## Lesson 14: Completing the Square (Part 3)

* Let’s complete the square for some more complicated expressions.

### 14.1: Perfect Squares in Two Forms

Elena says, “ can be expanded into . Likewise, can be expanded into .”

Find an error in Elena’s statement and correct the error. Show your reasoning.

### 14.2: Perfect in A Different Way

1. Write each expression in standard form:
2. Decide if each expression is a perfect square. If so, write an equivalent expression of the form . If not, suggest one change to turn it into a perfect square.

### 14.3: When All the Stars Align

1. Find the value of to make each expression in the left column a perfect square in standard form. Then, write an equivalent expression in the form of squared factors. In the last row, write your own pair of equivalent expressions.

|  |  |
| --- | --- |
| * standard form | * squared factors |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

1. Solve each equation by completing the square:

### 14.4: Putting Stars into Alignment

Here are three methods for solving .

Try to make sense of each method.

Method 1:

Method 2:

Method 3:

Once you understand the methods, use each method at least one time to solve these equations.

#### Are you ready for more?

Find the solutions to . Explain your reasoning.

### Lesson 14 Summary

In earlier lessons, we worked with perfect squares such as and . We learned that their equivalent expressions in standard form follow a predictable pattern:

* In general, can be written as .
* If a quadratic expression is of the form , and the value of is 1, then the value of is , and the value of is for some value of .

In this lesson, the variable in the factors being squared had a coefficient other than 1, for example and . Their equivalent expression in standard form also followed the same pattern we saw earlier.

|  |  |
| --- | --- |
| squared factors | standard form |
|  |  |
|  |  |

In general, can be written as:

or

If a quadratic expression is of the form , then:

* the value of is
* the value of is
* the value of is

We can use this pattern to help us complete the square and solve equations when the squared term has a coefficient other than 1—for example: .

What constant term can we add to make the expression on the left of the equal sign a perfect square? And how do we write this expression as squared factors?

* 16 is , so the squared factors could be .
* 40 is equal to , so or . This means that .
* If is , then or .
* So the expression is a perfect square and is equivalent to .

Let’s solve the equation by completing the square!

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