

Resource 5-Number Summary and Boxplots

5-number summary

The 5-number summary is a tool for describing a set of data. Consider the following set:

550, 61, 75, 228, 79, 121, 79, 129, 240, 150, 147, 72, 142, 50

To determine the 5-number summary for this data set, complete these four steps:

Step 1: Put the values in order from smallest to largest and identify the smallest value (the minimum) and the largest value (the maximum).

50, 61, 72, 75, 79, 79, 121, 129, 142, 147, 150, 228, 240, 550

The minimum value is 50 and the maximum value is 550.

Step 2: Compute the median.

50, 61, 72, 75, 79, 79, 121, 129, 142, 147, 150, 228, 240, 550
 ↑

The median is $(121 + 129)/2 = 125$

Step 3: Determine Q1 and Q3.

To determine Q1, compute the median of the smaller half of the numbers:

50, 61, 72, 75, 79, 79, 121

Q1 is 75 ↑

To determine Q3, compute the median of the larger half of the numbers:

129, 142, 147, 150, 228, 240, 550

Q3 is 150 ↑

Step 4: Report your 5-number summary in order.

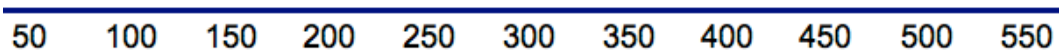
Minimum	50
Q1 (first quartile)	75
Median	125
Q3 (third quartile)	150
Maximum	550

Box-and-whisker plots: Graphical displays of the 5-number summary

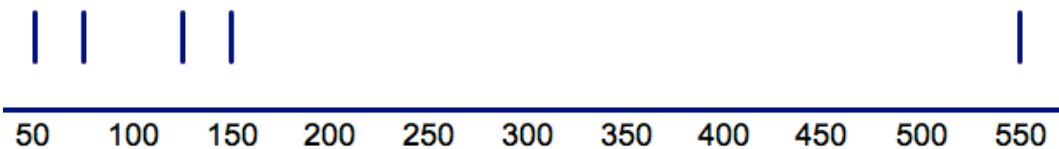
Box-and-whisker plots (often called simply “boxplots”) are a graphical way of illustrating data in quartiles (groups of 25% of the data).

A basic box-and-whisker plot can be created using the steps described below.

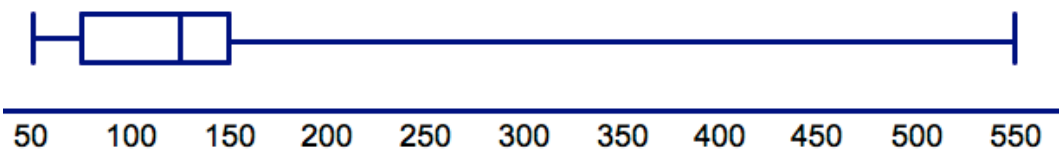
Step 1: Create a number line with evenly spaced increments, which reaches below the minimum value and above the maximum value of the data set.



Step 2: Place vertical markers above each of the values in the 5-number summary from the previous page.



Step 3: Draw horizontal markers to create the box and the whiskers as shown.



Step 4: Analyze the result.

Sample observation: Notice that the whisker on the right side is very long; this means that the top 25% of the data values are very spread out compared to the lowest 25% of the data values. The left whisker is very short; the lowest 25% of the data values are very close together.

Remember, this is the basic boxplot format. More sophisticated boxplots can be used to highlight unusual values in the data.