

Oxford Revise | Edexcel A Level Maths | Answers

- Method (**M**) marks are awarded for showing you know a method and have attempted to apply it.
- Accuracy (**A**) marks should only be awarded if the relevant M marks have been awarded.
- Unconditional accuracy (**B**) marks are awarded independently of M marks. They do not rely on method.
- The abbreviation **o.e.** means 'or equivalent (and appropriate)'.

Please note that:

- efficient use of advanced calculators is expected
- inexact numerical answers should be given to three significant figures unless the question states otherwise; values from statistical tables should be quoted in full
- when a value of g is required, it is taken as $g = 9.8 \text{ m s}^{-2}$ unless stated otherwise in the question.

Chapter 27 Collecting and interpreting data

Question	Answer	Extra information	Marks
27.1 (a)	Number all the teachers Select first teacher at random Then pick every 8th teacher	Correct method Correct method Must specify interval	B1 M1 A1
27.1 (b)	Some teachers may be absent or not teaching on those days	Valid explanation	B1
	Total		4 marks
27.2 (a)	All the people aged over 65 in the village	Must specify only people over 65	B1
27.2 (b)	Opportunity (sampling)	Also allow convenience (sampling)	B1

Question	Answer	Extra information	Marks
27.2 (c)	Sample will be biased (since everyone at the bus stop is likely to be travelling out of the village)	Valid explanation	B1
27.2 (d)	$\frac{420}{580} \times 60 = 43.4$ Sample 43 drivers	Method for finding number of drivers. Award if correct answer seen. Correct answer	M1 A1
27.2 (e)	Mean = 3.02 Standard deviation = 1.78	Correct answer to at least 3 s.f. Correct answer. Also allow 1.80	B1 B1
	Total		7 marks
27.3 (a)(i)	Midpoints 1.05, 1.15, 1.25, 1.4 Mean = 1.17	Midpoints seen written down. Can be implied by correct mean or standard deviation. Correct answer for mean to at least 3 s.f.	B1 B1
27.3 (a)(ii)	Standard deviation = 0.106	Also allow 0.107 for standard deviation	B1
27.3 (b)	$\mu + 2\sigma = 1.17 + 2 \times 0.106$ = 1.38 1.45 > 1.38 so will be an outlier	Method for calculating upper bound Correct conclusion. Must see 1.38	M1 A1
27.3 (c)	It may well be a correct measurement, so including it will give the nurse a better understanding of the data.	Valid explanation	B1
	Total		6 marks
27.4 (a)	Because all the chairs would be damaged and there would be none left to sell	Valid reason	B1

Question	Answer	Extra information	Marks
27.4 (b)	$\sqrt{\frac{213450}{20} - \left(\frac{2065}{20}\right)^2}$ = 3.46 kg	Correct use of formula Correct answer to at least 3 s.f. Correct units	M1 A1 B1
	Total		4 marks
27.5 (a)	Advantage: quicker/easier for large data set/sample Disadvantage: may introduce bias depending on how students are numbered	Advantage Disadvantage	B1 B1
27.5 (b)	Median = $4 + \frac{25}{131} \times 8$ = 5.53	Linear interpolation method for median Correct answer to at least 3 s.f. Also allow 5.56	M1 A1
27.5 (c)	The values are evenly distributed throughout the class		B1
27.5 (d)	This value is probably an error/anomaly	Valid explanation	B1
	Total		6 marks
27.6 (a)	Midpoints: 25, 35, 45, 70 Standard deviation = 15.2	Midpoints seen. Can be implied by correct standard deviation. Correct answer to at least 3 s.f. Also allow 15.3	B1 B1

Question	Answer	Extra information	Marks
27.6 (b)	$\frac{149}{4} = 37.25$ and $\frac{3}{4} \times 149 = 111.75$	37.25 and 111.75 seen or used	B1
	$Q_1 = 30 + \frac{22.25}{31} \times 10$ or $Q_3 = 50 + \frac{5.75}{43} \times 40$	Correct method for either Q_1 or Q_3	M1
	$Q_1 = 37.18$ (37.2 or 37.3) or $Q_3 = 55.35$ (55.3 or 55.4)	Correct answer for Q_1 or Q_3	A1
	$IQR = 55.35 - 37.18$ $= 18.2$	$Q_3 - Q_1$ with at least one value correct Also allow answers that round to 18	M1 A1
27.6 (c)	$Q_3 + 1.5(Q_3 - Q_1) = 55.35 + 1.5(18.2)$ $= 82.65$	Substituting correctly into rule given	M1
	$89 > 82.65$ so an outlier	Correct conclusion	A1
	Total		9 marks
27.7	$\bar{x} = 10 \times 2.1 + 300$ (or equivalent) $= 321$ (pages)	Method for decoding mean Correct answer	M1 A1
	$\sigma_x = 10 \times 13$ (or equivalent) $= 130$ (pages)	Method for decoding standard deviation Correct answer	M1 A1
	Total		4 marks
27.8 (a)	As there is no list of the population/sampling frame	Valid explanation	B1
27.8 (b)	The sample can be made so that it is representative of the population of fish in the pond.	Look for the word 'representative'	B1

Question	Answer	Extra information	Marks
27.8 (c)	$\frac{32}{2} = 16; \text{ median} = 99.5 + \frac{13}{15} \times 100$ $= 186 \text{ g}$	Linear interpolation method for median Correct answer	M1 A1
27.8 (d)	Midpoints: 74.5, 149.5, 249.5, 349.5 Mean = 189 (g) Standard deviation = 65.2 (g) $189 + 3 \times 65.2 = 384.6$ So, the value in the 300–399 class could be an outlier $189 - 3 \times 65.2 = -6.6$, so at most one outlier in total	Midpoints seen. Can be implied by correct mean or standard deviation. Correct answer for mean Also allow 66.3 for standard deviation Substituting correctly into rule given Correct conclusion	B1 B1 B1 M1 A1
	Total		9 marks
27.9 (a)	Standard deviation = $\sqrt{\frac{14\,200}{150}}$ $= 9.73$	Method for standard deviation Correct answer to at least 3 s.f.	M1 A1
27.9 (b)	$\Sigma x = (5 \times 2) + (15 \times 6) + (25 \times 25) + (35 \times 48) + 45\alpha + 55\beta$ $= 2405 + 45\alpha + 55\beta$ $\frac{2405 + 45\alpha + 55\beta}{150} = 37$ $2 + 6 + 25 + 48 + \alpha + \beta = 150$ Solving simultaneously $45\alpha + 55\beta = 3145$ and $\alpha + \beta = 69$ $\alpha = 65$ and $\beta = 4$	Forming expression for mean involving α and β Forming equation for the mean Forming equation for the total frequency Solving simultaneously Both values correct	B1 M1 M1 M1 A1

Question	Answer	Extra information	Marks
27.9 (c)	$\frac{2}{10} \times 150 = 30$	Recognising need to find 20th percentile	M1
	$20 + \frac{22}{25} \times 10 = 28.8$	Method for linear interpolation	M1
	Set pass mark at 29	Correct answer	A1
	Total		10 marks