Tutorial: Setting Up Proportions

Slide 1:

In this tutorial we will first learn how to set up proportions. We will then solve the proportions we have set up. Last, we will use what we learned to do several real life problems.

Slide 2:

Let's do a quick review of ratios. A ratio is a comparison of two quantities. It can be written as a fraction, with a colon, or with the word 'to'. For this lesson on proportions, we will use the fraction form of ratios.

Let's look at a few examples.
The ratio of boys to girls is 4 to 5. This can be written as the fraction 4 over 5. Notice that the first quantity, boys, is on the top of the fraction, and the second quantity, girls, is on the bottom of the fraction.
The ratio of cats to dogs is 2 to 11. This can be written as the fraction 2 over 11. Again, notice that the first quantity, cats, is on the top of the fraction, and the second quantity, dogs, is on the bottom of the fraction.
The ratio of US dollars to Japanese yen is 1 to .0103. This can be written as the fraction 1 over .0103. Again, notice that first quantity, dollars, is on the top of the fraction, and the second quantity, yen, is on the bottom of the fraction.

The placement in the fraction will be very important when we use proportions to solve problems.

Slide 3:

When we solve proportion problems, start by writing the fraction with words describing the quantity that is on the top and the quantity that is on the bottom.

If you are told that the ratio of sunny days to rainy days each week is 4 to 3, you can write the fraction with sunny on the top and rainy on the bottom.

If you are told that the ratio of the Chinese yuan to the US dollar is 1 to 0.1465, you can write the fraction with yuan on top and dollar on the bottom.

Slide 4:

Once we have written the fraction with words, the next step is to write the fraction with the given numbers.

If you are told that the ratio of sunny days to rainy days each week is 4 to 3, and we wrote the fraction with sunny on the top and rainy on the bottom, we can then write the fraction 4 over 3. The 4 corresponds with the number of sunny days and the 3 corresponds with the number of rainy days.

If you are told that the ratio of the Chinese yuan to the US dollar is 1 to 0.1465, and we wrote the fraction with yuan on top and dollar on the bottom, we can then write the fraction 1 over 0.1465. The 1 corresponds with the yuan and the 0.1465 corresponds with the dollar.

Slide 5:

Once we have written the fraction with words, and the fraction with the given numbers, we need to write a second fraction with the true values. This will contain a variable in place of the quantity we are trying to find.

We already set up the fractions for the sunny and rainy days. What if we are told that there were 88 sunny days and we want to find out how many rainy days there were? We would write one more fraction.

Because we are told the number of sunny days is 88, the 88 goes on the top of the fraction and the variable goes on the bottom.

We can also set up the fractions for the Chinese yuan and the US dollar. What if you have 75 US dollars and you want to know what the equivalent Chinese yuan would be. We would write one more fraction. Because we know how many US dollars you have, that amount goes on the bottom of the fraction and the variable goes on the top.

Slide 6:

The last step is to solve each proportion.

The first proportion we set up is 4 to 3 equals 88 to x. Cross multiply to get 4x equals 264, which means that x equals 66. There were 66 rainy days.

The second proportion we set up is 1 to 0.1465 equals x to 75. Cross multiply to get 75 equals 0.1465 x, which means x equals 511.95. 75 US dollars is equivalent to 511.95 Chinese yuan.

Slide 7:

Now you try. Answer each of the following questions. Click on Solution to check your work.

1. The ratio of As to Bs on the exam was 3 to 4. If 28 students scored a B, how many scored an A?

Solution: A over B equals 3 over 4 equals x over 28. Cross multiply to get 84 equals 4x. 21 equals x. 21 students got As on the exam.

2. The ratio of the South African rand to the US dollars is 1 to 0.1173. If something costs 250 rand, how much is that in US dollars?

Solution: rand over dollar equals 1 over 0.1173 equals 250 over x. cross multiply to get x equals 29.33. It is 29.33 US dollars.

Slide 8:

Remember:
Step 1: Write the fraction with words.
Step 2: Write the fraction with numbers.
Step 3: Write a second fraction with the true values. This will contain a variable. Be very careful on this step, that you write the quantities in the correct place in the fraction.
Step 4: Solve the proportions