Solving a Quadratic Equation
Transcript

Jeff: For this one, the reason we didn't want to expand is, I mean, why would you want a squared there when you're looking for x? But if you expand 2 minus, $(2x - 1)^2$ in an area map like so, like the first, second group did, you get 4x squared minus 4x plus 1. Set that equal to 10 minus 4x. Then you can add 4x to both sides. You get 4x squared plus 1 equals 10. Subtract 1 from both sides. Then you can just square root both sides. The square root of 4x squared is just 2x, and the square root of 9 is 3. And then you just get x is 1.5.

Teacher: Ok. Thank you.

Student: That makes sense.

Teacher: That makes sense, huh? Yes sir.

Ian: Uh, actually I kinda remember, uh, when we square root things and we're finding x's there was something about, like, plus or minus. And because there was x squared, it would be plus or minus that.

Jeff: Yeah that could be a positive or a negative is what he's saying. This is squared.

Teacher: I'm com— I'm not really sure— (to Jeff) can you put that up? Ian maybe you can be a little bit more specific as to what you're saying here.

Ian: Cause when they square rooted that—

Teacher: Uh, huh.

Ian: Uh, [Inaudible] I remember something about you have to, have to do like plus or minus on one side 'cause--

Jeff: You, you're saying that 2x could also be negative 3 because if you square it it also comes out to be 9?

Teacher: Hmm.

Ian: Like x could be positive or negative.

Teacher: How, how could— Ah, wait. You've shown that 2x equals 3 here. And, and so what you're claiming is that 2x can also equal negative 3?

Students: Yes.

Damien: But wouldn't that, uh, wouldn't that work both ways? Well, like, if it's plus or minus for whatever is being square rooted and it's plus or minus on that side it would have to

be plus or minus on that side, too. But then if both sides plus or minus they kind of cancel out when we divide three by 2.

Teacher: Hmm.

Luke: Um, I don't know if this is relevant but doesn't square rooting before dividing by 4 go against the reverse order of operations?

Teacher: So you're, you're posing a separate question right now. Uh, maybe we can answer that right now, too. Um, have we violated the order of operations here in these steps?

Student: Yes.

Student: Wouldn't you divide by 4 first?

Teacher: Hmm.

Nina: Well, isn't the whole point to get rid of the squared? And so—

Student: Point? No.

Nina: You'd have to get—

Jason: You'd still get the same thing.

Teacher: Damien?

Damien: Well, would it really matter if you divided by... well dividing by 4 first wouldn't... doesn't really have a point, like isn't it just if you do something to one side, you do the exact same thing to the other side to make both sides equal.

Teacher: Um-hum.

Damien: So if you do it like, we'll just say we were to multiply one side by -1 we multiply the other side by -1, too. So in this case we square rooted one side, so by square rooting the other side, would it really matter even if we did that earlier because, so long, cause, uh, so long as we did it, made it equal it wouldn't really matter what time it comes in.

Teacher: Ok. We got two really interesting questions out here. Let me, let me clarify... the first question- well the second question that Luke posed is: Is this the correct order to solve this equation...uh, of operations? The first question that's out there is: Is, is there another solution? Let's take two minutes with your groups to address those two questions.

[2 MINUTE BREAK]

Teacher: Uh, alrighty, um, the first question... or the second, let's go with the second question first. With, with regards to, is the order of operations, did we see it correctly? Or not? Who's got a, a position on that? Quinn.

Quinn: I think that technically we did violate them, but it doesn't matter because, uh, if you divided by 4 first then 9 divided by 4 is 2.25 and the square root of that is 1.5. It's the same thing.

Luke: But this is only a specific example, where it's one of the exceptions. If we did a different problem, like would it work for all problems in general?

Quinn: Maybe.

Teacher: Hmm, interesting question. Corinne?

Corinne: [Inaudible] said that for this one it didn't matter. He was just saying, like, we violated it but in this exact problem it doesn't matter, so--

Teacher: Interesting. Uh, Nina and then Joe.

Nina: Well, if it doesn't matter, I feel like, just to keep tradition or just to make it so we don't mess it up if we're in a different problem that it does matter in, you should stick to order of operations. I mean, the answer's still going to be the same, but it's probably a better method.

Teacher: Okay. Interesting. Joe?

Joe: Um, well, if you square something, it's just multiplying it by itself twice so in, in the [Inaudible] it's still a form of multiplication. So it doesn't really matter which one you do first, squaring or division because it's all under the same [Inaudible]. So you just like prefer to get rid of the square first, because it makes things easier in some ways.

Teacher: Interesting. Ok that's good. Um, so it doesn't matter for this particular problem. It's an interesting explanation you gave, Joe. How about the other issue? Is there actually another solution? Becky.

Becky: Um, I substituted negative 1.5 and 1.5 back in the problem and they both worked out.

Teacher: Ah. Nina?

Nina: If you think about it like a graph. It's like, since this is sort of a quadratic equation, it might be, I'm just not really sure, but if it's a parabola (motions and traces out a parabola that opens downward) in a parabolic shape, then it's symmetrical. So you're gonna have the same point, like, not the same point, but if it's 1.5 over here there's going to be a negative 1.5 over here that corresponds to the same value.

Teacher: Uh huh. Joe?

Joe: No, it, it is a quadratic equation.

Teacher: Ah.

Joe: If you take—

94 Teacher: How do you know it's a quadratic?

95 Joe: Because of the square.

96 Teacher: Ahh, right.