There are some algebraic expressions that because of their importance and use in mathematics, it is worth memorizing. These are called notable products.

Square of the sum

If a and b are real numbers (they can be unknowns!), it is satisfied that:

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(x+3)^2 = x^2 + 2 \cdot 3 \cdot x + 3^2 = x^2 + 6x + 9$$
$$(2x+1)^2 = (2x)^2 + 2 \cdot (2x) \cdot 1 + 1^2 = 4x^2 + 4x + 1$$
$$\left(x+\frac{1}{2}\right)^2 = x^2 + 2 \cdot \frac{1}{2} \cdot x + \left(\frac{1}{2}\right)^2 = x^2 + x + \frac{1}{4}$$

Square of the subtraction

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$(x-3)^2 = x^2 - 2 \cdot 3 \cdot x + 3^2 = x^2 - 6x + 9$$
$$(2x-1)^2 = (2x)^2 - 2 \cdot (2x) \cdot 1 + 1^2 = 4x^2 - 4x + 1$$
$$\left(x-\frac{1}{2}\right)^2 = x^2 - 2 \cdot \frac{1}{2} \cdot x + \left(\frac{1}{2}\right)^2 = x^2 - x + \frac{1}{4}$$

Cube of the sum

In the same way as the square, the cube of the sum is also important:

$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$(x+3)^3 = x^3 + 3 \cdot x^2 \cdot 3 + 3 \cdot x \cdot 3^2 + 3^3 =$$
$$= x^3 + 9x^2 + 27x + 27$$
$$(2x+1)^3 = (2x)^3 + 3 \cdot (2x)^2 \cdot 1 + 3 \cdot (2x) \cdot 1^2 + 1^3 =$$
$$= 8x^3 + 12x^2 + 3x + 1$$
$$\left(x+\frac{1}{2}\right)^3 = x^3 + 3 \cdot \frac{1}{2} \cdot x^2 + 3\left(\frac{1}{2}\right)^2 \cdot x + \left(\frac{1}{2}\right)^3 =$$
$$= x^3 + \frac{3}{2}x^2 + \frac{3}{4}x + \frac{1}{8}$$

Cube of the subtraction

$$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

$$(x-3)^3 = x^3 - 3 \cdot x^2 \cdot 3 + 3 \cdot x \cdot 3^2 - 3^3 =$$
$$= x^3 - 9x^2 + 27x - 27$$
$$(2x-1)^3 = (2x)^3 - 3 \cdot (2x)^2 \cdot 1 + 3 \cdot (2x) \cdot 1^2 - 1^3 =$$
$$= 8x^3 - 12x^2 + 3x - 1$$
$$\left(x-\frac{1}{2}\right)^3 = x^3 - 3 \cdot \frac{1}{2} \cdot x^2 + 3\left(\frac{1}{2}\right)^2 \cdot x - \left(\frac{1}{2}\right)^3 =$$
$$= x^3 - \frac{3}{2}x^2 + \frac{3}{4}x - \frac{1}{8}$$