mean

a. $\frac{88+77+65+70+65+72+95+80+106+68}{10} = \frac{786}{10} = 78.6$

$9.4 = |88-78.6|$
$1.6 = |77-78.6|$
$13.6 = |65-78.6|$
$9.6 = |70-78.6|$
$|65-78.6| = 13.6$

$|72-78.6| = 6.6$
$|95-78.6| = 16.4$
$|80-78.6| = 1.4$
$|106-78.6| = 27.4$
$|68-78.6| = 9.6$
+

$= \frac{109.2}{10}$

Show your work.

Got It? Do this problem to find out.

a. The table shows speeds of ten birds. Find the mean absolute deviation of the data. Round to the nearest hundredth. Describe what the mean absolute deviation represents.

Speeds of Top Ten Fastest Birds (mph)				
88	77	65	70	65
72	95	80	106	68

a. Sample answer: The average distance each data value is from the mean is 10.92 miles per hour.

10.92 miles per hour;

2. The table shows the height of waterslides at two different water parks. Find the mean absolute deviation for each set of data. Round to the nearest hundredth. Then write a few sentences comparing their variation. (Example 2)

Mean: 96

Mean: 116.6

Height of Waterslides (ft)										
Splash Lagoon					Wild Water Bay					
75	95	80	110	88	120	108	94	135	126	

Splash Lagoon: 10.32 feet; Wild Water Bay: 12.48 feet; Sample answer: The mean absolute deviation of the heights at Splash Lagoon is less than the mean absolute deviation of the heights at Wild Water Bay. The heights at Splash Lagoon are closer together.

3. **Building on the Essential Question** What does the mean absolute deviation tell you about a set of data?

Sample answer: It tells the average distance of each data value from the mean, which lets you know if the data values are close together and close to the mean, or close to the extremes and farther from the mean.

Independent Practice

Go online for Step-by-Step Solutions eHelp

Find the mean absolute deviation for each set of data. Round to the nearest hundredth if necessary. Then describe what the mean absolute deviation represents. (Example 1)

1

Known Moons of Planets			
0	0	1	2
63	34	27	13

17.88 moons;

Sample answer: The average distance each data value is from the mean is 17.88 moons.

2.

Hard Drive (gigabytes)			
640	250	500	640
720	640	250	720

158.75 gigabytes;

Sample answer: The average distance each data value is from the mean is 158.75 gigabytes.

3. The table shows the lengths of the longest bridges in the United States and in Europe. Find the mean absolute deviation for each set of data. Round to the nearest hundredth if necessary. Then write a few sentences comparing their variation.

Longest Bridges (kilometers)										
United States					Europe					
38.4	36.7	29.3	24.1	17.7	17.2	11.7	7.8	6.8	6.6
12.9	11.3	10.9	8.9	8.9	6.1	5.1	5.0	4.3	3.9

United States: 9.77 km; Europe: 2.87 km; Sample answer: The mean absolute deviation in bridge lengths in the U.S. is greater than the mean absolute deviation of the bridge lengths in Europe. The lengths of the bridges in Europe are closer to the mean.

For Exercises 4–7, refer to the table that shows the recent population, in millions, of the ten largest U.S. cities.

Population of Largest U.S. Cities (millions)				
1.5	3.8	1.3	1.6	2.9
1.4	0.9	2.3	8.4	1.3

4. Find the mean absolute deviation. Round to the nearest hundredth.

1.50 million

For Exercises 4–7, refer to the table that shows the recent population, in millions, of the ten largest U.S. cities.

Population of Largest U.S. Cities (millions)				
1.5	3.8	1.3	1.6	2.9
1.4	0.9	2.3	8.4	1.3

4. Find the mean absolute deviation. Round to the nearest hundredth.

1.50 million

5 How many data values are closer than one mean absolute deviation away from the mean? **eight**

6. Which population is farthest from the mean? How far away from the mean is that population? Round to the nearest hundredth.

8.40 million; 5.86 million

7. Are there any populations that are more than twice the mean absolute deviation from the mean? Explain. **yes; Sample answer: Twice the mean absolute deviation is 2 × 1.50 million, or 3.00 million. Since 5.86 million > 3.00 million, the population of 8.4 million is greater than 3.00 million away from the mean.**

CCSS **Be Precise** **For Exercises 8 and 9, look up the word *deviate* in a dictionary or online.**

8. What does the word *deviate* mean? How can it help you remember what the mean absolute deviation refers to? **to differ from; Sample answer: The mean absolute deviation describes how the data values differ from the mean.**

9. How does the word *absolute* help you to remember how to calculate the mean absolute deviation? **Sample answer: It helps me to remember to take the absolute value of the difference between each data value and the mean.**

Persevere with Problems **For Exercises 11 and 12, refer to the table that shows the recorded speeds of several cars on a busy street.**

Recorded Speeds (mph)					
35	38	41	35	36	55

11. Calculate the mean absolute deviation both with and without the data value of 55. Round to the nearest hundredth if necessary.

with the data value of 55: 5.33 miles per hour; without the data value of 55: 2 miles per hour

12. Explain how including the value of 55 affects the mean absolute deviation. **Sample answer: When the value of 55 was included, the mean absolute deviation increased. Because the value of 55 is so much greater then the other data values, the larger mean absolute deviation shows that the data are more spread out when the value of 55 is included as opposed to when it is not included.**

13. **Construct an Argument** Explain why the mean absolute deviation is calculated using absolute value. **Sample answer: The mean absolute deviation is the average distance that each data value is from the mean. Since distance cannot be negative, the absolute values of the differences are used.**

14. **Persevere with Problems** The table shows the high temperatures for 6 days. If the high temperature for day 7 is 61°F, how does the mean absolute deviation change?

High Temperature (°F)					
75	58	72	68	69	66

The mean absolute deviation increases from 4 to about 4.6.