6.10 Statistical Enquiry and Misleading Graphs: 30-minute Pack

Calculators not allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 In a sample of 50 pupils, 6 said they cycle to school. Work out the sample proportion as a fraction and as a percentage.

(a) Give the fraction and the percentage **(2)**

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2 A dataset of household incomes has one very large outlier. The mean is much higher than the median. Which average (mean or median) is a better measure of a typical household income here? Explain your answer in one sentence.

(a) Give the better average and a brief reason **(2)**

3 Mia wants to find out what pupils think about the canteen. She asks the first 30 pupils in the canteen queue. Give one reason why this sample may be biased.

(2)

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4 A bar chart shows the pupils at a school: June = 72, July = 80. The vertical axis starts at 70 instead of 0, so the July bar is drawn 5 times as tall as the June bar.
Explain why the chart is misleading and work out how many times larger July really is than June, to 2 decimal places.

(3)

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5 A bar chart shows the pupils at a school: June = 48, July = 60. The vertical axis starts at 40. Explain why this could be misleading, and compare the visible height ratio with the real ratio of the two values, each as July ÷ June. Give both as decimals to 1 dp.

(3)

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6 Mia wants to find out what pupils think about the canteen. She asks the first 40 pupils in the canteen queue. Give one reason why this sample may be biased.

(2)

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7 Here are summary statistics for marks.
Class 8X: mean 18, range 13.
Class 8Y: mean 20, range 20.
Compare the two sets of data.

(2)

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8 A line of best fit for hours of revision (x) and test mark (y) has equation $y = 2x + 29$. Write down what the gradient 2 means in this context.

(2)

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9 The scatter graph for hours of revision (x) and test mark (y) uses data with x values from 5 to 23. The line of best fit is $y = 2x + 15$. Katie uses the line to predict y when $x = 33$. Is this prediction likely to be reliable? Give a reason.

(2)

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10 A town has 12 000 residents. A researcher takes a sample that is 0.5% of the population. How many people are in the sample?

(a) Calculate the sample size **(1)**

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11 A line of best fit for hours of revision (x) and test mark (y) has equation $y = 3x + 27$. Use the line to estimate y when $x = 19$.

(2)

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12 Find the range of the following heights in cm: 150, 162, 158, 170, 155.

(a) Calculate the range **(1)**

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Mark scheme · 6.10 Statistical Enquiry and Misleading Graphs: 30-minute Pack

Question 1

(a) Writes correct fraction 6/50 and simplifies to 3/25 or shows method for percentage	M1
(a) 3/25 and 12% cao	A1

(a) Answer: **3/25, 12%**

Question 2

(a) Identifies median as better or mean as less suitable because of outlier	M1
(a) Explains median is less affected by the outlier so it better represents a typical household income	A1

(a) Answer: **Median; it is less affected by a very large outlier so better represents a typical household**

Question 3

identifies the sampling method as non-random	M1
only pupils who use the canteen are asked (not representative)	A1

Answer: **Only pupils who use the canteen are asked, so the sample is not representative**

Question 4

the axis does not start at zero, so the difference looks bigger	B1
80 ÷ 72	M1
1.11 times cao	A1

Answer: **The axis starts at 70, exaggerating the difference; the real ratio is 1.11**

Question 5

axis not starting at zero	B1
visible ratio 20/8 and real ratio 60/48	M1
visible 2.5, real 1.3	A1

Answer: **Axis starts at 40; visible ratio 2.5, real ratio 1.3**

Question 6

identifies the sampling method as non-random	M1
only pupils who use the canteen are asked (not representative)	A1

Answer: **Only pupils who use the canteen are asked, so the sample is not representative**

Question 7

comparison of the averages: Class 8Y has the higher mean	B1
comparison of the spread: Class 8X is more consistent (smaller range)	B1

Answer: **Class 8Y has the higher mean; Class 8X is more consistent as it has the smaller range**

Question 8

refers to the change in y for each 1 unit increase in x	M1
y increases by 2 for each extra unit of x	A1

Answer: **test mark increases by 2 for each extra unit of hours of revision**

Question 9

notes that 33 is outside the range of the data	M1
No, because it is extrapolation	A1

Answer: **No, it is outside the range of the data (extrapolation)**

Question 10

(a) 60 cao	B1

(a) Answer: **60**

Question 11

substitutes x = 19	M1
84 cao	A1

Answer: **84**

Question 12

(a) 20 cm cao	B1

(a) Answer: **20 cm**

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