

Mathematische Grundlagen

1.0 Multiplizieren Sie aus und fassen Sie soweit wie möglich zusammen.

$$1.1 \quad 8(5a + 7b - 6c) + 11(5a - 4b + 9c) - 12(3a - 6b + 7c)$$

$$1.2 \quad 25(2a + 3b - 5) - 16(4a - 6b) + 12(9 - 7b) - 14(5 - 3a)$$

$$1.3 \quad x(x - 3y) - y(3x - y)$$

$$1.4 \quad u(3u + 4w) - 2w(4u + 6w)$$

2.0 Vereinfachen Sie soweit wie möglich.

$$2.1 \quad 4x - [(a - 4x) + (3y + 17a) - (98x + 3y)]$$

$$2.2 \quad (9a^2 - a) + 4x - [(4ax + 3x - a) + 8a^2 - (ax - x)]$$

$$2.3 \quad 24k - (6n - 5k) - [7n - (6k + 5n) - (-4k + 3n) - 9k]$$

$$2.4 \quad a(a - 5) - 6a^2 + 9a(8a + 7) - 4a(3 + 5a)$$

$$2.5 \quad 14c(8x - 3y + 7c) + 13x(9c - 8y + 2x) - 11y(7x - 6c + 11y)$$

$$2.6 \quad (4m^2 - 5nm) \cdot 2n - 4n(3mn + 7m^2) - 8mn(4n - 3m)$$

3.0 Klammern Sie aus.

$$3.1 \quad 20x - 25y$$

$$3.2 \quad -m^2qt + m^2$$

$$3.3 \quad 3xy - 21x^2y^2$$

$$3.4 \quad 6ax^3 - 9ax^2 + 12ax$$

$$3.5 \quad 196a^2b^2 - 112a^3b^2 + 42a^2b^3$$

$$3.6 \quad m(2x + y) - 2x - y$$

$$3.7 \quad 4ax + 6ay + 6bx + 9by$$

$$3.8 \quad 4m + 2n + 5pn + 10pm$$

$$3.9 \quad y^4 + y^3 - 3y - 3$$

4.0 Klammern Sie aus und fassen Sie in den entstehenden Klammertermen zusammen.

$$4.1 (2p - 3q + 6)(a - 0,5b) - (0,5b - a)(5p + 4q - 6)$$

$$4.2 (2a - 4b + 7c)(7u - 3v + 2w) + (4a + 6b - 9c)(-28u + 12v - 8w)$$

$$4.3 (8ab - 3c)(4x + 5y) - (5y + 4x)(bc - 24a)$$

5.0 Verwandeln Sie folgende Summen mithilfe binomischer Formeln in Produkte.

$$5.1 4c^2 + 4cd + d^2$$

$$5.2 49x^2 - 112xy + 64y^2$$

$$5.3 a^{10} + 18a^5 + 81$$

6.0 Verwandeln Sie folgende Terme in Summen.

$$6.1 (8 + 2a)^2$$

$$6.2 (5x - 4y)^2$$

$$6.3 (9a - 4b)(9a + 4b)$$

$$6.4 (2p + q)^2 - (2p - q)^2$$

$$6.5 (3a + 4b)(3a - 4b) - (3a + 4b)^2$$

$$6.6 3(5y - 3x)^2 + 4(3x - 4y)(2x + 7y) - 6(8x - 6y)^2$$

$$6.7 (4x - 5)^2 - (6x + 7)^2 + 5(2x + 4)(2x - 4)$$

Lösungen

$$1.1 \quad 40a + 56b - 48c + 55a - 44b + 99c - 36a + 72b - 84c = 59a + 84b - 33c$$

$$1.2 \quad 50a + 75b - 125 - 64a + 96b + 108 - 84b - 70 + 42a = 28a + 87b - 87$$

$$1.3 \quad x^2 - 3xy - 3xy + y^2 = x^2 - 6xy + y^2$$

$$1.4 \quad 3u^2 + 4uw - 8uw - 12w^2 = 3u^2 - 4uw - 12w^2$$

$$2.1 \quad 4x - [a - 4x + 3y + 17a - 98x - 3y] = 4x - [18a - 102x] = 106x - 18a$$

2.2

$$9a^2 - a + 4x - [4ax + 3x - a + 8a^2 - ax + x] = 9a^2 - a + 4x - [3ax + 4x - a + 8a^2] =$$
$$9a^2 - a + 4x - 3ax - 4x + a - 8a^2 = a^2 - 3ax$$

2.3

$$24k - 6n + 5k - [7n - 6k - 5n + 4k - 3n - 9k] = 24k - 6n + 5k - [-n - 11k] =$$
$$24k - 6n + 5k + n + 11k = 40k - 5n$$

$$2.4 \quad a^2 - 5a - 6a^2 + 72a^2 + 63a - 12a - 20a^2 = 47a^2 + 46a$$

2.5

$$112cx - 42cy + 98c^2 + 117cx - 104xy + 26x^2 - 77xy + 66cy - 121y^2 =$$
$$= 229cx + 24cy + 98c^2 - 181xy + 26x^2 - 121y^2$$

$$2.6 \quad 8m^2n - 10mn^2 - 12mn^2 - 28m^2n - 32mn^2 + 24m^2n = 4m^2n - 54mn^2$$

$$3.1 \quad 5(4x - 5y)$$

$$3.2 \quad m^2(-qt + 1)$$

$$3.3 \quad 3xy(1 - 7xy)$$

$$3.4 \quad 3ax(2x^2 - 3x + 4)$$

$$3.5 \quad 14a^2b^2(14 - 8a + 3b)$$

$$3.6 \quad (2x + y)(m - 1)$$

$$3.7 \quad 2a(2x + 3y) + 3b(2x + 3y) = (2x + 3y)(2a + 3b)$$

$$3.8 \quad 2(2m + n) + 5p(2m + n) = (2m + n)(2 + 5p)$$

$$3.9 \quad y^3(y + 1) - 3(y + 1) = (y + 1)(y^3 - 3)$$

$$4.1 (a - 0,5b)[(2p - 3q + 6) - (-1)(5p + 4q - 6)] = (a - 0,5b)(7p + q)$$

4.2

$$\begin{aligned} & (2a - 4b + 7c)(7u - 3v + 2w) + [(4a + 6b - 9c)(-4)](7u - 3v + 2w) = \\ & = (7u - 3v + 2w)[(2a - 4b + 7c + (-4)(4a + 6b - 9c)] = \\ & = (7u - 3v + 2w)(2a - 4b + 7c - 16a - 24b + 36c) = (7u - 3v + 2w)(-14a - 28b + 43c) \end{aligned}$$

$$4.3 (4x + 5y)[8ab - 3c - bc + 24a] = (4x + 5y)[8a(b + 3) - c(b + 3)] = (4x + 5y)(b + 3)(8a - c)$$

$$5.1 (2c + d)^2$$

$$5.2 (7x - 8y)^2$$

$$5.3 (a^5 + 9)^2$$

$$6.1 64 + 32a + 4a^2$$

$$6.2 25x^2 - 40xy + 16y^2$$

$$6.3 36a^2 - 16b^2$$

$$6.4 4p^2 + 4pq + q^2 - (4p^2 - 4pq + q^2) = 8pq$$

$$6.5 9a^2 - 16b^2 - (9a^2 + 24ab + 16b^2) = -32b^2 - 24ab$$

6.6

$$\begin{aligned} & 3(25y^2 - 30xy + 9x^2) + 4(6x^2 + 21xy - 8xy - 28y^2) - 6(64x^2 - 96xy + 36y^2) = \\ & = 75y^2 - 90xy + 27x^2 + 24x^2 + 52xy - 112y^2 - 384x^2 + 576xy - 216y^2 = \\ & = -333x^2 + 538xy - 253y^2 \end{aligned}$$

6.7

$$\begin{aligned} & 16x^2 - 40xy + 25 - (36x^2 + 84x + 49) + 5(4x^2 - 16) = \\ & = 16x^2 - 40xy + 25 - 36x^2 - 84x - 49 + 20x^2 - 80 = \\ & = -124x - 104 \end{aligned}$$