

Solving Equations by Completing the Square

Solve each equation by completing the square.

1) $a^2 + 2a - 3 = 0$

$$a^2 + 2a + \frac{1}{1} = 3 + \frac{1}{1}$$

$$\sqrt{(a+1)^2} = \sqrt{4}$$

$$a+1 = \pm 2$$

$$a = -1 \pm 2$$

$$\begin{aligned} a &= -1 + 2 \\ a &= 1 \\ a &= -1 - 2 \\ a &= -3 \end{aligned}$$

3) $p^2 + 16p - 22 = 0$

$$p^2 + 16p + 64 = 22 + 64$$

$$\sqrt{(p+8)^2} = \sqrt{86}$$

$$p+8 = \pm \sqrt{86}$$

$$p = -8 \pm \sqrt{86}$$

5) $r^2 + 2r - 33 = 0$

2) $a^2 - 2a - 8 = 0$

$$a^2 - 2a + \frac{1}{1} = 8 + \frac{1}{1}$$

$$\sqrt{(a-1)^2} = \sqrt{9}$$

$$a-1 = \pm 3$$

$$a = 1 \pm 3$$

$$a = 1 + 3 = 4$$

$$a = 1 - 3 = -2$$

4) $k^2 + 8k + 12 = 0$

$$k^2 + 8k + 16 = -12 + 16$$

$$\sqrt{(k+4)^2} = \sqrt{4}$$

$$k+4 = \pm 2$$

$$k = -4 \pm 2$$

$$k = -4 + 2 = -2$$

$$k = -4 - 2 = -6$$

6) $a^2 - 2a - 48 = 0$

7) $m^2 - 12m + 26 = 0$

$$m^2 - 12m + \frac{36}{1} = -26 + \frac{36}{1}$$

$$\sqrt{(m-6)^2} = \sqrt{10}$$

$$m-6 = \pm \sqrt{10}$$

$$m = 6 \pm \sqrt{10}$$

9) $k^2 - 8k - 48 = 0$

8) $x^2 + 12x + 20 = 0$

$$x^2 + 12x + \frac{36}{1} = -20 + \frac{36}{1}$$

$$\sqrt{(x+6)^2} = \sqrt{16}$$

$$x+6 = \pm 4$$

$$x = -6 \pm 4$$

$$x = -6 + 4 = -2$$

$$x = -6 - 4 = -10$$

10) $p^2 + 2p - 63 = 0$

11) $m^2 + 2m - 48 = -6$

$$m^2 + 2m + \frac{1}{1} = 42 + \frac{1}{1}$$

$$\sqrt{(m+1)^2} = \sqrt{43}$$

$$m+1 = \pm \sqrt{43}$$

$$m = -1 \pm \sqrt{43}$$

12) $p^2 - 8p + 21 = 6$

$$p^2 - 8p + \frac{16}{1} = -15 + \frac{16}{1}$$

$$\sqrt{(p-4)^2} = \sqrt{1}$$

$$p-4 = \pm 1$$

$$p = 4 \pm 1$$

$$p = 4 + 1 = 5$$

$$p = 4 - 1 = 3$$

Solving Equations by Completing the Square

Solve each equation by completing the square.

1) $a^2 + 2a - 3 = 0$

$$a^2 + 2a + \frac{1}{1} = 3 + \frac{1}{1}$$

$$\sqrt{(a+1)^2} = \sqrt{4}$$

$$a+1 = \pm 2$$

$$a = -1 \pm 2$$

$$\begin{aligned} a &= -1 + 2 \\ a &= 1 \\ a &= -1 - 2 \\ a &= -3 \end{aligned}$$

3) $p^2 + 16p - 22 = 0$

$$p^2 + 16p + 64 = 22 + 64$$

$$\sqrt{(p+8)^2} = \sqrt{86}$$

$$p+8 = \pm\sqrt{86}$$

$$p = -8 \pm \sqrt{86}$$

5) $r^2 + 2r - 33 = 0$

2) $a^2 - 2a - 8 = 0$

$$a^2 - 2a + \frac{1}{1} = 8 + \frac{1}{1}$$

$$\sqrt{(a-1)^2} = \sqrt{9}$$

$$a-1 = \pm 3$$

$$a = 1 \pm 3$$

$$a = 1 + 3 = 4$$

$$a = 1 - 3 = -2$$

4) $k^2 + 8k + 12 = 0$

$$k^2 + 8k + 16 = -12 + 16$$

$$\sqrt{(k+4)^2} = \sqrt{4}$$

$$k+4 = \pm 2$$

$$k = -4 \pm 2$$

$$k = -4 + 2 = -2$$

$$k = -4 - 2 = -6$$

6) $a^2 - 2a - 48 = 0$

7) $m^2 - 12m + 26 = 0$

$$m^2 - 12m + 36 = -26 + 36$$

$$\sqrt{(m-6)^2} = \sqrt{10}$$

$$m-6 = \pm\sqrt{10}$$

$$m = 6 \pm \sqrt{10}$$

9) $k^2 - 8k - 48 = 0$

8) $x^2 + 12x + 20 = 0$

$$x^2 + 12x + 36 = -20 + 36$$

$$\sqrt{(x+6)^2} = \sqrt{16}$$

$$x+6 = \pm 4$$

$$x = -6 \pm 4$$

$$x = -6 + 4 = -2$$

$$x = -6 - 4 = -10$$

10) $p^2 + 2p - 63 = 0$

11) $m^2 + 2m - 48 = -6$

$$m^2 + 2m + 1 = 42 + 1$$

$$\sqrt{(m+1)^2} = \sqrt{43}$$

$$m+1 = \pm\sqrt{43}$$

$$m = -1 \pm \sqrt{43}$$

12) $p^2 - 8p + 21 = 6$

$$p^2 - 8p + 16 = -15 + 16$$

$$\sqrt{(p-4)^2} = \sqrt{1}$$

$$p-4 = \pm 1$$

$$p = 4 \pm 1$$

$$p = 4 + 1 = 5$$

$$p = 4 - 1 = 3$$