

## Box-And-Whisker Plots

EQ: How do I draw a picture of data?

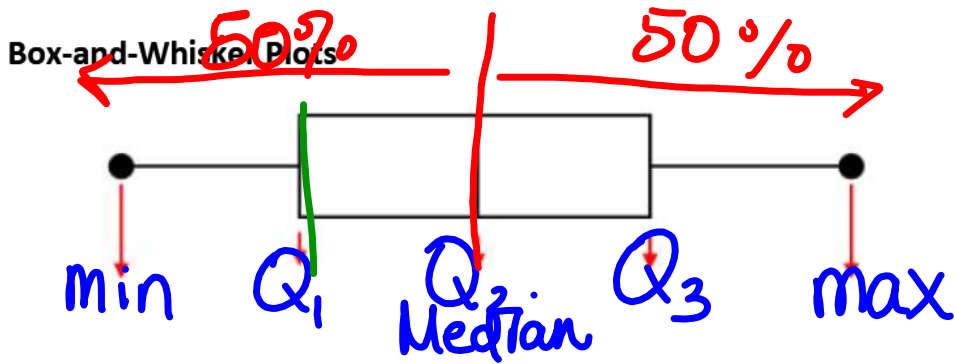
MCC9-12.S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

### 5-number summary:

- 1) Minimum - beginning of whisker
- 2) Lower Quartile - left side of box
- 3) Median - middle of box
- 4) Upper Quartile - right side of box
- 5) Maximum - end of whisker

These values describe the spread of the data and divide the data into 4 EQUAL PARTS.

Together, we use these values to draw a box-and-whisker plot.



Minimum: \_\_\_\_\_  
 Lower Quartile:  $Q_1$  \_\_\_\_\_  
 Median:  $Q_2$  \_\_\_\_\_  
 Upper Quartile:  $Q_3$  \_\_\_\_\_  
 Maximum: \_\_\_\_\_

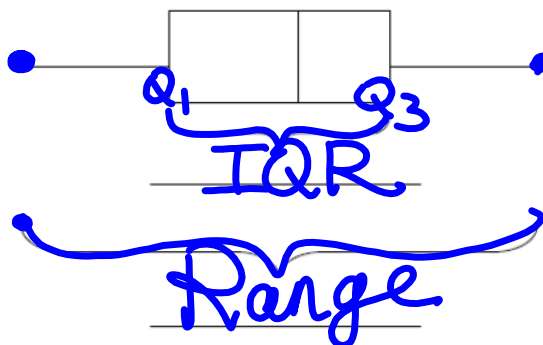
25% 25% 25% 25%

2, 4, 7, 8, 9, 10, 11, 13, 14, 15, 18, 21

Quartiles: Quartiles divide a data set into four equal parts. Each quartile contains

25% of the values in the set.

Interquartile Range (IQR) =  $Q_3 - Q_1$



From a five-number summary, a box plot can be created to represent the data graphically. To create a box plot, I need a SCALE which will allow me to compare 2 or more box plots. Each portion of the box plot represents 25% of the data.

## Vocabulary

Outlier - a point that is more than  $1.5IQR$  outside of the quartiles. In a box-and-whisker plot, we do not include outliers in the whiskers.

### Outliers

- This is an extreme value that is much less than or much greater than the other data values.
- Outliers have a strong effect on the **mean** and the **mean absolute deviation**
- In a box-and-whisker plot, we **DO NOT** include outliers in the whiskers

#### Calculating Outliers

Lower Fence (the smallest the data can be before becoming an outlier)

$$Q_1 - 1.5(IQR) = 15 - 1.5(7) = 4.5$$

Upper Fence (the largest the data can be before becoming an outlier)

$$Q_3 + 1.5(IQR) = 22 + 1.5(7) = 32.5$$

Outlier Interval

$$Q_1 - 1.5(IQR) \leq x \leq Q_3 + 1.5(IQR) \quad 4.5 \leq x \leq 32.5$$

14, 15, 17, 18, 20, 22, 23

Draw a box and whisker plot for the following data sets. Find the IQR.

Ex. 1 ~~26, 17, 22, 14, 23, 15, 18~~

IQR: 7

Outlier? NO OUTLIERS

• Min: 14 • LQ: 15 • Median: 18 • UQ: 22 • Max: 23

