Roots and Quadratic Equations

General Form of a Quadratic Equation is $\mathbf{ax^2 + bx + c = 0}$

If the roots of that quadratic equation are r_1 and r_2, then $x = r_1$ or $x = r_2$. We can write the general form of a quadratic equation in the form of a product of two linear terms as follows:

$$(x - r_1)(x - r_2) = 0$$
$$\mathbf{x^2 - (r_1 + r_2)x + r_1r_2 = 0}$$

By dividing the quadratic equation $ax^2 + bx + c = 0$ by **a**, it can be rewritten as

$$x^2 + (b/a)x + c/a = 0$$

Comparing the coefficients in the two equations, we see that

1. $\mathbf{r_1 \times r_2 = c/a}$
2. $\mathbf{-(r_1 + r_2) = b/a}$ or $\mathbf{r_1 + r_2 = -b/a}$

In words, the product of the roots of a quadratic equation is c/a. The sum pf the roots of a quadratic equation is –b/a

1. Without solving, find the sum and product of the roots of $x^2 + 7x + 12 = 0$.
2. Without solving, find the sum and product of the roots of $x^2 - 5x + 6 = 0$.
3. Without solving, find the sum and product of the roots of $x^2 - x - 30 = 0$.
4. Without solving, find the sum and product of the roots of $8x^2 - 2x - 3 = 0$.
5. Without solving, find the sum and product of the roots of $6x^2 + 13x + 5 = 0$.
6. Without solving, find the sum and product of the roots of $4x^2 = 23x - 15$
7. Find an equation whose roots are (– 4) and – 3.
8. Find an equation whose roots are 6 and (– 5).
9. Find an equation whose roots are 1/4 and (–2/3).
10. Find an equation whose roots are (–2/5) and (–3/4).
11. Find the equation whose roots are 2 + V3 and 2 – V3.

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