Level 3 Certificate
MATHEMATICAL STUDIES

Paper 2B

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 2B

Question	Answer	Mark
1 (a)	James has omitted the 0 and two 35s from his stem-and-leaf diagram / the stem-and-leaf diagram only shows 27 of the 30 data values collected. This has led to an incorrect median.	B1
	Possible improvements (any 2): Include a key. Give more information in the title to show what the stem-and-leaf diagram is about. Ask students to record times for more than one day.	B2
1 (b)	Median = $\dfrac{39 + 41}{2}$ = 40 minutes	M1 A1
2	The Transport Price Index includes many forms of transport, not just rail. Lucy has assumed that changes in rail costs are in line with this general price index.	B1
	The calculation of 14.3% is correct, but this increase is 14.3% of the base year price (when the CPI was 100), not a 14.3% increase of the 2010 price.	B1
	Lucy also subtracted incorrectly: 480 – 68.64 = 411.36 (not 412.36)	B1
	2010 price = $\dfrac{122.1}{136.4} \times 480 = 429.68 \approx £430$ (Other methods are possible.)	M1 A1
3 (a) (i)	365 (or 366) × 1.25 ÷ 1.5 = £304 or £305 (nearest pound) or approx £300	M1 A1
3 (a) (ii)	The newspaper report must be about relative poverty,	B1
	as £300 per annum is far lower than household incomes in the UK.	B1
3 (b)	Median disposable, equivalised household income	
	= 50th percentile = £319	B1
	Relative poverty threshold = 60% of £319 = £191.40 The 'children in poverty' are those living in households with incomes less than £191.40	M1 A1
	Suppose median household income fell, to say £300, whilst the incomes at the bottom end of the scale remained the same.	B1
	60% of £300 = £180, so only those living in households with incomes less than £180 would now be said to be living in poverty. This would be fewer households than before, so the official spokesperson is correct.	B1 B1
	(From the table there are now less than 20% below the poverty threshold whereas previously there were more than 20%.)	
4 (a)	If it is a legal obligation	B1
	or if you cannot afford to take the risk.	B1
4 (b)	Extra benefit £100	B1
	Expected extra cost £1000p	B1
	Expected extra cost < extra benefit when 1000p < 100	B1
	If $p < 0.1$ then take the option	B1
	unless you cannot afford the possible £1000 cost.	B1
	If $p > 0.1$ then do not take the option.	B1
	($p = 0.1$ can be included in either of these choices.)	

5 (a)		M1, A2 (2, 1, 0 reducing by number of errors)

First throw B1   Second throw B1   Third throw B1

5 (b)	P(3 points) = 0.7^3 = 0.343	B1
5 (c)	P(2 points) = $0.7 \times 0.7 \times 0.3 + 0.7 \times 0.3 \times 0.5 + 0.3 \times 0.5 \times 0.7$ = 0.357	M1 A1
	P(1 point) = $0.7 \times 0.3 \times 0.5 + 0.3 \times 0.5 \times 0.3 + 0.3 \times 0.5 \times 0.5$ = 0.225	A1
	P(0 points) = $0.3 \times 0.5 \times 0.5$ = 0.075	B1
	Expected number of points = $0.343 \times 3 + 0.357 \times 2 + 0.225 \times 1 + 0.075 \times 0$	M1
	≈ 1.97	A1 ft
6 (a)	25% of children will have a father with the trait, so 25% in F.	B1
	Half of these children have the trait and half do not, ie 12.5% in each part of F.	B1 B1
	$x = 0$ (both mother and father have normal genes)	B1
	$y = 100 - 25 = 75$	B1
6 (b)	Probability = $\dfrac{12.5}{12.5 + 75}$	B1 numerator B1 denominator
	$= \dfrac{1}{7}$ (Accept 0.143)	B1

7(a)	Network diagram	M1, A4 (3, 2, 1, 0 reducing by number of errors).

	Forward pass	M1, A1
	Reverse pass	M1, A2 (A1 for at least two of G, H, I, J, K correct)

7(b)	Gantt chart (or cascade diagram).	M1, A2 (1, 0 reducing by number of errors)

	Floats	B1