

## Topic 2.5: Completing the Square

Essential Question:

*How can you solve a quadratic equation by completing the square?*

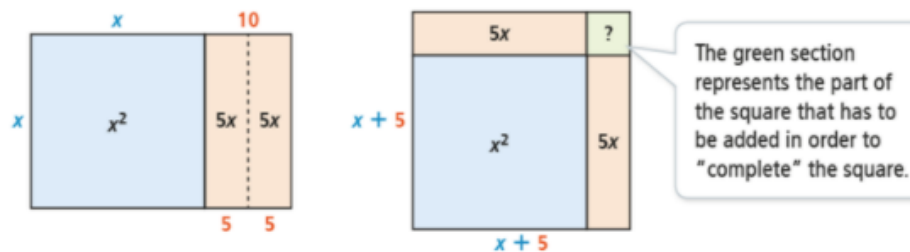
### Critique & Explain

Please complete the Critique & Explain online.

### CONCEPT Summary

#### Key Features of Completing the Square

**GEOMETRIC MODEL** The rectangles showing  $x^2 + 10x$  are arranged into a square.



The square has side length  $x + 5$ , so the number needed to complete the square is 25.

**ALGEBRAIC MODEL** The number needed to complete the square is half the coefficient of the middle term, squared: the middle term coefficient is 10, half of 10 is 5, and  $5^2 = 25$ .

To solve  $x^2 + 10x = 3$ , add 25 to both sides of the equation, take the square root of both sides and solve for  $x$ :

$$\begin{aligned}x^2 + 10x + 25 &= 3 + 25 \\(x + 5)^2 &= 28 \\x + 5 &= \pm 2\sqrt{7} \\x &= -5 \pm 2\sqrt{7}\end{aligned}$$

Notes:

## Examples & Questions

### Examples 1

Q: Why do you use absolute value in the solution process?

### Examples 2

Q: How does the diagram help you visualize completing the squares?

Q: Why is 16 added to each side of the equation?

Q: Why is completing the square useful?

### Examples 3

Q: How do you know that you need to complete the square to solve the equation?

Q: How could you check to make sure you completed the square correctly?

Q: What types of solutions does this equation have? Explain.

### Examples 4

Q: How are the formulas for the perimeter and the area of a rectangle related?

Q: Could the formula for perimeter  $l$  have been solved for  $w$  rather than for  $w$ ?

Q: Why are there two values for the length of the pen?

### Examples 5

Q: How do you know if the function will have a minimum or maximum value?

Q: Why was  $2(6.25)$  subtracted from the left side?

## Practice and Problem Solving

Complete MathXL for School: Additional Practice (online)

Complete MathXL for School: Enrichment (online)

Challenge: #14, 15, 16, 54 – key will be posted in Power School Learning.

## Lesson Quiz 2.5