Answers - Data: averages and charts

Year: Year 7

Answer to Question 1

a. Mean $52 \div 9 =$**5.8** (1 d.p.). Sorted: 2, 3, 4, 5, 7, 7, 7, 8, 9, median **7**. Mode **7**. Range $9 - 2 =$**7**.
b. Mean $44 \div 6 =$**7.3** (1 d.p.). Sorted: 4, 6, 6, 8, 9, 11, median $(6 + 8) \div 2 =$**7**. Mode **6**. Range **7**.
c. Mean $6.4 \div 5 =$**1.28**. Sorted: 0.8, 0.8, 1.2, 1.5, 2.1, median **1.2**. Mode **0.8**. Range **1.3**.

Answer to Question 2

a. $5 + 8 + 12 + 3 + x = 35$, so $28 + x = 35$, $x =$**7**.
b. Total $6 \times 9 = 54$. Five add to 44, so the sixth is **10**.
c. Any whole number greater than 8. The numbers 3, 5, 8 are then the three smallest and 8 stays the middle value.
d. The range of 4, 9 and 15 is 11, so y must change the range. If y is the smallest: $15 - y = 13$, $y = 2$. If y is the largest: $y - 4 = 13$, $y = 17$. So y is **2 or 17**.

Answer to Question 3

a. The highest frequency is 6, so the mode is **1 goal**.
b. 20 matches: the median is between the 10th and 11th values. Cumulative: 3, 9, 14. Both the 10th and 11th are 2, so the median is **2**.
c. Total $0 \times 3 + 1 \times 6 + 2 \times 5 + 3 \times 4 + 4 \times 2 = 36$. Mean $36 \div 20 =$**1.8**.
d. $4 - 0 =$**4**.

Answer to Question 4

a. Read the height of the banana bar against the vertical scale: **12** pupils chose bananas.
b. The mode is the most common choice, which is the tallest bar: **banana**.
c. 6 of the 30 pupils chose oranges: $\frac{6}{30}$. Divide top and bottom by 6: $\frac{1}{5}$.
d. 4 pupils chose grapes: $\frac{4}{30} \times 100 = 13.33\ldots$, so **13.3%** to 1 decimal place.

Answer to Question 5

a. 36 pupils share 360°, so each pupil is $360 \div 36 = 10^{\circ}$. Walk $15 \times 10 =$**150°**, bus $9 \times 10 =$**90°**, car **80°**, cycle **40°**.
b. $150 + 90 + 80 + 40 = 360$, so the angles make a full circle as they should.
c. **Bus** has 90°. That is a quarter of the circle, so a quarter of the 36 pupils (9 pupils) go by bus.

Answer to Question 6

a. The modal class is **14 ≤ t < 16** (frequency 8).
b. The median is between the 10th and 11th values. Cumulative: 3, 11. So the median is in **14 ≤ t < 16**.
c. Total $3 \times 13 + 8 \times 15 + 6 \times 17 + 3 \times 19 = 39 + 120 + 102 + 57 = 318$. Mean $318 \div 20 =$**15.9 seconds**.
d. We do not know the exact values in each class, so we assume they equal the midpoint.

Answer to Question 7

a. 7A: sorted 7, 9, 11, 12, 14, 15, 15, 15, 18. Mean $116 \div 9 = 12.9$, median 14, mode 15, range 11. 7B: sorted 12, 13, 13, 14, 14, 14, 15, 15, 16. Mean $126 \div 9 = 14$, median 14, mode 14, range 4.
b. 7B has the higher mean (14 against 12.9), so 7B did better on average.
c. 7B is more consistent because its range (4) is smaller than the range for 7A (11).
d. New total $116 + 20 = 136$, 10 pupils, mean **13.6**.

Answer to Question 8

a. Size 5: 1, 6: 5, 7: 3, 8: 1, 9: 1, 10: 1. Total 12.
b. The mode is **size 6**, because it is the size sold most often and the owner should stock more of it.
c. Sorted: 5, 6, 6, 6, 6, 6, 7, 7, 7, 8, 9, 10. Median $(6 + 7) \div 2 =$**6.5**.
d. Mean $83 \div 12 =$**6.9**. The mean may not be a real size, so it is less useful for stocking.

Answer to Question 9

a. Total 79, mean $79 \div 7 =$**11.3 °C**.
b. Sorted: 8, 9, 11, 12, 12, 13, 14. Median **12 °C**. Range **6 °C**.
c. Warmer than 11.3 °C: Tuesday, Thursday, Friday and Sunday.

d. New total 89, mean $89 \div 8 =$**11.1 °C**.

Answer to Question 10

a. Total 103. Mean $103 \div 10 =$**10.3**. Sorted: 5, 5, 5, 5, 6, 7, 8, 10, 12, 40. Median $(6 + 7) \div 2 =$**6.5**. Mode **5**.
b. The value **40**.
c. Total 63 for 9 values, mean **£7**.
d. The median (£6.50) or the mode (£5), because the mean (£10.30) is pulled up by the outlier.

Answer to Question 11

a. Each pupil is 9°: pizza $144 \div 9 = 16$, pasta 10, salad 6, sandwich 8.
b. Pasta $\frac{10}{40} = \frac{1}{4}$.
c. **Pizza**.
d. On Monday pizza minus salad is $16 - 6 = 10$, not 15, so the claim was **not** true for Monday.

Answer to Question 12

a. Week 1: total 56, mean **8 km**. Week 2: total 59, mean $59 \div 7 =$**8.4 km**.
b. Week 1: sorted 0, 5, 7, 8, 9, 12, 15: median **8**, range **15**. Week 2: sorted 6, 7, 8, 8, 9, 10, 11: median **8**, range **5**.
c. Week 2 (smaller range).
d. Total $56 + 59 = 115$, mean $115 \div 14 = 8.2$. She did **not** reach 9 km.

Answer to Question 13

a. Rovers: total 16, mean **2**, sorted 0, 0, 1, 1, 2, 3, 4, 5 so median **1.5**, range **5**. United: total 16, mean **2**, sorted 1, 1, 2, 2, 2, 2, 3, 3 so median **2**, range **2**.
b. They have the same mean (2).
c. United, because its range (2) is smaller.
d. One high score does not make a team better: the total goals are the same and Rovers scored 0 in two matches.

Answer to Question 14

a. Ben's method, because it is systematic and covers the whole year group, not just friends.

b. $150 \div 10 =$**15 pupils**.
c. For example: "How many hours do you usually sleep on a school night?" with boxes: less than 7, 7 to less than 8, 8 to less than 9, 9 or more.
d. Mode **8** (it appears 5 times). Sorted: 6, 7, 7, 7, 8, 8, 8, 8, 8, 9, 9, 9, 9, 10, 10, so the median is the 8th value, **8**. Mean $123 \div 15 =$**8.2** hours.

Answer to Question 15

a. Mode **14** (it appears three times). Sorted: 9, 9, 12, 14, 14, 14, 15, 17, 21, 30, so the median is $(14 + 14) \div 2 =$**14**. Mean $155 \div 10 =$**15.5**.
b. The day with **30** loans is far higher than the others, for example just before a school holiday or a reading challenge.
c. Without 30 the total is $155 - 30 = 125$ for 9 days: $125 \div 9 =$**13.9** (1 d.p.).
d. To estimate a total we use the mean, because mean × number of days gives the total: $20 \times 15.5 =$**310 books** (or about $20 \times 13.9 \approx 278$ if the unusual day is ignored).

Answer to Question 16

a. Mean = total ÷ 5, so total = $5 \times 8 =$**40**.
b. Range = largest − smallest, so largest = $3 + 9 =$**12**.
c. In order: 3, a, 7, b, 12 (7 is the median). Then $a + b = 40 - 3 - 7 - 12 = 18$. The mode is 7, so a must be 7, giving $b = 11$. The numbers are **3, 7, 7, 11, 12**.
d. $3 + 7 + 7 + 11 + 12 = 40$, mean $40 \div 5 = 8$. Median 7. Mode 7. Range $12 - 3 = 9$. All four conditions are met.

Answer to Question 17

a. Total 270, mean $270 \div 7 =$**£38 571** (nearest pound). Median **£22 000**. Mode **£20 000**.
b. The mean.
c. The median (£22 000), because the mean is pulled up by the owner's salary.
d. New sorted data: 18, 20, 20, 22, 22, 24, 26, 140. Median $(22 + 22) \div 2 =$**£22 000**. Mean $292 \div 8 =$**£36 500**.

Answer to Question 18

a. The data must be sorted first: 3, 5, 7, 9. The median is $(5 + 7) \div 2 =$**6**.
b. She forgot to divide by 3: mean $36 \div 3 =$**12**.
c. The range is largest minus smallest: $15 - 4 =$**11**.
d. Both 3 and 4 appear twice, so the data are **bimodal**: modes 3 and 4.

Answer to Question 19

a. Each pupil is 3°: sport 36, reading 24, games 40, music 20.
b. $\frac{108}{360} =$**30%**.
c. Sport + music = 56 pupils, which is less than 60, so she is **not** right (46.7%).
d. $20 \times 1.2 =$**24 pupils**.

Answer to Question 20

a. A: $10 \times 14 = 140$. B: $20 \times 17 = 340$.
b. Total 480 for 30 pupils: $480 \div 30 =$**16**.
c. The classes have different sizes, so Class B counts more: the mean is weighted.
d. New total $11 \times 14.5 = 159.5$, so the new pupil scored $159.5 - 140 =$**19.5**.