

# FSMQ 2002

*January Series*



## Report on the Examination

# Free-Standing Mathematics Qualifications

- 
- Managing Money (6981)
  - Making Sense of Data (6983)
  - Calculating Finances (6984)
  - Handling and Interpreting Data (6986)

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*Kathleen Tattersall, Director General*

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# Coursework Portfolios (6981, 6983)

## *Foundation*

### **General**

It was pleasing to note that, possibly as a result of the standardisation meetings, all centres assessed the work within approved tolerances. However, it was noticeable that centres differed widely on the amount of annotation that they gave to the work. Annotating the work is helpful to candidates as it provides them with feedback and this feedback can often identify which parts of the criteria they need to include within the next part of their portfolio.

There was a wide variation in the quality of portfolios submitted from those, the vast majority, who produced excellent work, to a few who showed little enthusiasm for their study.

The problem that did arise in the portfolios was in Theme 2, Using Appropriate Mathematics and Working Accurately. Candidates found it difficult to show explicitly where checking had taken place. It was noticeable that candidates did not score highly in this theme.

It was noticeable that many candidates had been withdrawn, a much greater percentage than in the summer series.

### **Administration**

The paper work this session was often completed correctly. The administrative arrangements re: CAM forms caused minor difficulties; one or two centres sent only one copy.

# Managing Money (6981)

## *Foundation*

### **Paper 6981/2**

#### **General**

There was a substantial entry for this examination this session and the candidates were well prepared for the paper. Many scored highly with a significant proportion gaining over thirty marks out of the maximum of forty, whereas very few achieved fewer than ten marks. The questions causing most difficulty were questions 6 (b), 7 and 8. In question 6 (b), few candidates noticed that there were five parts in total for the ratio. When completing the spreadsheet in question 7, the requirement to convert to pence was rarely noticed. Seldom did a candidate use an estimation as required in question 8.

#### ***Question 1***

- (a) £2.56      (b) £3.31      (c) 24

Part (a) was answered well. In part (b), a number of candidates found the price of 3kg of apples and others truncated  $2.9 \times £1.14$  to £3.30. In part (c), some gave the answer as 4, the number of packs, rather than 24, the number of oranges.

#### ***Question 2***

- (a) £11.74      (b) £10, £1, 50p, 20p, 2p, 2p.

This question was answered well by most candidates.

#### ***Question 3***

- (a) £700      (b) £750

Answers to this question were usually correct. In part (b), the incorrect answers included £740 and a significant number of scripts gave £750.20.

**Question 4**

- (a)(i)  $\frac{4}{5}$  (ii) 0.8 (b) 40%

Part (a) was rarely answered correctly; those who did understand fractions rarely converted their answer to its lowest terms. Part (b) was usually answered well.

Part (b) was often correctly calculated, but many candidates gave the answer as 60% rather than 40%. The answer of 60% was also given by some of those candidates who had appreciated that the questions related to the number of melons not sold, and had already found this number correctly as 80.

**Question 5**

- (a) £151.20 (b) £6.26 (c) £7.91

In general, part (a) was answered well, although a minority left the answer as £151.2 or even £151.02 not realising that amounts of money must be given to two decimal places if money involves pounds and pence.

In parts (b) and (c), a small proportion of candidates did not add the increase to the original rate of pay. In part (c), other candidates converted  $\frac{1}{6}$  into 17%, or even 16%, as they decided not to use the division key on their calculators. These candidates inevitably failed to obtain the required answer.

**Question 6**

- (a) £4.80 (b) £38.40

A few candidates multiplied £48 by 10 in part (a), rather than dividing. Part (b) was very badly attempted as very few candidates noticed that dividing in the ratio 1 : 4 involved adding one to four and obtaining 5 parts. Virtually all candidates just divided by four.

**Question 7**

- (a) Column D; 83.9, 84.4, 89.1 (b) 28.12.01 (c) =  $C2 \times 100 \div B2$

Most candidates divided correctly to obtain all the entries in column D. Unfortunately, they virtually all forgot to convert their answer into pence. They also forgot to give their answer to one decimal place as the question required. Part (b) was usually answered correctly, often using follow on techniques. It was pleasing to note that in this session a greater proportion of candidates appreciated the need to give a formula in part (c) and this formula was given correctly by most of these candidates.

**Question 8**

- (eg) 10% of £90 = £9.

Very few candidates used an estimation to explain why the discount was incorrect.

Of those who did try, a number found 9% of £90 to be  $\frac{90}{9} = £10$ .

**Question 9**

£251.52; £5491.52

This question was usually answered correctly. The common error was to find  $0.48 \times £5240$  rather than  $0.048 \times £5240$ .

# Making Sense of Data (6983)

## *Foundation*

### **Paper 6983/2**

#### **General**

There was a small entry for this paper in this session. The paper was found accessible by the candidates who gained marks varying from 12 to 35 out of the maximum of 40. Candidates appeared to be well prepared for the paper.

#### ***Question 1***

(a) 150 cm (b) 5 cm (c) 10 cm (d) 12.5 cm (e) 46.2 cm (f) 145

This question was well answered by most candidates with only one or two not identifying correctly the median and the mean.

#### ***Question 2***

(a)(i) Coaches (ii) 320 (b)(i) Cars (ii) 12 344 (c) Cars 3.91%, Goods vehicles 9.43%, Coaches 8.43%

Most candidates correctly answered part (a) and the majority could also cope with part (b). However, it was rare to find a completely correct answer to part (c). A number were unable to type correctly into their calculators numbers such as 315547.

#### ***Question 3***

(c) 4.5, the cost of one inch of chain

The scatter diagram technique was well understood but a number of candidates plotted values 1 cm out of position. They usually overcame this problem by drawing a very thick line or a deliberately rough line as the line of best fit. The theory needed in part (b) was known whether or not it fitted their graph. In part (c), candidates recognised the word gradient to mean the slope; however, candidates could rarely calculate it or recognise its meaning.

#### ***Question 4***

(b) Total number of tallies is 20

The tally and the bar chart were completed well with no candidate scoring less than four marks out of six on this question.

**Question 5**

(a)  $\frac{3}{5}$

Most candidates failed to find the required fraction to be  $\frac{3}{5}$ . This was due to a mixture of errors in finding the total number of tickets sold to be 50 and the number of tickets sold costing between £10 and £29.99 to be 30.

The pie chart was usually drawn badly, with only one candidate calculating the angles correctly.

# Coursework Portfolios (6984, 6986)

## *Intermediate*

### **General**

It was pleasing to note that, possibly as a result of the standardisation meetings, the two centres that entered candidates at this level this session assessed their work within approved tolerances.

It was disappointing that the portfolios on Handling and Interpreting Data rarely involved the use of statistical techniques that were not contained in the Foundation level data unit. The portfolios did however include an analysis of a statistical report as required.

The portfolios completed for the Calculating Finances unit showed a greater involvement with the topics on the intermediate unit.

Work moderated included many substantial portfolios but there was, on Handling and Interpreting Data, a significant proportion of portfolios which were not complete. Naturally this caused the marks which they were given on the portfolios to be low. Often these portfolios contained work of a high standard on those parts of the portfolios that they had completed.

### **Administration**

Centres carried out their administration well.

# Calculating Finances (6984)

## *Intermediate*

### **Paper 6984/2**

#### **General**

Candidates found this paper accessible and of the correct length. There were a number of good scripts, although none gained more than forty marks out of a possible fifty.

Topics which candidates found most difficult included back percentages tested in question 7 and the use of formulae in question 9. The correct method required to find National Insurance contributions in question 6 was rarely used.

#### ***Question 1***

(a)(i) £164.71 (ii) £5929.56 (b)(i) £25.15 (ii) £905.40

Part (a)(i) was usually found correctly, although in part (ii) there was a premature rounding of .56 into .6; part (b)(i) was also usually correct. In part (b)(ii) those candidates who multiplied (b)(i) by 36 were generally successful, but a number found the total repayments and subtracted. These candidates were more likely to make arithmetic errors.

#### ***Question 2***

3.50 – 3.55 p.m. or 3.20 – 3.30 p.m. Graph has steepest gradient

The time of day was usually found within the ranges accepted. Unfortunately, candidates did not mention gradient or slope in their justification of the time.

#### ***Question 3***

(a) £355.25 (b) £67.10 (or £67.09) (c) 29.17%

In part (a), few candidates found the total invested to be £165. Without this they struggled to find the amount required. In part (b), many found 97.3% of £2485 but disbelieved their answer and gave anything connecting these two figures. In part (c), the reduction of £7 was frequently seen, but the requirement to find £7 as a percentage of £24 was beyond most candidates.

**Question 4**

- (a) £440.50 (b) £24.54 (or £24.53)

The total cost was usually correct although a number added the £38 insurance before finding the discount. Most candidates completed part (b) successfully.

**Question 5**

- (a) £36 409 (b) £9046

This question was attempted well. Part (a) was usually correct and candidates found £188 and £6054.40 as the amounts paid at 10% and 22%. Unfortunately, many candidates had difficulty in finding the £7009 to be taxed at 40%.

**Question 6**

£94.33

All candidates found £1500, the monthly pay. Few however subtracted £377, being the amount earned before National Insurance was charged.

**Question 7**

£4.25

Very few candidates equated £89.25 to 105% of the cost before VAT was added. Those who did, rapidly changed back to simply find 5% of £89.25.

**Question 8**

14%

This question was poorly attempted, most candidates simply subtracting 40% from 90%.

**Question 9**

4.12%

Most candidates obtained  $\sqrt[4]{\frac{9872}{8400}} - 1$  but very few could evaluate the root.

**Question 10**

- (a) 0.12 (b) £240

Part (a) was completed well. However, candidates rarely multiplied 0.12 by £2000 to find the minimum premium.

# Handling and Interpreting Data (6986)

## *Intermediate*

### **Paper 6986/2**

#### **General**

A few candidates produced good scripts but a significant proportion, who would have been entered more appropriately at Foundation Level, found this paper challenging. These weaker candidates often struggled with the scatter diagram in question 1 and then showed little idea on how to approach the comparative pie charts in question 2. This paper reflected the requirement that the Intermediate tier is broadly equivalent to GCSE grades C to A\*. Candidates who are unable to handle both scatter diagrams and cumulative frequency (question 3) were unlikely to have gained much satisfaction from the course.

#### ***Question 1***

(b) positive      (d)(i) 24.5    (ii) a long way from the line of best fit

Some candidates struggled to find suitable scales and some even quoted 19, 20, 27, 28 on the thick lines of the diet axis. Most candidates appreciated that the correlation shown was positive and the majority drew their line of best fit through the given mean point. Some used the mean as (23.6, 22.6) instead of (22.6, 23.6) as given. However, many candidates made no attempt to position their line through the middle of the points that they had plotted. In part (d)(i) most gave a correct result from their line. Their comments in part (d)(ii) rarely reflected the fact that the data for Portugal was clearly different from the data for the five European countries given.

#### ***Question 2***

(a) 6.7 inches    (b) 156 inches    (c) 44.7 inches    (d) In Edinburgh, the summer is wettest; at Ben Nevis, the winter is wettest.

A significant proportion of candidates did not measure the angle as  $96^\circ$ . In part (b), only a minority appreciated the need to measure the two radii and of these a significant proportion did not measure

them accurately (2cm and 5cm). Relatively few candidates remembered to multiply  $\left(\frac{5}{2}\right)^2$  by the

amount of rain in Edinburgh that was 25 inches. Hence few candidates scored well in parts (b) and (c). In part (d), most candidates described the differences in the amount of rainfall instead of the seasonal differences in the proportion of rainfall. Hence the comment: “there is more rain in the summer in Edinburgh than on Ben Nevis” was frequently seen.

**Question 3**

(a)(i) 117 (ii) 103 (iii) 132 (iv) 29 (c) The medians are the same; the range in Musical Moments is larger.

A significant minority of candidates simply gave 60, 30, 90 as the median, lower quartile and upper quartile values. Nevertheless, these candidates were often able to draw an accurate box and whisker diagram in part (b), incorporating the real median and quartiles. The whisker ending at 180, rather than 190, was often missed. Comments in part (c) were rarely appropriate. The box and whisker diagrams reflect medians, quartiles and ranges, not mean values.

**Question 4**

(a) Column D, 41.2, 41.0, 40.4 (b) =  $B4 * 1000 / C4$  (c) Length of rail journeys is decreasing slowly

Part (a) was rarely completed correctly, with most candidates dividing the numbers given regardless of magnitude. Hence  $770 \div 31.7$  gave an answer which was possibly sensible, and thus was far more common than the correct  $31700 \div 770$ . Candidates who did divide the correct way often misplaced the position of the decimal point. Formulae given in part (b) rarely included the 1000. In part (c), most gave a sensible interpretation for their data.

**Question 5**

(b) Both car parks are more popular at weekends.

A significant proportion of candidates answered part (a) well. Occasionally, the stem and leaf diagram was subdivided in its stem with, for example, 4 appearing twice, once as 4 meaning 40 – 45 and the other 4 meaning 46 – 49. In part (b), bad weather on the other days was the only sensible comment seen, and that was relatively rare.

**Question 6**

Graph starts at 230, (e.g.) different weights

Most candidates quoted a sensible way in which the graph was misleading although few stated that the scale on the vertical axis started at 230.

**Question 7**

(a) 6 symbols link with 4.5% but 7 symbols link with 5%, hence symbols do not link with percentages, or leaves for EU and World are the same.

(b) no year when data for EU and World given, or unusual time intervals.

Most candidates assumed that the percentage had to match the number of leaves. Only a few candidates noticed that most years shown used one leaf to represent 0.75% whereas for 1924, the representation was 7 leaves for 5%. In Part (b), most recognised that the years chosen appeared to be random in their selection.

# Mark Ranges and Award of Grades

## Foundation Level

### 6981 Managing Money

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Coursework Portfolio 6981/1	51	51	20.7	11.6
Written Paper 6981/2	40	51	23.8	7.5

Grade	Max. Mark	A	B	C	D	E
Scaled Boundary Mark 6981/1	51	40	32	24	17	10
Boundary Mark 6981/2	40	33	28	24	20	16

Provisional statistics for the qualification as a whole (329 candidates)

	A	B	C	D	E
Cumulative %	2.1	13.7	33.1	54.1	77.5

### 6983 Making Sense of Data

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Coursework Portfolio 6983/1	51	51	29.8	4.4
Written Paper 6983/2	40	51	23.4	8.1

Grade	Max. Mark	A	B	C	D	E
Scaled Boundary Mark 6983/1	51	40	32	24	17	10
Boundary Mark 6983/2	40	31	27	23	19	16

Provisional statistics for the qualification as a whole (5 candidates)

	A	B	C	D	E
Cumulative %	0.0	40.0	60.0	100.0	100.0

*Intermediate Level***6984 Calculating Finances**

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Coursework Portfolio 6984/1	51	51	23.1	8.6
Written Paper 6984/2	50	51	21.2	7.6

Grade	Max. Mark	A	B	C	D	E
Scaled Boundary Mark 6984/1	51	40	32	24	17	10
Boundary Mark 6984/2	50	38	33	28	23	19

Provisional statistics for the qualification as a whole (13 candidates)

	A	B	C	D	E
Cumulative %	0.0	0.0	30.8	69.2	84.6

**6986 Handling and Interpreting Data**

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Coursework Portfolio 6986/1	51	51	19.8	9.3
Written Paper 6986/2	50	51	19.3	8.9

Grade	Max. Mark	A	B	C	D	E
Scaled Boundary Mark 6986/1	51	40	32	24	17	10
Boundary Mark 6986/2	50	39	34	30	26	22

Provisional statistics for the qualification as a whole (125 candidates)

	A	B	C	D	E
Cumulative %	0.0	1.6	16.8	27.2	56.0

## Definitions

**Boundary Mark:** the minimum (scaled) mark required by a candidate to qualify for a given grade.

**Mean Mark:** is the sum of all candidates' marks divided by the number of candidates. In order to compare mean marks for different components, the mean mark (scaled) should be expressed as a percentage of the maximum mark (scaled).

**Standard Deviation:** a measure of the spread of candidates' marks. In most components, approximately two-thirds of all candidates lie in a range of plus or minus one standard deviation from the mean, and approximately 95% of all candidates lie in a range of plus or minus two standard deviations from the mean. In order to compare the standard deviations for different components, the standard deviation (scaled) should be expressed as a percentage of the maximum mark (scaled).