

Further Mathematics GA 2: Written examination 1

GENERAL COMMENTS

The number of students who sat for Further Mathematics Examination 1 in 2002 was 20 402, an increase of 5.1% over the 19 403 who sat in 2001. Overall, most Further Mathematics students appeared to be well prepared.

SPECIFIC INFORMATION

This table indicates the approximate percentage of students choosing each distractor. The correct answer is the shaded alternative.

Question	A	B	C	D	E
1	79	3	14	3	1
2	1	1	3	90	3
3	2	2	9	2	85
4	18	6	66	4	6
5	2	5	91	2	0
6	19	40	16	17	8
7	6	5	3	76	10
8	22	41	19	11	7
9	8	25	10	39	18
10	8	6	14	66	6
11	17	20	25	30	8
12	15	52	28	2	3
13	8	12	11	14	55

Modules

Module 1: Number patterns and applications

Question	A	B	C	D	E
1	4	3	1	86	6
2	5	8	20	9	58
3	7	52	12	26	3
4	1	2	8	83	6
5	4	13	17	27	39
6	33	29	5	7	26
7	2	1	86	9	2
8	43	2	4	1	50
9	46	10	17	23	4

Module 2: Geometry and trigonometry

Question	A	B	C	D	E
1	7	76	9	5	3
2	4	49	5	28	14
3	4	18	67	9	2
4	5	10	24	15	46
5	52	8	27	11	2
6	2	7	51	14	26
7	10	48	23	16	3
8	34	14	12	18	22
9	14	44	22	10	10

Module 3: Graphs and relations

Question	A	B	C %	D	E
1	1	2	25	53	19
2	6	22	59	11	2
3	3	1	2	1	93
4	6	10	16	8	60
5	44	12	32	10	2
6	8	9	19	55	9
7	43	29	12	11	5
8	40	32	20	5	3
9	5	17	45	26	7

Module 4: Business and related mathematics

Question	A	B	C %	D	E
1	24	3	3	67	3
2	10	79	7	3	1
3	13	21	23	37	6
4	18	15	50	11	6
5	20	42	14	17	7
6	5	6	61	19	9
7	9	21	45	14	11
8	55	11	12	7	15
9	11	16	29	34	10

Module 5: Networks and decision mathematics

Question	A	B	C %	D	E
1	2	10	76	7	5
2	2	6	2	83	7
3	88	4	4	1	3
4	2	5	79	10	4
5	5	12	5	8	70
6	5	4	9	67	15
7	2	35	9	51	3
8	67	8	15	7	3
9	27	33	13	15	12

Areas of strength and weakness

Core

While the data analysis questions were generally well done, students did not do well on two questions in particular, both of which were related to regression.

The first of these, Question 9, required fitting a least squares regression line to a set of bivariate data. The most commonly chosen alternative (D) indicated that many students were unaware of the importance of identifying the independent variable (in this case, waist measurement) and dependent variable (weight) as part of the process of calculating the equation of a least squares regression line. When determining the equation of the least squares line, it **cannot** always be assumed that the first variable listed is the independent (or x -) variable. Given that this is the second year in a row that students have made the same error, teachers need to highlight this during review work.

The second question that was poorly done, Question 11, involved fitting a three median line to a scatterplot and determining its slope. This is the second year in a row that students have not done well on this sort of question. It needs to be recognised that the three-median line is primarily a graphical method, and this is what should be emphasised, not the use of a formula.

Number patterns and applications

Questions 3, 5 and 6 caused particular difficulties in this module. Question 3, which involved finding the sum of a geometric sequence found students not to recognising a sum was required and instead finding the value of the 5th term. Question 5 was a standard geometric growth problem, but the success rate suggested that students tend to find such problems difficult. From the distribution of the incorrect responses, it is clear that a significant number of students were on the right track, but failed to include the original size of the oil spill in their calculation. Question 6 indicated that

many students had trouble with inter-relating difference equations and arithmetic and geometric sequences. Students should be aware that arithmetic and geometric sequences are special cases of first order difference equations.

Geometry and trigonometry

With the exception of Questions 5 and 8, this module was moderately well done. Question 5 involved scaling up a volume. From the distribution of responses, most students were able to determine the correct scaling factor, 8, but then failed to give their answer in the form required. Question 8 involved working with bearings and some relatively straightforward geometric reasoning. This question turned out to be more difficult for students than might have been expected for this material.

Graphs and relations

This module was well done, with the exception of Questions 7, 8 and 9. In Question 7, most students failed to recognise that the co-ordinates on the correct line would be (x^2, y) and not (x, y) . The low success rate in Question 8 seemed to be a product of students not taking sufficient care in noting the directions of the final inequality. The challenge for students in answering Question 9 was that students had to realise that, while the inspection rates were given in items per hour, the quota for the minimum items to be inspected was given for an eight-hour day.

Business and related mathematics

Questions 3 and 9 caused particular difficulties in this module. Question 3 differed from standard questions in that it asked for the interest paid in a particular year rather than the total interest paid over a number of years. Most students gave answers suggesting that they were well trained in giving answers to the latter rather than the former situation. Question 9 required students to work from first principles and reason their way through a problem applying successive percentage increases and decreases. This difficulty existed for many students but could have been answered by considering the required calculation applied to an initial \$100.

Networks and decision mathematics

This module was well done with the exception of Question 9. This problem required students to locate the minimum cut for a network. They needed to work systematically to ensure that they considered all relevant cuts.