

Examiners' Reports: FHS Mathematics and Philosophy Part A; Trinity Term 2004

Part I

A STATISTICS

- Numbers and percentages in each range

As for Part A Mathematics, candidates are not classified in this examination, rather the marks awarded are carried forward for the consideration of Examiners in subsequent years. What is tabulated here is the distribution of candidates by rounded average USM in the ranges associated with the different classes. This is intended only to summarise performance in Part A. For comparison, the final column is an average of performance in the last five year's FHS Mathematics and Philosophy. (It should be noted that there are only mathematics papers in this examination.)

Range	Number	Percentages %	2003 Finals %
70-100	12	50%	40%
60-69	9	38%	46%
50-59	1	4%	13%
40-49	2	8%	1%
30-39	0	0%	0%
0-20	0	0%	0%
Total	24	100%	100%

- There were no vivas and no double-marking. The same system of checking was used as in all parts of FHS Mathematics.
- All 24 candidates take all three papers, namely AC1(P), AC2(P) and AO3(P). Papers AC1(P) and AC2(P) contain respectively short and long questions on the compulsory core subjects, while AO3(P) contains both short and long questions on the optional subjects. All three papers are of two and a quarter hours duration.

B. New examining methods and procedures

- This was the first occasion on which this exam was set. All the Internal Examiners examined in FHS Mathematics in 2003 and where possible the same or similar procedures were followed.
- The Examiners calculate three USMs for each candidate, one for each paper. These USMs are calculated from the raw marks obtained on each paper, rescaled to be a mark out of 100, using the algorithms devised for this purpose by the Examiners in FHS Mathematics Part A, and described in the Chairman's report for that school.
- Paper AC1(P) contains six of the nine questions on paper AC1 in Part A Mathematics, and so is marked out of 60. This raw mark is multiplied by $3/2$ and then the AC1 algorithm is applied to it.

Paper AC2(P) contains six of the nine questions on paper AC2. The best three answers from each candidate are credited, rather than four on AC2 in Part A Mathematics, so that this paper is marked out of 75. This raw mark is therefore multiplied by $4/3$ and then the AC2 algorithm is applied to it.

Paper AO3(P) is split into Part 1 and Part 2. Part 1 consists of short questions, similar to those on AO1 in Part A Mathematics, and candidates are required to attempt at most three, of which the best two are credited, against ten for AO1. Part 2 consists of long questions, a subset of those on AO2, and candidates are required to attempt at most three of which the best two are credited, against four on AO2. There are three stages in calculating a USM for this paper:

- the raw mark on Part 1 is multiplied by $10/3$ and the algorithm for AO1 is applied, to give say P_1 ;
- the raw mark on Part 2 is doubled and the algorithm for AO2 is applied, to give say P_2 ;
- finally the USM for AO3(P) is given as $\frac{2}{7}P_1 + \frac{5}{7}P_2$.

This algorithm was designed with the aim that the long and short options questions contribute to the result in the same proportion as they would for candidates in FHS Mathematics. Something different will be used in 2005, when paper AO3(P) will contain only long questions.

- On paper AC1(P), ten marks are available for 'the assessment of mathematical presentation'. Since AC1(P) contains two sections, each marked by one of the Examiners, a mark out of ten was assigned for each section and these were averaged. These marks were regarded as USMs rather than raw marks and so were not subject to rescaling.

C. Changes in examining methods and procedures currently under discussion or contemplated for the future

Paper AO3(P) will in future contain only long questions.

D. Notice of examination conventions for candidates

The candidates were given details of the examination conventions both in a supplement to their handbooks and in the notices sent round by the Examiners and attached below.

Part II

A. General Comments on the Examination

1. The papers were taken on Thursday morning (AC1(P)) and afternoon (AC2(P)) and Friday afternoon (AO3(P)) of 9th week of Trinity Term, June 25th and 26th, at Ewert House in Summertown.
2. As already noted, questions on the Compulsory Core papers, AC1(P) and AC2(P), are a subset of those on papers AC1 and AC2 in FHS Mathematics, whose composition and marking are described in the Chairman's report for that school. Likewise questions on the Options paper, AO3(P), were composed and marked as were the options questions in Part A of FHS Mathematics.
3. No points on the conduct of the examination separate from those in the FHS Mathematics report need to be made.
4. The introduction of the Part A examination required the writing of a new data-base, for which the Department engaged Alan Dyson. This was very successful. Alan was responsive, helpful and calm and, with the usual initial minor hiccups, the data-base seems to have worked well.
5. The Examiners are also grateful for administrative and secreterial support to Ana Fraser, Keith Gillow, Catherine Goodwin, Becci Love, Linda Mildenhall and Maria Moreno,

B. Equal opportunities issues and breakdown of the results by gender

The table below shows numbers of male and female candidates in the different ranges of average USM in Part A Mathematics and Philosophy.

	Male	Female	Total
70-100	9	3	12
60-69	4	5	9
50-59	1	0	1
40-49	0	2	2
30-39	0	0	0
0-29	0	0	0
Total	14	10	24

C. Detailed numbers on candidates performance in each part of the exam

1. It may be helpful, in the first year of this examination, to summarise what the rubrics for the different papers call for, and to note how far candidates followed these rubrics.

For paper AC1(P), candidates are instructed to attempt all six questions. All but three, who each attempted only five, did so.

For paper AC2(P), candidates are instructed to attempt no more than four questions, of which the best three are credited. The average number attempted was 3.4, and all candidates received credit for three answers.

For paper AO3(P), candidates are instructed to attempt no more than three from each part, with the best two from each part being credited. All candidates received credit for two answers in Part 1, and all but one did so in Part 2. The exception was credited with one question.

In summary, the rubrics were followed quite closely.

2. Means and standard deviations are given below in raw marks and USMs for each of the four papers.

Paper	aveRaw	sdRaw	aveUSM	sdUSM
AC1(P)	44.1	8.5	71.5	11.6
AC2(P)	54.3	11.6	69.3	12.2
AO3(P)short	15.5	3.9		
AO3(P)long	30.8	12.4		
AO3(P)total			68.8	17.9

As noted above, the raw mark on AC1(P) is a mark out of 60, as there were ten marks available for presentation. The average presentation mark was 7.2.

The average USM on each paper is higher than for the corresponding paper in FHS Mathematics Part A.

3. The algorithms converting raw marks to USMs for each paper are given in detail in the Chairman's report for FHS Mathematics.

4. Here we give means, standard deviations and number of attempts on individual problems. On papers AC2(P) and AO3(P) both the number of attempts for which credit was given and the number of ‘unused’ attempts is presented.

For paper AC1(P), where each question is marked out of ten, and all questions should be attempted:

Subject	Question	rawAve	rawSD	Attempts
Algebra	1	7.79	2.28	24
	2	7.39	1.67	23
	3	8.83	0.92	24
Analysis	4	8.50	2.43	24
	5	7.71	1.78	24
	6	4.55	3.53	22

For paper AC2(P), where each question is marked out of 25:

Subject	Question	rawAve	rawSD	Attempts	Unused
Algebra	1	19.41	5.20	17	2
	2	9.63	6.35	8	4
	3	20.15	1.57	20	0
Analysis	4	19.00	4.66	14	2
	5	18.57	6.60	7	1
	6	16.33	6.09	6	1

For paper AO3(P), where each question in Part 1 is marked out of ten, and each question in Part 2 is marked out of 25:

Part 1					
Subject	Question	rawAve	rawSD	Attempts	Unused
Groups in action	A1(P)	6.67	2.94	15	1
Intro to Fields	B1(P)	8.83	1.59	12	2
Number Theory	C1(P)	7.71	1.50	7	3
Integration	D1(P)	6.00		1	0
	D2(P)	8.50	0.71	2	0
Topology	E1(P)	8.40	2.30	5	0
	E2(P)	7.67	2.42	6	0
Multivble Calc	F1(P)			0	0

Part 2					
Groups in action	A2	17.24	6.15	17	1
Intro to Fields	B2	15.70	7.45	10	3
Number Theory	C2	16.86	7.20	7	0
Integration	D3	14.50	7.78	2	0
	D4	1.00		1	0
Topology	E3	14.00	10.56	5	2
	E4	14.40	5.37	5	0
Multivble Calc	F2			0	0

The short question averages on this paper are by and large higher than those on AO1 in FHS Mathematics, which explains at least in part why the average on AO3(P) is higher than that on AO1 and AO2.

Section D. Comments on papers and individual questions

(i) Compulsory Core: papers AC1(P) and AC2(P)

These may be found in the Chairman's report for Part A of FHS Mathematics.

(ii) Options: paper AO3(P)

Specific comments only on questions not set in Part A of FHS Mathematics are given here. Comments on other questions and general remarks may be found in the Chairman's Report on Part A FHS Mathematics.

A: Groups in Action

A1(P). The definitions and bookwork were well done on the whole, but very few candidates could compute the subgroups of the cyclic group of order 9.

B: Introduction to Fields

B1(P). This was well done by 11 of the 14 candidates who attempted it.

C: Number Theory

C1(P). This question was somewhat easier than the other short question (C1), and I think this is reflected by the students average performance. There were no deviations from the mark

scheme here - in fact since nearly everyone did this question in exactly the same way it was particularly easy to mark.

D: Integration

See general comments in Maths Part A report.

E: Topology

See general comments in Maths Part A report.

F: Multivariable Calculus

No attempts.

1 Section E. Comments on performance of identifiable individuals

There are at present no prizes available in this examination and so nothing to report here.

F. Names of members of the Board of Examiners

Prof K P Tod (Chairman), Dr A Dancer, Dr J Norbury, Prof E Rees (external).

Assessors for paper AO3(P):

Dr T Browning, Prof R Haydon, Dr G Luke, Prof M Vaughan-Lee.

The Examiners are grateful to these assessors for their help and cooperation. Paper AO3(P) was a particular burden this year as extra short questions had to be set, in addition to the ones for AO1.

Paul Tod

Chairman of Part A Examiners

28/9/04