

□1 次の式を因数分解せよ。

(1) $xy^2 - 2xy$

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

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

(4) $64x^2y^2 - 25$

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

(6) $x^2 - 6x - 16$

(7) $2x^2 - 3x - 5$

(8) $6x^2 + x - 15$

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

(10) $(2a - b)^2 + 7(2a - b)$

□2 次の値を求めよ。

(1) ${}_6C_3$ (2) ${}_8C_4$ (3) ${}_{10}C_0$ (4) ${}_{10}C_9$ (5) ${}_{100}C_{98}$

(6) ${}_7C_3$ (7) ${}_8C_3$ (8) ${}_5C_1$ (9) ${}_6C_6$

□3 次の計算をせよ。

(1) $(5x - 2y) - (3x + 7y)$ (2) $(x - 6y) - (2x - 3y)$ (3) $5(2x + 3y) - 2(8x - 5y)$

(4) $\frac{3x+2}{4} + \frac{x+2}{2}$ (5) $\frac{3x+4}{2} - \frac{5x+2}{6}$ (6) $\frac{2x+1}{2} - \frac{x-2}{3}$

□4 次の整式 A, B について, $A + B, A - B$ を計算せよ。

(1) $A = 6x^2 + 2x - 3, B = 3x^2 - 5x + 4$

(2) $A = -3x^2 - 7x + 2, B = 5x^2 - 4$

□5 $A = 3x^2 - 2x + 1, B = -2x^2 + 4x - 3$ とするとき, 次の計算をせよ。

(1) $3A + 2B$ (2) $5A - 3B$

□6 次の計算をせよ。

(1) $5x^3 \times 3x^4$ (2) $2a^3b \times (-9ab^5)$ (3) $(-2x^2)^3$

(4) $(2a^3)^2 \times (-3a)$ (5) $(4x^2y)^3 \times (-x^5y^3)^2$

□ (1) $xy^2 - 2xy = xy \times y - 2 \times xy = xy(y - 2)$

(2) $4x^2 - 4x + 1 = (2x)^2 - 2 \times 2x \times 1 + 1^2 = (2x - 1)^2$

(3) $9x^2 + 12xy + 4y^2 = (3x)^2 + 2 \times 3x \times 2y + (2y)^2 = (3x + 2y)^2$

(4) $64x^2y^2 - 25 = (8xy)^2 - 5^2 = (8xy + 5)(8xy - 5)$

(5) 和が-5, 積が6となるのは-2と3より、

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

(6) 和が-6, 積が-16となるのは-8と2であるから

$$x^2 - 6x - 16 = (x - 8)(x + 2)$$

(7) 積が2, 積が-5となることから

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

$$\begin{array}{r} 2 \quad -5 \\ \hline 1 \quad +1 \longrightarrow +2 \\ 2 \quad -5 \longrightarrow -5 \\ \hline \quad \quad -3 \end{array}$$

(8) 積が6, 積が-15となることから

$$6x^2 + x - 15 = (2x - 3)(3x + 5)$$

$$\begin{array}{r} 6 \quad -15 \\ \hline 2 \quad -3 \longrightarrow -9 \\ 3 \quad +5 \longrightarrow +10 \\ \hline \quad \quad +1 \end{array}$$

(9) $x + 2y = A$ とおくと

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

(10) $2a - b = A$ とおくと

$$\begin{aligned} & (2a - b)^2 + 7(2a - b) \\ &= A^2 + 7A = A(A + 7) \\ &= (2a - b)(2a - b + 7) \end{aligned}$$

□

(1) ${}_6C_3 = \frac{6 \times 5 \times 4}{3 \times 2 \times 1} = 20$

(2) ${}_8C_4 = \frac{8 \times 7 \times 6 \times 5}{4 \times 3 \times 2 \times 1} = 70$

(3) ${}_{10}C_0 = 1$

(4) ${}_{10}C_9 = {}_{10}C_{10-9} = {}_{10}C_1 = \frac{10}{1} = 10$

(5) ${}_{100}C_{98} = {}_{100}C_{100-98} = {}_{100}C_2 = \frac{100 \times 99}{2 \times 1} = 4950$

(6) ${}_7C_3 = \frac{7 \times 6 \times 5}{3 \times 2 \times 1} = 35$

(7) ${}_8C_3 = \frac{8 \times 7 \times 6}{3 \times 2 \times 1} = 56$

(8) ${}_5C_1 = \frac{5}{1} = 5$

(9) ${}_6C_6 = {}_6C_{6-6} = {}_6C_0 = 1$

(別解) ${}_6C_6 = \frac{6 \times 5 \times 4 \times 3 \times 2 \times 1}{6 \times 5 \times 4 \times 3 \times 2 \times 1} = 1$

$$\begin{aligned} \boxed{3} \quad (1) \quad (5x-2y)-(3x+7y) &= 5x-2y-3x-7y \\ &= 5x-3x-2y-7y \\ &= \mathbf{2x-9y} \end{aligned}$$

$$(2) \quad (x-6y)-(2x-3y) = x-6y-2x+3y = \mathbf{-x-3y}$$

$$(3) \quad 5(2x+3y)-2(8x-5y) = 10x+15y-16x+10y = \mathbf{-6x+25y}$$

$$(4) \quad \frac{3x+2}{4} + \frac{x+2}{2} = \frac{3x+2}{4} + \frac{2(x+2)}{4} = \frac{3x+2+2(x+2)}{4} = \frac{3x+2+2x+4}{4} = \frac{5x+6}{4}$$

$$\begin{aligned} (5) \quad \frac{3x+4}{2} - \frac{5x+2}{6} &= \frac{3(3x+4)}{6} - \frac{5x+2}{6} \\ &= \frac{3(3x+4)-(5x+2)}{6} = \frac{9x+12-5x-2}{6} \\ &= \frac{4x+10}{6} = \frac{2x+5}{3} \quad \leftarrow \text{約分} \end{aligned}$$

$$\begin{aligned} (6) \quad \frac{2x+1}{2} - \frac{x-2}{3} &= \frac{3(2x+1)}{6} - \frac{2(x-2)}{6} \\ &= \frac{3(2x+1)-2(x-2)}{6} = \frac{6x+3-2x+4}{6} \\ &= \frac{4x+7}{6} \end{aligned}$$

$\boxed{4}$

$$(1) \quad A+B = (6x^2+2x-3) + (3x^2-5x+4) = 6x^2+2x-3+3x^2-5x+4 = \mathbf{9x^2-3x+1}$$

$$A-B = (6x^2+2x-3) - (3x^2-5x+4) = 6x^2+2x-3-3x^2+5x-4 = \mathbf{3x^2+7x-7}$$

$$(2) \quad A+B = (-3x^2-7x+2) + (5x^2-4) = -3x^2-7x+2+5x^2-4 = \mathbf{2x^2-7x-2}$$

$$A-B = (-3x^2-7x+2) - (5x^2-4) = -3x^2-7x+2-5x^2+4 = \mathbf{-8x^2-7x+6}$$

$\boxed{5}$

$$\begin{aligned} (1) \quad 3A+2B &= 3(3x^2-2x+1) + 2(-2x^2+4x-3) \\ &= 9x^2-6x+3-4x^2+8x-6 = \mathbf{5x^2+2x-3} \end{aligned}$$

$$\begin{aligned} (2) \quad 5A-3B &= 5(3x^2-2x+1) - 3(-2x^2+4x-3) \\ &= 15x^2-10x+5+6x^2-12x+9 = \mathbf{21x^2-22x+14} \end{aligned}$$

$\boxed{6}$

$$(1) \quad 5x^3 \times 3x^4 = 5 \times 3 \times x^{3+4} = 15x^7$$

$$(2) \quad 2a^3b \times (-9ab^5) = 2 \times (-9) \times a^{3+1} \times b^{1+5} = \mathbf{-18a^4b^6}$$

$$(3) \quad (-2x^2)^3 = (-2)^3 \times (x^2)^3 = \mathbf{-8x^6}$$

$$(4) \quad (2a^3)^2 \times (-3a) = 2^2 \times (a^3)^2 \times (-3a) = 2^2 \times (-3) \times a^{6+1} = \mathbf{-12a^7}$$

$$\begin{aligned} (5) \quad (4x^2y)^3 \times (-x^5y^3)^2 &= 4^3 \times (x^2)^3 \times y^3 \times (-1)^2 \times (x^5)^2 \times (y^3)^2 \\ &= 4^3 \times (-1)^2 \times x^{6+10} \times y^{3+6} = \mathbf{64x^{16}y^9} \end{aligned}$$