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Mon, 11/22 4:10PM 8:45

SUMMARY KEYWORDS

squared, factor, expressions, negative, notice, factoring, equal, write, 6a, multiply, identity, put, simplify, rewrite, brackets, terms, fractions, negative $2x$, remember, relies

SPEAKERS

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In this video, we're going to look at simplifying expressions, algebraic expressions, and we're going to use factoring to do that. It's important to be able to factor because often getting an important theoretical result in Business and Economics relies on making the mathematics as simple as possible. Let's take a look at some more complicated expressions, we want to factor these expressions and then write them in the simplest form possible. So let's start by taking a look at this top one. Notice that it has some common features in both terms, there's two terms. So we've got a term here, and we have a term over there. And they have a common factor. One common factor is this one plus D . And they have a second common factor, which is this Z , or Z .

And so let's start off by factoring out the one plus D . So to do that, I'll write one plus D , and I'll put brackets around it, just like the brackets are on the left hand side. And I'll multiply it by what's left. After we factor out the one plus D , we've got a Z , plus a Z times D , like so. Now, we can keep going. So let's factor out the Z . I've got one plus D , multiplied by one plus D . And I kind of kind of forgot my Z here. So let me go back to the beginning of the expression, and I'll put a Z right there. And, you know, if we want to simplify this thing and make it look nice, we can notice that we've got one plus D times one plus D . And so we could rewrite this as Z one plus D squared. And we got a nicer expression out of this than we started with when we had two terms. Now we've simplified it and shrunk it down.

Now let's take a look at this question right here. So we can see that we've got some sort of, there's something common about the X 's. And the two is definitely a factor of the four. So we could rewrite this as $2X$ to the power of negative 2 plus $2D$, X to the power of negative three. Now, we can't do too much about this $2D$ over here. But we can do something about the X to the negative three. What if we factor out X to the negative three? Well, what's going to happen? Well, we can write this in a couple of different ways. One, we could take a negative $2X$ to the power of negative 2, that would leave us with a one inside the bracket plus $2DX$ to the negative one. So we could write it like that. But generally, we don't like negative exponents, right? Remember, negative remember, X to the negative one is equal to one over X . And it's a little bit awkward to have two fractions floating around in our answer, right, because of course, X to the negative 2 is going to be equal to one over X squared. So we can simplify this better if we factor out the entire X to the negative three. And we can write that as

$2X$ to the power of negative three times X plus $2D$, like so. And if you factor through, notice that notice that X to the power of negative three times X to the one is equal to X minus three plus one, which is going to be equal to X to the power of negative 2. Oh, and my bad I absent mindedly put that X in there of course, that X shouldn't be there at all. But there should be a D .

Now we can also factor using the identities that I encourage you to memorize. Take a look at the first example we have here. $36A$ squared minus one probably are, it's very likely that to you, it doesn't seem like this is possible to factor. But remember that one of our identities said that if we had A minus B times A plus B , that would just be equal to A squared minus B squared. And so we've got A minus here. So we're, we're partway there. And notice also that one times negative one, is equal to negative one. So it's, even though it's just the one there, it's actually possible to multiply to multiply it in a way such that we can still factor this thing. Now also notice that 36 is equal to six squared. And of course, a two, a squared is equal to A times A . So it looks like we've got everything we need to apply this identity up here. And so according to that identity, we should have $6A$ minus one, times $6A$ plus one is equal to $36A$ squared minus one.

If we want a little proof, or we want to convince ourselves that this is true, we can expand this proof and just expand the above to convince ourselves that it's true. And we get, you know, we're going to use FOIL. So we start with the first, we get $36A$ squared plus $6A$, $6A$ times one, minus $6A$ times one, or plus $6A$ times negative one, minus one. And notice that these two terms are going to cancel out, because this is a negative one. That's a little hard to see. And we get $36A$ squared minus one. Taking a look at this problem down here, there is an identity and the identity is that A plus B squared is equal to A squared plus $2AB$ plus B squared. Now we've got X 's and Y 's. And we've got some numbers. So it's not so clear, but why don't we start factoring here. So notice, we can factor out a four. So if we factor out a four, we get X squared plus $2XY$ plus Y squared in the form that we're looking for. They've got the A squared, the X squared, the B squared, the Y squared, and the $2AB$ and the $2AB$. So we can write this as $4X$ plus Y squared. And if you want to see and make sure that that's true, then you can expand this and show that if you expanded you're going to end up with what we started with.