

LÖSUNGEN

$$\begin{aligned} 1a) \quad 3x - (5x + 7) &= 3x - 5x - 7 \\ &= -2x - 7 \end{aligned}$$

$$\begin{aligned} b) \quad 4 \cdot (5x + 2) + 7x &= 4 \cdot 5x + 4 \cdot 2 + 7x \\ &= 20x + 8 + 7x = 27x + 8 \end{aligned}$$

$$\begin{aligned} c) \quad 6x - (3x + 4) \cdot 2 - 5x \\ &= 6x - (2 \cdot 3x + 4 \cdot 2) - 5x \\ &= 6x - (6x + 8) - 5x \\ &= 6x - 6x - 8 - 5x \\ &= -5x - 8 \end{aligned}$$

$$\begin{aligned} d) \quad 3 \cdot (5x + 2) + 3 &= 3 \cdot 5x + 3 \cdot 2 + 3 \\ &= 15x + 6 + 3 \\ &= 15x + 9 \end{aligned}$$

$$\begin{aligned} e) \quad 3x + (2x + 7)^2 + 2 \\ &= 3x + ((2x)^2 + 2 \cdot 2x \cdot 7 + 7^2) + 2 \\ &= 3x + 4x^2 + 4x \cdot 7 + 49 + 2 \\ &= 3x + 4x^2 + 28x + 49 + 2 \\ &= 4x^2 + 31x + 51 \end{aligned}$$

$$\begin{aligned} f) \quad 10x^2 - 3x \cdot (3x + 2) + 1 \\ &= 10x^2 - 3x \cdot 3x + 3x \cdot 2 + 1 \\ &= 10x^2 - 9x^2 + 6x + 1 \\ &= x^2 + 6x + 1 \end{aligned}$$

$$\begin{aligned} g) \quad 4x - 3x \cdot (2x + 5) &= 4x - 3x \cdot 2x - 3x \cdot 5 \\ &= 4x - 6x^2 - 15x = -6x^2 - 11x \end{aligned}$$

$$\begin{aligned} h) \quad 6x + (10x + 5) : 5 &= 6x + (10x + 5) \cdot \frac{1}{5} \\ &= 6x + \frac{1}{5} \cdot 10x + \frac{1}{5} \cdot 5 = 6x + 2x + 1 = 8x + 1 \end{aligned}$$

$$i) 6x + (6x + 9) + 6x = 6x + 6x + 9 + 6x \\ = 18x + 9$$

$$j) 3x \cdot (2x + 5) = 3x \cdot 2x + 3x \cdot 5 \\ = 6x^2 + 15x$$

$$k) 5 - (2x + 4) + (2x + 7) = 5 - 2x - 4 + 2x + 7 \\ = 8$$

$$l) 3x \cdot (2x \cdot 2x) = 3x \cdot 4x^2 = 12x^3$$

$$2) a) (x + 7) \cdot (x + 10) = x \cdot x + x \cdot 10 + 7 \cdot x + 7 \cdot 10 \\ = x^2 + 10x + 7x + 70 \\ = x^2 + 17x + 70$$

$$b) (x - 2) \cdot (x + 9) = x \cdot x + x \cdot 9 - 2 \cdot x - 2 \cdot 9 \\ = x^2 + 9x - 2x - 18 \\ = x^2 + 7x - 18$$

$$c) (x + 9) \cdot (x - 3) = x \cdot x + x \cdot (-3) + 9 \cdot x + 9 \cdot (-3) \\ = x^2 - 3x + 9x - 27 \\ = x^2 + 6x - 27$$

$$d) (x - 2) \cdot (x - 3) = x \cdot x + x \cdot (-3) + (-2) \cdot x + (-2) \cdot (-3) \\ = x^2 - 3x - 2x + 6 \\ = x^2 - 5x + 6$$

$$e) (2x + 7) \cdot (3x + 5) = 2x \cdot 3x + 2x \cdot 5 + 7 \cdot 3x + 7 \cdot 5 \\ = 6x^2 + 10x + 21x + 35 \\ = 6x^2 + 31x + 35$$

$$f) (3x - 7) \cdot (7x - 2) = 3x \cdot 7x + 3x \cdot (-2) + (-7) \cdot 7x + (-7) \cdot (-2) \\ = 21x^2 - 6x - 49x + 14 \\ = 21x^2 - 54x + 14$$

$$\begin{aligned}
 g) (3x+9) \cdot (-2x+1) &= 3x \cdot 2x + 3x \cdot 1 + 9 \cdot 2x + 9 \cdot 1 \\
 &= 6x^2 + 3x + 18x + 9 \\
 &= 6x^2 + 21x + 9
 \end{aligned}$$

$$\begin{aligned}
 h) (6x-2) \cdot (2x+5) &= 6x \cdot 2x + 6x \cdot 5 + (-2) \cdot 2x + (-2) \cdot 5 \\
 &= 12x^2 + 30x - 4x - 10 \\
 &= 12x^2 + 26x - 10
 \end{aligned}$$

$$\begin{aligned}
 i) (-2x+4) \cdot (5x+2) &= (-2x) \cdot 5x + (-2x) \cdot 2 + 4 \cdot 5x + 4 \cdot 2 \\
 &= -10x^2 - 4x + 20x + 8 \\
 &= -10x^2 + 16x + 8
 \end{aligned}$$

$$\begin{aligned}
 j) (-5x-2) \cdot (x+4) &= -5x \cdot x + (-5x) \cdot 4 + (-2) \cdot x + (-2) \cdot 4 \\
 &= -5x^2 - 20x - 2x - 8 \\
 &= -5x^2 - 22x - 8
 \end{aligned}$$

$$\begin{aligned}
 k) (-2x+1) \cdot (-3x+4) &= (-2x) \cdot (-3x) + (-2x) \cdot 4 + 1 \cdot (-3x) + 1 \cdot 4 \\
 &= 6x^2 - 8x - 3x + 4 \\
 &= 6x^2 - 11x + 4
 \end{aligned}$$

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

$$\begin{aligned}
 m) (x^2+2) \cdot (-2x+3) &= x^2 \cdot (-2x) + x^2 \cdot 3 + 2 \cdot (-2x) + 2 \cdot 3 \\
 &= -2x^3 + 3x^2 - 4x + 6
 \end{aligned}$$

$$\begin{aligned}
 n) (3x^2+x) \cdot (x+7) &= 3x^2 \cdot x + 3x^2 \cdot 7 + x \cdot x + x \cdot 7 \\
 &= 3x^3 + 21x^2 + x^2 + 7x \\
 &= 3x^3 + 22x^2 + 7x
 \end{aligned}$$

$$\begin{aligned}
 o) (-2x^3+x^2) \cdot (x^2+2) &= -2x^3 \cdot x^2 - 2x^3 \cdot 2 + x^2 \cdot x^2 + x^2 \cdot 2 \\
 &= -2x^5 - 4x^3 + x^4 + 2x^2 \\
 &= -2x^5 + x^4 - 4x^3 + 2x^2
 \end{aligned}$$

$$\begin{aligned}
 p) (x^2 + 2x + 1) \cdot (x + 5) &= x^2 \cdot x + x^2 \cdot 5 + 2x \cdot x + 2x \cdot 5 + x + 5 \\
 &= x^3 + 5x^2 + 2x^2 + 10x + x + 5 \\
 &= x^3 + 7x^2 + 11x + 5
 \end{aligned}$$

$$\begin{aligned}
 q) (x^2 + 3x + 5) \cdot (x^2 + 4x - 1) &= x^2 \cdot x^2 + x^2 \cdot 4x + x^2 \cdot (-1) + 3x \cdot x^2 \\
 &\quad + 3x \cdot 4x + 3x \cdot (-1) + 5x^2 + 5 \cdot 4x + 5 \cdot (-1) \\
 &= x^4 + 4x^3 - x^2 + 3x^3 + 12x^2 - 3x + 5x^2 + 20x - 5 \\
 &= x^4 + 7x^3 + 16x^2 + 17x - 5
 \end{aligned}$$

$$\begin{aligned}
 r) (-x + 4) \cdot (x^3 + 2x^2 - x + 5) \\
 &= -x \cdot x^3 + 2x^2 \cdot (-x) - x \cdot (-x) + 5 \cdot (-x) + 4x^3 + 4 \cdot 2x^2 - 4x + 4 \cdot 5 \\
 &= -x^4 - 2x^3 + x^2 - 5x + 4x^3 + 8x^2 - 4x + 20 \\
 &= -x^4 + 2x^3 + 9x^2 - 9x + 20
 \end{aligned}$$

$$\begin{aligned}
 3) a) (x + 4)^2 &= x^2 + 2 \cdot x \cdot 4 + 4^2 \\
 &= x^2 + 8x + 16
 \end{aligned}$$

$$\begin{aligned}
 b) (x - 7)^2 &= x^2 - 2 \cdot x \cdot 7 + 7^2 \\
 &= x^2 - 14x + 49
 \end{aligned}$$

$$c) (x + 3) \cdot (x - 3) = x^2 - 9$$

$$\begin{aligned}
 d) (2x + 5)^2 &= (2x)^2 + 2 \cdot 2x \cdot 5 + 5^2 \\
 &= 4x^2 + 20x + 25
 \end{aligned}$$

$$\begin{aligned}
 e) (3x - 7)^2 &= (3x)^2 - 2 \cdot 3x \cdot 7 + 7^2 \\
 &= 9x^2 - 42x + 49
 \end{aligned}$$

$$\begin{aligned}
 f) (3x + 1) \cdot (3x - 1) &= (3x)^2 - 1^2 \\
 &= 9x^2 - 1
 \end{aligned}$$

$$\begin{aligned}
 g) (2x^2 + x)^2 &= (2x^2)^2 + 2 \cdot 2x^2 \cdot x + x^2 \\
 &= 4x^4 + 4x^3 + x^2
 \end{aligned}$$

$$h) (x^2 - 2x)^2 = (x^2)^2 - 2 \cdot x^2 \cdot 2x + (2x)^2 \\ = x^4 - 4x^3 + 4x^2$$

$$i) (3x + 2y)^2 = (3x)^2 + 2 \cdot 3x \cdot 2y + (2y)^2 \\ = 9x^2 + 12xy + 4y^2$$

$$j) \left(\frac{1}{2}x + 7\right)^2 = \left(\frac{1}{2}x\right)^2 + 2 \cdot \frac{1}{2} \cdot 7x + 7^2 \\ = \frac{1}{4}x^2 + 7x + 49$$

$$k) (5x - x^2)^2 = (5x)^2 - 2 \cdot 5x \cdot x^2 + (x^2)^2 \\ = 25x^2 - 10x^3 + x^4 \\ = x^4 - 10x^3 + 25x^2$$

$$l) (7 - x)^2 = 49 - 2 \cdot 7 \cdot x + x^2 \\ = 49 - 14x + x^2 \\ = x^2 - 14x + 49$$

$$4) a) 5x + 2x \cdot (x + 7) - (x^2 + 2) \\ = 5x + 2x \cdot x + 2x \cdot 7 - x^2 - 2 \\ = 5x + 2x^2 + 14x - x^2 - 2 \\ = x^2 + 19x - 2$$

$$b) 3 \cdot (x + 1)^2 + 2x^3 - (x^3 + 2) \\ = 3 \cdot (x^2 + 2 \cdot x \cdot 1 + 1^2) + 2x^3 - x^3 - 2 \\ = 3(x^2 + 2x + 1) + 2x^3 - x^3 - 2 \\ = 3x^2 + 6x + 3 + 2x^3 - x^3 - 2 \\ = x^3 + 3x^2 + 6x + 1$$

$$c) x^2 \cdot (x + 1) + (x + 2)^2 \\ = x^2 \cdot x + x^2 \cdot 1 + (x^2 + 2 \cdot x \cdot 2 + 2^2) \\ = x^3 + x^2 + x^2 + 4x + 4 \\ = x^3 + 2x^2 + 4x + 4$$

$$\begin{aligned}
 d) & 3x + 2 \cdot (x+3)^2 + (3x-1)^2 \\
 & = 3x + 2 \cdot (x^2 + 2 \cdot x \cdot 3 + 3^2) + (3x)^2 - 2 \cdot 3x \cdot 1 + 1^2 \\
 & = 3x + 2x^2 + 12x + 18 + 9x^2 - 6x + 1 \\
 & = 11x^2 + 9x + 19
 \end{aligned}$$

$$\begin{aligned}
 e) & 3x + (x+2) \cdot (x-4) + 5x \\
 & = 3x + x \cdot x + x \cdot (-4) + 2 \cdot x + 2 \cdot (-4) + 5x \\
 & = 3x + x^2 - 4x + 2x - 8 + 5x \\
 & = x^2 + 6x - 8
 \end{aligned}$$

$$\begin{aligned}
 f) & 6x^2 + (x+2)^2 - 2x \cdot (5x+7) \\
 & = 6x^2 + (x^2 + 2 \cdot x \cdot 2 + 2^2) - (2x \cdot 5x + 2x \cdot 7) \\
 & = 6x^2 + x^2 + 4x + 4 - 10x^2 - 14x \\
 & = -3x^2 - 10x + 4
 \end{aligned}$$

$$\begin{aligned}
 g) & 6x^2 - 2x \cdot (5x+7) + 4x \\
 & = 6x^2 - (2x \cdot 5x + 2x \cdot 7) + 4x \\
 & = 6x^2 - 10x^2 - 14x + 4x \\
 & = -4x^2 - 10x
 \end{aligned}$$

$$\begin{aligned}
 h) & (x+2) \cdot (x^2+x+4) - (3x+9) \\
 & = x \cdot x^2 + x \cdot x + 4 \cdot x + 2 \cdot x^2 + 2 \cdot x + 2 \cdot 4 - (3x+9) \\
 & = x^3 + x^2 + 4x + 2x^2 + 2x + 8 - 3x - 9 \\
 & = x^3 + 3x^2 + 3x - 1
 \end{aligned}$$

$$\begin{aligned}
 i) & 4x - 3x \cdot (x+1)^2 + 9x \\
 & = 4x - 3x \cdot (x^2 + 2x + 1) + 9x \\
 & = 4x - (3x \cdot x^2 + 3x \cdot 2x + 3x) + 9x \\
 & = 4x - (3x^3 + 6x^2 + 3x) + 9x \\
 & = 4x - 3x^3 - 6x^2 - 3x + 9x \\
 & = -3x^3 - 6x^2 + 10x
 \end{aligned}$$

$$\begin{aligned}
 j) & x \cdot (x+2)^2 + 2x \cdot (x-1)^2 \\
 & = x \cdot (x^2 + 2 \cdot x \cdot 2 + 2^2) + 2x \cdot (x^2 - 2x \cdot 1 + 1) \\
 & = x \cdot (x^2 + 4x + 4) + 2x \cdot (x^2 - 2x + 1) \\
 & = x^3 + 4x^2 + 4x + 2x^3 - 4x^2 + 2x \\
 & = 3x^3 + 6x
 \end{aligned}$$

$$\begin{aligned}
 5) a) & x^2 + 6x + 9 = (x+3)^2 \\
 & \text{denn } \sqrt{x^2} = x \\
 & \quad \sqrt{9} = 3
 \end{aligned}$$

$$\begin{aligned}
 \text{Probe: } & (x+3)^2 = x^2 + 2 \cdot 3x + 3^2 \\
 & = x^2 + 6x + 9
 \end{aligned}$$

$$\begin{aligned}
 b) & x^2 - 10x + 25 = (x-5)^2 \\
 & \text{denn } \sqrt{x^2} = x \\
 & \quad \sqrt{25} = 5
 \end{aligned}$$

$$\begin{aligned}
 \text{Probe: } & (x-5)^2 = x^2 - 2 \cdot x \cdot 5 + 5^2 \\
 & = x^2 - 10x + 25
 \end{aligned}$$

$$\begin{aligned}
 c) & 4x^2 - 4x + 1 = (2x-1)^2 \\
 & \text{denn } \sqrt{4x^2} = 2x \\
 & \quad \sqrt{1} = 1
 \end{aligned}$$

$$\begin{aligned}
 \text{Probe: } & (2x-1)^2 = (2x)^2 - 2 \cdot 2x \cdot 1 + 1^2 \\
 & = 4x^2 - 4x + 1
 \end{aligned}$$

$$\begin{aligned}
 d) & x^2 - 81 = (x-9) \cdot (x+9) \\
 & \text{denn } \sqrt{x^2} = x \\
 & \quad \sqrt{81} = 9
 \end{aligned}$$

$$\text{Probe: } (x-9)(x+9) = x^2 - 9^2 = x^2 - 81$$

$$e) 9x^2 + 24x + 16 = (3x + 4)^2$$

$$\text{denn } \sqrt{9x^2} = 3x$$

$$\sqrt{16} = 4$$

$$\text{Probe: } (3x + 4)^2 = (3x)^2 + 2 \cdot 3x \cdot 4 + 4^2 \\ = 9x^2 + 24x + 16$$

$$f) x^2 - 2x + 1 = (x - 1)^2$$

$$\text{denn } \sqrt{x^2} = x$$

$$\sqrt{1} = 1$$

$$\text{Probe: } (x - 1)^2 = x^2 - 2x + 1$$

$$g) x^4 + 2x^2 + 1 = (x^2 + 1)^2$$

$$\text{denn } \sqrt{x^4} = x^2$$

$$\sqrt{1} = 1$$

$$\text{Probe: } (x^2 + 1)^2 = (x^2)^2 + 2 \cdot x^2 + 1 \\ = x^4 + 2x^2 + 1$$

$$h) 0,25x^2 + 5x + 25 = (0,5x + 5)^2$$

$$\text{denn } \sqrt{0,25x^2} = 0,5x$$

$$\sqrt{25} = 5$$

$$\text{Probe: } (0,5x + 5)^2 = (0,5x)^2 + 2 \cdot 0,5x \cdot 5 + 5^2 \\ = 0,25x^2 + 5x + 25$$

$$i) x^2 - 20x + 100 = (x - 10)^2$$

$$\text{denn: } \sqrt{x^2} = x$$

$$\sqrt{100} = 10$$

$$\text{Probe: } (x - 10)^2 = x^2 - 2 \cdot x \cdot 10 + 10^2 \\ = x^2 - 20x + 100$$

$$j) 4x^2 + 28x + 49 = (2x + 7)^2$$

$$\text{denn: } \sqrt{4x^2} = 2x$$

$$\sqrt{49} = 7$$

$$\text{Probe: } (2x + 7)^2 = (2x)^2 + 2 \cdot 2x \cdot 7 + 7^2 \\ = 4x^2 + 28x + 49$$

$$6/a) x^2 + 3x + 2 = (x+1) \cdot (x+2)$$

$$b) x^2 + 6x + 8 = (x+2) \cdot (x+4)$$

$$c) x^2 - 7x - 3 = (x-3) \cdot (x+1)$$

$$d) x^2 + 2x + 1 = (x+1) \cdot (x+1) = (x+1)^2$$

7)	$x+2$	Länge des neuen Grundstücks
	$x+2$	Breite des neuen Grundstücks

$$\begin{aligned}(x+2) \cdot (x+2) &= 49 \\(x+2)^2 &= 49 \quad | \sqrt{} \\x+2 &= 7 \\x &= 5\end{aligned}$$

Das alte Grundstück hatte eine Fläche
von $5 \cdot 5 = 25 \text{ m}^2$.