LESSON MAKER PRO

# Outlier Effects

*Compare data with and without a distant value.*

**GRADE 8 · PA.D.1.2**

**PA.D.1.2** "Explain how outliers affect measures of center and spread."

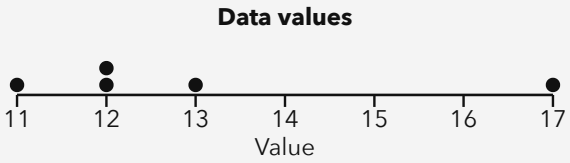
NAME _____ DATE _____

## THE BIG IDEA

An outlier is a value far from the rest of a data set. Compare the data with and without it: the mean and range often change, while the median may stay the same.

## WORKED EXAMPLE

How do the mean and range change when 17 is included?




1. Without 17: mean = (11 + 12 + 12 + 13)/4 = 12.
2. With 17: mean = 65/5 = 13.
3. Range: 13 - 11 = 2 without 17; 17 - 11 = 6 with 17.

**Answer: Including 17 raises the mean from 12 to 13 and the range from 2 to 6.**

## PRACTICE 4 problems

**1** Data: 4, 4, 6, 6. How do the mean and range change when 16 is added?

**ANSWER** _____

**2** Data: 5, 5, 9, 9. How do the median and range change when 0 is added?

**ANSWER** _____

**3** Data: 6, 8, 8, 10. How do the mean and range change when 20 is added?

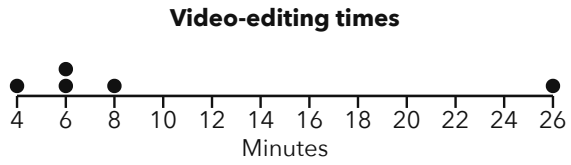
**ANSWER** _____

**4** Data: 14, 14, 16, 16. How do the median and range change when 4 is added?

**ANSWER** _____

## APPLY IT Show your work

**1** The plot shows video-editing times in minutes. How do the mean and range change if the 26-minute video is removed?




**ANSWER** _____

**2** A basketball team's scores are 30, 34, 34, 38, and 64 points. How do the median and range change if the 64-point game is removed?

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

Four quiz scores are 6, 8, 8, and 10. A high score is added. The mean rises from 8 to 10, but the median stays 8. Find the added score and how much the range increases. Explain.

WORK SPACE AND ANSWER

ANSWER KEY

# Outlier Effects

GRADE 8 · PA.D.1.2

## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | Data: 4, 4, 6, 6. How do the mean and range change when 16 is added? | **Mean: 5 to 7.2. Range: 2 to 12.** |
| 2 | Data: 5, 5, 9, 9. How do the median and range change when 0 is added? | **Median: 7 to 5. Range: 4 to 9.** |
| 3 | Data: 6, 8, 8, 10. How do the mean and range change when 20 is added? | **Mean: 8 to 10.4. Range: 4 to 14.** |
| 4 | Data: 14, 14, 16, 16. How do the median and range change when 4 is added? | **Median: 15 to 14. Range: 2 to 12.** |

## PART 2 · APPLY IT

1. **Mean: 10 to 6 minutes. Range: 22 to 4 minutes.** The five times total 50 minutes; the four remaining times total 24 minutes. Removing 26 changes the maximum from 26 to 8.
2. **Median: 34 to 34 points. Range: 34 to 8 points.** The middle score is 34 both before and after removal. The maximum changes from 64 to 38.

## CHALLENGE

**The added score is 18. Five scores with a mean of 10 total 50; the original four total 32, so the new score is 18. The range rises from 4 to 12, an increase of 8. The median stays 8.**

Accept equivalent statements of each change, including the amount of increase or decrease when both starting and ending values are clear.