

Übung zu Termen 10

1. Multiplizieren Sie aus und fassen Sie zusammen. Setzen Sie anschließend $x=2$ und $y=-4$ und berechnen Sie das Endergebnis.

a) $4(x - y) + 5(y - x)$

b) $-3(y - x) + 4(x - 2y)(x + 3) - 4x^2$

c) $-(x - 2)(x + 2) - (y - 2)(y + 2)$

d) $7x^2 - 3(x - y)(x + y) - 4(x - y)^2 + y^2$

e) $2x - 3y + 2(x - y) + 3(y - x)$

f) $-(x - 4)^2 + (y - 4)^2$

g) $(x - 4)(x + 4) - (x - 4)^2 - (x + 4)^2$

2. Klammern Sie gemeinsame Faktoren aus

a) $12x - 4y$

b) $8x^2 - 4xy + 4xz$

c) $\frac{1}{2}x^2 - \frac{3}{2}y^2$

d) $7x^2 - 8xy - 9xy^2$

e) $x^4 + x^3 - x^2$

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1. a) $4(x - y) + 5(y - x) = 4x - 4y + 5y - 5x = -x + y = -2 + (-4) = -6$

b)

$$\begin{aligned} -3(y - x) + 4(x - 2y)(x + 3) - 4x^2 &= -3y + 3x + 4(x^2 + 3x - 2xy - 6y) - 4x^2 \\ &= -3y + 3x + 4x^2 + 12x - 8xy - 24y - 4x^2 \\ &= 15x - 8xy - 27y \\ &= 15 * 2 - 8 * 2 * (-4) - 27 * (-4) \\ &= 30 + 64 + 108 = 202 \end{aligned}$$

c)

$$\begin{aligned} -(x - 2)(x + 2) - (y - 2)(y + 2) &= -(x^2 + 2x - 2x - 4) - (y^2 + 2y - 2y - 4) \\ &= -x^2 + 4 - y^2 + 4 \\ &= -x^2 - y^2 + 8 \\ &= -2^2 - (-4)^2 + 8 \\ &= -4 - 16 + 8 = -12 \end{aligned}$$

d)

$$\begin{aligned} 7x^2 - 3(x - y)(x + y) - 4(x - y)^2 + y^2 &= 7x^2 - 3(x^2 - y^2) - 4(x^2 - 2xy + y^2) + y^2 \\ &= 7x^2 - 3x^2 + 3y^2 - 4x^2 + 8xy - 4y^2 + y^2 \\ &= 8xy \\ &= 8 * 2 * (-4) \\ &= -64 \end{aligned}$$

e)

$$\begin{aligned} 2x - 3y + 2(x - y) + 3(y - x) &= 2x - 3y + 2x - 2y + 3y - 3x \\ &= x - 2y \\ &= 2 - 2 * (-4) \\ &= 10 \end{aligned}$$

f)

$$\begin{aligned} -(x - 4)^2 + (y - 4)^2 &= -(x^2 - 4x - 4x + 16) + (y^2 - 4y - 4y + 16) \\ &= -x^2 + 8x - 16 + y^2 - 8y + 16 \\ &= x - x^2 - 8y + y^2 \\ &= 8 * 2 - 2^2 - 8 * (-4) + (-4)^2 \\ &= 16 - 4 + 32 + 16 \\ &= 60 \end{aligned}$$

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g)

$$\begin{aligned}(x-4)(x+4) - (x-4)^2 - (x+4)^2 &= x^2 + 4x - 4x - 16 - (x^2 - 4x - 4x + 16) - \\ &\quad (x^2 + 4x + 4x + 16) \\ &= x^2 - 16 - x^2 + 8x - 16 - x^2 - 8x - 16 \\ &= -x^2 - 48 \\ &= -2^2 - 48 \\ &= -52\end{aligned}$$

2. a) $12x - 4y = 4(3x - y)$
b) $8x^2 - 4xy + 4xz = 4x(2x - y + z)$
c) $\frac{1}{2}x^2 - \frac{3}{2}y^2 = \frac{1}{2}(x^2 - 3y^2)$
d) $7x^2 - 8xy - 9xy^2 = x(7x - 8y - 9y^2)$
e) $x^4 + x^3 - x^2 = x^2(x^2 + x - 1)$