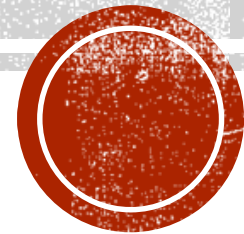


# PERCENTS OF INCREASE AND DECREASE

## Lesson 6.5



- Percents can be used to describe how an amount changes.
- This is used to compare differences of **increases** or **decreases**. For example, the price of gasoline has decreased from \$4.00/gal. to \$2.00 per gallon. The average price of homes has decreased from \$500,000 to \$425,000. Which has decreased more?



# EXAMPLE

- Many people might say that the prices of homes have decreased more than the price of gas. The homes have decreased by \$75,000 and the gas has decreased by \$2. However, we need to consider what we are comparing.
- Homes are very expensive in relation to gasoline. We are comparing two very different things.



# EXAMPLE

- There is a formula we can use to calculate the percent of change. Then we can compare the two different items.

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

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



# EXAMPLE

Now let's look at the home and gasoline prices.

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

The house prices went from \$500,000 to \$425,000.

$$\begin{aligned} &= \frac{500,000 - 425,000}{500,000} \\ &= \frac{75,000}{500,000} \\ &= 0.15 \\ &= 15\% \end{aligned}$$

The gas prices went from \$4 to \$2.

$$\begin{aligned} &= \frac{4 - 2}{4} \\ &= \frac{2}{4} \\ &= 0.5 \\ &= 50\% \end{aligned}$$



## Key Idea

### 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**

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

Day	Hours Online
Saturday	2
Sunday	4.5

The number of hours on Sunday is greater than the number of hours on Saturday. So, the percent of change is a percent of increase.



**EXAMPLE****1****Finding a Percent of Increase**

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

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$$\begin{aligned}\text{percent of increase} &= \frac{\text{new amount} - \text{original amount}}{\text{original amount}} \\ &= \frac{4.5 - 2}{2} && \text{Substitute.}\end{aligned}$$



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

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

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



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$$\begin{aligned}\text{percent of increase} &= \frac{\text{new amount} - \text{original amount}}{\text{original amount}} \\ &= \frac{4.5 - 2}{2} && \text{Substitute.} \\ &= \frac{2.5}{2} && \text{Subtract.} \\ &= 1.25, \text{ or } 125\% && \text{Write as a percent.}\end{aligned}$$

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



## On Your Own

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

1. 10 inches to 25 inches

150%

2. 57 people to 65 people

14%

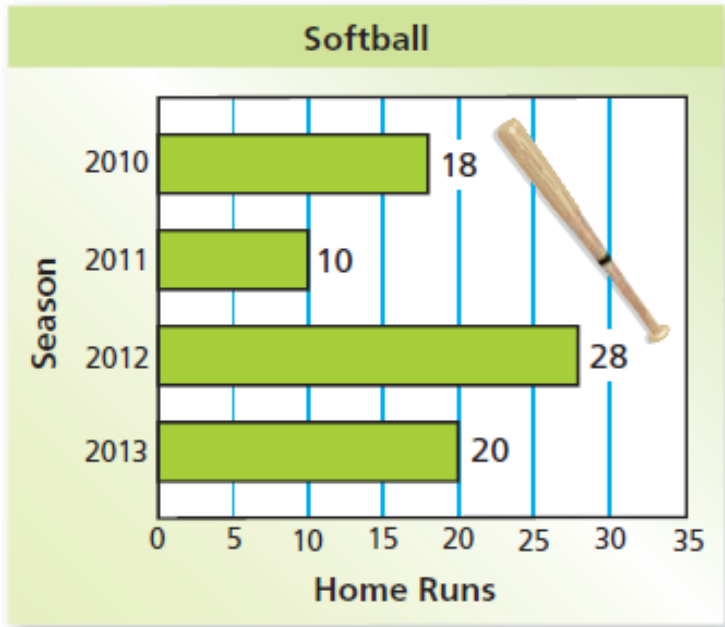


## EXAMPLE

### 2

## Finding a Percent of Decrease

The bar graph shows a softball player's home run totals. What was the percent of change from 2012 to 2013?



The number of home runs decreased from 2012 to 2013. So, the percent of change is a percent of decrease.

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

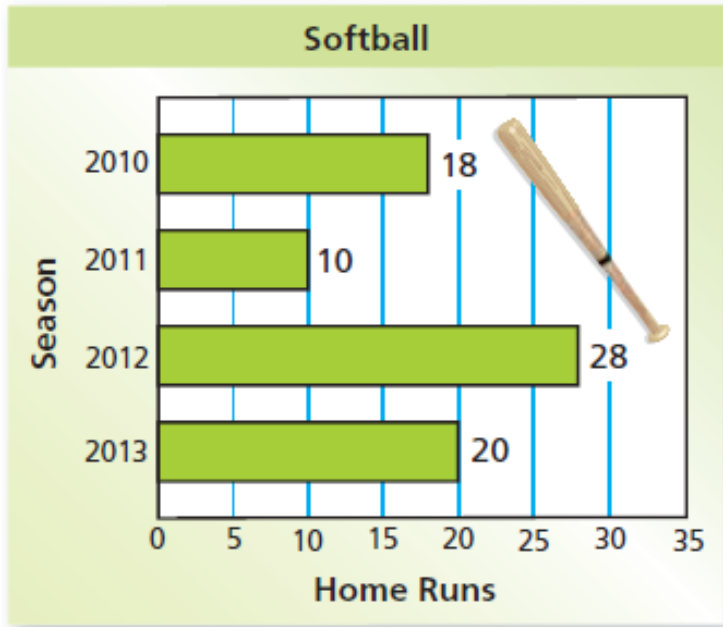


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$$\begin{aligned}\text{percent of decrease} &= \frac{\text{original amount} - \text{new amount}}{\text{original amount}} \\ &= \frac{28 - 20}{28} \quad \text{Substitute.}\end{aligned}$$

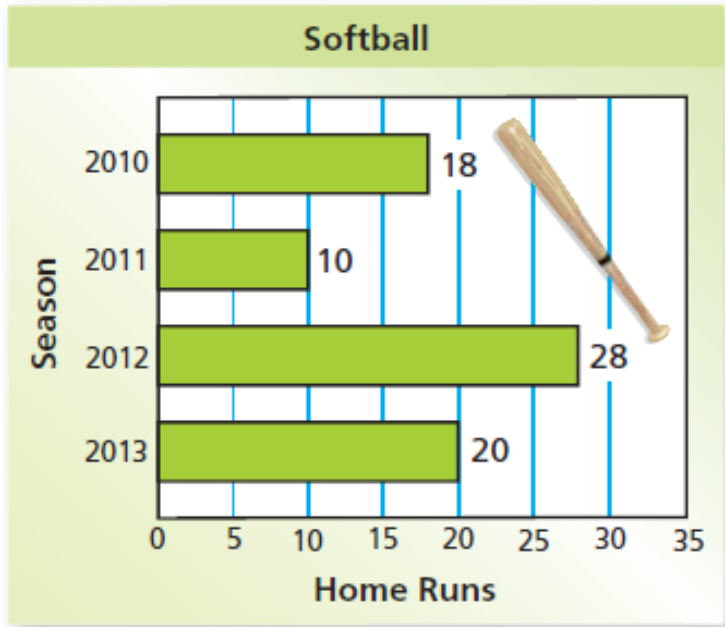


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$$\begin{aligned}\text{percent of decrease} &= \frac{\text{original amount} - \text{new amount}}{\text{original amount}} \\ &= \frac{28 - 20}{28} && \text{Substitute.} \\ &= \frac{8}{28} && \text{Subtract.}\end{aligned}$$

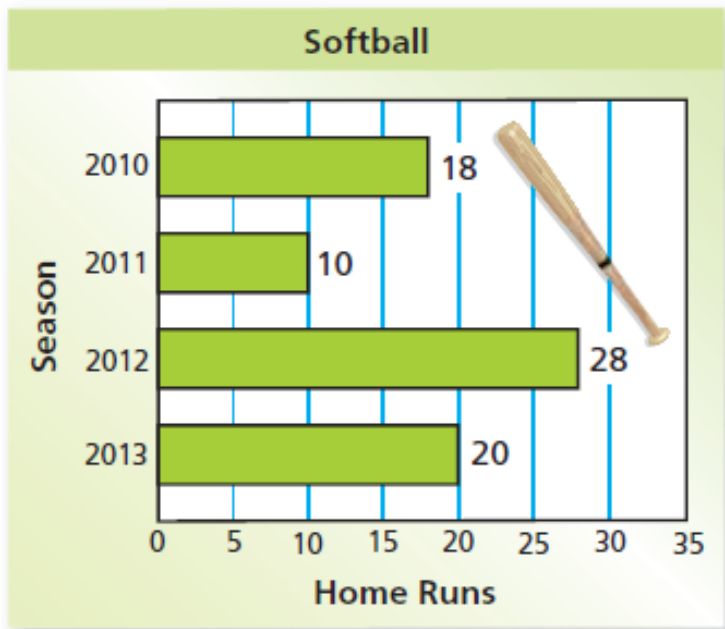


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$$\text{percent of decrease} = \frac{\text{original amount} - \text{new amount}}{\text{original amount}}$$

$$= \frac{28 - 20}{28} \quad \text{Substitute.}$$

$$= \frac{8}{28} \quad \text{Subtract.}$$

$$\approx 0.286, \text{ or } 28.6\% \quad \text{Write as a percent.}$$

❖ So, the number of home runs decreased about 28.6%.





## EXAMPLE

3

### Finding a Percent Error

You estimate that the length of your classroom is 16 feet. The actual length is 21 feet. Find the percent error.

The amount of error is  $21 - 16 = 5$  feet.



**EXAMPLE****3****Finding a Percent Error**

You estimate that the length of your classroom is 16 feet. The actual length is 21 feet. Find the percent error.

The amount of error is  $21 - 16 = 5$  feet.

$$\text{percent error} = \frac{\text{amount of error}}{\text{actual amount}}$$

Write percent error equation.



**EXAMPLE****3****Finding a Percent Error**

You estimate that the length of your classroom is 16 feet. The actual length is 21 feet. Find the percent error.

The amount of error is  $21 - 16 = 5$  feet.

$$\begin{aligned}\text{percent error} &= \frac{\text{amount of error}}{\text{actual amount}} \\ &= \frac{5}{21}\end{aligned}$$

Write percent error equation.

Substitute.



**EXAMPLE****3 Finding a Percent Error**

You estimate that the length of your classroom is 16 feet. The actual length is 21 feet. Find the percent error.

The amount of error is  $21 - 16 = 5$  feet.

$$\begin{aligned} \text{percent error} &= \frac{\text{amount of error}}{\text{actual amount}} && \text{Write percent error equation.} \\ &= \frac{5}{21} && \text{Substitute.} \\ &\approx 0.238, \text{ or } 23.8\% && \text{Write as a percent.} \end{aligned}$$

❖ The percent error is about 23.8%.

