Hi, my name is Anthony Varela. And in this tutorial, I'd like to talk about the properties and algebraic expressions. And the properties that we're going to talk about are the commutative and associative properties. Then we'll take a look at distribution and factoring. And we're going to do this using both numerical and algebraic examples.

So let's start off by talking about the commutative properties. And this applies to both addition and multiplication. Now talking about commutative property of addition, this means that I could say, for example, that 8 plus 7 is the same as 7 plus 8. With multiplication. I could say that 3 times 5 is the same as 5 times 3.

So we see that our commutative property talks about ordering of our terms or factors. It doesn't matter in which order we add or multiply. And this once again applies to addition and multiplication.

Well, the commutative property also works with algebraic expressions. So I could say that 8x plus 7x is the same as 7x plus 8x, changing that order. With multiplication, I could say that 3c times 5c is the same as 5c times 3c.

So now let's take a look at where we can apply the commutative property to simplify. So here, we have 4x plus 6 plus 3x. So all of these terms are being added.

So our communicative property allows us to add in any order we wish. So you might want to then rewrite this so you have two like terms that are close to each other. So that might prompt you to recognize that you can combine these two like terms to get 7x plus 6.

Now let's talk about the associative properties, which also apply to addition and multiplication. So our associative properties says, with addition, we could say that the quantity 5 plus 3 plus 7 is the same as 5 plus the quantity 3 plus 7. So you've noticed that I've grouped my terms differently on both sides of the equation, but they're still equal.

An example with multiplication would be the quantity 7 times 2 being multiplied by 4 is the same as 7 being multiplied by the quantity 2 times 4. So with the associative property, this involves how you group. And this works with addition and multiplication.

Well, this also works with algebraic expressions. So an example with addition would be 5 plus 3x plus 7x is the same as 5 plus the quantity 3x plus 7x. With multiplication, I could say that the quantity 7y times two being multiplied by 4y is the same as 7y being multiplied by the quantity 2 times 4y.

So where the associative property then might come in handy-- let's say we have this expression. The quantity 6x squared plus 2x. And then we're adding to that 3x. Well, we can regroup these terms so that you have your like terms grouped together. So evaluating this or simplifying this using the order of operations would prompt you to combine your like terms first. You would have 6x squared plus 5x.

So now let's talk about distribution. And the whole idea behind distribution is that we distribute an outside factor into a sum. So let's take a look at distribution with a numerical example and an algebraic example.

So here's our numerical example of 7 being multiplied by the quantity 3 plus 2. And what we do is we take that outside factor 7 and distribute or multiply it by 3 and 2. So we have 7 times 3.

And then we have 7 times 2. So this would give us 21 plus 14, which is 35. And we can see that that's true just by adding 3 and 2, which is 5 and multiplying by 7 to get 35.

So really, the power of distribution really comes to light in an algebraic example. So let's take a look at that. Here we have 3 times the quantity 5x minus 4. So what we're going to do is distribute the outside factor 3. So I multiply three by 5x. And then I multiply 3 by negative 4. Or I can think of this as subtracting a 3 times a positive 4.

And now 3 times 5x is 15x. And 3 times 4 is 12. So I can simplify that there. So distribution, we take an outside factor and distribute it into all of these terms of a sum.

Well, now I'd like to talk about basic factoring. And you can think of factoring as the reverse process of distribution. So once again, let's take a look at a numerical example and an algebraic example.

So here, I have 24 plus 18. And it seems a bit silly to factor anything out. But once again, you're really going to see the power of basic factoring in the algebraic example.

But thinking about factors of 24 and factors of 18, I'd like to factor out a common factor. So I can think of 24 as being 6 times 4. And I could think of 18 as being 6 times 3 because both 24 and 18 have a factor of 6.

Well, now because they both have a factor of 6, I can factor that out. It's like doing distribution backwards. So I'm writing this as 6 times 4 plus 3. Taking out the 6 in both of these terms, and I have my 4 plus 3.

So let's take a look at this algebraically. See where I have 12x plus 9. So how am I going to factor this? Well, think about all of the factors of 12 and all of the factors of 9 and pick out their greatest common factor.

So factors of 12 would be 1, 2, 3, 4, 6, and 12. Factors of 9 would be 1, 3, and 9. So the greatest common factor is 3. So I'm going to factor that out. So 12x equals 3 times 4x. And 9 equals 3 times 3.

So here, I can see they're common factors of 3. So I'm going to pull that out. And I have 3 times 4x plus 3. So factoring can be thought of as the reverse process of distribution, identifying a common factor and then factoring it out.

So let's review properties and algebraic expressions. We looked at the commutative property, which deals with how you order. And this applies to addition and multiplication. The associative property deals with grouping. And this also applies to addition and multiplication.

Then we talked about distribution where we have an outside factor and distributed to everything in a sum that's being multiplied by that factor. And then we talked about factoring, which is that the reverse process of distribution where I identify a common factor that you can factor out. Well, thanks for watching this tutorial on the properties and algebraic expressions. Hope to see you next time.