NAME Answer Key DATE _____ PERIOD _____

3.5 Solving Quadratic Equations by Completing the Square ▪ Form A

All work must be completed, clearly, on a separate page. Circle/Box final answers only on WS. No work = No credit.

Exampled 1-3

Solve each equation by using the Square Root Property.

1. $x^2 + 20x + 100 = 64$

$\{-18, -2\}$

2. $4x^2 + 4x + 1 = 16$

$\{-2.5, 1.5\}$

3. $16x^2 + 24x + 9 = 81$

$\{-3, 1.5\}$

4. $25x^2 + 40x + 16 = 28$

$\{-\frac{4}{5} \pm \frac{2\sqrt{7}}{5}\}$

5. $36x^2 + 48x + 16 = 12$

$\{-\frac{2}{3} \pm \frac{\sqrt{3}}{3}\}$

6. $4x^2 - 20x + 25 = 32$

$\{5/2 \pm 2\sqrt{2}\}$

7. $2x^2 - 24x + 72 = -162$

$\{6 \pm 9i\}$

8. $x^2 - 8x + 16 = -36$

$\{4 \pm 6i\}$

9. $3x^2 - 24x + 48 = -363$

$\{4 \pm 11i\}$

Example 4

Find the value of *c* that makes each trinomial a perfect square. Then write the trinomial as a perfect square trinomial.

10. $x^2 - 14x + c$

$49;\ (x-7)^2$

11. $x^2 + 5x + c$

$\frac{25}{4};\ (x+\frac{5}{2})^2$

12. $x^2 - x + c$

$\frac{1}{4};\ (x-\frac{1}{2})^2$

Example 5 and 6

Solve each equation by completing the square.

13. $x^2 + x - 6 = 0$

$\{-3, 2\}$

14. $x^2 + 3x - 6 = 0$

$\{\frac{-3}{2} \pm \frac{\sqrt{33}}{2}\}$

15. $x^2 - 8x - 65 = 0$

$\{-5, 13\}$

Example 7 and 8

Solve each equation by completing the square.

16. $2x^2 - 8x - 24 = 0$

$\{-2, 6\}$

17. $2x^2 - 13x - 7 = 0$

$\{\frac{-1}{2}, 7\}$

18. $2x^2 + 7x - 4 = 0$

$\{-4, 1/2\}$

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

$\{2, 2\}$

20. $2x^2 + 5x + 7 = 0$

$\{-\frac{5}{4} \pm \frac{i\sqrt{31}}{4}\}$

21. $x^2 = -24$

$\{\pm 2i\sqrt{6}\}$

Examples 9 and 10

Write each function in vertex form. Find the axis of symmetry. Then find the vertex, and determine if it is a *maximum* or *minimum*.

22. $y = x^2 + 2x - 5$

$y = (x+1)^2 - 6$ a.o.s $x = -1$

$v: (-1, -6)$ minimum

23. $y = -x^2 + 4x + 2$

$y = -(x-2)^2 + 6$ a.o.s $x = 2$

$v: (2, 6)$ maximum

24. $y = 2x^2 + 4x + 3$

$y = 2(x+1)^2 + 1$ a.o.s $x = -1$

$v: (-1, 1)$ minimum

Example 11

25. **FIREWORKS** The height of a firework at an amusement park celebration can be modeled by a quadratic function. Suppose the firework is launched 2 feet off the ground at a velocity of 96 feet per second. Hint: Use $h(t) = -\frac{1}{2}gt^2 + vt + h_0$, where $g = 32\,\frac{\text{ft}}{\text{s}^2}$.

a. Write a function to represent this situation. $h(t) = -16t^2 + 96t + 2$

b. Rewrite the function in vertex form. $h(t) = -16(t-3)^2 + 146$

c. Find the axis of symmetry and the vertex and interpret their meaning in the context of the situation. A.o.s $x = 3$ $v(3, 146)$