Oxford Revise | AQA GCSE Maths Higher | Answers

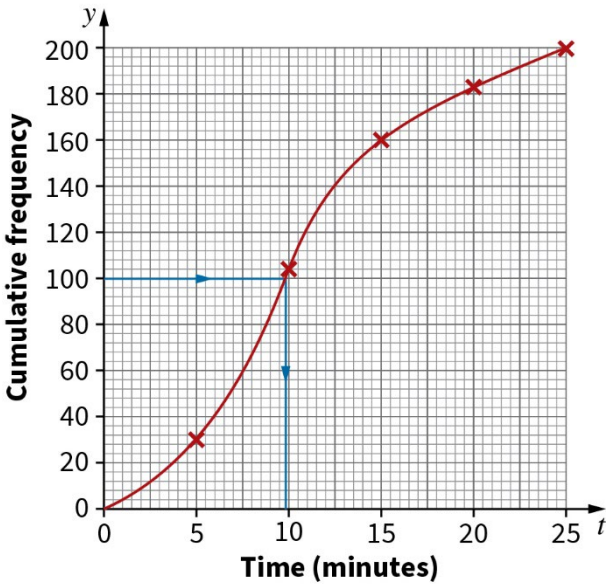
Chapter 31 Data collection, cumulative frequency, and box plots

Question	Answer	Extra information	Marks
31.1	Data too out of date to use going forward		1
31.2 (a)	8 out of the 40 sampled would like a day at the fun fair. That represents 20% of the sample. 20% of the population is $180 \times 0.2 = 36$	$\frac{8}{40}$ or 20% Correct answer	1 1
31.2 (b)	Assumption: the sample is representative		1
31.3 (a)	Every item has an equal chance of being selected		1
31.3 (b) (i)	All students at her school		1
31.3 (b) (ii)	Her five best friends		1
31.3 (c)	Not every student had an equal chance of being selected, so the sample isn't random and thus could be biased		1
31.3 (d)	Take a much larger sample; and make sure the students in the sample are chosen randomly		1 1

ISBN 9781382039833

Question	Answer	Extra information	Marks
31.4 (a)	$N = \frac{50 \times 234}{18} = 650$ Estimate the total number of gulls to be 650 Or, let x represent the total number of gulls: $\frac{18}{234} = \frac{50}{x}$ $x = \frac{50 \times 234}{18}$	$\frac{18}{50}$ or $\frac{18}{234}$ used $\frac{50 \times 234}{18}$ Correct answer	1 1 1
31.4 (b)	Samples are random; the tagged/untagged gulls have mixed up; the population hasn't changed in 24 hours; tags are still intact, etc.		1
31.4 (c)	If some tags had fallen off, then the tagged number on Wednesday would be less than 18, and thus the calculation $N = \frac{50 \times 234}{<18}$ would result in a number greater than 650, suggesting the population was larger than it actually is.	Correct analysis	1
31.5	Box plot drawn with the following attributes: Minimum value $= 0.8$ Maximum value $= 2.0$ Median $= 1.4$ Lower quartile $= 1.1$ Upper quartile $= 1.75$	Correct method to find median or either quartile Median and both quartiles correct Median and quartiles plotted correctly to form the box Fully correct box plot	1 1 1 1

Question	Answer	Extra information	Marks
31.6 (a)	Box plot drawn with the following attributes: Minimum value = 22 Maximum value = 48 Median = 34 Lower quartile = 32 Upper quartile = 40	 Median and quartiles plotted correctly to form the box Fully correct box plot	 1 1
31.6 (b)	For year 10, median = 34 and IQR = 8 For year 11, median = 37.5 and IQR = 9.5 The median and IQR are both higher for Y11. This shows that, on average, they spend longer doing their homework than Y10, but there is also a greater variation in time spent.	 Median = 37.5 IQR = 9.5 Comparing medians and IQRs correctly	 1 1 1

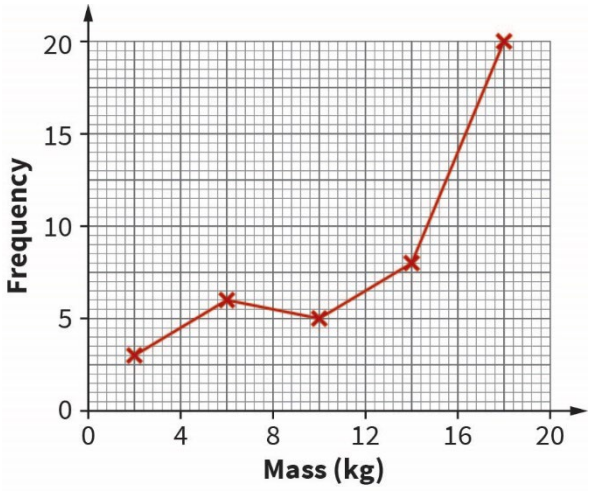
Question	Answer	Extra information	Marks
31.7 (a)	Cumulative frequency diagram  	Plotting upper boundaries against cumulative frequencies All plotted correctly with curve added	2 1
31.7 (b)	Median is approximately 9.7 minutes		1
31.7 (c)	Use the CF diagram to show that at 8 minutes, the cumulative frequency would be approximately 64. With 200 students in total, this represents $\frac{64}{200} = 32\%$ so, Neve is correct.	Graph used to find y-value when $x = 8$ 64 stated Correct answer and conclusion	1 1 1

<table>
<tr><th>Question</th><th>Answer</th><th>Extra information</th><th>Marks</th></tr>
<tr><td>31.8 (a)</td><td>
<table>
<tr><th>Speed, s</th><th>Frequency</th><th>Freq density</th></tr>
<tr><td>$65 < s \leq 70$</td><td>25</td><td>5.0</td></tr>
<tr><td>$70 < s \leq 80$</td><td>44</td><td>4.4</td></tr>
<tr><td>$80 < s \leq 85$</td><td>21</td><td>4.2</td></tr>
<tr><td>$85 < s \leq 100$</td><td>18</td><td>1.2</td></tr>
</table>
Add bars to table:

From 70–80 speed: height (freq density) = 4.4
From 85–100 speed: height (freq density) = 1.2</td><td>Either 25 or 21
Both frequency table entries correct
Correct frequency density calculated or for one bar correct
Histogram fully correct</td><td>1
1
1

1</td></tr>
<tr><td>31.8 (b)</td><td>$\frac{(67.5\times25)+(75\times44)+(82.5\times21)+(92.5\times18)}{25+44+21+18} = 77.6$
Mean speed = 77.6 km/h</td><td></td><td>1</td></tr>
</table>

Question	Answer	Extra information	Marks
31.8 (c)	There are $25 + 44 + 21 + 18 = 108$ cars, so the median is the 54.5th value. This lies in the $70 < s \leq 80$ class interval. $54.5 - 25 = 29.5$, so the median lies $\frac{29.5}{44}$ of the way through that class interval. The class has size 10, so the median is $\frac{29.5}{44} \times 10 + 70 = 76.7$ Median speed $= 76.7$ km/h Assumption: the speeds are evenly distributed within the $70 < s \leq 80$ class interval.	Indication of the median in the $70 < s \leq 80$ class interval Median is approx. 76.7 Correct assumption	1 1 1
31.9 (a)	The largest mass class has nearly as many dogs in it than all other classes combined. The data is so heavily skewed that no single measure of central tendency will accurately describe the data set.	Any reasonable observation	1
31.9 (b)	There are 42 values, so the median will be the 21.5th value. This lies in the $12 < m \leq 16$ interval.		1

Question	Answer	Extra information	Marks
31.9 (c)		Midpoints used Fully correct	1 1
31.10 (a)	Box plot drawn with the following attributes: Minimum value = 10 Maximum value = 48 Median = 25 Lower quartile = 18 Upper quartile = 32	Median placed correctly Both quartiles correct to draw box Fully correct, with whiskers	1 1 1
31.10 (b)	E.g. The scores were much more varied in the test on the second day. If the test were easier, all the values would have been higher. Therefore, it does not follow that the test was easier. Cain is wrong.	Correct answer Reasonable observation	1 1

Question	Answer	Extra information	Marks
31.11	Top left graph is quadratic: $y = x^2$ Top right graph is reciprocal: $y = \frac{1}{x}$ Bottom left graph is linear: $y = x$ Bottom right graph is cubic: $y = x^3$	1 mark for 2 out of 4 correct 2 marks in total for all 4 correct	1 1