ALBERT

Name _____ Date _____

Shape, Center, Spread and Outliers Worksheet

Algebra 1 · Common Core HSS-ID.A.3

> Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

Practice

Builds the skill step by step.

1. Which value is an outlier in 3, 4, 5, 5, 6, 40?

2. A distribution has a long tail on the right. What is its shape?

   A. skewed left

   B. skewed right

   C. uniform

   D. symmetric

3. What is the mean of 3, 4, 5, 5, 6, 40?

4. What is the mean of 3, 4, 5, 5, 6 (without the 40)?

5. The median of 3, 4, 5, 5, 6, 40 is 5, and the median of 3, 4, 5, 5, 6 is also 5. By how much did removing 40 change the median?

6. Which is affected more by an outlier?

   A. the median

   B. the IQR

   C. the mode

   D. the mean

7. In a symmetric distribution, how do the mean and median compare?

   A. The mean is much larger.

   B. They can't be compared.

   C. They are about equal.

   D. The median is much larger.

8. What is the range of 3, 4, 5, 5, 6, 40?

9. A distribution is skewed left. Where is its long tail?

   A. on the left

   B. on the right

   C. on both sides

   D. in the middle

10. What does it mean for a distribution to be bimodal?

    A. It has two outliers.

    B. It has two peaks.

    C. It is symmetric.

    D. It has two medians.

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On Level

Grade-level practice.

1. For 10, 12, 13, 15, 16, 18, 20, 50, Q1 = 12.5 and Q3 = 19. Values above Q3 + 1.5 × IQR are outliers. What is that cutoff?

2. Using that cutoff (28.75), is 50 an outlier in 10, 12, 13, 15, 16, 18, 20, 50?

   A. No

   B. Yes

   C. Only if the mean is used

   D. You can't tell

3. In a town, the mean home price is 410,000 dollars and the median is 290,000 dollars. Explain what this suggests about the distribution.

4. Class A has mean 75 and median 76. Class B has mean 70 and median 78. Which class's scores are probably skewed left?

   A. Class B

   B. Class A

   C. both

   D. neither

5. 10, 12, 13, 15, 16, 18, 20, 50 has a mean of 19.25. What is the mean without the 50, to the nearest tenth?

6. A data set is skewed right. Which measure of center is better?

   A. the median

   B. the mean

   C. the range

   D. the maximum

7. What is the median of 2, 30, 31, 32, 33, 34?

8. What is the mean of 2, 30, 31, 32, 33, 34?

9. A dot plot of typing speeds has one cluster near 30 words per minute and another near 70. What shape is it?

   A. bimodal

   B. skewed right

   C. skewed left

   D. uniform

10. For 1, 2, 3, 4, 5, 6, 7, 100, Q1 = 2.5 and Q3 = 6.5. What is the IQR?

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Challenge

Multi-step and word problems that stretch it.

1. For 1, 2, 3, 4, 5, 6, 7, 100 (Q1 = 2.5, IQR = 4), values below Q1 − 1.5 × IQR are outliers. What is that cutoff?

2. Town A's yearly rainfall is symmetric around 30 inches with a small spread. Town B's rainfall is usually near 25 inches, but one year had 70 inches. Compare the two distributions.

3. Which change does NOT affect the median of a data set with an odd number of values?

   A. replacing the median with a larger number

   B. removing the median

   C. adding two values below the median

   D. increasing the largest value

4. Nine values have a median of 20. The largest value is increased by 100. What is the new median?

5. Nine values have a mean of 30. The largest value is increased by 100. By how much does the mean increase, to the nearest tenth?

6. Is the standard deviation sensitive to outliers?

   A. No: it ignores extreme values.

   B. Only for small data sets.

   C. Yes: it uses every distance from the mean.

   D. Only for skewed data.

7. For 5, 5, 6, 6, 7, 30, how much greater is the mean than the median, to the nearest hundredth?

8. A company has a few executives with very high salaries. Which statistic best describes a typical salary?

   A. the maximum

   B. the median

   C. the range

   D. the mean

9. A data value of 500 is found to be a typing error for 50. What should you do?

   A. Correct it to 50 and note the change.

   B. Keep 500 because it is data.

   C. Delete the whole data set.

   D. Double every value.

10. Explain why the IQR is a better measure of spread than the range when the data have an outlier.