

How to Find the Five Number Summary and Then Create a Box Plot:

Find the Five Number Summary.

1. Put your data in order from smallest to largest
2. Find the middle value. If you have an odd number of data points, then the middle data point is the median. If you have an even number of data points, then you must average the middle two data points to get the median.
3. Once you have found the median, divide your data points into two groups: those to the left of the median and those to the right of the median. Now find the median of those two groups. The median of the left group is the first quartile and the median of the right group is the third quartile.
4. The min and max are just the smallest value and the largest data points.

Ex: Use the same data set as above: 11 12 15 18 19 22 24 26 26 30 35 36 40 44 48 49 50. We have 17 data points. The middle data point is data point 9, which corresponds to 26. So the median is 26. Now we will divide our data set into two groups, placing the median in both groups:

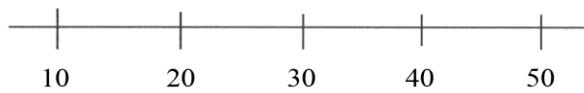
11 12 15 18 19 22 24 26 26 30 35 36 40 44 48 49 50. The lower half has 9 data points and the middle data point is data point 5, which corresponds to 19. So $Q1 = 19$. The upper half has 9 data points and the middle data point is data point 5 (count from the right), which corresponds to 40. So $Q3 = 40$. The min is 11 and the max is 50. So our five number summary is:

	26	
19		40
11		50

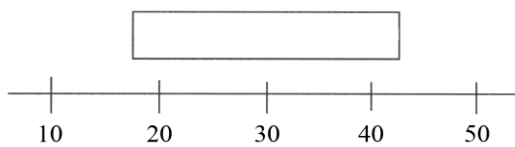
Make a Box Plot

1. Find the five number summary.
2. Make a horizontal or vertical axis with correctly spaced values, whose values encompass all data points in the data set.
3. Draw a box with ends at $Q1$ and $Q3$.
4. Draw a line in the box at the median.
5. Find $1.5(Q3 - Q1)$. If $\text{min} > Q1 - (1.5(Q3 - Q1))$, then draw a whisker to the min. If $\text{min} < Q1 - (1.5(Q3 - Q1))$, then draw a whisker to $Q1 - (1.5(Q3 - Q1))$ and mark any data values less than this with an asterisk. Also, if $\text{max} < Q3 + (1.5(Q3 - Q1))$, then draw a whisker to the max. If $\text{max} > Q3 + (1.5(Q3 - Q1))$, then draw a whisker to $Q3 + (1.5(Q3 - Q1))$ and mark any data values larger than this with an asterisk.

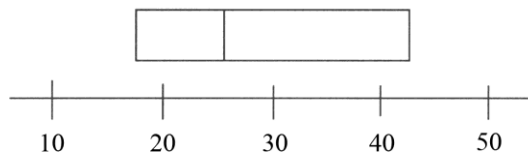
Ex: Using the sample example, we already have the five number summary. Draw the axis.



Now we can draw the box.



Now the line for the median.



Now, $1.5 \cdot (Q3 - Q1) = 1.5 \cdot (42 - 18.5) = 1.5 \cdot 23.5 = 35.25$

$Q1 - 1.5 \cdot (Q3 - Q1) = 18.5 - 35.25 = -16.75$. So, we draw the left whisker to the min of 11.

$Q3 + 1.5 \cdot (Q3 - Q1) = 42 + 35.25 = 77.25$. So, we draw the right whisker to the max of 50.

