

Past-paper walk-through

Representation of data ■ 5.1

eXercise

Questions in this set

- 9709/51 N25 Q3 ■ 8 marks
- 9709/52 N25 Q5 ■ 7 marks
- 9709/51 J25 Q3 ■ 12 marks

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 3

9709/51 N25 ■ Q3 ■ 8 marks

The back-to-back stem-and-leaf diagram shows the annual salaries, in dollars, of 27 employees at each of two companies, Browns and Greens.

(a) Find the median and interquartile range for the annual salaries of employees at Browns. **[3]**

(b) The annual salary of an employee at Browns is denoted by x thousand dollars and that of an employee at Greens by y thousand dollars. For the 27 employees at each company, $\sum x = 878.3$, $\sum x^2 = 28616.09$, $\sum y = 896.5$, $\sum y^2 = 29815.63$. Find the mean and standard deviation of the annual salaries of these 54 employees. **[5]**

Question 3

Browns									Greens							
(3)	9 8 4							30	6 8	(2)						
(7)	8 8 5 3	3 1 0	31	2 4 5 8	(4)											
(7)	9 7 6 4	2 2 0	32	3 6 6 7 9	(5)											
(6)	8 7 5	5 3 1	33	1 1 3 7 8 8 9 9	(8)											
(3)	4 2 2							34	0 2 3 5 6 9	(6)						
(1)	7							35	3 7	(2)						

Solution 3

(a)

Mark scheme

- Median = \$32 400; IQR = \$33 500 – \$31 300 = \$2 200.

Solution 3

(b)

Mark scheme

$$\begin{aligned} \blacksquare \text{ Mean} &= \frac{878.3 + 896.5}{54} = 32.867 \text{ thousand} = \$32\,900. \text{ Variance} \\ &= \frac{28616.09 + 29815.63}{54} - \left(\frac{1774.8}{54} \right)^2 = 1.8511, \text{ so sd} = 1.36, \text{ i.e. } \$1\,360. \end{aligned}$$

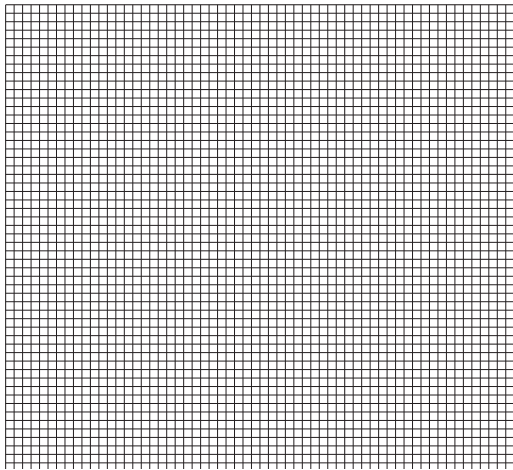
Question 5

9709/52 N25 ■ Q5 ■ 7 marks

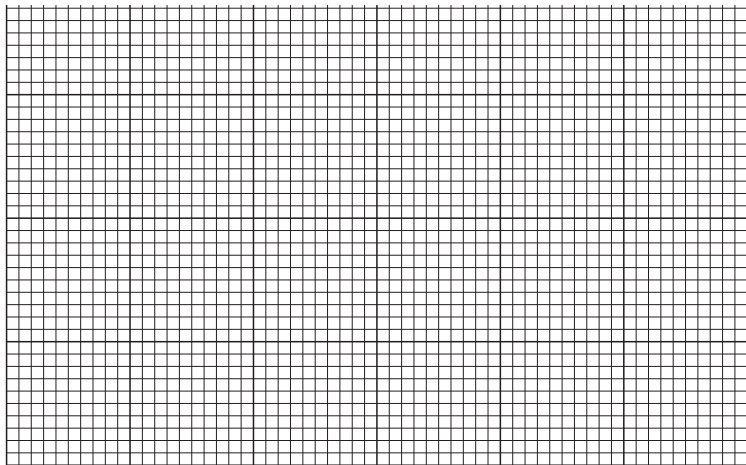
The times of 240 competitors taking part in an event are recorded correct to the nearest minute. Time (minutes) / Frequency: 1–10 / 12, 11–20 / 38, 21–25 / 68, 26–30 / 76, 31–50 / 46.

- (a) Draw a histogram to represent this information. [4]
- (b) Calculate an estimate of the mean time taken by the 240 competitors. [3]

Question 5



Question 5



Question 5

Time (minutes)	1 – 10	11 – 20	21 – 25	26 – 30	31 – 50
Frequency	12	38	68	76	46

Solution 5

(a)

Mark scheme

- Histogram with class boundaries 0.5–10.5, 10.5–20.5, 20.5–25.5, 25.5–30.5, 30.5–50.5 and frequency densities 1.2, 3.8, 13.6, 15.2, 2.3.

Solution 5

(b)

Mark scheme

- Midpoints 5.5, 15.5, 23, 28, 40.5:

$$\bar{x} = \frac{12(5.5) + 38(15.5) + 68(23) + 76(28) + 46(40.5)}{240} = \frac{6210}{240} = 25.9$$

minutes.

Question 3

9709/51 J25 ■ Q3 ■ 12 marks

Last Sunday, teams of runners took part in a charity event. The time taken, in seconds, to run 50 m was recorded, correct to 1 decimal place, for each runner. The times recorded for 11 runners from each of the Gulls and the Herons are shown in the table. Gulls: 7.9, 8.2, 8.3, 8.6, 8.6, 8.8, 9.2, 9.7, 9.8, 10.0, 10.4. Herons: 9.5, 9.9, 8.5, 8.1, 9.2, 10.8, 8.3, 9.7, 9.3, 9.9, 8.7.

- (a)** Draw a back-to-back stem-and-leaf diagram to represent this information, with Gulls on the left-hand side. **[4]**
- (b)** Find the median and the interquartile range of the times of the runners from the Gulls. **[3]**
- (c)** Two other teams, the Eagles and the Swifts, also took part. The recorded times in seconds for 20 runners from the Eagles and 30 runners from the Swifts are denoted by

Question 3

x and y respectively. It is given that $\sum x = 175.0$ and that the mean of y is 8.4. Find the mean of the times taken by all 50 runners. [2]

(d) It is given that $\sum x^2 = 1823.0$. It is also known that the standard deviation of the times taken by all 50 runners is 1.38 seconds. Find the value of $\sum y^2$, correct to 1 decimal place. [3]

Question 3

Gulls	7.9	8.2	8.3	8.6	8.6	8.8	9.2	9.7	9.8	10.0	10.4
Hérons	9.5	9.9	8.5	8.1	9.2	10.8	8.3	9.7	9.3	9.9	8.7

Solution 3

(a)

Mark scheme

- Back-to-back stem-and-leaf (stems 7, 8, 9, 10), Gulls leaves on the left ordered from the stem, Herons on the right, with key e.g. 7|9|5 means 9.7 s (Gulls) and 9.5 s (Hérons).

Solution 3

(b)

Mark scheme

- Median (6th value) = 8.8 s; IQR = $UQ - LQ = 9.8 - 8.3 = 1.5$ s.

Solution 3

(c)

Mark scheme

$$\blacksquare \text{ Mean} = \frac{175.0 + 30(8.4)}{50} = \frac{427.0}{50} = 8.54 \text{ s.}$$

Solution 3

(d)

Mark scheme

$$\blacksquare 1.38^2 = \frac{1823.0 + \sum y^2}{50} - \left(\frac{427.0}{50} \right)^2 \Rightarrow \sum y^2 = 1918.8.$$