Úpravy výrazů

Zadání

Upravte na součin

1. $x^6y^3 - z^9$

2. $x^{12} + y^6z^9$

3. $64 - 27x^3$

4. $125y^3 + 8$

5. $64y^3 - 144y^2 + 108y - 27$

6. $8t^3 + 60t^2 + 150t + 125$

7. $8x^3 - 36x^2y + 54xy^2 - 27y^3$

8. $x^2 + 3x + 2xy + 6y$

9. $3xy^2 + 6x - y^2 - 2$

10. $9x^2y + 18x^2 - 4y - 8$

11. $-8x^3y + 32x^3 - y + 4$

12. $8x^3 + 12x^2y - 18xy^2 - 27y^3$

13. $2t^3 - 3t^2 + 8t - 12$

*14. $t^4 + 4$

*15. $81x^4 + 64$

Výsledky

1. $x^6y^3 - z^9 = \left(x^2y\right)^3 - \left(z^3\right)^3 = \left(x^2y - z^3\right)\left[\left(x^2y\right)^2 + x^2yz^3 + \left(z^3\right)^2\right] =$
$= \left(x^2y - z^3\right)\left(x^4y^2 + x^2yz^3 + z^6\right)$

2. $x^{12} + y^6z^9 = \left(x^4\right)^3 + \left(y^2z^3\right)^3 = \left(x^4 + y^2z^3\right)\left[\left(x^4\right)^2 - x^4y^2z^3 + \left(y^2z^3\right)^2\right] =$
$= \left(x^4 + y^2z^3\right)\left(x^8 - x^4y^2z^3 + y^4z^6\right)$

3. $64 - 27x^3 = 4^3 - (3x)^3 = (4 - 3x)\left[4^2 + 4 \cdot (3x) + (3x)^2\right] = (4 - 3x)\left(16 + 12x + 9x^2\right)$

4. $125y^3 + 8 = (5y)^3 + 2^3 = (5y + 2)\left[(5y)^2 - (5y) \cdot 2 + 2^2\right] = (5y + 2)\left(25y^2 - 10y + 4\right)$

5. $64y^3 - 144y^2 + 108y - 27 = (4y)^3 - 3 \cdot (4y)^2 \cdot 3 + 3 \cdot 4y \cdot 3^2 - 3^3 = (4y - 3)^3$

6. $8t^3 + 60t^2 + 150t + 125 = (2t)^3 + 3 \cdot (2t)^3 \cdot 5 + 3 \cdot 2t \cdot 5^2 + 5^3 = (2t + 5)^3$

7. $8x^3 - 36x^2y + 54xy^2 - 27y^3 = (2x)^3 - 3 \cdot (2x)^2 \cdot 3y + 3 \cdot 2y \cdot (3y)^2 - (3y)^3 = (2x - 3y)^3$

8. $x^2 + 3x + 2xy + 6y = x\left(x + 3\right) + 2y\left(x + 3\right) = \left(x + 2y\right)\left(x + 3\right)$

9. $3xy^2 + 6x - y^2 - 2 = 3x\left(y^2 + 2\right) - \left(y^2 + 2\right) = \left(3x - 1\right)\left(y^2 + 2\right)$

10. $9x^2y + 18x^2 - 4y - 8 = 9x^2\left(y + 2\right) - 4\left(y + 2\right) = \left(y + 2\right)\left(9x^2 - 4\right) =$
    $= \left(y + 2\right)\left[\left(3x\right)^2 - 2^2\right] = \left(y + 2\right)\left(3x - 2\right)\left(3x + 2\right)$

11. $-8x^3y + 32x^3 - y + 4 = 8x^3\left(4 - y\right) + \left(4 - y\right) = \left(8x^3 + 1\right)\left(4 - y\right) = \left[\left(2x\right)^3 + 1^3\right]\left(4 - y\right) =$
    $= \left(2x + 1\right)\left[\left(2x\right)^2 - 2x \cdot 1 + 1^2\right]\left(4 - y\right) = \left(2x + 1\right)\left(4x^2 - 2x + 1\right)\left(4 - y\right)$

12. $8x^3 + 12x^2y - 18xy^2 - 27y^3 = 4x^2\left(4x + 3y\right) - 9y^2\left(2x + 3y\right) = \left(4x^2 - 9y^2\right)\left(2x + 3y\right) =$
    $= \left[\left(2x\right)^2 - \left(3y\right)^2\right]\left(2x + 3y\right) = \left(2x - 3y\right)\left(2x + 3y\right)\left(2x + 3y\right) = \left(2x - 3y\right)\left(2x + 3y\right)^2$

13. $2t^3 - 3t^2 + 8t - 12 = t^2\left(2t - 3\right) + 4\left(2t - 3\right) = \left(t^2 + 4\right)\left(2t - 3\right)$

*14. $t^4 + 4 = \left(t^2\right)^2 + 2 \cdot \left(t^2\right) \cdot 2 + 2^2 - 4t^2 = \left(t^2 + 2\right)^2 - \left(2t\right)^2 = \left(t^2 - 2t + 2\right)\left(t^2 + 2t + 2\right)$

*15. $81x^4 + 64 = \left(9x^2\right)^2 + 2 \cdot \left(9x^2\right) \cdot 8 + 8^2 - 144x^2 = \left(9x^2 + 8\right) - \left(12x\right)^2 =$
    $= \left(9x^2 - 12x + 8\right)\left(9x^2 + 12x + 8\right)$