Basic Algebra: Module 6

CANDACE CHAPPELLE: OK. Now we're working with module 6 expressions. So let's talk about evaluating an expression using the given values. So say someone gives us a times b minus 4c. And they give us that a is equal to negative 10, b is equal to 3, and c is equal to negative 3.

Since these are all equal we can just substitute the numbers in for the letters. So our expression ab minus 4c becomes a, which is negative 10 times b, which is 3, minus 4 times c, which is negative 3. And what do we have? Let's look at this first term. We have negative 10 times 3.

We know 10 times 3 is 30, and we have one negative. So we're going to have a negative 30. And then the second part of our equation, we have negative 4 times negative 3. We know that 4 times 3 is going to be 12. We have two negatives now, so we're going to add. It's going become positive 12.

So we have minus 30 plus 12, or we can rewrite that as 12 minus 30. Either way, we're going to get the same result. And we're going to be left with negative 18. So that means I'll rewrite this. ab minus 4c with a equaling negative 10, b equaling 3, and c equaling negative 3, gives us negative 18.

OK. So now let's look at simple algebraic equations. So they're basically going to say solve the equation and check your answer. So in this equation they give us 2x minus 5 and 7x plus 5. So first of all, what we want to do is we want to-- since we have an equal sign, we want to isolate everything with an x term on one side and everything without an x term on the other.

So let's subtract 2x from both sides. So now we're left with minus 5 is equal to 7x minus 2x. We have 5x plus 5. And now we want to put everything without an x on one side and everything with an x on the other. So we want to get rid of this 5 on this side.

So we just subtract 5 from both sides and we have negative 10. Should be equal to 5x. But we don't want to know what 5x is equal to. We just want to know what x is equal to. So we're going to divide both sides by 5, negative 10 divided by 5.

And remember we have that negative, but we have one of them, so our answer is going to be negative. And 10 divided by 5 is 2. So we have negative 2. Should be equal to x. So that's really fun.

And we've got negative two is equal to x, but we want to double check to make sure that this is the correct answer. So if this is correct, we should be able to plug-in that negative 2 into our original equation. And we should get some number is equal to that same number. So if we plug-in negative 2 for x-- so this is just like what we did in the first example.

And we're going to have 2x, and we're going to have 2 times x, which is negative 2, minus 5. Should be equal to 7 times x, which is negative 2, plus 5. So negative 2 times 2 is negative 4, minus 5. Should be equal to 7 times negative 2 is negative 14, plus 5 minus 4, minus 5, or minus 4 plus negative 5 is going to be negative 9. And minus 14 plus 5 is also going to be negative 9. So we know that our answer is correct. And indeed, x minus 2 does solve this expression.

OK. So now we're going to solve intermediate equations. So we're going to take example three, problem D, and we're going to solve and check our answer. So we're given x divided by 2 minus 8/5. Should be equal to 1/2 minus x/5.

And we want to figure out what x has to be in order to make this equation true. So again, we want to isolate everything with x's on one side and everything without x's on the other side. So let's add x/5 to both sides. So now we have x/2 plus x/5, minus 8/5. Should be equal to 1/2.

And again, we want to take everything that doesn't have an x and we want to put it on the other side. So let's add 8/5 to both sides. So we have x/2 plus x/5. Should be equal to 1/2 plus 8/5. Now going back to what we were talking about in module three with fractions.

It's difficult to figure out if there are two pieces here and there are five pieces, how many pieces we have. We need to cut them in the same amount of pieces. So we're going to take this x/2, and we're going to cut it 5 times the amount of times, and we're going to take this x/5 and cut it twice. So we're going to get 5x/10 because we multiply straight across when we're multiplying fractions. And we're going to add it to 2x/10.

Now we're cutting these into the same amount of pieces. So we can just add them straight together and we can understand how many pieces we have. We're going to do the same thing with just the numbers. The 1/2 is cut into halves, the 8/5 is cut into fifths. We need to figure out how many pieces we have.

So we're going to cut the 1/2 5 times the amount of times, and we're going to add it to the 8/5. And we're going to cut that 2 times the amount of times. So again, we have 5x/10 plus 2x/10. Should be equal to 5 because again, we're multiplying fractions. We multiply them straight across the numbers. 5/10 plus 8 times 2 is 16/10.

And now since we have a common denominator, we can just add these up. So 5x plus 2x is 7x. And when we're adding, we're not going to add the denominator. That's how many pieces we have. Same thing on the other side.

We're not going to add the denominator. That just stays the same. And we have 5 plus 16, which is 21. We're almost there. So we have 7x/10 equals 21/10.

Well, now we need to figure out what x is. So we need to isolate x by itself. So first of all, notice that we're dividing by 10 on both sides. So we can multiply both sides by 10 and then we no longer have to deal with fractions. So remember that 10/10 is 1.

So this side becomes just 7x, so this side just becomes 7x. And then we have 21 times 10/10. 10/10 is 1. So the 7x is equal to 21. So 7x is equal to 21. And then we want to isolate x, so we divide both sides by 7, and we get x is equal to 21 divided by 7, which is equal to 3. So x is equal to 3.

We're not quite done yet. We want to double check and make sure that x equals 3 solves our solution. So again, our original equation had x/2 minus 8/5 is equal to 1/2 minus x/5. Now we're claiming that x is equal to 3. So that means if I plug-in 3 for x, gives us 3/2 minus 8/5. Should equal to 1/2 minus 3/5.

And we want to make sure that once we do-- we want to make sure once we combine these fractions that we get the same fraction on both sides, or the same number. So again, we're cutting these in a different size pieces. So we need to cut them into the same amount of pieces to understand how many pieces we have.

So we're going to cut the 3/2 5/5 times, the 8/5, 2/2 times. So we multiply straight across, 5 times 3 is 15, 5 times 2 is 10, and we're going to subtract off 8 times 2 is 16 over 5 times 2, which is 10. We're going to do the same thing with the other side. So we're going to cut 1/2 5/5 times, and we're going to cut 3/5 2/2 times. So 5 times 1 is 5, 2 times 5 is 10, minus 3 times 2 is 6/5 times 2 is 10.

OK. So if I have 15 tenths of something and I subtract 16 tenths from it, 16 is bigger than 15, so we're going to have a negative number. So basically we're going to owe someone something. So 15 minutes 16 is negative 1. And we still have our denominator over 10.

And same thing over here. 5 minus 6. 6 is bigger than 5 and we're left with negative 1/10 and negative 1/10 is equal to negative 1/10. So that's true. So that means x equals 3 does solve our equation. And that's the end of module six.