VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

2005 Further Mathematics GA 2: Written examination 1

GENERAL COMMENTS

The majority of Further Mathematics students appeared to be well prepared for examination 1 in 2005, with the average marks for the Core and each of the modules exceeding 50 per cent. The number of students that sat for Further Mathematics Examination 1 in 2005 was 21 815 compared to 21 216 in 2004.

SPECIFIC INFORMATION

The tables below indicate the percentage of students who chose each option. The correct answer is indicated by shading.

Core

Question	% A	% B	% C	% D	% E	% No Answer
1	3	87	6	1	3	0
2	3	1	0	3	93	0
3	6	2	1	74	17	0
4	2	10	80	2	5	0
5	43	13	23	11	9	1
6	10	6	57	15	11	0
7	18	8	2	62	10	0
8	11	10	71	4	2	1
9	13	47	9	7	23	0
10	44	30	8	10	8	0
11	72	7	13	6	2	0
12	2	90	4	1	3	0
13	1	8	13	8	70	0

The Core section was generally well done, with only Question 10 proving difficult for the majority of students. In this question, students were given a set of points on a two dimensional grid and asked to locate the median point. This is a critical skill in both fitting a three median line and in median smoothing. Approximately 44 per cent of students chose option A, which indicated they had determined the median of the set of points with reference to a single number line (the *t*-axis). However, to obtain the correct answer students needed to then determine the median of the set of points with reference to a second number line (the *y*-axis) and then combine the results.

Number patterns and applications

Question	% A	% B	% C	% D	% E	% No Answer
1	5	2	92	1	0	0
2	2	6	16	57	19	0
3	2	8	10	75	4	0
4	2	4	70	8	16	0
5	9	17	12	7	55	1
6	18	72	2	5	3	0
7	49	22	16	6	6	0
8	7	9	65	11	8	0
9	6	43	31	11	9	0

This module was generally well done, with no question causing unexpected difficulties.

Geometry and trigonometry

Question	% A	% B	% C	% D	% E	% No Answer
1	4	4	81	5	7	0
2	7	6	77	8	2	0
3	10	2	11	13	63	0
4	11	60	9	2	18	0
5	7	13	12	25	43	1
6	77	7	6	7	3	0
7	12	68	10	5	5	0
8	3	27	7	52	10	0
9	51	17	13	11	7	1

This module was generally well done with the exception of Question 8, which involved scaling. As pointed out in 2004, this is clearly a continuing area of student difficulty which needs particular attention from teachers. Although 27 per cent of students used the correct scale factor of 1.25 to give the correct answer 45 m (option B), 52 per cent incorrectly used a scale factor of 1.5625 to arrive at an answer of 56.25 (option D). These students failed to take into account the dimensions of the quantities being scaled.

Graphs and relations

Question	% A	% B	% C	% D	% E	% No Answer
1	73	6	18	0	3	0
2	3	12	14	14	56	0
3	19	14	38	12	16	0
4	8	8	56	6	22	1
5	1	2	3	91	2	0
6	15	13	9	6	57	1
7	33	38	13	4	12	0
8	2	4	15	13	65	0
9	23	38	12	17	9	0

This module was reasonably well done, with the exception of Questions 3, 7 and 9.

Question 3 had a correct response rate of 38 per cent. The relatively even distribution of student responses across the four incorrect options suggested that students tried to identify the correct response by inspection, rather than systematically testing each option.

Question 7 also had a success rate of 38 per cent. The key to answering this question correctly was to recognise that in the linear plot the coordinates (2, 4) represent the values of a^2 and b respectively, not a and b. This is known to be conceptually difficult for students, so the high percentage of incorrect responses was not unexpected.

Question 9, with a success rate of only 23 per cent, was clearly a challenging question. The key to answering this question correctly was to recognise that the constant k first needed to be determined using the information given in the stem of the question.

Business and related mathematics

Question	% A	% B	% C	% D	% E	% No Answer
1	3	2	3	90	1	0
2	45	46	1	6	1	0
3	2	81	11	3	3	0
4	73	5	13	5	3	1
5	5	35	20	23	16	1
6	16	8	47	8	20	1
7	26	21	25	20	8	1
8	53	6	4	30	6	0
9	9	20	17	8	46	1

This module was also reasonably well done, with the exception of Questions 5, 7 and 8.

Question 5 had a success rate of 35 per cent. To answer this question, students needed to recognise that, for an interest only loan, the monthly repayment is equal to the interest owed. The answer can then be found as follows:

monthly repayment = interest owed each month = $200\,000 \times \frac{0.085}{12} = \$1416.67$.

A TVM solver or similar program could have been used to answer this question, but a clear understanding of the way in which a TVM solver works was required. In this case, because the future value (FV) is non-zero, it must be given the opposite sign of that assigned to the present value (PV).

Question 7 had a correct response rate of 26 per cent. To answer this question, students could step their way through the problem by calculating the value of the investment at the end of the first year and then using this value as the starting point for the next year and so on. Alternatively, students could have recognised that this form of investment was the reverse of a reducing balance loan. It is most effectively solved using a TVM solver or similar program.

Question 8 had a success rate of 30 per cent. The question was an exercise in applying repeated, but different, percentage changes to the price of an object. If P is the price of the clock on Monday, one method of solving the problem was as follows:
Final price = $P(1 + 0.10) \times (1 – 0.10) \times (1 + 0.20) \times (1 – 0.20) = P \times 0.9504$
Therefore, the final price is closest to 5% lower than the price at the start of the week (option D).

Alternatively, an initial ‘price’, such as $100, could be used and the resulting price change interpreted accordingly.

Networks and decision mathematics

Question	% A	% B	% C	% D	% E	% No Answer
1	6	3	87	2	1	0
2	13	7	7	65	7	1
3	2	94	1	2	1	0
4	2	80	6	8	3	0
5	66	10	9	9	6	1
6	6	12	39	27	14	0
7	15	31	13	33	8	0
8	16	7	51	14	11	1
9	10	43	28	14	4	0

This module was generally well done. Question 7, which had the lowest (33 per cent) success rate, was similar to Question 4 in 2004, which was equally poorly answered. The skill being tested here was students’ ability to make the link between a graph (network) and the real world situation it has been constructed to model (in this case a network of roads). This required students to have a clear understanding of what aspect of the real world situation was being represented in the graph. In this case, vertices represent towns while edges represent the possible road connections between towns.