



## Lesson 27: Solving Percent Problems

### Student Outcomes

- Students find the percent of a quantity. Given a part and the percent, students solve problems involving finding the whole.

### Classwork

#### Example (10 minutes)

##### Example

Solve the following three problems.

Write the words PERCENT, WHOLE, PART under each problem to show which piece you were solving for.

$60\% \text{ of } 300 = \underline{180}$ $\frac{60 \times 3}{100 \times 3} = \frac{\underline{180}}{300}$	$60\% \text{ of } \underline{500} = 300$ $\frac{60 \times 5}{100 \times 5} = \frac{\underline{300}}{500}$	$60 \text{ out of } 300 = \underline{20}\%$ $\frac{60 \div 3}{300 \div 3} = \frac{\underline{20}}{100}$
PART	WHOLE	PERCENT

How did your solving method differ with each problem?

*Solutions will vary. A possible answer may include: When solving for the part, I need to find the missing number in the numerator. When solving for the whole, I solve for the denominator. When I solve for the percent, I need to find the numerator when the denominator is 100.*

- What are you trying to find in each example?
  - Part, whole, percent
- How are the problems different from each other?
  - Answers will vary.
- How are the problems alike?
  - Answers will vary.

Take time to discuss the clues in each problem including the placement of the word “of.” The word “of” will let students know which piece of information is the whole amount compared to the part. In the first example, 60% of 300 tells us that we are looking for part of 300. Therefore, 300 is the whole. In the second example where 60% of 500 is 300, 300 is the part and 500 is the whole. In the third example, 60 out of 300 tells us that now, 60 is the part, and 300 is the whole. Structure the conversation around the part-whole relationship.

- In the first question, what is 60% of 300?
  - Students should understand that  $\frac{60}{100}$  is the same ratio as  $\frac{\text{unknown number}}{300}$ . 180.



- In this case, is 180 the part or the whole?
  - 180 is the part. It is part of 300.
- In the second question, we are given 60% of some value equals 300  $\rightarrow \frac{60}{100} = \frac{300}{?}$ . What is that value?
  - 500
- In this case, is 500 the part or the whole? What about 300? Is that a part or the whole?
  - 500 is the whole, and 300 is the part.
- In the third question, we are asked 60 out of 300 equals what percent  $\rightarrow \frac{60}{300} = \frac{?}{100}$ . What percent is that?
  - The percent is 20%.
- In this case, is 300 the part or the whole?
  - 300 is the whole.

**Exercise (20 minutes)**

At this time, the students break out into pairs or small thinking groups to solve the problem.

**Exercise**

Use models, such as  $10 \times 10$  grids, ratio tables, tape diagrams, or double number line diagrams, to solve the following situation.

Priya is doing her back-to-school shopping. Calculate all of the missing values in the table below, rounding to the nearest penny, and calculate the total amount Priya will spend on her outfit after she received the indicated discounts.

	Shirt (25% discount)	Pants (30% discount)	Shoes (15% discount)	Necklace (10% discount)	Sweater (20% discount)
Original Price	\$44	\$50	\$60	\$20	\$35
Amount of Discount	\$11	\$15	\$9	\$2	\$7

What is the total cost of Priya’s outfit?

Shirt  $25\% = \frac{25}{100} = \frac{1}{4} = \frac{11}{44}$  The discount is \$11. The cost of the shirt is \$33 because  $\$44 - \$11 = \$33$ .

Pants  $30\% = \frac{30}{100} = \frac{15}{50}$  The original price is \$50. The price of the pants is \$35 because  $\$50 - \$15 = \$35$ .

Shoes  $15\% = \frac{15}{100} = \frac{3}{20} = \frac{9}{60}$  The original price is \$60. The cost of the shoes is \$51 because  $\$60 - \$9 = \$51$ .

Necklace  $10\% = \frac{1}{10} = \frac{2}{20}$  The discount is \$2. The cost of the necklace is \$18 because  $\$20 - \$2 = \$18$ .

Sweater  $20\% = \frac{20}{100} = \frac{1}{5} = \frac{7}{35}$  The original price is \$35. The cost of the sweater is \$28 because  $\$35 - \$7 = \$28$ .

The total outfit would cost:  $\$33 + \$35 + \$51 + \$18 + \$28 = \$165$

**Closing (10 minutes)**

Give time for students to share samples of how they solved the problem and describe the methods they chose to use when solving.

**Lesson Summary**

Percent problems include the part, whole, and percent. When one of these values is missing, we can use tables, diagrams, and models to solve for the missing number.

**Exit Ticket (5 minutes)**



Name \_\_\_\_\_

Date \_\_\_\_\_

## Lesson 27: Solving Percent Problems

### Exit Ticket

Jane paid \$40 for an item after she received a 20% discount. Jane's friend says this means that the original price of the item was \$48.

a. How do you think Jane's friend arrived at this amount?

b. Is her friend correct? Why or why not?



## Exit Ticket Sample Solutions

Jane paid \$40 for an item after she received a 20% discount. Jane's friend says this means that the original price of the item was \$48.

- a. How do you think Jane's friend arrived at this amount?

*Jane's friend found that 20% of 40 is 8. Then she added \$8 to the sale price:  $40 + 8 = 48$ . Then she determined that the original amount was \$48.*

- b. Is her friend correct? Why or why not?

*Jane's friend was incorrect. Because Jane saved 20%, she paid 80% of the original amount, so that means that 40 is 80% of the original amount.*



*The original amount of the item was \$50.*

## Problem Set Sample Solutions

1. Mr. Yoshi has 75 papers. He graded 60 papers, and he had a student teacher grade the rest. What percent of the papers did each person grade?

*Mr. Yoshi graded 80% of the papers, and the student teacher graded 20%.*

2. Mrs. Bennett has graded 20% of her 150 students' papers. How many papers does she still need to finish grading?

*Mrs. Bennett has graded 30 papers.  $150 - 30 = 120$ . Mrs. Bennett has 120 papers left to grade.*