

5. <整式の展開> 次の式を展開しなさい。

<乗法公式>

1. $(a+b)^2 = a^2 + 2ab + b^2$	$(a-b)^2 = a^2 - 2ab + b^2$
2. $(a+b)(a-b) = a^2 - b^2$	
3. $(x+a)(x+b) = x^2 + (a+b)x + ab$	
4. $(ax+b)(cx+d) = acx^2 + (ad+bc)x + bd$	

例1. ①  $(x+3)(x+5)$       ②  $(x-4)(x+1)$       ③  $(2x-1)(x+5)$

解)  $(x+a)(x+b) = x^2 + (a+b)x + ab$  (公式3.)

①  $(x+3)(x+5) = x^2 + (3+5)x + 3 \cdot 5 = \underline{x^2 + 8x + 15}$

②  $(x-4)(x+1) = x^2 + (-4+1)x + (-4) \cdot 1 = \underline{x^2 - 3x - 4}$

③  $(2x-1)(x+5) = 2 \cdot 1x^2 + \{2 \cdot 5 + (-1) \cdot 1\}x + (-1) \cdot 5 = \underline{2x^2 + 9x - 5}$

$(2x-1)(x+5) = 2x^2 + 10x - x - 5 = 2x^2 + 9x - 5$  でも良い。

①  $(x+8)(x-1) = x^2 + \{ \quad + \quad \}x + \quad \times \quad =$

②  $(x+6)(x+4) =$

③  $(x+2)(3x+1) =$

④  $(3x-2)(2x-5) =$

例2. ①  $(2x+3)^2$       ②  $(5x-1)^2$       ③  $(5x+2)(5x-2)$

解)  $(a+b)^2 = a^2 + 2ab + b^2$  (公式1.)

①  $(2x+3)^2 = (2x)^2 + 2 \cdot 2x \cdot 3 + 3^2 = \underline{4x^2 + 12x + 9}$

②  $(5x-1)^2 = (5x)^2 - 2 \cdot 5x \cdot 1 + 1^2 = \underline{25x^2 - 10x + 1}$       ← (公式1. を利用)

③  $(5x+2)(5x-2) = (5x)^2 - 2^2 = \underline{25x^2 - 4}$       ← (公式2. を利用)

⑤  $(3x+2)^2 = ( \quad )^2 + 2 \times \quad \times \quad + ( \quad )^2 =$

⑥  $(x+4)^2 =$

$$\textcircled{7} (2x-5)^2 = (\quad)^2 - 2 \times \quad \times \quad + (\quad)^2 =$$

$$\textcircled{8} (x-1)^2 =$$

$$\textcircled{9} (3x+4)(3x-4) = (\quad)^2 - (\quad)^2 =$$

$$\textcircled{10} (x+5)(x-5) =$$

例3. ①  $(x+y+z)^2$       ②  $(x+y+2)(x-y+2)$

解) ①  $x+y=X$  とおくと,

$$\begin{aligned} & (x+y+z)^2 \\ &= (X+z)^2 \\ &= X^2 + 2Xz + z^2 \\ &= (x+y)^2 + 2(x+y)z + z^2 \\ &= x^2 + 2xy + y^2 + 2xz + 2yz + z^2 \\ &= \underline{x^2 + y^2 + z^2 + 2xy + 2yz + 2zx} \end{aligned}$$

②  $x+2=X$  とおくと,

$$\begin{aligned} (x+y+2)(x-y+2) &= (x+2+y)(x+2-y) \\ &= (X+y)(X-y) \\ &= X^2 - y^2 \\ &= (x+2)^2 - y^2 \\ &= x^2 + 4x + 4 - y^2 \\ &= \underline{x^2 - y^2 + 4x + 4} \end{aligned}$$

$$\textcircled{11} (x+y+5)^2$$

$$\textcircled{12} (x-y+3)(x-y-3)$$

## 6. <因数分解> 次の式を因数分解しなさい。

例1.  $6x^2 - 8x$   
 $= 2x \cdot 3x - 2x \cdot 4$   
 $= \underline{2x(3x-4)}$

$$AB + AC = A(B + C)$$

$$\textcircled{1} x^2 - 3x$$

$$\textcircled{2} x^2 + 5x$$

$$\textcircled{3} x^2 - x$$

$$\textcircled{4} 2x^2 + 6x$$

$$\textcircled{5} 3x^2 + 8x$$

$$\textcircled{6} 6x^2 - 10x$$

例2.  $x^2 - 8x + 16$   
 $= x^2 - 2 \cdot 4x + 4^2$   
 $= \underline{(x-4)^2}$

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

$$\textcircled{7} x^2 + 6x + 9$$

$$\textcircled{8} x^2 - 2x + 1$$

$$\textcircled{9} x^2 + 10x + 25$$

$$\textcircled{10} x^2 - 12x + 36$$

$$\textcircled{11} x^2 + 8x + 16$$

$$\textcircled{12} x^2 - 16x + 64$$

例3.  $4x^2 - 25$   
 $= (2x)^2 - 5^2$   
 $= \underline{(2x+5)(2x-5)}$

$$a^2 - b^2 = (a+b)(a-b)$$

⑬  $x^2 - 9$

⑭  $x^2 - 64$

⑮  $x^2 - 1$

⑯  $x^2 - 36$

⑰  $4x^2 - 49$

⑱  $9x^2 - 25$

$x^2 + (a+b)x + ab = (x+a)(x+b)$

例 4.  $x^2 + \underline{7x} + \underline{10}$

和が 7, 積が 10 の数字を探す

$$= \underline{(x+2)(x+5)}$$

$x^2 - \underline{x} - \underline{6}$

和が -1, 積が -6 の数字を探す

$$= \underline{(x+2)(x-3)}$$

⑲  $x^2 + 3x + 2$

⑳  $x^2 - 8x + 15$

㉑  $x^2 + 5x + 6$

㉒  $x^2 + 8x + 12$

㉓  $x^2 - x - 6$

㉔  $x^2 - x - 12$

㉕  $x^2 + 7x + 12$

㉖  $x^2 - 5x + 6$

㉗  $x^2 + 5x - 6$

例 5. ①  $(x+y)^2 + 4(x+y) + 3$     ②  $(x-y)^2 + x - y - 6$     ③  $(x-y)^2 - 16$

解)  $(x+y)^2 + 4(x+y) + 3$

$x+y = X$  とおく

$= X^2 + 4X + 3$

$= (X+1)(X+3)$

$= \{(x+y)+1\} \{(x+y)+3\}$

$= (x+y+1)(x+y+3)$

解)  $(x-y)^2 + x - y - 6$

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

$x-y = X$  とおく

$= X^2 + X - 6$

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

$= \{(x-y)+3\} \{(x-y)-2\}$

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

解)  $(x-y)^2 - 16$

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

$x-y = X$  とおく

$= X^2 - 4^2$

$= (X+4)(X-4)$

$= \{(x-y)+4\} \{(x-y)-4\}$

$= (x-y+4)(x-y-4)$

⑳  $(x-y)^2 - 2(x-y) - 15$

㉙  $(x+y)^2 + x + y - 12$

㉚  $(x-y)^2 - 4$

㉛  $(x+3)^2 - y^2$