

Using Mean and Mean Absolute Deviation to Compare Data

Name: _____

Prerequisite: Measures of Center

Study the example showing how to describe the center of a data set using mean, median, and mode. Then solve problems 1–6.

Example

Miguel keeps track of his number of hits in baseball games this year. His data set is:

{3, 2, 5, 3, 0, 2, 3, 5, 4}

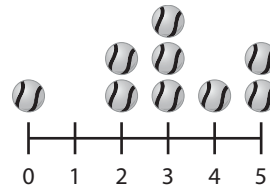
He draws a dot plot to represent these data. How can Miguel describe the center of the data set?

One way that Miguel can describe the center of the data set is by finding the *mean*, or average, of the data. To find the mean, add the numbers together and divide by the total number of values.

$$\text{Sum} = 0 + 2 + 2 + 3 + 3 + 3 + 4 + 5 + 5 = 27$$

$$\text{Mean} = \frac{27}{9} = 3$$

Miguel's average is 3 hits per game.



- 1** What is the median of Miguel's data? Show how you found your answer.

- 2** How can you use a dot plot to identify the mode of a data set?

- 3** What is the mode of the Miguel's data?

Vocabulary

mean the average of a data set.

median the middle number in an ordered set of numbers.

mode the most common number in a set of numbers.

Solve.

- 4** Janna's health class measures the heart rates of students after they walked for five minutes. The heart rates, in beats per minute, were {102, 74, 86, 74, 96, 95, 103, 102}. Find the mean of the data set. What does the mean tell you?

Show your work.

Solution: _____

- 5** Bayo measured the distance in inches that a toy car traveled after going down a ramp. She collected this data for seven trials: {117, 135, 117, 139, 121, 133, 22}.

- a.** An *outlier* is one or more data values that are quite different from the other data values in the set. Are there any outliers in Bayo's data? If so, which one(s)? _____
- b.** Which measure of center (mean, median, or mode) is most affected by an outlier? Justify your answer.

- c.** What measure of center would you use to describe this data set? Explain.

- 6** Kobe collected data on the weight, in pounds, of 5 different dogs at an animal shelter. The mean of his data was 38, the median was 37, and the mode was 35. Give an example of a data set with these measures of center. Show that your data set meets the requirements.

Comparing Variabilities and Centers

Study the example showing how to compare data sets that have similar variabilities. Then solve problems 1–9.

Example

Mr. Markum is ordering sneakers for the boys' baseball team. The sizes ordered and the number of pairs of each size are shown in the table. To the nearest tenth, the mean size of the sneakers for the baseball team is 10.6. What is the mean absolute deviation (MAD)?

Sneaker Size	8.5	9	9.5	10	10.5	11	11.5	12
Number	1	2	0	2	3	4	1	3
Difference from Mean Size	2.1	1.6	0	0.6	0.1	−0.4	−0.9	−1.4

To find the MAD of the sneaker sizes, subtract each data value from the mean. Then average the absolute values of these numbers and round to the nearest tenth.

$$\frac{2.1 + (2 \times 1.6) + (2 \times 0.6) + (3 \times 0.1) + (4 \times 0.4) + 0.9 + (3 \times 1.4)}{16} = \frac{13.5}{16} \approx 0.8$$

- 1** Mr. Markum also orders sneakers for the girls' softball team. He makes the table below. The mean size of the sneakers to the nearest tenth is 8.2. Complete the table.

Sneaker Size	7	7.5	8	8.5	9	9.5	10
Number	2	3	5	1	3	1	1
Difference from Mean Size							

- 2** Calculate the MAD of the softball sneaker sizes to the nearest tenth.
- _____
- 3** What is the difference in the mean sizes of the two types of sneakers? What is the difference in their MADs? Interpret the differences in the means and MADs.
- _____
- _____
- _____



Solve.

The table gives average speeds of eight horses in a horse race and eight cars in a car race. Use the table to solve problems 4–9.

Number	1	2	3	4	5	6	7	8
Speed of Horse (mph)	29	30	27	25	27	26	27	23
Speed of Car (mph)	233	228	229	234	231	228	232	226

4 Calculate the mean of the horses' speeds to the nearest tenth. Then calculate the mean of the cars' speeds to the nearest tenth.

5 Calculate the MAD of the horses' speeds to the nearest tenth. Calculate the MAD of the cars' speeds to the nearest tenth.

6 Were the horses' speeds or the cars' speeds closer to their mean? Explain.

7 What is the difference in the means? _____

8 By what number would you have to multiply the MAD of the cars' speeds to get the difference between the means that you found in problem 7? Round your answer to the nearest tenth.

9 What do your answers to problems 4, 5, and 8 tell you about the two data sets? Your answers should refer to the means and the MADs of the data sets.

Using Mean and Mean Absolute Deviation to Compare Data

Solve the problems.

- 1 Which of the following measures the variability of a data set?

A MAD C median
B mean D mode

Brandon chose **B** as the correct answer. How did he get that answer?

What is the definition of each term?



- 2 Tell whether each statement is *True* or *False* for the following data set: {5, 7, 12, 3, 7, 8}.

a. The mean is 8. ☐ True ☐ False
b. The data set has no mode. ☐ True ☐ False
c. A deviation of 3 from the mean is -4 . ☐ True ☐ False
d. The MAD is 2. ☐ True ☐ False

How do you compute the mean, mode, and MAD?



- 3 Which of the following results show similar variability but noticeably different centers? Select all that apply.

A Data set 1: Mean = 2.4; MAD = 26.9
Data set 2: Mean = 2.2; MAD = 25.3
B Data set 1: Mean = 6.7; MAD = 33.2
Data set 2: Mean = 2.0; MAD = 35.0
C Data set 1: Mean = 1.1; MAD = 32.8
Data set 2: Mean = 1.0; MAD = 5.1
D Data set 1: Mean = 10.3; MAD = 2.2
Data set 2: Mean = 37.2; MAD = 2.4

What measure indicates the variability of a data set?



Solve.

- 4 Which of the following is *not* true about the mean of a set of data?
- A The mean can be one of the data values.
 - B The mean can be different from all of the data values.
 - C The mean can be less than the minimum data value.
 - D The mean can be the same value as the median.

Try constructing data sets with the given characteristics.



- 5 Gerald kept track of the high temperatures for two weeks, and he recorded the results in a table.

Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Week 1 Temp. (°F)	52	65	63	48	52	53	60
Week 2 Temp. (°F)	59	62	63	60	56	55	54

- a. Calculate the difference between the weekly mean high temperatures rounded to the nearest tenth.
- _____
- b. Compare and interpret the MADs of weeks 1 and 2.
- _____
- _____
- _____

How do you calculate the mean of a data set?



- 6 Create two sets of data with the following characteristics:
- Each data set has 5 values.
 - The mean of set 1 is greater than the mean of set 2.
 - The MAD of set 1 is less than the MAD of set 2.
- _____
- _____
- _____
- _____

Use examples of data sets that you have seen to help you solve this problem.

