


Solve & Discuss It!

A florist is making flower arrangements for a party. He uses purple and white flowers in a ratio of 3 purple flowers to 1 white flower. How many flowers will he need in order to make 30 identical arrangements?



Look for Relationships
How are the number of purple flowers related to the number of white flowers?

Lesson 3-2

Connect Percent and Proportion

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I can...
use proportions to solve percent problems.

Focus on math practices

Make Sense and Persevere If the florist can only buy white flowers in groups of flowers that have 3 white flowers and 2 red flowers, how many red flowers will the florist have to purchase? Explain your answer.

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Essential Question

How does proportional reasoning relate to percent?

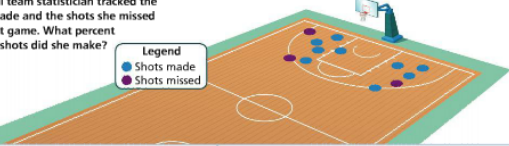
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EXAMPLE 1 Use a Proportion to Find the Percent

The basketball team statistician tracked the shots Emily made and the shots she missed during the last game. What percent of attempted shots did she make?

Legend

- Shots made
- Shots missed



Draw a bar diagram and write a proportion to represent the number of shots made and the total number of shots.

9 shots made

p%

100%

12 attempted shots

$$\frac{9}{12} = \frac{p}{100}$$

Solve the proportion to find the percent of shots made during the last game.

$$\frac{9}{12} \cdot 100 = \frac{p}{100} \cdot 100$$

$$75 = p$$

Emily made 75% of her shots.

Reasoning The ratio of part to whole describes a proportional relationship.

Try It!

Camila makes 2 of her 5 shots attempted. Is the percent of shots she made more than, less than, or the same as Emily's percent of shots?

2 shots made

p%

100%

5 attempted shots

= $\frac{p}{100}$

= $\frac{p}{100}$

= $\frac{p}{100}$

Camila made % of her shots.

Camila's percent of the shots made is Emily's.

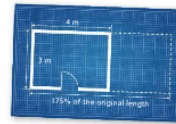
Convince Me! A hockey goalie stops 37 out of 40 shots. What percent of attempted goals did she stop?

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EXAMPLE 2 Use a Proportion to Find the Part

A plan to expand Megan's room will make the length of the room 175% of the current length. What will be the new length of her room?
 Draw a bar diagram to represent the problem and then write a percent proportion to find the new length.



Bar diagram showing 100% (4 meters) and 175% (n meters).

$$\frac{\text{new length}}{\text{old length}} = \frac{p}{100}$$

$$\frac{n}{4} = \frac{175}{100}$$

$$n \cdot 4 = \frac{175}{100} \cdot 4$$

$$n = 7$$

The new length of the room will be 7 meters.

EXAMPLE 3 Use a Proportion to Find the Whole

The nutrition label shows the percents of the recommended daily intake for nutrients found in a serving of a soy milk. How many milligrams of calcium should you consume each day?
 Write a percent proportion to find the amount of calcium.



$$\frac{\text{calcium per serving}}{\text{daily value}} = \frac{p}{100}$$

$$\frac{260}{w} = \frac{20}{100}$$

$$260 \cdot 100 = 20w$$

$$1,300 = w$$

Multiply both sides by the variable.
 Multiply both sides by the reciprocal.

The daily value for calcium is 1,300 mg.

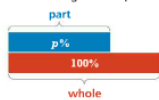
Try It!

- Megan's room is expanded so the width is 150% of 3 meters. What is the new width?
- Use the soy milk label in Example 3. What is the recommended amount of iron needed each day? Round your answer to the nearest mg.

KEY CONCEPT

"part is % of whole"

Percent problems represent a kind of proportional relationship. You can use proportional reasoning to solve percent problems.



$$\frac{\text{part}}{\text{whole}} = \frac{p}{100}$$

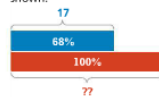
$$\frac{A}{W} = \frac{P\%}{100}$$

Do You Understand?

- Essential Question** How does proportional reasoning relate to percent?
- Reasoning** Why does one of the ratios in a percent proportion always have a denominator of 100?
- Construct Arguments** The proportion $\frac{75}{100} = \frac{150}{w}$ can be used to find the whole, w . Use the language of percent to explain whether w is less than or greater than 75.

Do You Know How?

- Write a percent proportion for the bar diagram shown.



- Use a proportion to find each value.

- 2% of 180

$$\frac{n}{180} = \frac{2}{100}$$

- What percent is 17 out of 40?

$$\frac{17}{40} = \frac{p}{100} \cdot \frac{100}{1}$$

- Construct Arguments** Gia researches online that her car is worth \$3,000. She hopes to sell it for 85% of that value, but she wants to get at least 70%. She ends up selling it for \$1,800. Did she get what she wanted? Justify your answer.

$$\frac{5 \cdot 17}{1 \cdot 2} = P$$

$$42.5 = P$$

$$P = 42.5\%$$

Practice & Problem Solving

7. The rabbit population in a certain area is 200% of last year's population. There are 1,100 rabbits this year. How many were there last year?

8. A company that makes hair-care products had 3,000 people try a new shampoo. Of the 3,000 people, 9 had a mild allergic reaction. What percent of the people had a mild allergic reaction?

9. A survey was given to people who owned a certain type of car. What percent of the people surveyed were completely satisfied with the car?

10. The Washingtons buy a studio apartment for \$240,000. They pay a down payment of \$50,000. Their down payment is what percent of the purchase price?

11. A restaurant customer left \$3.50 as a tip. The tax on the meal was 7% and the total cost of the cost including tax is \$17.50.

12. Reasoning What is a good estimate for 38% of 60? Explain.

Car Satisfaction Survey

Completely satisfied	160
Somewhat satisfied	740
Not satisfied	160
Total	1,100

Handwritten notes on the page:

- $\frac{A}{W} = \frac{P}{100}$
- $\frac{1100}{2000} = \frac{P \times 20}{100 \times 20}$
- $\frac{1100}{2000} = \frac{P \cdot 20}{2000}$
- $\frac{1100}{20} = \frac{P \cdot 20}{20}$
- $55 = P$
- 55%
- The 7% is not needed since the 20% includes the tax.
- $\frac{3.50}{W} = \frac{20}{100}$
- $\frac{3.50}{W} = \frac{20}{100}$
- $\frac{3.50}{W} = \frac{2 \times 1.75}{10 \times 1.75}$
- $W = \frac{1.75}{10} \times 10$
- $\$17.50$
- The total bill was \$17.50.

13. Critique Reasoning Marna thinks that about 35% of her mail is junk mail. She gets about twice as much regular mail as junk mail. Is she correct? Explain.

14. Hypatia has read 13 chapters of a 22-chapter book.
a. What percent of the chapters has she read?

15. A school year has 4 quarters. What percent of a school year is 7 quarters?

16. Construct Arguments A survey found that 27% of high school students and 94% of teachers and school employees drive to school. The ratio of students who drive to school is greater than the number of teachers and employees who drive to school. Explain how Roger's statement could be correct.

17. Higher Order Thinking Stefan sells Jin a bicycle for \$114 and a helmet for \$18. The total cost for Jin is 120% of what Stefan spent originally to buy the bike and helmet. How much did Stefan spend originally? How much money did he make by selling the bicycle and helmet to Jin?



Assessment Practice

18. Last month you spent \$30. This month you spent 140% of what you spent last month. Set up a proportion to model this situation. How much did you spend this month?

19. The owner of a small store buys coats for \$50.00 each.

PART A

She sells the coats for \$90.00 each. What percent of the purchase price is the selling price?

PART B

The owner increases the sale price the same percent that you found in Part A when she buys jackets for \$35 and sells them. How many jackets must the owner buy for the total jacket sales to be at least \$250? Explain your answer.

