

Lesson 1 Reteach

Using the Percent Proportion

In a **percent proportion**, one ratio compares *part* of a quantity to the *whole* quantity. The other ratio is the equivalent percent, written as a fraction, with a denominator of 100.

Example 1 Find each percent.

a. Twelve is what percent of 16?

$$\frac{a}{b} = \frac{p}{100} \rightarrow \frac{12}{16} = \frac{p}{100}$$

Replace the variables.

$$12 \cdot 100 = p \cdot 16$$

Find the cross products.

$$1200 = 16p$$

Multiply.

$$75 = p$$

Divide.

So, twelve is 75% of 16.

b. What percent of 8 is 7?

$$\frac{a}{b} = \frac{p}{100} \rightarrow \frac{7}{8} = \frac{p}{100}$$

Replace the variables.

$$p \cdot 8 = 100 \cdot 7$$

Find the cross products.

$$700 = 8p$$

Multiply.

$$87.5 = p$$

Divide.

So, 87.5% of 8 is 7.

Example 2 Find the part or the whole.

a. What number is 1.4% of 15?

$$\frac{a}{b} = \frac{p}{100} \rightarrow \frac{a}{15} = \frac{1.4}{100}$$

Replace the variables.

$$a \cdot 100 = 15 \cdot 1.4$$

Find the cross products.

$$100a = 21$$

Multiply.

$$a = 0.21$$

Divide.

So, 0.21 is 1.4% of 15.

b. 225 is 36% of what number?

$$\frac{a}{b} = \frac{p}{100} \rightarrow \frac{225}{b} = \frac{36}{100}$$

Replace the variables.

$$225 \cdot 100 = 36 \cdot b$$

Find the cross products.

$$22,500 = 36b$$

Multiply.

$$625 = b$$

Divide.

So, 225 is 36% of 625.

Exercises

Use the percent proportion to solve each problem.

1. 43.2 is what percent of 48?

2. 292 is what percent of 400?

3. What percent of 22 is 55?

4. What percent of 20 is 4?

5. What is 80% of 840?

6. What is 5% of 38?

7. What is 16% of 36?

8. 85 is 80% of what number?

9. 60 is 30% of what number?

10. 4.5 is 90% of what number?

Lesson 1 Reteach - **ANSWERS**

Using the Percent Proportion

Exercises

Use the percent proportion to solve each problem.

1. 43.2 is what percent of 48? **90%**
2. 292 is what percent of 400? **73%**
3. What percent of 22 is 55? **250%**
4. What percent of 20 is 4? **20%**
5. What is 80% of 840? **672**
6. What is 5% of 38? **1.9**
7. What is 16% of 36? **5.76**
8. 85 is 80% of what number? **106.25**
9. 60 is 30% of what number? **200**
10. 4.5 is 90% of what number? **5**

Lesson 2 Reteach

Find Percent of a Number Mentally

When working with common percents like 10%, 25%, 40%, and 50%, it may be helpful to use the fraction form of the percent.

Percent-Fraction Equivalents				
$25\% = \frac{1}{4}$	$10\% = \frac{1}{10}$	$20\% = \frac{1}{5}$	$12\frac{1}{2}\% = \frac{1}{8}$	$16\frac{2}{3}\% = \frac{1}{6}$
$50\% = \frac{1}{2}$	$30\% = \frac{3}{10}$	$40\% = \frac{2}{5}$	$37\frac{1}{2}\% = \frac{3}{8}$	$33\frac{1}{3}\% = \frac{1}{3}$
$75\% = \frac{3}{4}$	$70\% = \frac{7}{10}$	$60\% = \frac{3}{5}$	$62\frac{1}{2}\% = \frac{5}{8}$	$66\frac{2}{3}\% = \frac{2}{3}$
$100\% = 1$	$90\% = \frac{9}{10}$	$80\% = \frac{4}{5}$	$87\frac{1}{2}\% = \frac{7}{8}$	$83\frac{1}{3}\% = \frac{5}{6}$

Example 1 Find 20% of 35 mentally.

$$\begin{aligned}
 20\% \text{ of } 35 &= \frac{1}{5} \text{ of } 35 & \text{Think: } 20\% &= \frac{1}{5}. \\
 &= 7 & \text{Think: } \frac{1}{5} \text{ of } 35 &\text{ is } 7. \text{ So, } 20\% \text{ of } 35 \text{ is } 7.
 \end{aligned}$$

When an exact answer is not needed, estimate by rounding and using mental math to compute the answer.

Example 2 Estimate.

a. 23% of 84

23% is about 25% or $\frac{1}{4}$.

$\frac{1}{4}$ of 84 is 21.

So, 23% of 84 is about 21.

b. $\frac{1}{2}\%$ of 490

$$\frac{1}{2}\% = \frac{1}{2} \cdot 1\%$$

490 is almost 500.

So, $\frac{1}{2}\%$ of 490 is about $\frac{1}{2} \times 5$ or 2.5.

Exercises

Find the percent of each number mentally.

1. 50% of 6

2. 25% of 100

3. 60% of 25

4. 75% of 28

5. $66\frac{2}{3}\%$ of 33

6. 150% of 2

7. 125% of 4

8. 175% of 4

9. 10% of 110

Estimate.

10. 19% of 20

11. 52% of 129

12. 8% of 35

13. $\frac{1}{2}\%$ of 390

14. 150% of 200

15. 33% of 33

Lesson 2 Reteach - ANSWERS

Find Percent of a Number Mentally

Exercises

Find the percent of each number mentally.

- | | | |
|------------------------|--------------------------------------|-------------------------|
| 1. 50% of 6 3 | 2. 25% of 100 25 | 3. 60% of 25 15 |
| 4. 75% of 28 21 | 5. $66\frac{2}{3}\%$ of 33 22 | 6. 150% of 2 3 |
| 7. 125% of 4 5 | 8. 175% of 4 7 | 9. 10% of 110 11 |

Estimate. **10–15. Sample answers given.**

- | | | |
|-------------------------------------|----------------------------|-------------------------|
| 10. 19% of 20 4 | 11. 52% of 129 65 | 12. 8% of 35 3.5 |
| 13. $\frac{1}{2}\%$ of 390 2 | 14. 150% of 200 300 | 15. 33% of 33 11 |

Lesson 3 Reteach

Using the Percent Equation

A **percent equation** is an equivalent form of the percent proportion. In a percent equation, the percent is written as a decimal.

Example Solve each problem using a percent equation.

a. Find 22% of 95.

$$n = 0.22(95)$$

$$n = 20.9$$

So, 22% of 95 is 20.9.

b. 15 is what percent of 75?

$$15 = n(75)$$

$$0.2 = n$$

So, 15 is 20% of 75.

c. 90 is 20% of what number?

$$90 = 0.2n$$

$$450 = n$$

So, 90 is 20% of 450.

Exercises

Solve each problem using a percent equation.

1. Find 76% of 25.

2. Find 9% of 410.

3. Find 40% of 7.

4. Find 26% of 505.

5. Find 3.5% of 280.

6. Find 18.5% of 60.

7. Find 107% of 1080.

8. 256 is what percent of 800?

9. 36 is what percent of 240?

10. 2089.5 is what percent of 2100?

11. 15.4 is what percent of 55?

12. 7 is what percent of 350?

13. 13.2 is what percent of 80?

14. 14.4 is what percent of 120?

15. 36 is 9% of what number?

16. 2925 is 39% of what number?

17. 576 is 90% of what number?

18. 24.2 is 55% of what number?

19. 25 is 125% of what number?

20. 0.6 is 7.5% of what number?

Lesson 3 Reteach - ANSWERS

Using the Percent Equation

Exercises

Solve each problem using a percent equation.

- | | |
|--|--|
| 1. Find 76% of 25. 19 | 2. Find 9% of 410. 36.9 |
| 3. Find 40% of 7. 2.8 | 4. Find 26% of 505. 131.3 |
| 5. Find 3.5% of 280. 9.8 | 6. Find 18.5% of 60. 11.1 |
| 7. Find 107% of 1080. 1155.6 | 8. 256 is what percent of 800? 32% |
| 9. 36 is what percent of 240? 15% | 10. 2089.5 is what percent of 2100? 99.5% |
| 11. 15.4 is what percent of 55? 28% | 12. 7 is what percent of 350? 2% |
| 13. 13.2 is what percent of 80? 16.5% | 14. 14.4 is what percent of 120? 12% |
| 15. 36 is 9% of what number? 400 | 16. 2925 is 39% of what number? 7500 |
| 17. 576 is 90% of what number? 640 | 18. 24.2 is 55% of what number? 44 |
| 19. 25 is 125% of what number? 20 | 20. 0.6 is 7.5% of what number? 8 |

Lesson 4 Reteach

Percent of Change

A **percent of change** is a ratio of the amount of change to the original amount.

Example 1 Find the percent of change from 75 yards to 54 yards.

Step 1 Subtract to find the amount of change.

$$54 - 75 = -21 \quad \text{final amount} - \text{original amount}$$

Step 2 Write a ratio that compares the amount of change to the original amount. Express the ratio as a percent.

$$\begin{aligned} \text{percent of change} &= \frac{\text{amount of change}}{\text{original amount}} \\ &= \frac{-21}{75} = -0.28 \text{ or } -28\% \end{aligned}$$

A **percent error** is a ratio of the amount of error to the actual value of a measurement.

Example 2 Dominic estimates that the length of a ribbon is 75 centimeters. It is actually 66 centimeters long. What is the percent of error of his estimate?

Step 1 Subtract to find the amount of error.

$$75 - 66 = 9 \quad \text{Subtract the actual value from the estimate.}$$

Step 2 Write a ratio that compares the amount of change to the original measurement. Express the ratio as a percent.

$$\text{percent of error} = \frac{\text{amount of error}}{\text{actual value}} \times 100 = \frac{9}{66} \times 100 \approx 0.13$$

So, the percent error is 13.6%

Exercises

Find the percent of change. Round to the nearest tenth, if necessary. Then state whether the percent of change is an *increase* or *decrease*.

1. from 22 inches to 16 inches
2. from 8 years to 10 years
3. from 55 people to 217 people
4. from 45 mi per gal to 24 mi per gal

Find the percent error.

5. actual cost: \$83 meters, estimated cost: \$75
6. estimated mass: 250 grams, actual mass: 231 grams
7. projected time: 45 minutes, actual time: 80 minutes
8. estimated length: 15 meters, actual length: 12 meters

Lesson 4 Reteach - ANSWERS

Percent of Change

Exercises

Find the percent of change. Round to the nearest tenth, if necessary. Then state whether the percent of change is an *increase* or *decrease*.

- | | |
|--|---|
| 1. from 22 inches to 16 inches
−27.3%; decrease | 2. from 8 years to 10 years
25%; increase |
| 3. from 55 people to 217 people
294.5%; increase | 4. from 45 mi per gal to 24 mi per gal
−46.7%; decrease |

Find the percent error.

- actual cost: \$83 meters, estimated cost: \$75 **9.6%**
- estimated mass: 250 grams, actual mass: 231 grams **8.2%**
- projected time: 45 minutes, actual time: 80 minutes **43.8%**
- estimated length: 15 meters, actual length: 12 meters **25%**

Lesson 5 Reteach

Discount and Markup

A store sells items for more than it pays for those items so it can make a profit. The amount of increase is the **markup**. The percent of markup is a percent of increase. The amount the customer actually pays for an item is the **selling price**. When a store has a sale, the **discount** is the amount by which the regular price is reduced. The percent discount is a percent of decrease.

Example 1 Find the selling price if a store pays \$167 for a set of luggage and the markup is 38%.

Method 1 Find the amount of the markup first.

The whole is \$167. The percent is 38. You need to find the amount of the markup, or the part. Let m represent the amount of the markup.

$$\begin{aligned} m &= 0.38 \cdot 167 & \text{part} &= \text{percent} \cdot \text{whole} \\ m &= 63.46 & \text{Multiply.} \end{aligned}$$

Add the markup to the cost. So, $\$167 + \$63.46 = \$230.46$.

Method 2 Find the total percent first.

The customer will pay 100% of the store's price plus an extra 38%, or 138% of the store's price. Let p represent the price.

$$\begin{aligned} p &= 1.38(167) & \text{part} &= \text{percent} \cdot \text{whole} \\ p &= 230.46 & \text{Multiply.} \end{aligned}$$

The selling price is \$230.46.

Example 2 Find the sale price of a purebred German Shepherd puppy that is regularly \$450 and is on sale for 35% off.

Method 1 Find the amount of discount first. Let d represent the amount of the discount.

$$\begin{aligned} d &= 0.35 \cdot 450 & \text{part} &= \text{percent} \cdot \text{whole} \\ d &= 157.50 & \text{Multiply.} \end{aligned}$$

Subtract the discount from the original cost. So, $\$450 - 157.50 = \292.50

Method 2 Find the total percent first. Let p represent the sale price.

The amount of the discount is 35%, so the customer will pay $100\% - 35\%$ or 65% of the original cost.

$$\begin{aligned} p &= 0.65(450) & \text{part} &= \text{percent} \cdot \text{whole} \\ p &= 292.50 & \text{Multiply.} \end{aligned}$$

The sale price is \$292.50.

Exercises

Find the selling price for each item given the cost and the percent of the markup or discount.

- | | |
|--------------------------------|---------------------------------|
| 1. guitar: \$500; 60% discount | 2. MP3 player: \$28; 78% markup |
| 3. lamp: \$24; 18% markup | 4. jeans: \$26; 5% discount |

Lesson 5 Reteach - ANSWERS

Discount and Markup

Exercises

Find the selling price for each item given the cost and the percent of the markup or discount.

1. guitar: \$500; 60% discount **\$200**

2. MP3 player: \$28; 78% markup **\$49.84**

3. lamp: \$24; 18% markup **\$28.32**

4. jeans: \$26; 5% discount **\$24.70**

Math Accelerated • Chapter 6 Percents

Lesson 6 Reteach

Simple and Compound Interest

Interest is the amount of money paid or earned for the use of money by a financial institution. To find interest, use the formula $I = prt$, where I is the interest, p is the principal (the amount of money invested or borrowed), r is the interest rate, and t is the time in years. **Simple interest** is paid only on the initial principal. **Compound interest** is paid on the initial principal and on interest earned in the past.

Example 1 Find the simple interest for \$500 invested at 3.2% for 5 years.

$$I = prt \quad \text{Write the simple interest formula.}$$

$$I = 500 \cdot 0.032 \cdot 5 \quad \text{Replace } p \text{ with 500, } r \text{ with 0.032, and } t \text{ with 5.}$$

$$I = 80 \quad \text{Simplify.}$$

The simple interest is \$80.

Example 2 What is the total amount of money in an account where \$350 is invested at an interest rate of 7.25% compounded annually for 2 years?

Step 1 Find the amount of money in the account at the end of the first year.

$$I = prt \quad \text{Write the simple interest formula.}$$

$$I = 350 \cdot 0.0725 \cdot 1 \quad \text{Replace } p \text{ with 350, } r \text{ with 0.0725, and } t \text{ with 1.}$$

$$I = 25.375 \approx 25.38 \quad \text{Simplify.}$$

$$350 + 25.38 = 375.38 \quad \text{Add the amount invested and the interest.}$$

At the end of the first year, there is \$375.38 in the account.

Step 2 Find the amount of money in the account at the end of the second year.

$$I = prt \quad \text{Write the simple interest formula.}$$

$$I = 375.38 \cdot 0.0725 \cdot 1 \quad \text{Replace } p \text{ with 375.38, } r \text{ with 0.0725, and } t \text{ with 1.}$$

$$I = 27.21505 \approx 27.22 \quad \text{Simplify.}$$

$$375.38 + 27.22 = 402.60 \quad \text{Add the amount invested and the interest.}$$

At the end of the first year, there is \$402.60 in the account.

Exercises

Find the simple interest to the nearest cent.

- | | |
|----------------------------------|-------------------------------|
| 1. \$300 at 8% for 4 years | 2. \$1500 at 7.5% for 3 years |
| 3. \$1225 at 6.25% for 18 months | 4. \$900 at 12% for 60 months |

Find the total amount in each account to the nearest cent if the interest is compounded annually.

- | | |
|--------------------------------|------------------------------|
| 5. \$2825 at 4.75% for 2 years | 6. \$695 at 6.5% for 3 years |
| 7. \$530 at 5.5% for 5 years | 8. \$950 at 6.8% for 2 years |

Lesson 6 Reteach - **ANSWERS**

Simple and Compound Interest

Exercises

Find the simple interest to the nearest cent.

- | | |
|--|---|
| 1. \$300 at 8% for 4 years \$96 | 2. \$1500 at 7.5% for 3 years \$337.50 |
| 3. \$1225 at 6.25% for 18 months \$114.84 | 4. \$900 at 12% for 60 months \$540 |

Find the total amount in each account to the nearest cent if the interest is compounded annually.

- | | |
|---|---|
| 5. \$2825 at 4.75% for 2 years \$3099.75 | 6. \$695 at 6.5% for 3 years \$839.53 |
| 7. \$530 at 5.5% for 5 years \$692.68 | 8. \$950 at 6.8% for 2 years \$1083.59 |