Paper 3. For instance, it would be better if the exam consisted of all the options and the student would study for the option that they wanted and answer the questions relevant to that option.	154407-154401-9348018
The IB HL Maths needs serious reconsideration to be offering a competitive choice for students. Had I realised the difficulty of the course in comparison to other group subjects I would not have chosen Maths HL as I am confident I could have achieved much higher in another subject despite having A* GCSE, a top grade in FSMQ and regional success in Maths competitions. Since my school was new to the IB guidance was little about this	154407-154401-9348090
IB was a wonderful experience. The Math HL class/exam, though difficult, really did push me and my peers to strive to be better mathematicians. Even if my university degree isn't mathematically based, the kind of knowledge I received from my education through Math HL is indispensable.	154407-154401-9348095
I was the only student in my year doing HL, which explains why the course didn't particularly prepare me for group work. I also mostly self-studied, so learning from lectures doesn't really apply to me.	154407-154401-9348134
Only think I could say that mathematics was the only subject I was disappointed at once joining the IB. With all confidence I could say I was a very good mathematician before joining the IB programme, but once I joined the program, the maths was the only one which I did not enjoy while previously enjoying it.	154407-154401-9348097
My teacher prepared my HL Maths class extremely well, and I genuinely feel I would have performed poorly in my Maths exams if it wasn't for him.	154407-154401-9348232
Ultimately, I must admit that my math HL experience was largely driven by the good fortune of having amazing peers, a brilliant teacher, and a small class size. Furthermore, please note that I have yet to start university beyond an optional bridging unit on proofs that was sent to me by the institution I will be attending and this may have affected some of my responses.	154407-154401-9348056
During university, my degree was not in mathematics but I still took mathematics classes and tutored other math students. I think my interest in doing so was strongly due to my IB HL Maths course.	154407-154401-9348302
Make IB credits more highly regard than AP credits	154407-154401-9348297
IB taught me how to deal with being busy, lots of work, and thinking, but misses out on some specifics.	154407-154401-9348165
Good luck improving the system!	154407-154401-9348314
NA	154407-154401-9348276
Overall I feel that the course has prepared me excellently for my degree programme, even	154407-154401-9348390

Overall I feel that the course has prepared me excellently for my degree programme, even though I did not get the highest grades during the Maths HL course.	154407-154401-9348390
The standard and rigour that IB prides itself in the subject of higher mathematics is a joke. Compared to the rigours of university level mathematics, IB higher is like spoon feeding a toddler.	154407-154401-9348410
While I had some difficulty in the class during high school, it no doubt benefitted me immensely	154407-154401-9348433
In the IB DP, I studied two kinds of art, music and theatre. Both at HL. My grades were, respectively, 3 and 5. My science and social science was Ecosystems & societies.	154407-154401-9348514
I personally enjoyed my HL math classes, although I'm sure some of my classmates would not agree with me.	154407-154401-9348714
HL math gave me a great and vast experience in many topics in mathematics.	154407-154401-9348733
I enjoy learning DP Math HL. The syllabus provided (in 2009-2011) was complete and interesting.	154407-154401-9348167
The IA better prepared me in the application of mathematics to the real world, although it was rather confusing at the beginning.	154407-154401-9349011
For what it's worth, I'm currently a Ph.D. student in mathematics.	154407-154401-9349415
Thanks for doing this research!	154407-154401-9349478
Math HL was one of my favorite courses in the IB!	154407-154401-9349563
(. Y .)	154407-154401-9349685
The IB Diploma was a great experience for my personal and intellectual growth	154407-154401-9349691
Math HL was my second favorite IB class (favorite is chemistry), because so few people take it! Small class teaching is fun and awesome! And the best part was that the teacher did not enjoy math, so she focused on training our exam techniques (helping us get over the obstacle of math HL)! Rather than getting distracted by enthusiasm. :p	154407-154401-9349696
Add matrices to the syllabus	154407-154401-9349886
While I enjoyed being in HL Math, it was very difficult and if I had the option to go back, I probably would've taken SL Math (Methods) instead.	154407-154401-9349908
IB was the worst 2 years of my existence. Everyday was suicidal for me.	154407-154401-9349837
Math HL was the best course I have taken, I recommend to all students interested in mathematics. I wish I had the mindset I have now for mathematics, to have enjoyed the course to the fullest.	154407-154401-9350282
The IB HL Math course is very good, but the exam is just an absolute nightmare. Any student can do well in all the tests, study an insane amount and be able to technically do everything and still get a 4. That's not right. The course either needs to be more courswork assessed, or the exam needs to be made more fair. A person perfectly capable of tackling almost all questions in textbooks should be able to get a safe 6, not struggle to pass at all.	154407-154401-9349713
HL math is the course I'm most happy to have took. It was hard, really hard sometimes, but it has actually made a difference in my life. I'm where I am and doing as well as I am because of HL math and my teacher in the course.	154407-154401-9350288
Maybe adding proofs to the HL Math curriculum isn't entirely feasible for students at the	154407-154401-9350247

secondary school stage, but adding more concepts that could serve as a transition or introduction to a formal study of proofs would be helpful to prepare students for university. For instance, a rigorous epsilon-delta treatment of limits would perhaps not be too difficult for secondary school students to understand.	
Unfortunatelty the reason why i feel comfortable in mathematics now is in no way liked to the couse of math HL (IB), rather it is thanks to other professors and methodologie of studies i have encountered in my degree program at university.	154407-154401-9350303
I really feel that the IB Diploma Program can be significantly improved. I attended a public high school in southern California, U.S.A., and I feel like the same IB classes taught at one school are way different from that of another public high school. I think the program needs to be more unison in teaching curriculum and the way of teacher (for example: teachers should get together so they conduct their own IB classes with the same consistency) Yes, some teachers may be better at explaining certain subjects than others, but I feel like the IB program was not really a good option for me (vs. taking just Advanced Placement Courses). I do admit that the IB program has helped me with handling rigourous courses and time management skills, but I feel like the teaching is a little lacking. Please consider improving. Thank you!	154407-154401-9350390
I think there should be an entrance test for HL Maths. Most of the students in my school had extremely hard time learning. And when some people didnt have hard time the things get uglier, as the teachers sometimes were not comfortable with the students who couldnt understand as quickly as others can. So to solve that I think you should consider an entrancce test. In addition, this survey is a great idea of IBO.I appreciate you for designing this survey.	154407-154401-9350434
Math IB HL was my favorite time in high school. It was partly because of the curriculum and partly because of a great teacher. It made my university sooooo much easier.	154407-154401-9350418
The IB math program was a fantastic experience for me. I wish my university-level mathematics would be more like my experience in IB Math.	154407-154401-9348393
maths HL ruined my life in high school :)))	154407-154401-9350756
Math HL was hard.	154407-154401-9350884
N/A	154407-154401-9350936
Thank you for the survey. HL math is one of the best choices I have made in my school career!	154407-154401-9351005
Maths IA was fun, keep doing that. Be thankful that y'all have good teachers for your curriculum, otherwise, I'm not sure how well it'd turn out.	154407-154401-9351062
Don't let schools teach this course if they have not been preparing their students adequately for it all along. We weren't allowed to drop down to SL Math even though HL Math was a deathtrap.	154407-154401-9348060
HI math was one of my most favorite and enjoyable class in hs	154407-154401-9351190
IB PAPER 3 IS TERRRRRRRRRRRRRRRRIBLE	154407-154401-9348059
Paper 3 topics were way beyond my limits and the criteria(ex: exploration) are hard to fulfill. The difference between SL and HL are unbelievable.	154407-154401-9351613
This is the best course I've ever taken. I have never felt so much reward from a single course, and I am still in touch with my teacher to remind him of this. I am very lucky to have had such a strong instructor for it!	154407-154401-9351856
please do send me any cool findings :) siunce I'm a psych student and all	154407-154401-9352051
I truly appreciate the function of IB DP Mathematics HL, and the IB Programme as a whole. I	154407-154401-9351981

would say that the Mathematics department of the program could certainly use some extents of refinement in terms of what it intends to teach students, especially for those whose future career paths involve a fair to large deal of math in their work. In this regard, perhaps the model used by the AP (Advanced Placement) or university-level curriculum format might be an advisable device for analysis and refinement to make the Mathematics curriculum and question form more conducive to faster and more efficient comprehension and teaching. Otherwise, there are no particularly standing-out issues to name. Thank you, and the works of the IB Programme are truly appreciated.	
I chose my degree almost purely based on my personal interests, but after one year of study I do find that I miss mathematical problem solving to an extent. I feel like my subject at university almost exclusively consists of argueing around a certain topic and does not offer absolute answers. I miss this a little and am thinking of ways to incorporate more mathematics in my life again.	154407-154401-9352355
You should have my email, but if there are any more questions, Id happily talk to someone. Maths has always been my favourite subject, and if i could find a job where i could get paid to sit and solve maths problems, id be the happiest chap alive. Accounting gets me into maths a little bit, but not as much as Id thought.Looking forward to hearing from someone. Change is good. Im glad to have been asked about this. :)	154407-154401-9352461
This was my favorite subject throughout the two years of IB, even though before I didn't like mathematics at all. The exams could have been better structured, but otherwise it was a very pleasant and enriching experience. Overall, an excellent course, and despite the challenge, I would deinitely recommend others to choose the HL option instead of lower levels!	154407-154401-9352578
I haven't actually started university yet, so - for some questions - I just had to predict what the answer would be in a year or two.	154407-154401-9352849
Even two years into my college education, I still find myself using notes from HL Math. It was a really good course; I'm glad I got to take it, even if it was rough at the time.	154407-154401-9348528
GET RID OF PROOFS -- NOT helpful to engineering degree	154407-154401-9352892
The IB has changed my life. I've learnt how to be open-minded, and my mathematics has improved beyond words after taking the Higher Level course. I came into this course with self-doubt, and I never believed I'd do well under all the pressure. But as the course went on, I improved. I learnt more, and I understood what I was learning. It made me realise what I want to study at University. From then on Mathematics became an interest and a passion, even to the very last day of the exams. The result I achieved in mathematics meant more than just getting into university, it was symbolic of my improvement. Higher Level Mathematics is definitely the most demanding and rigorous pre-university maths course in the world. The IB course has pushed me and challenged me over the past two years, but it was for the best. I couldn't imagine taking any other course because the IB didn't just teach me what's written in your textbook, it taught me content that will forever be applicable to the real world, and most importantly: it taught me how to teach others.	154407-154401-9352819
HL Mathematics prepared me well for my BSc in Mathematics, and it is a strong reason why I am currently pursuing an MSc in Mathematical Science.	154407-154401-9353190
Great decision to take the IB instead of the A Levels!	154407-154401-9353294
I believe mathematics higher level helped shape my perception of the world, and I thoroughly enjoyed it.	154407-154401-9353296
Overall, I am glad that I graduated from an IB school, as the skills and experiences I had at that school well prepared me for university, for my development into adult, and for my life of continuous learning.	154407-154401-9353284

The exploration essay was a good idea and I somewhat enjoyed it, but there is a risk of going too far beyond the scope of the course.	154407-154401-9353323
I also currently have Statistics concentration, but I don't feel confident saying that I am good at mathematics.	154407-154401-9353421
HL was perhaps the most enjoyable course of high school and I thank IB for that :)	154407-154401-9353424
Though it was rigorous, I truly enjoyed IB HL Math and it has prepared me well for my future!	154407-154401-9353445
HL math was fun & challenging. A suggestion would be to provide more studying/teaching resources to make the course less intimidating/difficult.	154407-154401-9353465
Great program! HL math was very helpful in my university courses.	154407-154401-9353463
The HL curriculum is (and should be) rigorous and challenging. But I believe there must be a minimum number of hours allocated to teaching, AND a minimum number of hours dedicated to follow up on the Investigation, and to catch problems students may have. It is possible for students without a strong background in maths to complete the HL course, but to do so they MUST have available support systems present. Also, put the matrices back in, as well as differential equations.	154407-154401-9352798
N/A	154407-154401-9353530
Overall, I wish HL Math had focused more on introducing and facilitating understanding of linear algebra, multivariable calculus, and differential equations instead of spreading out between various topics less correlated with university-level mathematics.	154407-154401-9353531
IB helps with transitioning from a cushioned high school lifestyle to hard, cold college.	154407-154401-9350650
I don't work hard in university	154407-154401-9353595
My school only had IB Math HL for one year. I feel that if I had taken the course for two years, I would have had at least one grade higher than what I had received.	154407-154401-9353612
My primary choice for university degree did not have specific subject requirements, so I chose IB DP subjects according to my interest. This included choosing HL Mathematics, since I enjoy being challenged.	154407-154401-9353616
We did not have an actual IB math course, but we had an AP Statistics course that was adapted to help IB students. That may be why I didn't feel as competent. Also, math has always been my weakest point and I never liked it and don't need much beyond basic mathematics for my career.	154407-154401-9353657
I was 2 marks away from a 7 in math HL and that was because of time constraints.	154407-154401-9353688
. thought was going to pass	154407-154401-9353894
n/a	154407-154401-9350011
I think the way you guys teach it needs to change for sure.	154407-154401-9354214
N/A	154407-154401-9356604
The best thing that the IB program could do, specifically for US students, would be to work with colleges to accept IB course work. Many colleges and their advisors have never heard of IB. Due to this my first year and a half will be spent retaking Calculus 1, 2, and 3 that I previously learned from the Maths HL course however my college does not accept it as credit.	154407-154401-9356618
Teachers do not seem to be well equipped in guidance and teaching for the mathematical exploration internal assessment	154407-154401-9355658

Maths HL was a great subject to do. Sometimes it was hard, but in general it was always fun and interesting. Thanks to the teachers!	154407-154401-9349803
Please investigate/improve/renegotiate compatibility with Swedish school system and gradings. Alternatively investigate the quality and performance of IBO Sweden. (more specifically in western Sweden, school code: 001012)	154407-154401-9358862
i think the IB DP in general made me very well prepared for both university and career life	154407-154401-9353489
I can't stress enough that finding or creating a better textbook is important!	154407-154401-9360475
HL math prepared me to be one of the top performers in my university.	154407-154401-9361171
When I say maths HL didn't prepare me for lecture, it's solely because after the amazing learning environment that was focused on small-group and individualized education, learning mathematics in a lecture was near impossible. Math became a social activity, and going to lecture felt off-putting. Calculus III remains the only course I've withdrawn from.	154407-154401-9361649
I took HL math, then Further Math. I enjoyed both immensely. Even though I am studying music performance, the problem solving skills I learned help me every day when I am practicing my instrument.	154407-154401-9362115
Sets, Groups, Relations is a FANTASTIC option and definitely helped me be more prepared.	154407-154401-9362568
i like IA but i figure we need better teachers to teach how to choose topic for and write an IA in all subjects including math	154407-154401-9363584
HL Maths was the most IB course I benefited from.	154407-154401-9363653
Add linear algebra	154407-154401-9366502
N/A	154407-154401-9368568
I'm glad I chose Math HL :)	154407-154401-9382979
I think choosing Mathematics HL was the right choice based on what I'm studying now, and after looking at other students who're far behind my knowledge	154407-154401-9384359
I am overjoyed to have been able to take mathematics HL in high school. It is one of the most interesting topics I saw in high school and it prepared me so well for college. Thank you!	154407-154401-9392756
I enjoyed the course a lot. I love to go back to the whole IB experience. It was challenging when I went through it, but I feel like it made me much smarter and more confident in myself and my abilities. For me, getting a 7 in Math HL was so far the most rewarding thing I have done, only 9% got it, as stated in the M14 statistical bulletin. I enjoyed the whole experience and I think that the IBO is a very professional organization. Thank you, Rami Banna.	154407-154401-9392766
Teacher in my school didn't know english well. It was a huge problem for us. She also didn't know many things and refused to elaborate on things we didn't understand.	154407-154401-9392838
I think math hl should have more of a component to stimulate interest in the students rather than assume they are interested because they are taking math hl, this attitude can result in decreasing interest levels in math for the students, especially when the course is so condense and loaded.	154407-154401-9392840
Replace the math IA with another component	154407-154401-9392839
Teachers should be given more information about the exploration, who inturn should provide more examples and explaination	154407-154401-9392941

more examples and explanation.	
My teacher should take credit not the IB	154407-154401-9393123
IB Mathematics HL really gave me a more solid foundation and understanding, as well as much stronger problem solving skills from the exams, compared to my peers from the US, most of whom took AP Calculus AB or BC, the exam for which is much easier. This is evident from the statistics alone: on average about 50% of students get the top grade of 5 on the BC exam, compared to the about 7% who get a 7 in IB HL Math each year. This is also demonstrated by the fact that I'm doing much better than most of them in college-level math courses. I have so far taken two: Differential Equations and Linear Algebra, and Multivariable Calculus, in which I received grades of A- and A+ respectively. I am currently taking Honors Linear Algebra, and intend to continue taking math classes outside my major requirements and get a minor in Mathematics. Despite all this, getting transfer credit for IB in general, and Math is particular, is still quite an flawed system, and a problem I feel rather strongly about as it affected me personally. For IB Math HL, at my institution Rice University at least, I was originally only supposed to get credit to skip the most basic Calculus I (MATH 101) course, even though AP Calculus BC, which is arguably easier, gives credit for both 101 and 102. Early last school year, I read an article about this exact issue on one of the IB Alumni newsletters, encouraging students to speak up for themselves and ask for IB credit. So I did exactly that, essentially showing that we covered everything in 102 in the Calculus option (which in retrospect is why they couldn't give 102 credit by default, as not everyone would have done that option), and got the credit to allow be to go straight to a 200 level course. This is one area that the IB really could and needs to work to improve: creating better a system for transfer IB credit with US institutions in particular, to make sure students like me get their fair recognition, not just in Math but all subjects, for their not insignificant achievements completing a program as rigorous as the IB diploma in the future. And I know work is being done in the IB to this end. If you would like to have further feedback and input about my experiences, feel free to contact me at haihao.liu@gmail.com [at] gmail.com, or even forward this message to the IB if you feel it could be helpful. Haihao Liu	154407-154401-9393320
I believe many of my qualms with HL math came from my extremely small class size (6) and very tough teacher.	154407-154401-9393564
.	154407-154401-9393568
The IB (especially maths course) put an undue amount of pressure on students. I did not enjoy most of my time doing it. Stopping it has been a relief and I have finally got to enjoy my life. I do not use this lightly but I hated doing it and wish that I had chosen to do A-levels. Nobody I know enjoyed it. A noble idea but badly done to the point of actual harm to students.	154407-154401-9393729
I never felt comfortable doing the IAs. But ultimately, most of the pedagogical failings I suffered is down to the teacher, and there is so much that IB can do.	154407-154401-9394083
I greatly appreciate the research aspects of Higher Level and Further Mathematics, which have prepared me substantially for scientifically research at Yale. In addition, I think that the hollistic approach of Math HL has greatly benefited me in the way that I am able to see mathematics as a whole fit together.	154407-154401-9394131
What I learned in the IB Math HL course was very helpful for me in my university classes	154407-154401-9394178
I have many friends who were good mathematicians who were caused undue stress and worry because of Math HL. Although in the end they got 5s and 6s, their other subjects suffered more than they should. In addition - although satisfied with my grades - I did worse than I expected in other subjects, probably due to my focus on Math.	154407-154401-9394288
Math is my sultry mistress.	154407-154401-9397136
Please include a warning that Math HL may result in teenage depression as was the case with me.	154407-154401-9399162

me.	
I like math and I'm good enough at it to realize that I'm not good enough at it and there are giants above me.	154407-154401-9406135
As evidenced by my responses, I took DP Mathematics HL not because my interests laid in maths. I actually took the course because otherwise my degree was too humanities heavy, and it was the only other class that fit with my schedule. I think my results show that I was never too inclined to use maths later in my education. As a middle school and high school student, I had been naturally good at maths, and thought I could continue on at the Diploma level despite my lack of personal interest. Bad health and a busy schedule contributed to a significant number of absences that caused me to fall behind around the calculus unit. Because of my weak foundation in basic calculus, I continued to struggle through until the final exam, where I was relieved just to pass. I think there should be a disclaimer for the course that those who are not interested in using maths at degree level should strongly consider dropping the course. Personally, it was not the right fit for me.	154407-154401-9406217
Although Maths HL was one of the hardest things I've done in my life, I thoroughly enjoyed the experience. I've learnt more than mathematics in the subject, including things that would help me in further studies. The experience was a challenging and good one, and having achieved a good score at the end was exceptionally great.	154407-154401-9406216
My IB maths teacher was not inspiring at all. At the university I was achieving rather good grades in maths, and I believe it was thanks to our lecturers who could explain concepts in clear and engaging way. In I didn't see much difference between interaction with my teacher and the textbook, but this was rather the problem of my school.	154407-154401-9406678
I'd really love to see people come out of HL math with a love for math. I was just confused, about everything. Everything just started to blend together because there was so much.	154407-154401-9406886
Charles Wu is a teapot	154407-154401-9407779
My HL Math class was very small (2-3 people) so perhaps that affected whether we did group work or not.	154407-154401-9408316
The biggest factor in my enjoyment of IB Math HL was my teacher's legitiamte concern for all students, strong teaching skills, and the enjoyment he took from spending class time with us and comparing problem solving methods.	154407-154401-9408503
One issue with the Mathematics in IB is that there is too big of a difference between math studies and math standard whereas math HL is very close to Math SL. The Math studies students usually struggle with everyday BASIC math! It should prepare them better.	154407-154401-9408619
The IB HL Mathemarics curriculum was one of my favorites during the IB Programme.	154407-154401-9409488
thanks IB. The best thing I learned in my IB Maths course is to tolerate failures.	154407-154401-9409516
I think this is a really good idea, for surveying alumni.	154407-154401-9410396
For me, learning mathematics durying the highschool was a choice, and even when I knew I was going to study something completely different from sciences, I thought that knowing a little bit about mathematics, fisic and chemistry was necesary to understand the world where we live. It is true that during the previous yearse of my studies (and during the first year of my IB cours) I loved mathematics, but my last highschool year (the second one of my IB course) was pretty disappointing, I think becouse of my mathematics teacher. He didn't got to give us explanations enough, and the complete class got worse califications in the final test that in other subjects.	154407-154401-9415173
Do I get a cookie now? No? Dammit!	154407-154401-9418028

Oh and about the comment, ehm, I believe IB Maths HL should reflect similar level of intensity as other maths courses which its compared with (e.g. A-level Maths). Relatively, I spent the most amount of my home study time on maths (~40%), but it still yielded joint lowest grade of 5! Have a great day! (Or night) :)	
I don't know. I want to say so much, but I feel it is of no use now. I would have really really wanted a good teacher. Both teachers are head were not passionate about their subject and thus, uninterested. One had graduated in Math and the other in Mechanical Engineering. I also felt the support system at school was very underdeveloped and I could only rely on Khan Academy. Good teachers are the key.	154407-154401-9434689
IB is the best high school diploma programme and I feel extremely fortunate to have been a part of it.	154407-154401-9437742
HL Mathematics was the best preparation for my university career. Compared to others in my first year, I was advanced in my mathematics knowledge that carried over for about 3 terms! I feel more comfortable about learning new material, and I have developped excellent studying skills. I am very glad and grateful to have taken HL Mathematics.	154407-154401-9444618