

# 5.4 Lesson

## Key Vocabulary

percent of change, p. 412  
 percent of increase, p. 412  
 percent of decrease, p. 412  
 percent error, p. 414

A **percent of change** is the percent that a quantity changes from the original amount.

$$\text{percent of change} = \frac{\text{amount of change}}{\text{original amount}}$$

## Key Ideas

### Percents of Increase and Decrease

When the original amount increases, the percent of change is called a **percent of increase**.

$$\text{percent of increase} = \frac{\text{new amount} - \text{original amount}}{\text{original amount}}$$

When the original amount decreases, the percent of change is called a **percent of decrease**.

$$\text{percent of decrease} = \frac{\text{original amount} - \text{new amount}}{\text{original amount}}$$

### Example 1 Finding a Percent of Increase

Day	Hours Online
Saturday	2
Sunday	4.5

The table shows the numbers of hours you spent online last weekend. What is the percent of change in your time spent online from Saturday to Sunday?

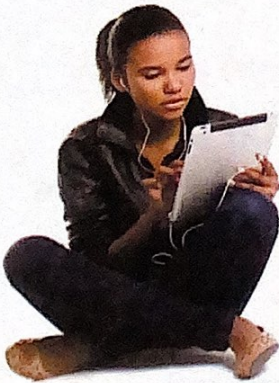
The time spent online Sunday is greater than the time spent online Saturday. So, the percent of change is a percent of increase.

$$\text{percent of increase} = \frac{\text{new amount} - \text{original amount}}{\text{original amount}}$$

$$= \frac{4.5 - 2}{2} \quad \text{Substitute.}$$

$$= \frac{2.5}{2} \quad \text{Subtract.}$$

$$= 1.25, \text{ or } 125\% \quad \text{Write as a percent.}$$



► So, your time spent online increased 125% from Saturday to Sunday.

## Try It

Find the percent of change. Round to the nearest tenth of a percent if necessary.

1. 10 inches to 25 inches *increase*

$$\frac{25 - 10}{10} = 1.5$$

**150%**

2. 57 people to 65 people *increase*

$$\frac{65 - 57}{57} = 0.1403$$

**about 14%**

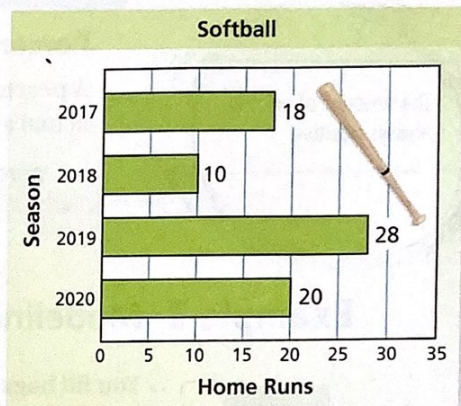


## Example 2 Finding a Percent of Decrease

The bar graph shows a softball player's home run totals. What was the percent of change from 2019 to 2020?

The number of home runs decreased from 2019 to 2020. So, the percent of change is a percent of decrease.

$$\begin{aligned} \text{percent of decrease} &= \frac{\text{original amount} - \text{new amount}}{\text{original amount}} \\ &= \frac{28 - 20}{28} && \text{Substitute.} \\ &= \frac{8}{28} && \text{Subtract.} \\ &\approx 0.286, \text{ or } 28.6\% && \text{Write as a percent.} \end{aligned}$$



► So, the number of home runs decreased about 28.6% from 2019 to 2020.

### Try It

3. In Example 2, what was the percent of change from 2017 to 2018?

### In-Class Practice

1 I don't understand yet.

2 I can do it with help.

3 I can do it on my own.

4 I can teach someone else.

4. **VOCABULARY** What does it mean for a quantity to change by  $n\%$ ?
5. **NUMBER SENSE** Without calculating, determine which situation has a greater percent of change. Explain.
- 5 bonus points added to 50 points
  - 5 bonus points added to 100 points

**FINDING A PERCENT OF CHANGE** Identify the percent of change as an *increase* or a *decrease*. Then find the percent of change.

6. 8 feet to 24 feet *increase*

$$\frac{24 - 8}{8} = \frac{16}{8} = 2 = 200\%$$

7. 300 miles to 210 miles *decrease*

$$\frac{210 - 300}{300} = \frac{-90}{300} = -0.3 = 30\%$$

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**FINDING A PERCENT OF CHANGE** Identify the percent of change as an *increase* or a *decrease*. Then find the percent of change. Round to the nearest tenth of a percent if necessary. (See Examples 1 and 2.)

12. 12 inches to 36 inches

▶ 13. 75 people to 25 people *decrease*

$$\frac{25 - 75}{75} = -0.666\bar{6}$$

14. 50 pounds to 35 pounds *decrease* ▶ 15. 24 songs to 78 songs

$$\frac{35 - 50}{50} = -0.3$$

30%

16. 10 gallons to 24 gallons

17. 72 paper clips to 63 paper clips

18. 16 centimeters to 44.2 centimeters

19. 68 miles to 42.5 miles

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MTR

20. **YOU BE THE TEACHER** Your friend finds the percent increase from 18 to 26. Is your friend correct? Explain your reasoning.

$$\frac{26 - 18}{26} \approx 0.31 = 31\%$$

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MTR

21. **MODELING REAL LIFE** Last week, you finished Level 2 of a video game in 32 minutes. Today, you finish Level 2 in 28 minutes. What is the percent of change?

$$\frac{4}{32} = 0.125$$

12.5%

7  
MTR

22. **MODELING REAL LIFE** You estimate that a baby pig weighs 20 pounds. The actual weight of the baby pig is 16 pounds. Find the percent error.

$$\frac{\text{amount error}}{\text{actual}} = \frac{4}{16} = 0.25$$

25%

