

39 Polynomien kertolasku

Harjoittele

486

$3+7$		
		$6+9$

a)

$$\begin{aligned} A &= (6+9) \cdot (3+7) \\ &= 15 \cdot 10 \\ &= 150 \end{aligned}$$

7	7·6	7·9
3	3·6	3·9
	6	9

b)

$$\begin{aligned}
 A &= 3 \cdot 6 + 7 \cdot 6 + 3 \cdot 9 + 7 \cdot 9 \\
 &= 18 + 42 = 27 + 63 \\
 &= 150
 \end{aligned}$$

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$$\begin{array}{c|c} x & x \cdot x \\ \hline 9 & \overline{9 \cdot x} \\ \hline & x + 10 \end{array}$$

$$\begin{aligned}
 A &= (x+10)(x+9) \\
 &= x \cdot x + x \cdot 9 + 10 \cdot x + 10 \cdot 9 \\
 &= x^2 + 9x + 10x + 90 \\
 &= x^2 + 19x + 90
 \end{aligned}$$

$$488 \quad a) (x+3)(x+8)$$

jokaisella kertojapolymin terminä on kerrottava jokainen takkopolynomien terä!

$$= X \cdot X + X \cdot 8 + 3 \cdot X + 3 \cdot 8$$

$$= x^2 + 8x + 3x + 24$$

$$= x^2 + 11x + 24$$

Lasketa samanmuotoiset yhteen

$$b) (x+4)(x+7)$$

$$= x \cdot x + 4 \cdot f + 4 \cdot x + 4 \cdot f$$

$$= x^2 + 7x + 4x + 28$$

$$= x^2 + 11x + 28$$

$$c) (x+5)(x+1)$$

$$= X \cdot X + X \cdot 1 + 5 \cdot X + 5 \cdot 1$$

$$= x^2 + x + 5x + 5$$

$$= x^2 + 6x + 5$$

$$d) (x+9)(x+9)$$

$$= x \cdot x + x \cdot 9 + 9 \cdot x + 9 \cdot 9$$

$$= x^2 + 9x + 9x + 87$$

$$= x^2 + 18x + 81$$

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s.87

489

a) $(2x+2)(3x+3)$

$$\begin{aligned} &= 2x \cdot 3x + 2x \cdot 3 + 2 \cdot 3x + 2 \cdot 3 \\ &= 6x^2 + 6x + 6x + 6 \\ &= 6x^2 + 12x + 6 \end{aligned}$$

b) $(7x+7)(7x+7)$

$$\begin{aligned} &= 7x \cdot 7x + 7x \cdot 7 + 7 \cdot 7x + 7 \cdot 7 \\ &= 49x^2 + 49x + 49x + 49 \\ &= 49x^2 + 98x + 49 \end{aligned}$$

c) $(x+5)(2x+1)$

$$\begin{aligned} &= x \cdot 2x + x \cdot 1 + 5 \cdot 2x + 5 \cdot 1 \\ &= 2x^2 + x + 10x + 5 \\ &= 2x^2 + 11x + 5 \end{aligned}$$

d) $(3x+5)(6x+4)$

$$\begin{aligned} &= 3x \cdot 6x + 3x \cdot 4 + 5 \cdot 6x + 5 \cdot 4 \\ &= 18x^2 + 12x + 30x + 20 \\ &= 18x^2 + 42x + 20 \end{aligned}$$

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S. 87

490

$$a) (x+1)(x+1)$$

$$\begin{aligned} &= x \cdot x + x \cdot 1 + 1 \cdot x + 1 \cdot 1 \\ &= x^2 + x + x + 1 \\ &= x^2 + 2x + 1 \end{aligned}$$

$$b) (x+1)(x-1)$$

$$\begin{aligned} &= x \cdot x - x \cdot 1 + 1 \cdot x - 1 \cdot 1 \\ &= x^2 - x + x - 1 \\ &= x^2 - 1 \end{aligned}$$

$$c) (x-1)(x+1)$$

$$\begin{aligned} &= x \cdot x + x \cdot 1 - 1 \cdot x - 1 \cdot 1 \\ &= x^2 + x - x - 1 \\ &= x^2 - 1 \end{aligned}$$

$$d) (x-1)(x-1)$$

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

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$$a) (x-8)(x+8)$$

$$\begin{aligned} &= x \cdot x + x \cdot 8 - 8 \cdot x - 8 \cdot 8 \\ &= x^2 - 64 \end{aligned}$$

$$b) (x-6)(x-7)$$

$$\begin{aligned} &= x \cdot x - x \cdot 7 - 6 \cdot x + 6 \cdot 7 \\ &= x^2 - 7x - 6x + 42 \\ &= x^2 - 13x + 42 \end{aligned}$$

$$c) (x-5)(x+6)$$

$$\begin{aligned} &= x \cdot x + x \cdot 6 - 5 \cdot x - 5 \cdot 6 \\ &= x^2 + 6x - 5x - 30 \\ &= x^2 + x - 30 \end{aligned}$$

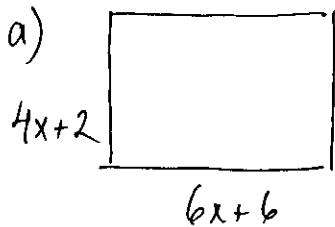
$$d) (x+2)(x-9)$$

$$\begin{aligned} &= x \cdot x - x \cdot 9 + 2 \cdot x - 2 \cdot 9 \\ &= x^2 - 9x + 2x - 18 \\ &= x^2 - 7x - 18 \end{aligned}$$

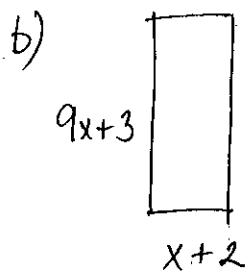
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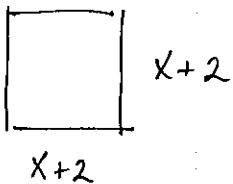


$$\begin{aligned}
 A &= (4x+2)(6x+6) \\
 &= 4x \cdot 6x + 4x \cdot 6 + 2 \cdot 6x + 2 \cdot 6 \\
 &= 24x^2 + 24x + 12x + 12 \\
 &= 24x^2 + 36x + 12
 \end{aligned}$$



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

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

494

a) $(2x-9)(x-8)$

$$\begin{aligned}
 &= 2x \cdot x + 2x \cdot (-8) - 9 \cdot x + 9 \cdot 8 \\
 &= 2x^2 - 16x - 9x + 72 \\
 &= 2x^2 - 25x + 72
 \end{aligned}$$

b) $(-6x+5)(3x-1)$

$$\begin{aligned}
 &= -6x \cdot 3x + 6x \cdot 1 + 5 \cdot 3x - 5 \cdot 1 \\
 &= -18x^2 + 6x + 15x - 5 \\
 &= -18x^2 + 21x - 5
 \end{aligned}$$

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495

$$a) (4x^2 + x)(x - 7)$$

$$\begin{aligned} &= 4x^2 \cdot x - 4x^2 \cdot 7 + x \cdot x - x \cdot 7 \\ &= 4x^3 - 28x^2 + x^2 - 7x \\ &= 4x^3 - 27x^2 - 7x \end{aligned}$$

$$b) (2x^2 + 1)(-x + 9)$$

$$\begin{aligned} &= -2x^2 \cdot x + 2x^2 \cdot 9 - 1 \cdot x + 1 \cdot 9 \\ &= -2x^3 + 18x^2 - x + 9 \quad \text{VALMIS!} \end{aligned}$$

~~= 27x^3 + 9~~

Vaihda etumerkit
↓ ↓

496

$$a) \text{ Summa } (7x+5) + (2x-3)$$

$$\begin{aligned} &= 7x + 5 + 2x - 3 \\ &= 9x + 2 \end{aligned}$$

$$b) \text{ erotus } (7x+5) - (2x-3)$$

$$\begin{aligned} &= 7x + 5 - 2x + 3 \\ &= 5x + 8 \end{aligned}$$

$$c) \text{ tulo } (7x+5)(2x-3)$$

$$\begin{aligned} &= 7x \cdot 2x - 7x \cdot 3 + 5 \cdot 2x - 5 \cdot 3 \\ &= 14x^2 - 21x + 10x - 15 \\ &= 14x^2 - 11x - 15 \end{aligned}$$

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$$a) 9x^2 - 16 \quad \text{Päättely:} \begin{array}{l} \bullet \text{ binomeissa tulee olla termiit } 3x \\ \text{koska } 3x \cdot 3x = 9x^2 \\ \bullet \text{ Vakioterminien tulee olla } +4 \text{ ja } -4 \\ \text{koska } 4 \cdot (-4) = -16 \end{array}$$

$$V: (3x+4) \text{ ja } (3x-4)$$

$$b) 12x^2 - 7x - 12 \quad \bullet \quad 3x \cdot 4x = 12x^2 \text{ ja } 3 \cdot (-4) \text{ tai } (-3 \cdot 4) \text{ on } -12$$

$$\begin{array}{l} \text{Kokonilaan } (3x-4)(4x+3) \\ = 12x^2 + 9x - 16x - 12 \\ = 12x^2 - 7x - 12 \end{array}$$

$$\begin{array}{l} (3x+4)(4x-3) \\ = 12x^2 - 9x + 16x - 12 \\ = 12x^2 + 7x - 12 \end{array}$$

$$V: (3x-4) \text{ ja } (4x+3)$$