

**Example 14****Self Tutor**

Consider the data set: 8 2 3 9 6 5 3 2 2 6 2 5 4 5 5 6

- a** Construct the five-number summary for this data.
- b** Draw a boxplot.
- c** Find the: **i** range **ii** interquartile range of the data.
- d** Find the percentage of data values less than 3.

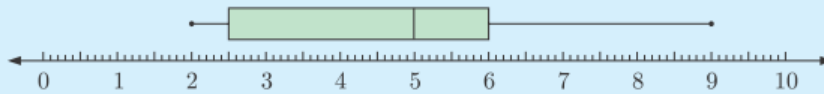
**a** The ordered data set is:

2 2 2 2 3 3 4 5 5 5 5 6 6 6 8 9 {16 data values}

$Q_1 = 2.5$     median = 5     $Q_3 = 6$

So the 5-number summary is:  $\begin{cases} \text{minimum} = 2 & Q_1 = 2.5 \\ \text{median} = 5 & Q_3 = 6 \\ \text{maximum} = 9 \end{cases}$

**b**



- c i** range = maximum – minimum  
= 9 – 2  
= 7
- ii** IQR =  $Q_3 - Q_1$   
= 6 – 2.5  
= 3.5

**d** 25% of the data values are less than 3.

This can be seen from the original data set. We cannot read it straight from the boxplot because the boxplot does not tell us that all of the data values are integers.



**Example 15****Self Tutor**

A hospital is trialling a new anaesthetic drug and has collected data on how long the new and old drugs take before the patient becomes unconscious. They wish to know which drug acts faster and which is more reliable.

*Old drug times (s):* 8, 12, 9, 8, 16, 10, 14, 7, 5, 21,  
13, 10, 8, 10, 11, 8, 11, 9, 11, 14

*New drug times (s):* 8, 12, 7, 8, 12, 11, 9, 8, 10, 8,  
10, 9, 12, 8, 8, 7, 10, 7, 9, 9

Prepare a parallel boxplot for the data sets and use it to compare the two drugs for speed and reliability.

The 5-number summaries are:

For the old drug:  $\min_x = 5$

$$Q_1 = 8$$

$$\text{median} = 10$$

$$Q_3 = 12.5$$

$$\max_x = 21$$

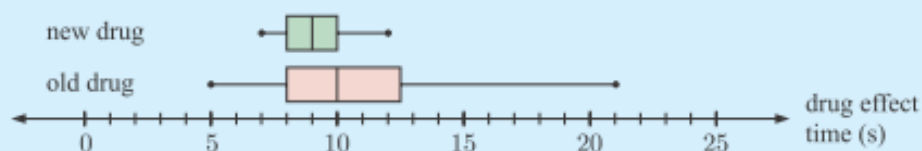
For the new drug:  $\min_x = 7$

$$Q_1 = 8$$

$$\text{median} = 9$$

$$Q_3 = 10$$

$$\max_x = 12$$



Using the median, 50% of the time the new drug takes 9 seconds or less, compared with 10 seconds for the old drug. We conclude that the new drug is generally a little quicker.

Comparing the spread:

$$\begin{aligned} \text{range for old drug} &= 21 - 5 \\ &= 16 \end{aligned}$$

$$\begin{aligned} \text{IQR} &= Q_3 - Q_1 \\ &= 12.5 - 8 \\ &= 4.5 \end{aligned}$$

$$\begin{aligned} \text{range for new drug} &= 12 - 7 \\ &= 5 \end{aligned}$$

$$\begin{aligned} \text{IQR} &= Q_3 - Q_1 \\ &= 10 - 8 \\ &= 2 \end{aligned}$$

The new drug times are less 'spread out' than the old drug times. They are more predictable or reliable.

