## Lesson 16: Solving Quadratics

* Let’s solve quadratic equations.

### 16.1: Find the Perfect Squares

The expression is equivalent to . Which expressions are equivalent to for some number ?

### 16.2: Different Ways to Solve It

Elena and Han solved the equation  in different ways.

Elena said, “First I added 2 to each side:

So that tells me:

I can find the square roots of both sides:

Which is the same as:

So the two solutions are and .”

Han said, “I used the quadratic formula:

Since , that means , , and . I know:

or

So:

I think the solutions are and .”

Do you agree with either of them? Explain your reasoning.

#### Are you ready for more?

Under what circumstances would solving an equation of the form lead to a solution that doesn’t involve fractions?

### 16.3: Solve These Ones

Solve each quadratic equation with the method of your choice. Be prepared to compare your approach with a partner‘s.

### Lesson 16 Summary

Consider the quadratic equation:

It is often most efficient to solve equations like this by completing the square. To complete the square, note that the perfect square is equal to . Compare the coefficients of in to our expression to see that we want , or just . This means the perfect square is equal to , so adding to each side of our equation will give us a perfect square.

The two numbers that square to make are and , so:

which means the two solutions are:

Other times, it is most efficient to use the quadratic formula. Look at the quadratic equation:

We could divide each side by 3 and then complete the square like before, but the equation would get even messier and the chance of making a mistake might be higher. With messier equations like this, it is often most efficient to use the quadratic formula:

To use this formula, we first need to put the equation in standard form and identify , , and . Rearranging, we get:

so , , and . We have to be careful to pay attention to the negative signs. Using the quadratic formula, we get:

Evaluating these solutions with a calculator gives decimal approximations -0.281 and 0.948.



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