Please get your clicker, calculator/device and be ready for the warm-up questions.

Today's lesson is on solving percent problems using proportions.

Solve for n: n/32 = 1/4

Use your number keypad and text in the number that n represents

A proportion is an equation stating that two _____ are equal

(A) rates

(B) ratios

(C) percents

Solving Percent Problems Using Proportions

Algebra

7.RP.3

What You'll Learn

To use proportions to solve problems involving percent

Why Learn This?

Survey and poll results are often reported using percents.

In a survey of 2,000 people in the United States, 204 said they are left-handed. You can use this information to find the percent of people who are left-handed.
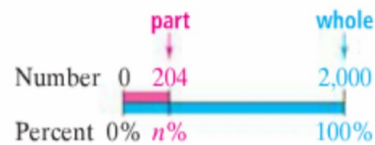
You can use a model to help find this percent.

part   whole

Number	0 204	2,000
Percent	0% n%	100%

$$\frac{204}{2,000} = \frac{n}{100}$$ ← The part, 204, corresponds to n in the model.
                   ← The whole, 2,000, corresponds to 100.

Remember the word percent means out of 100

part   whole

Number	0 204	2,000
Percent	0% n%	100%

$$\frac{204}{2,000} = \frac{n}{100}$$ ← The part, 204, corresponds to n in the model.
                   ← The whole, 2,000, corresponds to 100.

EXAMPLE   **Finding a Percent**

1 What percent of 2,000 is 204?

Using the model above, you can write and solve a proportion.

$$\frac{204}{2,000} = \frac{n}{100}$$ ← Write a proportion.

$$2000n = 204(100)$$ ← Write cross products.

$$\frac{2,000n}{2,000} = \frac{204(100)}{2,000}$$ ← Divide each side by 2,000.

$$n = 10.2$$ ← Simplify.

204 is 10.2% of 2,000.

① EXAMPLE What percent of 150 is 45?

You can write a proportion to find the percent.
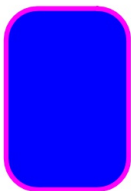
$\frac{45}{150} = \frac{n}{100}$ ← Write a proportion.

$150n = 45(100)$ ← Write the cross products.

$\frac{150n}{150} = \frac{45(100)}{150}$ ← Divide each side by 150.

$n = 30$ ← Simplify.

45 is 30% of 150.

Talk about this problem with your table partners, and then enter your answer on your clicker.

1. What percent of 92 is 23? Use a proportion to solve.
   A. 21.16%
   B. 25%
   C. 0.25%
   D. 12.7%

2 20% of 55 is what number?

part   whole

0   n   55

0%   20%   100%

$$\frac{n}{55} = \frac{20}{100}$$ ← Write a proportion.

$$\frac{n}{55} = \frac{1}{5}$$ ← Simplify the fraction.

×11

$$\frac{n}{55} = \frac{1}{5}$$ ← Use the common multiplier, 11.

×11

$$n = 11$$ ← Simplify.

11 is 20% of 55.

2 EXAMPLE 35% of 90 is what number?

$$\frac{n}{90} = \frac{35}{100}$$ ← Write a proportion.

$$100n = 90(35)$$ ← Write the cross products.

$$\frac{100n}{100} = \frac{90(35)}{100}$$ ← Divide each side by 100.

$$n = 31.5$$ ← Simplify.

35% of 90 is 31.5.

3 **Budgets** Suppose your entertainment budget is 30% of your weekly wages from a job. You plan to spend $10.50 on a movie night. How much will you need to earn at your job in order to stay within your budget?
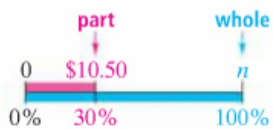
$$\frac{10.50}{n} = \frac{30}{100} \qquad \leftarrow \text{Write a proportion.}$$
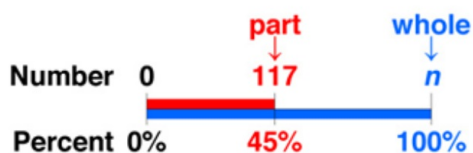
$$30n = 10.50(100) \qquad \leftarrow \text{Write cross products.}$$

$$\frac{30n}{30} = \frac{10.50(100)}{30} \qquad \leftarrow \text{Divide.}$$

$$n = 35 \qquad \leftarrow \text{Simplify.}$$

You need to earn $35 to stay within your budget.

part   whole

0   $10.50 n

0%   30%   100%

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3 **EXAMPLE** 117 is 45% of what number?

part   whole

Number 0   117 n $\leftarrow$ The model shows the relationship.

Percent 0%   45%   100%

$$\frac{117}{n} = \frac{45}{100} \qquad \leftarrow \text{Write the proportion.}$$

$$45n = 117(100) \qquad \leftarrow \text{Write the cross products.}$$

$$\frac{45n}{45} = \frac{117(100)}{45} \qquad \leftarrow \text{Divide each side by 45.}$$

$$n = 260 \qquad \leftarrow \text{Simplify.}$$

117 is 45% of 260.

Write these three patterns in your notes please.

KEY CONCEPTS · **Percents and Proportions**

Finding a Percent	Finding a Part	Finding a Whole
What percent of 25 is 5?	What is 20% of 25?	20% of what is 5?

0 5   25   0 n 25   0 5 n

0% n%   100%   0% 20%   100%   0% 20%   100%

$$\frac{5}{25} = \frac{n}{100}$$
$$n = 20$$

$$\frac{n}{25} = \frac{20}{100}$$
$$n = 5$$

$$\frac{5}{n} = \frac{20}{100}$$
$$n = 25$$

20% of 25 is 5.   5 is 20% of 25.   20% of 25 is 5.

Can you notice any patterns related to the words "is" and "of"?
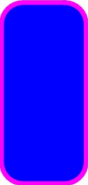
The next several clickers questions are to be answered on your own.
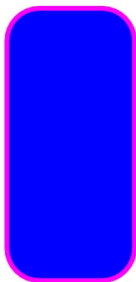
1. 85% of 20 is what number?

    A. 425

    B. 17

    C. 23.5

    D. 10.5

2. Your math teacher assigned 25 problems for homework. You have done 60% of them. How many problems have you done?

A. 20 problems
B. 1.5 problems
C. 14 problems
D. 15 problems

Tell whether the answer to the question is a *percent*, a *part*, or a *whole*. Then answer the question.

1. What percent of 200 is 50?

A. part; 10
B. part; 25
C. percent; 25%
D. percent; 10%

**Tell whether the answer to the question is a *percent*, a *part*, or a *whole*. Then answer the question.**
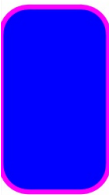
2.　12 is 80% of what number?

　A. whole; 9.6
　B. part; 15
　C. part; 9.6
　D. whole; 15

Tell whether the answer to the question is a *percent*, a *part*, or a *whole*. Then answer the question.

3.　50% of what number is 8?

　A. whole; 16
　B. part; 16
　C. part; 4
　D. whole; 4

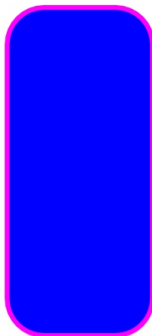**Match each question with the proportion you could use to answer it.**
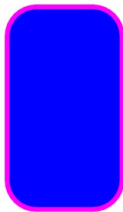
5. What is 40% of 15?

A. $\dfrac{n}{15} = \dfrac{100}{40}$

B. $\dfrac{n}{15} = \dfrac{40}{100}$

C. $\dfrac{15}{n} = \dfrac{40}{100}$

D. $\dfrac{15}{40} = \dfrac{n}{100}$

Match each question with the proportion you could use to answer it.

6. 15 is what percent of 40?

A. $\dfrac{n}{15} = \dfrac{40}{100}$

B. $\dfrac{15}{n} = \dfrac{40}{100}$

C. $\dfrac{15}{n} = \dfrac{100}{40}$

D. $\dfrac{15}{40} = \dfrac{n}{100}$

Power down your clickers and put them away. You have an assignment worksheet.

Name _____ Class _____ Date _____

Practice 5-2   Solving Percent Problems Using Proportions

Use a proportion to solve.

1. 48 is 60% of what number?   2. What is 175% of 85?

_____   _____

3. What percent of 90 is 50?   4. 76 is 80% of what number?

_____   _____

5. What is 50% of 42.88?   6. 96 is 160% of what number?

_____   _____

7. What percent of 24 is 72?   8. What is 85% of 120?

_____   _____

9. What is 80% of 12?   10. 56 is 75% of what number?

_____   _____

Solve.

11. The sale price of a bicycle is $120. This is 75% of the original price. Find the original price.

_____

12. The attendance at a family reunion was 160 people. This was 125% of last year's attendance. How many people attended the reunion last year?

_____

13. A company has 875 employees. On "Half-Price Wednesday," 64% of the employees eat lunch at the company cafeteria. How many employees eat lunch at the cafeteria on Wednesdays?

_____

14. There are 1,295 students attending a small university. There are 714 women enrolled. What percentage of students are women?

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