

# Study Guide

Student Edition  
Pages 359–364

## Sum and Product of Roots

The quadratic formula gives the roots of  $ax^2 + bx + c = 0$ , with  $a \neq 0$ , as

$$\frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{and} \quad \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

You can add and simplify these expressions, then multiply and simplify to find expressions for the sum and the product of the roots.

Sum and Product of Roots
If the roots of $ax^2 + bx + c = 0$ , with $a \neq 0$ , are $S_1$ and $S_2$ , then $S_1 + S_2 = -\frac{b}{a}$ and $S_1 S_2 = \frac{c}{a}$ .

You can usually find the values of the expressions  $-\frac{b}{a}$  and  $\frac{c}{a}$  by merely glancing at the quadratic equation. Therefore, they give a quick check on the correctness of the solutions you obtain when you solve a quadratic equation.

**Example:** Tell what the sum and product of the roots of  $9x^2 + 9x - 10 = 0$  will be and use the results to check whether  $\frac{2}{3}$  and  $\frac{5}{3}$  are correct solutions.

The sum of the roots will be  $-\frac{9}{9}$  or  $-1$ . The product of the roots will be  $-\frac{10}{9}$ . Since  $\frac{2}{3} + \frac{5}{3}$  does not equal  $-1$  and  $\frac{2}{3} \cdot \frac{5}{3}$  does not equal  $-\frac{10}{9}$ , the proposed solutions are *not* correct.

**Without solving the equation, state the sum and the product of the roots of each quadratic equation.**

1.  $x^2 + 2x - 15 = 0$

2.  $x^2 + 3x - 28 = 0$

3.  $x^2 - x + 1 = 0$

4.  $7x^2 + 14x - 3 = 0$

5.  $-2x^2 - 5x = 6$

6.  $16x^2 + 18x - 12 = 0$

**Solve each equation. Then find the sum and the product of the roots to check your solutions.**

7.  $x^2 - 7x = 18$

8.  $25x^2 = 36$

9.  $7p^2 - 11p = 6$

10.  $3c^2 + 7c - 2 = 0$