

① (1) 5, -5 (2)  $\frac{3}{4}$ ,  $-\frac{3}{4}$  (3) 0.7, -0.7

② 左から順に,

(1) 49, 7, -7 (2)  $\frac{4}{9}$ ,  $\frac{2}{3}$ ,  $-\frac{2}{3}$

③ (1) 6, -6 (2) 10, -10 (3) 1, -1

(4)  $\frac{3}{7}$ ,  $-\frac{3}{7}$  (5)  $\frac{4}{11}$ ,  $-\frac{4}{11}$  (6) 0.9, -0.9

④ (1)  $\pm\sqrt{5}$  (2)  $\pm\sqrt{\frac{2}{7}}$  (3)  $\pm\sqrt{0.8}$

⑤ 左から順に, 3, 3

⑥ (1)  $\pm\sqrt{6}$  (2)  $\pm\sqrt{\frac{3}{5}}$  (3)  $\pm\sqrt{0.7}$

(4) 5 (5) 1 (6)  $-\frac{4}{5}$

⑦ (1)  $3 > \sqrt{8}$  (2)  $-\sqrt{15} > -4$

**解説**

(1)  $3^2 = 9$ ,  $(\sqrt{8})^2 = 8$  より,  $3 > \sqrt{8}$

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

⑧ (1)  $-\sqrt{5}$ ,  $\sqrt{2}$  (2)  $-\sqrt{7}$ , 0,  $\sqrt{5}$

(3)  $\sqrt{4}$ ,  $\sqrt{9}$  (4)  $-\sqrt{10}$ ,  $-\sqrt{8}$

⑨ (1)  $4 > \sqrt{9}$  (2)  $-\sqrt{10} > -5$

⑩ (1)  $\frac{5}{3}$ , 2,  $\sqrt{5}$  (2) -3,  $-\sqrt{6}$ ,  $-\sqrt{5}$

⑪ (1)  $\sqrt{6}$  (2)  $10\sqrt{3}$

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

**解説**

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

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

(3) 与式  $= \sqrt{10 \div 2} = \sqrt{5}$

(4) 与式  $= \sqrt{12 \div 3} = \sqrt{4} = \sqrt{2^2} = 2$

⑫ (1)  $\sqrt{15}$  (2)  $\sqrt{10}$

(3)  $12\sqrt{2}$  (4)  $-10\sqrt{3}$

(5) 2 (6) 5

⑬ (1)  $\sqrt{10}$  (2) 6

(3) 2 (4) 15

⑭ (1)  $\sqrt{18}$  (2)  $2\sqrt{5}$

**解説**

(1)  $3\sqrt{2} = \sqrt{3^2 \times 2} = \sqrt{18}$

(2)  $\sqrt{20} = \sqrt{2^2 \times 5} = 2\sqrt{5}$

⑮ (1)  $\sqrt{32}$  (2)  $-\sqrt{12}$

(3)  $\sqrt{\frac{2}{9}}$  (4)  $\sqrt{\frac{27}{2}}$

⑯ (1)  $3\sqrt{2}$  (2)  $-2\sqrt{2}$

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

⑰ (1) 14.14 (2) 2.828

**解説**

(1)  $\sqrt{200} = 10\sqrt{2} = 10 \times 1.414 = 14.14$

(2)  $\sqrt{8} = 2\sqrt{2} = 2 \times 1.414 = 2.828$

⑱ (1) 17.32 (2) 54.77

(3) 0.5477 (4) 0.1732

**解説**

(3)  $\sqrt{0.3} = \sqrt{\frac{30}{100}} = \frac{\sqrt{30}}{10} = \frac{5.477}{10} = 0.5477$

(4)  $\sqrt{0.03} = \sqrt{\frac{3}{100}} = \frac{\sqrt{3}}{10} = \frac{1.732}{10} = 0.1732$

⑲ (1) 4.242 (2) 3.464

(3) 10.392 (4) 1.1312

**解説**

(1)  $\sqrt{18} = 3\sqrt{2} = 3 \times 1.414 = 4.242$

(2)  $\sqrt{12} = 2\sqrt{3} = 2 \times 1.732 = 3.464$

(3)  $\sqrt{108} = 6\sqrt{3} = 6 \times 1.732 = 10.392$

(4)  $\sqrt{\frac{32}{25}} = \frac{4\sqrt{2}}{5} = \frac{4}{5} \times 1.414 = 1.1312$

⑳ (1)  $\frac{2}{5}\sqrt{5}$  (2)  $\frac{\sqrt{2}}{2}$  (3)  $\sqrt{7}$

**解説**

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

(2)  $\frac{2}{\sqrt{8}} = \frac{2}{2\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{1 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} = \frac{\sqrt{2}}{2}$

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

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

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

㉒ (1)  $3\sqrt{2}$  (2)  $4\sqrt{21}$

(3)  $\frac{5}{3}$  (4)  $\frac{4}{15}\sqrt{6}$

**解説**

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

(2) 与式  $= \sqrt{4 \times 3} \times \sqrt{4 \times 7} = 4\sqrt{21}$

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

(4) 与式  $= \frac{4\sqrt{2}}{5\sqrt{3}} = \frac{4\sqrt{2} \times \sqrt{3}}{5\sqrt{3} \times \sqrt{3}} = \frac{4}{15}\sqrt{6}$

㉓ (1)  $5\sqrt{2}$  (2)  $3\sqrt{14}$  (3)  $18\sqrt{2}$

(4)  $16\sqrt{3}$  (5)  $10\sqrt{7}$  (6) 18

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

(4)  $\frac{\sqrt{6}}{4}$  (5)  $6\sqrt{2}$  (6)  $\frac{9}{2}\sqrt{3}$

㉕ (1)  $4\sqrt{2}$  (2)  $\sqrt{2}$

**解説**

(1) 与式  $= (1+3)\sqrt{2} = 4\sqrt{2}$

(2) 与式  $= 4\sqrt{2} - 3\sqrt{2} = (4-3)\sqrt{2} = \sqrt{2}$

㉖ (1)  $5\sqrt{3}$  (2)  $-5\sqrt{5}$  (3)  $7\sqrt{3}$

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

㉗ (1)  $3\sqrt{2}$  (2)  $-\sqrt{2}$

28 (1)  $2+\sqrt{6}$  (2)  $\sqrt{7}-1$   
 (3)  $4\sqrt{3}$  (4)  $-\sqrt{2}$

解説

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

(2) 与式  $=\sqrt{35} \div \sqrt{5} - \sqrt{5} \div \sqrt{5} = \sqrt{7} - 1$

(3) 与式  $=5\sqrt{3} - \sqrt{3} = 4\sqrt{3}$

(4) 与式  $=\sqrt{18} - \sqrt{32} = 3\sqrt{2} - 4\sqrt{2} = -\sqrt{2}$

29 (1)  $2\sqrt{3}+3$  (2)  $\sqrt{15}-6\sqrt{2}$   
 (3) 5 (4)  $1-\sqrt{6}$

30 (1)  $4\sqrt{2}$  (2)  $-\sqrt{6}$   
 (3)  $-6\sqrt{3}$  (4)  $6-3\sqrt{3}$

31 (1)  $8-2\sqrt{15}$  (2) 5  
 (3)  $-5+2\sqrt{3}$  (4) 4

解説

(1) 与式  $=(\sqrt{5})^2 - 2 \times \sqrt{5} \times \sqrt{3} + (\sqrt{3})^2$   
 $=8 - 2\sqrt{15}$

(2) 与式  $=(\sqrt{7})^2 - (\sqrt{2})^2 = 7 - 2 = 5$

(3)  $\sqrt{3}$  を  $x$  とおく。

与式  $= (x+4)(x-2) = x^2 + 2x - 8$   
 $= (\sqrt{3})^2 + 2 \times \sqrt{3} - 8 = -5 + 2\sqrt{3}$

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

32 (1)  $7+4\sqrt{3}$  (2)  $9-2\sqrt{14}$   
 (3) 3 (4) 2

33 (1)  $8+5\sqrt{2}$  (2)  $16-12\sqrt{2}$   
 (3) 3 (4)  $4-2\sqrt{5}$

34 (1) 1 (2) 10

解説

(1) 与式  $=x(x+2)$  これに  $x=\sqrt{2}-1$  を代入して、

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

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

(2) 与式  $= (x+y)^2 - 2xy$

ここで、 $x+y = (\sqrt{3}+\sqrt{2}) + (\sqrt{3}-\sqrt{2}) = 2\sqrt{3}$

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

$$= 1$$

よって、 $(2\sqrt{3})^2 - 2 \times 1 = 12 - 2 = 10$

35 (1) 21 (2) 4

36 (1) 16 (2) 13

解説

(1) 与式  $= (x+y)^2$

$$x+y = (2+\sqrt{3}) + (2-\sqrt{3}) = 4 \text{ より,}$$

$$4^2 = 16$$

(2) 与式  $= (x+y)^2 - 3xy$

$$x+y = 4, \quad xy = (2+\sqrt{3})(2-\sqrt{3}) = 1 \text{ より,}$$

$$4^2 - 3 \times 1 = 13$$

37 (1)  $\sqrt{3}-\sqrt{2}$  (2)  $\frac{3\sqrt{5}+3}{4}$

解説

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

$$= \sqrt{3}-\sqrt{2}$$

$$(2) \text{ 与式} = \frac{3 \times (\sqrt{5}+1)}{(\sqrt{5}-1)(\sqrt{5}+1)} = \frac{3(\sqrt{5}+1)}{5-1}$$

$$= \frac{3\sqrt{5}+3}{4}$$

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

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

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

解説

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

$$= \sqrt{3}-\sqrt{2}$$

$$y = \frac{1 \times (\sqrt{3}+\sqrt{2})}{(\sqrt{3}-\sqrt{2})(\sqrt{3}+\sqrt{2})} = \frac{(\sqrt{3}+\sqrt{2})}{3-2}$$

$$= \sqrt{3}+\sqrt{2}$$

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

(2)  $x^2+y^2 = (x+y)^2 - 2xy$   
 $= (2\sqrt{3})^2 - 2(\sqrt{3}-\sqrt{2})(\sqrt{3}+\sqrt{2}) = 10$

40 (1) -2 (2)  $a=3$

解説

(1)  $1 < \sqrt{2} < 2$  なので、 $x = \sqrt{2}-1$  となる。

$$x^2 + 2x - 3 = (x+3)(x-1) \text{ これに } x \text{ の値を代}$$

$$\text{入して、} (\sqrt{2}-1+3)(\sqrt{2}-1-1) = (\sqrt{2}+2) \times$$

$$(\sqrt{2}-2) = 2 - 4 = -2$$

(2)  $12a$  が (整数)<sup>2</sup> の形になればよい。  $12 = 2^2 \times 3$   
 より、最小の  $a$  は 3

41 (1) 2 (2) 4

解説

(2)  $a = \sqrt{5}-2$  となる。与式  $= (a+1)(a+3)$  で、  
 これに  $a$  の値を代入する。

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

$$= 5 - 1 = 4$$

42 (1)  $x=15$  (2)  $a=35$

## 章のまとめ

① (1) ①  $\pm 4$     ②  $\pm 0.6$     ③  $\pm \frac{7}{4}$

(2) ① 5    ② 4    ③ 3

(3) ①  $\sqrt{45}$     ②  $-\sqrt{48}$     ③  $2\sqrt{6}$     ④  $3\sqrt{5}$

(4) ①  $\sqrt{15} < 4$     ②  $\sqrt{15} < 4 < 2\sqrt{5}$

③  $-8 < -3\sqrt{7} < -\sqrt{60}$

② (1) 0.1414    (2) 4.472    (3) 70.7

③ (1)  $\frac{5}{2}\sqrt{2}$     (2)  $\frac{\sqrt{21}}{15}$     (3)  $\frac{2}{3}\sqrt{3}$

④ (1)  $3\sqrt{14}$     (2)  $4\sqrt{6}$     (3)  $6\sqrt{3}$

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

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

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

⑥ (1)  $2\sqrt{3} - 15$     (2)  $2\sqrt{3} - 1$

(3)  $\sqrt{3}$     (4)  $-3\sqrt{2}$

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

(3)  $22 - 4\sqrt{10}$     (4)  $30 - 12\sqrt{6}$

(5) 2    (6) 35

(7)  $5 + 3\sqrt{3}$     (8)  $57 - 3\sqrt{7}$

⑧ (1)  $5 + 2\sqrt{3} - 2\sqrt{6}$     (2) 0

(3)  $14 - 6\sqrt{2}$     (4)  $4\sqrt{14}$

⑨ (1)  $5 + \sqrt{5}$     (2) 22

**解説**

$$\begin{aligned} (2) \text{与式} &= a^2 + 4ab + 4b^2 + 4a^2 - 4ab \\ &= 5a^2 + 4b^2 = 5 \times (\sqrt{2})^2 + 4 \times (-\sqrt{3})^2 \\ &= 22 \end{aligned}$$

⑩ (1)  $a + b = 2\sqrt{7}$ ,  $a - b = 4$ ,  $ab = 3$

(2)  $8\sqrt{7}$     (3) 31

**解説**

(2)与式  $= (a + b)(a - b) = 2\sqrt{7} \times 4 = 8\sqrt{7}$

(3)与式  $= (a + b)^2 + ab = (2\sqrt{7})^2 + 3 = 31$

⑪ (1)  $a = \sqrt{3} - 1$     (2) 3    (3)  $3 + \sqrt{3}$

**解説**

$$\begin{aligned} (3) \text{与式} &= (a + 2)(a + 1) = (\sqrt{3} - 1 + 2)(\sqrt{3} - 1 + 1) \\ &= 3 + \sqrt{3} \end{aligned}$$

⑫ (1)  $a = 10$     (2)  $x = 2, 8$     (3)  $m = 30$

**解説**

(2) $18 = 2 \times 3^2$  より,  $x = 2, 2 \times 2^2$  となる。