

# Algebraické úpravy s roznásobením

řešení

1.

Upravte výraz:  $3x - 3[2(x - 2) - x] =$

$$3x - 3[2(x - 2) - x] = 3x - 3[2x - 4 - x] = 3x - 3[x - 4] = 3x - 3x + 12 = \underline{\underline{12}}$$

2.

Upravte výraz:  $17x - 2[5(2x - 1) + 3(2 - x)] =$

$$\begin{aligned} 17x - 2[5(2x - 1) + 3(2 - x)] &= 17x - 2[10x - 5 + 6 - 3x] = 17x - 2[7x + 1] = \\ &= 17x - 14x - 2 = \underline{\underline{3x - 2}} \end{aligned}$$

3.

Upravte výraz:  $8x - 6[7x - 3(2x - 3) - 2] =$

$$\begin{aligned} 8x - 6[7x - 3(2x - 3) - 2] &= 8x - 6[7x - 6x + 9 - 2] = 8x - 6[x + 7] = 8x - 6x - 42 = \\ &= \underline{\underline{2x - 42}} \end{aligned}$$

4.

Upravte výraz:  $(3x - 2)[12x - (2x - 3) \cdot 5 - 3(3 - x)] =$

$$\begin{aligned} (3x - 2)[12x - (2x - 3) \cdot 5 - 3(3 - x)] &= (3x - 2)[12x - 10x + 15 - 9 + 3x] = \\ &= (3x - 2)[5x + 6] = 15x^2 + 18x - 10x - 12 = \underline{\underline{15x^2 + 8x - 12}} \end{aligned}$$

5.

Upravte výraz:  $(4x + 5)(2x + 1) + (3x + 7)(5x + 2) =$

$$\begin{aligned}(4x + 5)(2x + 1) + (3x + 7)(5x + 2) &= (8x^2 + 4x + 10x + 5) + (15x^2 + 6x + 35x + 14) = \\ &= (8x^2 + 14x + 5) + (15x^2 + 41x + 14) = 8x^2 + 14x + 5 + 15x^2 + 41x + 14 = \\ &= \underline{\underline{23x^2 + 55x + 19}}\end{aligned}$$

6.

Upravte výraz:  $(3x - 2)(4x + 5) - (7x + 1)(5x - 2) =$

$$\begin{aligned}(3x - 2)(4x + 5) - (7x + 1)(5x - 2) &= (12x^2 + 15x - 8x - 10) - (35x^2 - 14x + 5x - 2) = \\ &= (12x^2 + 7x - 10) - (35x^2 - 9x - 2) = 12x^2 + 7x - 10 - 35x^2 + 9x + 2 = \\ &= \underline{\underline{-23x^2 + 16x - 8}}\end{aligned}$$

7.

Upravte výraz:  $(5x - 2)(7 - x) - (8 - 3x)(5 - 2x) =$

$$\begin{aligned}(5x - 2)(7 - x) - (8 - 3x)(5 - 2x) &= (35x - 5x^2 - 14 + 2x) - (40 - 16x - 15x + 6x^2) = \\ &= (-5x^2 + 37x - 14) - (6x^2 - 31x + 40) = -5x^2 + 37x - 14 - 6x^2 + 31x - 40 = \\ &= \underline{\underline{-11x^2 + 68x - 54}}\end{aligned}$$

8.

Upravte výraz:  $(2 - x)(3 - x) - (3 - x)(1 - x) - (x + 1)(x - 2) =$

$$\begin{aligned}
& (2-x)(3-x) - (3-x)(1-x) - (x+1)(x-2) = (6-2x-3x+x^2) - (3-3x-x+x^2) - \\
& - (x^2-2x+x-2) = (x^2-5x+6) - (x^2-4x+3) - (x^2-x-2) = x^2-5x+6-x^2+ \\
& +4x-3-x^2+x+2 = \underline{\underline{-x^2+5}}
\end{aligned}$$

9.

$$\begin{aligned}
& \text{Upravte výraz: } 2(x-1)(x+3) - (5-x)(x+4) - 3(1-x)(x+2) = \\
& 2(x-1)(x+3) - (5-x)(x+4) - 3(1-x)(x+2) = 2(x^2+3x-x-3) - (5x+20-x^2- \\
& -4x) - 3(x+2-x^2-2x) = 2(x^2+2x-3) - (-x^2+x+20) - 3(-x^2-x+2) = \\
& = 2x^2+4x-6+x^2-x-20+3x^2+3x-6 = \underline{\underline{6x^2+6x-32}}
\end{aligned}$$

10.

$$\begin{aligned}
& \text{Upravte výraz: } 3(x-2)(3-4x) - (-x)(5-2x) - 7(x+1)(2x-3) = \\
& 3(x-2)(3-4x) - (-x)(5-2x) - 7(x+1)(2x-3) = 3(3x-4x^2-6+8x) - (-5x+ \\
& +2x^2) - 7(2x^2-3x+2x-3) = 3(-4x^2+11x-6) - (2x^2-5x) - 7(2x^2-x-3) = \\
& = -12x^2+33x-18-2x^2+5x-14x^2+7x+21 = \underline{\underline{-28x^2+45x+3}}
\end{aligned}$$

11.

$$\begin{aligned}
& \text{Upravte výraz: } 5x - 2[(-4x)(6x-3) - (x-5)(1-20x)] = \\
& 5x - 2[(-4x)(6x-3) - (x-5)(1-20x)] = \\
& = 5x - 2[-24x^2+12x - (x-20x^2-5+100x)] = \\
& = 5x - 2[-24x^2+12x - (-20x^2+101x-5)] =
\end{aligned}$$

$$\begin{aligned}
&= 5x - 2[-24x^2 + 12x + 20x^2 - 101x + 5] = \\
&= 5x - 2[-4x^2 - 89x + 5] = 5x + 8x^2 + 178x - 10 = \underline{\underline{8x^2 + 183x - 10}}
\end{aligned}$$

**12.**

$$\begin{aligned}
&\text{Upravte výraz: } [(3x - 5)(5x - 3) - 15x^2] \cdot [(7x - 2)(2x - 7) - 14x^2] = \\
&[(3x - 5)(5x - 3) - 15x^2] \cdot [(7x - 2)(2x - 7) - 14x^2] = \\
&= [(15x^2 - 9x - 25x + 15) - 15x^2] \cdot [(14x^2 - 49x - 4x + 14) - 14x^2] = \\
&= [15x^2 - 9x - 25x + 15 - 15x^2] \cdot [14x^2 - 49x - 4x + 14 - 14x^2] = \\
&= [15 - 34x] \cdot [14 - 53x] = 210 - 795x - 476x + 1802x^2 = \underline{\underline{1802x^2 - 1271x + 210}}
\end{aligned}$$

**13.**

$$\begin{aligned}
&\text{Upravte výraz: } (2x - 3) \cdot [(-3)(5 - 2x)(-3x) - (-1)(3x - 2)(-2x)] = \\
&(2x - 3) \cdot [(-3)(5 - 2x)(-3x) - (-1)(3x - 2)(-2x)] = \\
&= (2x - 3) \cdot [3 \cdot (5 - 2x) \cdot 3x - (3x - 2) \cdot 2x] = \\
&= (2x - 3) \cdot [(15 - 6x) \cdot 3x - (6x^2 - 4x)] = \\
&= (2x - 3) \cdot [(45x - 18x^2) - 6x^2 + 4x] = \\
&= (2x - 3) \cdot [-24x^2 + 49x] = -48x^3 + 98x^2 + 72x^2 - 147x = \underline{\underline{-48x^3 + 170x^2 - 147x}}
\end{aligned}$$

**14.**

$$\begin{aligned}
&\text{Upravte výraz: } (x - 1)(x - 2)(x - 3) - (x - 2)(x - 5) = \\
&(x - 1)(x - 2)(x - 3) - (x - 2)(x - 5) = (x^2 - 2x - x + 2)(x - 3) - (x^2 - 5x - 2x + 10) =
\end{aligned}$$

$$\begin{aligned}
&= (x^2 - 3x + 2)(x - 3) - (x^2 - 7x + 10) = \\
&= (x^3 - 3x^2 - 3x^2 + 9x + 2x - 6) - (x^2 - 7x + 10) = x^3 - 6x^2 + 11x - 6 - x^2 + 7x - 10 = \\
&= \underline{\underline{x^3 - 7x^2 + 18x - 16}}
\end{aligned}$$

15.

$$\begin{aligned}
&\text{Upravte výraz: } (x + 4)(x - 2)(x + 1) - (x + 1)(x - 2)(x + 3) = \\
&(x + 4)(x - 2)(x + 1) - (x + 1)(x - 2)(x + 3) = \\
&= (x^2 - 2x + 4x - 8)(x + 1) - (x^2 - 2x + x - 2)(x + 3) = \\
&= (x^2 + 2x - 8)(x + 1) - (x^2 - x - 2)(x + 3) = \\
&= (x^3 + x^2 + 2x^2 + 2x - 8x - 8) - (x^3 + 3x^2 - x^2 - 3x - 2x - 6) = \\
&= x^3 + 3x^2 - 6x - 8 - x^3 - 2x^2 + 5x + 6 = \underline{\underline{x^2 - x - 2}}
\end{aligned}$$

16.

$$\begin{aligned}
&\text{Upravte výraz: } (x + 1)(2x - 1) - 3[x + 1 - (2x - 4)] - 4(x + 2)(x - 3) = \\
&(x + 1)(2x - 1) - 3[x + 1 - (2x - 4)] - 4(x + 2)(x - 3) = \\
&= 2x^2 - x + 2x - 1 - 3[x + 1 - 2x + 4] - 4(x^2 - 3x + 2x - 6) = \\
&= 2x^2 + x - 1 - 3[-x + 5] - 4(x^2 - x - 6) = \\
&= 2x^2 + x - 1 + 3x - 15 - 4x^2 + 4x + 24 = \underline{\underline{-2x^2 + 8x + 8}}
\end{aligned}$$

17.

$$\begin{aligned}
&\text{Upravte výraz: } 5(x + 2)(3x - 3) - 2[x^2 - (2x - 1)(2 - x)] - 2(x - 1)(x + 7) = \\
&5(x + 2)(3x - 3) - 2[x^2 - (2x - 1)(2 - x)] - 2(x - 1)(x + 7) =
\end{aligned}$$

$$\begin{aligned}
&= 5(3x^2 - 3x + 6x - 6) - 2[x^2 - (4x - 2x^2 - 2 + x)] - 2(x^2 + 7x - x - 7) = \\
&= 5(3x^2 + 3x - 6) - 2[x^2 - (-2x^2 + 5x - 2)] - 2(x^2 + 6x - 7) = \\
&= 15x^2 + 15x - 30 - 2[x^2 + 2x^2 - 5x + 2] - 2x^2 - 12x + 14 = \\
&= 13x^2 + 3x - 16 - 2[3x^2 - 5x + 2] = 13x^2 + 3x - 16 - 6x^2 + 10x - 4 = \underline{\underline{7x^2 + 13x - 20}}
\end{aligned}$$

**18.**

$$\begin{aligned}
&\text{Upravte výraz: } (2x - 7) \cdot (-3) \cdot (-2) - 3[(x + 1)(5 - x) + x^2] = \\
&(2x - 7) \cdot (-3) \cdot (-2) - 3[(x + 1)(5 - x) + x^2] = \\
&= 6 \cdot (2x - 7) - 3[5x - x^2 + 5 - x + x^2] = \\
&= 12x - 42 - 3[4x + 5] = 12x - 42 - 12x - 15 = \underline{\underline{-57}}
\end{aligned}$$

**19.**

$$\begin{aligned}
&\text{Upravte výraz: } 3(x + 1)(y + 2)(z - 3) - 2(x - 2)(y - 1)(z + 3) = \\
&3(x + 1)(y + 2)(z - 3) - 2(x - 2)(y - 1)(z + 3) = \\
&= 3(xy + 2x + y + 2)(z - 3) - 2(xy - x - 2y + 2)(z + 3) = \\
&= 3(xyz - 3xy + 2xz - 6x + yz - 3y + 2z - 6) - 2(xyz + 3xy - xz - 3x - 2yz - 6y + \\
&+ 2z + 6) = 3xyz - 9xy + 6xz - 18x + 3yz - 9y + 6z - 18 - 2xyz - 6xy + 2xz + 6x + \\
&+ 4yz + 12y - 4z - 12 = \underline{\underline{xyz - 15xy + 8xz - 12x + 7yz + 3y + 2z - 30}}
\end{aligned}$$

**20.**

$$\text{Upravte výraz: } 5x \cdot (x + y) - x \cdot [y \cdot (x + 2) - x \cdot (y - 3) - 5(x + y)] - 3y(x - y) =$$

$$\begin{aligned} & 5x \cdot (x + y) - x \cdot [y \cdot (x + 2) - x \cdot (y - 3) - 5(x + y)] - 3y(x - y) = \\ & = 5x^2 + 5xy - x \cdot [xy + 2y - xy + 3x - 5x - 5y] - 3xy + 3y^2 = \\ & = 5x^2 + 5xy - x \cdot [-2x - 3y] - 3xy + 3y^2 = 5x^2 + 5xy + 2x^2 + 3xy - 3xy + 3y^2 = \\ & = \underline{\underline{7x^2 + 5xy + 3y^2}} \end{aligned}$$