

Percent and Estimation

(pages 450–453)



The following examples show two different ways to estimate percents.

EXAMPLES

A Estimate 21% of 196.

Round 21% to 20% and 196 to 200. Use a fraction.

20% is the same as $\frac{1}{5}$.

$\frac{1}{5}$ of 200 is 40.

21% of 196 is about 40.

B Estimate 21% of 196.

Round 21% to 20% and 196 to 200. Find 10% and multiply.

10% is the same as $\frac{1}{10}$ or 0.1.

10% of 200 is 0.1(200) or 20.

Now find 20% or 2 times 10% of 200.

$$2 \times 20 = 40$$

21% of 196 is about 40.

Try These Together

Estimate.

1. 32% of 87.5

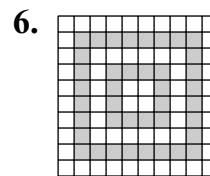
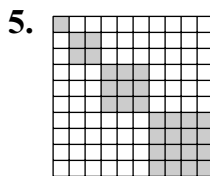
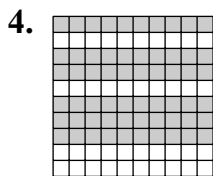
2. 51% of 520

3. 81% of 49

HINT: Round the number and the percent. Then use one of the methods from the examples.

PRACTICE

Estimate the percent shaded. Then count to find the exact percent.



Write the fraction, decimal, mixed number, or whole number equivalent of each percent that could be used to estimate.

7. 18%

8. 0.9%

9. 25.54%

10. 400%

11. 75%

12. $\frac{9}{10}$ %

Estimate.

13. 48% of 139

14. 9% of 12

15. 73.5% of 61

16. 9% of 122

17. 153% of 21

18. 0.9% of 810

19. Nutrition Based on a 2,000 Calorie diet, the recommended daily allowance (R.D.A.) for fat is 65 grams. One serving of whole milk yogurt has 11% of the R.D.A. for fat. About how many grams is that?



20. Standardized Test Practice Estimate 250% of 39.

A 10

B 100

C 120

D 200

Answers: 1–3. Sample answers are given. 1. 27 2. 250 3. 40 4. 60% 5. 30% 6. 40% 7–19. Sample answers are given. 7. 0.2 8. 0.01 9. $\frac{4}{1}$ 10. 4 11. $\frac{4}{8}$ 12. 0.01 13. 70 14. 1 15. 45 16. 12 17. 30 18. 8 19. about 7 grams 20. B

The Percent Equation

(pages 456–458)



In Chapter 8, you learned that you can solve many percent problems with the percent proportion, $\frac{P}{B} = \frac{r}{100}$. Remember that P is the percentage, B is the base, and $\frac{r}{100}$ is the rate. The rule below is the percent proportion written as an equation. This rule uses R to represent the ratio $\frac{r}{100}$. You can use the percent equation to solve percent problems.

Percent Equation	The percentage (P) is equal to the rate (R) times the base (B). $P = R \cdot B$
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EXAMPLES

A What number is 45% of 72?

In this problem, R is 45% or 0.45 and B is 72.

$$P = R \cdot B$$

$$P = 0.45 \cdot 72 \quad \text{Replace } R \text{ with } 0.45 \text{ and } B \text{ with } 72.$$

$$P = 32.4$$

45% of 72 is 32.4.

B 24 is 80% of what number?

In this problem, 24 is P and 80% is R .

$$P = R \cdot B$$

$$24 = 0.8 \cdot B \quad \text{Replace } P \text{ with } 24 \text{ and } R \text{ with } 0.8.$$

$$\frac{24}{0.8} = B \quad \text{Divide each side by } 0.8.$$

$$30 = B$$

24 is 80% of 30.

Try These Together

Use a percent equation to solve each problem. Round answers to the nearest tenth.

1. 29 is what percent of 75?

HINT: The number following "of" is usually B .

2. Find 73% of 147.

HINT: The number with the % is R .

PRACTICE

Use a percent equation to solve each problem. Round answers to the nearest tenth.

- | | |
|-------------------------------|---------------------------------|
| 3. Find 70% of 49. | 4. 33% of what number is 1.048? |
| 5. What percent of 97 is 39? | 6. 47.7% of what number is 70? |
| 7. 24% of 16 is what number? | 8. 24 is 31% of what number? |
| 9. 19 is what percent of 14? | 10. 79 is 60% of what number? |
| 11. 15% of 64 is what number? | 12. 20 is what percent of 400? |
| 13. 71 is what percent of 23? | 14. Find 82% of 84. |



15. Standardized Test Practice What is 2.1% of 76? Round to the nearest tenth.

A 1.6

B 3.6

C 15.0

D 159.6

Answers: 1. 38.7% 2. 107.3 3. 34.3 4. 3.2 5. 40.2% 6. 146.8 7. 3.8 8. 77.4 9. 77.4 9. 135.7% 10. 131.7 11. 9.6 12. 5%

Making Circle Graphs

(pages 460–463)



You can use a **circle graph** to compare parts of a whole.

EXAMPLE

Of those polled, 24% preferred Candidate A, 58% preferred Candidate B, and 18% preferred Candidate C. Express this information in a circle graph.

Step 1	Find the number of degrees for each part of the graph. Use $P = R \cdot B$. Candidate A 24% of $360^\circ = 0.24 \times 360^\circ = 86.4^\circ$ Candidate B 58% of $360^\circ = 0.58 \times 360^\circ = 208.8^\circ$ Candidate C 18% of $360^\circ = 0.18 \times 360^\circ = 64.8^\circ$	<p>Preferred Candidates</p>
Step 2	Use a compass to draw a circle. Then draw a radius.	
Step 3	You can start with the least number of degrees, in this case, 64.8° . Use your protractor to draw an angle of 64.8° .	
Step 4	Repeat for another section.	
Step 5	In the case of this graph there is only one section left, which should have an angle of 208.8° . Label each section of the graph and give it a title.	

PRACTICE

1. Population Refer to the table.

- Write a ratio that compares each number with the total. Write as a decimal to the nearest thousandth.
- Find the number of degrees for each section of the graph. Round to the nearest tenth.
- Make a circle graph of the world population.

Estimate of the World Population, 1998

Region	Population (millions)
North America	301
Latin America	507
Europe	507
Former USSR	291
Asia	3,529
Africa	761
Oceania	30

Source: U.S. Department of Commerce, U.S. Census Bureau, International Data Base



2. **Standardized Test Practice** If 85 of the 170 respondents to a survey answered “yes,” what are the number of degrees for the “yes” part in a circle graph?

- A** 50° **B** 68° **C** 85° **D** 180°

Answers: 1a–b. North America: 0.051, 18.4°; Latin America: 0.086%, 31.0°; Europe: 0.086, 31.0°; Former USSR: 0.049, 17.6°; Asia: 0.596, 214.6°; Africa: 0.128, 46.1°; Oceania: 0.005, 1.8° **1c.** See Answer Key. **2. D**

Using Statistics to Predict

(pages 464–467)



If you want to make a prediction about a large group of people, you may wish to use a smaller group, or **sample**, from the larger group. The large group from which you gathered your sample is known as the **population**. To make sure your information represents the population, the sample must be drawn at **random**. A random sample gives everyone the same chance of being selected.

Suggestions for Drawing a Random Sample	<p>Suppose you need to find out what is the most popular meal in your school’s cafeteria. To get a random sample, you could</p> <ul style="list-style-type: none"> • survey every fifteenth student named on the school roster. • survey every tenth student in the lunch line at the cafeteria. • survey two students from each homeroom class. <p>Each of these methods ensures that everyone has an equal chance of being selected.</p>
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PRACTICE

1. Music Oakdale Middle School’s school newspaper surveyed the school’s students by asking them what their favorite type of music is. The school has 1,020 students.

Type of Music	Number
Pop/Rock	58
Rap/Hip Hop	37
Country	32
R & B	15
Other	8

- What was the sample size?
- To the nearest percent, what percent of students preferred pop/rock?
- How many students in the school would you expect to say that pop/rock is their favorite?
- If the school newspaper had only surveyed students from some boys’ physical education classes, would that be a random sample? Explain.

2. Sales Each month Peterman’s Books, a local bookstore, randomly surveys customer purchases for marketing purposes.

March Survey	
Books	Percent
Fiction	31%
Non-Fiction	26%
Children’s	10%
Romance	8%
Mystery	5%
Horror/Science Fiction	4%
Other	16%

- Do you think this sample is representative of every bookstore in the United States? Why or why not?
- Of the 482 books sold on Tuesday, how many would you expect to be romance books?



3. Standardized Test Practice Refer to the table in Exercise 1. About how many students in the school would you expect to say that country is their favorite?

- A** 214 **B** 314 **C** 320 **D** 480

Answers: 1a. 150 students 1b. 39% 1c. about 398 1d. No; the sample does not contain any girls. 2a. No; customers at bookstores in other parts of the country may have different preferences. 2b. about 39 books 3. A

Percent of Change

(pages 469–472)



Percent of change describes how much a quantity increases or decreases.

EXAMPLE

Last year, Melvin paid \$12 to purchase a ticket to a water amusement park. This year, the ticket cost him \$14. What was the percent of increase?

Step 1	Find the amount of increase. $\$14 - \$12 = \$2$
Step 2	Use the percent proportion. $\frac{\text{amount of increase}}{\text{original amount}} = \frac{r}{100}$ $\frac{2}{12} = \frac{r}{100}$
Step 3	Solve for r . $2 \cdot 100 = 12r$ Find the cross products. $\frac{200}{12} = \frac{12r}{12}$ Divide each side by 12. $16.7 \approx r$ The percent of increase is about 17%.

Try These Together

Find the percent of change. Round to the nearest whole percent.

1. original: \$5
new: \$2

2. original: \$10
new: \$7

3. original: 60
new: 54

HINT: Find the amount of change, then set up the percent proportion and solve for r .

PRACTICE

Find the percent of change. Round to the nearest whole percent.

- | | | |
|---------------------------------|---------------------------------------|---------------------------------|
| 4. original: 27.5
new: 35.5 | 5. original: \$186
new: \$196 | 6. original: 64
new: 70 |
| 7. original: \$3
new: \$6 | 8. original: 34
new: 59 | 9. original: \$77
new: \$110 |
| 10. original: 50
new: 63 | 11. original: \$41.50
new: \$10.50 | 12. original: 93
new: 19 |
| 13. original: \$61
new: \$72 | 14. original: \$38
new: \$49 | 15. original: 67
new: 55 |
16. **Money Matters** Hank pays \$580 each month for rent. Next month his rent increases to \$620. What is the percent of increase?



17. **Standardized Test Practice** What is the percent of increase from 50 to 75?

A 25%

B 33%

C 50%

D 75%

Answers: 1. 60% 2. 30% 3. 10% 4. 29% 5. 5% 6. 9% 7. 100% 8. 74% 9. 43% 10. 26% 11. 75% 12. 80% 13. 18% 14. 29% 15. 18% 16. about 7% 17. C

Discount and Sales Tax

(pages 474–477)



You can use one of the two methods that follow to find the total cost of an item including sales tax or the sale price of an item including a discount.

	Sales Tax	Discount
Method 1	<ul style="list-style-type: none"> First, find the amount of the sales tax, t. Then add the sales tax to the price of the item. 	<ul style="list-style-type: none"> First, find the amount of the discount, d. Then subtract the discount from the price of the item.
Method 2	<ul style="list-style-type: none"> First, add the percent of tax to 100%. Then multiply to find the total cost including tax. 	<ul style="list-style-type: none"> First, subtract the percent of discount from 100%. Then multiply to find the sale price including discount.

EXAMPLES

A Find the total cost of a \$72 item with 6% sales tax.

$$6\% \text{ of } \$72 = t, \text{ or } \$4.32$$

$$\$72 + \$4.32 = \$76.32$$

The total cost is \$76.32.

B Find the sale price of a \$250 item with a 30% discount.

$$100\% - 30\% = 70\%$$

So the sale price will be 70% of the original price.

$$\$250 \times 0.7 = \$175$$

The sale price is \$175.

Try These Together

Find the total cost or sale price to the nearest cent.

1. \$6.95 lamp; 15% off

HINT: The sale price will be less than \$6.95.

2. \$19.50 sweatpants; 6% tax

HINT: The total cost will be more than \$19.50.

PRACTICE

Find the total cost or sale price to the nearest cent.

3. \$24.50 sandals; 20% discount

4. \$230 trampoline; 30% off

5. \$25 dartboard; $6\frac{1}{2}\%$ tax

6. \$37.95 computer game; $5\frac{1}{2}\%$ tax



7. **Standardized Test Practice** What is the sale price to the nearest cent of a \$79 rug on sale for 10% off?

A \$86.90

B \$78.21

C \$71.10

D \$69.00

Answers: 1. \$59.11 2. \$20.76 3. \$19.60 4. \$161 5. \$26.68 6. \$40.04 7. C

Simple Interest

 (pages 478–480)


Simple interest is money you pay the bank or lender for the use of money. Similarly, if you deposit money in a savings account, the bank may pay you simple interest for the use of the money.

Simple Interest	The formula for simple interest is $I = prt$, where I is the interest , p is the principal , or the amount of money invested or borrowed, r is the annual interest rate , and t is the time , in years.
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EXAMPLES

- A** What interest would you earn on a savings deposit of \$1,200 at 8% interest for six months?

$$I = prt$$

$$I = 1,200 \times 0.08 \times \frac{1}{2} \quad p = \$1,200, r = 8\% \text{ or } 0.08, t = 6 \text{ months or } \frac{1}{2} \text{ year}$$

$$I = 48$$

The interest you would earn is \$48.

- B** How much interest would you pay on a credit card balance of \$2,000 at 15% interest for 1 year?

$$I = prt$$

$$I = 2,000 \times 0.15 \times 1 \quad p = \$2,000, r = 15\% \text{ or } 0.15, t = 1 \text{ year}$$

$$I = 300$$

The interest you would pay is \$300.

Try These Together

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

1. \$420, 9%, 6 months

$$\text{HINT: } p = \$420; r = 0.09; t = \frac{1}{2}$$

2. \$816, 7%, 9 months

HINT: Replace p , r , and t with the values given.

PRACTICE

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

3. \$3,800, 10%, 1 year

4. \$2,903, 11%, 18 months

5. \$850.30, 3.75%, 1 year

6. \$283.85, 8.5%, 2 years

Find the interest to the nearest cent on credit cards for each credit card balance, interest rate, and time.

7. \$844, 9%, 3 years

8. \$3,000, 12%, 3 months

9. \$1,700, 24%, 9 months

10. \$275, 17.5%, 2 years



- 11. Standardized Test Practice** What is the interest on a credit card balance of \$500 over two years if the interest rate is $10\frac{1}{2}\%$?

A \$150.00

B \$105.00

C \$102.00

D \$52.50

Answers: 1. \$18.90 2. \$42.84 3. \$380 4. \$479.00 5. \$31.89 6. \$48.25 7. \$227.88 8. \$90 9. \$306 10. \$96.25 11. B

Chapter 11 Review



Which Price is Right?

Cut out the cards below and shuffle them. Give three cards to your parent and three to yourself. Then, pick the item on each card with the lower price. You each get one point for each correct answer. The one with the most points wins the round. Exchange cards and play again, or create your own cards.

1. **A.** A pair of in-line skates with an original cost of \$60 after a 20% discount

B. A pair of in-line skates with an original cost of \$60 after a \$15 discount

2. **A.** A music CD bought from an online retailer for \$12 plus \$3.20 shipping and handling

B. A music CD bought from a local music store for \$14 plus 8% sales tax

3. **A.** A group of five friends who go to an amusement park and pay \$60 per carload for admission

B. A group of five friends who go to an amusement park and pay \$15 each for admission

4. **A.** Internet service that costs \$9.99 per month

B. Internet service that costs \$99 per year

5. **A.** A mountain bike that costs three payments of \$89

B. A mountain bike that costs \$275

6. **A.** A \$19 pizza plus 15% gratuity at a restaurant

B. A \$20 pizza plus $8\frac{1}{4}\%$ sales tax from a takeout window

Answers are located on page 115.