Percent Equation (is/of = %/100)
MA6871

Activity Introduction

Welcome to Math News Now! Where we speak the language of numbers. Today's top story, solving percent problems. (pause) And bringing you news on finding percent, percent of, and the whole unit…

here she is viewers – she's got positivity plus, it's Saaaally Newsworth!

Direct Instruction

Thanks Shmitty. Percentages are really just a fancy form of fractions… in other words a piece of the whole. But if you stop and think about it… percentages are really great to learn about because you see them everywhere!

You see 'em when you go shopping, you hear about them in discussions about politics, you'll even see them at the grocery store! (pause) To get you thinking more about percentages, we take you now to Lord Rottington.

Model 1

Well h-he-hellooo. (pause) Alrighty! I'd say that's certainly enough small talk. We shan't dilly dally today!   Let's jump right into a problem, shall we? You can learn something from doing something!

Jolly good then, what is fifty percent of two-hundred-forty?

Now… you may recall that the word percent means out of one-hundred. So, never fret! Allow me to show you one utterly fascinating way to solve the problem.

If I make a chart to show the percents from zero to one hundred in increments of twenty-five, and then add another chart next to it, going from zero to two-hundred-forty, you can probably already guess how to solve this problem visually.

To find fifty percent of two-hundred-forty, place a red bar up to the fifty percent mark. Now, if fifty percent is half of one-hundred percent,

Finding the solution is a matter of finding the corresponding half of two-hundred-forty. And here's what we get. Fifty percent of two-hundred-forty is one-hundred-twenty.

Please indulge me whilst I explain how you can use this. First set up the one-hundred-percent grid. Next you mark the grid for twenty-five, fifty, and seventy-five percent.

Next, put your number at the top and then calculate one-fourth, one-half, and three-fourths of the number. After that you can place a bar, or just shade in, up to the appropriate percent.

This method is an easy way to find a percent of a number and I like to use it to see if my answer is reasonable. However, it isn't the most accurate. For example,

In this problem, using the grid I can tell the answer to thirty percent of sixty is slightly larger than fifteen. It could be seventeen, eighteen, or nineteen. I'm not sure. The grid doesn't give an exact number.

So, this problem requires a more accurate way to solve a percent problem. How do you do that? You set up a proportion. The saying I always use to help me set up proportions is, "is over of, equals percent over one-hundred."

So now let me show you how that applies to building a proportion out of this problem. So… what is… (spoken as an aside) I suppose a question mark should fit nicely… (pause) thirty percent (pause), you see that goes here… of sixty? (pause) which I'm plugging in over here.

Now my proportion, or problem, is something over sixty is equal to thirty over one-hundred. To solve this problem, use cross-multiplication, which looks like this. You solve what you know.

For example, I can solve (slowly) sixty multiplied by thirty, (pause) which is one-thousand, eight-hundred. Then divide the product, (pause) one-thousand, eight-hundred, by one-hundred (pause) and get eighteen. Sooo, thirty percent of sixty is eighteen.

So for an accurate answer, use proportion, and if all you need is to get a reasonable sense of the answer you can use the grid.

At this point I'd like to ask you if all of this is clear, or if you'd like Lord Rottington to explain it again.

Model 2

With more details on this story, and an additional example of how this process works, we take you back now to Lord Rottington.

Yes. I've got another example of what I'm t-t-talking about right here. What is forty percent of ninety?

Using the grid method reveals that the answer is something less than forty-five. (pause) But, I want to know the exact answer.

So, I do believe that using cross-multiplication is in order! Remember "is over of equals percent over one-hundred". So my problem as a proportion is something over ninety equals forty over one-hundred.

So, multiply ninety by forty to get three-thousand, six-hundred. Then divide that product by one-hundred to get the answer. Forty percent of ninety then, is thirty-six. Which isn't too far off, from the reasonable answer I got from the grid.

Now then. What do you think? Would you like Lord Rottington to go through all of that again for you, or are your ready to move on?

Direct Instruction

You've seen what it means to find the percent of a number…but that's only thirty-three percent of the story. For a more in-depth look at finding percent, we return you to Lord Rottington.

Model 1

When you have a problem like this: twenty-eight is what percent of one-hundred-forty; you're being asked to find the percent.

F-f-f-fear not fine student. You already have the s-s-skills. Remember this? Just like before… finding the percent is done by setting up a proportion.

So let's see what we have here… (as if he is speaking to himself) Twenty-eight is (pause) what percent (pause) of one-hundred-forty. There we are! Ready to solve the proportion using cross multiplication.

Now remember, when you use cross-multiplication, you solve what you know first. You know how to find twenty-eight multiplied by one-hundred. It's two-thousand, eight-hundred. Next you divide, two-thousand, eight-hundred divided by one-hundred-forty. After all of that, you get twenty.

Twenty-eight is twenty percent of one-hundred-forty. Of course, you could use the grid to see if your answer is reasonable. Twenty-eight is less than thirty-five, which is one-forth of one-hundred-forty. I'd say our answer is well within reason then!

(said like a Canadian) Informative stuff hey! (back to normal) would you like to watch that again, or are you good to keep going?

Model 2

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OH! I've just received word that Lord Rottington has prepared additional examples.

Here's another problem to which we can apply this method. One and twenty-six-hundredths is what percent of fourteen?

Keeping in mind that phrase that helps when setting up a proportion... We've got (Slowly) One-and-twenty-six hundredths is (pause) what percent (pause) of fourteen.

Solving what we know here, one and twenty-six-hundredths multiplied by one-hundred is one-hundred-twenty-six. Next…divide! One-hundred-twenty-six divided by fourteen is nine.

So… one and twenty-six-hundredths is nine percent of fourteen. When in doubt… just use the grid to see if your answer is reasonable.

Another excellent example from Lord Rottington. Are you ready for more, or would you like to see this example again?

Model 3

Here's Lord Rottington with yet another example.

Here's an example of the quiz variety. Which proportion can be used to find what percent of fifty is twenty? (pause) So…to identify the correct proportion, I'll kindly ask you to recall this…"is over of equals percent over one-hundred."

Well I am certainly no lazy man, but I often do the easiest task first. In the case of a multiple choice question like this, I can go ahead and eliminate any answers that don't even fit the correct formula.

Look at answer choice D. You see how the number one-hundred is not in the denominator. Well, let me tell you the second fraction will always have the number one-hundred as the denominator, so answer choice D can be crossed out.

That's all we can rule out right now, so we should look back at the problem. It's asking us what percent, yadda, yadda, yadda. That's your clue that the variable should take the place of the percent sign.

Look carefully at answer choice "B". The percent is shown as fifty… not a variable at all; and wouldn't you know it we can now eliminate answer choice "B".

Only two choices left now, so let's go back to the problem and see if we can't go on and eliminate one more!

(as if speaking to self) Hummm… of… fifty (pause) is… twenty. The number twenty should be the numerator and the number fifty should be the denominator. Answer choice "A" shows the numbers in the wrong places. Let's get rid of it! And there's the answer… "C".

Terrific! I couldn't have explained it better myself. So, if you enjoyed that so much that you'd like to see it again, let me know. If you've got the hang of this, we can move on to practice some.

Direct Instruction

We've now covered sixty-six percent of the story! For the remaining thirty-three percent, identifying the total amount when only the percentage and the percent of the number are given, here's Lord Rottington.

Model 1

Right then! So once more, I think action will speak louder then words! Allow me to walk you through a problem, and I'll explain as we go along. And by "allow me," I mean… that's what we're doing… so ready yourself!

So the problem we'll look at is as follows: fifty-four is sixty percent of what number? (awkward pause) Oh… I suppose you'd like to see what that looks like…

Here you are then. When identifying the total amount from the percentage and the percent of the number,

you'll still find that setting up the proportion is a must! (slowly as if talking to self) Fifty-four is… yes.. and… (pause) sixty percent... Good! (pause) of what number. (pause) Yes. That's how it should look.

Now, good news. At this point, you still solve the equation using cross-multiplication. Fifty-four multiplied by one-hundred is five-thousand, four-hundred. Five-thousand, four-hundred divided by sixty is ninety!

Fifty-four is sixty percent of ninety!

You can still use the grid method to visualize the problem and see if your answer is reasonable. Notice we've got the percent, sixty. We also know that fifty-four and sixty-percent are equal. So, observe… fifty-four is more than half way, which means fifty percent would be less than fifty-four.

As well… one-hundred percent, or the number we would be trying to find, if we hadn't just calculated it… would need to be less than one-hundred-eight. So the answer, ninety, should fall between fifty-four and one-hundred-eight, and it does!

How you doin' out there? Is this making sense? Ready to keep going, or would you like to hear Lord Rottington explain this again?

Model 2

As usual, Lord Rottington has prepared another example of this for today. So thorough! Here's Lord Rottington.

I'd like to see what you can learn from this story. In the flat down the street my young neighbor, Kennedy, did not want to tell her father how much money she financed to purchase the car of her dreams. So, not wanting to lie, she told her father she had a great financing plan where she would pay fifteen percent and six-thousand-three hundred dollars in interest.

Now, Kennedy's father knew if he wanted to find the purchase price of the car, he would need to calculate this. Six-thousand, three-hundred is fifteen percent of what number. The question is…How much was Kennedy's car?

The first step is to set up a proportion. (slowly) Six-thousand, three-hundred is (pause) fifteen percent (pause) of what number.

Now, solve using cross multiplication so, six-thousand, three-hundred multiplied by one-hundred is six-hundred-thirty-thousand. And then of course, divide the product by fifteen. That quotient is forty-two thousand. We end up with six-thousand, three hundred being fifteen percent of forty-two thousand.

Answering Kennedy's father's question, how much was Kennedy's car… it cost forty-two thousand dollars! I do say!!!

Hi there. Just checking in. Do you think you're all ready to give this a try, or would you like it explained for you once more?

End of Activity Review

Okay, let's step back and look over what we've learned today.

The key to success in solving a percentage problem is setting up a proportion.

You'll use this same equation when figuring out the percentage of a number (pause) finding percentage, (pause) or finding the whole number that a percentage has been taken from.

Of course because you're looking for different things, the set-up should look different, as you can see here with the placement of the variable.

The way to remember where everything goes is to use the phrase "is (pause) over of, (pause) equals percent (pause) over one-hundred."

Once you've done that, you can cross-multiply to find the answer to whatever type of problem you're trying to solve.

There's also this grid or graphic model method to use (pause) if you want to see if your answer is reasonable. (pause)

So take some time, to look over this, and make sure your story matches mine, and when you're all through let me know so we can call it a wrap and sign off.