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Lesson 1 Reteach

Percent of a Number

To find the percent of a number, you can write the percent as a fraction and then multiply or write the percent as a decimal and then multiply.

Example 1

Find 25% of 80.

$25\% = \frac{25}{100}$ or $\frac{1}{4}$ — Write 25% as a fraction, and reduce to lowest terms.

$\frac{1}{4}$ of $80 = \frac{1}{4} \times 80$ or 20 — Multiply.

So, 25% of 80 is 20.

Example 2

What number is 15% of 200?

15% of $200 = 15\% \times 200$ — Write a multiplication expression.

$= 0.15 \times 200$ — Write 15% as a decimal.

$= 30$ — Multiply.

So, 15% of 200 is 30.

Exercises

Find each number.

1. Find 20% of 50.

2. What is 55% of $400?

3. 5% of 1,500 is what number?

4. Find 190% of 20.

5. What is 24% of $500?

6. 8% of $300 is how much?

7. What is 12.5% of 60?

8. Find 0.2% of 40.

9. Find 3% of $800.

10. What is 0.5% of 180?

11. 0.25% of 42 is what number?

12. What is 0.02% of 280?

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Lesson 1 Skills Practice

Percent of a Number

Find each number.

1. Find 80% of 80.

2. What is 95% of 600?

3. 35% of 20 is what number?

4. Find 60% of $150.

5. What is 75% of 240?

6. 380% of 30 is what number?

7. Find 40% of 80.

8. What is 30% of $320?

9. 12% of 150 is what number?

10. Find 58% of 200.

11. What is 18% of $450?

12. What is 70% of 1,760?

13. Find 92% of 120.

14. 45% of 156 is what number?

15. What is 12% of 12?

16. Find 60% of 264.

17. 37.5% of 16 is what number?

18. What is 82.5% of 400?

19. What is 0.25% of 900?

20. Find 1.5% of 220.

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Lesson 2 Reteach

Percent and Estimation

To estimate the percent of a number, you can use a fraction or a multiple of 10% or 1%.

Example 1

Estimate 77% of 800.

77% is about 75% or $\frac{3}{4}$.

$77\% \text{ of } 800 \approx \frac{3}{4} \cdot 800$ Use $\frac{3}{4}$ to estimate.

≈ 600 Multiply.

So, 77% of 800 is about 600.

Example 2

Estimate 137% of 50.

137% is more than 100%, so 137% of 50 is greater than 50. $137\% \approx 140\%$.

$140\% \text{ of } 50 = (100\% \text{ of } 50) + (40\% \text{ of } 50)$ $140\% = 100\% + 40\%$

$= (1 \cdot 50) + \left(\frac{2}{5} \cdot 50\right)$ $100\% = 1$ and $40\% = \frac{2}{5}$

$= 50 + 20 \text{ or } 70$ Simplify.

So, 137% of 50 is about 70.

Example 3

Estimate 0.5% of 692.

0.5% is half of 1%. 692 is about 700.

$1\% \text{ of } 700 = 0.01 \cdot 700$ To multiply by 1%, move the decimal point two places to the left.

$= 7$

One half of 7 is $\frac{1}{2} \cdot 7$ or 3.5.

So, 0.5% of 697 is about 3.5.

Exercises

Estimate.

1. 24% of 36

2. 81% of 25

3. 11% of 67

4. 150% of 179

5. 67% of 450

6. 79% of 590

7. 0.4% of 200

8. 42% of 61

9. 19% of 41

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Lesson 2 Skills Practice

Percent and Estimation

Estimate by using fractions.

1. 51% of 128

2. 76% of 200

3. 32.9% of 90

4. 23% of 8

5. 19% of 45

6. 81% of 16

Estimate by using 10%.

7. 12% of 98

8. 89% of 300

9. 31% of 80

10. 28% of 49

11. 62% of 13

12. 77% of 28

Estimate.

13. 308% of 500

14. 0.5% of 87

15. 153% of 20

16. 0.6% of 41

17. 231% of 54

18. 0.9% of 116

19. 0.26% of 36

20. 425% of 119

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Lesson 3 Reteach

The Percent Proportion

A **percent proportion** compares part of a quantity to a whole quantity for one ratio and lists the percent as a number over 100 for the other ratio.

$$\left.\begin{array}{r}\text{part} \longrightarrow \frac{p}{w} = \frac{n}{100}\\ \text{whole} \longrightarrow\end{array}\right\} \text{percent}$$

Example 1

What percent of 24 is 18?

$\frac{p}{w} = \frac{n}{100}$ Percent proportion

Let $n\%$ represent the percent.

$\frac{18}{24} = \frac{n}{100}$ Write the proportion.

$18 \times 100 = 24 \times n$ Find the cross products.

$1{,}800 = 24n$ Simplify.

$\frac{1{,}800}{24} = \frac{24n}{24}$ Divide each side by 24.

$75 = n$

So, 18 is 75% of 24.

Example 2

What number is 60% of 150?

$\frac{p}{w} = \frac{n}{100}$ Percent proportion

Let $n\%$ represent the percent.

$\frac{n}{150} = \frac{60}{100}$ Write the proportion.

$n \times 100 = 150 \times 60$ Find the cross products.

$100n = 9{,}000$ Simplify.

$\frac{100n}{100} = \frac{9{,}000}{100}$ Divide each side by 100.

$n = 90$

So, 90 is 60% of 150.

Exercises

Find each number. Round to the nearest tenth if necessary.

1. What number is 25% of 20?

2. What percent of 50 is 30?

3. 30 is 75% of what number?

4. 40% of what number is 36?

5. What number is 20% of 625?

6. 12 is what percent of 30?

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Lesson 3 Skills Practice

The Percent Proportion

Find each number. Round to the nearest tenth if necessary.

1. 50 is 20% of what number?

2. What percent of 20 is 4?

3. What number is 70% of 250?

4. 10 is 5% of what number?

5. What number is 45% of 180?

6. 40% of what number is 82?

7. What percent of 90 is 36?

8. 60 is 25% of what number?

9. What number is 32% of 1,000?

10. What percent of 125 is 5?

11. 73 is 20% of what number?

12. 57% of 109 is what number?

13. What percent of 185 is 35?

14. 25 is what percent of 365?

15. 85% of 190 is what number?

16. 12.5 is 25% of what number?

17. What percent of 128 is 24?

18. 5.25% of 170 is what number?

19. What is 82% of 230?

20. What percent of 49 is 7?

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Lesson 4 Reteach

The Percent Equation

To solve any type of percent problem, you can use the **percent equation**, part = percent • whole, where the percent is written as a decimal.

Example 1

600 is what percent of 750?

600 is the part and 750 is the whole. Let n represent the percent.

$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{whole}}$

$600 = n \cdot 750$	Write the percent equation.
$\frac{600}{750} = \frac{750n}{750}$	Divide each side by 750.
$0.8 = n$	Simplify.
$80\% = n$	Write 0.8 as a percent. So, 600 is 80% of 750.

Example 2

45 is 90% of what number?

45 is the part and 90% or 0.9 is the percent. Let w represent the whole.

$\underbrace{\text{part}} = \underbrace{\text{percent}} \cdot \underbrace{\text{whole}}$

$45 = 0.9 \cdot w$	Write the percent equation.
$\frac{45}{0.9} = \frac{0.9w}{0.9}$	Divide each side by 0.9.
$50 = w$	Simplify. So, 45 is 90% of 50.

Exercises

Write an equation for each problem. Then solve. Round to the nearest tenth if necessary.

1. What percent of 56 is 14?

2. 36 is what percent of 40?

3. 80 is 40% of what number?

4. 65% of what number is 78?

5. What percent of 2,000 is 8?

6. What is 110% of 80?

7. 85 is what percent of 170?

8. Find 30% of 70.

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Lesson 4 Skills Practice

The Percent Equation

Write an equation for each problem. Then solve. Round to the nearest tenth if necessary.

1. 25% of 176 is what number?

2. What is 90% of 20?

3. 24 is what percent of 30?

4. 80% of what number is 94?

5. What is 60% of 45?

6. 9 is what percent of 30?

7. What percent of 125 is 25?

8. What is 120% of 20?

9. 2% of what number is 5?

10. 15% of 290 is what number?

11. 16 is what percent of 4,000?

12. What is 140% of 60?

13. 344.8 is what percent of 862?

14. 6% of what number is 21?

15. What number is 60% of 605?

16. 32% of 250 is what number?

17. Find 30% of 70.

18. What is 80% of 65?

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Reteach

Problem-Solving Investigation: Determine Reasonable Answers

When solving problems, it is often helpful to determine reasonable answers by using rounding and estimation. Checking answers with a calculator is always helpful in determining if the answer found is, in fact, reasonable.

Example

SURVEYS On its blog, the student council reported that 4.8% of the 895 students have a pet hamster. Julian said that 45 students have a pet hamster. Is 45 students a reasonable estimate? Justify your answer.

Understand The number of students is 895. The percent of students with pet hamsters is 4.8%. Julian's estimate is 45 students.

Plan Round 895 to 900 and 4.8% to 5%. Then use mental math to find 5% of 900.

Solve Round 895 to 900.

Round 4.8% to 5%.

10% of $900 = 0.1 \times 900$, or 90 Use mental math. 10% = 0.1

5% is $\frac{1}{2}$ of 10%.

So, $\frac{1}{2}$ of 90 is 45.

So, 45 is a reasonable estimate for the number of students with pet hamsters.

Check Use a calculator to check.

$0.048 \times 895 = 42.96$

Since 45 is close to 42.96, the answer is reasonable.

Exercises

1. **TELEVISION** A recent survey shows that 67% of students watch 3 or more hours of television a night. Suppose there are 892 students in your school. What would be a reasonable estimate of the number of students in your school who watch 3 or more hours of television a night? Explain your reasoning.

2. **REUNIONS** The Hernandez family invited 150 relatives to a family reunion. Seventy-eight percent of the relatives attended the reunion. Is 110, 120, or 130 a reasonable estimate for the number of relatives that attended the reunion? Explain.

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Skills Practice

Problem-Solving Investigation: Determine Reasonable Answers

Determine reasonable answers for each.

1. **MONEY** Gillian, Roger, LaToya, and Ichiro had lunch at a restaurant. After sales tax and tip were added, the total bill was $23.80. They decided that everyone would pay 25% of the total bill. What is a reasonable amount for how much each person paid?

2. **SPORTS** Of the 82,000 fans that attended a bowl game between Ohio State and Notre Dame, 60% were Ohio State fans. About how many fans at the game were for Notre Dame?

3. **ICE CREAM** A survey of 1,950 people found that 39% preferred chocolate ice cream to vanilla. About how many people preferred chocolate ice cream according to the survey?

4. **EARTH** The surface area of Earth is approximately 70% water. If the surface area is about 510,000,000 square kilometers, about how many square kilometers are water?

5. **COLLEGE** Of 7,450 first-year college students interviewed, 72% had changed their major area of study since the beginning of the academic year. About how many students had kept the same major?

6. **MONEY** While shopping, Hilary spent $149. If the amount she spent was 20% of her savings, how much savings did she have before she shopped?

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Lesson 5 Reteach

Percent of Change

A **percent of change** is a ratio that compares the change in quantity to the original amount. If the original quantity is increased, it is a **percent of increase**. If the original quantity is decreased, it is a **percent of decrease**.

Example 1

Last year, 2,376 people attended the rodeo. This year, attendance was 2,950. What was the percent of change in attendance to the nearest whole percent?

Since this year's attendance is greater than last year's attendance, this is a percent of increase.

The amount of change is 2,950 − 2,376 or 574.

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

$$= \frac{574}{2{,}376} \qquad \text{Substitution}$$

$$\approx 0.24 \text{ or } 24\% \qquad \text{Simplify.}$$

The percent of increase is about 24%.

Example 2

Che's grade on the first math exam was 94. His grade on the second math exam was 86. What was the percent of change in Che's grade to the nearest whole percent?

Since the second grade is less than the first grade, this is a percent of decrease. The amount of change is 94 − 86 or 8.

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

$$= \frac{8}{94} \qquad \text{Substitution}$$

$$\approx 0.09 \text{ or } 9\% \qquad \text{Simplify.}$$

The percent of decrease is 9%.

Exercises

Find each percent of change. Round to the nearest whole percent if necessary. State whether the percent of change is an *increase* or *decrease*.

1. original: 4
new: 5

2. original: 1.0
new: 1.3

3. original: 15
new: 12

4. original: $30
new: $18

5. original: 60
new: 63

6. original: 160
new: 136

7. original: 7.7
new: 10.5

8. original: 9.6
new: 5.9

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Lesson 5 Skills Practice

Percent of Change

Find each percent of change. Round to the nearest whole percent if necessary. State whether the percent of change is an *increase* or *decrease*.

1. original: 35
new: 70

2. original: 8
new: 12

3. original: 45
new: 30

4. original: $350
new: $400

5. original: $75
new: $60

6. original: 250
new: 100

7. original: $30
new: $110

8. original: 35
new: 28

9. original: $12.50
new: $15

10. original: 80
new: 52

11. original: 45
new: 63

12. original: 120
new: 132

13. original: $210
new: $105

14. original: 84
new: 111

15. original: $84
new: $100

16. original: 6.8
new: 8.2

17. original: 1.5
new: 2.5

18. original: 91
new: 77

19. original: $465.50
new: $350

20. original: $87.05
new: $100

21. original: 144
new: 108

22. original: 20.8
new: 12.2

23. original: $75
new: $15

24. original: 8.6
new: 7

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Lesson 6 Reteach

Sales Tax, Tips, and Markup

Sales Tax is a percent of the purchase price and is an amount paid in addition to the purchase price.

Tip, or **gratuity,** is a small amount of money in return for service. The amount a store increases the price of an item by is called the **markup**.

Example 1

SOCCER Find the total cost of a $17.75 soccer ball if the sales tax is 6%.

Method 1

First, find the sales tax.

6% of $\$17.75 = 0.06 \cdot 17.75$

≈ 1.07

The sales tax is $1.07.

Next, add the sales tax to the regular price.

$1.07 + 17.75 = 18.82$

The total cost of the soccer ball is $18.82.

Method 2

$100\% + 6\% = 106\%$ Add the percent of tax to 100%.

The total cost is 106% of the regular price.

106% of $\$17.75 = 1.06 \cdot 17.75$

≈ 18.82

Example 2

MEAL A customer wants to leave a 15% tip on a bill for $18.50 at a restaurant.

Method 1 Add tip to regular price.

First, find the tip.

15% of $\$18.50 = 0.15 \cdot 18.50$

$= 2.78$

Next, add the tip to the bill total.

$\$18.50 + \$2.78 = \$21.28$

The total cost of the bill is $21.28.

Method 2 Add the percent of tip to 100%.

$100\% + 15\% = 115\%$ Add the percent of tip to 100%.

The total cost is 115% of the bill.

115% of $\$18.50 = 1.15 \cdot 18.50$

$= 21.28$

Exercises

Find the total cost to the nearest cent.

1. $22.95 shirt, 6% tax

2. $24 lunch, 15% tip

3. $10.85 book, 4% tax

4. $97.55 business breakfast, 18% tip

5. $59.99 DVD box set, 6.5% tax

6. $37.65 dinner, 15% tip

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Lesson 6 Skills Practice

Sales Tax, Tips, and Markup

Find the total cost to the nearest cent.

1. \$49.95 CD player; 5% tax

2. \$69 shoes; 6% tax

3. \$37 dinner; 15% tip

4. \$2.99 socks; 5.5% markup

5. \$115 coat; 7% tax

6. \$15 lunch; 20% tip

7. \$299 DVD player; 7% tax

8. \$43 shirt; 6% tax

9. \$16 haircut; 15% tip

10. \$8.75 breakfast; 15% tip

11. \$47 tie; 4.5% markup

12. \$40.80 dinner; 17% tip

13. \$52 lunch; 20% tip

14. \$18.99 CD; 6% markup

15. \$22 haircut; 20% tip

16. \$128 catered dinners; 18% tip

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Lesson 7 Reteach

Discount

Discount is the amount by which the regular price of an item is reduced. The sale price is the regular price minus the discount.

Example

TENNIS Find the price of a $69.50 tennis racket that is on sale for 20% off the regular price.

Method 1: Subtract the discount from the regular price.

First, find the amount of the discount.

$20\% \text{ of } \$69.50 = 0.2 \cdot \$69.50$ Write 20% as a decimal.

$= \$13.90$ The discount is $13.90.

Next, subtract the discount from the regular price.

$\$69.50 - \$13.90 = \$55.60.$

Method 2: Subtract the percent of discount from 100%.

$100\% - 20\% = 80\%$ Subtract the discount from 100%.

The sale price is 80% of the regular price.

$80\% \text{ of } \$69.50 = 0.80 \cdot 69.50$

$= 55.60$

The sale price of the tennis racket is $55.60.

Exercises

Find the sale price to the nearest cent.

1. $32.45 shirt; 15% discount

2. $128.79 watch; 30% discount

3. $40.00 jeans; 20% discount

4. $74.00 sweatshirt; 25% discount

5. $28.00 basketball; 50% discount

6. $98.00 tent; 40% discount

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Lesson 7 Skills Practice

Discount

Find the sale price to the nearest cent.

1. $89.95 DVD player; 5% discount

2. $75 dress shirt; 20% discount

3. $14 socks; 15% discount

4. $2.99 toy; 30% discount

5. $140 coat; 10% discount

6. $65 dress pants; 20% discount

7. $325 tent; 15% discount

8. $80 boots; 25% discount

9. $45.50 book; 30% discount

10. $52 tie; 50% discount

11. $35 volleyball; 20% discount

12. $490 stove; 15% discount

13. $299 bicycle; 10% discount

14. $32 shorts; 50% discount

15. $5 box of cereal; 40% discount

16. $45 shelf; 35% discount

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Lesson 8 Reteach

Financial Literacy

Simple interest is the amount of money paid or earned for the use of money. To find simple interest I, use the formula $I = prt$. Principal p is the amount of money deposited or invested. Rate r is the annual interest rate written as a decimal. Time t is the amount of time the money is invested in years.

Example 1

Find the simple interest earned in a savings account where $136 is deposited for 2 years if the interest rate is 7.5% per year.

$I = prt$	Formula for simple interest
$I = 136 \cdot 0.075 \cdot 2$	Replace p with \$136, r with 0.075, and t with 2.
$I = 20.40$	Simplify.

The simple interest earned is \$20.40.

Example 2

Find the simple interest for $600 invested at 8.5% for 6 months.

6 months $= \frac{6}{12}$ or 0.5 year	Write the time in years.
$I = prt$	Formula for simple interest
$I = 600 \cdot 0.085 \cdot 0.5$	$p =$ \$600, $r = 0.085$, $t = 0.5$
$I = 25.50$	Simplify.

The simple interest is \$25.50.

Exercises

Find the simple interest earned to the nearest cent for each principal, interest rate, and time.

1. \$300, 5%, 2 years

2. \$650, 8%, 3 years

3. \$575, 4.5%, 4 years

4. \$735, 7%, $2\frac{1}{2}$ years

5. \$1,665, 6.75%, 3 years

6. \$2,105, 11%, $1\frac{3}{4}$ years

7. \$903, 8.75%, 18 months

8. \$4,275, 19%, 3 months

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Lesson 8 Skills Practice

Financial Literacy

Find the simple interest earned to the nearest cent for each principal, interest rate, and time.

1. \$500, 4%, 2 years

2. \$350, 6.2%, 3 years

3. \$740, 3.25%, 2 years

4. \$725, 4.3%, $2\frac{1}{2}$ years

5. \$955, 6.75%, $3\frac{1}{4}$ years

6. \$1,540, 8.25%, 2 years

7. \$3,500, 4.2%, $1\frac{3}{4}$ years

8. \$568, 16%, 8 months

Find the simple interest paid to the nearest cent for each loan, interest rate, and time.

9. \$800, 9%, 4 years

10. \$280, 5.5%, 4 years

11. \$1,150, 7.6%, 5 years

12. \$266, 5.2%, 3 years

13. \$450, 22%, 1 year

14. \$2,180, 7.7%, $2\frac{1}{2}$ years

15. \$2,650, 3.65%, $4\frac{1}{2}$ years

16. \$1,245, 5.4%, 6 months