

「慣習」は「Σ」が重要!!

1 次の式を展開せよ。

(1) $(x+2y+2z)^2$

$A = x+2y$ とおくと (おろかえ)

$$= (A+2z)^2$$

$$= A^2 + 4Az + 4z^2$$

$$= (x+2y)^2 + 4(x+2y)z + 4z^2$$

$$= x^2 + 4xy + 4y^2 + 4xz + 8yz + 4z^2$$

$$= \underline{x^2 + 4y^2 + 4z^2 + 4xy + 8yz + 4zx}$$

輪環の性質

2 次の式を展開せよ。

(1) $(x-3y+2z)(x-3y-2z)$

(1) $A = x-3y$ とおくと

$$= (A+2z)(A-2z)$$

$$= A^2 - 4z^2$$

$$= (x-3y)^2 - 4z^2$$

$$= \underline{x^2 - 6xy + 9y^2 - 4z^2}$$

(3) $(x+2y+3)(x+2y-2)$

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$$C = x+2y$$

$$= (C+3)(C-2)$$

$$= C^2 + C - 6$$

$$= (x+2y)^2 + (x+2y) - 6$$

(2) $(a+2b-1)^2 = (a+2b)^2 - 2(a+2b) \cdot 1 + 1^2$

$$= a^2 + 4ab + 4b^2 - 2a - 4b + 1$$

$$= \underline{a^2 + (4b-2)a + 4b^2 - 4b + 1}$$

a は a の降下式の性質

(2) $(2x+y-z)(2x-y-z)$

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$$= (2x-z+y)(2x-z-y)$$

$$B = 2x-z$$

$$= (B+y)(B-y)$$

$$= B^2 - y^2 = (2x-z)^2 - y^2$$

$$= \underline{4x^2 - 4xz + z^2 - y^2}$$

3 次の式を展開せよ。

(1) $(x^2-3x+1)(x^2+3x+1)$

(1) $A = x^2+1$ とおくと

$$(A-3x)(A+3x)$$

$$= A^2 - 9x^2$$

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

$$= x^4 + 2x^2 + 1 - 9x^2$$

$$= \underline{x^4 - 7x^2 + 1}$$

(2) $(x^2-2x-1)(x^2-2x+3)$

(2) $B = x^2-2x$ とおくと

$$(B-1)(B+3)$$

$$= B^2 + 2B - 3$$

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

$$= x^4 - 4x^3 + 4x^2 + 2x^2 - 4x - 3$$

$$= \underline{x^4 - 4x^3 + 6x^2 - 4x - 3}$$

(3) $C = x^2+4$ とおくと

$$(C+3x)(C-4x)$$

$$= C^2 - Cx - 12x^2$$

$$= (x^2+4)^2 - (x^2+4)x - 12x^2$$

$$= x^4 + 8x^2 + 16 - x^3 - 4x - 12x^2$$

$$= \underline{x^4 - x^3 - 4x^2 - 4x + 16}$$

(1) $A = 3x+1$

とおくと
ミスが少なくなる
注意!!

$$= x^2 + 4xy + 4y^2 + x + 2y - 6$$

$$= \underline{x^2 + (4y+1)x + 4y^2 + 2y - 6}$$

$a^2b^2 = (ab)^2$ を利用

4 次の式を展開せよ。

$$\begin{aligned} (1) & (a+2b)^2(a-2b)^2 \\ &= \{(a+2b)(a-2b)\}^2 \\ &= (a^2-4b^2)^2 \\ &= a^4 - 8a^2b^2 + 16b^4 \end{aligned}$$

$$\begin{aligned} (2) & (a-2b)(a+2b)(a^2+4b^2) \\ &= (a^2-4b^2)(a^2+4b^2) \\ &= a^4 - 16b^4 \end{aligned}$$

5 次の式を展開せよ。

$$\begin{aligned} (1) & (x+3)^3 \\ &= x^3 + 3x^2 \cdot 3 + 3x \cdot 3^2 + 3^3 \\ &= x^3 + 9x^2 + 27x + 27 \end{aligned}$$

$$\begin{aligned} (2) & (x+4)(x^2-4x+16) \\ &= x^3 + 64 \end{aligned}$$

6 次の式を展開せよ。

$$\begin{aligned} (1) & (x+1)(x+3)(x-1)(x-3) \\ (3) & (x-1)(x+1)(x+2)(x+4) \end{aligned}$$

$$\begin{aligned} (2) & x(x+1)(x+2)(x+3) \\ (4) & (x-2)(x+2)(x^2+4)(x^4+16) \end{aligned}$$

$$\begin{aligned} (1) & (x+1)(x-1)(x+3)(x-3) \\ &= (x^2-1)(x^2-9) \\ &= x^4 - 10x^2 + 9 \end{aligned}$$

$$\begin{aligned} (2) & x(x+3)(x+1)(x+2) \\ &= (x^2+3x)(x^2+3x+2) \\ &= (x^2+3x)^2 + 2(x^2+3x) \\ &= x^4 + 6x^3 + 9x^2 + 2x^2 + 6x \\ &= x^4 + 6x^3 + 11x^2 + 6x \end{aligned}$$

$$\begin{aligned} (3) & (x-1)(x+4)(x+1)(x+2) \\ &= (x^2+3x-4)(x^2+3x+2) \\ &= (x^2+3x)^2 - 2(x^2+3x) - 8 \\ &= x^4 + 6x^3 + 9x^2 - 2x^2 - 6x - 8 \\ &= x^4 + 6x^3 + 7x^2 - 6x - 8 \end{aligned}$$

$$\begin{aligned} (4) & (x-2)(x+2)(x^2+4)(x^4+16) \\ &= (x^2-4)(x^2+4)(x^4+16) \\ &= (x^4-16)(x^4+16) \\ &= x^8 - 16^2 \\ &= x^8 - 256 \end{aligned}$$

(2), (3) は

対称式の性質を利用。

<今日のふりかえり>

おまじま

2"と3"と5"と7" !!

<公式>

$$\begin{aligned} (a+b)^3 &= a^3 + 3a^2b + 3ab^2 + b^3 \\ (a-b)^3 &= a^3 - 3a^2b + 3ab^2 - b^3 \\ (a+b)(a^2-ab+b^2) &= a^3 + b^3 \\ (a-b)(a^2+ab+b^2) &= a^3 - b^3 \end{aligned}$$