

Name: Ima Key Date: _____**Solving Quadratic Equations by Completing the Square**

(from the textbook p. 536 #8 - 12, 26 - 28)

1. $x^2 + 6x + 4 = 0$

$$\begin{array}{r} x^2 + 6x + 4 = 0 \\ -4 \quad -4 \\ \hline x^2 + 6x + 9 = -4 + 9 \end{array}$$

$$\sqrt{(x+3)^2} = \sqrt{5}$$

$$\begin{array}{r} x+3 = \pm\sqrt{5} \\ -3 \quad -3 \end{array}$$

$$x = -3 \pm \sqrt{5}$$

2. $x^2 + 8 = 6x$

$$x^2 - 6x + 9 = -8 + 9$$

$$\sqrt{(x-3)^2} = \sqrt{1}$$

$$\begin{array}{r} x-3 = \pm 1 \\ -3 \quad -3 \end{array}$$

$$x = -4, -2$$

3. $2x^2 - 20x = 8$

$$x^2 - 10x + 25 = 4 + 25$$

$$\sqrt{(x-5)^2} = \sqrt{29}$$

$$\begin{array}{r} x-5 = \pm\sqrt{29} \\ +5 \quad +5 \end{array}$$

$$x = 5 \pm \sqrt{29}$$

4. $x^2 = 24 - 4x$

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

$$\sqrt{(x+2)^2} = \sqrt{28}$$

$$\begin{array}{r} x+2 = \pm 2\sqrt{7} \\ -2 \quad -2 \end{array}$$

$$x = -2 \pm 2\sqrt{7}$$

5. $x^2 + 10x = 42$

$$x^2 + 10x + 25 = 42 + 25$$

$$\sqrt{(x+5)^2} = \sqrt{67}$$

$$\begin{array}{r} x+5 = \pm\sqrt{67} \\ -5 \quad -5 \end{array}$$

$$x = -5 \pm \sqrt{67}$$

6. $x^2 + 2x + 7 = 0$

$$x^2 + 2x + 1 = -7 + 1$$

$$\sqrt{(x+1)^2} = \sqrt{-6}$$

$$\begin{array}{r} x+1 = \pm i\sqrt{6} \\ -1 \quad -1 \end{array}$$

$$x = -1 \pm i\sqrt{6}$$

7. $x^2 - 4x + 1 = 0$

$$x^2 - 4x + 4 = -1 + 4$$

$$\sqrt{(x-2)^2} = \sqrt{3}$$

$$\begin{array}{r} x-2 = \pm\sqrt{3} \\ +2 \quad +2 \end{array}$$

$$x = 2 \pm \sqrt{3}$$

8. $2x^2 - 8x = 22$

$$\begin{array}{r} 2x^2 - 8x = 22 \\ 2 \\ \hline x^2 - 4x + 4 = 11 + 4 \end{array}$$

$$\sqrt{(x-2)^2} = \sqrt{15}$$

$$\begin{array}{r} x-2 = \pm\sqrt{15} \\ +2 \quad +2 \end{array}$$

$$x = 2 \pm \sqrt{15}$$

Solve by taking square roots:

9. $x^2 + 144 = 0$

$$\pm\sqrt{x^2} = \pm\sqrt{144}$$

$$x = \pm 12i$$

10. $\sqrt{(x+8)^2} = \sqrt{50}$

$$x+8 = \pm 5\sqrt{2}$$

$$\begin{array}{r} -8 \\ -8 \end{array}$$

$$x = -8 \pm 5\sqrt{2}$$

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

$$\begin{array}{r} +20 \\ +20 \end{array}$$

$$\frac{2x^2}{2} = \frac{28}{2}$$

$$x^2 = 14$$

$$x = \pm\sqrt{14}$$

12. $(x+3)^2 - 4 = 20$

$$\begin{array}{r} +4 \\ +4 \end{array}$$

$$\pm\sqrt{(x+3)^2} = \pm\sqrt{24}$$

$$x+3 = \pm 2\sqrt{6}$$

$$\begin{array}{r} -3 \\ -3 \end{array}$$

$$x = -3 \pm 2\sqrt{6}$$

13. $x^2 = -42$

$$x = \pm\sqrt{-42}$$

$$x = \pm i\sqrt{42}$$

14. $(x+7)^2 + 20 = 0$

$$\begin{array}{r} -20 \\ -20 \end{array}$$

$$\pm\sqrt{(x+7)^2} = \pm\sqrt{-20}$$

$$x+7 = \pm 2i\sqrt{5}$$

$$\begin{array}{r} -7 \\ -7 \end{array}$$

$$x = -7 \pm 2i\sqrt{5}$$