AQA

LEVEL 3 MATHEMATICAL STUDIES

(1350)

Specification

For teaching from September 2014 onwards
For exams in May/June 2016 onwards

Subject content

3.1 Analysis of data
3.2 Maths for personal finance
3.3 Estimation
3.4 Critical analysis of given data and models (including spreadsheets and tabular data)
3.5 The normal distribution
3.6 Probabilities and estimation
3.7 Correlation and regression

Assessments

Paper 1

What's assessed:

- 3.1
- 3.2
- 3.3

Assessed:

- written exam: 1 hour 30 minutes
- 60 marks
- scientific calculator or graphics calculator allowed (see section 5.9 for more information on calculators).

Questions:

Copy of Preliminary material available in advance on eAQA and clean copy of Preliminary material to be provided in examination room.

Formulae sheet available.

No optional questions.

Paper 2A: Statistical techniques

What's assessed:

- 3.4
- 3.5
- 3.6
- 3.7

Students will be expected to draw on the mathematical content of Paper 1.

Students will be expected to develop and demonstrate confidence and competence in the understanding and application of mathematical modelling in the solution of problems related to the use of statistical techniques.

Assessed:

- written exam: 1 hour 30 minutes
- 60 marks
- scientific calculator or graphics calculator allowed (see section 5.9 for more information on calculators).

Questions:

Copy of Preliminary material available in advance on eAQA and clean copy of Preliminary material to be provided in examination room.

Formulae sheet available.

Statistical tables available.

No optional questions.

Paper 1 – 60 marks in 1 hour 30 minutes

Analysis of data

Data and sampling
A fair representation?
Measures of spread
Box and whisker plots
Cumulative frequency graphs
Histograms
Choosing methods

Modelling and estimation

Modelling the Gulf Stream
Standard form
Estimation technique 1 – scaling
Estimation technique 2 – subdividing
Estimation technique 3 – stating assumptions
Useful facts and formulae
Lessons from history

Personal finance

Budgeting
Income tax
Your payslip
Controlling debt
Annual percentage rate (APR)
Mortgages
Savings and investments
VAT and other percentages
Exchange rates
Inflation

Paper 2 – 60 marks in 1 hour 30 minutes

Critical analysis

What is critical analysis?
Clarity
Selectivity of data
Sampling and trialling
Misleading with data
Coincidence?
Critical analysis of models

Confidence intervals

Quality control
The sample mean
Confidence intervals

The normal distribution

Features of a normal distribution
The standard normal distribution
Calculating probabilities

Correlation and regression

Lines of best fit
Regression lines
Pearson's product moment correlation coefficient

E2: Fermi estimation

Learning objectives

You will learn how to:

- Make fast, rough estimates of quantities which are either difficult or impossible to measure directly.

Example 1

How many piano tuners are there in Liverpool?

To estimate an answer, assumptions are needed about the number of pianos in Liverpool. The number of pianos will depend on the number of people, so start by thinking about how many people there are in Liverpool. Here is a set of assumptions to be used in the estimate.

1 There are about 2 000 000 people in the Liverpool area.

2 There are on average five people in a household.

3 About one household in 50 has a piano that is tuned once a year.

4 A piano tuner can tune two pianos a day.

5 A piano tuner works 5 days a week for 50 weeks.

- From assumptions 1 and 2, there are $\frac{2\,000\,000}{5} = 400\,000$ households.
- From assumption 3, the number of pianos is $\frac{400\,000}{50} = 8000$
- From assumptions 4 and 5, one piano tuner can tune $2 \times 5 \times 50 = 500$ pianos in a year.

Therefore there should be about $\frac{8000}{500} = 16$ piano tuners in Liverpool.

June 2007 Paper 1

4 Estimate the number of litres of liquid drunk by the population of a small English town in one month.

State any assumptions that you have made.
You **must** show your working.

[5 marks]

Assumptions

5000 = Population of a small English town

2 litres = Average number of litres drunk by a person each day

30 = days in a month

Calculation

$2 \times 5000 = 10000$ Amount of litres of liquid drunk per day by a small town

$10000 \times 30 = 300,000$

4	Makes an assumption about number of litres per person per day in the range 1 litre to 10 litres (or ml equivalents) **and** assumes a number of days in a month in the range 28 to 31 **and** Makes an assumption about number of people in a small town in the range 1000 to 100000	B3	Must state units eg Minimum for B3 (Assume) 5 litres, 28 days,15000 people or B2 for 2 correct assumptions (one missing or not in range) eg (Assume) 3 litres, 30 days, 300000 people or B2 for all 3 values within range but not stated as assumptions eg 4 × 30 × 10000 seen gets B2 M1 or B1 Any one correct assumption stated eg drink about 3 litres per day or Multiplication of 3 values with 2 in range and no units eg 12 × 31 × 20000
	Multiplies their 3 values together	M1	This may be done in two steps
	Accurate answer to their calculation	A1ft	ft their 3 values May be rounded

June 2008 Paper 1

4 Estimate how many hours of sleep the average person in the UK has in their lifetime.

State any assumptions you make.

You **must** show your working.

[5 marks]

Assumptions

8 = Average hours of sleep a person get each night

70 yrs = Life expectancy of a person in the UK

365 = nights in a year

Calculation

$8 \times 70 \times 365 =$

Makes an assumption about number of hours sleep per night for an average person	B1	Allow 6 – 10
Makes an assumption about life expectancy for average adult	B1	Allow 65 - 90
Uses 365 or 365.25 days or a combination of 365 and 366 days in the ratio 3 : 1 (for leap years) or uses 52 weeks	B1	Uses a suitable number of days or weeks Allow rounded values if explanation is given eg 52 weeks in a year so that's about 50
their hours per night × their days per year × their number of years eg 9 × 365 × 75 eg 8 × 7 × 52 × 85	M1	their days per year do not have to be correct
Accurate answer for their values	A1ft	May be rounded Do not accept decimal answers

Coffee

A Core Maths question

4 (c) Estimate how far a person is likely to walk in their lifetime.

Show details of your assumptions and calculations.

[6 marks]

(AQA: Mathematical Studies)