

**9-5 Completing the Square**

Answer each question as directed.

1. Find the missing value and complete the square:

$$x^2 + 18x + \underline{81} = (x + a)^2$$

$\downarrow$       $\nearrow$   
 9

2. Find the missing value and complete the square

$$x^2 - 12x + 36 = (x - 6)^2$$

$\uparrow$       $\swarrow$   
 6

Solve each quadratic equation by completing the square. Express your answer in simplest radical form.

3.  $x^2 - 4x - 30 = 0$

$$\begin{array}{r} x^2 - 4x - 30 = 0 \\ +30 \quad +30 \\ \hline x^2 - 4x + 4 = 30 + 4 \end{array}$$

$$\sqrt{(x - 2)^2} = \sqrt{34}$$

$$\begin{array}{r} x - 2 = \pm\sqrt{34} \\ +2 \quad +2 \end{array}$$

$$x = 2 \pm \sqrt{34}$$

4.  $x^2 + 59 = -16x$

$$\begin{array}{r} x^2 + 59 = -16x \\ +16x \quad +16x \\ \hline x^2 + 16x + 59 = 0 \end{array}$$

$$\begin{array}{r} x^2 + 16x + 59 = 0 \\ +64 \quad -59 \\ \hline x^2 + 16x + 64 = -59 + 64 \end{array}$$

$$\sqrt{(x + 8)^2} = \sqrt{5}$$

$$\begin{array}{r} x + 8 = \pm\sqrt{5} \\ -8 \quad -8 \end{array}$$

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

5.  $\frac{4x^2}{4} - \frac{8x}{4} - \frac{24}{4} = 0$

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

$$\begin{array}{r} x^2 - 2x + 1 = 6 + 1 \end{array}$$

$$\sqrt{(x - 1)^2} = \sqrt{7}$$

$$\begin{array}{r} x - 1 = \pm\sqrt{7} \\ +1 \quad +1 \end{array}$$

$$x = 1 \pm \sqrt{7}$$