Test answers - Statistics: scatter graphs and averages

Year: Year 8 · Duration: 45 minutes · /20

Answer to Question 1 (4 marks)

a. Mean: add the six values, $5 + 8 + 8 + 9 + 12 + 14 = 56$, and divide by 6: $56 \div 6 = 9.33\ldots$, so **9.3** (1 mark). Median: the values are already in order and there are 6 of them, so the median is halfway between the 3rd and 4th values: $(8 + 9) \div 2 =$**8.5** (1 mark). Mode: 8 appears twice, more than any other value, so the mode is **8** (1 mark).
b. Range = largest − smallest $= 14 - 5 =$**9**. (1 mark)

With an even number of values the median is not one of the data values. Here the three averages are all quite close, which shows the data has no extreme values.

Answer to Question 2 (4 marks)

a. Multiply each number of siblings by its frequency: $0 \times 6 + 1 \times 12 + 2 \times 8 + 3 \times 4 = 0 + 12 + 16 + 12 = 40$ siblings in total (1 mark). Mean $= 40 \div 30 = 1.33\ldots$, which is **1.33** siblings (1 mark).
b. With 30 pupils the median lies between the 15th and 16th values. Running totals: 6 pupils have 0 siblings, then $6 + 12 = 18$ have 0 or 1. The 15th and 16th pupils both have 1 sibling, so the median is **1**. (1 mark)
c. The highest frequency, 12, belongs to 1 sibling, so the modal number is **1**. (1 mark)

Dividing 40 by 4, the number of columns, is a common error.

Answer to Question 3 (4 marks)

a. The full circle of 360° represents 60 pupils, so each pupil is $360 \div 60 = 6^\circ$. Zoo $25 \times 6 =$**150°**, museum $20 \times 6 =$**120°**, park $15 \times 6 =$**90°**. (1 mark for each angle)
b. The largest sector belongs to the destination chosen by the most pupils, which is the **zoo**. (1 mark)

Check: $150 + 120 + 90 = 360^\circ$, so the sectors fill the circle. The park sector is exactly a right angle, a quarter of the circle, because 15 is a quarter of 60. When drawing, start from a vertical radius and measure each angle with a protractor from the previous line.

Answer to Question 4 (4 marks)

a. As the temperature rises, the number of ice creams sold rises too, and the points lie close to a straight line. This is **strong positive correlation**. (1 mark)
b. Draw a straight line with roughly equal numbers of points above and below it, passing through the mean point (21 °C, 41.75 sales) (1 mark). Reading up from 21 °C gives about **42 ice creams**; any answer from 40 to 45 is accepted (1 mark).
c. 5 °C is far below the lowest temperature in the data (14 °C). Using the line there is extrapolation, and the pattern may not continue; the line would even predict a negative number of sales. (1 mark)

Answer to Question 5 (4 marks)

a. Mean: $12 + 14 + 15 + 15 + 16 + 48 = 120$, and $120 \div 6 =$**20** (1 mark). Median: with 6 ordered values, take the 3rd and 4th: $(15 + 15) \div 2 =$**15** (1 mark).
b. An outlier is a value far from the rest of the data. The score **48** is more than three times any other score. (1 mark)
c. The **median** is better (1 mark). The outlier pulls the mean up to 20, which is higher than five of the six scores, so the mean does not represent a typical pupil. The median, 15, sits right in the middle of the main group.

Without 48 the mean would be $72 \div 5 = 14.4$, very close to the median.