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10-3 Study Guide and Intervention *(continued)*

Solving Quadratic Equations by Completing the Square

Complete the Square Since few quadratic expressions are perfect square trinomials, the method of **completing the square** can be used to solve some quadratic equations. Use the following steps to complete the square for a quadratic expression of the form $ax^2 + bx$.

Step 1	Find $\frac{b}{2}$.
Step 2	Find $\left(\frac{b}{2}\right)^2$.
Step 3	Add $\left(\frac{b}{2}\right)^2$ to $ax^2 + bx$.

Example **Solve $x^2 + 6x + 3 = 10$ by completing the square.**

$x^2 + 6x + 3 = 10$	Original equation
$x^2 + 6x + 3 - 3 = 10 - 3$	Subtract 3 from each side.
$x^2 + 6x = 7$	Simplify.
$x^2 + 6x + 9 = 7 + 9$	Since $\left(\frac{6}{2}\right)^2 = 9$, add 9 to each side.
$(x + 3)^2 = 16$	Factor $x^2 + 6x + 9$.
$x + 3 = \pm 4$	Take the square root of each side.
$x = -3 \pm 4$	Simplify.

$x = -3 + 4$ or $x = -3 - 4$
$= 1$ $= -7$

The solution set is $\{-7, 1\}$.

Exercises

Solve each equation by completing the square. Round to the nearest tenth if necessary.

1. $t^2 - 4t + 3 = 0$

2. $y^2 + 10y = -9$

3. $y^2 - 8y - 9 = 0$

4. $x^2 - 6x = 16$

5. $p^2 - 4p - 5 = 0$

6. $x^2 - 12x = 9$

7. $c^2 + 8c = 20$

8. $p^2 = 2p + 1$

9. $x^2 + 20x + 11 = -8$

10. $x^2 - 1 = 5x$

11. $a^2 = 22a + 23$

12. $m^2 - 8m = -7$

13. $x^2 + 10x = 24$

14. $a^2 - 18a = 19$

15. $b^2 + 16b = -16$

16. $4x^2 = 24 + 4x$

17. $2m^2 + 4m + 2 = 8$

18. $4k^2 = 40k + 44$

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10-3 Skills Practice

Solving Quadratic Equations by Completing the Square

Solve each equation by taking the square root of each side. Round to the nearest tenth if necessary.

1. $c^2 - 12c + 36 = 4$

2. $w^2 - 10w + 25 = 16$

3. $b^2 + 16b + 64 = 9$

4. $y^2 + 2y + 1 = 3$

5. $r^2 + 4r + 4 = 7$

6. $a^2 - 8a + 16 = 12$

Find the value of c that makes each trinomial a perfect square.

7. $g^2 + 6g + c$

8. $y^2 + 4y + c$

9. $a^2 - 14a + c$

10. $n^2 - 2n + c$

11. $s^2 - 18s + c$

12. $p^2 + 20p + c$

Solve each equation by completing the square. Round to the nearest tenth if necessary.

13. $x^2 + 4x - 12 = 0$

14. $v^2 - 8v + 15 = 0$

15. $q^2 + 6q = 7$

16. $r^2 - 2r = 15$

17. $m^2 - 14m + 30 = 6$

18. $b^2 + 12b + 21 = 10$

19. $z^2 - 4z + 1 = 0$

20. $y^2 - 6y + 4 = 0$

21. $r^2 - 8r + 10 = 0$

22. $p^2 - 2p = 5$

23. $2a^2 + 20a = -2$

24. $0.5g^2 + 8g = -7$

Lesson 10-3