ALBERT

Name _____ Date _____

Completing the Square Worksheet

Algebra 1 · Common Core HSA-REI.B.4a

> Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

Practice

Builds the skill step by step.

1. What number completes the square: $x^2 + 6x + ___$?

2. What number completes the square: $x^2 - 10x + ___$?

3. $x^2 + 8x + 16 = (x + n)^2$. What is n?

4. To solve $x^2 + 6x = 7$, add 9 to both sides. Which equation do you get?

   A. $(x + 6)^2 = 16$

   B. $(x + 3)^2 = 7$

   C. $(x + 3)^2 = 13$

   D. $(x + 3)^2 = 16$

5. Solve $(x + 3)^2 = 16$.

6. Solve $x^2 - 4x = 5$ by completing the square.

7. To complete the square in $x^2 + bx$, what do you add?

   A. $(\frac{b}{2})^2$

   B. b^2

   C. $\frac{b}{2}$

   D. $2b$

8. Write $x^2 - 2x - 8 = 0$ in the form $(x - p)^2 = q$. What are p and q?

9. Solve $x^2 + 2x - 3 = 0$ by completing the square.

10. What number completes the square: $x^2 + 12x + ___$?

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On Level

Grade-level practice.

1. Solve $x^2 + 10x + 9 = 0$ by completing the square.

2. Write $x^2 - 6x + 2 = 0$ in the form $(x - p)^2 = q$. What are p and q?

3. What are the solutions of $x^2 - 6x + 2 = 0$?

   A. $x = 3 \pm 7$

   B. $x = 3 \pm \sqrt{7}$

   C. $x = -3 \pm \sqrt{7}$

   D. $x = 6 \pm \sqrt{7}$

4. Solve $2x^2 + 8x - 10 = 0$ by completing the square.

5. What number completes the square: $x^2 + 5x + ___$?

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

7. What is the best first step to complete the square in $3x^2 + 12x = 15$?

   A. Add 36 to both sides.

   B. Add 4 to both sides.

   C. Divide every term by 3.

   D. Take the square root of both sides.

8. Write $x^2 + 8x + 20 = 0$ in the form $(x - p)^2 = q$. What are p and q?

9. An equation becomes $(x + 4)^2 = -4$. What does this tell you?

   A. It has exactly one real solution.

   B. It has no real solutions, because a square can't be negative.

   C. It has two real solutions.

   D. Its solution is $x = -4$.

10. Solve $x^2 - 2x - 1 = 0$ by completing the square. Round to the nearest hundredth.

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Challenge

Multi-step and word problems that stretch it.

1. To derive the quadratic formula from $ax^2 + bx + c = 0$ ($a \neq 0$), what is the first step?

   A. Divide every term by a: $x^2 + \frac{b}{a}x + \frac{c}{a} = 0$

   B. Subtract bx from both sides

   C. Take the square root of both sides

   D. Add b^2 to both sides

2. Next, $x^2 + \frac{b}{a}x = -\frac{c}{a}$. What do you add to both sides to complete the square?

   A. $\frac{b}{2a}$

   B. $\frac{b^2}{a^2}$

   C. $\frac{b^2}{4a^2}$

   D. $\frac{b^2}{4a}$

3. After completing the square, $(x + \frac{b}{2a})^2$ equals which expression?

   A. $\frac{b^2 - 4ac}{2a}$

   B. $\frac{b^2 - 4ac}{4a}$

   C. $\frac{b^2 + 4ac}{4a^2}$

   D. $\frac{b^2 - 4ac}{4a^2}$

4. Use the quadratic formula to solve $x^2 - 6x + 5 = 0$.

5. What is the value of $b^2 - 4ac$ for $2x^2 + 3x - 2 = 0$?

6. Solve $2x^2 + 3x - 2 = 0$ with the quadratic formula.

7. Ray completes the square on $x^2 + 6x = 4$ and writes $(x + 3)^2 = 4$. What is his mistake?

   A. He made no mistake.

   B. He added 9 to the left side but not to the right side.

   C. He should have written $(x + 6)^2$.

   D. He should have added 3 to both sides.

8. Write $4x^2 - 8x - 5 = 0$ in the form $(x - p)^2 = q$. What are p and q?

9. Solve $4x^2 - 8x - 5 = 0$.

10. For which value of c does $x^2 + 6x + c = 0$ have exactly one solution?

    A. 36

    B. 3

    C. 0

    D. 9