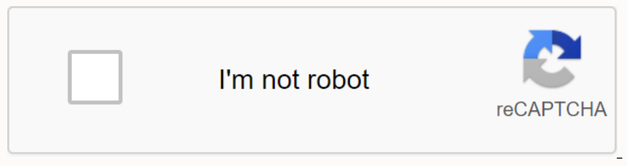

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What is an extraneous solution in absolute value

Now let's start with the part of Advanced Algebra, such a grab bag of advanced themes algebra. The first thing we talk about is the equations of absolute value. Remember what we said about absolute value in positive and negative numbers-II arithmetic and fraction module. If you haven't seen this module yet, you haven't seen this lesson, I'd recommend looking at it for the first time and be happy about the absolute value before we review all the information in this lesson. So, we're going to start with a simple observation, like. Absolute value positive 5, of course, it is positive 5, absolute value negative 5 ir course positive 5. Therefore, whether these equations have an absolute value of 5 equals x or an absolute value of 5 equals x would be one solution x equals 5. These are not very interesting equations, it is not very interesting if there are no variables inside the absolute value. It becomes more interesting when we put variables inside the absolute value. So the absolute value x equals 5. Think about it. There are two solutions to this. Positive 5 or negative 5, x can be one of these values. And it's similar to how the rectangular equation has two solutions. So, this is another category of algebra equations that can have two solutions. Let's say an expression that is not x is in absolute value. For example, an absolute value of 2x plus 3. And anything that equals five. Of course, if all this expression has an absolute value of 5, there are only two options. Is the expression on equals 5 or negative 5. So it's very much the same approach. We set this expression to 5 and set it negative to 5, and of course it relates to the word or. And remember, in exactly the same way as a square, this word or is a mathematical object, it's not a piece of garnish, it's a necessary part of the problem. So we solve equations individually and x equals 1 or x equals negative 4. And these are two options. By generalization, we can say that if E is any algebraic expression and k is a positive number, then the absolute value of the equation E is equal to k, the solutions E is equal to a positive k or E equals a negative k. I should hurry to add here this note I use the E expression i just compiled it up on this page. It's not a general, a general indication that you're seeing somewhere else. I'm just using it here in a short hand. The idea is that we could put any expression in absolute values, and then whatever it is equal, regardless of the absolute value equal, the expression itself would be equal to the positive or negative of the same value. Note that if the absolute value is not on one side, you need to isolate it before we can break it into two or equation. There's a practice problem. Stop the video, and then Tell me about it. So, of course, we must first isolate absolute values. We're divorcing on 1 January. If we separate one, we'll be ready. It breaks into two equations. Solve each equation one by one, please part with 3. And we get x equals positive two thirds or x equals negative 2. And these are two solutions. What if the absolute value of an expression is not equal to a single number, but in another expression? Now we're actually getting into the territory that the tests are really asking us to do. We still follow the same plan, so the absolute value of something equals anything else. This means that the absolute value A is either positive B or negative B. Thus, it is equal to either an expression on the other side or an expression on the other side with a negative sign in front of it. Sometimes it gives us side-by-side solutions. Solutions that are correctly derived from mathematics but that do not work in the original equation. We're going to have to go over every piece. So it's a strange thing about absolute equations. And we'll see it again much later when we talk about square roots too, so we can get sided solutions. That means we have to check our work, check the answers we find. So here's the practice question. Stop the video and then we'll talk about it. Okay, this one absolute value is already isolated so we can break it right away or into the equation. So we say that the thing inside the absolute value of 1 plus 2x either equals that expression 4 minus x or equals the expression negative sign in front of it. And of course, by placing a negative sign in front of subtraction just cancels orders, subtraction becomes x minus 4. So the first thing we do is get all the X's in every equation. Then subtract 1 and isolate x and then divide. And we get solutions x equals 1 and x equals negative 5. Now we're not done here. We did the right math, so these two solutions rightly stem from mathematics. But we don't know if they actually satisfy the original equation. So we have to check. So x equals 1, I connect it to the left side, I get 3, I connect it to the right side, I get 3. So it works. Negative 5, I'll connect it to the left side, I'll get 9, I'll connect it to the right side, I'll get 9. So it works, too. So both answers work here. So here we have two valid solutions to the equation. Here's the practice question. Stop the video, work on it, and then we'll talk about it. Okay, again, the absolute value is isolated. So we can go straight or into the equation. So the thing inside x plus 4, which is either going to equal expression or equal to the expression multiplied by the negative sign. So the first thing we do is get all the x's on one side. Then we subtract to isolate x and we can either x equals 1, or x equals negative 1.5, or three halves. Now let's turn them on and check them out. These are our two solutions. Positive One, if we connect it to the left side, we'll get 5. If we connect to the right, we'll get to the 5th. This check, that's perfectly good. Negative 1.5, if we connect it to the left side, we get 2.5. If we connect it to the right side, we get a negative 2.5. So it's not working. It gives a different value on the right and left side when we connect. So it does not work, and this equation has only one solution, x equals 1. Here's another practice question. Stop the video and then we'll talk about it. So we can go straight to or in the equation, thing inside, 2x plus 5 either equals x plus 1 or equals x plus 1 multiplied by negative sign. We're going to put the Xs to one, we're going to split the 5. And we have to split 3 in the second equation. So we can, x equals negative 4, or x equals negative 2. So these are our roots. So we need to check these roots now. Check first, x equals negative 4. If we combine x plus 1, we get a negative 3. It's a negative number. So we don't even have to plug-in, in absolute terms, because we know that the absolute value can't be an output that's negative. So that answer doesn't work. Now we're checking the negative 2. If we connect it to the right side, we get a negative number. So it also doesn't work for the same reason. We can't have an output absolute value equal to a negative number. So both answers stemmed from the correct math we followed all the steps in mathematics correctly. But they're both remote roots. Algebra makes us think that these may be solutions, but it turns out that they don't really work when we connect them to the original equation. So, so our roots here have extraneous roots, and what it means, we have an equation at the top that is not the solution. In conclusion, we solve the absolute value of the equation A equals B by dividing it into two equations. A equals B or A equals negative B. Remember, we need to isolate the absolute value before we can divide it into two or equation. When we solve the answers, we need to verify that every running in the original equation in this way eliminates the extraneous roots. Page 2 This video is only available to Magoosh GRE premium users. To access our full library of over 250 Magoosh GRE lessons, sign up for Magoosh GRE today. Solve the equation. Check the side effects. 100% reviews = 28 Absolute value is away from scratch. 100% reviews = 28 4x = 28 or 4x = -28 {two digits that are 28 from zero is 28 and -28} x = 7 or x = -7 {divided on either side44} Check. If he's doing the wrong data, it's a remote solution. Check7: |4(7)| 28 |28| = 28 {multiplied} 28 = 28 {true statement, so 7 is not remote} Check -7: |4(-7)| 28 |-28| = 28 {multiplied} 28 28 {true statement, so -7 is not remote} - Algebra House House