# Unit 5 · Statistics

**HARDER PRACTICE QUESTIONS**

Full marks 27

Write your answers on separate paper. Show your working. Quartile and percentile places are the $\frac{N+1}{4}$th and $\frac{n(N+1)}{100}$th items, as in the unit.

## 1 Multiple choice [4]

**i.** In a set of 11 marks, the largest is changed from 40 to 400 by a typing mistake. Which of these does **not** change? [1]

**a.** the mean **b.** the mean deviation from the mean
**c.** the standard deviation **d.** the quartile deviation

**ii.** A data set has a quartile deviation of 6 and a coefficient of quartile deviation of 0.25. What is $Q_1$? [1]

**a.** 12 **b.** 18
**c.** 24 **d.** 30

**iii.** A data set has a standard deviation of 4. Every value is doubled and then 3 is added. What is the new standard deviation? [1]

**a.** 4 **b.** 7
**c.** 8 **d.** 11

**iv.** 39 values are arranged in ascending order. Which item is the 60th percentile, $P_{60}$? [1]

**a.** the 23.4th **b.** the 24th
**c.** the 25th **d.** the 60th

## 2 Short answers [14]

**a.** Work backwards. Nine values in ascending order are 4, 7, 9, 12, 15, 18, 21, $a$, 30, and their interquartile range is 16. Find $a$. [3]

**b.** Find the quartile deviation, its coefficient and the 90th percentile. [3]

| Marks ($X$) | 10 | 20 | 30 | 40 | 50 |
|---|---|---|---|---|---|
| Students ($f$) | 3 | 7 | 9 | 6 | 5 |

**c.** For the values 2, 3, 5, 6, 14, find the mean deviation from the mean and the mean deviation from the median. Which is smaller? Which of the two averages is pulled by the 14? [3]

**d.** The mean of 4, 6, 8, 10 and $x$ is 8. Find $x$, the standard deviation and the coefficient of variation. [3]

**e.** Spot the error. Sapana found the standard deviation of 2, 4 and 6 like this: [2]

$$\sigma = \sqrt{\frac{2^2 + 4^2 + 6^2}{3} - 4} = \sqrt{18.67 - 4} \approx 3.83.$$

Find her mistake and the right answer.

## 3 Long answers [7]

**a.** Two momo shops counted the plates they sold on five days (made-up numbers). **[4]**

| Day | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Shop A | 40 | 45 | 50 | 55 | 60 |
| Shop B | 90 | 100 | 110 | 95 | 105 |

a. Find the mean and the standard deviation for each shop.
b. Find each shop's coefficient of variation.
c. Rojina says the two shops are equally steady, since their standard deviations are equal. Is she right? Which shop's sales are more consistent?

**b.** The waiting times, in minutes, of 11 patients at a health post were 3, 5, 6, 8, 9, 10, 12, 15, 18, 22, 30 (made-up numbers). **[3]**

a. Find the five-number summary.
b. On squared paper, draw the box and whisker plot.
c. Which quarter of the times is the most spread out? What does that say about the waits?

## 4 Think [2]

Can a data set have a quartile deviation of 0 but a standard deviation that is not 0? Give an example or explain why not.