

## ・因数分解の公式

$$0 \quad \cancel{m}a + \cancel{m}b = m(a+b) \quad \text{共通因数}$$

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

$$2 \quad a^2 - b^2 = (a+b)(a-b) \quad \leftarrow \text{平方の差は和と差の積}$$

$$3 \quad x^2 + \underbrace{(a+b)}_{\text{和}}x + \underbrace{ab}_{\text{積}} = (x+a)(x+b)$$

$$4 \quad acx^2 + (ad+bc)x + bd = (ax+b)(cx+d) \quad \leftarrow \text{暗記ではなく、たすきかけ}$$

$$5 \quad a^3 + 3a^2b + 3ab^2 + b^3 = (a+b)^3 \quad a^3 - 3a^2b + 3ab^2 - b^3 = (a-b)^3$$

$$6 \quad a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2) \quad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

(例) 次の式を因数分解せよ。

$$(1) \quad 4x^2y^2 - 2xy^3 = \underline{2xy^2} \cdot \underline{2x - y} = \underline{2xy^2(2x - y)},,$$

$$(2) \quad (a-b)x + (b-a)y = \underline{(a-b)x - (a-b)y} \\ = \underline{(a-b)(x-y)},,$$

$$(3) \quad 4a^2 - 12ab + 9b^2 = (2a)^2 + 2 \cdot 2a \cdot (-3b) + (-3b)^2 \quad \leftarrow \quad \square^2 + 2\square\Delta + \Delta^2 = (\square + \Delta)^2 \\ = (2a - 3b)^2,,$$

$$(4) \quad 16a^2 - 9b^2 = (4a)^2 - (3b)^2 \quad \leftarrow \quad \square^2 - \Delta^2 = (\square + \Delta)(\square - \Delta) \\ = (4a + 3b)(4a - 3b),,$$

$$(5) \quad x^2 + 5x + 6 = x^2 + (2+3)x + 2 \cdot 3 \quad \leftarrow \quad x^2 + \textcircled{+}x + \textcircled{+} = (x+a)(x+b) \\ = (x+2)(x+3),,$$

$$(6) \quad x^2 - 3xy - 18y^2 = x^2 + \{3y + (-6y)\}x + 3y \cdot (-6y) \quad \leftarrow \quad x^2 + \textcircled{+}x + \textcircled{+} = (x+a)(x+b) \\ = (x+3y)(x-6y),,$$

$$(7) \quad a^3 - 9a^2b + 27ab^2 - 27b^3 = a^3 + 3 \cdot a^2 \cdot (-3b) + 3 \cdot a \cdot (-3b)^2 + (-3b)^3 \\ = (a-3b)^3, \quad \uparrow \quad \square^3 + 3\square^2\Delta + 3\square\Delta^2 + \Delta^3 = (\square + \Delta)^3$$

$$(8) \quad x^3 + 27 = x^3 + 3^3 \\ = (x+3)(x^2 - x \cdot 3 + 3^2) \\ = (x+3)(x^2 - 3x + 9),,$$

$$(9) \quad 8a^3 - b^3 = (2a)^3 - b^3 \\ = (2a-b)\{(2a)^2 + 2a \cdot b + b^2\} \\ = (2a-b)(4a^2 + 2ab + b^2),,$$