

Title: Percents**Materials:**

Teacher notes and script. (*This page and next.*)

Student note sheet. (*Make a copy for each student.*)

Student activity – choose option A, B, or C. (*Make a copy for each student – If doing activity in class, you'll need scissors and glue sticks for options A & B and newspaper/magazine ads for option A.*)

Overheads (*Make transparencies.*)

Previous Knowledge Needed: Proportions**Important Concepts/Methods:**

To solve percents:

Step 1: Read the problem and answers

Step 2: Rewrite question in the form: _____ is _____ % of _____

Step 3: Put numbers in the equation: $\frac{\text{is}}{\text{of}} = \frac{\%}{100}$, use a variable for the unknown number.

Step 4: Solve the proportion by cross multiplying, and then divide by the number with the variable.

Step 5: Did you answer the question, or is there something else you need to do?

Script:

Today we're going to work on solving percent problems. Step 1 says read the problem and answers. (*Put problem up on overhead and read.*)

Problem:

To purchase feed for his cattle, Nelson took out a 1 year loan at 8% simple interest. If he borrowed \$2,000, how much must he pay back to the bank at the end of the year?

- a) \$2,008
- b) \$160
- c) \$2,160
- d) \$2,800

Step 2 says to rewrite question in the form: _____ is _____ % of _____? ↻

Who can tell me what question this problem is asking? It needs to be asked in this form. (*Give students a chance to think. Then help them come up with "What is 8% of \$2000?" Write the question on the overhead. Be sure students write down the question on their paper.*)

So our question is "What is 8% of \$2000?" Any questions? (*Answer any questions students have.*)

Step 3 says to set up the numbers in the equation as: $\frac{\text{is}}{\text{of}} = \frac{\%}{100}$ using a variable for the unknown

number. So if we look at our question, what is the "is" part? (*Get students to say they don't know it.*)

We don't know so we use a variable. (*Write x in formula*)

What's the "of" part? (*Get students to say 2000*) Of 2000 (*Write 2000 in the formula*) and what's the

% part? (*Get students to say 8. Write it in the formula and finish it. You should have $\frac{x}{2000} = \frac{8}{100}$*

written down. Be sure students are writing down the problem.)

This is just like the proportions we did.

Now step 4 is to solve the proportion by cross multiplying, and then divide by the number with the variable. So if we cross multiply we get $100x = 16,000$, (*Write $100x = 16,000$ on the overhead.*) and then we divide by the number with the variable. So 16,000 divided by 100 equals 160. (*Write out solution.*) Any questions? (*Answer any questions students have.*)

Step 5 is did you answer the question, or is there something else you need to do? What do you think? Is our answer \$160? (*Have students discuss and decide if they need to do something else. If they have a difficult time deciding what they need to do, ask them questions like, "Would the bank only want you to pay them back \$160?"*)

The bank wants their money back plus the interest, so we need to add $2000 + 160$ (*Write problem on the overhead and work out.*) to get \$2160. So the answer is C.

Common Mistakes:

Let's see how they got their other answers.

A) \$2008 is just adding the two numbers in the problem together. (*Write $2000 + 8 = 2008$ on the overhead.*)

B) \$160 is just the interest, so they didn't answer the question that was asked.

D) \$2800 is kind of like A where they just added the two numbers, but they made 8% into 800.

Student Problems:

Try the next 2 problems on your own. (*Give students time to try problem.*)

(*Put overhead up and either work out problems or give students the opportunity to come up and explain them. Make sure they do all steps.*)

Assignment:

(*Hand out assignment sheet. Either give students time to do and then discuss their problems, or give as homework and collect the next day.*)

To purchase feed for his cattle, Nelson took out a 1 year loan at 8% simple interest. If he borrowed \$2,000, how much must he pay back to the bank at the end of the year?

- a) \$2,008
- b) \$160
- c) \$2,160
- d) \$2,800

Over the summer, Tina swam in 45 swim meets. She won 27 meets. What percent of the swim meets did Tina win?

- a) 27%
- b) 40%
- c) 43%
- d) 60%
- e) 80%

Donna took out a loan of \$300.00 from her bank to pay dental bills. She paid back the entire loan in 6 months. The interest on the loan was 9% per year. What was the total amount of money Donna paid back?

- a) \$273.00
- b) \$286.50
- c) \$313.50
- d) \$327.00

Ideas that I'm going to study and learn.

To solve percents:

Step 1: Read the problem and answers

Step 2: Rewrite question in the form: _____ is _____ % of _____

Step 3: Put numbers in the equation: $\frac{is}{of} = \frac{\%}{100}$, use a variable for the unknown number.

Step 4: Solve the proportion by cross multiplying, then divide by the number with the variable.

Step 5: Did you answer the question, or is there something else you need to do?

Example:

To purchase feed for his cattle, Nelson took out a 1 year loan at 8% simple interest. If he borrowed \$2,000, how much must he pay back to the bank at the end of the year?

- a) \$2,008
- b) \$160
- c) \$2,160
- d) \$2,800

To try on my own:

Over the summer, Tina swam in 45 swim meets. She won 27 meets. What percent of the swim meets did Tina win?

- a) 27%
- b) 40%
- c) 43%
- d) 60%
- e) 80%

Donna took out a loan of \$300.00 from her bank to pay dental bills. She paid back the entire loan in 6 months. The interest on the loan was 9% per year. What was the total amount of money Donna paid back?

- a) \$273.00
- b) \$286.50
- c) \$313.50
- d) \$327.00

Let me show what I know!

Find two different sales ads from the newspaper or a magazine. Glue or tape the ads to this sheet, then write and solve two percent problems based on the ads. If the ads have a percent in them you might ask for the sales price, if they don't you might want to find the percent. Be creative in writing your problems.

Example:

To purchase feed for his cattle, Nelson took out a 1 year loan at 8% simple interest. If he borrowed \$2,000, how much must he pay back to the bank at the end of the year?

- a) \$2,008
- b) \$160
- c) \$2,160
- d) \$2,800

Hint: Think – interest *is* the part of the whole loan amount.
Need to find interest. We know the loan amount.

Question: What is 8% of 2000?

$$\frac{x}{2000} = \frac{8}{100} \text{ (cross multiply)}$$

$$\frac{x}{2000} \square \frac{8}{100} \& \frac{x}{2000} \square \frac{8}{100} \quad 2000$$

$$100x = 16,000 \text{ (divide by 100)}$$

$$\frac{100x}{100} = \frac{16,000}{100}$$

$$x = 160 \text{ (That's just the interest!)}$$

$$\begin{array}{r} 3000 \\ +160 \\ \hline 3160 \end{array}$$

To try on my own:

Over the summer, Tina swam in 45 swim meets. She won 27 meets. What percent of the swim meets did Tina win? (*did = is*)

- a) 27%
- b) 40%
- c) 43%
- d) 60%
- e) 80%

Question: 27 is what% of 45?

$$\frac{27}{45} = \frac{x}{100} \text{ (cross multiply)}$$

$$\frac{27}{45} \square \frac{x}{100} \& \frac{27}{45} \square \frac{x}{100}$$

$$2700 = 45x \text{ (divide by 45)}$$

$$\frac{2700}{45} = \frac{45x}{45}$$

$$60 = x$$

Donna took out a loan of \$300.00 from her bank to pay dental bills. She paid back the entire loan in 6 months. The interest on the loan was 9% per year. What was the total amount of money Donna paid back?

- a) \$273.00
- b) \$286.50
- c) \$313.50
- d) \$327.00

Question: What is 9% of 300?

$$\frac{x}{300} = \frac{9}{100} \text{ (cross multiply)}$$

$$\frac{x}{300} \square \frac{9}{100} \& \frac{x}{300} \square \frac{9}{100}$$

$$100x = 2,700 \text{ (divide by 100)}$$

$$\frac{100x}{100} = \frac{2,700}{100}$$

$x = 27$ (That's the interest for a whole year! We want 6 months or 1/2 a year!)

$$27 \div 2 = 27 \times \frac{1}{2} = 13.50 \text{ (Just Interest!)}$$

$$\begin{array}{r} 300.00 \\ +13.50 \\ \hline 313.50 \end{array}$$

Percents Matching

Problems	What the problem is asking.	Set up the proportion to match the problem.	Solve the proportion.

Cut the pieces below apart. For each word problem, find the corresponding question, proportion, and value of the variable that would help you solve the problem. Once you have all the matching pieces, glue them into the appropriate columns of the Percents Matching grid. Make sure you go back and use the value of the variable to answer each word problem with a complete sentence.

Miguel wants to save money to buy an iPod. His parents give him \$20 a week for lunches. If he wants to put 25% towards his iPod, how much does he need to put aside each week?

25 is 20% of
what number?

$$\frac{20}{x} = \frac{25}{100}$$

$$x = 5$$

Su Lei went shopping at the mall. She found a sale for 25% off. If she saved \$20, how much was the original price?

25 is what
percent of 20?

$$\frac{x}{20} = \frac{25}{100}$$

$$x = 125$$

The local weather report said that this year's 25 inches of rainfall is 20% of last year's total. What was last year's total?

20 is 25% of
what number?

$$\frac{25}{20} = \frac{x}{100}$$

$$x = 125$$

Sophia got answered all the questions on the quiz correctly – even the extra credit problems. If her final score was 25 points and the quiz was worth 20 points, what was her percentage on the quiz?

What number is
25% of 20?

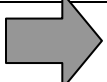
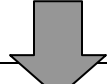
$$\frac{25}{x} = \frac{20}{100}$$

$$x = 80$$

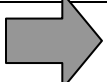
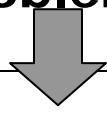
Percents Matching

Problems	What the problem is asking.	Set up the proportion to match the problem.	Solve the proportion.
Miguel wants to save money to buy an iPod. His parents give him \$20 a week for lunches. If he wants to put 25% towards his iPod, how much does he need to put aside each week?	What number is 25% of 20?	$\frac{x}{20} = \frac{25}{100}$	$x = 5$
Su Lei went shopping at the mall. She found a sale for 25% off. If she saved \$20, how much was the original price?	20 is 25% of what number?	$\frac{20}{x} = \frac{25}{100}$	$x = 80$
The local weather report said that this year's 25 inches of rainfall is 20% of last year's total. What was last year's total?	25 is 20% of what number?	$\frac{25}{x} = \frac{20}{100}$	$x = 125$
Sophia got answered all the questions on the quiz correctly – even the extra credit problems. If her final score was 25 points and the quiz was worth 20 points, what was her percentage on the quiz?	25 is what percent of 20?	$\frac{25}{20} = \frac{x}{100}$	$x = 125$

Percents Matrix

Tasks Problems  	Predict the answer.	Set up the proportion to match the problem.	Solve the proportion. Show all steps.	Describe a real-life situation where you would need to solve this problem.
Find 16% of 300.				
12 is what percent of 150?				
27 is 15% of what number?				
What number is 20% of 85?				

Percents Matrix

Tasks  Problems 	Predict the answer.	Set up the proportion to match the problem.	Solve the proportion. Show all steps.	Describe a real-life situation where you would need to solve this problem.
Find 16% of 300.	Answers will vary.	$\frac{x}{300} = \frac{16}{100}$	$\frac{x}{300} = \frac{16}{100}$ $100x = 4800$ $\frac{100x}{100} = \frac{4800}{100}$ $x = 48$	Answers will vary. Example: If you take out a \$300 loan at 16% interest per year, how much interest will you owe at the end of the first year?
12 is what percent of 150?	Answers will vary.	$\frac{12}{150} = \frac{x}{100}$	$\frac{12}{150} = \frac{x}{100}$ $1200 = 150x$ $\frac{1200}{150} = \frac{150x}{150}$ $x = 8$	Answers will vary. Example: It rained 12 of the last 150 days. What percent of the days did it rain?
27 is 15% of what number?	Answers will vary.	$\frac{27}{x} = \frac{15}{100}$	$\frac{27}{x} = \frac{15}{100}$ $2700 = 15x$ $\frac{2700}{15} = \frac{15x}{15}$ $x = 180$	Answers will vary. Example: The team has lost 27 games in the last 5 years. That's 15% of the total games played. How many games have they played in the last 5 years?
What number is 20% of 85?	Answers will vary.	$\frac{x}{85} = \frac{20}{100}$	$\frac{x}{85} = \frac{20}{100}$ $100x = 1700$ $\frac{100x}{100} = \frac{1700}{100}$ $x = 17$	Answers will vary. Example: You missed 20% of the questions on the test. There were a total of 85 questions. How many questions did you miss?