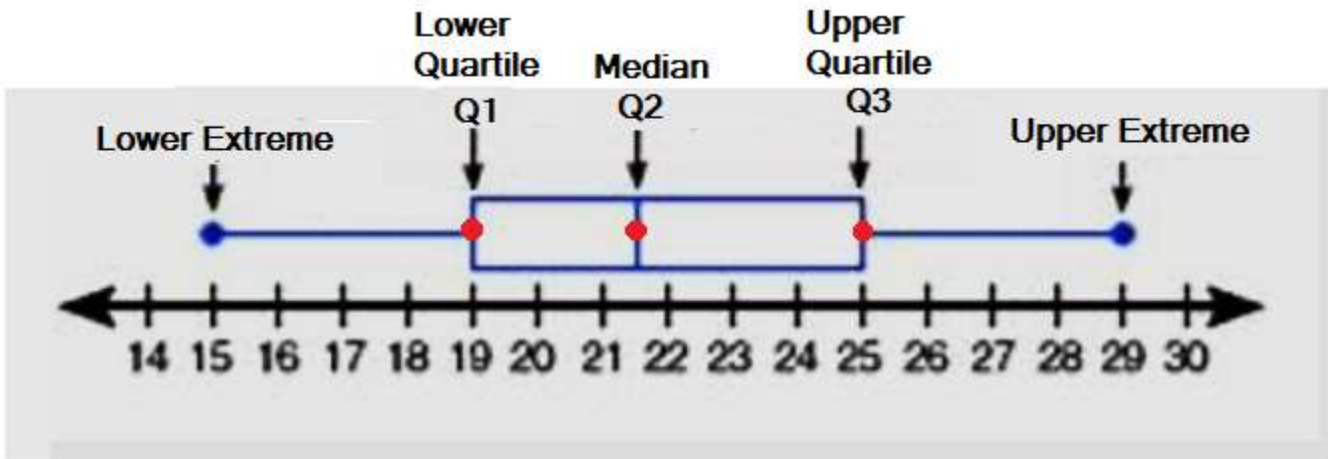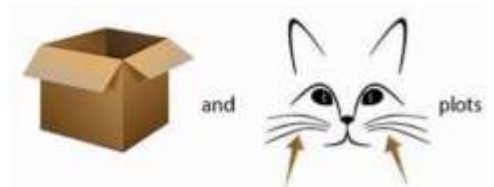Box-and-Whisker Plots

What is a Box-and-Whisker Plot?

Here is what a Box Plot looks like.

The dots used to draw this graph are referred to as the **Five Number Summary**. These five numbers are determined from your dataset, which is not given in this example.

Five Number Summary		
Lower Quartile (Q1)	19	Box
Median (Q2)	21.5	Box
Upper Quartile (Q3)	25	Box
Lower Extreme	15	Whiskers
Upper Extreme	29	Whiskers

Five Number Summary	Example

Dataset: 18, 27, 34, 52, 54, 59, 61, 68, 78, 82, 85, 87, 91, 93, 100

- **Median (Q2) – This is the median of the entire data set.**
  Median = 68

- **Lower Quartile (Q1) - This is the median of the LOWER half of the dataset.**

  The lower half of the dataset is: **18, 27, 34, 52, 54, 59, 61**
  Lower Quartile = 52

  Notice… When finding the lower quartile, we <u>did not</u> include **68**. It is not included when there is only *one* middle number in the *entire* dataset.

  If there had been *two* middle numbers, then one would be included with the lower quartile data and the other middle would have been included with the upper quartile data.

- **Upper Quartile (Q3) – This is the median of the UPPER half of the dataset.**
  The upper half of the dataset is: **78, 82, 85, 87, 91, 93, 100**
  Upper Quartile = 87

- **Lower Extreme – It is the lowest value in the data set.**
  Lower Extreme = 18

- **Upper Extreme – It is the highest value in the data set.**
  Upper Extreme = 100

Five Number Summary	
(Q1)	52
(Q2)	68
(Q3)	87
Lower Extreme	18
Upper Extreme	100

Box-and-Whisker Plots

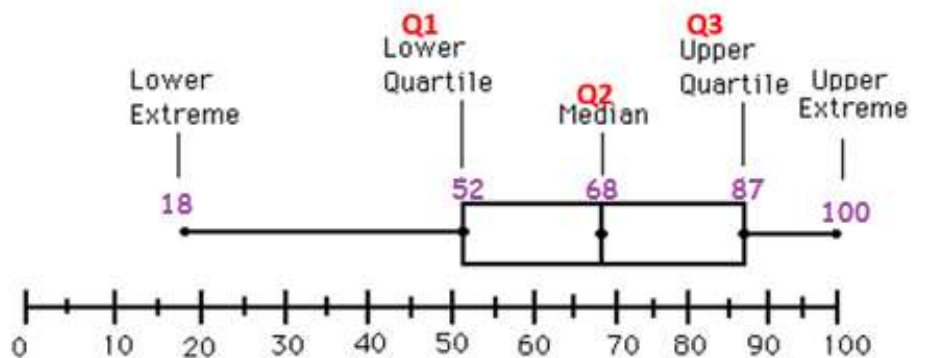## Graphing your Box Plot Using the Five Number Summary

Step 1:

- Place a dot to mark the locations of Q1, Q2, and Q3.

- Make the box using these dots.

Step 2:

- Place a dot to mark the lower extreme and upper extreme.

- Make the whiskers using these dots.

Five Number Summary	
(Q1)	52
(Q2)	68
(Q3)	87
Lower Extreme	18
Upper Extreme	100

Measures of Variability (Box Plots)

- **Range**
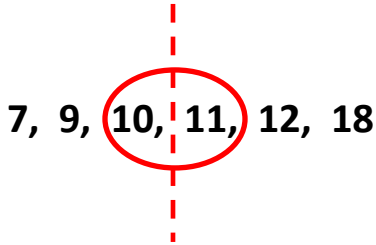 The difference between the *upper extreme* and *lower extreme*.

  100 – 18 = 82

- **Interquartile Range (IQR)**
  The difference between the *upper quartile (Q3)* and the *lower quartile (Q1)*.

  87 − 52 = 35
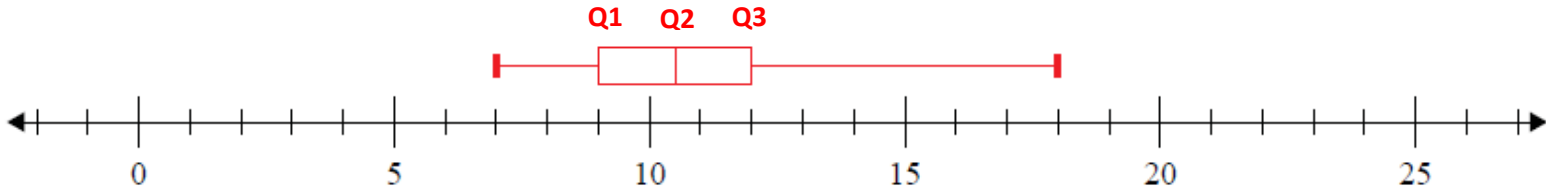
Example with an even amount of values in the dataset

Dataset: 11 , 12 , 10 , 7 , 9 , 18

7, 9, 10, 11, 12, 18

Five Number Summary	
Lower Quartile (Q1)	9
Median (Q2)	10.5
Upper Quartile (Q3)	12
Lower Extreme	7
Upper Extreme	18

Q1   Q2   Q3

0   5   10   15   20   25

What is the range of the data?   11

What is the interquartile range? 3