

LESSON

16.1 Measures of Center

COMMON CORE

6.SP.5

Summarize numerical data sets in relation to their context, ... Also 6.SP.3, 6.SP.5a, 6.SP.5b, 6.SP.5c, 6.SP.5d

?

ESSENTIAL QUESTION

How can you use measures of center to describe a data set?

EXPLORE ACTIVITY 1

Real World

COMMON CORE

6.SP.5c, 6.SP.3, 6.SP.5a

Finding the Mean

A **measure of center** is a single number used to describe a set of numeric data. A measure of center describes a typical value from the data set.

One measure of center is the *mean*. The **mean**, or average, of a data set is the sum of the data values divided by the number of data values in the set.

Tami surveyed five of her friends to find out how many brothers and sisters they have. Her results are shown in the table.

Number of Siblings				
Amy	Ben	Cal	Don	Eva
2	3	1	1	3

A Model each person’s response as a group of counters.

Amy	Ben	Cal	Don	Eva
●	●	●	●	●
●	●			●
	●			●

B Now rearrange the counters so that each group has the same number of counters.

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Each group now has _____ counter(s). This value is the mean. This model demonstrates how the mean “evens out” the data values.

C Use numbers to calculate the mean.

The sum of the data values is $2 + 3 + \square + \square + \square = \square$.

How many data values are in the set? _____

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EXPLORE ACTIVITY 1 (cont'd)

$$\text{Mean} = \frac{\text{sum of data values}}{\text{number of data values}} = \frac{\boxed{}}{\boxed{}} = \boxed{}$$

Reflect

1. Can the mean be greater than the greatest value in a data set? Why or why not?

Math Talk**Mathematical Practices**

Suppose you have a data set in which all of the values are 2. What is the mean?

**Finding the Median**

Another measure of center is the *median*. The **median** represents the middle value of an ordered data set.

EXAMPLE 1**COMMON CORE****6.SP.5c, 6.SP.5b**

- A** A coach records the distances that some cross-country team members ran last week. Find the median.

Write the data values in order from least to greatest.

3 4 5 5 6 7 7 8 10 10 10

This value is the median.

Equal number of values on either side of the median

The median is 7.

- B** Find the median of these test scores: 87, 90, 77, 83, 99, 94, 93, 90, 85, 83.

Write the data values in order from least to greatest.

77 83 83 85 87 90 90 93 94 99

This data set has two middle values: 87 and 90.

The median is the average of these two values:

$$\text{Median} = \frac{87 + 90}{2} = 88.5$$

The median is 88.5.

Math Talk**Mathematical Practices**

Why does the data set in **A** have one middle value while the data set in **B** has two middle values?

Distances Run	
Cara	3 mi
Rob	5 mi
Maria	7 mi
Olivia	10 mi
Paul	10 mi
Chris	4 mi
Amir	7 mi
Iris	5 mi
Alex	8 mi
Tara	10 mi
Ned	6 mi

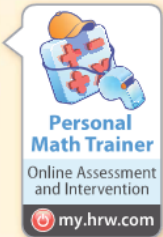
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Reflect

2. **What If?** Which units are used for the data in **A**? If the coach had recorded some distances in kilometers and some in miles, can you still find the median of the data? Explain.

YOUR TURN

3. Charlotte recorded the number of minutes she spent exercising in the past ten days: 12, 4, 5, 6, 8, 7, 9, 8, 2, 1. Find the median of the data.



EXPLORE ACTIVITY 2



COMMON
CORE

6.SP.5d, 6.SP.5c

Comparing the Mean and the Median

The mean and median of a data set may be equal, very close to each other, or very different from each other. For data sets where the mean and median differ greatly, one likely describes the data set better than the other.

The monthly earnings of several teenagers are \$200, \$320, \$275, \$250, \$750, \$350, and \$310.



- A** Find the mean.

$$\frac{\boxed{} + \boxed{} + \boxed{} + \boxed{} + \boxed{} + \boxed{} + \boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} \approx \boxed{}$$

- B** Write the data values in order from least to greatest and find the median.

- C** The mean and the median differ by about \$ _____. Why?

- D** Which measure of center better describes the typical monthly earnings for this group of teenagers—the mean or the median? Explain.

EXPLORE ACTIVITY 2 (cont'd)

Reflect

4. **Communicate Mathematical Ideas** Luka’s final exam scores for this semester are 70, 72, 99, 72, and 69. Find the mean and median. Which is a better description of Luka’s typical exam score? Explain your thinking.

Guided Practice

1. Spencer surveyed five of his friends to find out how many pets they have. His results are shown in the table. What is the mean number of pets? (Explore Activity 1)

Number of Pets				
Lara	Cody	Sam	Ella	Maria
3	5	2	4	1

$$\text{Mean} = \frac{\text{sum of data values}}{\text{number of data values}} = \frac{\boxed{}}{\boxed{}} = \boxed{}$$

The mean number of pets is _____.

2. The following are the weights, in pounds, of some dogs at a kennel: 36, 45, 29, 39, 51, 49. (Example 1)
- a. Find the median. _____
- b. Suppose one of the weights were given in kilograms. Can you still find the median? Explain.

3. a. Find the mean and the median of this data set: 9, 6, 5, 3, 28, 6, 4, 7. (Explore Activity 2)

- b. Which better describes the data set, the mean or the median? Explain.



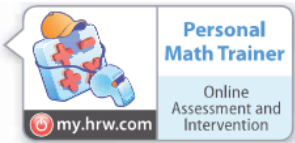
ESSENTIAL QUESTION CHECK-IN

4. How can you use measures of center to describe a data set?

Name _____ Class _____ Date _____

16.1 Independent Practice

COMMON CORE 6.SP.3, 6.SP.5, 6.SP.5a, 6.SP.5b, 6.SP.5c, 6.SP.5d



Several students in Ashton’s class were randomly selected and asked how many text messages they sent yesterday. Their answers were 1, 0, 10, 7, 13, 2, 9, 15, 0, 3.

5. How many students were asked? How do you know?

6. Find the mean and the median for these data.

Mean = _____ Median = _____

The points scored by a basketball team in its last 6 games are shown. Use these data for 7 and 8.

Points Scored					
73	77	85	84	37	115

7. Find the mean score and the median score.

Mean = _____ Median = _____

8. Which measure better describes the typical number of points scored? Explain.

Some people were asked how long it takes them to commute to work. Use the data for 9–11.

9. What units are used for the data? What should you do before finding the mean and median number of minutes?

16 min	5 min
7 min	8 min
14 min	12 min
0.5 hr	1 hr

10. Find the mean and median number of minutes.

Mean = _____ Median = _____

11. Which measure do you think is more typical of the data?

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H.O.T. FOCUS ON HIGHER ORDER THINKING

12. Critique Reasoning For two weeks, the school librarian recorded the number of library books returned each morning. The data are shown in the dot plot. The librarian found the mean number of books returned each morning.



$$\frac{8 + 6 + 10 + 5 + 9 + 8 + 3 + 6}{8} = \frac{55}{8} \approx 6.9$$

Is this the correct mean of this data set? If not, explain and correct the answer.

13. Critical Thinking Lauren’s scores on her math tests are 93, 91, 98, 100, 95, 92, and 96. What score could Lauren get on her next math test so that the mean and median remain the same? Explain your answer.

14. Persevere in Problem Solving Yuko wants to take a job selling cars. Since she will get a commission for every car she sells, she finds out the sale price of the last four cars sold at each company.

Company A: \$16,000; \$20,000; \$25,000; \$35,000;

Company B: \$21,000, \$23,000, \$36,000, \$48,000

a. Find the mean selling price at each company.

b. Find the median selling price at each company.

c. Communicate Mathematical Ideas At either company, Yuko will get paid a commission of 20% of the sale price of each car she sells. Based on the data, where do you recommend she take a job? Why?

Work Area

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