

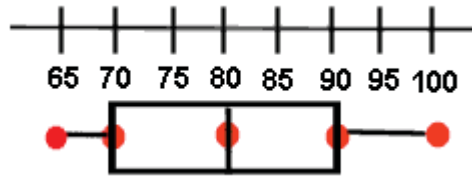
Do now

Makeup quizzes on Wednesday

Quiz 3 on Thursday

Practice: Box Plot and Outlier Rule

The box-and-whisker plot below shows the distribution of tests scores in Mrs. Uebelhoer's Algebra 2 class.



1. Determine the median of the box-and-whisker plot.
2. What percentage of students scored between 90 and 100?
3. What percentage of students scored between 70 and 90?

Joe interviewed the cross country team at his high school to find out how many miles per week they run. The following list is the data Joe collected.

15, 25, 33, 47, 52, 35, 8, 55, 42, 29, 45, 54, 41, 37, 48, 56, 45, 40

4. Rewrite the list of data in order from least to greatest.
5. Determine the 5-number summary
6. Make a box-and-whisker plot for the data set.
7. How many miles do the bottom 75% of runners run per week?
8. Use the 1.5 IQR rule to determine if there are outliers.

Interquartile Range (IQ) = _____

Lower Fence = _____

Upper Fence = _____

Outliers = _____

Modified Box Plot

DEFINITION:

In statistics, **an outlier** is an observation that is numerically distant from the rest of the data.

How to calculate an outlier

1) Subtract the lower quartile from the higher quartile to get *the interquartile range, IQ*.

2) Multiply the interquartile range by 1.5. Add this to the upper quartile and subtract it from the lower quartile. Any data point outside these values is an **outlier**.

The **lower fence** is the lower "cut-off point" for outliers

The **upper fence** is the upper "cut-off point" for outliers

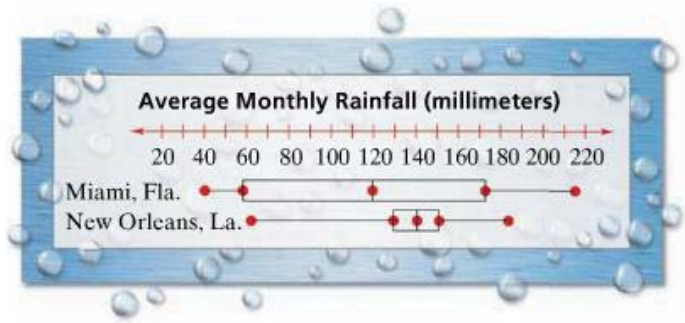
$$\text{Lower Fence} = Q_1 - 1.5(IQ)$$

$$\text{Upper Fence} = Q_3 + 1.5(IQ)$$

The parallel box-and-whisker plot below shows average monthly rainfall for Miami and New Orleans.

10. a. Which city shows a greater range in average monthly rainfall?

b. Explain how the parallel box-and-whisker plot makes it easy to compare the ranges.



11. In Miami, what percentage of rainfall was between 60 and 216 millimeters?

12. In New Orleans, what percentage of rainfall was between 61 and 130 millimeters?

Mrs. Hagan measured the height, in inches, of all the girls in her PE class. She recorded her results in the following list.

63, 60, 67, 62, 58, 63, 68, 59, 62, 65, 56, 63, 59, 62, 58

13. Determine the 5-number summary and make a box-and-whisker plot for the data set.

14. Between what heights are the middle 50% of the girls in Mrs. Hagan's PE class?

15. Use the 1.5 IQR rule to determine if there are outliers.

Interquartile Range (IQR) = _____

Lower Fence = _____

Upper Fence = _____

Outliers = _____

Modified Box Plot

13. Home runs. In 1961 Roger Maris made baseball headlines by hitting 61 home runs, breaking a famous record held by Babe Ruth. Here are Maris's home run totals for his 10 seasons in the American League. Would you consider his record-setting year to be an outlier? Explain.

8, 13, 14, 16, 23, 26, 28, 33, 39, 61

Boxplots Worksheet

1. The following are the scores of 12 members of a woman's golf team in tournament play:

89 90 87 95 86 81 111 108 83 88 91 79

- Construct a modified boxplot of the data.
- Are there any outliers?
- Find the mean.
- Based on the mean and median describe the distribution.

2. Students from a statistics class were asked to record their heights in inches:

65 72 68 64 60 55 73 71 52 63 61 65
74 69 67 74 50 44 75 67 62 66 80 64

- Construct a modified boxplot of the data.
- Find the value of the IQR.
- Are there any outliers? List them, if any, and try to offer an explanation.

3. Below is the data on maximum daily rainfall in South Bend, Indiana over a 30-year period:

1.88 2.23 2.58 2.07 2.94 2.29 3.14 2.15 1.95 2.51
2.86 1.48 1.12 2.76 3.10 2.05 2.23 1.70 1.57 2.81
1.24 3.29 1.87 1.50 2.99 3.48 2.12 4.69 2.29 2.12

- Compute the 5 number summary.
- Draw a modified boxplot.
- Are there any outliers?
- Based on the shape of the distribution (histogram) do you expect the mean to fall distinctly above the median, close to the median, or distinctly below the median?

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