Quadratische Formel

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

z.B. $(2x+3)^2 = (2x)^2 + 2 \cdot 2x \cdot 3 + 3^2 = 4x^2 + 12x + 9$

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

z.B. $(5y-4)^2 = (5y)^2 - 2 \cdot 5y \cdot 4 + 4^2 = 25y^2 - 40y + 16$

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

z.B. $(6z-5)(6z+5) = (6z)^2 - 5^2 = 36z^2 - 25$

Quadratische Formel umgekehrt

$16x^2 + 56x + 49 = (4x)^2 + 2 \cdot 4x \cdot 7 + 7^2 = (4x+7)^2$

$64y^2 - 48y + 9 = (8y)^2 - 2 \cdot 8y \cdot 3 + 3^2 = (8y-3)^2$

$100z^2 - 81 = (10z)^2 - 9^2 = (10z-9)(10z+9)$

Algebraische Brüche

Kürzen

$$\frac{a^2 - 2ab + b^2}{a^2b - ab^2} = \frac{(a-b)^2}{ab(a-b)} = \frac{a-b}{ab}$$

Multiplikations

$$\frac{a^2 + 12a + 36}{a^2 - 36} \cdot \frac{4a^3 - 24a^2}{2a^2 + 12a} = \frac{(a+6)^2}{(a-6)(a+6)} \cdot \frac{4a^2(a-6)}{2a(a+6)} = 2a$$

Division

$$\frac{a^2b^3 - 9b^5}{ab^4} : \frac{a^2 - 3ab}{3a^2b} = \frac{b^3(a^2 - 9b^2)}{ab^4} \cdot \frac{3a^2b}{a(a-3b)} = \frac{b^3(a-3b)(a+3b)}{ab^4} \cdot \frac{3a^2b}{a(a-3b)} = 3(a+3b)$$

Addition, Subtraktion

$$\frac{3}{2x^2 - 2x} - \frac{x}{x^2 - 2x + 1} + \frac{1}{x-1} = \frac{3}{2x(x-1)} - \frac{x}{(x-1)^2} + \frac{1}{x-1} =$$

$$= \frac{3(x-1)}{2x(x-1)^2} - \frac{x \cdot 2x}{2x(x-1)^2} + \frac{2x(x-1)}{2x(x-1)^2} = \frac{3(x-1) - 2x^2 + 2x(x-1)}{2x(x-1)^2} =$$

$$= \frac{3x - 3 - 2x^2 + 2x^2 - 2x}{2x(x-1)^2} = \frac{x-3}{2x(x-1)^2}$$