

# 高校数学の復習

## 第2回 因数分解



# 本時の目標

因数分解の公式を用いて、2次式  
や3次式の因数分解ができるよう  
になります

- 1 共通因数でくくる
- 2 2次式を因数分解する
- 3 3次式を因数分解する
- 4 置き換えを利用する

# 共通因数で括る

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$$ab + ac = a(b + c)$$

例題 1

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

例題 2

$$\begin{aligned}2x^2y - 8xy^2 + 10xyz \\ &= (2xy) \cdot x - (2xy) \cdot 4y + (2xy) \cdot 5z \\ &= 2xy(x - 4y + 5z)\end{aligned}$$

# 因数分解の公式 1

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

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

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

$$4 \quad x^2 + (a + b)x + ab = (x + a)(x + b)$$

$$5 \quad acx^2 + (ad + bc)x + bd = (ax + b)(cx + d)$$

# 因数分解の公式 1 を用いた計算例

例題 3  $x^2 + 10x + 25 = x^2 + 2 \cdot 5x + 5^2 = (x + 5)^2$

例題 4  $4x^2 - 1 = (2x)^2 - 1^2 = (2x + 1)(2x - 1)$

例題 5  $x^2 + 5x + 6 = x^2 + (2 + 3)x + 2 \cdot 3$   
 $= (x + 2)(x + 3)$

例題 6  $x^2 - x - 6 = x^2 + (2 - 3)x + 2 \cdot (-3)$   
 $= (x + 2)(x - 3)$

# たすき掛け

例題7  $3x^2 + 7x + 2$

$$acx^2 + (ad + bc)x + bd = (ax + b)(cx + d)$$

$$\underline{ac = 3}, \underline{ad + bc = 7}, \underline{bd = 2}$$

$$1 \cdot 3 \quad \begin{array}{l} a \times b = bc \\ c \times d = ad \end{array} \quad 1 \cdot 2$$

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$$ad + bc$$

$$\begin{array}{r} 1 \times 1 = 3 \\ 3 \times 2 = 2 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 1 \times 2 = 6 \\ 3 \times 1 = 1 \\ \hline 7 \end{array}$$

$$3x^2 + 7x + 2 = (x + 2)(3x + 1)$$

# たすき掛け

例題8  $6x^2 - 5x - 6$

$$\begin{array}{r} 1 \times -6 = -36 \\ 6 \times 1 = 6 \\ \hline -35 \end{array}$$

$$\begin{array}{r} 1 \times 6 = 6 \\ 6 \times -1 = -6 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 2 \times -3 = -6 \\ 3 \times 2 = 6 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 2 \times 3 = 6 \\ 3 \times -2 = -6 \\ \hline 0 \end{array}$$

$$6x^2 - 5x - 6 = (2x - 3)(3x + 2)$$

例題9  $4x^2 + 8xy - 21y^2$

$$\begin{array}{r} 2 \times 7y = 14y \\ 2 \times -3y = -6y \\ \hline 8y \end{array}$$

$$4x^2 + 8xy - 21y^2 = (2x + 7y)(2x - 3y)$$

# 因数分解の公式2

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

$$7 \quad a^3 - 3a^2b + 3ab^2 - b^3 = (a - b)^3$$

$$8 \quad a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$9 \quad a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$



# 因数分解の公式2を用いた計算例

例題10  $x^3 + 1 = x^3 + 1^3$   
 $= (x + 1)(\underline{x^2 - x + 1})$

例題11  $x^3 - 8y^3 = x^3 - (2y)^3$   
 $= (x - 2y)\{x^2 + x \cdot 2y + (2y)^2\}$   
 $= (x - 2y)(x^2 + 2xy + 4y^2)$

# 置き換えによる因数分解

$$\begin{aligned} & \underline{x^2 - 6xy + 9y^2} - 2x + 6y + 1 \\ &= x^2 - 2(3y + 1)x + 9y^2 + 6y + 1 \\ &= x^2 - 2(3y + 1)x + (3y + 1)^2 \\ &= \{x - (3y + 1)\}^2 \\ &= (x - 3y - 1)^2 \end{aligned}$$

$$\begin{aligned} \text{与式} &= (x - 3y)^2 - 2(x - 3y) + 1 \\ &= (x - 3y - 1)^2 \end{aligned}$$