

CHAPTER 9

Data and Graphs

What You've Learned

- In Chapter 1, you compared and ordered decimals.
- You used addition, subtraction, multiplication, and division to solve problems involving decimals.
- You used order of operations to simplify expressions.



Check Your Readiness

Using Order of Operations

Find the value of each expression.

1. $16 + 12 \div 4 - 1$

2. $6 \times (4 + 3) - 2$

Adding Decimals

Find each sum.

3. $13.2 + 23.6 + 26.3$

4. $152.3 + 143.6 + 128$

5. $49.0 + 22.2 + 11.22 + 23.4$

6. $6.09 + 1.5 + 4.68 + 13.6$

Subtracting Decimals

Find each difference.

7. $109.55 - 89.34$

8. $10.42 - 9.36$

9. $75 - 73.2$

Dividing Decimals

Find each quotient.

10. $142.03 \div 10$

11. $361.6 \div 16$

12. $100.75 \div 25$

What You'll Learn Next

- In this chapter, you will find the mean, median, mode, and range of a set of data.
- You will select and use different types of data graphs such as dot plots, box-and-whisker plots, and histograms.
- You will solve problems by collecting, organizing, displaying, and interpreting data.

Key Vocabulary

- box-and-whisker plot (p. 323)
- dot plot (p. 320)
- frequency table (p. 319)
- histogram (p. 328)
- interquartile range (IQR) (p. 335)
- lower quartile (p. 323)
- mean (p. 311)
- mean absolute deviation (MAD) (p. 334)
- measure of center (p. 334)
- measure of variability (p. 334)
- median (p. 315)
- mode (p. 316)
- outlier (p. 312)
- range (p. 320)
- statistical question (p. 345)
- upper quartile (p. 323)

9-1

Finding the Mean

What You'll Learn

To find and analyze the mean of a data set using models and calculations

New Vocabulary mean, outlier

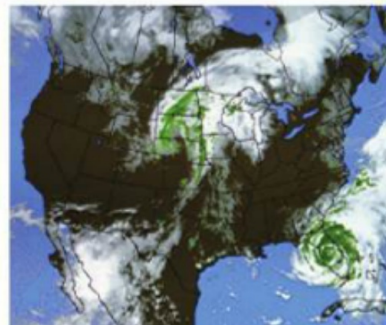
CONTENT STANDARDS

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

Why Learn This?

Meteorologists analyze data. They often use a measure, such as the mean, to help describe a set of data.

The **mean** of a set of data is the sum of the data divided by the number of data items. To find the mean of a set of data, you can adjust all of the values so the values are the same.

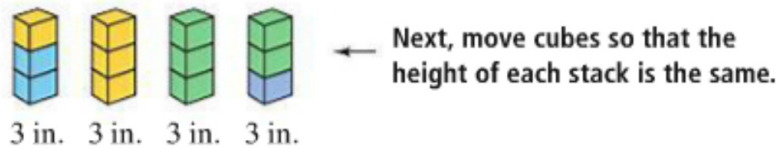
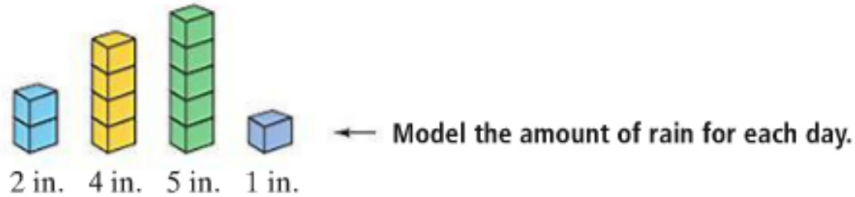


EXAMPLE

Using a Model to Find the Mean

- 1 On four days it rained 2 inches, 4 inches, 5 inches, and 1 inch. Find the mean amount of rain.

You can draw a picture or use objects to model the situation.

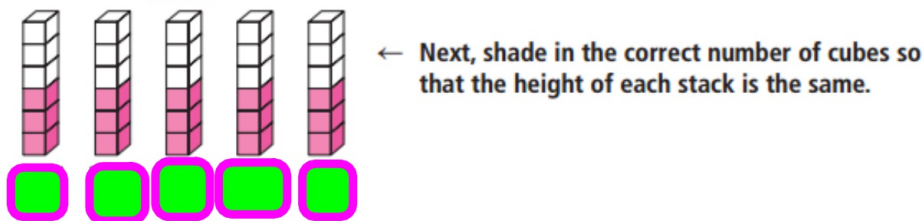
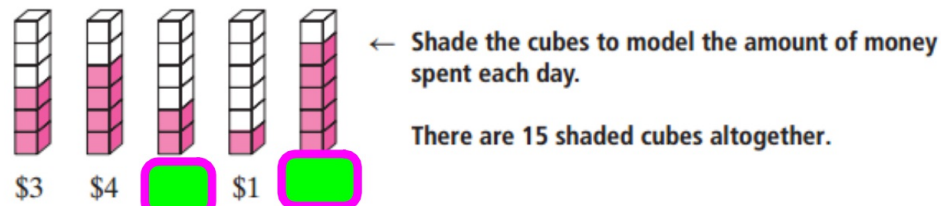


The mean amount of rain is 3 inches.

Example

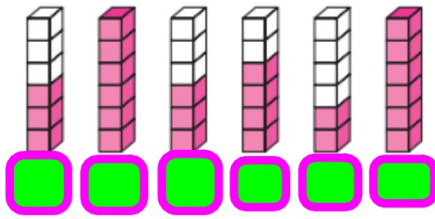
- 1 **Using a Model to Find the Mean** In five days Rebecca spent \$3, \$4, \$2, \$1, and \$5. Find the mean amount of money spent.

Shade in the cubes to model the situation.



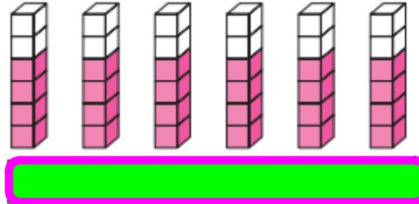
Quick Check

1. Use a model to find the mean of 3, 6, 3, 4, 2, and 6.



← Shade the cubes to model the amount of money spent each day.

There are shaded cubes altogether.



← Next, shade in the correct number of cubes so that the height of each stack is the same.



The thorny lizard survives high temperatures by using its spikes to collect moisture at night.

EXAMPLE

Calculating the Mean

- 2 You measure the temperature outside each day during the week. The temperatures are 95° , 96° , 103° , 99° , and 96° . Find the mean temperature.

$$95 + 96 + 103 + 99 + 96 = 489 \quad \leftarrow \text{Add the temperatures.}$$

$$\frac{489}{5} = 97.8 \quad \leftarrow \text{Divide by the number of readings.}$$

The mean temperature is 97.8° .

Check for Reasonableness The mean is between the lowest value, 95, and the greatest value, 103. So, the answer 97.8 is reasonable.

Examples

- ② **Calculating the Mean** Find the mean test score of 78, 85, 94, 88, and 91.

$$78 + 85 + 94 + 88 + 91 = 436$$

← Add the test scores.

$$\frac{\boxed{436}}{5} = \boxed{87.2}$$

← Divide by the number of tests.

The mean test score is $\boxed{87.2}$.

Check for Reasonableness The mean is between the lowest value, $\boxed{78}$, and the greatest value, $\boxed{94}$. So the answer $\boxed{87.2}$ is reasonable.

An **outlier** is a data item that is much greater or less than the other data items. If a data set has an outlier, then the mean may not describe the data very well.

EXAMPLE Analyzing the Mean

Quiz Scores		
81	77	92
89	81	87
75	42	81

- 3 Your quiz scores in science are listed at the left. Find the mean test score with and without the outlier. What effect does the outlier have on the mean?

Since 42 is much less than the other scores, the outlier is 42. Find the mean with and without the outlier.

$$\text{With the outlier: } \frac{81 + 77 + 92 + 89 + 81 + 87 + 75 + 42 + 81}{9} \\ \approx 78.333$$

$$\text{Without the outlier: } \frac{81 + 77 + 92 + 89 + 81 + 87 + 75 + 81}{8} \\ = 82.875$$

The outlier reduced the mean quiz score by about 5 points.

- 3 **Analyzing the Mean** Identify the outlier in the data set 64, 66, 61, 91, 68 and 59. Find the mean with and without the outlier. What effect does the outlier have on the mean?

The outlier is

Calculate the mean with the outlier.

$$\frac{64 + 66 + 61 + 91 + \text{} + \text{}}{6} \approx \text{}$$

Calculate the mean *without* the outlier.

$$\frac{64 + 66 + \text{} + \text{} + \text{}}{5} = \text{}$$

The outlier increases the value of the mean by about .

Quick Check

2. You play a word game. Your scores are 12, 23, 13, 32, and 30. Find your mean score.

3. You keep track of the number of hours you baby-sit for six days: 1.25, 1.50, 1.50, 1.75, 2.0, 5.5. What effect does the outlier have on the mean?

Vocabulary

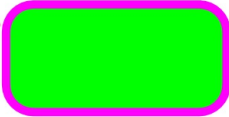
The mean is the sum of a set of data divided by the number of data items.

An outlier is



Check Your Understanding

1.



1. **Vocabulary** Explain how to find the mean of five test scores.

Use a model to find the mean of each data set.

2. 3, 2, 8, 4, 3



3. 5, 3, 7, 10, 6, 5



You have an assignment worksheet and time to begin working on it.

Practice 9-1 Finding the Mean

Find the mean of each data set.

1. 4, 5, 7, 5, 6, 3 _____ 2. 85, 91, 76, 85, 93 _____

For each set of data, identify any outliers. Then determine the effect that the outlier has on the mean.

3. 64, 65, 62, 69, 59, 23, 61, 67 _____
 4. 8.1, 8.3, 7.8, 7.9, 8.4, 6.8, 8.0 _____
 5. 1230, 1225, 1228, 1232, 1233, 1321, 1229, 1231 _____

Use the table for Exercises 6–8.

Name	Hourly Wage
Julia	\$8.75
Ron	7.50
Miguel	25.00
Natasha	11.00
Robert	10.50

6. Whose wage is an outlier in the data set?

7. Find the mean hourly wage with and without the outlier.

8. What effect does the outlier have on the mean?

Fill in the blanks to find the mean of each data set.

9. 4, 6, 2, 8, 5: $\frac{25}{4} = \square$
10. 10, 4, 2, 12, 6, 8: $\frac{\square}{6} = \square$

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