Test answers - Charts, averages and cumulative frequency

Year: Year 11 · Duration: 45 minutes · /20

Answer to Question 1 (4 marks)

a. Mode **1**; sorted 0, 0, 1, 1, 1, 2, 2, 3, 4 so median **1**; range $4 - 0 = \mathbf{4}$ (1 each)
b. $14 \div 9 = \mathbf{1.56}$ (1)

In (a), the value 1 appears three times, more often than any other score, so it is the mode. With 9 values, the median is the $\frac{9+1}{2} = 5$th value in the ordered list, which is 1. The range is the largest score minus the smallest. In (b), add all the goals, $2 + 0 + 1 + 3 + 1 + 4 + 1 + 0 + 2 = 14$, and divide by the 9 matches: the mean is about 1.56 goals per match.

Answer to Question 2 (4 marks)

a. $6 + 16 + 15 + 16 + 10 = 63$ (2 for the products), $63 \div 25 = \mathbf{2.52}$ (1)
b. Cumulative frequencies 6, 14, 19, 23, 25. The 13th value is in the group 2, so the median is **2** (1)

In (a), multiply each number of items by its frequency, add the products and divide by the number of customers, 25, not by 5 (the number of columns). In (b), the median is the $\frac{25+1}{2} = 13$th customer; the first 6 bought one item and customers 7 to 14 bought two, so the median is 2 items.

Answer to Question 3 (4 marks)

a. $2 < m \leq 4$ (1)
b. Midpoints 1, 3, 5, 8: $8 + 42 + 60 + 48 = 158$ (2); $158 \div 40 = \mathbf{3.95\ kg}$ (1)

In (a), the modal class is the class with the highest frequency, 14. In (b), the exact masses are unknown, so each parcel is given the midpoint of its class: $8 \times 1 = 8$, $14 \times 3 = 42$, $12 \times 5 = 60$ and $6 \times 8 = 48$. Add these products to get 158 and divide by the total frequency, 40. The answer is only an estimate because the midpoints replace the real values. A common error is to use the class width 4 for the last class midpoint instead of 8.

Answer to Question 4 (4 marks)

a. Class widths 10, 20, 30, so the densities are **1.2, 1.5, 1.5** (1 each)
b. Between 30 and 40: $10 \times 1.5 = 15$. Between 40 and 50: $10 \times 1.5 = 15$. Total **30**

(1)

In (a), frequency density is frequency divided by class width: $12 \div 10 = 1.2$, $30 \div 20 = 1.5$ and $45 \div 30 = 1.5$. In (b), the people aged 30 to 50 cover half of the class 20 to 40 and one third of the class 40 to 70. Area gives $\frac{1}{2} \times 30 + \frac{1}{3} \times 45 = 15 + 15 = 30$ people, an estimate since we assume the ages are spread evenly in each class.

Answer to Question 5 (4 marks)

a. The 30th value is in the class 20 to 30: $20 + \dfrac{30 - 15}{25} \times 10 =$ **26 cm** (1 for the position, 1 for the answer)
b. At 35 cm the cumulative frequency is about $40 + \frac{1}{2} \times 16 = 48$, so $60 - 48 =$ **12 plants** (1 for 48, 1 for the answer)

In (a), the median is at half of 60, so read across from a cumulative frequency of 30 on the curve. Between 20 cm and 30 cm the total rises by 25, and we need 15 of those 25 plants. In (b), 35 cm is halfway between 30 and 40 cm, so we add half of the 16 plants in that class to 40.