8. Rozklad mnohočlenů na součin

Vytýkáním

1. Vytkni z mnohočlenů společného dělitele:

a) $15x - 20y = 5(3x - 4y)$

b) $18t^2 + 15t - 12 = 3(6t^2 - 5t - 4)$

c) $9u^2 - 18u^3 + 9 = 9(u^2 - 2u^3 + 1)$

d) $21z - 14z^2 + 42 = 7(3z - 2z^2 + 6)$

e) $-30k^4 - 24k^2 - 36 = -6(5k^4 + 4k^2 + 6)$

f) $-48p^2 - 32p - 64 = -16(3p^2 + 2p + 4)$

g) $52m^3 + 39n^2 - 26p = 13(m^3 + 3n^2 - 2p)$

h) $144a^2c - 72b^2d^2 + 108bc = 12(12a^2c - 6b^2d^2 + 9c) = 36(4a^2c - 2b^2d^2 + 3c)$

2. Uprav na součin vytýkáním:

a) $3x^3 + 5x^2 - 7x = x(3x^2 + 5x - 7)$

b) $9y^3 - 4y^2 - y = y(9y^2 - 4y - 1)$

c) $2z^4 - 3z^2 = z^2(2z^2 - 3)$

d) $-5u^4 - 3u^3 - 7u = -u(5u^3 + 3u^2 + 7)$

e) $4a^2b - 10ab - 13ab^2 = ab(4a - 10 - 13b)$

f) $6c^2de^3 - 5c^3d^2e^2 - c^2de^2 = c^2de^2(6e - 5cd - 1)$

g) $-4k^3m^2 - 3k^2m^3 - 7k^3m^3 = -k^2m^2(4k + 3m + 7km)$

h) $4p^5r^3s^2 + 5p^3rs^5 - 7p^2r^3s^3 = p^2rs^2(4p^3r + 5ps^3 - 7r^2s)$

3. Uprav na součin vytýkáním:

a) $6p^3 - 3p^2 + 9p = 3p(2p^2 - p + 3)$

b) $-16s^4 + 8s^3 + 12s^2 = 4s^2(-4s^2 + 2s + 3)$

c) $15k^3m + 40k^2m^3 + 35km^3 = 5km(3k^2 + 8km^2 + 7m^2)$

d) $-48p^3r^2s - 32pr^3s^2 - 56p^2rs^3 = -8prs(6p^2r + 4r^2s + 7ps^2)$

e) $75x^3y^2z^4 + 105x^4y^2z^3 + 60x^2y^3z = 15x^2y^2z(5xz^3 + 7x^2z^2 + 4y)$

f) $-105t^2u^3v - 84t^3uv^2 - 56t^2u^2v = -7t^2uv(15u^2 + 12tv + 8v)$

4. Vytkni stejné dvojčleny:

a) $3(a - 4) + b(a - 4) = (a - 4)(3 + b)$

b) $c(d + 2) - 5(d + 2) = (d + 2)(c - 5)$

c) $3k(m + 2) - 4(m + 2) = (m + 2)(3k - 4)$

d) $5f(2g + 3) + 2h(2g + 3) = (2g + 3)(5f + 2h)$

e) $s(r + 5) + (r + 5) \cdot 3 = (r + 5)(s + 3)$

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

g) $2d(3e + f) - g(3e + f) = (3e + f)(2d - g)$

i) $(1 + y^2) \cdot 4 - (y^2 + 1) \cdot z = (1 + y^2)(4 - z)$

5. Uprav vytýkáním:

a) $z(x + 3) + (x + 3) = (x + 3)(z + 1)$

b) $3k(m - 2) + (m - 2) = (m - 2)(3k + 1)$

c) $d(d + 4) + d(d + 4) = (d + 4)(1 + d)$

d) $(n - 7) - o(n - 7) = (n - 7)(1 - o)$

e) $a^2(b + 2) + (2 + b) = (b + 2)(a^2 + 1)$

f) $2s(s - 3) - 3 + s = -2s(3 - s) - (3 - s) = (3 - s)(-2s - 1) = (s - 3)(2s + 1)$

g) $r(p - 8) - p + 8 = (p - 8)(r - 1)$

h) $(5 - c) + d(c - 5) = (5 - c)(1 - d)$

6. Rozlož na součin:

a) $3(b - 2) + a(2 - b) = (b - 2)(3 - a)$

b) $2e(d - f) - 5(f - d) = (d - f)(2e + 5)$

c) $z(4a - 5) + 7(5 - 4a) = (4a - 5)(z - 7)$

d) $u(3t - 2) + 6(2 - 3t) = (3t - 2)(u - 6)$

e) $3m + 4n(3m + 2) + 2 = (3m + 2)(1 + 4n)$

f) $5x - y - 4z(y - 5x) = (5x - y)(1 + 4z)$

g) $a(x + 3) + 2x + 6 = (x + 3)(a + 2)$

h) $4(t - 2) - tu + 2u = 4(t - 2) - u(t - 2) = (t - 2)(4 - u)$

7. Vytýkej postupně:

a) $ax + bx + ay + by = a(x + y) + b(x + y) = (x + y)(a + b)$

b) $3c + 3d + ce + de = 3(c + d) + e(c + d) = (c + d)(3 + e)$

c) $mo - no + 2m - 2n = o(m - n) + 2(m - n) = (m - n)(o + 2)$

d) $k^2 - 4k + kl - 4l =$ $k(k-4) + l(k-4) = (k-4)(k+l)$

* e) $yz - 4y - 3z + 12 =$ $y(z-4) - 3(z-4) = (z-4)(y-3)$

f) $xy + 3y + x + 3 =$ $xy + x + 3y + 3 = x(y+1) + 3(y+1) = (y+1)(x+3)$

* g) $ef - 7e - 5f + 35 =$ $e(f-7) - 5(f-7) = (f-7)(e-5)$

h) $3ab - 6a + b^2 - 2b =$ $3a(b-2) + b(b-2) = (b-2)(3a+b)$

8. Rozlož na součin:

a) $x^3 + x^2 + x + 1 =$ $x^2(x+1) + (x+1) = (x+1)(x^2+1)$

b) $y^3 - y^2 + y - 1 =$ $y^2(y-1) + (y-1) = (y-1)(y^2+1)$

c) $k^4 + k^3 + k + 1 =$ $k^3(k+1) + (k+1) = (k+1)(k^3+1)$

d) $u^4 - u^3 + u - 1 =$ $u^3(u-1) + (u-1) = (u-1)(u^3+1)$

e) $z^4 - z^3 - z + 1 =$ $z^3(z-1) - (z-1) = (z-1)(z^3-1)$

f) $m^4 + 2m^3 - 3m^2 - 6m =$ $m^3(m+2) - 3m(m+2) = (m+2)(m^3-3m) =$

g) $r^3 - 2r^2 + 3r - 6 =$ $r^2(r-2) + 3(r-2) =$ $= (r-2)(r^2+3)$

h) $ab^3 + ab^2 + ab + a =$ $a(b^3 + b^2 + b + 1) = a(b+1)(b^2+1)$

$= m(m+2)(m^2-3)$

Pomocí vzorců

1. Rozlož pomocí vzorce $(A + B)^2$:

a) $a^2 + 4a + 4 =$ $(a+2)^2$

b) $b^2 - 2bc + c^2 =$ $(b-c)^2$

c) $4d^2 + 12de + 9e^2 =$ $(2d+3e)^2$

d) $25m^2 - 20m + 4 =$ $(5m-2)^2$

e) $k^2 - 6k + 9 =$ $(k-3)^2$

f) $4n^2 + 28n + 49 =$ $(2n+7)^2$

g) $x^2 + y^2 + 2xy =$ $(x+y)^2$

h) $16t^2 + 9u^2 - 24tu =$ $(4t-3u)^2$

2. Rozlož na součin:

a) $z^4 + 2z^2 + 1 =$ $(z^2+1)^2$

b) $c^4 - 4c^2 + 4 =$ $(c^2-2)^2$

c) $a^2b^2 + c^2 + 2abc =$ $(ab+c)^2$

d) $e^2 + e + 0{,}25 =$ $(e+0{,}5)^2$

e) $m^4 - 4m^2n + 4n^2 =$ $(m^2-2n)^2$

f) $4r^4 - 12r^2s^2 + 9s^4 =$ $(2r^2-3s^2)^2$

g) $\frac{1}{9k^2} - \frac{2}{3k} + 1 =$ $\left(\frac{1}{3k}-1\right)^2$

h) $25u^2v^2 + 4z^2 - 20uvz =$ $(5uv-2z)^2$

* Nejprve vytkni, potom použij vzorec:

a) $-d^2 - 2de - e^2 =$ $-(d+e)^2$

b) $k^2 + 8k - 16 =$

c) $10mn - 25m^2 - n^2 =$ $-1(5m-n)^2$

d) $-9t^2 + 24tu - 16u^2 =$ $-(3t-4u)^2$

e) $-49x^2 - 9y^2 + 42xy =$ $-(7x-3y)^2$

f) $-4r^2 - 20rs - 25s^2 =$ $-(2r+5s)^2$