

7. Násobení mnohočlenů

Násobení mnohočlenu jednočlenem

1. Vynásob jednočleny:

a) $3x \cdot 5x^2 = 15x^3$

c) $2z^2 \cdot z = 2z^3$

e) $6t^4 \cdot 2t^2 = 12t^6$

g) $0,02s^4 \cdot 0,3s^5 = 0,006s^9$

b) $7y^3 \cdot (-2y^2) = -14y^5$

d) $(-4u) \cdot u^3 = -4u^4$

f) $-3r^2 \cdot 2r^2 = -6r^4$

h) $-\frac{2}{9}p^4 \cdot \frac{3}{4}p^6 = -\frac{1}{3} \cdot \frac{1}{2} p^{10} = -\frac{1}{6}p^{10}$

2. Vynásob jednočleny:

a) $4x^2y \cdot 3y^2z = 12x^2y^3z$

b) $2xy^2 \cdot 3y^2z = 6xy^4z$

c) $-2a^2b^3 \cdot (-ab^2) \cdot (-3ab^3) = -6a^4b^8$

d) $3ab^2 \cdot (-4ab^3) \cdot 5a^3b = -60a^5b^6$

e) $5k^4l^3 \cdot (-4k^5l^4) = -20k^9l^7$

f) $0,1m^3o \cdot (-n^2o^3) \cdot (-0,2m^3n) = +0,02m^6n^3o^4$

g) $\frac{2}{5}t^2u^3 \cdot 1\frac{1}{2}tu^4 \cdot 1\frac{2}{3}t^2 = \frac{2}{5} \cdot \frac{3}{2} \cdot \frac{5}{3} t^5u^7 = 1t^5u^7$

h) $\frac{2}{3}p^2r^4 \cdot 0,25p^3r = \frac{2}{3} \cdot \frac{1}{4} p^5r^5 = \frac{1}{6}p^5r^5$

3. Vynásob:

a) $4 \cdot (3a + 5) = 12a + 20$

c) $3 \cdot (2b - 8) = 6b - 24$

e) $(4c^2 + c) \cdot 2 = 8c^2 + 2c$

g) $(5e^2 - 3e + 5) \cdot 3 = 15e^2 - 9e + 15$

b) $-2 \cdot (7x + 4) = -14x - 8$

d) $-5 \cdot (3y - 1) = -15y + 5$

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

h) $(-4z^3 + 3z^2 - 4) \cdot (-4) = 16z^3 - 12z^2 + 16$

4. Vypočítej (dodržuj pořadí početních operací):

a) $3(2a + 3b) + 4(a - 2b) = 6a + 9b + 4a - 8b = 10a + b$

b) $2(3c - 2d) + 3(-5d + 4c) = 6c - 4d - 15d + 12c = 18c - 19d$

c) $7(e - 2g) - 2(3g - e) = 7e - 14g - 6g + 2e = 9e - 20g$

d) $(4h + 2j) \cdot 2 + (7h - 2j) \cdot 3 = 8h + 4j + 21h - 6j = 29h - 2j$

e) $(-5) \cdot (3k - m) - 2(4k + 2m) = -15k + 5m - 8k - 4m = -23k + m$

f) $-6(-7m + 3n) - (3n + 2m) \cdot (-2) = 42m - 18n + 6n + 4m = 46m - 12n$

g) $2p(3p^2 + p) + (p + 4) \cdot 3p^2 = 6p^3 + 2p^2 + 3p^3 + 12p^2 = 9p^3 + 14p^2$

h) $3r^2(r - 7) - (4r^2 + 3) \cdot (-r) = 3r^3 - 21r^2 + 4r^3 + 3r = 7r^3 - 21r^2 + 3r$

* 5. Vypočítej (dodržuj pořadí početních operací a umístění závorek):

a) $2a[3a - 2(a - 3)] = 2a \cdot [3a - 2a + 6] = 2a \cdot (a + 6) = \underline{\underline{2a^2 + 12a}}$

$$\begin{aligned} \text{b) } 3b[2b - 3(2b + 1) - 4(3 - b)] &= \\ &= 3b \cdot [2b - 6b - 3 - 12 + 4b] = \\ &= 3b \cdot [-11] = \underline{\underline{-33b}} \end{aligned}$$

$$\begin{aligned} \text{c) } 4c^2 - 3c[2(c - 3) - 5(-3 - 2c) + 2] &= \\ &= 4c^2 - 3c \cdot [2c - 6 + 15 + 10c + 2] = \\ &= 4c^2 - 3c \cdot [12c + 11] = \\ &= 4c^2 - 36c^2 - 33c = \underline{\underline{-32c^2 - 33c}} \end{aligned}$$

$$\begin{aligned} \text{d) } 3(2d^2 + 5) - 4d[5(3 - d) + 3(2d - 3)] - (d + 5)(-4d) &= \\ &= 6d^2 + 15 - 4d[15 - 5d + 6d - 9] + 4d^2 + 20d = \\ &= 6d^2 + 15 - 4d \cdot (6 + d) + 4d^2 + 20d = \\ &= 6d^2 + 15 - 24d - 4d^2 + 4d^2 + 20d = \\ &= 6d^2 - 4d + 15 \end{aligned}$$

$$\text{e) } -4e[5e - 4(2e - 1)] = -4e[5e - 8e + 4] = -20e^2 + 32e^2 - 16e = 12e^2 - 16e$$

$$\text{f) } -2f[3f - 4(1 - 2f)] + f(3 + f) = -2f \cdot [3f - 4 + 8f + 3f + f^2] = -6f^2 + 8f - 16f^2 - 6f^2 - 2f^3 - 2f^3 - 28f^2 + 8f$$

$$\text{g) } 7g - 4g[5g + 2(3 - 2g)] + 5g^2 = 7g - 4g \cdot [5g + 6 - 4g] + 5g^2 = 7g - 20g^2 - 24g + 16g^2 + 5g^2 = 1g^2 - 17g$$

$$\begin{aligned} \text{h) } (2h - 3)(-2h) + h[4h - 5(h + 3) + 8] - (3h - 4)(-h) &= -4h^2 + 6h + h \cdot [4h - 5h - 15 + 8] + 3h^2 - 4h = \\ &= -4h^2 + 6h + 4h^2 - 5h^2 - 7h + 3h^2 - 4h = -2h^2 - 5h \end{aligned}$$

6. Porovnej obvody čtverce a obdélníku. Čtverec má délku strany a cm. Obdélník má délku $(a + 4)$ cm a šířku $(a - 5)$ cm. Urči nejmenší délku stran čtverce, aby byly rozměry obou obrazců celé centimetry.

$$\begin{aligned} P_1 &= 4a & P_2 &= 2 \cdot (a + 4 + a - 5) \\ & & P_2 &= 2 \cdot (2a - 1) \\ & & P_2 &= 4a - 2 \end{aligned}$$

$$a = 6 \text{ cm}$$

Násobení mnohočlenů mnohočlenem

1. Vynásob a výsledné mnohočleny uspořádej sestupně:

$$\text{a) } (x + 5)(x - 2) = x^2 + 3x - 10$$

$$\text{b) } (y + 3)(y - 4) = y^2 - y - 12$$

$$\text{c) } (z - 4)(z + 1) = z^2 - 3z - 4$$

$$\text{d) } (2t - 5)(t + 2) = 2t^2 - 3t - 10$$

$$\text{e) } (u^2 + 3)(u - 2) = u^3 - 2u^2 + 3u - 6$$

$$\text{f) } (-v + 4)(v^2 + 5) = -v^3 + 4v^2 - 5v + 20$$

$$\text{g) } (3r - r^2)(r - 2) = 3r^2 - 6r - r^3 + 2r^2 = -r^3 + 5r^2 - 6r$$

$$\text{h) } (3s^2 - 2s)(-4s - 7) = -12s^3 - 21s^2 + 8s^2 + 14s = -12s^3 - 13s^2 + 14s$$

2. Vynásob mnohočleny:

$$a) (r^2 + 2r - 3)(r - 1) = \underline{\underline{r^3 + 2r^2 - 3r - r^2 - 2r + 3 = r^3 + r^2 - 5r + 3}}$$

$$b) (s + 2)(3s^2 - s + 5) = \underline{\underline{s^3 - s^2 + 5s + 6s^2 - 2s + 10 = s^3 + 5s^2 + 3s + 10}}$$

$$c) (3t^2 - t + 4)(2t^2 - 5) = \underline{\underline{6t^4 - 15t^2 - 2t^3 + 5t + 8t^2 - 20 = 6t^4 - 2t^3 - 7t^2 + 5t - 20}}$$

$$d) (u^2 + 5u - 4)(-u + 3) = \underline{\underline{-u^3 + 3u^2 - 5u^2 + 15u + 4u - 12 = -u^3 - 2u^2 + 19u - 12}}$$

$$e) (2uv^2 + uv - 2)(u^2v + uv - 3u) =$$

$$f) (3x^2 + 2x^2 - x)(x - 2) =$$

$$g) (y^2 + 2y + 4)(y - 2) =$$

$$h) (z^2 - 3z + 9)(z + 3) =$$

3. Vynásob mnohočleny:

$$a) (3k + 2l)(kl - 2l) = \underline{\underline{3k^2l - 6kl + 2kl^2 - 4l^2}}$$

$$b) (2m^2 + 3)(4m^2 - 5) = \underline{\underline{8m^4 + 2m^2 - 15}}$$

$$* c) (4n + 1) \cdot 3n \cdot (2n + 3) = 3n \cdot (8n^2 + 14n + 3) = \underline{\underline{24n^3 + 42n^2 + 9n}}$$

$$* d) (-3p + q)(-pq) \cdot (p^2 + q) = -pq \cdot (-3p^3 - 3pq + qp^2 + q^2) = \underline{\underline{3p^4q + 3p^2q^2 - p^3q^2 - pq^3}}$$

$$e) (7r - 3r^2)(-2r - 5r^2) =$$

$$g) (u^2 - v)(2uv - 2v) =$$

$$f) (s^2 - st)(st^2 + s) =$$

$$h) (3z^2 - 1)(z^2 + 2z) =$$

4. Vynásob:

$$a) (2ab + a)(b + 3ab) = \underline{\underline{2ab^2 + 6a^2b^2 + ab + 3a^2b}}$$

$$b) (3c^2 - 2d)(-3c + 4d) = \underline{\underline{-9c^3 + 12c^2d + 6cd - 8d^2}}$$

$$\begin{aligned} * c) (2e - 3)(4 - 3e)(1 + e) &= (1 + e) \cdot (12e - 6e^2 - 12 + 9e) = (1 + e) \cdot (-6e^2 + 21e - 12) = \\ &= \underline{\underline{-6e^3 + 21e^2 - 12e - 6e^2 + 21e^2 - 12e}} = \underline{\underline{-6e^3 + 15e^2 + 9e - 12}} \end{aligned}$$

$$\begin{aligned} * d) (5ef + e)(f - 2e)(3e + f) &= (3e + f) \cdot (5ef^2 - 10e^2f + ef - 2e^2) = \underline{\underline{15e^2f^2 - 30e^3f + 3e^2f - 6e^3 + 5ef^3 - 10e^2f^2 + ef^2 - 2e^2f}} = \\ &= \underline{\underline{5e^2f^2 + ef^3 - 30e^3f - 6e^3 + 5ef^3 + ef^2}} \end{aligned}$$

$$* e) (k - 2)(3 - k)(1 + k) =$$

$$* g) (y - 2)(y^2 + 4)(y + 2) =$$

$$* f) (2m - 3)(2 - 3m)(3 + 2m) =$$

$$* h) (q^2 + 3)(2 - q)(4 - q^2) =$$

5. Vypočítej součin součtu a rozdílu výrazů $(3a + 2b)$ a $(4a - b)$.

$$\begin{aligned} [(3a + 2b) + (4a - b)] \cdot [(3a + 2b) - (4a - b)] &= \\ (7a + b) \cdot (-a + 3b) &= \underline{\underline{-7a^2 + 21ab - ab + 3b^2}} = \underline{\underline{-7a^2 + 20ab + 3b^2}} \end{aligned}$$

* 6. Vypočítej:

$$a) (a + 3)(a - 2) + (a - 4)(a + 1) = (a^2 + a - 6) + (a^2 - 3a - 4) = \underline{\underline{2a^2 - 2a - 10}}$$

$$\begin{aligned} b) (a + 3)[(a - 2) + (a - 4)(a + 1)] &= (a + 3) \cdot [a - 2 + a^2 - 3a - 4] = (a + 3) \cdot (a^2 - 2a - 6) = \\ &= \underline{\underline{a^3 - 2a^2 - 6a + 3a^2 - 6a - 18}} = \underline{\underline{a^3 + a^2 - 12a - 18}} \end{aligned}$$