

【復習 1】 正負の数・文字式

1

P.4

- (1) ㉞, ㉟, ㊱, ㊲, ㊳
 (2) ㊴, ㊵, ㊶, ㊷, ㊸

2

P.4

- (1) 14 (2) 36
 (3) -23 (4) 15
 (5) 32 (6) -20
 (7) 28 (8) 7

【解説】

- (1) $5 - (-9) = 5 + 9 = 14$
 (2) $(-6)^2 = (-6) \times (-6) = 36$
 (3) $3 \times (-5) - 8 = -15 - 8 = -23$
 (4) $35 \div (-7) - 5 \times (-4) = -5 + 20 = 15$
 (5) $-8 \times (-7 + 3) = -8 \times (-4) = 32$
 (6) $(5 - 9) \times 3 - 8 = (-4) \times 3 - 8 = -12 - 8 = -20$
 (7) $10 - (-3^2) \times 2 = 10 - (-9) \times 2 = 10 + 18 = 28$
 (8) $(-4)^2 + (5 - 2^3) \times 3 = 16 + (5 - 8) \times 3 = 16 - 9 = 7$

3

P.4

- (1) 21点 (2) 58点

【解説】

- (1) もっとも高い生徒はB,
 もっとも低い生徒はCである。
 $8 - (-13) = 21$ (点)
 (2) 表の5つの数の平均は,
 $\{(-6) + 8 + (-13) + (-4) + 5\} \div 5 = (-10) \div 5 = -2$
 5人の得点の平均は,
 $60 + (-2) = 58$ (点)

4

P.5

- (1) ① $-7a$ ② x^2y ③ $\frac{3x+y}{2}$
 (2) ① $8 \times x \times y$ ② $a \times a \times a \times b$
 ③ $(a-b) \div 5$

5

P.5

- (1) 単項式...㉞, ㉟ 多項式...㊱, ㊲
 (2) 4
 (3) $x^2, 3x$
 (4) ㉞ 2 ㉟ 2 ㊱ 3 ㊲ 1

6

P.5

- (1) $80a$ m
 (2) $\frac{20}{100}a$ 人 [または $\frac{1}{5}a$ 人]
 (3) $1000 - 50a = b$ (4) $2x + 7 > y$

【解説】

- (2) $a \times \frac{20}{100} = \frac{20}{100}a = \frac{1}{5}a$ (人)
 (3) おつりは, $(1000 - 50a)$ 円

- | | |
|-----------------|-----------------------------|
| (1) $a + 8b$ | (2) $-3x^2 + x$ |
| (3) $-2x - 2$ | (4) $x + 3y$ |
| (5) $-18a$ | (6) $3a$ |
| (7) $12a + 21b$ | (8) $10x - 15y - 5$ |
| (9) $3x + 4$ | (10) $4x^2 - 3x + 5$ |
| (11) $7x - 3$ | (12) $6x + 8y$ |
| (13) $9x$ | (14) $\frac{11x - 11y}{12}$ |

【解説】

- (3) $(x - 7) + (-3x + 5) = x - 7 - 3x + 5$
 $= -2x - 2$
- (4) $(4x + y) - (3x - 2y) = 4x + y - 3x + 2y$
 $= x + 3y$
- (9) $(6x + 8) \div 2 = (6x + 8) \times \frac{1}{2}$
 $= 3x + 4$
- (10) $(12x^2 - 9x + 15) \div 3 = (12x^2 - 9x + 15) \times \frac{1}{3}$
 $= 4x^2 - 3x + 5$
- (11) $3(x + 5) + 2(2x - 9) = 3x + 15 + 4x - 18$
 $= 7x - 3$
- (12) $4(3x - y) - 6(x - 2y) = 12x - 4y - 6x + 12y$
 $= 6x + 8y$
- (13) $\frac{1}{2}(4x^2 + 6x) - \frac{2}{3}(3x^2 - 9x) = 2x^2 + 3x - 2x^2 + 6x$
 $= 9x$
- (14) $\frac{x - 5y}{4} + \frac{2x + y}{3} = \frac{3(x - 5y) + 4(2x + y)}{12}$
 $= \frac{3x - 15y + 8x + 4y}{12}$
 $= \frac{11x - 11y}{12}$

- | | |
|------------|---------------|
| (1) $-6xy$ | (2) $16m^2$ |
| (3) $-2x$ | (4) $-15b$ |
| (5) $6b$ | (6) $-4x$ |
| (7) $2x^3$ | (8) $2a^2b^2$ |

【解説】

- (2) $(-4m)^2 = (-4m) \times (-4m)$
 $= 16m^2$
- (3) $8xy \div (-4y) = -\frac{8xy}{4y}$
 $= -2x$
- (4) $(-10ab^2) \div \frac{2}{3}ab = (-10ab^2) \times \frac{3}{2ab}$
 $= -15b$
- (5) $4a \times 3b^2 \div 2ab = \frac{4a \times 3b^2}{2ab}$
 $= 6b$
- (6) $8x^3 \div (-2x) \div x = -\frac{8x^3}{2x \times x}$
 $= -4x$
- (7) $(-2x)^3 \times x \div (-4x) = (-8x^3) \times x \div (-4x)$
 $= \frac{8x^3 \times x}{4x} = 2x^3$
- (8) $6a^2b \times (-3ab) \div (-9a) = \frac{6a^2b \times 3ab}{9a}$
 $= 2a^2b^2$

- | | |
|------------|--------|
| (1)① -11 | ② -8 |
| (2)① 4 | ② 18 |
| ③ 12 | ④ -6 |

【解説】

- (1)① $4a - 3 = 4 \times (-2) - 3$
 $= -11$
- ② $a^3 = (-2)^3$
 $= -8$
- (2)① $2x + 5y = 2 \times (-3) + 5 \times 2$
 $= 4$
- ② $x^2y = (-3)^2 \times 2$
 $= 18$
- ③ $(-14x^2y^3) \div 7xy^2 = -2xy$
 $= -2 \times (-3) \times 2 = 12$
- ④ $(7x - 6y + 8) - (5x - 7y + 10)$
 $= 2x + y - 2$
 $= 2 \times (-3) + 2 - 2$
 $= -6$

- | | |
|-----------------------------|-----------------------|
| (1) $x = \frac{7 - 3y}{2}$ | (2) $y = \frac{2}{x}$ |
| (3) $r = \frac{\ell}{2\pi}$ | (4) $b = 2m - a$ |

【解説】

- (1) $2x + 3y = 7$
 $2x = 7 - 3y$
 $x = \frac{7 - 3y}{2}$
- (2) $5xy = 10$
 $y = \frac{10}{5x}$
 $y = \frac{2}{x}$
- (3) $\ell = 2\pi r$
 $2\pi r = \ell$
 $r = \frac{\ell}{2\pi}$
- (4) $m = \frac{a + b}{2}$
 $2m = a + b$
 $a + b = 2m$
 $b = 2m - a$

- (1) m, n を整数とすると, 2つの偶数は $2m, 2n$ と表せるから,

$$2m \times 2n = 4mn$$

mn は整数だから, $4mn$ は 4 の倍数である。

したがって, 2つの偶数の積は 4 の倍数になる。

- (2) 2けたの自然数の十の位を x , 一の位を y とすると, この自然数は $10x + y$ で, 各位の数の和をひいた数は,

$$(10x + y) - (x + y) = 9x$$

x は整数だから, $9x$ は 9 の倍数である。

したがって, 2けたの自然数から, その数の各位の数の和をひくと, 9 の倍数になる。

1 多項式の計算(1)

確認問題 1

P.8

- | | |
|---------------------|---------------------|
| (1)① $4x^2 + 8xy$ | ② $-10a^2 + 6ab$ |
| ③ $-9a^2 + 6ab$ | ④ $-14x^2 + 21x$ |
| ⑤ $2x^2 - 4xy + 6x$ | ⑥ $6a^2 + 3ab - 9a$ |
| ⑦ $3a^2 - a$ | ⑧ $6a^2 + 15ab$ |
| (2)① $x + 2y$ | ② $3a - 2b$ |
| ③ $-xy + 3$ | ④ $a + 2b$ |
| ⑤ $ab - 2b^2 - 3$ | ⑥ $2a - 2b$ |
| ⑦ $3ab - 9b^2$ | ⑧ $12y - 4$ |

【解説】

- (1)① $4x(x+2y) = 4x \times x + 4x \times 2y$
 $= 4x^2 + 8xy$
- ② $(5a-3b) \times (-2a) = 5a \times (-2a) - 3b \times (-2a)$
 $= -10a^2 + 6ab$
- ③ $-3a(3a-2b) = -3a \times 3a - 3a \times (-2b)$
 $= -9a^2 + 6ab$
- ④ $7x(-2x+3) = 7x \times (-2x) + 7x \times 3$
 $= -14x^2 + 21x$
- ⑤ $2x(x-2y+3) = 2x \times x + 2x \times (-2y) + 2x \times 3$
 $= 2x^2 - 4xy + 6x$
- ⑥ $(2a+b-3) \times 3a = 2a \times 3a + b \times 3a - 3 \times 3a$
 $= 6a^2 + 3ab - 9a$
- ⑦ $\frac{1}{3}a(9a-3) = \frac{1}{3}a \times 9a + \frac{1}{3}a \times (-3)$
 $= 3a^2 - a$
- ⑧ $\frac{3}{2}a(4a+10b) = \frac{3}{2}a \times 4a + \frac{3}{2}a \times 10b$
 $= 6a^2 + 15ab$
- (2)① $(2x^2+4xy) \div 2x = (2x^2+4xy) \times \frac{1}{2x}$
 $= x + 2y$
- ② $(9ab-6b^2) \div 3b = (9ab-6b^2) \times \frac{1}{3b}$
 $= 3a - 2b$
- ③ $(4x^2y-12x) \div (-4x)$
 $= (4x^2y-12x) \times \left(-\frac{1}{4x}\right)$
 $= -xy + 3$
- ④ $(5a^2b+10ab^2) \div 5ab = (5a^2b+10ab^2) \times \frac{1}{5ab}$
 $= a + 2b$

- ⑤ $(a^2b-2ab^2-3a) \div a = (a^2b-2ab^2-3a) \times \frac{1}{a}$
 $= ab - 2b^2 - 3$
- ⑥ $(a^2-ab) \div \frac{1}{2}a = (a^2-ab) \times \frac{2}{a}$
 $= 2a - 2b$
- ⑦ $(2a^2b-6ab^2) \div \frac{2}{3}a = (2a^2b-6ab^2) \times \frac{3}{2a}$
 $= 3ab - 9b^2$
- ⑧ $(9xy^2-3xy) \div \frac{3}{4}xy = (9xy^2-3xy) \times \frac{4}{3xy}$
 $= 12y - 4$

確認問題 2

P.9

- | | |
|--------------------------------------|--------------------------|
| (1) $ab + 3a + 2b + 6$ | (2) $xy + 6x - 8y - 48$ |
| (3) $ax - ay - bx + by$ | (4) $ac + ad - bc - bd$ |
| (5) $x^2 + 8x + 15$ | (6) $2x^2 + 9x + 4$ |
| (7) $6a^2 + a - 12$ | (8) $3y^2 - 13y - 10$ |
| (9) $x^2 + 4xy + 3y^2$ | (10) $6a^2 - ab - 12b^2$ |
| (11) $x^2 - xy + 3x - 2y + 2$ | |
| (12) $2a^2 - ab - b^2 + 4a - 4b$ | |
| (13) $3x^2 - 5xy + 2y^2 + 15x - 10y$ | |
| (14) $a^2 - 2ab - 8b^2 + 3a - 12b$ | |

【解説】

- (5) $(x+3)(x+5) = x^2 + 5x + 3x + 15$
 $= x^2 + 8x + 15$
- (6) $(x+4)(2x+1) = 2x^2 + x + 8x + 4$
 $= 2x^2 + 9x + 4$
- (7) $(3a-4)(2a+3) = 6a^2 + 9a - 8a - 12$
 $= 6a^2 + a - 12$
- (8) $(y-5)(3y+2) = 3y^2 + 2y - 15y - 10$
 $= 3y^2 - 13y - 10$
- (9) $(x+3y)(x+y) = x^2 + xy + 3xy + 3y^2$
 $= x^2 + 4xy + 3y^2$
- (10) $(3a+4b)(2a-3b) = 6a^2 - 9ab + 8ab - 12b^2$
 $= 6a^2 - ab - 12b^2$
- (11) $(x+2)(x-y+1) = x(x-y+1) + 2(x-y+1)$
 $= x^2 - xy + x + 2x - 2y + 2$
 $= x^2 - xy + 3x - 2y + 2$
- (12) $(a-b)(2a+b+4)$
 $= a(2a+b+4) - b(2a+b+4)$
 $= 2a^2 + ab + 4a - 2ab - b^2 - 4b$
 $= 2a^2 - ab - b^2 + 4a - 4b$
- (13) $(x-y+5)(3x-2y)$
 $= x(3x-2y) - y(3x-2y) + 5(3x-2y)$
 $= 3x^2 - 2xy - 3xy + 2y^2 + 15x - 10y$
 $= 3x^2 - 5xy + 2y^2 + 15x - 10y$
- (14) $(a+2b+3)(a-4b)$
 $= a(a-4b) + 2b(a-4b) + 3(a-4b)$
 $= a^2 - 4ab + 2ab - 8b^2 + 3a - 12b$
 $= a^2 - 2ab - 8b^2 + 3a - 12b$

確認問題 3

P.10

- | | |
|------------------------------|---|
| (1) $x^2 + 7x + 12$ | (2) $a^2 + 15a + 54$ |
| (3) $x^2 - 6x + 5$ | (4) $y^2 + 5y - 14$ |
| (5) $x^2 - 3x - 18$ | (6) $x^2 - 4x - 12$ |
| (7) $x^2 + 4x - 12$ | (8) $x^2 + x - 20$ |
| (9) $y^2 + 4y - 21$ | (10) $x^2 - 7x - 8$ |
| (11) $a^2 - 4a - 60$ | (12) $x^2 - 8x + 7$ |
| (13) $x^2 - 17x + 72$ | (14) $m^2 - 5m - 50$ |
| (15) $x^2 - x + \frac{2}{9}$ | (16) $a^2 + \frac{1}{4}a - \frac{3}{8}$ |

【解説】

- (1) $(x+4)(x+3) = x^2 + (4+3)x + 4 \times 3$
 $= x^2 + 7x + 12$
- (2) $(a+6)(a+9) = a^2 + (6+9)a + 6 \times 9$
 $= a^2 + 15a + 54$
- (3) $(x-1)(x-5) = x^2 + (-1-5)x + (-1) \times (-5)$
 $= x^2 - 6x + 5$
- (4) $(y+7)(y-2) = y^2 + (7-2)y + 7 \times (-2)$
 $= y^2 + 5y - 14$
- (5) $(x-6)(x+3) = x^2 + (-6+3)x + (-6) \times 3$
 $= x^2 - 3x - 18$
- (6) $(x+2)(x-6) = x^2 + (2-6)x + 2 \times (-6)$
 $= x^2 - 4x - 12$
- (7) $(x-2)(x+6) = x^2 + (-2+6)x + (-2) \times 6$
 $= x^2 + 4x - 12$
- (8) $(x+5)(x-4) = x^2 + (5-4)x + 5 \times (-4)$
 $= x^2 + x - 20$
- (9) $(y-3)(y+7) = y^2 + (-3+7)y + (-3) \times 7$
 $= y^2 + 4y - 21$
- (10) $(x+1)(x-8) = x^2 + (1-8)x + 1 \times (-8)$
 $= x^2 - 7x - 8$
- (11) $(a-10)(a+6) = a^2 + (-10+6)a + (-10) \times 6$
 $= a^2 - 4a - 60$

- (12) $(x-7)(x-1) = x^2 + (-7-1)x + (-7) \times (-1)$
 $= x^2 - 8x + 7$
- (13) $(x-9)(x-8) = x^2 + (-9-8)x + (-9) \times (-8)$
 $= x^2 - 17x + 72$
- (14) $(m+5)(m-10) = m^2 + (5-10)m + 5 \times (-10)$
 $= m^2 - 5m - 50$
- (15) $\left(x - \frac{1}{3}\right)\left(x - \frac{2}{3}\right)$
 $= x^2 + \left(-\frac{1}{3} - \frac{2}{3}\right)x + \left(-\frac{1}{3}\right) \times \left(-\frac{2}{3}\right)$
 $= x^2 - x + \frac{2}{9}$
- (16) $\left(a + \frac{3}{4}\right)\left(a - \frac{1}{2}\right)$
 $= a^2 + \left(\frac{3}{4} - \frac{1}{2}\right)a + \frac{3}{4} \times \left(-\frac{1}{2}\right)$
 $= a^2 + \frac{1}{4}a - \frac{3}{8}$

確認問題 4

P.11

- | | |
|-----------------------|-----------------------|
| (1) $x^2 + 8x + 16$ | (2) $a^2 + 14a + 49$ |
| (3) $x^2 + 20x + 100$ | (4) $x^2 - 4x + 4$ |
| (5) $y^2 - 12y + 36$ | (6) $a^2 - 22a + 121$ |

【解説】

- (1) $(x+4)^2 = x^2 + 2 \times 4 \times x + 4^2$
 $= x^2 + 8x + 16$
- (2) $(a+7)^2 = a^2 + 2 \times 7 \times a + 7^2$
 $= a^2 + 14a + 49$
- (3) $(x+10)^2 = x^2 + 2 \times 10 \times x + 10^2$
 $= x^2 + 20x + 100$
- (4) $(x-2)^2 = x^2 - 2 \times 2 \times x + 2^2$
 $= x^2 - 4x + 4$
- (5) $(y-6)^2 = y^2 - 2 \times 6 \times y + 6^2$
 $= y^2 - 12y + 36$
- (6) $(a-11)^2 = a^2 - 2 \times 11 \times a + 11^2$
 $= a^2 - 22a + 121$

確認問題 5

P.11

- (1) $x^2 - 1$ (2) $a^2 - 9$
 (3) $m^2 - n^2$ (4) $x^2 - 81$
 (5) $a^2 - 100$ (6) $a^2 - 144$

【解説】

- (1) $(x+1)(x-1) = x^2 - 1^2 = x^2 - 1$
 (2) $(a-3)(a+3) = a^2 - 3^2 = a^2 - 9$
 (4) $(x+9)(x-9) = x^2 - 9^2 = x^2 - 81$
 (5) $(a+10)(a-10) = a^2 - 10^2 = a^2 - 100$
 (6) $(a-12)(a+12) = a^2 - 12^2 = a^2 - 144$

1章 式の計算

1 標準問題

1

P.12

- (1) $10x^2 + 6xy$ (2) $-a^2 - 7ab$
 (3) $-12a^2 + 4ab$ (4) $10m^2 - 5mn + 20m$
 (5) $6xy - 4y^2 + 2y$ (6) $3a^2 - 4ab$

【解説】

- (1) $2x(5x+3y) = 2x \times 5x + 2x \times 3y = 10x^2 + 6xy$
 (2) $(a+7b) \times (-a) = a \times (-a) + 7b \times (-a) = -a^2 - 7ab$
 (3) $4a(-3a+b) = 4a \times (-3a) + 4a \times b = -12a^2 + 4ab$
 (4) $5m(2m-n+4) = 5m \times 2m + 5m \times (-n) + 5m \times 4 = 10m^2 - 5mn + 20m$
 (5) $(3x-2y+1) \times 2y = 3x \times 2y - 2y \times 2y + 1 \times 2y = 6xy - 4y^2 + 2y$
 (6) $\frac{1}{2}a(6a-8b) = \frac{1}{2}a \times 6a + \frac{1}{2}a \times (-8b) = 3a^2 - 4ab$

2

P.12

- (1) $4a - 3b$ (2) $5x + 3y$
 (3) $3a - 4b$ (4) $-4x + 3y$
 (5) $3b - 6a$ (6) $6x + 9y$

【解説】

- (1) $(8a^2 - 6ab) \div 2a = (8a^2 - 6ab) \times \frac{1}{2a} = 4a - 3b$
 (2) $(15xy + 9y^2) \div 3y = (15xy + 9y^2) \times \frac{1}{3y} = 5x + 3y$
 (3) $(6a^2b - 8ab^2) \div 2ab = (6a^2b - 8ab^2) \times \frac{1}{2ab} = 3a - 4b$
 (4) $(16x^2 - 12xy) \div (-4x) = (16x^2 - 12xy) \times \left(-\frac{1}{4x}\right) = -4x + 3y$
 (5) $(ab - 2a^2) \div \frac{1}{3}a = (ab - 2a^2) \times \frac{3}{a} = 3b - 6a$
 (6) $(4x^2y + 6xy^2) \div \frac{2}{3}xy = (4x^2y + 6xy^2) \times \frac{3}{2xy} = 6x + 9y$

3

P.12

- (1) $ac - ad + bc - bd$ (2) $2xy + 3x - 8y - 12$
 (3) $6x^2 - 19x - 7$ (4) $4a^2 - 7a - 15$
 (5) $a^2 - ab + 7a - 3b + 12$
 (6) $6x^2 - 17xy + 5y^2 + 4x - 10y$

【解説】

- (3) $(3x+1)(2x-7) = 6x^2 - 21x + 2x - 7 = 6x^2 - 19x - 7$
 (4) $(a-3)(4a+5) = 4a^2 + 5a - 12a - 15 = 4a^2 - 7a - 15$
 (5) $(a+3)(a-b+4) = a(a-b+4) + 3(a-b+4) = a^2 - ab + 4a + 3a - 3b + 12 = a^2 - ab + 7a - 3b + 12$
 (6) $(3x-y+2)(2x-5y) = 3x(2x-5y) - y(2x-5y) + 2(2x-5y) = 6x^2 - 15xy - 2xy + 5y^2 + 4x - 10y = 6x^2 - 17xy + 5y^2 + 4x - 10y$

4

P.13

- (1) $x^2 + 9x + 14$ (2) $a^2 - 5a - 24$
 (3) $y^2 - y - 30$ (4) $m^2 - 13m + 36$
 (5) $x^2 + 3x - 70$ (6) $t^2 + 5t - 104$

【解説】

- (1) $(x+2)(x+7) = x^2 + (2+7)x + 2 \times 7 = x^2 + 9x + 14$
 (2) $(a-8)(a+3) = a^2 + (-8+3)a + (-8) \times 3 = a^2 - 5a - 24$
 (3) $(y+5)(y-6) = y^2 + (5-6)y + 5 \times (-6) = y^2 - y - 30$
 (4) $(m-4)(m-9) = m^2 + (-4-9)m + (-4) \times (-9) = m^2 - 13m + 36$
 (5) $(x+10)(x-7) = x^2 + (10-7)x + 10 \times (-7) = x^2 + 3x - 70$
 (6) $(t-8)(t+13) = t^2 + (-8+13)t + (-8) \times 13 = t^2 + 5t - 104$

5

P.13

- (1) $x^2 + 12x + 36$ (2) $a^2 - 16a + 64$
 (3) $x^2 - \frac{3}{2}x + \frac{9}{16}$ (4) $x^2 + x + \frac{1}{4}$
 (5) $x^2 - \frac{1}{2}x + \frac{1}{16}$ (6) $a^2 - \frac{4}{3}a + \frac{4}{9}$

【解説】

- (1) $(x+6)^2 = x^2 + 2 \times 6 \times x + 6^2 = x^2 + 12x + 36$
 (2) $(a-8)^2 = a^2 - 2 \times 8 \times a + 8^2 = a^2 - 16a + 64$
 (3) $\left(x - \frac{3}{4}\right)^2 = x^2 - 2 \times \frac{3}{4} \times x + \left(\frac{3}{4}\right)^2 = x^2 - \frac{3}{2}x + \frac{9}{16}$
 (4) $\left(x + \frac{1}{2}\right)^2 = x^2 + 2 \times \frac{1}{2} \times x + \left(\frac{1}{2}\right)^2 = x^2 + x + \frac{1}{4}$
 (5) $\left(x - \frac{1}{4}\right)^2 = x^2 - 2 \times \frac{1}{4} \times x + \left(\frac{1}{4}\right)^2 = x^2 - \frac{1}{2}x + \frac{1}{16}$
 (6) $\left(a - \frac{2}{3}\right)^2 = a^2 - 2 \times \frac{2}{3} \times a + \left(\frac{2}{3}\right)^2 = a^2 - \frac{4}{3}a + \frac{4}{9}$

6

P.13

- (1) $y^2 - 25$ (2) $x^2 - 49$
 (3) $a^2 - 64$ (4) $25 - m^2$
 (5) $x^2 - \frac{1}{4}$ (6) $a^2 - \frac{4}{25}$

【解説】

- (1) $(y-5)(y+5) = y^2 - 5^2 = y^2 - 25$
 (2) $(x+7)(x-7) = x^2 - 7^2 = x^2 - 49$
 (3) $(a-8)(a+8) = a^2 - 8^2 = a^2 - 64$
 (4) $(5+m)(5-m) = 5^2 - m^2 = 25 - m^2$
 (5) $\left(x + \frac{1}{2}\right)\left(x - \frac{1}{2}\right) = x^2 - \left(\frac{1}{2}\right)^2 = x^2 - \frac{1}{4}$
 (6) $\left(a + \frac{2}{5}\right)\left(a - \frac{2}{5}\right) = a^2 - \left(\frac{2}{5}\right)^2 = a^2 - \frac{4}{25}$

2 多項式の計算(2)

確認問題 1

P.14

- | | |
|--------------------------|--------------------------------|
| (1) $4x^2 + 16x + 15$ | (2) $16a^2 - 8a - 3$ |
| (3) $9x^2 - 24x + 7$ | (4) $\frac{1}{4}x^2 + 4x + 15$ |
| (5) $4x^2 + 12x + 9$ | (6) $25x^2 - 40x + 16$ |
| (7) $9a^2 - 12ab + 4b^2$ | (8) $16x^2 + 56xy + 49y^2$ |
| (9) $9x^2 - 4$ | (10) $16a^2 - 81$ |
| (11) $25a^2 - 9b^2$ | (12) $4a^2 - \frac{1}{9}$ |

【解説】

- (1) $(2x+5)(2x+3) \xrightarrow{2x=A \text{ とおく}}$
 $= (A+5)(A+3)$
 $= A^2 + 8A + 15$
 $= 4x^2 + 16x + 15$
- (2) $(4a-3)(4a+1) \xrightarrow{4a=A \text{ とおく}}$
 $= (A-3)(A+1)$
 $= A^2 - 2A - 3$
 $= 16a^2 - 8a - 3$
- (3) $(-3x+7)(-3x+1) \xrightarrow{-3x=A \text{ とおく}}$
 $= (A+7)(A+1)$
 $= A^2 + 8A + 7$
 $= 9x^2 - 24x + 7$
- (4) $\left(\frac{1}{2}x+3\right)\left(\frac{1}{2}x+5\right) \xrightarrow{\frac{1}{2}x=A \text{ とおく}}$
 $= (A+3)(A+5)$
 $= A^2 + 8A + 15$
 $= \frac{1}{4}x^2 + 4x + 15$
- (5) $(2x+3)^2 = (2x)^2 + 2 \times 3 \times 2x + 3^2$
 $= 4x^2 + 12x + 9$
- (6) $(5x-4)^2 = (5x)^2 - 2 \times 4 \times 5x + 4^2$
 $= 25x^2 - 40x + 16$
- (7) $(3a-2b)^2 = (3a)^2 - 2 \times 2b \times 3a + (2b)^2$
 $= 9a^2 - 12ab + 4b^2$
- (8) $(4x+7y)^2 = (4x)^2 + 2 \times 7y \times 4x + (7y)^2$
 $= 16x^2 + 56xy + 49y^2$
- (9) $(3x+2)(3x-2) = (3x)^2 - 2^2$
 $= 9x^2 - 4$
- (10) $(4a+9)(4a-9) = (4a)^2 - 9^2$
 $= 16a^2 - 81$
- (11) $(5a+3b)(5a-3b) = (5a)^2 - (3b)^2$
 $= 25a^2 - 9b^2$

$$(12) \left(2a + \frac{1}{3}\right)\left(2a - \frac{1}{3}\right) = (2a)^2 - \left(\frac{1}{3}\right)^2$$

$$= 4a^2 - \frac{1}{9}$$

確認問題 2

P.15

- | | |
|---|-----------------------------|
| (1) $a^2 + 2ab + b^2 + 5a + 5b + 6$ | |
| (2) $x^2 + 2xy + y^2 + 3x + 3y - 4$ | |
| (3) $x^2 - 2xy + y^2 - 16$ | (4) $a^2 + 2ab + b^2 - 25$ |
| (5) $a^2 + 2ab + b^2 + 6a + 6b + 9$ | |
| (6) $a^2 - 2ab + b^2 - 4a + 4b + 4$ | |
| (7) $x^2 - 2xy + y^2 + 7x - 7y + 10$ | |
| (8) $a^2 - 2ab + b^2 + 5a - 5b + 4$ | |
| (9) $x^2 - 2xy + y^2 + 8x - 8y + 16$ | |
| (10) $x^2 + 2xy + y^2 - 12x - 12y + 36$ | |
| (11) $x^2 + 2xy + y^2 - 9$ | (12) $a^2 - b^2 + 14b - 49$ |

【解説】

- (1) $(a+b+2)(a+b+3) \xrightarrow{a+b=A \text{ とおく}}$
 $= (A+2)(A+3)$
 $= A^2 + 5A + 6$
 $= a^2 + 2ab + b^2 + 5a + 5b + 6$
- (2) $(x+y-1)(x+y+4) \xrightarrow{x+y=A \text{ とおく}}$
 $= (A-1)(A+4)$
 $= A^2 + 3A - 4$
 $= x^2 + 2xy + y^2 + 3x + 3y - 4$
- (3) $(x-y+4)(x-y-4) \xrightarrow{x-y=A \text{ とおく}}$
 $= (A+4)(A-4)$
 $= A^2 - 16$
 $= x^2 - 2xy + y^2 - 16$
- (4) $(a+b-5)(a+b+5) \xrightarrow{a+b=A \text{ とおく}}$
 $= (A-5)(A+5)$
 $= A^2 - 25$
 $= a^2 + 2ab + b^2 - 25$
- (5) $(a+b+3)^2 \xrightarrow{a+b=A \text{ とおく}}$
 $= (A+3)^2$
 $= A^2 + 6A + 9$
 $= a^2 + 2ab + b^2 + 6a + 6b + 9$
- (6) $(a-b-2)^2 \xrightarrow{a-b=A \text{ とおく}}$
 $= (A-2)^2$
 $= A^2 - 4A + 4$
 $= a^2 - 2ab + b^2 - 4a + 4b + 4$

確認問題 3

P.16

- | | |
|------------------------|-----------------------|
| (1) $x^2 + x + 2$ | (2) $x^2 - 2x - 1$ |
| (3) $3x^2 - 5x - 4$ | (4) $4x^2 + 2x + 4$ |
| (5) $2x^2 + 7x + 7$ | (6) $2x^2 - 6x + 5$ |
| (7) $2x^2 + 6x$ | (8) -3 |
| (9) $2x + 38$ | (10) $2a^2 - 2a + 13$ |
| (11) $3x^2 + 12x - 31$ | (12) $3x^2 - 2x - 35$ |
| (13) $2x^2 + 16x + 44$ | (14) $3x^2 - 4x - 7$ |

【解説】

- (1) $(x+2)(x+3) - 4(x+1) = x^2 + 5x + 6 - 4x - 4$
 $= x^2 + x + 2$
- (2) $(x-3)^2 + 2(2x-5) = x^2 - 6x + 9 + 4x - 10$
 $= x^2 - 2x - 1$
- (3) $(x-4)(x+1) + 2x(x-1)$
 $= x^2 - 3x - 4 + 2x^2 - 2x$
 $= 3x^2 - 5x - 4$
- (4) $x(3x-2) + (x+2)^2 = 3x^2 - 2x + x^2 + 4x + 4$
 $= 4x^2 + 2x + 4$
- (5) $(x+1)^2 + (x+2)(x+3)$
 $= x^2 + 2x + 1 + x^2 + 5x + 6$
 $= 2x^2 + 7x + 7$
- (6) $(x+2)(x-2) + (x-3)^2 = x^2 - 4 + x^2 - 6x + 9$
 $= 2x^2 - 6x + 5$
- (7) $(x+1)(x+6) + (x+2)(x-3)$
 $= x^2 + 7x + 6 + x^2 - x - 6$
 $= 2x^2 + 6x$
- (8) $(x-9)(x-5) - (x-6)(x-8)$
 $= x^2 - 14x + 45 - (x^2 - 14x + 48)$
 $= x^2 - 14x + 45 - x^2 + 14x - 48$
 $= -3$
- (9) $(x-5)(x+5) - (x+7)(x-9)$
 $= x^2 - 25 - (x^2 - 2x - 63)$
 $= x^2 - 25 - x^2 + 2x + 63$
 $= 2x + 38$
- (10) $(a+2)^2 + (a-3)^2 = a^2 + 4a + 4 + a^2 - 6a + 9$
 $= 2a^2 - 2a + 13$
- (11) $2(x+3)^2 + (x+7)(x-7)$
 $= 2(x^2 + 6x + 9) + x^2 - 49$
 $= 2x^2 + 12x + 18 + x^2 - 49$
 $= 3x^2 + 12x - 31$

- (12) $(x+1)(x-3) + 2(x+4)(x-4)$
 $= x^2 - 2x - 3 + 2(x^2 - 16)$
 $= x^2 - 2x - 3 + 2x^2 - 32$
 $= 3x^2 - 2x - 35$
- (13) $3(x+2)^2 - (x+4)(x-8)$
 $= 3(x^2 + 4x + 4) - (x^2 - 4x - 32)$
 $= 3x^2 + 12x + 12 - x^2 + 4x + 32$
 $= 2x^2 + 16x + 44$
- (14) $2(x-1)^2 + (x+3)(x-3)$
 $= 2(x^2 - 2x + 1) + x^2 - 9$
 $= 2x^2 - 4x + 2 + x^2 - 9$
 $= 3x^2 - 4x - 7$

2 標準問題

1

P.17

- (1) $4x^2 + 12x + 5$ (2) $9a^2 + 6a - 8$
 (3) $4a^2 - 12a + 9$ (4) $16a^2 + 24ab + 9b^2$
 (5) $9x^2 - 4$ (6) $4m^2 - 25n^2$

【解説】

- (1) $(2x+1)(2x+5) \xrightarrow{2x=A}$ とおく
 $= (A+1)(A+5)$
 $= A^2 + 6A + 5$
 $= 4x^2 + 12x + 5$
 (2) $(3a-2)(3a+4) \xrightarrow{3a=A}$ とおく
 $= (A-2)(A+4)$
 $= A^2 + 2A - 8$
 $= 9a^2 + 6a - 8$
 (4) $(4a+3b)^2 = (4a)^2 + 2 \times 3b \times 4a + (3b)^2$
 $= 16a^2 + 24ab + 9b^2$
 (6) $(2m+5n)(2m-5n) = (2m)^2 - (5n)^2$
 $= 4m^2 - 25n^2$

2

P.17

- (1) $a^2 + 2ab + b^2 - 3a - 3b + 2$
 (2) $x^2 - 4xy + 4y^2 + x - 2y - 6$
 (3) $x^2 + 2xy + y^2 + 4x + 4y + 4$
 (4) $a^2 - 2ab + b^2 - 10a + 10b + 25$
 (5) $x^2 - 2xy + y^2 - 36$
 (6) $a^2 + 8a + 16 - 9b^2$

【解説】

- (1) $(a+b-1)(a+b-2) \xrightarrow{a+b=A}$ とおく
 $= (A-1)(A-2)$
 $= A^2 - 3A + 2$
 $= a^2 + 2ab + b^2 - 3a - 3b + 2$
 (3) $(x+y+2)^2 \xrightarrow{x+y=A}$ とおく
 $= (A+2)^2$
 $= A^2 + 4A + 4$
 $= x^2 + 2xy + y^2 + 4x + 4y + 4$
 (4) $(a-b-5)^2 \xrightarrow{a-b=A}$ とおく
 $= (A-5)^2$
 $= A^2 - 10A + 25$
 $= a^2 - 2ab + b^2 - 10a + 10b + 25$

- (5) $(x-y+6)(x-y-6) \xrightarrow{x-y=A}$ とおく
 $= (A+6)(A-6)$
 $= A^2 - 36$
 $= x^2 - 2xy + y^2 - 36$

3

P.17

- (1) $x^2 - 6x + 2$ (2) $7x^2 - 2x + 16$
 (3) $2x^2 + 3x + 5$ (4) $2x^2 - x$
 (5) $2x - 5$ (6) $x^2 + 2x + 1$
 (7) $4x^2 - 9x - 28$ (8) $-x^2 - x - 6$

【解説】

- (1) $(x+2)(x-5) - 3(x-4)$
 $= x^2 - 3x - 10 - 3x + 12$
 $= x^2 - 6x + 2$
 (2) $2x(3x-5) + (x+4)^2 = 6x^2 - 10x + x^2 + 8x + 16$
 $= 7x^2 - 2x + 16$
 (3) $(x-1)^2 + (x+1)(x+4)$
 $= x^2 - 2x + 1 + x^2 + 5x + 4$
 $= 2x^2 + 3x + 5$
 (4) $(x+4)(x-1) + (x-2)^2$
 $= x^2 + 3x - 4 + x^2 - 4x + 4$
 $= 2x^2 - x$
 (5) $(x+2)(x-2) - (x-1)^2$
 $= x^2 - 4 - (x^2 - 2x + 1)$
 $= x^2 - 4 - x^2 + 2x - 1$
 $= 2x - 5$
 (6) $2(x-1)(x+1) - (x+1)(x-3)$
 $= 2(x^2 - 1) - (x^2 - 2x - 3)$
 $= 2x^2 - 2 - x^2 + 2x + 3$
 $= x^2 + 2x + 1$
 (7) $3(x-2)^2 + (x+8)(x-5)$
 $= 3(x^2 - 4x + 4) + x^2 + 3x - 40$
 $= 3x^2 - 12x + 12 + x^2 + 3x - 40$
 $= 4x^2 - 9x - 28$
 (8) $(x-2)(x+7) - 2(x-1)(x+4)$
 $= x^2 + 5x - 14 - 2(x^2 + 3x - 4)$
 $= x^2 + 5x - 14 - 2x^2 - 6x + 8$
 $= -x^2 - x - 6$

計算トレーニング

1

P.18

- (1) $10a^2 + 5ab$ (2) $-6x^2 + 4xy$
 (3) $-7m^2 + 2mn$ (4) $18xy + 30x^2$
 (5) $a^2b - 3ab^2 + 4ab$ (6) $6xy - 8y^2 + 2y$
 (7) $6x^2 - 9xy$ (8) $4a^2b + 6ab$
 (9) $-2a^2 + ab$ (10) $-6x^2 + 9xy + 3x$

【解説】

- (1) $5a(2a+b) = 5a \times 2a + 5a \times b$
 $= 10a^2 + 5ab$
 (2) $(3x-2y) \times (-2x) = 3x \times (-2x) - 2y \times (-2x)$
 $= -6x^2 + 4xy$
 (3) $-m(7m-2n) = (-m) \times 7m - m \times (-2n)$
 $= -7m^2 + 2mn$
 (4) $6x(3y+5x) = 6x \times 3y + 6x \times 5x$
 $= 18xy + 30x^2$
 (5) $ab(a-3b+4) = ab \times a + ab \times (-3b) + ab \times 4$
 $= a^2b - 3ab^2 + 4ab$
 (6) $(3x-4y+1) \times 2y = 3x \times 2y - 4y \times 2y + 1 \times 2y$
 $= 6xy - 8y^2 + 2y$
 (7) $\frac{3}{2}x(4x-6y) = \frac{3}{2}x \times 4x + \frac{3}{2}x \times (-6y)$
 $= 6x^2 - 9xy$
 (8) $\frac{2}{5}a(10ab+15b) = \frac{2}{5}a \times 10ab + \frac{2}{5}a \times 15b$
 $= 4a^2b + 6ab$

2

P.18

- (1) $3x + 2y$ (2) $-2a + b$
 (3) $-2m + 3n$ (4) $4a - 3b$
 (5) $xy - y^2 - 2$ (6) $2x - 2$
 (7) $10a - 5b$ (8) $6y - 9$
 (9) $-12a + 8b$ (10) $4a - 6$

【解説】

- (1) $(12x^2 + 8xy) \div 4x = (12x^2 + 8xy) \times \frac{1}{4x}$
 $= 3x + 2y$
 (2) $(-6ab + 3b^2) \div 3b = (-6ab + 3b^2) \times \frac{1}{3b}$
 $= -2a + b$

- (3) $(10m^2 - 15mn) \div (-5m)$
 $= (10m^2 - 15mn) \times \left(-\frac{1}{5m}\right)$
 $= -2m + 3n$

- (4) $(8a^2b - 6ab^2) \div 2ab = (8a^2b - 6ab^2) \times \frac{1}{2ab}$
 $= 4a - 3b$
 (5) $(x^2y - xy^2 - 2x) \div x = (x^2y - xy^2 - 2x) \times \frac{1}{x}$
 $= xy - y^2 - 2$
 (6) $(xy - y) \div \frac{1}{2}y = (xy - y) \times \frac{2}{y}$
 $= 2x - 2$
 (7) $(6a^2 - 3ab) \div \frac{3}{5}a = (6a^2 - 3ab) \times \frac{5}{3a}$
 $= 10a - 5b$
 (8) $(8xy^2 - 12xy) \div \frac{4}{3}xy = (8xy^2 - 12xy) \times \frac{3}{4xy}$
 $= 6y - 9$

3

P.19

- (1) $ax + ay + bx + by$ (2) $ab + 5a - 4b - 20$
 (3) $3x^2 + 5x - 2$ (4) $6a^2 - 13a - 28$
 (5) $2a^2 + ab - 15b^2$ (6) $3x^2 - 19xy + 20y^2$
 (7) $ax + bx + ay + by - 2a - 2b$
 (8) $ax - bx + 4x - ay + by - 4y$
 (9) $2a^2 - 3ab - 3a + 12b - 20$
 (10) $8x^2 - 10xy + 3y^2 + 12x - 6y$

【解説】

- (3) $(x+2)(3x-1) = 3x^2 - x + 6x - 2$
 $= 3x^2 + 5x - 2$
 (4) $(3a+4)(2a-7) = 6a^2 - 21a + 8a - 28$
 $= 6a^2 - 13a - 28$
 (5) $(2a-5b)(a+3b) = 2a^2 + 6ab - 5ab - 15b^2$
 $= 2a^2 + ab - 15b^2$
 (6) $(x-5y)(3x-4y) = 3x^2 - 4xy - 15xy + 20y^2$
 $= 3x^2 - 19xy + 20y^2$
 (9) $(a-4)(2a-3b+5)$
 $= a(2a-3b+5) - 4(2a-3b+5)$
 $= 2a^2 - 3ab + 5a - 8a + 12b - 20$
 $= 2a^2 - 3ab - 3a + 12b - 20$
 (10) $(4x-3y+6)(2x-y)$
 $= 4x(2x-y) - 3y(2x-y) + 6(2x-y)$
 $= 8x^2 - 4xy - 6xy + 3y^2 + 12x - 6y$
 $= 8x^2 - 10xy + 3y^2 + 12x - 6y$

- (1) $x^2 + 11x + 18$
- (2) $a^2 - 13a + 42$
- (3) $y^2 - y - 56$
- (4) $x^2 + 6x - 135$
- (5) $a^2 - 9a - 36$
- (6) $y^2 - 25y + 156$
- (7) $t^2 + 7t - 120$
- (8) $x^2 - 2x - 120$
- (9) $x^2 + 5ax + 6a^2$
- (10) $x^2 + 4xy - 5y^2$
- (11) $a^2 - ab - 12b^2$
- (12) $a^2 - 13ab + 42b^2$

【解説】

- (1) $(x+2)(x+9) = x^2 + (2+9)x + 2 \times 9$
 $= x^2 + 11x + 18$
- (2) $(a-7)(a-6) = a^2 + (-7-6)a + (-7) \times (-6)$
 $= a^2 - 13a + 42$
- (3) $(y-8)(y+7) = y^2 + (-8+7)y + (-8) \times 7$
 $= y^2 - y - 56$
- (9) $(x+2a)(x+3a) = x^2 + (2a+3a)x + 2a \times 3a$
 $= x^2 + 5ax + 6a^2$
- (10) $(x-y)(x+5y) = x^2 + (-y+5y)x + (-y) \times 5y$
 $= x^2 + 4xy - 5y^2$
- (11) $(a+3b)(a-4b) = a^2 + (3b-4b)a + 3b \times (-4b)$
 $= a^2 - ab - 12b^2$
- (12) $(a-7b)(a-6b) = a^2 + (-7b-6b)a + (-7b) \times (-6b)$
 $= a^2 - 13ab + 42b^2$

- (1) $x^2 - 24x + 144$
- (2) $m^2 + 18m + 81$
- (3) $a^2 - 40a + 400$
- (4) $y^2 + 30y + 225$
- (5) $x^2 + 3x + \frac{9}{4}$
- (6) $t^2 - \frac{5}{2}t + \frac{25}{16}$
- (7) $9a^2 + 30ab + 25b^2$
- (8) $4x^2 - 28xy + 49y^2$
- (9) $x^2 - 10xy + 25y^2$
- (10) $4m^2 - 12mn + 9n^2$

【解説】

- (1) $(x-12)^2 = x^2 - 2 \times 12 \times x + 12^2$
 $= x^2 - 24x + 144$
- (2) $(m+9)^2 = m^2 + 2 \times 9 \times m + 9^2$
 $= m^2 + 18m + 81$
- (9) $(-x+5y)^2 = (-x)^2 + 2 \times 5y \times (-x) + (5y)^2$
 $= x^2 - 10xy + 25y^2$
- (10) $(-2m+3n)^2 = (-2m)^2 + 2 \times 3n \times (-2m) + (3n)^2$
 $= 4m^2 - 12mn + 9n^2$

- (1) $a^2 - 36$
- (2) $81 - m^2$
- (3) $x^2 - 121$
- (4) $y^2 - 169$
- (5) $x^2 - \frac{4}{9}$
- (6) $\frac{1}{4} - a^2$
- (7) $-a^2 + 9b^2$
- (8) $9x^2 - 25$
- (9) $25x^2 - y^2$
- (10) $4a^2 - 49b^2$

【解説】

- (1) $(a+6)(a-6) = a^2 - 6^2$
 $= a^2 - 36$
- (2) $(9+m)(9-m) = 9^2 - m^2$
 $= 81 - m^2$
- (9) $(5x+y)(5x-y) = (5x)^2 - y^2$
 $= 25x^2 - y^2$
- (10) $(2a-7b)(2a+7b) = (2a)^2 - (7b)^2$
 $= 4a^2 - 49b^2$

- (1) $a^2 + 2ab + b^2 - 4a - 4b - 12$
- (2) $x^2 + 2xy + y^2 - 2x - 2y - 15$
- (3) $a^2 - 2ab + b^2 - 16$
- (4) $4a^2 - 4ab + b^2 - 1$
- (5) $x^2 - 4xy + 4y^2 + 2x - 4y + 1$
- (6) $9a^2 + 6ab + b^2 - 12a - 4b + 4$
- (7) $a^2 + 2ab + b^2 - c^2$
- (8) $x^2 - 2xy + y^2 - z^2$

【解説】

- (2) $(x+y-5)(x+y+3) \xrightarrow{\leftarrow} x+y=A \text{ とおく}$
 $= (A-5)(A+3)$
 $= A^2 - 2A - 15$
 $= x^2 + 2xy + y^2 - 2x - 2y - 15$
- (3) $(a-b+4)(a-b-4) \xrightarrow{\leftarrow} a-b=A \text{ とおく}$
 $= (A+4)(A-4)$
 $= A^2 - 16$
 $= a^2 - 2ab + b^2 - 16$
- (5) $(x-2y+1)^2 \xrightarrow{\leftarrow} x-2y=A \text{ とおく}$
 $= (A+1)^2$
 $= A^2 + 2A + 1$
 $= x^2 - 4xy + 4y^2 + 2x - 4y + 1$
- (6) $(3a+b-2)^2 \xrightarrow{\leftarrow} 3a+b=A \text{ とおく}$
 $= (A-2)^2$
 $= A^2 - 4A + 4$
 $= 9a^2 + 6ab + b^2 - 12a - 4b + 4$

- (1) $x^2 - 4x + 19$
- (2) $3x^2 + 2x - 2$
- (3) $6x^2 - 7x + 1$
- (4) $x^2 + 5x - 28$
- (5) $2x^2 - 9x + 10$
- (6) $12a$
- (7) $3x$
- (8) $2a^2 - 10a - 37$
- (9) $x^2 - 6xy + y^2$
- (10) $3x^2 + 8x - 43$
- (11) $5xy - 3y^2$
- (12) $11a - 22$

【解説】

- (5) $(x+2)(x-3) + (x-4)^2$
 $= x^2 - x - 6 + x^2 - 8x + 16$
 $= 2x^2 - 9x + 10$
- (6) $(a+3)^2 - (a-3)^2 = a^2 + 6a + 9 - (a^2 - 6a + 9)$
 $= a^2 + 6a + 9 - a^2 + 6a - 9$
 $= 12a$
- (7) $(x-1)(x+4) - (x+2)(x-2)$
 $= x^2 + 3x - 4 - (x^2 - 4)$
 $= x^2 + 3x - 4 - x^2 + 4$
 $= 3x$
- (8) $3(a-2)(a+2) - (a+5)^2$
 $= 3(a^2 - 4) - (a^2 + 10a + 25)$
 $= 3a^2 - 12 - a^2 - 10a - 25$
 $= 2a^2 - 10a - 37$
- (9) $2(x-y)^2 - (x+y)^2$
 $= 2(x^2 - 2xy + y^2) - (x^2 + 2xy + y^2)$
 $= 2x^2 - 4xy + 2y^2 - x^2 - 2xy - y^2$
 $= x^2 - 6xy + y^2$
- (10) $4(x-3)(x+4) - (x+1)(x-5)$
 $= 4(x^2 + x - 12) - (x^2 - 4x - 5)$
 $= 4x^2 + 4x - 48 - x^2 + 4x + 5$
 $= 3x^2 + 8x - 43$
- (11) $(2x-y)(x+y) - 2(x-y)^2$
 $= 2x^2 + 2xy - xy - y^2 - 2(x^2 - 2xy + y^2)$
 $= 2x^2 + xy - y^2 - 2x^2 + 4xy - 2y^2$
 $= 5xy - 3y^2$
- (12) $(2a-5)(2a+5) - (a-3)(4a+1)$
 $= 4a^2 - 25 - (4a^2 + a - 12a - 3)$
 $= 4a^2 - 25 - 4a^2 + 11a + 3$
 $= 11a - 22$

3 因数分解

確認問題 1

- (1) 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
- (2) ① 2^3 ② $2^2 \times 3$ ③ 2×3^2
- ④ $2^2 \times 5$ ⑤ 3^3 ⑥ $2 \times 3 \times 7$
- ⑦ $2^2 \times 13$ ⑧ $3^2 \times 7$ ⑨ 3×5^2
- ⑩ 3^4 ⑪ $2^2 \times 3 \times 11$ ⑫ $2 \times 3 \times 5^2$

【解説】

- (2) ① $\begin{array}{r} 2 \overline{) 8} \\ 2 \overline{) 4} \\ \hline 2 \end{array}$ ② $\begin{array}{r} 2 \overline{) 12} \\ 2 \overline{) 6} \\ \hline 3 \end{array}$ ③ $\begin{array}{r} 2 \overline{) 18} \\ 3 \overline{) 9} \\ \hline 3 \end{array}$
- ④ $\begin{array}{r} 2 \overline{) 20} \\ 2 \overline{) 10} \\ \hline 5 \end{array}$ ⑤ $\begin{array}{r} 3 \overline{) 27} \\ 3 \overline{) 9} \\ \hline 3 \end{array}$ ⑥ $\begin{array}{r} 2 \overline{) 42} \\ 3 \overline{) 21} \\ \hline 7 \end{array}$
- ⑦ $\begin{array}{r} 2 \overline{) 52} \\ 2 \overline{) 26} \\ \hline 13 \end{array}$ ⑧ $\begin{array}{r} 3 \overline{) 63} \\ 3 \overline{) 21} \\ \hline 7 \end{array}$ ⑨ $\begin{array}{r} 3 \overline{) 75} \\ 5 \overline{) 25} \\ \hline 5 \end{array}$
- ⑩ $\begin{array}{r} 3 \overline{) 81} \\ 3 \overline{) 27} \\ 3 \overline{) 9} \\ \hline 3 \end{array}$ ⑪ $\begin{array}{r} 2 \overline{) 132} \\ 2 \overline{) 66} \\ 3 \overline{) 33} \\ \hline 11 \end{array}$ ⑫ $\begin{array}{r} 2 \overline{) 150} \\ 3 \overline{) 75} \\ 5 \overline{) 25} \\ \hline 5 \end{array}$

確認問題 2

- (1) ① $x^2 - 5x - 6$ ② $x+1$ ③ $x-6$
- ④ $x^2 - 64$ ⑤ $x+8$ ⑥ $x-8$
- (2) ① $a(x-y)$ ② $x(y+6)$
- ③ $5x(a-b)$ ④ $4a(2m-n)$
- ⑤ $ab(a+b)$ ⑥ $2xy(3x-5)$
- ⑦ $7ay(2a-3y)$ ⑧ $5xy(1+3y)$
- ⑨ $3b(ab-4a-3)$ ⑩ $2xy(4x-2y+1)$

確認問題 3

P.24

- (1) $(x+2)(x+7)$ (2) $(x-2)(x-8)$
 (3) $(x-6)(x-7)$ (4) $(x-1)(x+9)$
 (5) $(x-7)(x+8)$ (6) $(x+3)(x-6)$
 (7) $(a+2)(a-6)$ (8) $(y+6)(y+9)$
 (9) $(x-6)(x+8)$ (10) $(x+8)(x-9)$
 (11) $(x-3)(x+15)$ (12) $(a-7)(a-9)$

【解説】

(1) $x^2 + \boxed{9}x + \boxed{14}$
 和 積

積が14, 和が9となる2数は, 2, 7

$$x^2 + 9x + 14 = (x+2)(x+7)$$

(2) $x^2 - \boxed{10}x + \boxed{16}$
 和 積

積が16, 和が-10となる2数は, -2, -8

$$x^2 - 10x + 16 = (x-2)(x-8)$$

確認問題 4

P.25

- (1) $(x+2)^2$ (2) $(x+6)^2$
 (3) $(x-5)^2$ (4) $(a-8)^2$
 (5) $(m-1)^2$ (6) $(x+4)^2$
 (7) $(y+7)^2$ (8) $(x-10)^2$
 (9) $(a+3)^2$ (10) $(x-9)^2$

【解説】

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

(2) $x^2 + 12x + 36 = x^2 + 2 \times 6 \times x + 6^2$
 $= (x+6)^2$

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

(4) $a^2 - 16a + 64 = a^2 - 2 \times 8 \times a + 8^2$
 $= (a-8)^2$

確認問題 5

P.25

- (1) $(x+1)(x-1)$ (2) $(a+4)(a-4)$
 (3) $(m+5)(m-5)$ (4) $(y+10)(y-10)$
 (5) $(x+8)(x-8)$ (6) $(7+y)(7-y)$
 (7) $(3+m)(3-m)$ (8) $(p+11)(p-11)$

【解説】

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

(2) $a^2 - 16 = a^2 - 4^2$
 $= (a+4)(a-4)$

(6) $49 - y^2 = 7^2 - y^2$
 $= (7+y)(7-y)$

(7) $9 - m^2 = 3^2 - m^2$
 $= (3+m)(3-m)$

1章 式の計算

3 標準問題

1

P.26

- (1) 61, 73, 97
 (2) ① $2^3 \times 5$ ② $2^3 \times 7$ ③ $2^2 \times 3 \times 7$
 ④ $2 \times 3^2 \times 5$ ⑤ $2 \times 3^2 \times 7$ ⑥ $2^3 \times 5^2$

【解説】

(2) ① $\begin{array}{r} 2 \overline{) 40} \\ 2 \overline{) 20} \\ 2 \overline{) 10} \\ \hline 5 \end{array}$ ② $\begin{array}{r} 2 \overline{) 56} \\ 2 \overline{) 28} \\ 2 \overline{) 14} \\ \hline 7 \end{array}$ ③ $\begin{array}{r} 2 \overline{) 84} \\ 2 \overline{) 42} \\ 3 \overline{) 21} \\ \hline 7 \end{array}$

④ $\begin{array}{r} 2 \overline{) 90} \\ 3 \overline{) 45} \\ 3 \overline{) 15} \\ \hline 5 \end{array}$ ⑤ $\begin{array}{r} 2 \overline{) 126} \\ 3 \overline{) 63} \\ 3 \overline{) 21} \\ \hline 7 \end{array}$ ⑥ $\begin{array}{r} 2 \overline{) 200} \\ 2 \overline{) 100} \\ 2 \overline{) 50} \\ 5 \overline{) 25} \\ \hline 5 \end{array}$

2

P.26

- (1) $y(x+4)$ (2) $b(a-c)$
 (3) $2x(x-2)$ (4) $xy(x+3y)$
 (5) $m(x+y-1)$ (6) $5x(2x-5y+3)$

3

P.26・P.27

- (1) $(x+2)(x+5)$ (2) $(x-3)(x-6)$
 (3) $(x-4)(x+5)$ (4) $(x+2)(x-8)$
 (5) $(x-3)(x-9)$ (6) $(x+2)(x-10)$
 (7) $(x-5)(x+8)$ (8) $(x+6)(x-7)$
 (9) $(x+5)(x+7)$ (10) $(x+4)(x-8)$
 (11) $(x+5)(x-10)$ (12) $(x-3)(x-8)$
 (13) $(x-7)(x+8)$ (14) $(x+7)(x-13)$

【解説】

(1) $x^2 + \boxed{7}x + \boxed{10}$
 和 積

積が10, 和が7となる2数は, 2, 5

$$x^2 + 7x + 10 = (x+2)(x+5)$$

(2) $x^2 - \boxed{9}x + \boxed{18}$
 和 積

積が18, 和が-9となる2数は, -3, -6

$$x^2 - 9x + 18 = (x-3)(x-6)$$

(3) $x^2 + \boxed{1}x - \boxed{20}$
 和 積

積が-20, 和が1となる2数は, -4, 5

$$x^2 + x - 20 = (x-4)(x+5)$$

4

P.27

- (1) $(x-1)^2$ (2) $(y+3)^2$
 (3) $(m+5)^2$ (4) $(x-7)^2$
 (5) $(a+9)^2$ (6) $(x-\frac{1}{2})^2$
 (7) $(y-12)^2$ (8) $(p+\frac{2}{3})^2$

【解説】

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

(2) $y^2 + 6y + 9 = y^2 + 2 \times 3 \times y + 3^2$
 $= (y+3)^2$

(6) $x^2 - x + \frac{1}{4} = x^2 - 2 \times \frac{1}{2} \times x + (\frac{1}{2})^2$
 $= (x - \frac{1}{2})^2$

(7) $y^2 - 24y + 144 = y^2 - 2 \times 12 \times y + 12^2$
 $= (y-12)^2$

(8) $p^2 + \frac{4}{3}p + \frac{4}{9} = p^2 + 2 \times \frac{2}{3} \times p + (\frac{2}{3})^2$
 $= (p + \frac{2}{3})^2$

5

P.27

- (1) $(m+7)(m-7)$ (2) $(y+8)(y-8)$
 (3) $(x+10)(x-10)$ (4) $(5+p)(5-p)$
 (5) $(a+\frac{1}{4})(a-\frac{1}{4})$ (6) $(\frac{3}{2}+m)(\frac{3}{2}-m)$

【解説】

(3) $x^2 - 100 = x^2 - 10^2$
 $= (x+10)(x-10)$

(4) $25 - p^2 = 5^2 - p^2$
 $= (5+p)(5-p)$

(5) $a^2 - \frac{1}{16} = a^2 - (\frac{1}{4})^2$
 $= (a + \frac{1}{4})(a - \frac{1}{4})$

(6) $\frac{9}{4} - m^2 = (\frac{3}{2})^2 - m^2$
 $= (\frac{3}{2} + m)(\frac{3}{2} - m)$

4 因数分解の利用

確認問題 1

P.28

- (1) $(2x-1)^2$ (2) $(3a+5)^2$
 (3) $(9a-2)^2$ (4) $(x+4y)^2$
 (5) $(6x+1)(6x-1)$ (6) $(2x+5)(2x-5)$

【解説】

- (1) $4x^2 - 4x + 1 = (2x)^2 - 2 \times 1 \times 2x + 1^2$
 $= (2x-1)^2$
 (2) $9a^2 + 30a + 25 = (3a)^2 + 2 \times 5 \times 3a + 5^2$
 $= (3a+5)^2$
 (3) $81a^2 - 36a + 4 = (9a)^2 - 2 \times 2 \times 9a + 2^2$
 $= (9a-2)^2$
 (4) $x^2 + 8xy + 16y^2 = x^2 + 2 \times 4y \times x + (4y)^2$
 $= (x+4y)^2$
 (5) $36x^2 - 1 = (6x)^2 - 1^2$
 $= (6x+1)(6x-1)$
 (6) $4x^2 - 25 = (2x)^2 - 5^2$
 $= (2x+5)(2x-5)$

確認問題 2

P.28

- (1) $2(x+2)(x+3)$ (2) $2(a+5)^2$
 (3) $3(m+5)(m-5)$ (4) $a(x+y)(x-y)$
 (5) $2a(b-3)^2$ (6) $-4b(a+4)(a-5)$

【解説】

- (1) $2x^2 + 10x + 12 = 2(x^2 + 5x + 6)$
 $= 2(x+2)(x+3)$
 (2) $2a^2 + 20a + 50 = 2(a^2 + 10a + 25)$
 $= 2(a+5)^2$
 (3) $3m^2 - 75 = 3(m^2 - 25)$
 $= 3(m+5)(m-5)$
 (4) $ax^2 - ay^2 = a(x^2 - y^2)$
 $= a(x+y)(x-y)$
 (5) $2ab^2 - 12ab + 18a = 2a(b^2 - 6b + 9)$
 $= 2a(b-3)^2$
 (6) $-4a^2b + 4ab + 80b = -4b(a^2 - a - 20)$
 $= -4b(a+4)(a-5)$

確認問題 3

P.29

- (1) $(a+b+1)^2$ (2) $(x+y+2)(x+y-5)$
 (3) $(x+3)(x-5)$ (4) $(a+1)(a+7)$
 (5) $(x+y)(a+3)$ (6) $(a+b)(x-2y)$

【解説】

- (1) $(a+b)^2 + 2(a+b) + 1$ $\leftarrow a+b=A$ とおく
 $= A^2 + 2A + 1$
 $= (A+1)^2$
 $= (a+b+1)^2$
 (2) $(x+y)^2 - 3(x+y) - 10$ $\leftarrow x+y=A$ とおく
 $= A^2 - 3A - 10$
 $= (A+2)(A-5)$
 $= (x+y+2)(x+y-5)$
 (3) $(x+1)^2 - 4(x+1) - 12$ $\leftarrow x+1=A$ とおく
 $= A^2 - 4A - 12$
 $= (A+2)(A-6)$
 $= (x+1+2)(x+1-6)$
 $= (x+3)(x-5)$

確認問題 4

P.29

- (1) $(a-2)(x+1)$ (2) $(y+3)(x+2)$
 (3) $(a+1)(m-1)$ (4) $(a-2)(b+4)$

【解説】

- (1) $ax - 2x + a - 2$
 $= x(a-2) + (a-2)$ $\leftarrow a-2=A$ とおく
 $= xA + A$
 $= A(x+1)$
 $= (a-2)(x+1)$
 (2) $xy + 3x + 2y + 6$
 $= x(y+3) + 2(y+3)$ $\leftarrow y+3=A$ とおく
 $= xA + 2A$
 $= A(x+2)$
 $= (y+3)(x+2)$
 (3) $am + m - a - 1$
 $= m(a+1) - (a+1)$ $\leftarrow a+1=A$ とおく
 $= mA - A$
 $= A(m-1)$
 $= (a+1)(m-1)$

- (4) $ab - 2b + 4a - 8$
 $= b(a-2) + 4(a-2)$ $\leftarrow a-2=A$ とおく
 $= bA + 4A$
 $= A(b+4)$
 $= (a-2)(b+4)$

確認問題 5

P.30

- (1) n を整数とすると、連続する2つの奇数は、
 $2n-1, 2n+1$
 と表される。
 大きい方の2乗から小さい方の2乗をひいた差は、
 $(2n+1)^2 - (2n-1)^2$
 $= 4n^2 + 4n + 1 - (4n^2 - 4n + 1)$
 $= 8n$
 n は整数だから、これは8の倍数である。
 よって、連続する2つの奇数では、大きい方の2乗から小さい方の2乗をひいた差は、8の倍数になる。
 (2) 小さい方の整数を n とすると、大きい方の整数は $n+1$ と表される。
 このとき、2乗の和は、
 $n^2 + (n+1)^2 = n^2 + n^2 + 2n + 1$
 $= 2n^2 + 2n + 1$
 $= n(n+1) \times 2 + 1$
 だから、この和は連続する2つの整数の積の2倍に1を加えた数に等しい。
 (3) 中央の整数を n とすると、3つの数は、 $n-1, n, n+1$ と表される。
 このとき、最大の数の2乗と最小の数の2乗の差は、
 $(n+1)^2 - (n-1)^2$
 $= n^2 + 2n + 1 - (n^2 - 2n + 1)$
 $= 4n$
 これは、中央の数の4倍に等しい。

確認問題 6

P.31

- (1) 1000 (2) 840
 (3) 1521 (4) 9025
 (5) 896 (6) 3599

【解説】

- (1) $55^2 - 45^2 = (55+45) \times (55-45)$
 $= 100 \times 10 = 1000$
 (2) $47^2 - 37^2 = (47+37) \times (47-37)$
 $= 84 \times 10 = 840$
 (3) $39^2 = (40-1)^2$
 $= 1600 - 80 + 1 = 1521$
 (4) $95^2 = (100-5)^2$
 $= 10000 - 1000 + 25 = 9025$
 (5) $28 \times 32 = (30-2) \times (30+2)$
 $= 900 - 4 = 896$
 (6) $59 \times 61 = (60-1) \times (60+1)$
 $= 3600 - 1 = 3599$

確認問題 7

P.31

$$S = (b+2a)(c+2a) - bc$$

$$= 4a^2 + 2ab + 2ac$$

$$= 2a(2a+b+c) \quad \dots \textcircled{1}$$

$$\ell = (b+a) \times 2 + (c+a) \times 2$$

$$= 2(2a+b+c)$$

したがって、 $a\ell = 2a(2a+b+c) \quad \dots \textcircled{2}$

$\textcircled{1}, \textcircled{2}$ から、 $S = a\ell$

4 標準問題

1

P.32

- (1) $(3x+1)^2$ (2) $(2a-3)^2$
 (3) $(5a+1)(5a-1)$ (4) $(9x+8y)(9x-8y)$
 (5) $(4x-3y)^2$ (6) $\left(2m - \frac{n}{2}\right)^2$
 (7) $3a(2b+c)(2b-c)$ (8) $2x(3y-2)^2$

【解説】

- (1) $9x^2 + 6x + 1 = (3x)^2 + 2 \times 1 \times 3x + 1^2$
 $= (3x+1)^2$
 (2) $4a^2 - 12a + 9 = (2a)^2 - 2 \times 3 \times 2a + 3^2$
 $= (2a-3)^2$
 (3) $25a^2 - 1 = (5a)^2 - 1^2$
 $= (5a+1)(5a-1)$
 (4) $81x^2 - 64y^2 = (9x)^2 - (8y)^2$
 $= (9x+8y)(9x-8y)$

- (5) $16x^2 - 24xy + 9y^2 = (4x)^2 - 2 \times 3y \times 4x + (3y)^2$
 $= (4x - 3y)^2$
- (6) $4m^2 - 2mn + \frac{n^2}{4} = (2m)^2 - 2 \times \frac{n}{2} \times 2m + \left(\frac{n}{2}\right)^2$
 $= \left(2m - \frac{n}{2}\right)^2$
- (7) $12ab^2 - 3ac^2 = 3a(4b^2 - c^2)$
 $= 3a(2b + c)(2b - c)$
- (8) $18xy^2 - 24xy + 8x = 2x(9y^2 - 12y + 4)$
 $= 2x(3y - 2)^2$

2

P.32

- (1) $3(x+3)(x-5)$ (2) $4(a-4)(a+5)$
 (3) $5(m+5)(m-5)$ (4) $2(4+y)(4-y)$
 (5) $a(x-4)^2$ (6) $2x(y-2)(y+5)$
 (7) $3a(b+3)(b-3)$ (8) $-4b(a+1)(a-3)$

【解説】

- (1) $3x^2 - 6x - 45 = 3(x^2 - 2x - 15)$
 $= 3(x+3)(x-5)$
- (2) $4a^2 + 4a - 80 = 4(a^2 + a - 20)$
 $= 4(a-4)(a+5)$
- (3) $5m^2 - 125 = 5(m^2 - 25)$
 $= 5(m+5)(m-5)$
- (4) $32 - 2y^2 = 2(16 - y^2)$
 $= 2(4+y)(4-y)$
- (5) $ax^2 - 8ax + 16a = a(x^2 - 8x + 16)$
 $= a(x-4)^2$
- (6) $2xy^2 + 6xy - 20x = 2x(y^2 + 3y - 10)$
 $= 2x(y-2)(y+5)$
- (7) $3ab^2 - 27a = 3a(b^2 - 9)$
 $= 3a(b+3)(b-3)$
- (8) $-4a^2b + 8ab + 12b = -4b(a^2 - 2a - 3)$
 $= -4b(a+1)(a-3)$

3

P.32

- (1) $(x+y+3)(x+y+4)$ (2) $(a+b-2)^2$
 (3) $(x-1)(x-11)$ (4) $(a+1)(b+3)$
 (5) $(x+y+4)(x+y-4)$ (6) $(3a+4)(a-6)$
 (7) $(x+2+y)(x+2-y)$ (8) $(x+2)(y-2)$

【解説】

- (1) $(x+y)^2 + 7(x+y) + 12$
 $= A^2 + 7A + 12$ $\leftarrow x+y=A$ とおく
 $= (A+3)(A+4)$
 $= (x+y+3)(x+y+4)$
- (2) $(a+b)^2 - 4(a+b) + 4$
 $= A^2 - 4A + 4$ $\leftarrow a+b=A$ とおく
 $= (A-2)^2$
 $= (a+b-2)^2$
- (3) $(x-5)^2 - 2(x-5) - 24$
 $= A^2 - 2A - 24$ $\leftarrow x-5=A$ とおく
 $= (A+4)(A-6)$
 $= (x-1)(x-11)$
- (4) $b(a+1) + 3(a+1)$
 $= bA + 3A$ $\leftarrow a+1=A$ とおく
 $= A(b+3)$
 $= (a+1)(b+3)$
- (5) $(x+y)^2 - 16$
 $= A^2 - 16$ $\leftarrow x+y=A$ とおく
 $= (A+4)(A-4)$
 $= (x+y+4)(x+y-4)$
- (6) $(2a-1)^2 - (a+5)^2$
 $= A^2 - B^2$ $\leftarrow \begin{matrix} 2a-1=A, \\ a+5=B \end{matrix}$ とおく
 $= (A+B)(A-B)$
 $= (2a-1+a+5)(2a-1-a-5)$
 $= (3a+4)(a-6)$
- (7) $x^2 + 4x + 4 - y^2$
 $= (x+2)^2 - y^2$ $\leftarrow x+2=A$ とおく
 $= A^2 - y^2$
 $= (A+y)(A-y)$
 $= (x+2+y)(x+2-y)$
- (8) $xy + 2y - 2x - 4$
 $= y(x+2) - 2(x+2)$ $\leftarrow x+2=A$ とおく
 $= yA - 2A$
 $= A(y-2)$
 $= (x+2)(y-2)$

4

P.33

- (1) 連続する2つの偶数の積に1を加えた和は、
 $2n(2n+2) + 1 = 4n^2 + 4n + 1$
 $= (2n+1)^2$
 2つの偶数 $2n, 2n+2$ の間にある奇数は $2n+1$ だから、これはその2乗に等しい。
- (2) もっとも小さい整数を n とすると、4つの数は、
 $n, n+1, n+2, n+3$ と表される。
 このとき、大きい方の2数の積から小さい方の2数の積をひいた差は、
 $(n+2)(n+3) - n(n+1)$
 $= n^2 + 5n + 6 - n^2 - n$
 $= 4n + 6 \dots \textcircled{1}$
 また、4つの数の和は、
 $n + (n+1) + (n+2) + (n+3)$
 $= 4n + 6 \dots \textcircled{2}$
 $\textcircled{1}, \textcircled{2}$ から、大きい方の2数の積から小さい方の2数の積をひいた差は、もとの4つの数の和に等しい。

5

P.33

- (1) 3600 (2) 1800
 (3) 50 (4) 2704
 (5) 9604 (6) 1591
 (7) 6396 (8) 100

【解説】

- (1) $68^2 - 32^2 = (68+32) \times (68-32)$
 $= 100 \times 36 = 3600$
- (2) $45^2 - 15^2 = (45+15) \times (45-15)$
 $= 60 \times 30 = 1800$
- (3) $7.5^2 - 2.5^2 = (7.5+2.5) \times (7.5-2.5)$
 $= 10 \times 5 = 50$
- (4) $52^2 = (50+2)^2$
 $= 2500 + 200 + 4 = 2704$
- (5) $98^2 = (100-2)^2$
 $= 10000 - 400 + 4 = 9604$
- (6) $43 \times 37 = (40+3) \times (40-3)$
 $= 1600 - 9 = 1591$
- (7) $78 \times 82 = (80-2) \times (80+2)$
 $= 6400 - 4 = 6396$

(8) $35^2 - 2 \times 35 \times 25 + 25^2 = (35 - 25)^2$
 $= 10^2 = 100$

6

P.33

2つの半円を合わせると1つの円になるから、

$$S = ax \times 2 + \pi \left(\frac{x}{2} + a\right)^2 - \pi \left(\frac{x}{2}\right)^2$$

$$= 2ax + \pi ax + \pi a^2$$

$$= a(2x + \pi x + \pi a) \dots \textcircled{1}$$

道の中央を通る半円の直径は、 $(x+a)m$ であるから、

$$\ell = x \times 2 + \pi(x+a)$$

$$= 2x + \pi x + \pi a$$

したがって、 $a\ell = a(2x + \pi x + \pi a) \dots \textcircled{2}$

$\textcircled{1}, \textcircled{2}$ から、 $S = a\ell$

1章 式の計算

計算トレーニング

1

P.34

- (1) $12a^2 + 21ab$ (2) $-8x^2 + 36xy$
 (3) $-12m^2 - 2mn$ (4) $14xy - 21x^2$
 (5) $6a^2 - 3ab + 12a$ (6) $2xy - 6y^2 + 10y$
 (7) $2x^2 - 3xy$ (8) $4a^2 + 10ab$

【解説】

- (1) $3a(4a+7b) = 3a \times 4a + 3a \times 7b$
 $= 12a^2 + 21ab$
- (2) $(2x-9y) \times (-4x) = 2x \times (-4x) - 9y \times (-4x)$
 $= -8x^2 + 36xy$
- (3) $-2m(6m+n) = -2m \times 6m - 2m \times n$
 $= -12m^2 - 2mn$
- (4) $7x(2y-3x) = 7x \times 2y - 7x \times 3x$
 $= 14xy - 21x^2$
- (5) $3a(2a-b+4) = 3a \times 2a - 3a \times b + 3a \times 4$
 $= 6a^2 - 3ab + 12a$
- (6) $(x-3y+5) \times 2y = x \times 2y - 3y \times 2y + 5 \times 2y$
 $= 2xy - 6y^2 + 10y$
- (7) $\frac{1}{4}x(8x-12y) = \frac{1}{4}x \times 8x - \frac{1}{4}x \times 12y$
 $= 2x^2 - 3xy$

$$(8) \frac{2}{5}a(10a+25b) = \frac{2}{5}a \times 10a + \frac{2}{5}a \times 25b \\ = 4a^2 + 10ab$$

2

P.34

- | | |
|----------------|--------------|
| (1) $2x+3$ | (2) $3a-2b$ |
| (3) $-3x-2y$ | (4) $4a-5$ |
| (5) $2ab+3b+4$ | (6) $3x-9y$ |
| (7) $10a-15b$ | (8) $36x+24$ |

【解説】

$$(1) (6x^2+9x) \div 3x = (6x^2+9x) \times \frac{1}{3x} \\ = 2x+3$$

$$(2) (12ab-8b^2) \div 4b = (12ab-8b^2) \times \frac{1}{4b} \\ = 3a-2b$$

$$(3) (15x^2y+10xy^2) \div (-5xy) \\ = (15x^2y+10xy^2) \times \left(-\frac{1}{5xy}\right) \\ = -3x-2y$$

$$(4) (24a^2b-30ab) \div 6ab = (24a^2b-30ab) \times \frac{1}{6ab} \\ = 4a-5$$

$$(5) (4a^2b+6ab+8a) \div 2a = (4a^2b+6ab+8a) \times \frac{1}{2a} \\ = 2ab+3b+4$$

$$(6) (2xy-6y^2) \div \frac{2}{3}y = (2xy-6y^2) \times \frac{3}{2y} \\ = 3x-9y$$

$$(7) (8a^2-12ab) \div \frac{4}{5}a = (8a^2-12ab) \times \frac{5}{4a} \\ = 10a-15b$$

$$(8) (30x^2y+20xy) \div \frac{5}{6}xy = (30x^2y+20xy) \times \frac{6}{5xy} \\ = 36x+24$$

3

P.34

- | | |
|---------------------------|-----------------------|
| (1) $xy-4x+5y-20$ | (2) $2ab+12a-7b-42$ |
| (3) $3x^2+22x-16$ | (4) $6p^2+pq-q^2$ |
| (5) $2x^2-5xy-12y^2$ | (6) $-5a^2+13ab+6b^2$ |
| (7) $3x^2-xy+13x-3y+12$ | |
| (8) $3a^2+2ab-8b^2+2a+4b$ | |

【解説】

$$(3) (3x-2)(x+8) = 3x^2+24x-2x-16 \\ = 3x^2+22x-16$$

$$(4) (2p+q)(3p-q) = 6p^2-2pq+3pq-q^2 \\ = 6p^2+pq-q^2$$

$$(5) (x-4y)(2x+3y) = 2x^2+3xy-8xy-12y^2 \\ = 2x^2-5xy-12y^2$$

$$(6) (5a+2b)(-a+3b) = -5a^2+15ab-2ab+6b^2 \\ = -5a^2+13ab+6b^2$$

$$(7) (x+3)(3x-y+4) \\ = x(3x-y+4) + 3(3x-y+4) \\ = 3x^2-xy+4x+9x-3y+12 \\ = 3x^2-xy+13x-3y+12$$

$$(8) (3a-4b+2)(a+2b) \\ = 3a(a+2b) - 4b(a+2b) + 2(a+2b) \\ = 3a^2+6ab-4ab-8b^2+2a+4b \\ = 3a^2+2ab-8b^2+2a+4b$$

4

P.35

- | | |
|-------------------------------|-----------------------|
| (1) $x^2+3x-28$ | (2) $a^2-4a-45$ |
| (3) $x^2+8xy+15y^2$ | (4) $4x^2-20x+21$ |
| (5) $a^2-26a+169$ | (6) $9x^2+36x+36$ |
| (7) $16a^2+24ab+9b^2$ | (8) $25x^2-20xy+4y^2$ |
| (9) x^2-64 | (10) $144-m^2$ |
| (11) $9x^2-49$ | (12) $25a^2-64b^2$ |
| (13) $x^2+2xy+y^2+x+y-20$ | |
| (14) $a^2+2ab+b^2-36$ | |
| (15) $a^2-2ab+b^2+6a-6b+9$ | |
| (16) $4x^2+4xy+y^2-16x-8y+16$ | |

【解説】

$$(1) (x-4)(x+7) = x^2 + (-4+7)x + (-4) \times 7 \\ = x^2+3x-28$$

$$(2) (a+5)(a-9) = a^2 + (5-9)a + 5 \times (-9) \\ = a^2-4a-45$$

$$(3) (x+5y)(x+3y) = x^2 + (5y+3y)x + 5y \times 3y \\ = x^2+8xy+15y^2$$

$$(4) (2x-3)(2x-7) \\ = (2x)^2 + (-3-7) \times 2x + (-3) \times (-7) \\ = 4x^2-20x+21$$

$$(5) (a-13)^2 = a^2 - 2 \times 13 \times a + 13^2 \\ = a^2-26a+169$$

$$(6) (3x+6)^2 = (3x)^2 + 2 \times 6 \times 3x + 6^2 \\ = 9x^2+36x+36$$

$$(7) (4a+3b)^2 = (4a)^2 + 2 \times 3b \times 4a + (3b)^2 \\ = 16a^2+24ab+9b^2$$

$$(8) (5x-2y)^2 = (5x)^2 - 2 \times 2y \times 5x + (2y)^2 \\ = 25x^2-20xy+4y^2$$

$$(9) (x+8)(x-8) = x^2-8^2 \\ = x^2-64$$

$$(10) (12-m)(12+m) = 12^2-m^2 \\ = 144-m^2$$

$$(11) (3x+7)(3x-7) = (3x)^2-7^2 \\ = 9x^2-49$$

$$(12) (5a+8b)(5a-8b) = (5a)^2-(8b)^2 \\ = 25a^2-64b^2$$

$$(13) (x+y-4)(x+y+5) \quad \left. \begin{array}{l} \\ \end{array} \right\} x+y=A \text{ とおく} \\ = (A-4)(A+5) \\ = A^2+A-20 \\ = x^2+2xy+y^2+x+y-20$$

$$(14) (a+b+6)(a+b-6) \quad \left. \begin{array}{l} \\ \end{array} \right\} a+b=A \text{ とおく} \\ = (A+6)(A-6) \\ = A^2-36 \\ = a^2+2ab+b^2-36$$

$$(15) (a-b+3)^2 \quad \left. \begin{array}{l} \\ \end{array} \right\} a-b=A \text{ とおく} \\ = (A+3)^2 \\ = A^2+6A+9 \\ = a^2-2ab+b^2+6a-6b+9$$

$$(16) (2x+y-4)^2 \quad \left. \begin{array}{l} \\ \end{array} \right\} 2x+y=A \text{ とおく} \\ = (A-4)^2 \\ = A^2-8A+16 \\ = 4x^2+4xy+y^2-16x-8y+16$$

5

P.35

- | | |
|--------------------|---------------|
| (1) $2x^2-7x$ | (2) $3x+1$ |
| (3) $15x+33$ | (4) $9a-46$ |
| (5) $x^2+10xy+y^2$ | (6) $8x^2+18$ |
| (7) $2a^2-6ab+b^2$ | (8) $-6a-2$ |

【解説】

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

$$(2) (x+3)(x-3) - (x+2)(x-5) \\ = x^2-9 - (x^2-3x-10) \\ = x^2-9-x^2+3x+10 \\ = 3x+1$$

$$(3) 2(x+4)^2 - (2x-1)(x+1) \\ = 2(x^2+8x+16) - (2x^2+2x-x-1) \\ = 2x^2+16x+32-2x^2-x+1 \\ = 15x+33$$

$$(4) (a-5)(a+6) - (a-4)^2 \\ = a^2+a-30 - (a^2-8a+16) \\ = a^2+a-30-a^2+8a-16 \\ = 9a-46$$

$$(5) 3(x+y)^2 - 2(x-y)^2 \\ = 3(x^2+2xy+y^2) - 2(x^2-2xy+y^2) \\ = 3x^2+6xy+3y^2-2x^2+4xy-2y^2 \\ = x^2+10xy+y^2$$

$$(6) (2x+3)^2 + (2x-3)^2 \\ = 4x^2+12x+9+4x^2-12x+9 \\ = 8x^2+18$$

$$(7) (a-3b)(a+b) + (a-2b)^2 \\ = a^2-2ab-3b^2+a^2-4ab+4b^2 \\ = 2a^2-6ab+b^2$$

$$(8) (3a+1)(3a-1) - (3a+1)^2 \\ = 9a^2-1 - (9a^2+6a+1) \\ = 9a^2-1-9a^2-6a-1 \\ = -6a-2$$

6

P.36

- | | |
|-------------------|-------------------|
| (1) $2a(x+2y)$ | (2) $4y(x-2y)$ |
| (3) $5m(2x-3y)$ | (4) $4ab(3a+4b)$ |
| (5) $7xy(x-3)$ | (6) $a(x-y+z)$ |
| (7) $2a(2a-4b+3)$ | (8) $3xy(x+2y-3)$ |

7

P.36

- | | |
|---|--------------------------------------|
| (1) $(x+5)(x+7)$ | (2) $(x+4)(x-8)$ |
| (3) $(a-5)(a-10)$ | (4) $(y-7)(y+9)$ |
| (5) $(x+2y)(x+7y)$ | (6) $(a+3b)(a-6b)$ |
| (7) $(x+8)^2$ | (8) $(p-11)^2$ |
| (9) $(3a-1)^2$ | (10) $(2x+5)^2$ |
| (11) $(x+7y)^2$ | (12) $\left(4x-\frac{y}{2}\right)^2$ |
| (13) $(x+9)(x-9)$ | (14) $(6+p)(6-p)$ |
| (15) $(2x+7)(2x-7)$ | (16) $(9a+1)(9a-1)$ |
| (17) $(5x+8y)(5x-8y)$ | |
| (18) $\left(3m+\frac{n}{3}\right)\left(3m-\frac{n}{3}\right)$ | |

【解説】

(1) $x^2 + \boxed{12}x + \boxed{35}$
和 積

積が 35, 和が 12 になる 2 数は, 5, 7
 $x^2 + 12x + 35 = (x+5)(x+7)$

(5) $x^2 + \boxed{9y}x + \boxed{14y^2}$
和 積

積が $14y^2$, 和が $9y$ になる 2 式は, $2y, 7y$
 $x^2 + 9xy + 14y^2 = (x+2y)(x+7y)$

(6) $a^2 - \boxed{3b}a - \boxed{18b^2}$
和 積

積が $-18b^2$, 和が $-3b$ になる 2 式は, $3b, -6b$
 $a^2 - 3ab - 18b^2 = (a+3b)(a-6b)$

(7) $x^2 + 16x + 64 = x^2 + 2 \times 8 \times x + 8^2$
 $= (x+8)^2$

(9) $9a^2 - 6a + 1 = (3a)^2 - 2 \times 1 \times 3a + 1^2$
 $= (3a-1)^2$

(11) $x^2 + 14xy + 49y^2 = x^2 + 2 \times 7y \times x + (7y)^2$
 $= (x+7y)^2$

(12) $16x^2 - 4xy + \frac{y^2}{4} = (4x)^2 - 2 \times \frac{y}{2} \times 4x + \left(\frac{y}{2}\right)^2$
 $= \left(4x - \frac{y}{2}\right)^2$

(13) $x^2 - 81 = x^2 - 9^2$
 $= (x+9)(x-9)$

(15) $4x^2 - 49 = (2x)^2 - 7^2$
 $= (2x+7)(2x-7)$

(16) $81a^2 - 1 = (9a)^2 - 1^2$
 $= (9a+1)(9a-1)$

(17) $25x^2 - 64y^2 = (5x)^2 - (8y)^2$
 $= (5x+8y)(5x-8y)$

(18) $9m^2 - \frac{n^2}{9} = (3m)^2 - \left(\frac{n}{3}\right)^2$
 $= \left(3m + \frac{n}{3}\right)\left(3m - \frac{n}{3}\right)$

8

P.37

- (1) $2(x+2)(x-5)$ (2) $5(a+1)(a+2)$
(3) $3(x+3)(x-3)$ (4) $-4(a-1)^2$
(5) $7(m+1)(m-2)$ (6) $6(x+y)^2$
(7) $5(1+m)(1-m)$ (8) $3(2a+5)(2a-5)$
(9) $a(x-4)(x-8)$ (10) $2a(x+2y)(x-2y)$
(11) $3a(b+2)(b-4)$ (12) $x(x+2)(x-7)$
(13) $3b(2a+3)(2a-3)$ (14) $3x(y-2)^2$

【解説】

(1) $2x^2 - 6x - 20 = 2(x^2 - 3x - 10)$
 $= 2(x+2)(x-5)$

(2) $5a^2 + 15a + 10 = 5(a^2 + 3a + 2)$
 $= 5(a+1)(a+2)$

(3) $3x^2 - 27 = 3(x^2 - 9)$
 $= 3(x+3)(x-3)$

(4) $-4a^2 + 8a - 4 = -4(a^2 - 2a + 1)$
 $= -4(a-1)^2$

(5) $7m^2 - 7m - 14 = 7(m^2 - m - 2)$
 $= 7(m+1)(m-2)$

(6) $6x^2 + 12xy + 6y^2 = 6(x^2 + 2xy + y^2)$
 $= 6(x+y)^2$

(7) $5 - 5m^2 = 5(1 - m^2)$
 $= 5(1+m)(1-m)$

(8) $12a^2 - 75 = 3(4a^2 - 25)$
 $= 3(2a+5)(2a-5)$

(9) $ax^2 - 12ax + 32a = a(x^2 - 12x + 32)$
 $= a(x-4)(x-8)$

(10) $2ax^2 - 8ay^2 = 2a(x^2 - 4y^2)$
 $= 2a(x+2y)(x-2y)$

(11) $3ab^2 - 6ab - 24a = 3a(b^2 - 2b - 8)$
 $= 3a(b+2)(b-4)$

(12) $x^3 - 5x^2 - 14x = x(x^2 - 5x - 14)$
 $= x(x+2)(x-7)$

(13) $12a^2b - 27b = 3b(4a^2 - 9)$
 $= 3b(2a+3)(2a-3)$

(14) $3xy^2 - 12xy + 12x = 3x(y^2 - 4y + 4)$
 $= 3x(y-2)^2$

9

P.37

- (1) $(x+y-3)(x+y-5)$
(2) $(a-b+4)(a-b-6)$
(3) $(x+1)^2$ (4) $(x-y)(m+2)$
(5) $(x+y+8)(x+y-8)$
(6) $(a+b+5)(a-b+3)$
(7) $(x-4+y)(x-4-y)$
(8) $(a-b+2c)(a-b-2c)$
(9) $(a-3)(b-2)$ (10) $(x+2)(y-3)$

【解説】

(1) $(x+y)^2 - 8(x+y) + 15$
 $= A^2 - 8A + 15$
 $= (A-3)(A-5)$
 $= (x+y-3)(x+y-5)$

(2) $(a-b)^2 - 2(a-b) - 24$
 $= A^2 - 2A - 24$
 $= (A+4)(A-6)$
 $= (a-b+4)(a-b-6)$

(3) $(x-4)^2 + 10(x-4) + 25$
 $= A^2 + 10A + 25$
 $= (A+5)^2$
 $= (x+1)^2$

(4) $m(x-y) + 2(x-y)$
 $= mA + 2A$
 $= A(m+2)$
 $= (x-y)(m+2)$

(5) $(x+y)^2 - 64$
 $= A^2 - 64$
 $= (A+8)(A-8)$
 $= (x+y+8)(x+y-8)$

(6) $(a+4)^2 - (b+1)^2$
 $= A^2 - B^2$
 $= (A+B)(A-B)$
 $= (a+4+b+1)(a+4-b-1)$
 $= (a+b+5)(a-b+3)$

(7) $x^2 - 8x + 16 - y^2$
 $= (x-4)^2 - y^2$
 $= A^2 - y^2$
 $= (A+y)(A-y)$
 $= (x-4+y)(x-4-y)$

- (8) $a^2 - 2ab + b^2 - 4c^2$
 $= (a-b)^2 - 4c^2$
 $= A^2 - (2c)^2$
 $= (A+2c)(A-2c)$
 $= (a-b+2c)(a-b-2c)$
- (9) $b(a-3) - 2a + 6$
 $= b(a-3) - 2(a-3)$
 $= bA - 2A$
 $= A(b-2)$
 $= (a-3)(b-2)$
- (10) $xy + 2y - 3x - 6$
 $= y(x+2) - 3(x+2)$
 $= yA - 3A$
 $= A(y-3)$

1章 式の計算

語句・基本問題

学習日 月 日

1

P.38

- ① 分配 ② 展開 ③ $ac + ad + bc + bd$
④ $x^2 + (a+b)x + ab$ ⑤ $x^2 + 2ax + a^2$
⑥ $x^2 - 2ax + a^2$ ⑦ $x^2 - a^2$

2

P.38

- ⑧ 素数 ⑨ 素因数分解 ⑩ 因数
⑪ 因数分解 ⑫ $a(b+c)$ ⑬ $(x+a)(x+b)$
⑭ $(x+a)^2$ ⑮ $(x-a)^2$ ⑯ $(x+a)(x-a)$

3

P.38

- ⑰ $x+y$ ⑱ $A^2 + 4A + 3$
⑲ $A+1$ ⑳ $A+3$ (⑲と⑳は順不同可)
㉑ $x+y+1$ ㉒ $x+y+3$ (㉑と㉒は順不同可)

4

P.38

- ㉓ 65 ㉔ 15 ㉕ 80
㉖ 50 ㉗ 4000 (㉕と㉖は順不同可)

1

P.39

- (1) $21a^2 - 35ab$ (2) $-2x + 4$
 (3) $8x - 12y$ (4) $-2x^2 - 9x$

【解説】

- (1) $7a(3a - 5b) = 7a \times 3a - 7a \times 5b$
 $= 21a^2 - 35ab$
 (2) $(8x^2 - 16x) \div (-4x) = (8x^2 - 16x) \times \left(-\frac{1}{4x}\right)$
 $= -2x + 4$
 (3) $(6xy - 9y^2) \div \frac{3}{4}y = (6xy - 9y^2) \times \frac{4}{3y}$
 $= 8x - 12y$
 (4) $3x(x - 2) - x(5x + 3) = 3x^2 - 6x - 5x^2 - 3x$
 $= -2x^2 - 9x$

2

P.39

- (1) $2xy + 5x - 8y - 20$ (2) $x^2 + 2x - 63$
 (3) $9a^2 - 12a - 32$ (4) $49m^2 - 42m + 9$
 (5) $4x^2 - 81y^2$ (6) $a^2 + 2ab + b^2 - 49$

【解説】

- (2) $(x + 9)(x - 7) = x^2 + (9 - 7)x + 9 \times (-7)$
 $= x^2 + 2x - 63$
 (3) $(3a - 8)(3a + 4)$
 $= (3a)^2 + (-8 + 4) \times 3a + (-8) \times 4$
 $= 9a^2 - 12a - 32$
 (4) $(7m - 3)^2 = (7m)^2 - 2 \times 3 \times 7m + 3^2$
 $= 49m^2 - 42m + 9$
 (5) $(2x + 9y)(2x - 9y) = (2x)^2 - (9y)^2$
 $= 4x^2 - 81y^2$
 (6) $(a + b + 7)(a + b - 7)$ $\leftarrow a + b = A$ とおく
 $= (A + 7)(A - 7)$
 $= A^2 - 49$
 $= a^2 + 2ab + b^2 - 49$

3

P.39

- (1) $2x^2 - 6x + 8$ (2) $-10x - 24$
 (3) $3x - 37$ (4) $13x^2 - 12x + 8$

【解説】

- (1) $(x - 3)^2 + (x - 1)(x + 1) = x^2 - 6x + 9 + x^2 - 1$
 $= 2x^2 - 6x + 8$
 (2) $(x - 4)(x + 2) - (x + 4)^2$
 $= x^2 - 2x - 8 - (x^2 + 8x + 16)$
 $= x^2 - 2x - 8 - x^2 - 8x - 16$
 $= -10x - 24$
 (3) $2(x - 5)(x + 4) - (x - 3)(2x + 1)$
 $= 2(x^2 - x - 20) - (2x^2 + x - 6x - 3)$
 $= 2x^2 - 2x - 40 - 2x^2 + 5x + 3$
 $= 3x - 37$
 (4) $(3x + 1)(3x - 1) + (2x - 3)^2$
 $= 9x^2 - 1 + 4x^2 - 12x + 9$
 $= 13x^2 - 12x + 8$

4

P.39

- (1) $6x(xy - 2)$ (2) $(m - 7)(m - 8)$
 (3) $(a + 6)(a - 10)$ (4) $\left(a - \frac{3}{2}\right)^2$
 (5) $(x + 20)(x - 20)$ (6) $(0.6 + m)(0.6 - m)$

【解説】

- (2) $m^2 - 15m + 56$
 和 積
 積が 56, 和が -15 になる 2 数は, -7, -8
 $m^2 - 15m + 56 = (m - 7)(m - 8)$
 (4) $a^2 - 3a + \frac{9}{4} = a^2 - 2 \times \frac{3}{2} \times a + \left(\frac{3}{2}\right)^2$
 $= \left(a - \frac{3}{2}\right)^2$
 (5) $x^2 - 400 = x^2 - 20^2$
 $= (x + 20)(x - 20)$
 (6) $0.36 - m^2 = 0.6^2 - m^2$
 $= (0.6 + m)(0.6 - m)$

5

P.40

- (1) $3(x + 4)(x - 6)$ (2) $4(p + 5)(p - 5)$
 (3) $(5x - 4y)^2$ (4) $(3a + 8b)(3a - 8b)$
 (5) $2a(3b + 2)(3b - 2)$
 (6) $(a + b - 3)(a + b - 5)$
 (7) $(x - y + 7)(x - y - 7)$
 (8) $(a - 3)(b - 4)$

【解説】

- (1) $3x^2 - 6x - 72 = 3(x^2 - 2x - 24)$
 $= 3(x + 4)(x - 6)$
 (2) $4p^2 - 100 = 4(p^2 - 25)$
 $= 4(p + 5)(p - 5)$
 (3) $25x^2 - 40xy + 16y^2 = (5x)^2 - 2 \times 4y \times 5x + (4y)^2$
 $= (5x - 4y)^2$
 (4) $9a^2 - 64b^2 = (3a)^2 - (8b)^2$
 $= (3a + 8b)(3a - 8b)$
 (5) $18ab^2 - 8a = 2a(9b^2 - 4)$
 $= 2a(3b + 2)(3b - 2)$
 (6) $(a + b)^2 - 8(a + b) + 15$ $\leftarrow a + b = A$ とおく
 $= A^2 - 8A + 15$
 $= (A - 3)(A - 5)$
 $= (a + b - 3)(a + b - 5)$
 (7) $(x - y)^2 - 49$ $\leftarrow x - y = A$ とおく
 $= A^2 - 49$
 $= (A + 7)(A - 7)$
 $= (x - y + 7)(x - y - 7)$
 (8) $ab - 3b - 4a + 12$
 $= b(a - 3) - 4(a - 3)$ $\leftarrow a - 3 = A$ とおく
 $= bA - 4A$
 $= A(b - 4)$
 $= (a - 3)(b - 4)$

6

P.40

- (1)① 600 (2) 4891
 (2)① 189 (2) 40000
 (3) 28.
 (4) 連続する3つの奇数は, 整数 n を使って, $2n - 1$, $2n + 1$, $2n + 3$ と表される。
 この3つの奇数の2乗の和に1を加えると,
 $(2n - 1)^2 + (2n + 1)^2 + (2n + 3)^2 + 1$
 $= 4n^2 - 4n + 1 + 4n^2 + 4n + 1$
 $+ 4n^2 + 12n + 9 + 1$
 $= 12n^2 + 12n + 12$
 $= 12(n^2 + n + 1)$
 $n^2 + n + 1$ は整数だから, これは12の倍数になる。
 (5) AのほうがBより 25 cm^2 だけ大きい

【解説】

- (1)① $35^2 - 25^2 = (35 + 25) \times (35 - 25)$
 $= 60 \times 10 = 600$
 ② $73 \times 67 = (70 + 3) \times (70 - 3)$
 $= 4900 - 9 = 4891$
 (2)① $(x + 2)(x - 3) - (x - 1)^2$
 $= x^2 - x - 6 - (x^2 - 2x + 1)$
 $= x^2 - x - 6 - x^2 + 2x - 1$
 $= x - 7$
 $= 196 - 7 = 189$
 ② $x^2 + 8x + 16 = (x + 4)^2$
 $= (196 + 4)^2$
 $= 200^2 = 40000$
 (3) $a^2 - b^2 = (a + b)(a - b)$
 $= 8 \times 3.5 = 28$
 (5) Aの面積は, $x^2 \text{ cm}^2$
 Bの面積は, $(x + 5)(x - 5) = x^2 - 25 \text{ (cm}^2\text{)}$

1

P.41

- (1) $a^3 + 1$
- (2) $10x^2 - 51xy + 8x + 56y^2 - 28y$
- (3) $4a^2 + 4ab + b^2 - 9$
- (4) $x^2 + 4xy + 4y^2 - 8x - 16y + 16$
- (5) $x^2 - 2xy + y^2 - x + y - 56$
- (6) $9a^2 - b^2 + 2b - 1$

【解説】

- (1) $(a^2 - a + 1)(a + 1)$
 $= a^2(a + 1) - a(a + 1) + (a + 1)$
 $= a^3 + a^2 - a^2 - a + a + 1$
 $= a^3 + 1$
- (2) $(2x - 7y)(5x - 8y + 4)$
 $= 2x(5x - 8y + 4) - 7y(5x - 8y + 4)$
 $= 10x^2 - 16xy + 8x - 35xy + 56y^2 - 28y$
 $= 10x^2 - 51xy + 8x + 56y^2 - 28y$
- (3) $(2a + b + 3)(2a + b - 3)$ $\leftarrow 2a + b = A$ とおく
 $= (A + 3)(A - 3)$
 $= A^2 - 9$
 $= 4a^2 + 4ab + b^2 - 9$
- (4) $(x + 2y - 4)^2$ $\leftarrow x + 2y = A$ とおく
 $= (A - 4)^2$
 $= A^2 - 8A + 16$
 $= x^2 + 4xy + 4y^2 - 8x - 16y + 16$
- (5) $(x - y + 7)(x - y - 8)$ $\leftarrow x - y = A$ とおく
 $= (A + 7)(A - 8)$
 $= A^2 - A - 56$
 $= x^2 - 2xy + y^2 - x + y - 56$
- (6) $(3a + b - 1)(3a - b + 1)$ $\leftarrow b - 1 = A$ とおく
 $= (3a + A)(3a - A)$
 $= 9a^2 - A^2$
 $= 9a^2 - (b - 1)^2$
 $= 9a^2 - b^2 + 2b - 1$

2

P.41

- (1) $-5a^2 + 28ab + 12b^2$
- (2) $18xy - 34y^2$

【解説】

- (1) $4(a + 2b)^2 - (3a - 2b)^2$
 $= 4(a^2 + 4ab + 4b^2) - (9a^2 - 12ab + 4b^2)$
 $= 4a^2 + 16ab + 16b^2 - 9a^2 + 12ab - 4b^2$
 $= -5a^2 + 28ab + 12b^2$
- (2) $(3x - 5y)(3x + 5y) - 9(x - y)^2$
 $= 9x^2 - 25y^2 - 9(x^2 - 2xy + y^2)$
 $= 9x^2 - 25y^2 - 9x^2 + 18xy - 9y^2$
 $= 18xy - 34y^2$

3

P.41

- (1) $-5x(a + 2b)(a - 2b)$
- (2) $(a + 6b)(a - 8b)$
- (3) $(x + 4)(x - 4)$ (4) $(a - 10)^2$
- (5) $(x + y)(x - y - 1)$
- (6) $(a + b + 1)(a + b + 2)$

【解説】

- (1) $-5a^2x + 20b^2x = -5x(a^2 - 4b^2)$
 $= -5x(a + 2b)(a - 2b)$
- (2) $a^2 \overset{\text{和}}{\boxed{-2b}} \times a \overset{\text{積}}{\boxed{-48b^2}}$
 積が $-48b^2$, 和が $-2b$ になる 2 式は, $6b, -8b$
 $a^2 - 2ab - 48b^2 = (a + 6b)(a - 8b)$
- (3) $2x(x + 4) - (x + 4)^2$ $\leftarrow x + 4 = A$ とおく
 $= 2xA - A^2$
 $= A(2x - A)$
 $= (x + 4)(x - 4)$
- (4) $(a - 3)^2 - 14(a - 3) + 49$ $\leftarrow a - 3 = A$ とおく
 $= A^2 - 14A + 49$
 $= (A - 7)^2$
 $= (a - 10)^2$
- (5) $x^2 - y^2 - x - y$
 $= (x + y)(x - y) - (x + y)$ $\leftarrow x + y = A$ とおく
 $= A(x - y) - A$
 $= A(x - y - 1)$
 $= (x + y)(x - y - 1)$
- (6) $a^2 + 2ab + b^2 + 3a + 3b + 2$
 $= (a + b)^2 + 3(a + b) + 2$ $\leftarrow a + b = A$ とおく
 $= A^2 + 3A + 2$
 $= (A + 1)(A + 2)$
 $= (a + b + 1)(a + b + 2)$

4

P.41

- (1) ① 24.9984 ② 94.2
- (2) 9
- (3) -150

【解説】

- (1) ① $5.04 \times 4.96 = (5 + 0.04) \times (5 - 0.04)$
 $= 25 - 0.0016 = 24.9984$
- ② $6.5^2 \times 3.14 - 3.5^2 \times 3.14$
 $= (6.5^2 - 3.5^2) \times 3.14$
 $= (6.5 + 3.5) \times (6.5 - 3.5) \times 3.14$
 $= 10 \times 3 \times 3.14 = 94.2$
- (2) $9x^2 + 12xy + 4y^2 = (3x + 2y)^2$
 $= (3 \times 0.2 + 2 \times 1.2)^2$
 $= 3^2 = 9$
- (3) $(3x + 5y)^2 - (3x - 5y)^2$
 $= 9x^2 + 30xy + 25y^2 - (9x^2 - 30xy + 25y^2)$
 $= 60xy$
 $= 60 \times \frac{5}{3} \times \left(-\frac{3}{2}\right) = -150$

5

P.42

- (1) $a^2 + b^2 = a^2 + b^2 + 2ab - 2ab$
 $= (a + b)^2 - 2ab$
 $= (-2)^2 - 2 \times 8$
 $= 4 - 16$
 $= -12$
- (2) $a^2 - 2ab + b^2 = a^2 + b^2 + 2ab - 4ab$
 $= (a + b)^2 - 4ab$
 $= (-2)^2 - 4 \times 8$
 $= 4 - 32$
 $= -28$

6

P.42

連続する 4 つの自然数を, n を自然数として $n, n + 1, n + 2, n + 3$ とすると,
 $n^2 + (n + 1)^2 + (n + 2)^2 + (n + 3)^2$
 $= n^2 + n^2 + 2n + 1 + n^2 + 4n + 4 + n^2 + 6n + 9$
 $= 4n^2 + 12n + 14$
 $= 4(n^2 + 3n + 3) + 2$
 $n^2 + 3n + 3$ は整数だから, $4(n^2 + 3n + 3) + 2$ を 4 でわったときの余りは 2 である。

7

P.42

$AB = 2r + 2a$ であるから,
 $S = \pi(r + a)^2 - \pi r^2$
 $= 2\pi ar + \pi a^2$ …①
 $AM = 2r + a$ であるから,
 $\ell = \pi(2r + a)$
 $= 2\pi r + \pi a$
 したがって, $a\ell = a(2\pi r + \pi a)$
 $= 2\pi ar + \pi a^2$ …②
 ①, ②より, $S = a\ell$

8

P.42

(1) $a + b$ (cm)
 (2) (1)より, AB を直径とする半円の面積は,
 $\frac{\pi}{2}(a + b)^2 = \frac{\pi}{2}a^2 + \pi ab + \frac{\pi}{2}b^2$ (cm²)
 AC を直径とする半円の面積は $\frac{\pi}{2}a^2$, BC を直径とする半円の面積は $\frac{\pi}{2}b^2$ (cm²), よって,
 P の面積 $= \frac{\pi}{2}a^2 + \pi ab + \frac{\pi}{2}b^2 - \frac{\pi}{2}a^2 - \frac{\pi}{2}b^2$
 $= \pi ab$ (cm²)
 よって, πab (cm²) である。

【解説】

- (1) $\frac{1}{2}(2a + 2b) = a + b$ (cm)

左上の数を a とすると、右上の数は $a+1$ 、左下の数は $a+7$ 、右下の数は $a+8$ と表されるから、
 右上と左下の数の積は、 $(a+1)(a+7) = a^2 + 8a + 7$
 左上と右下の数の積は、 $a(a+8) = a^2 + 8a$
 よってこの2数の差は、
 $a^2 + 8a + 7 - (a^2 + 8a) = 7$
 ゆえに、このような囲み方をした4つの数において、常に右上と左下の数の積が、左上と右下の数の積より7大きくなる。

2つの自然数は、 $10a+b$ 、 $10a+c$ と表され、
 $b+c=10$ である。
 この2つの数の積は、
 $(10a+b)(10a+c)$
 $= 100a^2 + (b+c) \times 10a + bc$
 $= 100a^2 + 100a + bc$
 $= 100a(a+1) + bc$
 したがって、下2けたは一の位の数の積に、その上の2けたは十の位の数とそれに1を加えた数の積になる。

- (1) (例) $x(x+8)$ と12の和になっていて、因数の積の形になっていないから。
 (2) 7, 8, 13

【解説】

- (2) 積が12になる2つの自然数の積は、
 1×12 , 2×6 , 3×4
 □に入る数は、
 $1+12=13$, $2+6=8$, $3+4=7$

5 平方根

確認問題 1

P.44・P.45

- (1) ① ± 2 ② ± 6 ③ ± 9
 ④ $\pm \frac{3}{4}$ ⑤ $\pm \frac{5}{7}$ ⑥ ± 0.3
 (2) ① $\pm \sqrt{5}$ ② $\pm \sqrt{0.7}$ ③ $\pm \sqrt{\frac{2}{11}}$
 (3) ① 4 ② $-\frac{5}{6}$ ③ 13
 (4) ① 6 ② 15 ③ 81

確認問題 2

P.45

- (1) $\sqrt{3} < \sqrt{5}$ (2) $\sqrt{21} > \sqrt{19}$
 (3) $3 > \sqrt{8}$ (4) $7 < \sqrt{50}$
 (5) $\sqrt{90} > 9$ (6) $\sqrt{0.6} < 1$
 (7) $-\sqrt{10} > -\sqrt{11}$ (8) $-8 < -\sqrt{63}$
 (9) $2 < \sqrt{7} < 3$ (10) $\sqrt{21} < 5 < \sqrt{26}$

【解説】

- (3) $3 = \sqrt{9}$
 $9 > 8$ だから、 $\sqrt{9} > \sqrt{8}$
 $3 > \sqrt{8}$
 (4) $7 = \sqrt{49}$
 $49 < 50$ だから、 $\sqrt{49} < \sqrt{50}$
 $7 < \sqrt{50}$
 (5) $9 = \sqrt{81}$
 $90 > 81$ だから、 $\sqrt{90} > \sqrt{81}$
 $\sqrt{90} > 9$
 (6) $1 = \sqrt{1}$
 $0.6 < 1$ だから、 $\sqrt{0.6} < \sqrt{1}$
 $\sqrt{0.6} < 1$
 (7) $\sqrt{10} < \sqrt{11}$
 $-\sqrt{10} > -\sqrt{11}$
 (8) $8 = \sqrt{64}$
 $\sqrt{64} > \sqrt{63}$
 $8 > \sqrt{63}$
 $-8 < -\sqrt{63}$
 (9) $2 = \sqrt{4}$, $3 = \sqrt{9}$
 $4 < 7 < 9$ だから、 $\sqrt{4} < \sqrt{7} < \sqrt{9}$
 $2 < \sqrt{7} < 3$

(10) $5 = \sqrt{25}$

$21 < 25 < 26$ だから、
 $\sqrt{21} < \sqrt{25} < \sqrt{26}$
 $\sqrt{21} < 5 < \sqrt{26}$

確認問題 3

P.46

- (1) 有理数... ㉞, ㉟, ㊱, ㊲
 無理数... ㊳
 (2) ㉞ A ㉟ B
 ㊳ C ㊱ D

確認問題 4

P.47

- (1) 10, 11, 12 (2) 2
 (3) 6 と 7 (4) 14

【解説】

- (1) $3^2 < (\sqrt{a})^2 < 3.5^2$ より、
 $9 < a < 12.25$
 (2) $\sqrt{18a} = \sqrt{2 \times 3^2 \times a}$
 $a=2$ のとき、 $\sqrt{18a} = 2 \times 3$
 $= 6$
 (3) $6^2 = 36$, $7^2 = 49$ だから、
 $6^2 < 47 < 7^2$
 $6 < \sqrt{47} < 7$
 (4) $14^2 = 196$, $15^2 = 225$ だから、
 $14^2 < 210 < 15^2$
 $14 < \sqrt{210} < 15$
 だから、 $\sqrt{210}$ の整数部分の値は、14