

数学の

トリセツ!

中学
3年

解答と解説

1 章 多項式

4 ページ 1 多項式の展開

- 1 (1) $2x^2+6xy$ (2) $6a^2-9ab$
 (3) $-2m^2+7mn$ (4) $6x^2-8xy$
 (5) $5a^2-10ab+15a$ (6) $-9x^2+3xy+6x$

解説

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

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- 2 (1) $3xy+2y$ (2) $2ab-3$
 (3) $-5ab+2a$ (4) $2x-3y$
 (5) $4a+6b^2$ (6) $9x-12y$

解説

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

解説

- (3) 与式 $= x^2 + 4x + 3x + 12 = x^2 + 7x + 12$
 (4) 与式 $= 2x^2 + 10x - x - 5 = 2x^2 + 9x - 5$
 (5) 与式 $= 2a^2 - ab + 4ab - 2b^2 = 2a^2 + 3ab - 2b^2$
 (6) 与式 $= 6a^2 - 9ab + 4ab - 6b^2 = 6a^2 - 5ab - 6b^2$
 (7) 与式 $= a^2 - ab + 2a + 2a - 2b + 4$
 $= a^2 - ab + 4a - 2b + 4$
 (8) 与式 $= 2x^2 - 4xy - xy + 2y^2 + 3x - 6y$
 $= 2x^2 - 5xy + 2y^2 + 3x - 6y$

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練習問題A

- 4 (1) $6a^2-3ab$ (2) $10x^2-4xy$
 (3) $-4x^2+12xy$ (4) $9x^2-6xy$
 (5) $2a^2-6ab-4a$ (6) $-5x^2+15xy-10x$
- 5 (1) $xy-3y$ (2) $2m+1$
 (3) $2x-3y$ (4) $-2+3ab$
 (5) $9a+12b$ (6) $12a-4b$
- 6 (1) $xy+4x-3y-12$ (2) $4ab+6a-6b-9$
 (3) $x^2+13x+40$ (4) $3x^2+4xy-4y^2$
 (5) $2a^2-4ab+a+2b-1$
 (6) $2x^2-6xy+4y^2+3x-3y$

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練習問題B

- 7 (1) $-x^2+xy$ (2) $2ax-3bx$
 (3) $3x^3-6x^2-3x$ (4) $-2xy+2y^2+6y$
 (5) a^2-2a+3 (6) $3x^2+9xy-6x$
- 8 (1) $x^2+2x-80$ (2) $2x^2-13x+20$
 (3) $12x^2-7xy-10y^2$ (4) $3a^2-4ab-4b^2$
 (5) a^3+a^2-5a+3 (6) a^3+27

解説

- (1) 与式 $= x^2 + 10x - 8x - 80 = x^2 + 2x - 80$
 (2) 与式 $= 2x^2 - 8x - 5x + 20 = 2x^2 - 13x + 20$
 (3) 与式 $= 12x^2 + 8xy - 15xy - 10y^2$
 $= 12x^2 - 7xy - 10y^2$
 (4) 与式 $= (3a+2b)(a-2b) = 3a^2 - 6ab + 2ab - 4b^2$
 $= 3a^2 - 4ab - 4b^2$
 (5) 与式 $= a^3 - a^2 + 2a^2 - 2a - 3a + 3$
 $= a^3 + a^2 - 5a + 3$
 (6) 与式 $= a^3 - 3a^2 + 9a + 3a^2 - 9a + 27 = a^3 + 27$
- 9 (1) $8x^2-3x$ (2) $9a$
 (3) x^2-4x (4) x^2+3x-3
 (5) $7x^2-4x+1$ (6) $-4ab$

解説

- (1) 与式 $= 2x^2 - 6x + 6x^2 + 3x = 8x^2 - 3x$
 (2) 与式 $= 12a^2 - 9a - 12a^2 + 18a = 9a$
 (3) 与式 $= 3x^2 - x - 2x^2 - 3x = x^2 - 4x$
 (4) 与式 $= x^2 - 3x + 6x - 3 = x^2 + 3x - 3$
 (5) 与式 $= x^2 + x + 6x^2 - 2x - 3x + 1 = 7x^2 - 4x + 1$
 (6) 与式 $= 3a^2 - 2ab + 3ab - 2b^2 - (3a^2 + 6ab - ab$
 $- 2b^2) = 3a^2 + ab - 2b^2 - 3a^2 - 5ab + 2b^2$
 $= -4ab$

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2 乗法公式

- 10 (1) x^2+6x+8 (2) a^2+a-12
 (3) $x^2-5x-24$ (4) $x^2-12x+35$
- 11 (1) $4a^2+16a+15$ (2) $9x^2+6x-8$
 (3) $4a^2-4a-3$ (4) $25x^2-25x+6$

解説

- (1) 与式 $= (2a)^2 + 8 \times 2a + 15 = 4a^2 + 16a + 15$

- (2) 与式 $= (3x)^2 + 2 \times 3x - 8 = 9x^2 + 6x - 8$
 (3) 与式 $= (2a)^2 - 2 \times 2a - 3 = 4a^2 - 4a - 3$
 (4) 与式 $= (5x)^2 - 5 \times 5x + 6 = 25x^2 - 25x + 6$

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- 12** (1) $x^2 + 2x + 1$ (2) $x^2 - 4x + 4$
 (3) $a^2 - 8a + 16$ (4) $a^2 + 18a + 81$
 (5) $x^2 + x + \frac{1}{4}$ (6) $x^2 - \frac{2}{3}x + \frac{1}{9}$
13 (1) $4x^2 + 4x + 1$ (2) $4x^2 - 12x + 9$
 (3) $25x^2 - 10x + 1$ (4) $9x^2 + 12xy + 4y^2$

解説

- (1) 与式 $= (2x)^2 + 2 \times 2x \times 1 + 1^2 = 4x^2 + 4x + 1$
 (2) 与式 $= (2x)^2 - 2 \times 2x \times 3 + 3^2 = 4x^2 - 12x + 9$
 (3) 与式 $= (5x)^2 - 2 \times 5x \times 1 + 1^2 = 25x^2 - 10x + 1$
 (4) 与式 $= (3x)^2 + 2 \times 3x \times 2y + (2y)^2$
 $= 9x^2 + 12xy + 4y^2$

- 14** (1) $a^2 - 4$ (2) $x^2 - 25$
 (3) $a^2 - 49$ (4) $1 - x^2$
15 (1) $4x^2 - 1$ (2) $9x^2 - 16$
 (3) $25a^2 - 9b^2$ (4) $x^2 - 4y^2$

解説

- (1) 与式 $= (2x)^2 - 1^2 = 4x^2 - 1$
 (2) 与式 $= (3x)^2 - 4^2 = 9x^2 - 16$
 (3) 与式 $= (5a)^2 - (3b)^2 = 25a^2 - 9b^2$
 (4) 与式 $= (-x)^2 - (2y)^2 = x^2 - 4y^2$

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練習問題A

- 16** (1) $x^2 + 6x + 5$ (2) $x^2 + 4x - 12$
 (3) $x^2 - 8x + 15$ (4) $a^2 - 4a - 21$
 (5) $a^2 - 12a + 32$ (6) $a^2 - 8a - 20$
 (7) $x^2 - x - 90$ (8) $x^2 + 17x - 60$
 (9) $a^2 - 8a - 48$ (10) $4x^2 - 20x + 21$
 (11) $9x^2 + 9x - 40$ (12) $16x^2 - 8x - 3$
17 (1) $x^2 + 10x + 25$ (2) $x^2 - 16x + 64$
 (3) $x^2 + 4x + 4$ (4) $a^2 - 20a + 100$
 (5) $x^2 + 26x + 169$ (6) $x^2 - 8x + 16$
 (7) $4x^2 + 20x + 25$ (8) $a^2 + 6ab + 9b^2$
 (9) $9a^2 + 30ab + 25b^2$ (10) $9a^2 - 12ab + 4b^2$
 (11) $x^2 - 10xy + 25y^2$ (12) $a^2 - 6ab + 9b^2$
18 (1) $x^2 - 16$ (2) $m^2 - 36$
 (3) $81 - a^2$ (4) $9x^2 - 1$
 (5) $25x^2 - 16y^2$ (6) $4x^2 - 9y^2$

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練習問題B

- 19** (1) $x^2 - 4x - 45$ (2) $x^2 + 11x + 28$
 (3) $x^2 + x - 6$ (4) $36 - 12x + x^2$
 (5) $x^2 - 144$ (6) $25 - a^2$
 (7) $x^2y^2 - 3xy + 2$ (8) $4x^2 - 4x - 3$
 (9) $9x^2 - 9x - 10$ (10) $25x^2 - 49$
 (11) $x^2 + 16xy + 64y^2$ (12) $4a^2 - 24ab + 36b^2$

- 20** (1) $x^2 + x + \frac{2}{9}$ (2) $\frac{1}{4}x^2 + x - 8$
 (3) $9a^2 + 3a + \frac{1}{4}$ (4) $a^2 - \frac{1}{4}b^2$

- 21** (1) 3 (2) $2a^2 - 3a - 1$
 (3) $2x^2 + 98$ (4) $15x^2 + 3$
 (5) $5x^2 - 40x$ (6) $x^2 - 20$

解説

- (1) 与式 $= a^2 + 4a + 3 - a^2 - 4a = 3$
 (2) 与式 $= a^2 + 3a - 10 + a^2 - 6a + 9 = 2a^2 - 3a - 1$
 (3) 与式 $= x^2 + 14x + 49 + x^2 - 14x + 49 = 2x^2 + 98$
 (4) 与式 $= 16x^2 - 1 - (x^2 - 4) = 16x^2 - 1 - x^2 + 4$
 $= 15x^2 + 3$
 (5) 与式 $= x^2 - 100 + 4(x^2 - 10x + 25)$
 $= x^2 - 100 + 4x^2 - 40x + 100 = 5x^2 - 40x$
 (6) 与式 $= 2(x^2 + 3x - 18) - (x^2 + 6x - 16)$
 $= 2x^2 + 6x - 36 - x^2 - 6x + 16 = x^2 - 20$

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3 因数分解

- 22** (1) 2×3^2 (2) $2^3 \times 3$ (3) $2 \times 3 \times 5 \times 7$

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- 23** (1) 14 (2) 25

解説

- (1) $196 = 2^2 \times 7^2 = (2 \times 7)^2 = 14^2$
 (2) $625 = 5^4 = (5^2)^2 = 25^2$

- 24** (1) 3 (2) 3
 (3) 10 (4) 14

解説

- (1) $12 = 2^2 \times 3$ だから、3 をかけると、
 $2^2 \times 3 \times 3 = (2 \times 3)^2 = 6^2$
 (2) $75 = 3 \times 5^2$ だから、3 をかけると、
 $3 \times 5^2 \times 3 = (3 \times 5)^2 = 15^2$
 (3) $90 = 2 \times 3^2 \times 5$ だから、 $2 \times 5 = 10$ をかけると、
 $2 \times 3^2 \times 5 \times 2 \times 5 = (2 \times 3 \times 5)^2 = 30^2$
 (4) $56 = 2^3 \times 7$ だから、 $2 \times 7 = 14$ をかけると、
 $2^3 \times 7 \times 2 \times 7 = (2^2 \times 7)^2 = 28^2$

- 25** (1) $b(a + c)$ (2) $xy(3x - 5y)$
 (3) $2b(2a^2 - 3b)$ (4) $4x(2y - 1)$
26 (1) $a(x + 2y + 5)$ (2) $xy(x + y - 2)$
 (3) $3a(2a - b + 3c)$ (4) $5x(2x - 3y + 1)$

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- 27** (1) $(x + 1)(x + 8)$ (2) $(x + 3)(x + 6)$
 (3) $(x - 2)(x - 4)$ (4) $(x - 7)(x - 5)$
28 (1) $(x + 8)(x - 1)$ (2) $(x - 2)(x + 6)$
 (3) $(x - 3)(x + 4)$ (4) $(x - 8)(x + 5)$
 (5) $(x - 9)(x + 7)$ (6) $(x - 12)(x + 2)$

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- 29** (1) $(x + 1)^2$ (2) $(x - 3)^2$
 (3) $(a - 5)^2$ (4) $(a - 2b)^2$

- (5) $(2x-5)^2$ (6) $(3x-4y)^2$
30 (1) $(x-1)(x+1)$ (2) $(a-5)(a+5)$
 (3) $(2-a)(2+a)$ (4) $(4x-1)(4x+1)$
 (5) $(5x-6y)(5x+6y)$ (6) $(x-\frac{1}{3}y)(x+\frac{1}{3}y)$
31 (1) $a(b+1)(b+3)$ (2) $3(x-3)(x+2)$
 (3) $6(a-3)(a+3)$ (4) $2a(x-1)^2$

解説

- (1) 与式 $= a(b^2+4b+3) = a(b+1)(b+3)$
 (2) 与式 $= 3(x^2-x-6) = 3(x-3)(x+2)$
 (3) 与式 $= 6(a^2-9) = 6(a-3)(a+3)$
 (4) 与式 $= 2a(x^2-2x+1) = 2a(x-1)^2$

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練習問題A

- 32** (1) $2^2 \times 5$ (2) $2 \times 3 \times 11$ (3) $2^3 \times 3 \times 7$
33 (1) $2x(x-2)$ (2) $6m(2a-b)$
 (3) $5a(2a-b)$ (4) $(x+2)(x+5)$
 (5) $(x-5)(x-3)$ (6) $(x-1)(x-5)$
 (7) $(x-1)(x+6)$ (8) $(x-9)(x+2)$
 (9) $(x+7)(x-1)$ (10) $(a+4)^2$
 (11) $(x-7)^2$ (12) $(a+8)^2$
 (13) $(x+8)(x-8)$ (14) $(6-a)(6+a)$
 (15) $(x+1)(x-1)$
34 (1) $(3x+2)^2$ (2) $(4a-b)^2$
 (3) $(2x+7y)^2$ (4) $(2x-9y)(2x+9y)$
 (5) $(5x-\frac{1}{2})(5x+\frac{1}{2})$ (6) $(3x-8y)(3x+8y)$
35 (1) $2(x-1)(x+5)$ (2) $3(x-6)(x-5)$
 (3) $4x(y-2)^2$ (4) $2(2a-5)(2a+5)$

解説

- (1) 与式 $= 2(x^2+4x-5) = 2(x-1)(x+5)$
 (2) 与式 $= 3(x^2-11x+30) = 3(x-6)(x-5)$
 (3) 与式 $= 4x(y^2-4y+4) = 4x(y-2)^2$
 (4) 与式 $= 2(4a^2-25) = 2(2a-5)(2a+5)$

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練習問題B

- 36** (1) 6 (2) 14
解説
 (1) $54n = 2 \times 3^3 \times n$ より, $n = 2 \times 3 = 6$ のとき,
 $54 \times 6 = 2^2 \times 3^4 = (2 \times 3^2)^2 = 18^2$
 (2) $\frac{126}{n} = \frac{2 \times 3^2 \times 7}{n}$ より, $n = 2 \times 7 = 14$ のとき,
 $\frac{126}{14} = 3^2$
37 (1) $(x-7)(x-6)$ (2) $(x+9)(x-5)$
 (3) $(a-5)(a-6)$ (4) $(x-12)(x-3)$
 (5) $(x+2)(x+20)$ (6) $(a+5)(a-4)$
 (7) $(x+16)(x-4)$ (8) $(x-18)(x+4)$
 (9) $(a-10)(a-2)$
38 (1) $(a-8b)^2$ (2) $(3x+7y)^2$
 (3) $(9x-11)(9x+11)$ (4) $(x-\frac{4}{5})(x+\frac{4}{5})$
39 (1) $5(x-4)(x-2)$ (2) $-3(x-3)(x+7)$

- (3) $4(x-3)^2$ (4) $-(x-10)^2$
 (5) $2(x-7)(x+7)$ (6) $5(3x-4)(3x+4)$

解説

- (1) 与式 $= 5(x^2-6x+8) = 5(x-4)(x-2)$
 (2) 与式 $= -3(x^2+4x-21) = -3(x-3)(x+7)$
 (3) 与式 $= 4(x^2-6x+9) = 4(x-3)^2$
 (4) 与式 $= -(x^2-20x+100) = -(x-10)^2$
 (5) 与式 $= 2(x^2-49) = 2(x-7)(x+7)$
 (6) 与式 $= 5(9x^2-16) = 5(3x-4)(3x+4)$

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4 式の計算の利用

- 40** (1) 2704 (2) 3591 (3) 9975
 (4) 2700 (5) 60 (6) 5200

解説

- (1) 与式 $= (50+2)^2 = 2500 + 200 + 4 = 2704$
 (2) 与式 $= (60+3)(60-3) = 3600 - 9 = 3591$
 (3) 与式 $= (100-5)(100+5) = 10000 - 25 = 9975$
 (4) 与式 $= 27 \times (53+47) = 27 \times 100 = 2700$
 (5) 与式 $= (16-14)(16+14) = 2 \times 30 = 60$
 (6) 与式 $= (76-24)(76+24) = 52 \times 100 = 5200$

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解説

$$(4a^2b+6ab^2) \div 2ab = 2a+3b = 2 \times (-2) + 3 \times 3 = -4+9=5$$

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- 42** (1) 2 (2) 9000
 (3) 2000 (4) 1

解説

- (1) 与式 $= 2x^2-6xy+6xy-3y^2 = 2x^2-3y^2$
 $= 2 \times (-5)^2 - 3 \times 4^2 = 50 - 48 = 2$
 (2) 与式 $= (x-5)(x+5) = (95-5)(95+5)$
 $= 90 \times 100 = 9000$
 (3) 与式 $= (x-7)(x+3) = (47-7)(47+3)$
 $= 40 \times 50 = 2000$
 (4) 与式 $= (2x-3y)^2 = (2 \times 25 - 3 \times 17)^2$
 $= (50-51)^2 = (-1)^2 = 1$

- 43** (1) 〔証明〕 奇数を $2m+1$ (m は整数) とおくと,
 $(2m+1)^2 = 4m^2+4m+1 = 2(2m^2+2m)+1$
 $2m^2+2m$ は整数だから, $(2m+1)^2$ は奇数。
 (2) 〔証明〕 連続する 2 つの整数を $m, m+1$ とおくと,
 $m^2+(m+1)^2 = m^2+m^2+2m+1 = 2(m^2+m)+1$
 m^2+m は整数だから, $m^2+(m+1)^2$ は奇数。
 (3) 〔証明〕 連続した 2 つの偶数を $2m, 2m+2$ (m は整数) とおくと,
 $(2m)^2+(2m+2)^2 = 4m^2+4m^2+8m+4 = 4(2m^2+2m+1)$
 $2m^2+2m+1$ は整数だから, $(2m)^2+(2m+2)^2$ は 4 の倍数。

- 44 (1) $(4a+4)\text{cm}^2$ (2) 4cm^2 減る

解説

- (1) 1辺 $a\text{cm}$ の正方形の面積は $a^2\text{cm}^2$
 1辺 $(a+2)\text{cm}$ の正方形の面積は
 $(a+2)^2 = a^2 + 4a + 4$ だから、
 $a^2 + 4a + 4 - a^2 = 4a + 4(\text{cm}^2)$ 増える。
 (2) 長方形の面積は $(a+2)(a-2) = a^2 - 4(\text{cm}^2)$ と
 なるから、面積は $a^2 - 4 - a^2 = -4$ より、 4cm^2
 減る。

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練習問題A

- 45 (1) 1521 (2) 2496
 (3) 4900 (4) 200

解説

- (1) 与式 $= (40-1)^2 = 1600 - 80 + 1 = 1521$
 (2) 与式 $= (50-2)(50+2) = 2500 - 4 = 2496$
 (3) 与式 $= 49 \times (48+52) = 49 \times 100 = 4900$
 (4) 与式 $= (27-23)(27+23) = 4 \times 50 = 200$

- 46 (1) 18 (2) 270
 (3) 200 (4) 1

解説

- (1) 与式 $= 3a - 2b = 3 \times 4 - 2 \times (-3) = 12 + 6 = 18$
 (2) 与式 $= x^2 + 5xy + 4y^2 - (x^2 - 4xy + 4y^2) = 9xy$
 $= 9 \times 5 \times 6 = 270$
 (3) 与式 $= (x-8)(x+2) = (18-8)(18+2)$
 $= 10 \times 20 = 200$
 (4) 与式 $= (2x+3y)^2 = \{2 \times 4 + 3 \times (-3)\}^2$
 $= (-1)^2 = 1$

- 47 〔証明〕 連続する3つの整数を $x-1$, x , $x+1$
 とおくと、

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

- 48 (1) $2\pi b\text{cm}$ (2) $(2ab + b^2)\pi\text{cm}^2$

解説

- (1) $2\pi \times (a+b) - 2\pi \times a = 2\pi b(\text{cm})$
 (2) $\pi \times (a+b)^2 - \pi \times a^2 = (2ab + b^2)\pi(\text{cm}^2)$

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練習問題B

- 49 (1) 76 (2) 3140

解説

- (1) 与式 $= (8.8-1.2)(8.8+1.2) = 7.6 \times 10 = 76$
 (2) 与式 $= 3.14 \times (55^2 - 45^2)$
 $= 3.14 \times (55-45)(55+45)$
 $= 3.14 \times 10 \times 100 = 3140$

- 50 (1) 17 (2) 9 (3) $\frac{1}{9}$

解説

- (1) 与式 $= (x^2 + 4x + 4) - (x^2 + x - 12)$
 $= 3x + 16 = 3 \times \frac{1}{3} + 16 = 1 + 16 = 17$

- (2) 与式 $= (x+3y)^2 = (2.1+3 \times 0.3)^2 = 3^2 = 9$
 (3) 与式 $= (x+2y)^2 = \left\{\frac{2}{3} + 2 \times \left(-\frac{1}{6}\right)\right\}^2 = \left(\frac{1}{3}\right)^2$
 $= \frac{1}{9}$

- 51 〔証明〕 中央の数を n とおくと、左右の数は、
 $n-4$, $n+4$ とおけるから、
 $n^2 - (n-4)(n+4) = n^2 - (n^2 - 16) = 16$

- 52 〔証明〕 $S = (5+2a)^2 - 5^2 = 20a + 4a^2$
 $= 4a(5+a)$

$\ell = 4(5+a)$ だから、 $S = a \times \ell = a\ell$

22ページ

章末問題

- 1 (1) $5x^2 - 10xy$ (2) $-6a^2 + 2ab - 2a$
 (3) $5a - 3b$ (4) $9x + 6$

- 2 (1) $ab - 3a - 2b + 6$ (2) $6x^2 - 7x + 2$
 (3) $a^2 - 3ab + 5a - 9b + 6$
 (4) $x^2 + 3xy + 2y^2 - 2x - 4y$

- 3 (1) $x^2 + 9x + 14$ (2) $a^2 - 3a - 40$
 (3) $a^2 - 12a + 35$ (4) $4x^2 + 8x - 5$
 (5) $9x^2 - 9x + 2$ (6) $25x^2 + 5x - 2$
 (7) $x^2 + 12x + 36$ (8) $4x^2 - 28xy + 49y^2$
 (9) $16a^2 - 24ab + 9b^2$ (10) $x^2 - 64$
 (11) $16x^2 - y^2$ (12) $36a^2 - 25b^2$

- 4 (1) 2401 (2) 9996

解説

- (1) 与式 $= (50-1)^2 = 2500 - 100 + 1 = 2401$
 (2) 与式 $= (100+2)(100-2) = 10000 - 4 = 9996$

- 5 -1

解説

与式 $= -3x - 2y = -3 \times 5 - 2 \times (-7)$
 $= -15 + 14 = -1$

23ページ

- 6 (1) $2^2 \times 7$ (2) $2 \times 5 \times 7$ (3) $2^2 \times 3^3$

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

- 8 48

解説

$x^2 + y^2 = (x^2 + 2xy + y^2) - 2xy = (x+y)^2 - 2xy$
 $= 8^2 - 2 \times 8 = 64 - 16 = 48$

- 9 4

解説

$97^2 - 2 \times 97 \times 95 + 95^2 = (97-95)^2 = 2^2 = 4$

- 10 〔証明〕 長方形の床の縦に並んだタイルの枚

数を $2n$ (n は自然数)枚とすると、横に並んだタイルの枚数は $(2n+2)$ 枚で、タイル全体の枚数は、 $2n(2n+2)=4n^2+4n$ (枚)

これにさらに1枚のタイルを加えると、

$4n^2+4n+1=(2n+1)^2$ となり、正方形の床の1辺に奇数枚のタイルをしきつめることができることがわかる。

2章 平方根

24 ページ

5 平方根

- 1** (1) ± 1 (2) ± 5 (3) $\pm \frac{6}{7}$
 (4) $\pm \frac{3}{8}$ (5) ± 0.2 (6) ± 0.9
2 (1) $\pm \sqrt{5}$ (2) $\pm \sqrt{7}$ (3) $\pm \sqrt{0.6}$

25 ページ

- 3** (1) $\frac{3}{6}$ (2) -8 (3) 0.7
 (4) $\frac{5}{6}$ (5) 8 (6) $\frac{8}{5}$
4 (1) 8 (2) 7 (3) $\frac{3}{5}$
5 (1) $\sqrt{7} < \sqrt{10}$ (2) $\sqrt{1.2} < \sqrt{1.5}$
 (3) $\sqrt{\frac{1}{2}} > \sqrt{\frac{1}{3}}$ (4) $\sqrt{10} > -\sqrt{11}$
6 (1) $4 < \sqrt{17}$ (2) $8 > \sqrt{61}$ (3) $\sqrt{2} < 1.5$
 (4) $\frac{1}{2} < \sqrt{\frac{1}{3}}$ (5) $2 < \sqrt{6} < 3$ (6) $\sqrt{35} < 6 < \sqrt{40}$

解説

- (1) $4^2=16$, $(\sqrt{17})^2=17$ より, $4^2 < (\sqrt{17})^2$, $4 < \sqrt{17}$
 (2) $8^2=64$, $(\sqrt{61})^2=61$ より, $8^2 > (\sqrt{61})^2$, $8 > \sqrt{61}$
 (3) $(\sqrt{2})^2=2$, $1.5^2=2.25$ より, $(\sqrt{2})^2 < 1.5^2$, $\sqrt{2} < 1.5$
 (4) $\left(\frac{1}{2}\right)^2=\frac{1}{4}$, $\left(\sqrt{\frac{1}{3}}\right)^2=\frac{1}{3}$ より, $\left(\frac{1}{2}\right)^2 < \left(\sqrt{\frac{1}{3}}\right)^2$,
 $\frac{1}{2} < \sqrt{\frac{1}{3}}$
 (5) $2^2=4$, $3^2=9$, $(\sqrt{6})^2=6$ より, $2^2 < (\sqrt{6})^2 < 3^2$
 $2 < \sqrt{6} < 3$
 (6) $6^2=36$, $(\sqrt{35})^2=35$, $(\sqrt{40})^2=40$ より,
 $(\sqrt{35})^2 < 6^2 < (\sqrt{40})^2$, $\sqrt{35} < 6 < \sqrt{40}$

26 ページ

練習問題 A

- 7** (1) ± 4 (2) ± 9 (3) $\pm \frac{1}{5}$
 (4) $\pm \frac{7}{8}$ (5) ± 0.3 (6) ± 0.6
8 (1) $\pm \sqrt{6}$ (2) $\pm \sqrt{11}$ (3) $\pm \sqrt{1.7}$
9 (1) 2 (2) -10 (3) $\frac{4}{5}$
 (4) 0.8 (5) 3 (6) $-\frac{5}{3}$
10 (1) 9 (2) 12 (3) $\frac{1}{3}$
11 (1) $\sqrt{13} < \sqrt{14}$ (2) $\sqrt{\frac{1}{5}} > \sqrt{\frac{1}{6}}$ (3) $-\sqrt{8} < 3$
 (4) $2 > \sqrt{3}$ (5) $\sqrt{110} < 11$ (6) $1 < \sqrt{2.5} < 2$

解説

- (1) $(\sqrt{13})^2=13$, $(\sqrt{14})^2=14$ より, $(\sqrt{13})^2 < (\sqrt{14})^2$,
 $\sqrt{13} < \sqrt{14}$
 (2) $\left(\sqrt{\frac{1}{5}}\right)^2=\frac{1}{5}$, $\left(\sqrt{\frac{1}{6}}\right)^2=\frac{1}{6}$ より,
 $\left(\sqrt{\frac{1}{5}}\right)^2 > \left(\sqrt{\frac{1}{6}}\right)^2$, $\sqrt{\frac{1}{5}} > \sqrt{\frac{1}{6}}$
 (3) $-\sqrt{8} < 0 < 3$ より, $-\sqrt{8} < 3$

- (4) $2^2=4$, $(\sqrt{3})^2=3$ より, $2^2 > (\sqrt{3})^2$, $2 > \sqrt{3}$
 (5) $(\sqrt{110})^2=110$, $11^2=121$ より, $(\sqrt{110})^2 < 11^2$,
 $\sqrt{110} < 11$
 (6) $1^2=1$, $2^2=4$, $(\sqrt{2.5})^2=2.5$ より,
 $1^2 < (\sqrt{2.5})^2 < 2^2$, $1 < \sqrt{2.5} < 2$

27ページ

練習問題B

12 (1) ± 0.5 (2) $\pm \sqrt{\frac{2}{3}}$ (3) $\pm \frac{2}{3}$

(4) $\pm \sqrt{23}$ (5) ± 7 (6) ± 12

13 (1) 6 (2) $-\frac{7}{9}$ (3) 30

(4) 0.4 (5) 10 (6) 2

14 (1) $\sqrt{50} > 7$ (2) $\frac{1}{2} < \sqrt{\frac{1}{2}}$

(3) $-\sqrt{6} > -\sqrt{8}$ (4) $-9 > -\sqrt{90}$

(5) $\sqrt{2} < \sqrt{5} < 3$ (6) $-4 < -\sqrt{15} < 4$

解説

(1) $(\sqrt{50})^2=50$, $7^2=49$ より, $(\sqrt{50})^2 > 7^2$, $\sqrt{50} > 7$

(2) $\left(\frac{1}{2}\right)^2 = \frac{1}{4}$, $\left(\sqrt{\frac{1}{2}}\right)^2 = \frac{1}{2}$ より,

$\left(\frac{1}{2}\right)^2 < \left(\sqrt{\frac{1}{2}}\right)^2$, $\frac{1}{2} < \sqrt{\frac{1}{2}}$

(3) $-\sqrt{6} < 0$, $-\sqrt{8} < 0$ で, $(-\sqrt{6})^2=6$, $(-\sqrt{8})^2$

$=8$ より, $(-\sqrt{6})^2 < (-\sqrt{8})^2$, $-\sqrt{6} > -\sqrt{8}$

(4) $-9 < 0$, $-\sqrt{90} < 0$ で, $(-9)^2=81$, $(-\sqrt{90})^2$

$=90$ より, $(-9)^2 < (-\sqrt{90})^2$, $-9 > -\sqrt{90}$

(5) $(\sqrt{2})^2 < (\sqrt{5})^2 < 3^2$ より, $\sqrt{2} < \sqrt{5} < 3$

(6) $-\sqrt{15} < 0$, $-4 < 0$ で, $(-\sqrt{15})^2=15$, $(-4)^2$

$=16$ より, $(-\sqrt{15})^2 < (-4)^2$, $-4 < -\sqrt{15} < 0 < 4$

15 6個

解説

$3^2 < (\sqrt{x})^2 < 4^2$, $9 < x < 16$ より, $x=10 \sim 15$ の6個

28ページ

6 有理数と無理数

16 有理数… $-\sqrt{4}$, $1.\dot{3}$, $(\sqrt{7})^2$, $\sqrt{\frac{1}{4}}$, $\frac{1}{9}$

無理数… $\sqrt{5}$, $\frac{\pi}{2}$, $\frac{\sqrt{6}}{\sqrt{2}}$

29ページ

17 (1) $\frac{2}{3}$ (2) $\frac{8}{33}$ (3) $\frac{77}{111}$

解説

(1) $0.\dot{6}=0.\dot{1} \times 6 = \frac{1}{9} \times 6 = \frac{2}{3}$

(2) $0.\dot{2}\dot{4}=0.\dot{0}\dot{1} \times 24 = \frac{1}{99} \times 24 = \frac{8}{33}$

(3) $0.\dot{6}9\dot{3}=0.\dot{0}\dot{0}\dot{1} \times 693 = \frac{1}{999} \times 693 = \frac{77}{111}$

〔別解〕

(1) $x=0.\dot{6} \cdots \textcircled{1}$ とすると, $10x=6.\dot{6} \cdots \textcircled{2}$

$\textcircled{2}-\textcircled{1}$ より, $9x=6$, $x=\frac{2}{3}$

(2) $x=0.\dot{2}\dot{4} \cdots \textcircled{1}$ とすると, $100x=24.\dot{2}\dot{4} \cdots \textcircled{2}$

$\textcircled{2}-\textcircled{1}$ より, $99x=24$, $x=\frac{8}{33}$

(3) $x=0.\dot{6}9\dot{3} \cdots \textcircled{1}$ とすると, $1000x=693.\dot{6}9\dot{3} \cdots \textcircled{2}$

$\textcircled{2}-\textcircled{1}$ より, $999x=693$, $x=\frac{77}{111}$

練習問題

18 有理数… $\frac{1}{7}$, -9 , $-(\sqrt{6})^2$, 0.25 , 0

無理数… $2\sqrt{3}$, $\pi-3$, $\sqrt{2}+\sqrt{5}$, $1+\sqrt{10}$

19 (1) $0.\dot{2}$ (2) $0.\dot{2}\dot{5}$

(3) $0.20\dot{5}$ (4) $0.32\dot{4}$

解説

$\frac{1}{9}=0.\dot{1}$, $\frac{1}{99}=0.\dot{0}\dot{1}$, $\frac{1}{999}=0.\dot{0}\dot{0}\dot{1}$ を利用する。

(4) $\frac{12}{37}=\frac{324}{999}=0.\dot{3}2\dot{4}$

20 (1) $\frac{5}{9}$ (2) $\frac{28}{33}$ (3) $\frac{176}{333}$ (4) $\frac{1}{30}$

解説

(4) $0.0\dot{3}=0.\dot{3} \times \frac{1}{10} = \frac{1}{9} \times 3 \times \frac{1}{10} = \frac{1}{30}$

21 (1) $0.\dot{1}42857$ (2) 8

解説

(2) $\frac{1}{7}$ の小数点以下は 1, 4, 2, 8, 5, 7 の6つの数が繰り返され, $100 \div 6 = 16$ あまり 4 より, 小数第100位の数は, 繰り返される数の中の4番目にあたる8である。

30ページ

7 平方根の積と商

22 (1) $\sqrt{15}$ (2) $\sqrt{42}$ (3) $\sqrt{36} (=6)$

(4) $\sqrt{5}$ (5) $\sqrt{3}$ (6) $\sqrt{9} (=3)$

23 (1) $\sqrt{54}$ (2) $\sqrt{32}$ (3) $\sqrt{75}$

解説

(1) $3\sqrt{6}=\sqrt{3^2 \times 6}=\sqrt{54}$

(2) $4\sqrt{2}=\sqrt{4^2 \times 2}=\sqrt{32}$

(3) $5\sqrt{3}=\sqrt{5^2 \times 3}=\sqrt{75}$

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24 (1) $2\sqrt{3}$ (2) $3\sqrt{2}$ (3) $2\sqrt{5}$

(4) $3\sqrt{3}$ (5) $2\sqrt{7}$ (6) $2\sqrt{10}$

25 (1) $\frac{\sqrt{3}}{2}$ (2) $\frac{\sqrt{6}}{5}$ (3) $\frac{\sqrt{7}}{10}$

解説

(1) $\sqrt{\frac{3}{4}}=\frac{\sqrt{3}}{\sqrt{4}}=\frac{\sqrt{3}}{2}$

(2) $\sqrt{\frac{6}{25}}=\frac{\sqrt{6}}{\sqrt{25}}=\frac{\sqrt{6}}{5}$

(3) $\sqrt{\frac{7}{100}}=\frac{\sqrt{7}}{\sqrt{100}}=\frac{\sqrt{7}}{10}$

26 (1) 17.32 (2) 0.1732 (3) 173.2

解説

(1) $\sqrt{300} = 10\sqrt{3} = 10 \times 1.732 = 17.32$

(2) $\sqrt{0.03} = \frac{\sqrt{3}}{10} = 1.732 \times \frac{1}{10} = 0.1732$

(3) $\sqrt{30000} = 100\sqrt{3} = 100 \times 1.732 = 173.2$

27 (1) 54.77 (2) 0.5477 (3) 0.05477

解説

(1) $\sqrt{3000} = 10\sqrt{30} = 10 \times 5.477 = 54.77$

(2) $\sqrt{0.3} = \sqrt{\frac{30}{100}} = \frac{\sqrt{30}}{10} = 5.477 \times \frac{1}{10} = 0.5477$

(3) $\sqrt{0.003} = \sqrt{\frac{30}{10000}} = \frac{\sqrt{30}}{100} = 5.477 \times \frac{1}{100} = 0.05477$

28 (1) 22.36 (2) 70.71 (3) 0.7071

(4) 0.2236

解説

(1) $\sqrt{500} = 10\sqrt{5} = 10 \times 2.236 = 22.36$

(2) $\sqrt{5000} = 10\sqrt{50} = 10 \times 7.071 = 70.71$

(3) $\sqrt{0.5} = \sqrt{\frac{50}{100}} = \frac{\sqrt{50}}{10} = 7.071 \times \frac{1}{10} = 0.7071$

(4) $\sqrt{0.05} = \sqrt{\frac{5}{100}} = \frac{\sqrt{5}}{10} = 2.236 \times \frac{1}{10} = 0.2236$

32ページ**練習問題 A**

29 (1) $\sqrt{14}$ (2) $\sqrt{39}$ (3) 10

(4) $\sqrt{7}$ (5) $\sqrt{5}$ (6) 4

30 (1) $\sqrt{44}$ (2) $\sqrt{63}$ (3) $\sqrt{200}$

31 (1) $3\sqrt{5}$ (2) $5\sqrt{2}$ (3) $2\sqrt{13}$

(4) $7\sqrt{2}$ (5) $5\sqrt{5}$ (6) $10\sqrt{3}$

32 (1) $\frac{\sqrt{7}}{3}$ (2) $\frac{\sqrt{5}}{4}$ (3) $\frac{\sqrt{2}}{10}$

33 (1) 31.62 (2) 0.3162

解説

(1) $\sqrt{1000} = 10\sqrt{10} = 10 \times 3.162 = 31.62$

(2) $\sqrt{0.1} = \sqrt{\frac{10}{100}} = \frac{\sqrt{10}}{10} = 3.162 \times \frac{1}{10} = 0.3162$

34 (1) 26.46 (2) 83.67

(3) 0.8367 (4) 0.2646

解説

(1) $\sqrt{700} = 10\sqrt{7} = 10 \times 2.646 = 26.46$

(2) $\sqrt{7000} = 10\sqrt{70} = 10 \times 8.367 = 83.67$

(3) $\sqrt{0.7} = \sqrt{\frac{70}{100}} = \frac{\sqrt{70}}{10} = \frac{\sqrt{70}}{10} = 8.367 \times \frac{1}{10} = 0.8367$

(4) $\sqrt{0.07} = \sqrt{\frac{7}{100}} = \frac{\sqrt{7}}{\sqrt{100}} = \frac{\sqrt{7}}{10} = 2.646 \times \frac{1}{10} = 0.2646$

33ページ**練習問題 B**

35 (1) $\sqrt{21}$ (2) 8 (3) -6

(4) $\sqrt{2}$ (5) -2 (6) 3

解説

(1) 与式 $= \sqrt{7 \times 3} = \sqrt{21}$

(2) 与式 $= \sqrt{32 \times 2} = \sqrt{64} = 8$

(3) 与式 $= -\sqrt{6 \times 6} = -\sqrt{36} = -6$

(4) 与式 $= \sqrt{30 \div 15} = \sqrt{2}$

(5) 与式 $= -\sqrt{28 \div 7} = -\sqrt{4} = -2$

(6) 与式 $= \sqrt{45 \div 5} = \sqrt{9} = 3$

36 (1) $\sqrt{90}$ (2) $\sqrt{150}$ (3) $\sqrt{72}$

解説

(1) $3\sqrt{10} = \sqrt{3^2 \times 10} = \sqrt{90}$

(2) $5\sqrt{6} = \sqrt{5^2 \times 6} = \sqrt{150}$

(3) $6\sqrt{2} = \sqrt{6^2 \times 2} = \sqrt{72}$

37 (1) $2\sqrt{6}$ (2) $4\sqrt{3}$ (3) $5\sqrt{3}$

(4) $4\sqrt{5}$ (5) $6\sqrt{3}$ (6) $5\sqrt{10}$

解説

(1) $\sqrt{24} = \sqrt{2^2 \times 6} = 2\sqrt{6}$

(2) $\sqrt{48} = \sqrt{4^2 \times 3} = 4\sqrt{3}$

(3) $\sqrt{75} = \sqrt{5^2 \times 3} = 5\sqrt{3}$

(4) $\sqrt{80} = \sqrt{4^2 \times 5} = 4\sqrt{5}$

(5) $\sqrt{108} = \sqrt{6^2 \times 3} = 6\sqrt{3}$

(6) $\sqrt{250} = \sqrt{5^2 \times 10} = 5\sqrt{10}$

38 (1) $2\sqrt{5}$ (2) $-3\sqrt{5}$ (3) $7\sqrt{6}$

(4) $2\sqrt{2}$ (5) $-3\sqrt{3}$ (6) $\frac{\sqrt{2}}{3}$

解説

(1) 与式 $= \sqrt{2 \times 10} = \sqrt{2^2 \times 5} = 2\sqrt{5}$

(2) 与式 $= -\sqrt{15 \times 3} = -\sqrt{3^2 \times 5} = -3\sqrt{5}$

(3) 与式 $= \sqrt{14 \times 21} = \sqrt{7^2 \times 6} = 7\sqrt{6}$

(4) 与式 $= \sqrt{40 \div 5} = \sqrt{8} = \sqrt{2^2 \times 2} = 2\sqrt{2}$

(5) 与式 $= -\sqrt{54 \div 2} = -\sqrt{27} = -\sqrt{3^2 \times 3} = -3\sqrt{3}$

(6) 与式 $= \sqrt{\frac{6}{27}} = \sqrt{\frac{2}{9}} = \frac{\sqrt{2}}{\sqrt{9}} = \frac{\sqrt{2}}{3}$

39 (㊦と㊧), (㊨と㊩)

解説

$\sqrt{1300} = 10\sqrt{13}$, $\sqrt{0.013} = \sqrt{\frac{130}{10000}} = \frac{\sqrt{130}}{100}$ より,
 ㊦と㊧, ㊨と㊩が小数点の位置が異なり, 同じ
 数字が並ぶ。

34ページ**8 平方根の計算(1)**

40 (1) $\frac{\sqrt{2}}{2}$ (2) $\frac{\sqrt{6}}{3}$ (3) $2\sqrt{5}$

(4) $\frac{\sqrt{3}}{6}$ (5) $\frac{\sqrt{21}}{21}$ (6) $\frac{\sqrt{6}}{4}$

解説

(1) $\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{\sqrt{2} \times \sqrt{2}} = \frac{\sqrt{2}}{2}$

(2) $\frac{\sqrt{2}}{\sqrt{3}} = \frac{\sqrt{2} \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{\sqrt{6}}{3}$

(3) $\frac{10}{\sqrt{5}} = \frac{10 \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}} = \frac{10\sqrt{5}}{5} = 2\sqrt{5}$

(4) $\frac{1}{2\sqrt{3}} = \frac{\sqrt{3}}{2\sqrt{3} \times \sqrt{3}} = \frac{\sqrt{3}}{2 \times 3} = \frac{\sqrt{3}}{6}$

$$(5) \frac{\sqrt{3}}{3\sqrt{7}} = \frac{\sqrt{3} \times \sqrt{7}}{3\sqrt{7} \times \sqrt{7}} = \frac{\sqrt{21}}{3 \times 7} = \frac{\sqrt{21}}{21}$$

$$(6) \frac{3}{2\sqrt{6}} = \frac{3 \times \sqrt{6}}{2\sqrt{6} \times \sqrt{6}} = \frac{3\sqrt{6}}{2 \times 6} = \frac{3\sqrt{6}}{12} = \frac{\sqrt{6}}{4}$$

- 41** (1) $3\sqrt{10}$ (2) $8\sqrt{21}$
(3) $4\sqrt{6}$ (4) $30\sqrt{3}$

解説

(1) 与式 $= 3 \times \sqrt{2} \times \sqrt{5} = 3 \times \sqrt{10} = 3\sqrt{10}$
 (2) 与式 $= 2 \times \sqrt{3} \times 4 \times \sqrt{7} = 8 \times \sqrt{21} = 8\sqrt{21}$
 (3) 与式 $= 2\sqrt{2} \times 2\sqrt{3} = 4\sqrt{6}$
 (4) 与式 $= 6 \times \sqrt{75} = 6 \times 5\sqrt{3} = 30\sqrt{3}$

35 ページ

- 42** (1) $2\sqrt{2}$ (2) $\frac{3\sqrt{5}}{2}$
(3) $\frac{\sqrt{6}}{3}$ (4) $\frac{3\sqrt{2}}{2}$

解説

(1) 与式 $= \frac{8\sqrt{6}}{4\sqrt{3}} = \frac{8}{4} \sqrt{\frac{6}{3}} = 2\sqrt{2}$
 (2) 与式 $= \frac{9\sqrt{10}}{6\sqrt{2}} = \frac{9}{6} \sqrt{\frac{10}{2}} = \frac{3\sqrt{5}}{2}$
 (3) 与式 $= \frac{3\sqrt{2}}{3\sqrt{3}} = \frac{\sqrt{2}}{\sqrt{3}} = \frac{\sqrt{6}}{3}$
 (4) 与式 $= \frac{3\sqrt{6}}{2\sqrt{3}} = \frac{3}{2} \sqrt{\frac{6}{3}} = \frac{3\sqrt{2}}{2}$

- 43** (1) $5\sqrt{2}$ (2) $6\sqrt{3}$ (3) $5\sqrt{5}$
(4) $-2\sqrt{6}$ (5) $6\sqrt{5}$ (6) $-3\sqrt{2} + 6\sqrt{6}$

- 44** (1) $3\sqrt{5}$ (2) $2\sqrt{3}$
(3) $6\sqrt{7}$ (4) $3\sqrt{3} + \sqrt{2}$

解説

(1) 与式 $= 2\sqrt{5} + \sqrt{5} = 3\sqrt{5}$
 (2) 与式 $= 5\sqrt{3} - 3\sqrt{3} = 2\sqrt{3}$
 (3) 与式 $= \sqrt{7} + 2\sqrt{7} + 3\sqrt{7} = 6\sqrt{7}$
 (4) 与式 $= \sqrt{3} - 2\sqrt{2} + 2\sqrt{3} + 3\sqrt{2} = 3\sqrt{3} + \sqrt{2}$

- 45** (1) $4\sqrt{2}$ (2) $3\sqrt{5}$

解説

(1) 与式 $= \sqrt{2} + \frac{6\sqrt{2}}{2} = \sqrt{2} + 3\sqrt{2} = 4\sqrt{2}$
 (2) 与式 $= \frac{20\sqrt{5}}{5} - \sqrt{5} = 4\sqrt{5} - \sqrt{5} = 3\sqrt{5}$

36 ページ

練習問題 A

- 46** (1) $\frac{3\sqrt{5}}{5}$ (2) $3\sqrt{3}$ (3) $\frac{5\sqrt{2}}{4}$
47 (1) $6\sqrt{6}$ (2) $20\sqrt{10}$ (3) $3\sqrt{3}$
(4) $\frac{3\sqrt{7}}{2}$

- 48** (1) $2\sqrt{10}$ (2) $\frac{2\sqrt{15}}{3}$

解説

(1) 与式 $= 2\sqrt{3} \times 2\sqrt{5} \div \sqrt{6} = \frac{4\sqrt{5}}{\sqrt{2}} = 2\sqrt{10}$

(2) 与式 $= 2\sqrt{10} \div 3\sqrt{2} \times \sqrt{3} = \frac{2\sqrt{15}}{3}$

- 49** (1) $4\sqrt{5}$ (2) $-\sqrt{2}$ (3) $4\sqrt{7} - 3\sqrt{3}$
(4) $2\sqrt{6} + 1$
50 (1) $3\sqrt{6}$ (2) $2\sqrt{10}$ (3) $2\sqrt{5}$
(4) $\sqrt{2} - 2\sqrt{3}$ (5) $3\sqrt{3}$ (6) $2\sqrt{6}$

解説

(1) 与式 $= 2\sqrt{6} + \sqrt{6} = 3\sqrt{6}$
 (2) 与式 $= 3\sqrt{10} - \sqrt{10} = 2\sqrt{10}$
 (3) 与式 $= \sqrt{5} - 3\sqrt{5} + 4\sqrt{5} = 2\sqrt{5}$
 (4) 与式 $= 5\sqrt{2} - 3\sqrt{3} - 4\sqrt{2} + \sqrt{3} = \sqrt{2} - 2\sqrt{3}$
 (5) 与式 $= \frac{3\sqrt{3}}{3} + 2\sqrt{3} = \sqrt{3} + 2\sqrt{3} = 3\sqrt{3}$
 (6) 与式 $= \frac{30\sqrt{6}}{6} - 3\sqrt{6} = 5\sqrt{6} - 3\sqrt{6} = 2\sqrt{6}$

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練習問題 B

- 51** (1) $\frac{\sqrt{30}}{6}$ (2) $\frac{\sqrt{2}}{4}$ (3) $\frac{\sqrt{3}}{2}$
52 (1) $20\sqrt{3}$ (2) 20 (3) 18
(4) $30\sqrt{2}$ (5) 60 (6) $7\sqrt{6}$
(7) $\frac{\sqrt{2}}{2}$ (8) $\frac{\sqrt{10}}{2}$ (9) $\sqrt{3}$

解説

(1) 与式 $= 5 \times \sqrt{2} \times 2 \times \sqrt{6} = 10 \times 2\sqrt{3} = 20\sqrt{3}$
 (2) 与式 $= 2^2 \times (\sqrt{5})^2 = 4 \times 5 = 20$
 (3) 与式 $= (-3)^2 \times (\sqrt{2})^2 = 9 \times 2 = 18$
 (4) 与式 $= 10\sqrt{18} = 10 \times 3\sqrt{2} = 30\sqrt{2}$
 (5) 与式 $= 5\sqrt{3} \times 4\sqrt{3} = 20 \times 3 = 60$
 (6) 与式 $= \sqrt{2} \times 7 \times \sqrt{3} \times 7 = 7\sqrt{6}$
 (7) 与式 $= \frac{\sqrt{14}}{2\sqrt{7}} = \frac{\sqrt{2}}{2}$
 (8) 与式 $= \frac{5\sqrt{2}}{\sqrt{20}} = \frac{5}{\sqrt{10}} = \frac{5\sqrt{10}}{10} = \frac{\sqrt{10}}{2}$
 (9) 与式 $= \frac{6\sqrt{10}}{2\sqrt{30}} = \frac{3}{\sqrt{3}} = \sqrt{3}$

- 53** (1) $4\sqrt{7}$ (2) $-3\sqrt{2}$ (3) $7\sqrt{6} + 5\sqrt{3}$
(4) $2\sqrt{2} + 4\sqrt{5}$ (5) $\frac{3\sqrt{2}}{2}$ (6) $\frac{5\sqrt{3}}{6}$

解説

(1) 与式 $= 3\sqrt{7} + \sqrt{7} = 4\sqrt{7}$
 (2) 与式 $= 3\sqrt{2} - 2 \times 3\sqrt{2} = 3\sqrt{2} - 6\sqrt{2} = -3\sqrt{2}$
 (3) 与式 $= \sqrt{6} - \sqrt{3} + 6\sqrt{6} + 6\sqrt{3} = 7\sqrt{6} + 5\sqrt{3}$
 (4) 与式 $= 10\sqrt{2} - 5\sqrt{5} - 8\sqrt{2} + 9\sqrt{5} = 2\sqrt{2} + 4\sqrt{5}$
 (5) 与式 $= 2\sqrt{2} - \frac{\sqrt{2}}{2} = \frac{3\sqrt{2}}{2}$
 (6) 与式 $= \frac{\sqrt{3}}{3} + \frac{\sqrt{3}}{2} = \left(\frac{1}{3} + \frac{1}{2}\right)\sqrt{3} = \frac{5\sqrt{3}}{6}$

- 54** (1) 6 (2) 2 (3) $10\sqrt{2}$
(4) $2\sqrt{6}$

解説

- (1) 与式 $= 6\sqrt{20} \div 2\sqrt{5} = 3\sqrt{4} = 3 \times 2 = 6$
 (2) 与式 $= 2\sqrt{2} \times \sqrt{6} \div 2\sqrt{3} = 2\sqrt{12} \div 2\sqrt{3} = \sqrt{4} = 2$
 (3) 与式 $= 7\sqrt{2} + 3\sqrt{2} = 10\sqrt{2}$
 (4) 与式 $= 5\sqrt{6} - \frac{6\sqrt{3}}{\sqrt{2}} = 5\sqrt{6} - 3\sqrt{6} = 2\sqrt{6}$

38ページ 9 平方根の計算(2)

- 55** (1) $2\sqrt{2} - 13$ (2) $10 + 2\sqrt{21}$
 (3) $10 - 4\sqrt{6}$ (4) 5

解説

- (1) 与式 $= (\sqrt{2})^2 + (5-3)\sqrt{2} - 5 \times 3 = 2 + 2\sqrt{2} - 15 = 2\sqrt{2} - 13$
 (2) 与式 $= (\sqrt{3})^2 + 2 \times \sqrt{3} \times \sqrt{7} + (\sqrt{7})^2 = 3 + 2\sqrt{21} + 7 = 10 + 2\sqrt{21}$
 (3) 与式 $= (\sqrt{6})^2 - 2 \times \sqrt{6} \times 2 + 2^2 = 6 - 4\sqrt{6} + 4 = 10 - 4\sqrt{6}$
 (4) 与式 $= (\sqrt{10})^2 - (\sqrt{5})^2 = 10 - 5 = 5$

- 56** (1) $4 + \sqrt{6}$ (2) $4 + 3\sqrt{3}$

解説

- (1) 与式 $= \sqrt{2} \times \sqrt{8} + \sqrt{2} \times \sqrt{3} = \sqrt{16} + \sqrt{6} = 4 + \sqrt{6}$
 (2) 与式 $= 2\sqrt{3} \times \sqrt{3} + 2\sqrt{3} \times 2 - 1 \times \sqrt{3} - 1 \times 2 = 6 + 4\sqrt{3} - \sqrt{3} - 2 = 4 + 3\sqrt{3}$

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- 57** (1) -1 (2) $12\sqrt{2}$ (3) $8\sqrt{6}$

解説

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

- 58** (1) 2 (2) 3

解説

- (1) 与式 $= 6\sqrt{2} \times \sqrt{n} = 6\sqrt{2n}$ より, $n=2$
 (2) 与式 $= \frac{8\sqrt{3}}{\sqrt{n}}$ より, $n=3$

- 59** $a=3, 10, 15, 18, 19$

解説

- $\sqrt{19-3} = \sqrt{16} = 4, \sqrt{19-10} = \sqrt{9} = 3,$
 $\sqrt{19-15} = \sqrt{4} = 2, \sqrt{19-18} = \sqrt{1} = 1,$
 $\sqrt{19-19} = \sqrt{0} = 0$ より,
 $a=3, 10, 15, 18, 19$

- 60** $a=6, 7, 8$

解説

- $4 < \sqrt{3a} < 5$ のとき, $4^2 < (\sqrt{3a})^2 < 5^2,$
 $16 < 3a < 25, \frac{16}{3} < a < \frac{25}{3}$ より, $a=6, 7, 8$

- 61** (1) $a=\sqrt{3}-1$ (2) 2

解説

- (1) $\sqrt{3} = 1+a$ より, $a=\sqrt{3}-1$
 (2) 与式 $= a(a+2) = (\sqrt{3}-1)(\sqrt{3}-1+2) = (\sqrt{3}-1)(\sqrt{3}+1) = (\sqrt{3})^2 - 1^2 = 3 - 1 = 2$

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練習問題A

- 62** (1) $5+3\sqrt{3}$ (2) $2\sqrt{5}-3$

- (3) $11+4\sqrt{7}$ (4) $5-2\sqrt{6}$

- (5) 1 (6) 5

解説

- (1) 与式 $= (\sqrt{3})^2 + (2+1)\sqrt{3} + 2 \times 1 = 3 + 3\sqrt{3} + 2 = 5 + 3\sqrt{3}$
 (2) 与式 $= (\sqrt{5})^2 + (4-2)\sqrt{5} - 4 \times 2 = 5 + 2\sqrt{5} - 8 = 2\sqrt{5} - 3$
 (3) 与式 $= (\sqrt{7})^2 + 2 \times \sqrt{7} \times 2 + 2^2 = 7 + 4\sqrt{7} + 4 = 11 + 4\sqrt{7}$
 (4) 与式 $= (\sqrt{3})^2 - 2 \times \sqrt{3} \times \sqrt{2} + (\sqrt{2})^2 = 3 - 2\sqrt{6} + 2 = 5 - 2\sqrt{6}$
 (5) 与式 $= 2^2 - (\sqrt{3})^2 = 4 - 3 = 1$
 (6) 与式 $= (\sqrt{11})^2 - (\sqrt{6})^2 = 11 - 6 = 5$

- 63** (1) $3\sqrt{2}-3$ (2) $6+2\sqrt{6}$

- (3) $8+3\sqrt{5}$ (4) $7\sqrt{2}$

解説

- (1) 与式 $= \sqrt{3} \times \sqrt{6} - (\sqrt{3})^2 = \sqrt{18} - 3 = 3\sqrt{2} - 3$
 (2) 与式 $= \sqrt{2} \times \sqrt{18} + \sqrt{2} \times \sqrt{12} = \sqrt{36} + \sqrt{24} = 6 + 2\sqrt{6}$
 (3) 与式 $= \sqrt{5} \times 2\sqrt{5} - \sqrt{5} \times 1 + 2 \times 2\sqrt{5} - 2 \times 1 = 10 - \sqrt{5} + 4\sqrt{5} - 2 = 8 + 3\sqrt{5}$
 (4) 与式 $= 3\sqrt{2} \times \sqrt{2} + 3\sqrt{2} \times 3 - 2 \times \sqrt{2} - 2 \times 3 = 6 + 9\sqrt{2} - 2\sqrt{2} - 6 = 7\sqrt{2}$

- 64** (1) 1 (2) $12\sqrt{3}$ (3) 20

解説

- (1) $x^2 + 6x = x(x+6) = (\sqrt{10}-3)(\sqrt{10}-3+6) = (\sqrt{10}-3)(\sqrt{10}+3) = (\sqrt{10})^2 - 3^2 = 10 - 9 = 1$
 (2) $a^2 - b^2 = (a-b)(a+b) = (3+\sqrt{3}-3+\sqrt{3})(3+\sqrt{3}+3-\sqrt{3}) = 2\sqrt{3} \times 6 = 12\sqrt{3}$
 (3) $a^2 + 2ab + b^2 = (a+b)^2 = (\sqrt{5}+4+\sqrt{5}-4)^2 = (2\sqrt{5})^2 = 20$

- 65** $n=2, 8$

解説

- $\sqrt{18}\sqrt{n} = \sqrt{18n} = 3\sqrt{2n}$ より, $n=2$ と,
 $n=2 \times 2^2 = 8$

66 4

解説

$$\begin{aligned}\sqrt{13} &= 3 + a \text{ より, } a = \sqrt{13} - 3 \text{ だから,} \\ a^2 + 6a &= a(a+6) = (\sqrt{13}-3)(\sqrt{13}-3+6) \\ &= (\sqrt{13}-3)(\sqrt{13}+3) = (\sqrt{13})^2 - 3^2 = 13 - 9 = 4\end{aligned}$$

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練習問題 B

- 67 (1) $2\sqrt{6} - 2$ (2) $2\sqrt{10} - 1$
 (3) $9 + 4\sqrt{2}$ (4) $22 - 4\sqrt{10}$
 (5) 11 (6) 6

解説

$$\begin{aligned}(1) \text{与式} &= (\sqrt{6})^2 + (4-2)\sqrt{6} - 4 \times 2 = 6 + 2\sqrt{6} - 8 \\ &= 2\sqrt{6} - 2 \\ (2) \text{与式} &= (\sqrt{5})^2 - \sqrt{5} \times \sqrt{2} + 3\sqrt{2} \times \sqrt{5} - 3\sqrt{2} \\ &\quad \times \sqrt{2} = 5 - \sqrt{10} + 3\sqrt{10} - 6 = 2\sqrt{10} - 1 \\ (3) \text{与式} &= (2\sqrt{2})^2 + 2 \times 2\sqrt{2} \times 1 + 1^2 = 8 + 4\sqrt{2} + 1 \\ &= 9 + 4\sqrt{2} \\ (4) \text{与式} &= (2\sqrt{5})^2 - 2 \times 2\sqrt{5} \times \sqrt{2} + (\sqrt{2})^2 \\ &= 20 - 4\sqrt{10} + 2 = 22 - 4\sqrt{10} \\ (5) \text{与式} &= (3\sqrt{3})^2 - 4^2 = 27 - 16 = 11 \\ (6) \text{与式} &= (3\sqrt{2} - 2\sqrt{3})(3\sqrt{2} + 2\sqrt{3}) \\ &= (3\sqrt{2})^2 - (2\sqrt{3})^2 = 18 - 12 = 6\end{aligned}$$

- 68 (1) $\frac{\sqrt{6}+2}{2}$ (2) $\frac{3\sqrt{2}-\sqrt{6}}{6}$

解説

$$\begin{aligned}(1) \text{与式} &= \frac{(\sqrt{3}+\sqrt{2}) \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} = \frac{(\sqrt{3} \times \sqrt{2}) + (\sqrt{2})^2}{(\sqrt{2})^2} \\ &= \frac{\sqrt{6}+2}{2} \\ (2) \text{与式} &= \frac{(\sqrt{6}-\sqrt{2}) \times \sqrt{3}}{2\sqrt{3} \times \sqrt{3}} = \frac{\sqrt{18}-\sqrt{6}}{6} \\ &= \frac{3\sqrt{2}-\sqrt{6}}{6}\end{aligned}$$

- 69 (1) 8 (2) $3 + 2\sqrt{14}$

解説

$$\begin{aligned}(1) \text{与式} &= 3 - 2\sqrt{3} + 1 + 3 + 2\sqrt{3} + 1 = 8 \\ (2) \text{与式} &= 7 - 8 + 2\sqrt{14} + 4 = 3 + 2\sqrt{14}\end{aligned}$$

- 70 (1) $8\sqrt{6}$ (2) 24 (3) 7

解説

$$\begin{aligned}(1) x^2 - y^2 &= (x-y)(x+y) \\ &= (\sqrt{6} + 2 - \sqrt{6} + 2)(\sqrt{6} + 2 + \sqrt{6} - 2) \\ &= 4 \times 2\sqrt{6} = 8\sqrt{6} \\ (2) x^2 + 2xy + y^2 &= (x+y)^2 = (\sqrt{6} + 2 + \sqrt{6} - 2)^2 \\ &= (2\sqrt{6})^2 = 24 \\ (3) y^2 + 4y + 5 &= y(y+4) + 5 \\ &= (\sqrt{6} - 2)(\sqrt{6} - 2 + 4) + 5 \\ &= (\sqrt{6} - 2)(\sqrt{6} + 2) + 5 \\ &= (\sqrt{6})^2 - 2^2 + 5 = 6 - 4 + 5 = 7\end{aligned}$$

- 71 (1) 3, 12, 15 (2) 4

解説

$$\begin{aligned}(1) \sqrt{27(15-n)} &= 3\sqrt{3(15-n)} \text{ より,} \\ 15-n &= 0, 3, 3 \times 2^2 \\ n &= 15, 15-3, 15-12 \\ (2) 4 < \sqrt{20} < 5 \text{ より, } \sqrt{20} &= 4+a, a = \sqrt{20}-4 \text{ とお} \\ &\text{けるから,} \\ a^2 + 8a &= a(a+8) = (\sqrt{20}-4)(\sqrt{20}-4+8) \\ &= (\sqrt{20}-4)(\sqrt{20}+4) = 20 - 16 = 4\end{aligned}$$

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32 近似値と有効数字

- 72 (1) 5.25 (2) $5.25 \leq a < 5.35$ (3) 0.05

解説

$$(3) 5.3 - 5.25 = 0.05$$

- 73 (1) $7.20 \times 10^2 \text{ cm}$ (2) $2.45 \times 10^3 \text{ g}$

- 74 (1) 10g の位まで (2) 10km の位まで

解説

$$\begin{aligned}(1) 1.2 \times 10^2 \text{ g} &\text{をもとにもどすと, } 120 \text{ g. } 1.2 \text{ から } 1, \\ &2 \text{ が有効数字である(一の位の } 0 \text{ が有効数字では} \\ &\text{ない)ことから, } 10 \text{ g の位までとわかる.} \\ (2) \text{もとにもどすと } 3400 \text{ km. } 3.40 \text{ から十の位の } 0 \\ &\text{は有効数字であることがわかる.}\end{aligned}$$

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練習問題

- 75 (1) $4.65 \leq a < 4.75$ (2) 0.05

- 76 (1) 2.8 (2) $\frac{1}{30}$

解説

$$\begin{aligned}(1) 17 \div 6 &= 2.83\cdots \\ (2) \frac{17}{6} - 2.8 &= \frac{85}{30} - \frac{84}{30} = \frac{1}{30}\end{aligned}$$

- 77 (1) ① $1.58 \times 10^3 \text{ mm}$ ② $3.9 \times 10^3 \text{ g}$

- (2) ① 10g の位まで ② 10g の位まで

解説

$$\begin{aligned}(2) \text{① } 1.2 \times 10^2 &= 120 \text{ (g)} \\ \text{② } 2.30 \times 10^3 &= 2300 \text{ (g)}\end{aligned}$$

1 つの 0 が有効数字であることに注意。

- 78 約 $1.496 \times 10^8 \text{ km}$

解説

有効数字は, 1, 4, 9, 6。

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章末問題

- 1 (1) ± 6 (2) 7 (3) 3

- (4) 正しい (5) $\frac{\sqrt{10}}{5}$ (6) 7

解説

$$(5) \sqrt{0.4} = \sqrt{\frac{40}{100}} = \frac{2\sqrt{10}}{10} = \frac{\sqrt{10}}{5}$$

$$(6) \sqrt{9} + \sqrt{16} = 3 + 4 = 7$$

- 2 (1) $9 > \sqrt{80}$ (2) $0.5 < \sqrt{0.5}$ (3) $2\sqrt{3} < 3\sqrt{2}$

解説

$$\begin{aligned}(1) 9^2 &= 81, (\sqrt{80})^2 = 80 \text{ より, } 9^2 > (\sqrt{80})^2, 9 > \sqrt{80} \\ (2) 0.5^2 &= 0.25, (\sqrt{0.5})^2 = 0.5 \text{ より, } 0.5^2 < (\sqrt{0.5})^2,\end{aligned}$$

$$0.5 < \sqrt{0.5}$$

$$(3) (2\sqrt{3})^2 = 12, (3\sqrt{2})^2 = 18 \text{ より,}$$

$$(2\sqrt{3})^2 < (3\sqrt{2})^2, 2\sqrt{3} < 3\sqrt{2}$$

$$\boxed{3} \quad (1) 4\sqrt{7} \quad (2) \frac{2\sqrt{2}}{5} \quad (3) \frac{\sqrt{6}}{5}$$

解説

$$(1) \sqrt{112} = \sqrt{2^4 \times 7} = \sqrt{4^2 \times 7} = 4\sqrt{7}$$

$$(2) \sqrt{\frac{8}{25}} = \frac{\sqrt{8}}{\sqrt{25}} = \frac{2\sqrt{2}}{5}$$

$$(3) \sqrt{0.24} = \sqrt{\frac{24}{100}} = \frac{\sqrt{24}}{\sqrt{100}} = \frac{2\sqrt{6}}{10} = \frac{\sqrt{6}}{5}$$

$$\boxed{4} \quad (1) 0.7746 \quad (2) 24.49 \quad (3) 77.46$$

解説

$$(1) \sqrt{0.6} = \sqrt{\frac{60}{100}} = \frac{\sqrt{60}}{10} = 7.746 \times \frac{1}{10} = 0.7746$$

$$(2) \sqrt{600} = \sqrt{6 \times 100} = \sqrt{6} \times 10 = 2.449 \times 10 = 24.49$$

$$(3) \sqrt{6000} = \sqrt{60 \times 100} = \sqrt{60} \times 10 = 7.746 \times 10 =$$

$$77.46$$

$$\boxed{5} \quad (1) \frac{\sqrt{14}}{7} \quad (2) \frac{2\sqrt{6}}{3} \quad (3) \frac{\sqrt{5}}{2}$$

解説

$$(1) \frac{\sqrt{2}}{\sqrt{7}} = \frac{\sqrt{2} \times \sqrt{7}}{\sqrt{7} \times \sqrt{7}} = \frac{\sqrt{14}}{7}$$

$$(2) \frac{4}{\sqrt{6}} = \frac{4 \times \sqrt{6}}{\sqrt{6} \times \sqrt{6}} = \frac{4\sqrt{6}}{6} = \frac{2\sqrt{6}}{3}$$

$$(3) \frac{5}{2\sqrt{5}} = \frac{5 \times \sqrt{5}}{2\sqrt{5} \times \sqrt{5}} = \frac{5\sqrt{5}}{10} = \frac{\sqrt{5}}{2}$$

$$\boxed{6} \quad (1) 6\sqrt{35} \quad (2) \frac{\sqrt{5}}{2} \quad (3) 18$$

$$(4) 6\sqrt{6} \quad (5) \frac{5}{2} \quad (6) \frac{3}{2}$$

解説

$$(1) \text{与式} = 3 \times 2 \times \sqrt{7} \times \sqrt{5} = 6\sqrt{35}$$

$$(2) \text{与式} = \frac{3\sqrt{10}}{6\sqrt{2}} = \frac{\sqrt{5}}{2}$$

$$(3) \text{与式} = 3\sqrt{6} \times \sqrt{6} = 3 \times 6 = 18$$

$$(4) \text{与式} = 3\sqrt{2} \times 2\sqrt{3} = 6\sqrt{6}$$

$$(5) \text{与式} = 5\sqrt{2} \div 2\sqrt{2} = \frac{5\sqrt{2}}{2\sqrt{2}} = \frac{5}{2}$$

$$(6) \text{与式} = 3\sqrt{7} \div 2\sqrt{7} = \frac{3\sqrt{7}}{2\sqrt{7}} = \frac{3}{2}$$

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$$\boxed{7} \quad (1) 3\sqrt{7} \quad (2) \sqrt{2} - 2\sqrt{6}$$

$$(3) 2\sqrt{3} \quad (4) 5\sqrt{5}$$

$$(5) 3\sqrt{10} \quad (6) 3\sqrt{3} - 2\sqrt{2}$$

$$(7) 5\sqrt{2} \quad (8) 0$$

解説

$$(1) \text{与式} = (1+2)\sqrt{7} = 3\sqrt{7}$$

$$(2) \text{与式} = (2-1)\sqrt{2} + (1-3)\sqrt{6} = \sqrt{2} - 2\sqrt{6}$$

$$(3) \text{与式} = 3\sqrt{3} - \sqrt{3} = (3-1)\sqrt{3} = 2\sqrt{3}$$

$$(4) \text{与式} = 3\sqrt{5} + 2\sqrt{5} = (3+2)\sqrt{5} = 5\sqrt{5}$$

$$(5) \text{与式} = 4\sqrt{10} - 3\sqrt{10} + 2\sqrt{10} = (4-3+2)\sqrt{10} = 3\sqrt{10}$$

$$(6) \text{与式} = -2\sqrt{3} + 5\sqrt{2} + 5\sqrt{3} - 7\sqrt{2} \\ = 3\sqrt{3} - 2\sqrt{2}$$

$$(7) \text{与式} = 3\sqrt{2} + \frac{4\sqrt{2}}{2} = 3\sqrt{2} + 2\sqrt{2} = 5\sqrt{2}$$

$$(8) \text{与式} = \frac{12\sqrt{6}}{6} - 2\sqrt{6} = 2\sqrt{6} - 2\sqrt{6} = 0$$

$$\boxed{8} \quad (1) 1 + \sqrt{3} \quad (2) 14 + 6\sqrt{5}$$

$$(3) 8 - 4\sqrt{3} \quad (4) -9$$

$$(5) 5\sqrt{2} - 2\sqrt{5} \quad (6) 3\sqrt{2} + \sqrt{6} - 2\sqrt{3} - 2$$

解説

$$(1) \text{与式} = (\sqrt{3})^2 + (2-1)\sqrt{3} - 2 \times 1 \\ = 3 + \sqrt{3} - 2 = 1 + \sqrt{3}$$

$$(2) \text{与式} = (\sqrt{5})^2 + 2 \times \sqrt{5} \times 3 + 3^2 = 5 + 6\sqrt{5} + 9 \\ = 14 + 6\sqrt{5}$$

$$(3) \text{与式} = (\sqrt{6})^2 - 2 \times \sqrt{6} \times \sqrt{2} + (\sqrt{2})^2 \\ = 6 - 2\sqrt{12} + 2 = 8 - 4\sqrt{3}$$

$$(4) \text{与式} = (\sqrt{7})^2 - 4^2 = 7 - 16 = -9$$

$$(5) \text{与式} = \sqrt{50} - \sqrt{20} = 5\sqrt{2} - 2\sqrt{5}$$

$$(6) \text{与式} = \sqrt{18} + \sqrt{6} - \sqrt{12} - (\sqrt{2})^2 \\ = 3\sqrt{2} + \sqrt{6} - 2\sqrt{3} - 2$$

$$\boxed{9} \quad (1) 2 \quad (2) 4\sqrt{3} \quad (3) 2$$

解説

$$(1) xy = (\sqrt{3} + 1)(\sqrt{3} - 1) = (\sqrt{3})^2 - 1^2 \\ = 3 - 1 = 2$$

$$(2) x^2 - y^2 = (x-y)(x+y) \\ = (\sqrt{3} + 1 - \sqrt{3} + 1)(\sqrt{3} + 1 + \sqrt{3} - 1) \\ = 2 \times 2\sqrt{3} = 4\sqrt{3}$$

$$(3) x^2 - 2x = x(x-2) = (\sqrt{3} + 1)(\sqrt{3} + 1 - 2) \\ = (\sqrt{3} + 1)(\sqrt{3} - 1) = (\sqrt{3})^2 - 1^2 = 3 - 1 = 2$$

$$\boxed{10} \text{ 最も近い整数} \cdots 4, 2 \text{ 番目に近い整数} \cdots 3$$

解説

$$3^2 < (\sqrt{13})^2 < 4^2 \text{ で, } 3.5^2 = 12.25 \text{ より, } \sqrt{13} \text{ は } 3 \\ \text{ と } 4 \text{ の中央}(3.5) \text{ よりも } 4 \text{ に近いことがわかる。}$$

$$\boxed{11} \quad 70, 280$$

解説

$$\sqrt{\frac{35n}{2}} \text{ が整数となるのは,}$$

$$n = 2 \times 35 \times m^2 = 70m^2 \text{ (} m \text{ は自然数) のとき}$$

$$\sqrt{\frac{35n}{2}} = \sqrt{\frac{35 \times 70m^2}{2}} = 35m \text{ で, これが2けたの整}$$

$$\text{数となるのは, } m=1 \text{ または } 2 \text{ のときだから,}$$

$$n = 70 \times 1^2 = 70, n = 70 \times 2^2 = 280$$