

# 1 章 数と式

## Readiness check レディネス チェック

教科書 P.6

問1 (1)  $15 \div (-5) \times 3 - 2 \times 3^2$   
 $= 15 \div (-5) \times 3 - 2 \times 9$   
 $= (-3) \times 3 - 2 \times 9 = -9 - 18 = -27$

(2)  $6 - \{7 - (-2) \times (-1)\} \div (-5)$   
 $= 6 - (7 - 2) \div (-5) = 6 - 5 \div (-5)$   
 $= 6 + 1 = 7$

(3)  $\frac{-2^2}{3} - \left(\frac{-2}{3}\right)^2$   
 $= \frac{-2 \times 2}{3} - \left(\frac{-2}{3}\right) \times \left(\frac{-2}{3}\right)$   
 $= -\frac{4}{3} - \frac{4}{9} = -\frac{12+4}{9} = -\frac{16}{9}$

問2 (1)  $9a - 15 - 2(3a - 5) = 9a - 15 - (6a - 10)$   
 $= 9a - 15 - 6a + 10 = 3a - 5$

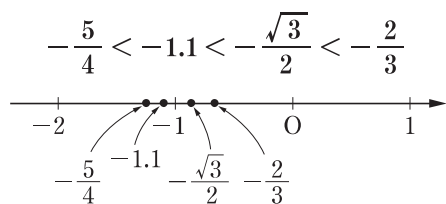
(2)  $\frac{2ab - 6a^2b}{2ab} = \frac{2ab(1 - 3a)}{2ab} = 1 - 3a$

(3)  $\frac{2x+4}{3} - (5x-3) = \frac{2x+4-3(5x-3)}{3}$   
 $= \frac{2x+4-15x+9}{3} = \frac{-13x+13}{3}$

教科書 P.7

問3  $-x^2 + 4x + 5$   
 $= -\left(-\frac{2}{3}\right)^2 + 4 \times \left(-\frac{2}{3}\right) + 5$   
 $= -\frac{4}{9} - \frac{8}{3} + 5$   
 $= \frac{-4 - 24 + 45}{9}$   
 $= \frac{17}{9}$

問4  $\sqrt{3} \doteq 1.73$  より  $-\frac{\sqrt{3}}{2} \doteq -0.865$   
 また  $-\frac{5}{4} = -1.25$ ,  $-\frac{2}{3} \doteq -0.667$  である  
 から



問5 (1)  $0.3x - 3 = 0.5(x - 2)$   
 両辺に 10 をかけて  
 $3x - 30 = 5(x - 2)$

$$3x - 30 = 5x - 10$$

$$3x - 5x = -10 + 30$$

$$-2x = 20$$

$$x = -10$$

(2)  $\frac{2x+4}{3} - (5x-3) = 0$

両辺に 3 をかけて

$$2x + 4 - 3(5x - 3) = 0$$

$$2x + 4 - 15x + 9 = 0$$

$$-13x + 13 = 0$$

$$-13x = -13$$

$$x = 1$$

## 1 節 式の計算

### 1 整式

教科書 P.8

問1 (1) 次数は 2, 係数は 4

(2) 次数は 1, 係数は  $\frac{1}{3}$

(3) 次数は 5, 係数は  $\frac{3}{2}$

(4) 次数は 3, 係数は -1

問2  $2x^3 - x^2 + 5x - 3 = 2x^3 + (-x^2) + 5x + (-3)$   
 であるから,  $2x^3 - x^2 + 5x - 3$  の項は

$$2x^3, -x^2, 5x, -3$$

教科書 P.9

問3 (1)  $x + 5x^2 - 2 + 7x^3 - 4x$   
 $= 7x^3 + 5x^2 + (1 - 4)x - 2$   
 $= 7x^3 + 5x^2 - 3x - 2$

(2)  $5x - x^2 + 3x^3 + 6x^2 + 3 - 2x^3$   
 $= (3 - 2)x^3 + (-1 + 6)x^2 + 5x + 3$   
 $= x^3 + 5x^2 + 5x + 3$

問4 (1) 次数の最も高い項は  $3x^4$  であるから  
 4 次式で, 定数項は -1

(2) 次数の最も高い項は  $-7x^3$  であるから  
 3 次式で, 定数項は 2

問5 (1)  $x^2 + ax + a^2 - x - 1$   
 $= x^2 + (a - 1)x + (a^2 - 1)$   
 $x$  については 2 次式で, 定数項は  $a^2 - 1$

(2)  $x^2 + 2xy - 3y^2 - 3x - 5y + 2$   
 $= x^2 + (2y - 3)x + (-3y^2 - 5y + 2)$

$x$  については

2次式で、定数項は  $-3y^2 - 5y + 2$

## ② 整式の加法・減法・乗法

教科書 P.10

問6 (1)  $A + B$

$$\begin{aligned} &= (4x^2 - 3x + 10) + (x^2 + x + 6) \\ &= 4x^2 - 3x + 10 + x^2 + x + 6 \\ &= (4+1)x^2 + (-3+1)x + 10+6 \\ &= 5x^2 - 2x + 16 \end{aligned}$$

$A - B$

$$\begin{aligned} &= (4x^2 - 3x + 10) - (x^2 + x + 6) \\ &= 4x^2 - 3x + 10 - x^2 - x - 6 \\ &= (4-1)x^2 + (-3-1)x + 10-6 \\ &= 3x^2 - 4x + 4 \end{aligned}$$

(2)  $A + B$

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

$A - B$

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

問7 (1)  $A + 2B$

$$\begin{aligned} &= (3x^2 - 2x + 5) + 2(2x^2 - 4x - 1) \\ &= 3x^2 - 2x + 5 + 4x^2 - 8x - 2 \\ &= (3+4)x^2 + (-2-8)x + 5-2 \\ &= 7x^2 - 10x + 3 \end{aligned}$$

(2)  $2A - 3B$

$$\begin{aligned} &= 2(3x^2 - 2x + 5) - 3(2x^2 - 4x - 1) \\ &= 6x^2 - 4x + 10 - 6x^2 + 12x + 3 \\ &= (6-6)x^2 + (-4+12)x + 10+3 \\ &= 8x + 13 \end{aligned}$$

教科書 P.11

問8 (1)  $a^6 \times a^3 = a^{6+3} = a^9$

(2)  $a \times a^7 = a^{1+7} = a^8$

(3)  $(a^5)^3 = a^{5 \times 3} = a^{15}$

(4)  $(a^4)^8 = a^{4 \times 8} = a^{32}$

(5)  $(ab^4)^2 = a^2(b^4)^2 = a^2b^{4 \times 2} = a^2b^8$

(6)  $(a^3b^5)^6 = (a^3)^6(b^5)^6 = a^{3 \times 6}b^{5 \times 6} = a^{18}b^{30}$

問9

(1)  $2x^3 \times 3x^5 = (2 \times 3) \times (x^3 \times x^5) = 6x^8$

(2)  $9xy \times (-5x^4)$   
 $= \{9 \times (-5)\} \times (xy \times x^4)$   
 $= \{9 \times (-5)\} \times \{(x \times x^4) \times y\}$   
 $= -45x^5y$

(3)  $(3x^3)^4 \times 10x^2$   
 $= 3^4(x^3)^4 \times 10x^2$   
 $= (3^4 \times 10) \times \{(x^3)^4 \times x^2\}$   
 $= (81 \times 10) \times (x^{12} \times x^2)$   
 $= 810x^{14}$

(4)  $(-2xy^3)^2 \times (3xy)^3$   
 $= (-2)^2x^2(y^3)^2 \times 3^3x^3y^3$   
 $= \{(-2)^2 \times 3^3\} \times (x^2 \times x^3) \times \{(y^3)^2 \times y^3\}$   
 $= (4 \times 27) \times x^5 \times (y^6 \times y^3)$   
 $= 108x^5y^9$

教科書 P.12

問10

(1)  $4x(x^2 + 4x - 3)$   
 $= 4x \cdot x^2 + 4x \cdot 4x + 4x \cdot (-3)$   
 $= 4x^3 + 16x^2 - 12x$

(2)  $(3x^2 - 2x + 5) \times (-2x)$   
 $= 3x^2 \cdot (-2x) - 2x \cdot (-2x) + 5 \cdot (-2x)$   
 $= -6x^3 + 4x^2 - 10x$

問11

(1)  $(x+6)(2x+3)$   
 $= x(2x+3) + 6(2x+3)$   
 $= 2x^2 + 3x + 12x + 18$   
 $= 2x^2 + (3+12)x + 18$   
 $= 2x^2 + 15x + 18$

(2)  $(3x-2)(x-1)$   
 $= 3x(x-1) - 2(x-1)$   
 $= 3x^2 - 3x - 2x + 2$   
 $= 3x^2 + (-3-2)x + 2$   
 $= 3x^2 - 5x + 2$

(3)  $(x+5)(2x^2-3x-6)$   
 $= x(2x^2-3x-6) + 5(2x^2-3x-6)$   
 $= 2x^3 - 3x^2 - 6x + 10x^2 - 15x - 30$   
 $= 2x^3 + (-3+10)x^2 + (-6-15)x - 30$   
 $= 2x^3 + 7x^2 - 21x - 30$

(4)  $(2x-3)(4x^2-x+2)$   
 $= 2x(4x^2-x+2) - 3(4x^2-x+2)$   
 $= 8x^3 - 2x^2 + 4x - 12x^2 + 3x - 6$

$$= 8x^3 + (-2 - 12)x^2 + (4 + 3)x - 6$$

$$= 8x^3 - 14x^2 + 7x - 6$$

教科書 P.13

問12 (1)  $(x+2)^2 = x^2 + 2 \cdot x \cdot 2 + 2^2$   
 $= x^2 + 4x + 4$

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

(3)  $(x+3y)^2$   
 $= x^2 + 2 \cdot x \cdot 3y + (3y)^2$   
 $= x^2 + 6xy + 9y^2$

(4)  $(3x-4y)^2$   
 $= (3x)^2 - 2 \cdot 3x \cdot 4y + (4y)^2$   
 $= 9x^2 - 24xy + 16y^2$

(5)  $(3x+2)(3x-2)$   
 $= (3x)^2 - 2^2 = 9x^2 - 4$

(6)  $(5x+2y)(5x-2y)$   
 $= (5x)^2 - (2y)^2 = 25x^2 - 4y^2$

問13 (1)  $(x+5)(x+3)$   
 $= x^2 + (5+3)x + 5 \cdot 3$   
 $= x^2 + 8x + 15$

(2)  $(x-3)(x+6)$   
 $= x^2 + (-3+6)x + (-3) \cdot 6$   
 $= x^2 + 3x - 18$

(3)  $(x+4y)(x-7y)$   
 $= x^2 + (4y-7y)x + 4y \cdot (-7y)$   
 $= x^2 - 3xy - 28y^2$

(4)  $(x-y)(x-5y)$   
 $= x^2 + (-y-5y)x + (-y) \cdot (-5y)$   
 $= x^2 - 6xy + 5y^2$

教科書 P.14

問14 (1)  $(3x+4)(2x+3)$   
 $= 3 \cdot 2x^2 + (3 \cdot 3 + 4 \cdot 2)x + 4 \cdot 3$   
 $= 6x^2 + 17x + 12$

(2)  $(4x+1)(5x-2)$   
 $= 4 \cdot 5x^2 + \{4 \cdot (-2) + 1 \cdot 5\}x + 1 \cdot (-2)$   
 $= 20x^2 - 3x - 2$

(3)  $(2x-3y)(x+5y)$   
 $= 2 \cdot 1x^2 + \{2 \cdot 5y + (-3y) \cdot 1\}x$   
 $\quad \quad \quad + (-3y) \cdot 5y$   
 $= 2x^2 + 7xy - 15y^2$

(4)  $(3x-2y)(4x-3y)$

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

$$\quad \quad \quad + (-2y) \cdot (-3y)$$

$$= 12x^2 - 17xy + 6y^2$$

問15 (1)  $a-b = A$  とおくと  
 $(a-b+3)(a-b-7)$

$$= (A+3)(A-7)$$

$$= A^2 - 4A - 21$$

$$= (a-b)^2 - 4(a-b) - 21$$

$$= a^2 - 2ab + b^2 - 4a + 4b - 21$$

(2)  $x+y = A$  とおくと  
 $(x+y)(x+y-z)$   
 $= A(A-z)$   
 $= A^2 - Az$   
 $= (x+y)^2 - (x+y)z$   
 $= x^2 + 2xy + y^2 - xz - yz$

教科書 P.15

問16 (1)  $(a-b-2)^2$   
 $= a^2 + (-b)^2 + (-2)^2 + 2 \cdot a \cdot (-b)$   
 $\quad \quad \quad + 2 \cdot (-b) \cdot (-2) + 2 \cdot (-2) \cdot a$   
 $= a^2 + b^2 + 4 - 2ab + 4b - 4a$

(2)  $(a-3b+2c)^2$   
 $= a^2 + (-3b)^2 + (2c)^2 + 2 \cdot a \cdot (-3b)$   
 $\quad \quad \quad + 2 \cdot (-3b) \cdot 2c + 2 \cdot 2c \cdot a$   
 $= a^2 + 9b^2 + 4c^2 - 6ab - 12bc + 4ca$

発展

3次式の乗法公式

教科書 P.16

問1 [1]  $(a+b)^3 = (a+b)(a+b)^2$   
 $= (a+b)(a^2 + 2ab + b^2)$   
 $= a \cdot a^2 + a \cdot 2ab + a \cdot b^2 + b \cdot a^2$   
 $\quad \quad \quad + b \cdot 2ab + b \cdot b^2$   
 $= a^3 + 2a^2b + ab^2 + a^2b + 2ab^2 + b^3$   
 $= a^3 + 3a^2b + 3ab^2 + b^3$

[2]  $(a-b)^3 = (a-b)(a-b)^2$   
 $= (a-b)(a^2 - 2ab + b^2)$   
 $= a \cdot a^2 + a \cdot (-2ab) + a \cdot b^2 - b \cdot a^2$   
 $\quad \quad \quad - b \cdot (-2ab) - b \cdot b^2$   
 $= a^3 - 2a^2b + ab^2 - a^2b + 2ab^2 - b^3$   
 $= a^3 - 3a^2b + 3ab^2 - b^3$

問2 (1)  $(x+1)^3 = x^3 + 3 \cdot x^2 \cdot 1 + 3 \cdot x \cdot 1^2 + 1^3$   
 $= x^3 + 3x^2 + 3x + 1$

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

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

$$= 8x^3 - 36x^2 + 54x - 27$$

$$(3) (3x + y)^3$$

$$= (3x)^3 + 3 \cdot (3x)^2 \cdot y + 3 \cdot 3x \cdot y^2 + y^3$$

$$= 27x^3 + 27x^2y + 9xy^2 + y^3$$

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

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

$$= x^3 - 6x^2y + 12xy^2 - 8y^3$$

**問3** [3]  $(a + b)(a^2 - ab + b^2)$

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

$$\quad \quad \quad + b \cdot (-ab) + b \cdot b^2$$

$$= a^3 - a^2b + ab^2 + a^2b - ab^2 + b^3$$

$$= a^3 + b^3$$

[4]  $(a - b)(a^2 + ab + b^2)$

$$= a \cdot a^2 + a \cdot ab + a \cdot b^2 - b \cdot a^2$$

$$\quad \quad \quad - b \cdot ab - b \cdot b^2$$

$$= a^3 + a^2b + ab^2 - a^2b - ab^2 - b^3$$

$$= a^3 - b^3$$

**問4** (1)  $(x + 5)(x^2 - 5x + 25)$

$$= (x + 5)(x^2 - 5 \cdot x + 5^2)$$

$$= x^3 + 5^3 = x^3 + 125$$

(2)  $(4x - 3y)(16x^2 + 12xy + 9y^2)$

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

$$= (4x)^3 - (3y)^3 = 64x^3 - 27y^3$$

### 3 因數分解

教科書 P.17

**問17** (1)  $xy + xz = x(y + z)$

(2)  $3a^2b + b = (3a^2 + 1)b$

(3)  $abc - acd = ac \cdot b - ac \cdot d$

$$= ac(b - d)$$

(4)  $12x^2y + 18xy^2 = 6xy \cdot 2x + 6xy \cdot 3y$

$$= 6xy(2x + 3y)$$

教科書 P.18

**問18** (1)  $x^2 + 4x + 4 = x^2 + 2 \cdot 2 \cdot x + 2^2$

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

(2)  $4x^2 - 20xy + 25y^2$

$$= (2x)^2 - 2 \cdot 2x \cdot 5y + (5y)^2$$

$$= (2x - 5y)^2$$

(3)  $9x^2 - 25 = (3x)^2 - 5^2$

$$= (3x + 5)(3x - 5)$$

(4)  $36x^2 - 49y^2 = (6x)^2 - (7y)^2$

$$= (6x + 7y)(6x - 7y)$$

**問19** (1)  $x^2 + 5x + 6$

$$= x^2 + (2 + 3)x + 2 \cdot 3$$

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

(2)  $x^2 - x - 12$

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

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

(3)  $x^2 - 9x + 18$

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

$$= (x - 3)(x - 6)$$

(4)  $x^2 + 5x - 24$

$$= x^2 + \{(-3) + 8\}x + (-3) \cdot 8$$

$$= (x - 3)(x + 8)$$

教科書 P.19

**問20** (1)  $x^2 + 6xy + 8y^2$

$$= x^2 + 6y \cdot x + 8y^2$$

$$= (x + 2y)(x + 4y) \quad \leftarrow \begin{cases} 8y^2 = 2y \cdot 4y \\ 6y = 2y + 4y \end{cases}$$

(2)  $x^2 - 3xy - 18y^2$

$$= x^2 - 3y \cdot x - 18y^2$$

$$= (x - 6y)(x + 3y) \quad \leftarrow \begin{cases} -18y^2 = (-6y) \cdot 3y \\ -3y = (-6y) + 3y \end{cases}$$

教科書 P.20

**問21** (1)  $2x^2 + 3x + 1$

$$= (x + 1)(2x + 1) \quad \begin{array}{r} 1 \quad \times \quad 1 \longrightarrow 2 \\ 2 \quad \quad \quad 1 \longrightarrow 1 \\ \hline 3 \end{array}$$

(2)  $5x^2 - 12x + 4$

$$= (x - 2)(5x - 2) \quad \begin{array}{r} 1 \quad \times \quad -2 \longrightarrow -10 \\ 5 \quad \quad \quad -2 \longrightarrow -2 \\ \hline -12 \end{array}$$

(3)  $8x^2 + 2x - 3$

$$= (2x - 1)(4x + 3) \quad \begin{array}{r} 2 \quad \times \quad -1 \longrightarrow -4 \\ 4 \quad \quad \quad 3 \longrightarrow 6 \\ \hline 2 \end{array}$$

(4)  $4x^2 - 11x + 6$

$$= (x - 2)(4x - 3) \quad \begin{array}{r} 1 \quad \times \quad -2 \longrightarrow -8 \\ 4 \quad \quad \quad -3 \longrightarrow -3 \\ \hline -11 \end{array}$$

(5)  $12x^2 - x - 6$

$$= (3x + 2)(4x - 3) \quad \begin{array}{r} 3 \quad \times \quad 2 \longrightarrow 8 \\ 4 \quad \quad \quad -3 \longrightarrow -9 \\ \hline -1 \end{array}$$

(6)  $6x^2 - 13x + 6$

$$= (2x - 3)(3x - 2) \quad \begin{array}{r} 2 \quad \times \quad -3 \longrightarrow -9 \\ 3 \quad \quad \quad -2 \longrightarrow -4 \\ \hline -13 \end{array}$$

問22 (1)  $4x^2 + 3xy - 7y^2$

$$\begin{array}{r}
 1 \times -y \longrightarrow -4y \\
 4 \times 7y \longrightarrow \underline{7y} \\
 = 4x^2 + 3y \cdot x - 7y^2 \\
 = (x - y)(4x + 7y)
 \end{array}$$

(2)  $8x^2 - 2xy - 15y^2$

$$\begin{array}{r}
 = 8x^2 - 2y \cdot x - 15y^2 \\
 = (2x - 3y)(4x + 5y)
 \end{array}$$

$$\begin{array}{r}
 2 \times -3y \longrightarrow -12y \\
 4 \times 5y \longrightarrow \underline{10y} \\
 \phantom{4 \times 5y} \phantom{\longrightarrow} -2y
 \end{array}$$

教科書 P.21

問23 (1)  $x + y = A$  とおくと

$$\begin{array}{l}
 x(x + y) + 5y(x + y) \\
 = xA + 5yA \\
 = A(x + 5y) \\
 = (x + y)(x + 5y)
 \end{array}$$

(2)  $a - b = A$  とおくと

$$\begin{array}{l}
 (a - b)^2 - 3(a - b) \\
 = A^2 - 3A = A(A - 3) \\
 = (a - b)(a - b - 3)
 \end{array}$$

(3)  $a - b = A$  とおくと

$$\begin{array}{l}
 x(a - b) + b - a \\
 = x(a - b) - (a - b) \\
 = xA - A \\
 = A(x - 1) \\
 = (a - b)(x - 1)
 \end{array}$$

問24 (1)  $x + y = A$  とおくと

$$\begin{array}{l}
 (x + y)^2 + 7(x + y) + 10 \\
 = A^2 + 7A + 10 \\
 = (A + 2)(A + 5) \\
 = (x + y + 2)(x + y + 5)
 \end{array}$$

(2)  $x + 2y = A$  とおくと

$$\begin{array}{l}
 (x + 2y)^2 - 6(x + 2y) + 9 \\
 = A^2 - 6A + 9 \\
 = (A - 3)^2 \\
 = (x + 2y - 3)^2
 \end{array}$$

(3)  $y + z = A$  とおくと

$$\begin{array}{l}
 x^2 - (y + z)^2 \\
 = x^2 - A^2 \\
 = (x + A)(x - A) \\
 = \{x + (y + z)\}\{x - (y + z)\} \\
 = (x + y + z)(x - y - z)
 \end{array}$$

問25 (1)  $y$  について整理すると

$$\begin{array}{l}
 x^2 + xy - x + y - 2 \\
 = y(x + 1) + (x^2 - x - 2) \\
 = y(x + 1) + (x + 1)(x - 2) \\
 = (x + 1)\{y + (x - 2)\} \\
 = (x + 1)(x + y - 2)
 \end{array}$$

(2)  $a$  について整理すると

$$\begin{array}{l}
 2ab + 2b^2 - a + b - 1 \\
 = a(2b - 1) + (2b^2 + b - 1) \\
 = a(2b - 1) + (2b - 1)(b + 1) \\
 = (2b - 1)(a + b + 1)
 \end{array}$$

教科書 P.22

問26 (1)  $x$  について整理すると

$$\begin{array}{l}
 x^2 + 4xy + 3y^2 - 4x - 14y - 5 \\
 = x^2 + (4y - 4)x + (3y^2 - 14y - 5) \\
 = x^2 + (4y - 4)x + (y - 5)(3y + 1) \\
 = \{x + (y - 5)\}\{x + (3y + 1)\} \\
 = (x + y - 5)(x + 3y + 1)
 \end{array}$$

$$\begin{array}{r}
 y \times -5 \longrightarrow -15y \\
 3y \times 1 \longrightarrow \underline{y} \\
 \phantom{3y \times 1} \phantom{\longrightarrow} -14y
 \end{array}$$

(2)  $x$  について整理すると

$$\begin{array}{l}
 3x^2 + 2xy - y^2 - x + 3y - 2 \\
 = 3x^2 + (2y - 1)x - (y^2 - 3y + 2) \\
 = 3x^2 + (2y - 1)x - (y - 1)(y - 2) \\
 = \{x + (y - 1)\}\{3x - (y - 2)\} \\
 = (x + y - 1)(3x - y + 2)
 \end{array}$$

$$\begin{array}{r}
 1 \times y - 1 \longrightarrow 3y - 3 \\
 3 \times -(y - 2) \longrightarrow \underline{-y + 2} \\
 \phantom{3 \times -(y - 2)} \phantom{\longrightarrow} 2y - 1
 \end{array}$$

発展 3次式の因数分解

問1 (1)  $x^3 + 64 = x^3 + 4^3$

$$\begin{array}{l}
 = (x + 4)(x^2 - x \cdot 4 + 4^2) \\
 = (x + 4)(x^2 - 4x + 16)
 \end{array}$$

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

$$\begin{array}{l}
 = (x - 1)(x^2 + x \cdot 1 + 1^2) \\
 = (x - 1)(x^2 + x + 1)
 \end{array}$$

(3)  $27x^3 + y^3 = (3x)^3 + y^3$

$$\begin{array}{l}
 = (3x + y)\{(3x)^2 - 3x \cdot y + y^2\} \\
 = (3x + y)(9x^2 - 3xy + y^2)
 \end{array}$$

- 1 (1)  $A - B - C$   
 $= (x^2 + x - 3) - (2x^2 - x + 4) - (-3x^2 + 5)$   
 $= x^2 + x - 3 - 2x^2 + x - 4 + 3x^2 - 5$   
 $= (1 - 2 + 3)x^2 + (1 + 1)x + (-3 - 4 - 5)$   
 $= 2x^2 + 2x - 12$
- (2)  $3(2A + B) - 2(3A - C)$   
 $= 6A + 3B - 6A + 2C = 3B + 2C$   
 $= 3(2x^2 - x + 4) + 2(-3x^2 + 5)$   
 $= 6x^2 - 3x + 12 - 6x^2 + 10$   
 $= -3x + 22$
- 2 (1)  $4a^5 \times 3a^2 = 4 \cdot 3 \cdot a^{5+2} = 12a^7$
- (2)  $-x^3 \times (-x)^4$   
 $= -x^3 \cdot x^4 = -x^{3+4} = -x^7$
- (3)  $5a^3b \times (-7a^4b^5)$   
 $= 5 \cdot (-7) \cdot a^{3+4} \cdot b^{1+5}$   
 $= -35a^7b^6$
- (4)  $(-2xy)^3 \times (3x^2y^3)^2$   
 $= (-2)^3 x^3 y^3 \times 3^2 (x^2)^2 (y^3)^2$   
 $= \{(-2)^3 \cdot 3^2\} \times \{x^3 \cdot (x^2)^2\} \times \{y^3 \cdot (y^3)^2\}$   
 $= -72x^7y^9$
- 3 (1)  $5xy(x^2 - xy + 3y^2)$   
 $= 5xy \cdot x^2 + 5xy(-xy) + 5xy \cdot 3y^2$   
 $= 5x^3y - 5x^2y^2 + 15xy^3$
- (2)  $(3x - 1)(x^2 + 7x + 5)$   
 $= 3x(x^2 + 7x + 5) - (x^2 + 7x + 5)$   
 $= 3x^3 + 21x^2 + 15x - x^2 - 7x - 5$   
 $= 3x^3 + 20x^2 + 8x - 5$
- (3)  $(9x + 2y)^2$   
 $= (9x)^2 + 2 \cdot 9x \cdot 2y + (2y)^2$   
 $= 81x^2 + 36xy + 4y^2$
- (4)  $(6x - 7y)^2$   
 $= (6x)^2 - 2 \cdot 6x \cdot 7y + (7y)^2$   
 $= 36x^2 - 84xy + 49y^2$
- (5)  $(3x + 10y)(3x - 10y)$   
 $= (3x)^2 - (10y)^2$   
 $= 9x^2 - 100y^2$
- (6)  $(x - 8y)(x + 6y)$   
 $= x^2 + (-8y + 6y)x - 8y \cdot 6y$   
 $= x^2 - 2xy - 48y^2$

- (7)  $(5x - 2y)(3x - y)$   
 $= 5 \cdot 3x^2 + \{5 \cdot (-y) - 2y \cdot 3\}x - 2y \cdot (-y)$   
 $= 15x^2 - 11xy + 2y^2$
- (8)  $(4x + 5y)(5x - 4y)$   
 $= 4 \cdot 5x^2 + \{4 \cdot (-4y) + 5y \cdot 5\}x + 5y \cdot (-4y)$   
 $= 20x^2 + 9xy - 20y^2$

- 4 (1)  $a + c = A$  とおくと  
 $(a + b + c)(a - b + c)$   
 $= (A + b)(A - b)$   
 $= A^2 - b^2$   
 $= (a + c)^2 - b^2$   
 $= a^2 + 2ac + c^2 - b^2$   
 $= a^2 - b^2 + c^2 + 2ac$
- (2)  $(2a - 3b + 1)^2$   
 $= (2a)^2 + (-3b)^2 + 1^2 + 2 \cdot 2a \cdot (-3b)$   
 $\quad + 2 \cdot (-3b) \cdot 1 + 2 \cdot 1 \cdot 2a$   
 $= 4a^2 + 9b^2 + 1 - 12ab - 6b + 4a$   
 $= 4a^2 - 12ab + 9b^2 + 4a - 6b + 1$

- 5 (1)  $3a^3b^2 - 6a^2b^3 + 12a^2b^2c$   
 $= 3a^2b^2 \cdot a - 3a^2b^2 \cdot 2b + 3a^2b^2 \cdot 4c$   
 $= 3a^2b^2(a - 2b + 4c)$

(2)  $x^2 - 8x + 16 = x^2 - 2 \cdot 4 \cdot x + 4^2$   
 $= (x - 4)^2$

(3)  $16a^2 + 24ab + 9b^2$   
 $= (4a)^2 + 2 \cdot 4a \cdot 3b + (3b)^2$   
 $= (4a + 3b)^2$

(4)  $16x^2 - 81y^2 = (4x)^2 - (9y)^2$   
 $= (4x + 9y)(4x - 9y)$

(5)  $x^2 - 11x + 10$   
 $= x^2 + (-1 - 10)x + (-1) \cdot (-10)$   
 $= (x - 1)(x - 10)$

(6)  $x^2 + 3xy - 54y^2$   
 $= x^2 + 3y \cdot x - 54y^2$   
 $= x^2 + \{(-6y) + 9y\}x + (-6y) \cdot 9y$   
 $= (x + 9y)(x - 6y)$

(7)  $10x^2 + 17x + 6$        $\begin{array}{l} 2 \quad \times \quad 1 \longrightarrow 5 \\ 5 \quad \times \quad 6 \longrightarrow 12 \\ \hline 17 \end{array}$   
 $= (2x + 1)(5x + 6)$

(8)  $8x^2 - 13x - 6$        $\begin{array}{l} 1 \quad \times \quad -2 \longrightarrow -16 \\ 8 \quad \times \quad 3 \longrightarrow 3 \\ \hline -13 \end{array}$   
 $= (x - 2)(8x + 3)$

$$\begin{aligned}
 (9) \quad & 15x^2 - 22xy + 8y^2 \\
 &= 15x^2 - 22y \cdot x + 8y^2 \\
 &= (3x - 2y)(5x - 4y)
 \end{aligned}$$

$$\begin{array}{r}
 3 \times -2y \longrightarrow -10y \\
 5 \times -4y \longrightarrow -12y \\
 \hline
 -22y
 \end{array}$$

$$\begin{aligned}
 (10) \quad & 6x^2 + 23xy - 18y^2 \\
 &= 6x^2 + 23y \cdot x - 18y^2 \\
 &= (2x + 9y)(3x - 2y)
 \end{aligned}$$

$$\begin{array}{r}
 2 \times 9y \longrightarrow 27y \\
 3 \times -2y \longrightarrow -4y \\
 \hline
 23y
 \end{array}$$

$$\begin{aligned}
 6 \quad (1) \quad & 2x^3 - 12x^2 + 18x \\
 &= 2x(x^2 - 6x + 9) \\
 &= 2x(x - 3)^2
 \end{aligned}$$

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

$$\begin{aligned}
 (3) \quad & x - 3y = A \text{ とおくと} \\
 & x(x - 3y) - 4y(3y - x) \\
 &= x(x - 3y) + 4y(x - 3y) \\
 &= xA + 4yA \\
 &= (x + 4y)A \\
 &= (x + 4y)(x - 3y)
 \end{aligned}$$

$$\begin{aligned}
 (4) \quad & 2x + y = A \text{ とおくと} \\
 & (2x + y)^2 + 6(2x + y) - 7 \\
 &= A^2 + 6A - 7 \\
 &= (A + 7)(A - 1) \\
 &= (2x + y + 7)(2x + y - 1)
 \end{aligned}$$

$$\begin{aligned}
 (5) \quad & x - y = A \text{ とおくと} \\
 & 2(x - y)^2 + (y - x) - 3 \\
 &= 2(x - y)^2 - (x - y) - 3 \\
 &= 2A^2 - A - 3 \\
 &= (A + 1)(2A - 3) \\
 &= (x - y + 1)(2x - 2y - 3)
 \end{aligned}$$

$$\begin{array}{r}
 1 \times 1 \longrightarrow 2 \\
 2 \times -3 \longrightarrow -3 \\
 \hline
 -1
 \end{array}$$

$$\begin{aligned}
 (6) \quad & b \text{ について整理すると} \\
 & a^2b - 3ab + a + 2b - 2 \\
 &= (a^2 - 3a + 2)b + (a - 2) \\
 &= (a - 2)(a - 1)b + (a - 2) \\
 &= (a - 2)\{(a - 1)b + 1\} \\
 &= (a - 2)(ab - b + 1)
 \end{aligned}$$

$$\begin{aligned}
 (7) \quad & x \text{ について整理すると} \\
 & 2x^2 + 5xy + 2y^2 - 5x - y - 3 \\
 &= 2x^2 + (5y - 5)x + (2y^2 - y - 3) \\
 &= 2x^2 + (5y - 5)x + (y + 1)(2y - 3) \\
 &= \{x + (2y - 3)\}\{2x + (y + 1)\} \\
 &= (x + 2y - 3)(2x + y + 1)
 \end{aligned}$$

$$\begin{array}{r}
 1 \times 1 \longrightarrow 2 \\
 2 \times -3 \longrightarrow -3 \\
 \hline
 -1
 \end{array}$$

$$\begin{array}{r}
 1 \times 2y - 3 \longrightarrow 4y - 6 \\
 2 \times y + 1 \longrightarrow y + 1 \\
 \hline
 5y - 5
 \end{array}$$

$$\begin{aligned}
 (8) \quad & x \text{ について整理すると} \\
 & x^2 - y^2 + 4x + 6y - 5 \\
 &= x^2 + 4x - (y^2 - 6y + 5) \\
 &= x^2 + 4x - (y - 1)(y - 5) \\
 &= \{x + (y - 1)\}\{x - (y - 5)\} \\
 &= (x + y - 1)(x - y + 5)
 \end{aligned}$$

## 2 節 実数

### 1 実数

教科書 P.24

問 1 (1)  $0.3 = \frac{3}{10}$

(2)  $2.04 = \frac{204}{100} = \frac{51}{25}$

(3)  $0.025 = \frac{25}{1000} = \frac{1}{40}$

教科書 P.25

問 2 (1)  $\frac{5}{6} = 0.8333\cdots = 0.8\dot{3}$

(2)  $\frac{3}{11} = 0.272727\cdots = 0.2\dot{7}$

(3)  $\frac{7}{27} = 0.259259259\cdots = 0.2\dot{5}9$