

5.16

Completing the Square

• Example 1

(a) Find the term that should be added to $x^2 + 4x$ so that the expression is a perfect-square trinomial.

To complete the square of $x^2 + 4x$, add the square of one-half of 4 (the x -coefficient).

$$x^2 + 4x + \left(\frac{1}{2} \cdot 4\right)^2 \quad \text{or} \quad x^2 + 4x + 2^2 \quad \text{or} \quad x^2 + 4x + 4$$

The trinomial $x^2 + 4x + 4$ is a perfect square because

$$x^2 + 4x + 4 = (x + 2)^2$$

(b) Find the term that should be added to $x^2 - 10x$ so that the expression is a perfect-square trinomial.

To complete the square of $x^2 - 10x$, add the square of one-half of -10 (the x -coefficient).

$$x^2 - 10x + \left[\frac{1}{2}(-10)\right]^2 \quad \text{or} \quad x^2 - 10x + (-5)^2 \quad \text{or} \quad x^2 - 10x + 25$$

Check for yourself, by factoring, that this is a perfect-square trinomial.

● ● ● CHECK YOURSELF 1

Complete the square and factor.

a. $x^2 + 2x$

b. $x^2 - 12x$

● ● ● CHECK YOURSELF ANSWER

1. (a) $x^2 + 2x + 1 = (x + 1)^2$; (b) $x^2 - 12x + 36 = (x - 6)^2$.

5.16 Exercises

Name _____

Section _____

Date _____

A N S W E R S

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Find the constant term that should be added to make each of the following expressions a perfect-square trinomial.

1. $x^2 + 6x$

2. $x^2 - 8x$

3. $x^2 - 10x$

4. $x^2 + 5x$

5. $x^2 + 9x$

6. $x^2 - 20x$

7. $x^2 - 14x$

8. $x^2 + 24x$

9. $x^2 - 7x$

10. $x^2 - 18x$