

## Binomische Formeln

- 1)  $(a + 2b)^2$   $(1/3a - 1/6b)^2$   
 $(4a + 2b)^2$   $(1/4x + 8y)^2$   
 $(x - 5y)^2$   $(\sqrt{x} - \sqrt{2y})(\sqrt{x} + \sqrt{2y})$   
 $(2x - 3y)(2x + 3y)$   $(\sqrt{x+y} - \sqrt{x-y})^2$   
 $(10a - 6b)(10a + 6b)$
- 2)  $(x + \underline{\quad})^2 = x^2 + \underline{\quad} + 9$   $(y + \underline{\quad})^2 = y^2 + 8y + \underline{\quad}$   
 $(a - \underline{\quad})^2 = a^2 - 10a + \underline{\quad}$   $(\underline{\quad} + \underline{\quad})^2 = 4a^2 + \underline{\quad} + 25b^2$   
 $(\underline{\quad} - \underline{\quad})^2 = 81x^2 - \underline{\quad} + 4y^2$   $(2x + \underline{\quad})^2 = \underline{\quad} + 8xy + \underline{\quad}$   
 $(\underline{\quad} - 4a)^2 = \underline{\quad} - 40a + \underline{\quad}$   $(\underline{\quad} + \underline{\quad})(\underline{\quad} - \underline{\quad}) = 100x^2 - 81y^2$   
 $(\underline{\quad} + 5b)(\underline{\quad} - 5b) = 36a^2 - \underline{\quad}$
- 3)  $4(x + y)^2$   
 $3(2x + 4y)^2$   
 $-(3x - 2y)^2$   
 $5(2a + 8b)^2$   
 $3(4a - 2b)^2 + 2(a - 4b)(a + 4b)$   
 $-2(8x + 4y)^2 - 3(4x - 5y)^2$   
 $4(2a - 4b)^2 - (6a + 5b)(6a - 5b)$

Hinweis: Steht ein Faktor vor der Klammer, wie z.B. bei  $2(a + b)^2$ , dann muss erst die binomische Formel angewendet werden und danach muss noch jeder Summand mit dem Faktor multipliziert werden. Aus diesem Grund sollte man das Zwischenergebnis in Klammern setzen:

$$2(a + b)^2 = 2(a^2 + 2ab + b^2) = 2a^2 + 4ab + 2b^2$$

- 4)  $(a^2 + 2b)^2$   
 $(a - 4b^2)^2$   
 $(5a^2 - 3b^4)^2$   
 $(3ab^2 - 4ab)^2$

## Lösungen

1)

$$(a + 2b)^2 = a^2 + 4ab + 4b^2$$

$$(1/3a - 1/6b)^2 = 1/9 \cdot a^2 - 1/9 \cdot ab + 1/36 \cdot b^2$$

$$(4a + 2b)^2 = 16a^2 + 16ab + 4b^2$$

$$(1/4x + 8y)^2 = 1/16 \cdot x^2 + 4xy + 64y^2$$

$$(x - 5y)^2 = x^2 - 10xy + 25y^2$$

$$(\sqrt{x} - \sqrt{2y})(\sqrt{x} + \sqrt{2y}) = x - 2y$$

$$(2x - 3y)(2x + 3y) = 4x^2 - 9y^2$$

$$(\sqrt{x+y} + \sqrt{x-y})^2$$

$$= (\sqrt{x+y})^2 + 2\sqrt{x+y}\sqrt{x-y} + (\sqrt{x-y})^2$$

$$= x + y + 2\sqrt{(x+y)(x-y)} + x - y$$

$$= 2x + 2\sqrt{x^2 - y^2}$$

$$(10a - 6b)(10a + 6b) = 100a^2 - 36b^2$$

2)

$$(x + \underline{3})^2 = x^2 + \underline{6x} + 9$$

$$(y + \underline{4})^2 = y^2 + 8y + \underline{16}$$

$$(a - \underline{5})^2 = a^2 - 10a + \underline{25}$$

$$(\underline{2a} + \underline{5b})^2 = 4a^2 + \underline{20ab} + 25b^2$$

$$(\underline{9x} - \underline{2y})^2 = 81x^2 - \underline{36xy} + 4y^2$$

$$(2x + \underline{2y})^2 = \underline{4x^2} + 8xy + \underline{4y^2}$$

$$\text{Denn: } 8xy/2x = 4y \text{ und } 4y/2 = 2y$$

$$(\underline{5} - 4a)^2 = \underline{25} - 40a + \underline{16a^2}$$

$$(\underline{10x} + \underline{9y})(\underline{10x} - \underline{9y}) = 100x^2 - 81y^2$$

$$(\underline{6a} + 5b)(\underline{6a} - 5b) = 36a^2 - \underline{25b^2}$$

3)

$$4(x + y)^2 = 4(x^2 + 2xy + y^2) = 4x^2 + 8xy + 4y^2$$

$$3(2x + 4y)^2 = 3(4x^2 + 16xy + 16y^2) = 12x^2 + 48xy + 48y^2$$

$$-(3x - 2y)^2 = (9x^2 - 12xy + 4y^2) = -9x^2 + 12xy - 4y^2$$

$$5(2a + 8b)^2 = 20a^2 + 160ab + 320b^2$$

$$\begin{aligned}3(4a - 2b)^2 + 2(a - 4b)(a + 4b) &= 3(16a^2 - 16ab + 4b^2) + 2(a^2 - 16b^2) \\ &= 48a^2 - 48ab + 12b^2 + 2a^2 - 32b^2 = 50a^2 - 48ab - 20b^2\end{aligned}$$

$$-2(8x + 4y)^2 - 3(4x - 5y)^2 = -176x^2 - 8xy - 107y^2$$

4)

$$(a^2 + 2b)^2 = a^4 + 4a^2b + 4b^2$$

$$(a - 4b^2)^2 = a^2 - 8ab^2 + 16b^4$$

$$(5a^2 - 3b^4)^2 = 25a^4 - 30a^2b^4 + 9b^8$$

$$(3ab^2 - 4ab)^2 = 9a^2b^4 - 24a^2b^3 + 16a^2b^2$$

$$\text{Denn: } -2 \cdot 3ab^2 \cdot 4ab = -24a^2b^3$$