

### 3. 多項式の展開②

$$(1) a^2 - 4ab + 4b^2 \quad (2) x^2 - 9y^2 \quad (3) x^2 + 4y^2 + 9z^2 - 4xy - 12yz + 6zx$$

$$(4) 8a^3 - 12a^2 + 6a - 1 \quad (5) x^4 + 2x^3 - x^2 - 2x - 15 \quad (6) a^2 - 4b^2 + 16bc - 16c^2$$

$$(7) x^4 + 10x^3 + 35x^2 + 50x + 24 \quad (8) 64x^3 - y^3$$

次の式を展開せよ。

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

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

$$\begin{aligned} (3) (x-2y+3z)^2 &= x^2 + (-2y)^2 + (3y)^2 + 2 \cdot x \cdot (-2y) + 2 \cdot (-2y) \cdot z + 2 \cdot 3y \cdot x \\ &= x^2 + 4y^2 + 9z^2 - 4xy - 12yz + 6zx \end{aligned}$$

(対称性を考え  $xz$  の項を  $zx$  としたが、どちらでもよい)

$$\begin{aligned} (4) (2a-1)^3 &= (2a)^3 + 3 \cdot (2a)^2 \cdot (-1) + 3 \cdot (2a) \cdot (-1)^2 + (-1)^3 \\ &= 8a^3 - 12a^2 + 6a - 1 \end{aligned}$$

$$\begin{aligned} (5) (x^2+x-5)(x^2+x+3) &= \{(x^2+x)-5\}\{(x^2+x)+3\} \\ &= (x^2+x)^2 - 2(x^2+x) - 15 \\ &= x^4 + 2x^3 + x^2 - 2x^2 - 2x - 15 \\ &= x^4 + 2x^3 - x^2 - 2x - 15 \end{aligned}$$

$$\begin{aligned} (6) (a+2b-4c)(a-2b+4c) &= \{a+(2b-4c)\}\{a-(2b-4c)\} \\ &= a^2 - (2b-4c)^2 \\ &= a^2 - (4b^2 - 16bc + 16c^2) \\ &= a^2 - 4b^2 + 16bc - 16c^2 \end{aligned}$$

$$\begin{aligned}(7) \quad (x+1)(x+2)(x+3)(x+4) &= \{(x+1)(x+4)\}\{(x+2)(x+3)\} \\ &= (x^2 + 5x + 4)(x^2 + 5x + 6) \\ &= (x^2 + 5x)^2 + 10(x^2 + 5x) + 24 \\ &= x^4 + 10x^3 + 25x^2 + 10x^2 + 50x + 24 \\ &= x^4 + 10x^3 + 35x^2 + 50x + 24\end{aligned}$$

$$\begin{aligned}(8) \quad (4x - y)(16x^2 + 4xy + y^2) &= (4x)^3 - y^3 \\ &= 64x^3 - y^3\end{aligned}$$