

Data Shape Detectives

Compare center, spread, shape, and outliers.

HIGH SCHOOL • AI-S.ID.3

AI-S.ID.3 "Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers)."

NAME _____

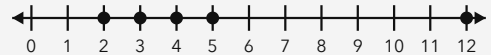
DATE _____

READ THE WHOLE DISTRIBUTION

Compare data sets by looking at center, spread, and shape. The median describes the middle value and is less affected by an outlier, while the mean and range can change a lot because of one extreme value.

WORKED EXAMPLE

The marks on the number line show five data values. Identify the median, range, likely outlier, and shape.



1. The middle mark is 4, so the median is 4.
2. Range = $12 - 2 = 10$.
3. The mark at 12 is far from the cluster from 2 to 5.
4. So 12 is a high outlier, the distribution is right-skewed, and the mean would be pulled higher.

Answer: Median: 4. Range: 10. Likely outlier: 12. Shape: right-skewed.

PRACTICE 4 problems

- 1** Set A: 10, 11, 11, 12, 13 Set B: 8, 10, 11, 12, 16 Find each median and range. Which set has less spread?

ANSWER _____

- 2** A data set is 20, 21, 22, 23, 50. Identify the likely outlier. Should the mean or median describe a usual value?

ANSWER _____

- 3** For 25, 28, 30, 32, 35, 70, find the median and range. Describe the shape.

ANSWER _____

- 4** Set C has median 54 and range 9. Set D has median 54 and range 27. Which set is more consistent?

ANSWER _____

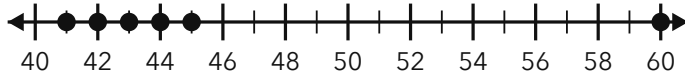
APPLY IT Show your work

- 1** The dot plot shows workout minutes logged by members of a fitness club. Describe the shape, find the median and range, and explain how the value at 30 affects the mean.



ANSWER _____

- 2** The marks show a student's daily reading minutes for six days. Give the median and range. Explain why the student should use the median, not the mean, to describe a typical day.



ANSWER _____

CHALLENGE One step up

Two esports teams recorded seven match scores. Team X: 70, 72, 73, 74, 76, 77, 78 Team Y: 69, 71, 73, 75, 77, 79, 95 Find each team's median, range, and mean. Then decide which team is more consistent and explain how the extreme score affects Team Y's distribution.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Set A: 10, 11, 11, 12, 13 Set B: 8, 10, 11, 12, 16 Find each median and range. Which set has less spread?	Set A: median 11, range 3. Set B: median 11, range 8. Set A has less spread.
2	A data set is 20, 21, 22, 23, 50. Identify the likely outlier. Should the mean or median describe a usual value?	Likely outlier: 50. Use the median, 22, because 50 pulls the mean higher.
3	For 25, 28, 30, 32, 35, 70, find the median and range. Describe the shape.	Median: 31. Range: 45. The distribution is right-skewed because 70 is a high outlier.
4	Set C has median 54 and range 9. Set D has median 54 and range 27. Which set is more consistent?	Set C is more consistent because it has the smaller range.

PART 2 • APPLY IT

- The distribution is right-skewed. The median is 16 and the range is 16. The value 30 is a likely high outlier that pulls the mean higher.** The fourth and fifth values are both 16, so the median is 16. Subtract 14 from 30 for the range, then note that the distant high value raises the mean.
- Median: 43.5 minutes. Range: 19 minutes. The 60-minute day is a likely high outlier, so it pulls the mean above a typical reading time.** Average the two middle values, 43 and 44, for the median. The distant mark at 60 makes the distribution right-skewed and affects the mean.

CHALLENGE

Team X: median 74, range 8, mean $74 \frac{2}{7}$. Team Y: median 75, range 26, mean 77. Team X is more consistent. Team Y is right-skewed because 95 raises its mean above its median.

Accept equivalent wording such as high outlier, unusually large value, or skewed right. For consistency comparisons, students should support the choice with the smaller range.