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 1 (10 minutes)

Example 1

Solve the following three problems.

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

60% of 300 = _____ *180* _____   60% of _____ *500* _____ = 300   60 out of 300 = _____ *20* _____ %

$$\frac{60\times3}{100\times3} = \frac{180}{300}$$ $$\frac{60\times5}{100\times5} = \frac{300}{500}$$ $$\frac{60\div3}{300\div3} = \frac{20}{100}$$

| *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 needed to find the missing number in the numerator. When solving for the whole, I solved for the denominator. When I solved for the percent, I needed to find the numerator when the denominator was 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. For example, 60% of 300 tells us that we are looking for part **of** 300. Therefore, 300 is the whole. 60 out **of** 300 also tells us that 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 $\frac{unknown\ number}{300}$.

60% of some value = 300 $\rightarrow \dfrac{60}{100} = \dfrac{300}{?}$

60 out of 300 = what percent $\rightarrow \dfrac{60}{300} = \dfrac{?}{100}$

Exercise 1 (20 minutes)

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

Exercise 1

Use models, such as 10×10 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 $25\% = \dfrac{25}{100} = \dfrac{1}{4}$ $\dfrac{1}{4} = \dfrac{11}{44}$ *The discount is $11.*

Pants $30\% = \dfrac{30}{100} = \dfrac{15}{50}$ *The original price is $50.*

Shoes $15\% = \dfrac{15}{100} = \dfrac{3}{20} = \dfrac{9}{60}$ *The original price is $60.*

Necklace $10\% = \dfrac{1}{10} = \dfrac{2}{20}$ *The discount is $2.*

Sweater $20\% = \dfrac{20}{100} = \dfrac{1}{5} = \dfrac{7}{35}$ *The original price is $35.*

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

The following solutions indicate an understanding of the objectives of this lesson:

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.

0	20%	40%	60%	80%	100%
0	10	20	30	40	50
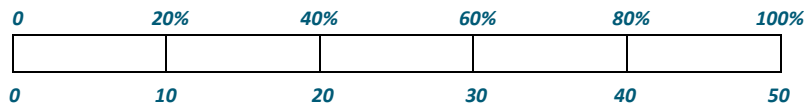
The original amount of the item was $50.

Problem Set Sample Solutions

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

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

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

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