



SET Z

Level 3 Certificate
MATHEMATICAL STUDIES

Paper 2C

Mark scheme

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 2C

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 = $\frac{39 + 41}{2} = 40$ 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 = $\frac{122.1}{136.4} \times 480 = 429.68 \approx \text{£}430$ (Other methods are possible.)	M1 A1
3 (a) (i)	$365 \text{ (or } 366) \times 1.25 \div 1.5 = \text{£}304 \text{ or } \text{£}305$ (nearest pound) or approx $\text{£}300$	M1 A1
3 (a) (ii)	The newspaper report must be about relative poverty, as $\text{£}300$ per annum is far lower than household incomes in the UK.	B1 B1
3 (b)	Median disposable, equivalised household income = 50th percentile = $\text{£}319$	B1
	Relative poverty threshold = 60% of $\text{£}319 = \text{£}191.40$ The 'children in poverty' are those living in households with incomes less than $\text{£}191.40$	M1 A1
	Suppose median household income fell, to say $\text{£}300$, whilst the incomes at the bottom end of the scale remained the same.	B1
	60% of $\text{£}300 = \text{£}180$, so only those living in households with incomes less than $\text{£}180$ 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)	$m = 4 \times 0.917^3 = 3.08$ grams (3sf)	M1 A1
4 (b)	$\frac{1}{4} = 0.917^t$	M1
	$t = \frac{\ln 0.25}{\ln 0.917} = 16.0$ days	M1 A1
4 (c)	$16 \div 2 = 8$ days (other methods using the exponential function are also acceptable)	M1 A1
4 (d)	It decays rapidly so the patient can come out of isolation relatively quickly	B1
	and cells in their body do not continue to be damaged for a prolonged period.	B1

5 (a)	30 m/s	B1
5 (b)	Tangent drawn at $t = 5$	M1
	Gradient = 1 ms^{-2}	A1
	The car is accelerating (and this acceleration is itself increasing).	B1
5 (c)	Acceleration = 10 ms^{-2}	B1 B1 (units)
	The car is probably in free fall.	B1
6 (a)	Missing values are: 26.7, 30, 26.7, 16.7, 0	B2 (B1 for 3 correct)
6 (b)		
	Points plotted correctly ($\frac{1}{2}$ square accuracy)	B1 ft
	Smooth curve through points	B1 ft
6 (c)	16.5 (allow 15 to 18)	B1
	163.5 (allow 162 to 165)	B1
6 (d) (i)	180 cm	B1
6 (d) (ii)	30 cm	B1
6 (e)	Numerator $x(110 - x)$	B1
	At $x = 55$, $55(110 - 55) = 3025$	B1
	For maximum value 20 at $x = 55$ $y = \frac{x(110 - x)20}{3025}$ or $y = \frac{x(110 - x)}{51.25}$	B1
7 (a)	Missing values are: 6.66, 7.26	B1
	8.37, 9.28	B1

7 (b)		
	Axes and labels	B1
	Points plotted correctly ($\frac{1}{2}$ square accuracy)	B2 ft (B1 for 3 correct)
	Line of best fit	B1
7 (c)	$\ln d = 5.42$, giving $\ln T \approx 6.5$ $T = e^{6.5} \approx 670$	B1 M1 A1
7 (d)	$T = 0.2\sqrt{4497^3} = 60\,300$ days	M1 A1
7 (e)	$\frac{60\,300}{365} \approx 165$ times	M1 A1