Median, Quartiles, Inter-Quartile Range and Box Plots.

Measures of Spread

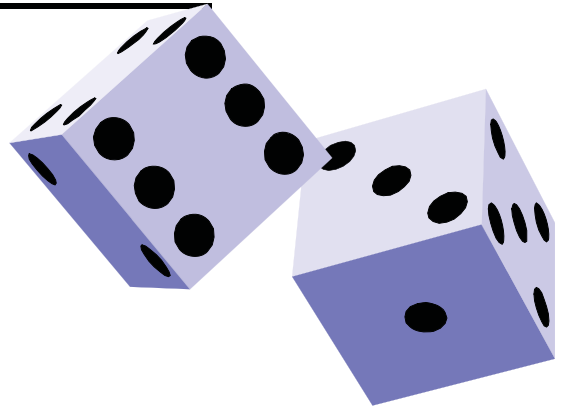
Remember: The range is the measure of spread that goes with the mean.

Example 1. Two dice were thrown 10 times and their scores were added together and recorded. Find the **mean** and **range** for this data.

7, 5, 2, 7, 6, 12, 10, 4, 8, 9

$$\text{Mean} = \frac{7 + 5 + 2 + 7 + 6 + 12 + 10 + 4 + 8 + 9}{10}$$

$$= \frac{70}{10} = 7$$



Range = 12 – 2 = **10**

Median, Quartiles, Inter-Quartile Range and Box Plots.

Measures of Spread

The range is **not** a good measure of spread because one extreme, (very high or very low value can have a big effect) The measure of spread that goes with the median is called the inter-quartile range and is generally a better measure of spread because it is not affected by extreme values.

A reminder about the median

Averages (The Median)

The **median** is the middle value of a set of data once the data has been **ordered**.

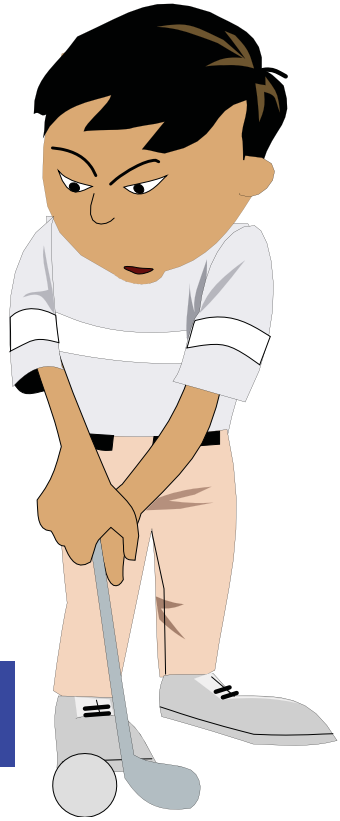
Example 1. Robert hit 11 balls at Grimsby driving range. The recorded distances of his drives, measured in yards, are given below. Find the median distance for his drives.

85, 125, 130, 65, 100, 70, 75, 50, 140, 95, 70

50, 65, 70, 70, 75, **85**, 95, 100, 125, 130, 140

Single middle value

Ordered data



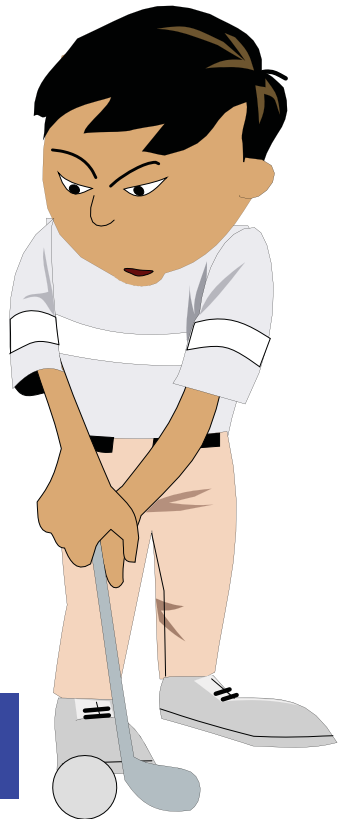
Median drive = 85 yards

Averages (The Median)

The **median** is the middle value of a set of data once the data has been **ordered**.

Example 1. Robert hit 12 balls at Grimsby driving range. The recorded distances of his drives, measured in yards, are given below. Find the median distance for his drives.

85, 125, 130, 65, 100, 70, 75, 50, 140, 135, 95, 70



50, 65, 70, 70, 75, 85, 95, 100, 125, 130, 135, 140

Two middle values so take the mean.

Ordered data

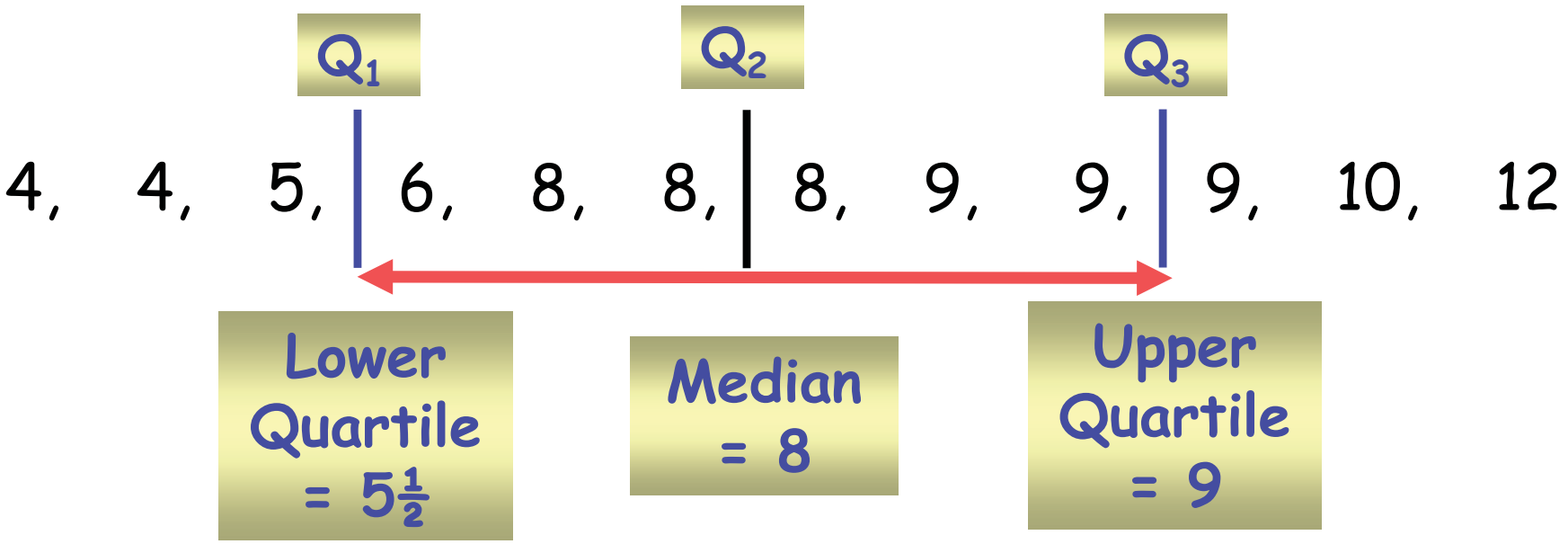
Median drive = 90 yards

Finding the median, quartiles and inter-quartile range.

Example 1: Find the median and quartiles for the data below.

12, 6, 4, 9, 8, 4, 9, 8, 5, 9, 8, 10

Order the data



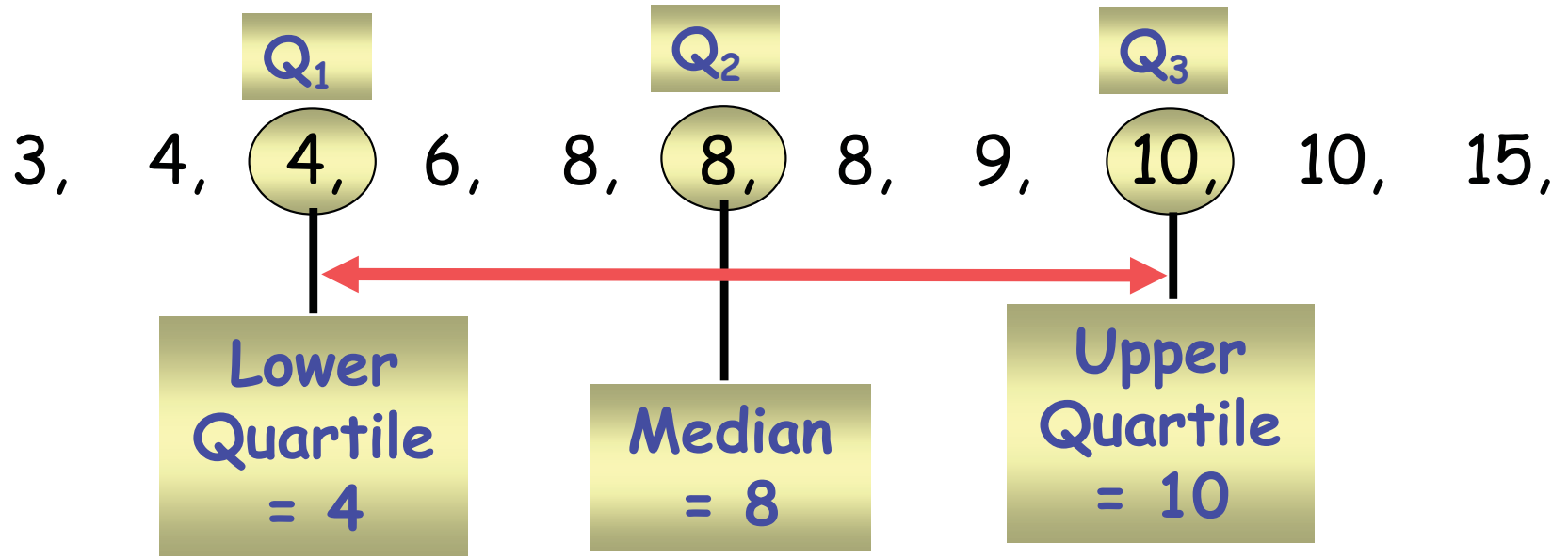
Inter- Quartile Range = 9 - 5½ = 3½

Finding the median, quartiles and inter-quartile range.

Example 2: Find the median and quartiles for the data below.

6, 3, 9, 8, 4, 10, 8, 4, 15, 8, 10

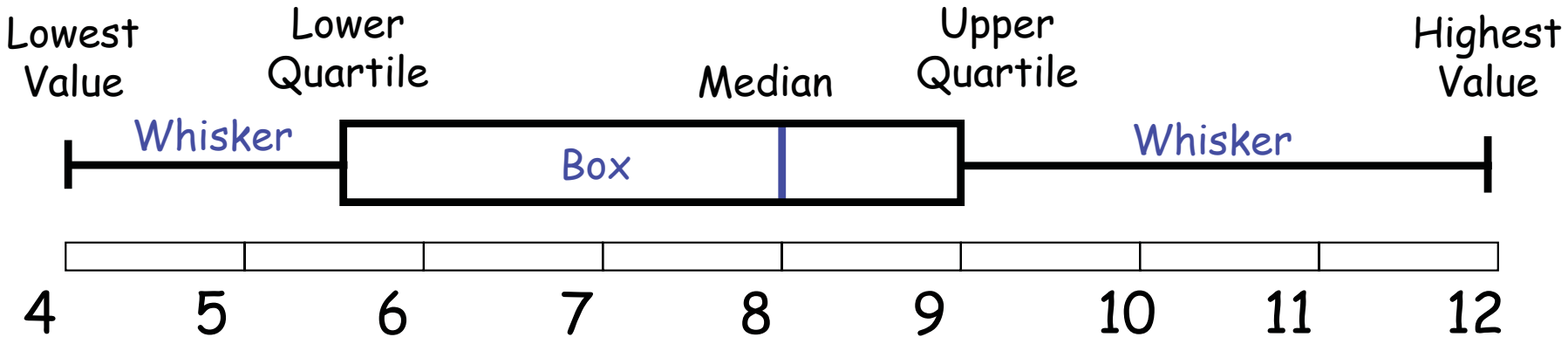
Order the data



Inter- Quartile Range = 10 - 4 = 6

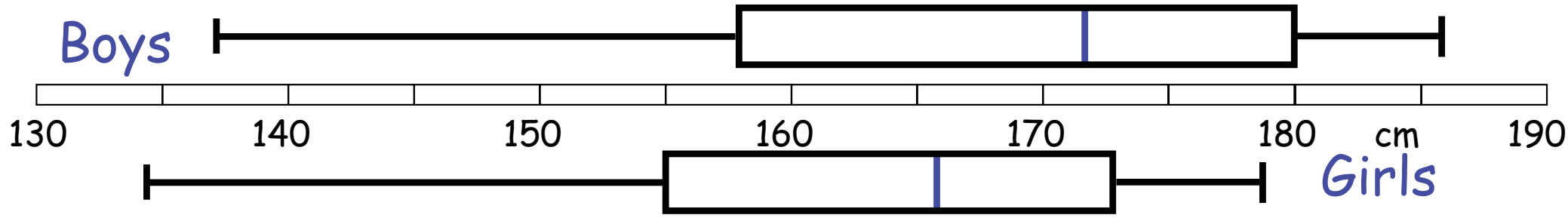
Box and Whisker Diagrams.

Anatomy of a Box and Whisker Diagram.



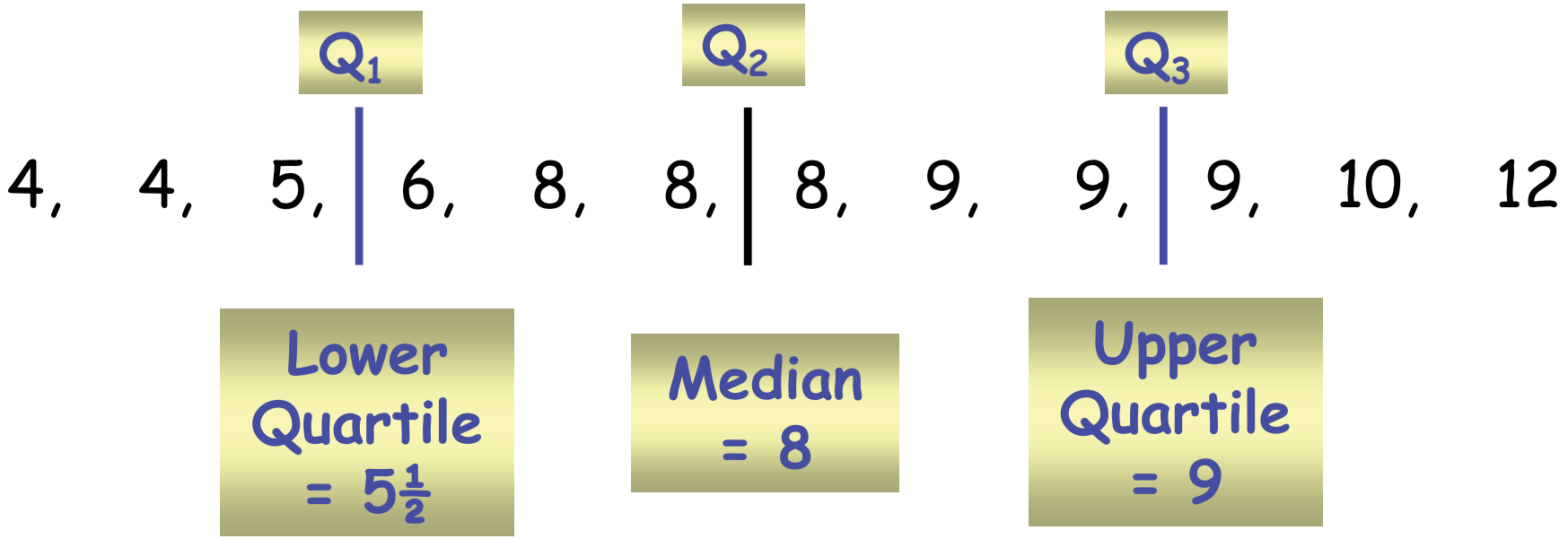
Box and Whisker Diagrams.

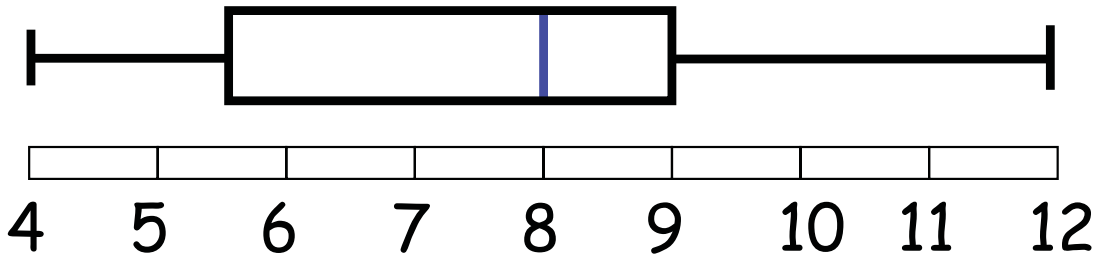
Box plots are useful for comparing two or more sets of data like that shown below for heights of boys and girls in a class.



Drawing a Box Plot.

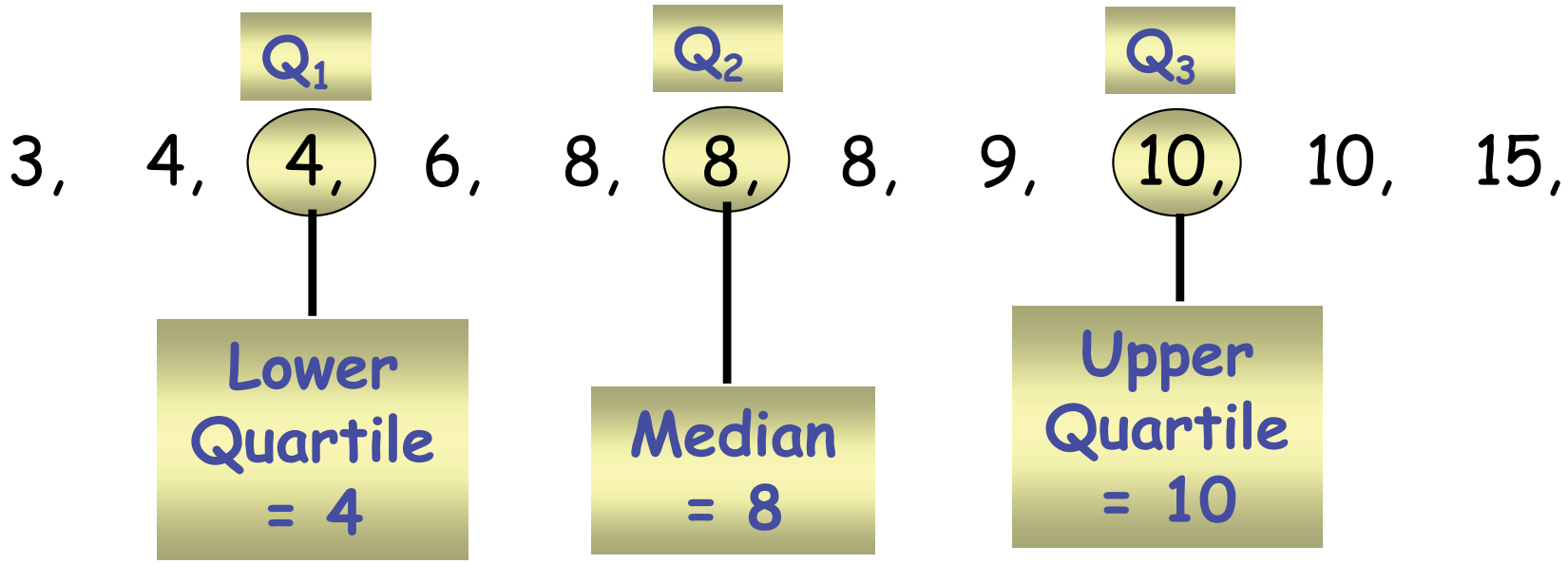
Example 1: Draw a Box plot for the data below

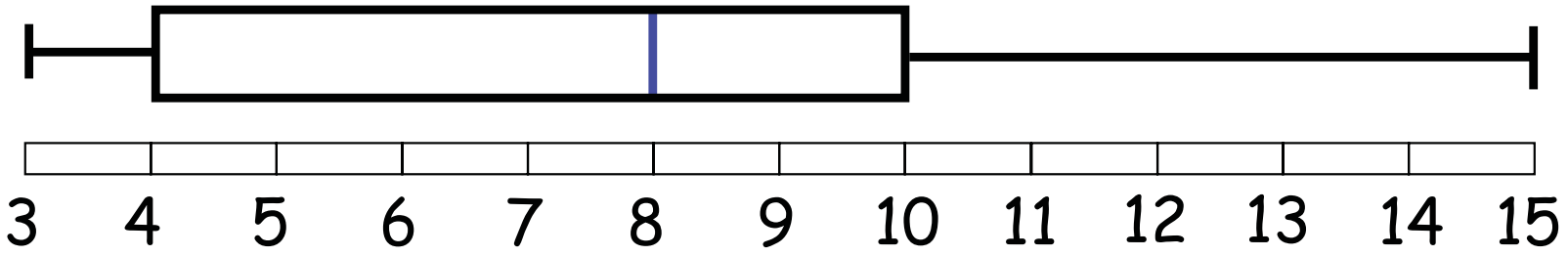




Drawing a Box Plot.

Example 2: Draw a Box plot for the data below





Drawing a Box Plot.

Question: Stuart recorded the heights in cm of boys in his class as shown below. Draw a box plot for this data.

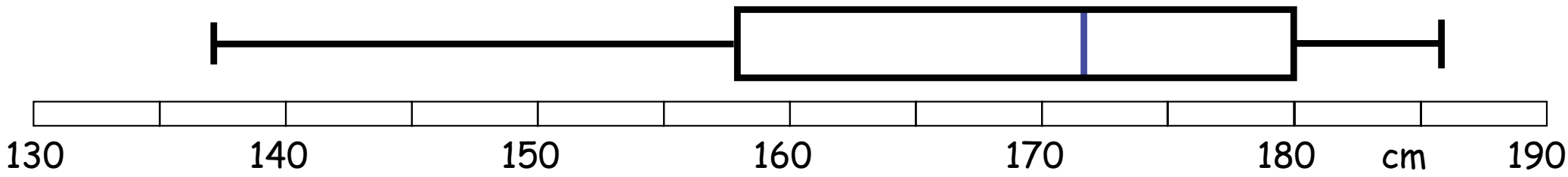
Q_L Q_2 Q_u

137, 148, 155, **158**, 165, 166, 166, **171**, 171, 173, 175, **180**, 184, 186, 186

Lower Quartile = 158

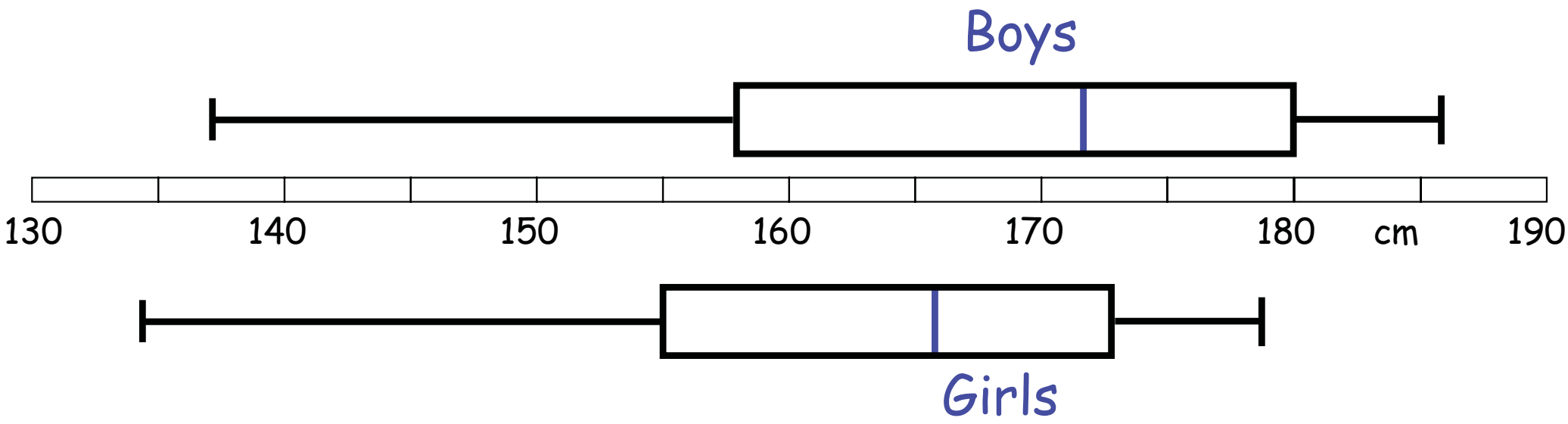
Median = 171

Upper Quartile = 180



Drawing a Box Plot.

Question: Gemma recorded the heights in cm of girls in the same class and constructed a box plot from the data. The box plots for both boys and girls are shown below. Use the box plots to choose some **correct** statements comparing heights of boys and girls in the class. Justify your answers.



1. The girls are taller on average.
2. The boys are taller on average.
3. The girls show less variability in height.
4. The boys show less variability in height.
5. The smallest person is a girl
6. The tallest person is a boy