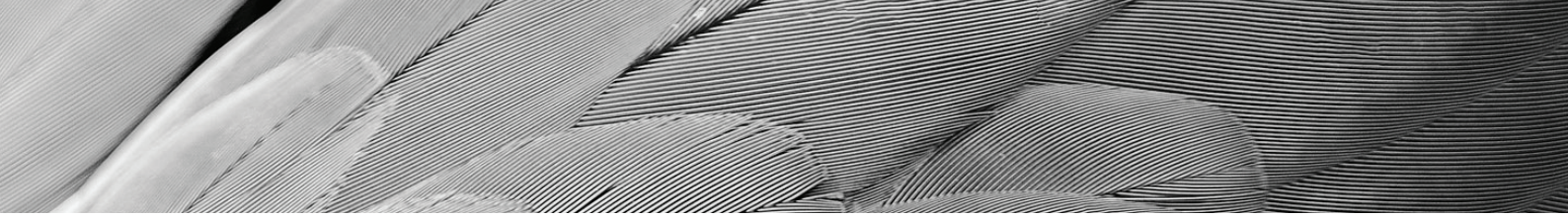


SET Z

Level 3 Certificate
MATHEMATICAL STUDIES

Paper 1

Mark scheme

OXFORD

Glossary

The marking scheme is given to indicate roughly where marks are likely to be awarded. The scheme does not necessarily reflect the precise allocation of marks that would be used by AQA Examining teams.

M	Method marks: awarded for evidence of a correct method which could lead to a correct answer.
A	Accuracy marks: awarded for a correct answer that follows from a correct method. To get these marks a correct method must be explicitly or implicitly shown; a correct answer alone gets no marks.
B	Marks that are awarded independently of any method.
ft	Follow through: marks awarded for an answer that uses correct working following a mistake in an earlier step.

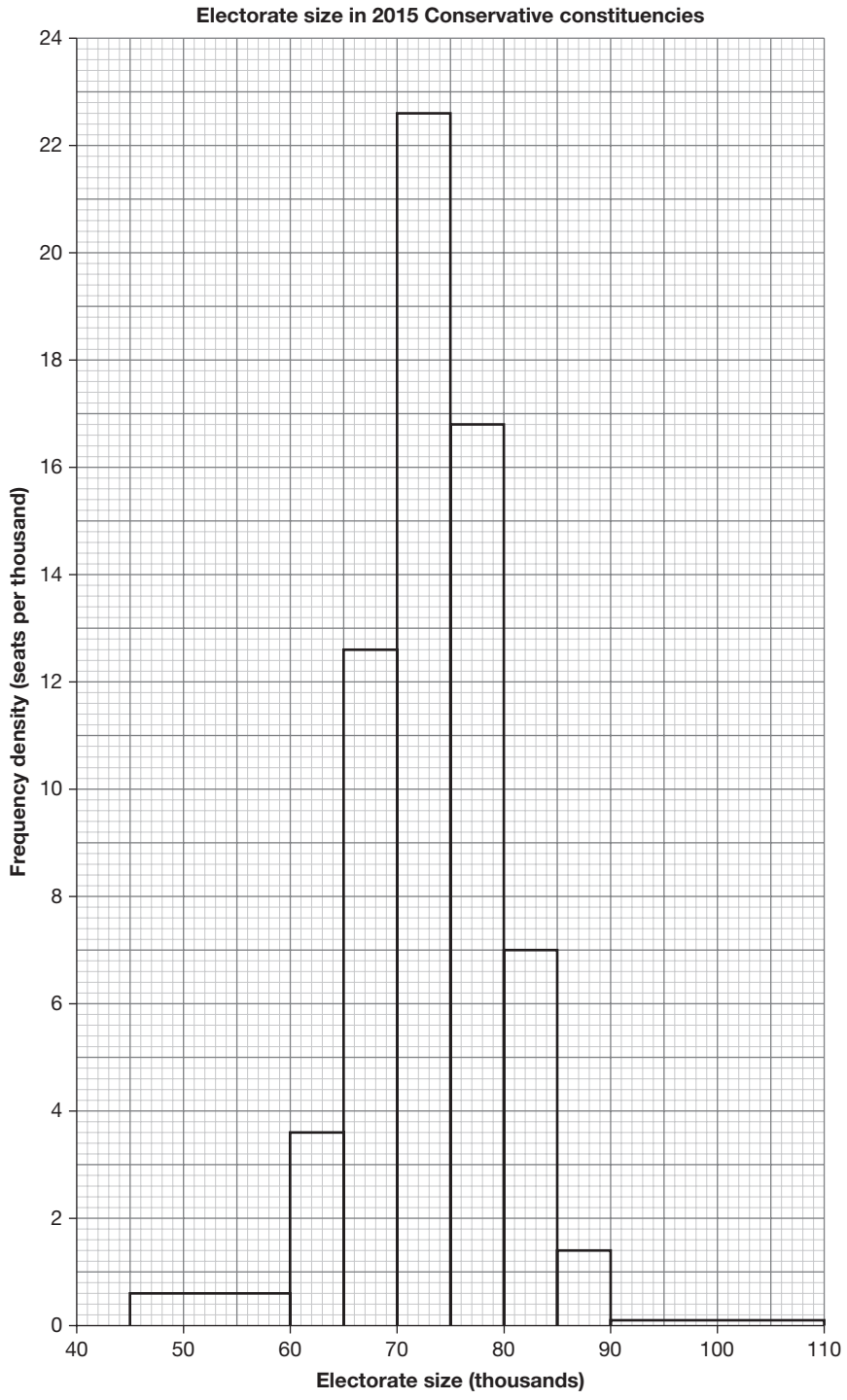
Mark scheme Paper 1

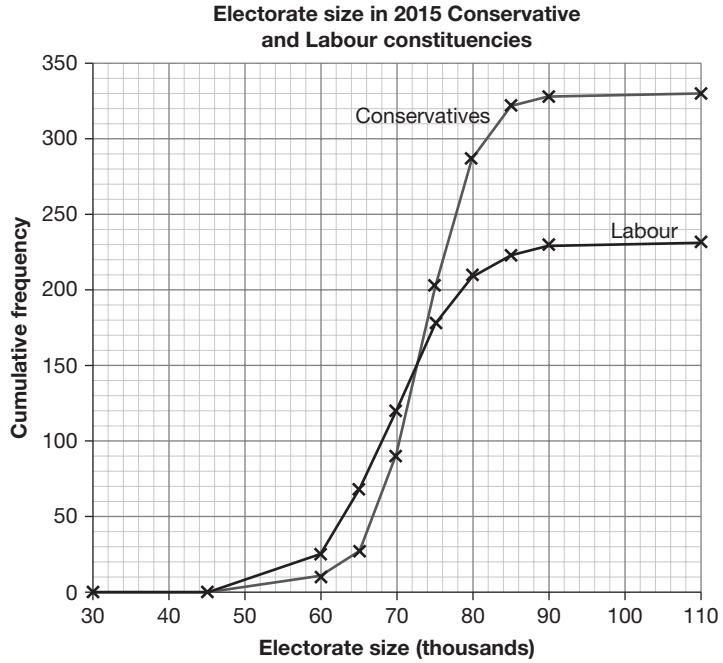
<table>
<tr><th>Question</th><th>Answer</th><th>Mark</th></tr>
<tr><td rowspan="3">1 (a)</td><td>Sample is too small.</td><td>B1</td></tr>
<tr><td>Sample not stratified/not taken in proportion to group size.</td><td>B1</td></tr>
<tr><td>(Other reasons may be allowed eg select according to type of holiday/length of stay etc.)</td><td></td></tr>
<tr><td rowspan="3">1 (b)</td><td>Use of a larger sample (for example 50).</td><td>B1</td></tr>
<tr><td>For a stratified sample of 50:
<table><tr><td>Country</td><td>France</td><td>Spain</td><td>Italy</td></tr><tr><td>Number in sample</td><td>$\frac{246}{719} \times 50$</td><td>$\frac{354}{719} \times 50$</td><td>$\frac{119}{719} \times 50$</td></tr></table></td><td>B1

M1</td></tr>
<tr><td>Select 17 holidaymakers at random from those who went to France, 25 from those who went to Spain and 8 from those who went to Italy.
(Clear instructions of how to carry out a systematic or random sample may also be allowed.)</td><td>A1
(ft from sample size)</td></tr>
<tr><td rowspan="2">2 (a)</td><td>Multiplying factor to add interest of 1.2% each month is $1 + \frac{1.2}{100} = 1.012$</td><td>B1</td></tr>
<tr><td>After multiplying by this factor, the £150 paid by Jack is subtracted to give the new balance.</td><td>B1</td></tr>
<tr><td>2 (b)</td><td><table><tr><th>n</th><th>B_n</th></tr><tr><td>0</td><td>790</td></tr><tr><td>1</td><td>649.48</td></tr><tr><td>2</td><td>507.27</td></tr><tr><td>3</td><td>363.36</td></tr><tr><td>4</td><td>217.72</td></tr><tr><td>5</td><td>70.33 or 0</td></tr></table></td><td>B2
(B1 for rounded or truncated values from 507.2737…)</td></tr>
<tr><td>2 (c)</td><td>Total amount paid = 5 × £150 + £70.33 = £820.33</td><td>M1 A1</td></tr>
<tr><td>2 (d)</td><td>Interest = £30.33
Interest as a % of original price = $\frac{30.33}{790} \times 100 = 3.8\%$ (1dp) or 3.84% (3sf)</td><td>M1 A1</td></tr>
<tr><td rowspan="4">3 (a)</td><td>Median price at Leeds is approximately £130</td><td>M1 A1</td></tr>
<tr><td>LQ at Leeds is approximately £114 and UQ at Leeds is approximately £167</td><td>M1 A1</td></tr>
<tr><td>Student accommodation prices are on average more expensive in Birmingham as the median is about £3 higher at Birmingham than Leeds.
(Or similar statement comparing median values.)</td><td>B1 ft</td></tr>
<tr><td>Student accommodation prices are more widely spread in Birmingham since the IQR at Birmingham ≈ £185 – £118 = £67 is higher than the IQR at Leeds ≈ £167 – £114 = £53
(Or similar statement comparing IQR or range.)</td><td>B1 ft</td></tr>
<tr><td>The cheapest price at Leeds is about £5 lower than at Birmingham.
(Or other statement comparing the cheapest and/or most expensive prices eg The most expensive accommodation at Birmingham is about £50 more.)</td><td>B1</td></tr>
</table>

3 (b)	Realistic prices.	B1
	Calculation for 1 week.	M1 A1
	(For example: Breakfast for 1 week: cereal (≈ £1.50) + milk (≈ £2) + loaf (≈ £1) + butter (≈ £1) + jam (≈ £1) + coffee (≈ £1) ≈ £7.50 Evening meal for 1 day: Meat (≈ £2) + vegetables (≈ £1.50) + drink (≈ 50p) ≈ £4 Total ≈ £7.50 + 7 × £4 = £35.50)	
4	Annual income = (£)1980 × 12 = (£)23 760	M1
	Taxable income = (£)23 760 – (£)10 600 = (£)13 160	M1
	Income tax = (£)13 160 × 0.2 = (£)2632 per year	M1
	Income tax per month = $\frac{(£)2632}{12}$ = (£)219.33	M1
	National Insurance = (£)(1980 – 672) × 0.12 = (£)156.96	M1
	Take home pay = (£)1980 – (£)156.96 – (£)219.33 = (£)1603.71	M1 A1
	Monthly saving = $\frac{(£)1603.71}{5}$ = (£)320.74 = £320 to nearest £10	B1 ft
5 (a)	(£)1600 × 1.028^5 = £1836.90	M1 A1
5 (b) (i)	AER	B1
5 (b) (ii)	2.96 ÷ 12 = 0.2466…	M1
	$1.002466…^{12}$ = 1.03000489…	M1 A1
	AER = 0.0300…. = 3.00%	B1
6	Conservative data mid-values: 52.5, 62.5, 67.5, 72.5, 77.5, 82.5, 87.5, 100	B1
	Conservative constituency mean size ≈ 73.3 thousand (1dp)	B1
	Conservative constituency standard deviation ≈ 6.8 thousand (1dp)	B1
	Labour group frequency = area of bar (eg 15 × 1.7 or 5 × 8.6)	M1
	Labour group frequencies: 26, 43, 52, 57, 32, 15, 5, 4	A2 (A1 for 4, 5 or 6 correct)
	Labour constituency mean size ≈ 69.4 thousand (1dp)	B1
	Labour constituency standard deviation ≈ 9.1 thousand (1dp)	B1
	(or allow B2 for standard deviation of **all** constituency sizes ≈ 8.1 thousand (1dp))	
	Constituencies are on average about 4000 larger in Conservative seats (or similar statement comparing mean values).	B1 ft
	The standard deviation(s) show that constituency sizes are variable (especially those of Labour seats since the standard deviation for Labour constituencies is about 2300 more than Conservative constituencies).	B1 ft

Other methods would be acceptable
(eg drawing a second histogram or comparing cumulative frequency graphs).



		
7 (a)	Continuous, primary	B1 B1
7 (b)	Reasonable estimate of number of dwellings with roofs eg 20 000	B1
	Reasonable dimensions for typical roof footprint eg 10 m by 6 m	B1
	Summer rainfall from chart 72, 86, 87, 65 (mm)	B1
	Total rainfall in metres = 0.31 (m)	B1 ft
	Calculation of water collected from one dwelling = 'their area' × 'their depth' × 0.8	M1
	eg 60 × 0.3 × 0.8 ≈ 14 (m^3)	A1 ft
	Total amount for town	M1
	eg 20 000 × 14 = 280 000 m^3 or 280 million litres	A1 ft
	Other reasonable consideration (eg some people live in flats, have no means of collecting water)	B1