Name _____ Date _____ Class_____

Challenge

Displaying Outliers in Box-and-Whisker Plots

Box-and-whisker plots can be misleading if either the minimum or maximum value is an outlier. The fair options are either to not use box-and-whisker plots for data with outliers or to show them as individual points.

Mathematically, a value is accepted as an outlier if it is at least 1.5(IQR) below Q1 or 1.5(IQR) above Q3.

For the data set {46, 22, 19, 2, 17, 23, 31, 42, 73, 16, 22, 26, 28}:

1. Find Q1.   2. Find Q3.   3. Find the IQR.

   _____   _____   _____

4. Find 1.5(IQR).   5. Find Q1 – 1.5(IQR).   6. Find Q3 + 1.5(IQR).

   _____   _____   _____

7. Using the rule of being 1.5(IQR) away from
   Q1 or Q3, what is the outlier in the data set above? _____

Outliers can be mild or extreme. A **mild outlier** is more than 1.5(IQR) from Q1 or Q3, but less than 3(IQR) from them. An **extreme outlier** is more than 3(IQR) from Q1 or Q3.

8. Classify the outlier identified in question 7. _____

To draw a box-and-whisker plot that has outliers, first plot Q1, the median, and Q3 as usual. Draw the box. Plot the minimum and maximum points that are not outliers. Draw the whiskers to these points. Then plot mild outliers with a closed dot and extreme outliers with an open dot.

9. Draw a box-and-whisker plot, displaying the outlier, for the data set above.

Draw box-and-whisker plots, displaying outliers, for each data set.

10. 41, 43, 30, 42, 29, 42, 41, 51, 43, 41, 43, 48

11. 30, 28, 27, 29, 33, 10, 21, 32, 27, 29

12. 124, 135, 83, 140, 210, 144

Holt McDougal Coordinate Algebra

4. mean: 0 median: 0
   mode: –1, 0, and 1 range: 2

5. outlier: 183, increases mean by 10.6, median by 1, and range by 58, no effect on mode

6. outlier: 0.8, increases mean by 0.15695, median by 0.0005, and range by 0.78, no effect on mode

7a. mean: 578.34 mg

7b. median, 582.4 mg; The outlier 561.4 affects the mean.

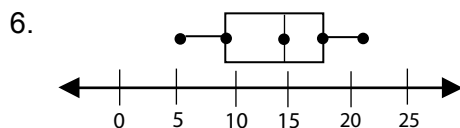7c. mean; It is further from the ideal weight than the median.

8.

9.
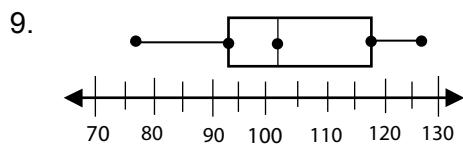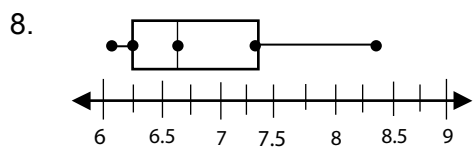
10. about 6

11. Possible answer: Emma, half of her counts are greater than 33, compared to 27 for Tammy.
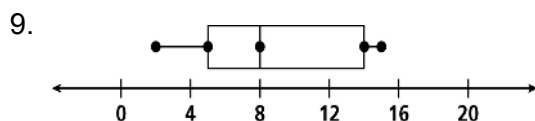
Review for Mastery

1. 8, 2, 3, 4, 3, 20, 4; median: 3, mode: 3, range: 6

2. mean: 5.5, median: 5, mode: 4 and 5, range: 4

3. mean: 10, median: 10, mode: none, range: 12
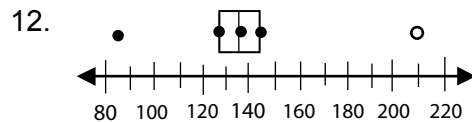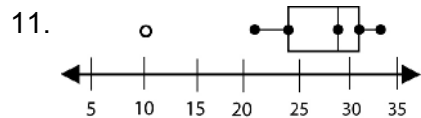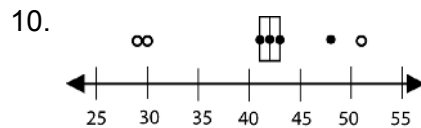
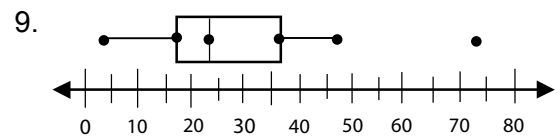4. 5, 9, 11, 14, 18, 18, 21

5. 5, 9, 14, 18, 21

6.

7. 2, 5, 7, 9, 14, 15

8. 2, 5, 8, 14, 15

9.

Challenge

1. 18   2. 36.5
3. 18.5   4. 27.75
5. –9.75   6. 64.25
7. 73   8. mild

9.

10.

11.

12.

Problem Solving

1. mean: $64, median: $58, mode: none; The median because only one price is above the mean.

2. mean: 40.125, median: 34, mode: 33; The mean decreases by 5.125, median decreases by 1.

3. mean: 84, median: 76, mode: 76; the mean

4. mean: ≈8.4, median: 8, mode: 8; the mode

5. B

6. F

7. B

Reading Strategies

1. the mean

2. because 2 occurs more often

3. when there is an even number of data values

4. The mode occurs most often; an outlier is different from the other numbers, so an outlier cannot be a mode.

5. mean: 8, median: 8.5, mode: 3 and 10

Holt McDougal Coordinate Algebra