

P 6 2 2章の章末問題

1.

(1) 64の平方根は $\pm 8$ である。 (2)  $\sqrt{900}$ は30である。

「平方根はふたつある」

900の平方根の正のほう

(3)  $\sqrt{(-7)^2}$ は $\sqrt{49}$ は7である。 (3)  $\sqrt{2} + \sqrt{8} = \sqrt{2} + 2\sqrt{2} = 3\sqrt{2}$

2.

(1)  $2 < \sqrt{a} < 3$   $\sqrt{4} < \sqrt{a} < \sqrt{9}$  「中身で勝負」  $a = 5, 6, 7, 8$

(2)  $9 < \sqrt{a} < 9.2$   $\sqrt{81} < \sqrt{a} < \sqrt{84.64}$   $a = 82, 83, 84$

3.

(1)  $\frac{6}{\sqrt{3}} = \frac{6 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{6\sqrt{3}}{\sqrt{9}} = \frac{6\sqrt{3}}{3} = 2\sqrt{3}$

(2)  $\frac{9}{\sqrt{12}} = \frac{9 \times \sqrt{3}}{\sqrt{12} \times \sqrt{3}} = \frac{9\sqrt{3}}{\sqrt{36}} = \frac{9\sqrt{3}}{6} = \frac{3\sqrt{3}}{2}$

(3)  $\frac{\sqrt{3}}{\sqrt{8}} = \frac{\sqrt{3} \times \sqrt{2}}{\sqrt{8} \times \sqrt{2}} = \frac{\sqrt{6}}{\sqrt{16}} = \frac{\sqrt{6}}{4}$

4.

$\sqrt{2} = 1.414$ として

(1)  $\sqrt{8} = \sqrt{4} \times \sqrt{2} = 2 \times \sqrt{2} = 2 \times 1.414 = 2.828$

(2)  $\sqrt{200} = \sqrt{100} \times \sqrt{2} = 10 \times \sqrt{2} = 10 \times 1.414 = 14.14$

(3)  $\sqrt{\frac{1}{50}} = \frac{\sqrt{1}}{\sqrt{50}} = \frac{\sqrt{2}}{\sqrt{50} \times \sqrt{2}} = \frac{\sqrt{2}}{\sqrt{100}} = \frac{\sqrt{2}}{10} = \frac{1.414}{10} = 0.1414$

5.

$$(1) \sqrt{32} \times \sqrt{2} = \sqrt{64} = 8 \quad (2) \sqrt{27} \times \sqrt{12} = 3\sqrt{3} \times 2\sqrt{3} \\ = 6\sqrt{9} = 6 \times 3 = 18$$

$$(3) 7\sqrt{2} \div \sqrt{7} = \frac{7\sqrt{2}}{\sqrt{7}} = \frac{7\sqrt{2} \times \sqrt{7}}{\sqrt{7} \times \sqrt{7}} = \frac{7\sqrt{14}}{\sqrt{49}} = \frac{7\sqrt{14}}{7} = \sqrt{14}$$

$$(4) \sqrt{90} \div \sqrt{15} \div \sqrt{2} = \sqrt{6} \div \sqrt{2} = \sqrt{3}$$

$$(5) (-\sqrt{14}) \div \sqrt{21} \times \sqrt{75} = -\frac{\sqrt{14} \times \sqrt{75}}{\sqrt{21}} = -\sqrt{\frac{2 \times 75}{3}} = -\sqrt{2 \times 25} \\ = -5\sqrt{2}$$

$$(6) \sqrt{50} + 2\sqrt{18} - 8\sqrt{2} = 5\sqrt{2} - 2 \times 3\sqrt{2} - 8\sqrt{2} \\ = 5\sqrt{2} - 6\sqrt{2} - 8\sqrt{2} = -9\sqrt{2}$$

$$(7) \sqrt{75} - \sqrt{3} - 3\sqrt{27} = 5\sqrt{3} - \sqrt{3} - 3 \times 3\sqrt{3} \\ = 5\sqrt{3} - \sqrt{3} - 9\sqrt{3} = -5\sqrt{3}$$

$$(8) 5\sqrt{8} - 2\sqrt{12} - 3\sqrt{18} = 5 \times 2\sqrt{2} - 2 \times 2\sqrt{3} - 3 \times 3\sqrt{2} \\ = 10\sqrt{2} - 4\sqrt{3} - 9\sqrt{2} \\ = \sqrt{2} - 4\sqrt{3}$$

$$(9) \frac{\sqrt{24}}{3} - \frac{2}{\sqrt{6}} = \frac{2\sqrt{6}}{3} - \frac{2\sqrt{6}}{\sqrt{6} \times \sqrt{6}} = \frac{2\sqrt{6}}{3} - \frac{2\sqrt{6}}{6} = \frac{2\sqrt{6}}{3} - \frac{\sqrt{6}}{3} = \frac{\sqrt{6}}{3}$$

$$\begin{aligned}
 (10) \quad \sqrt{\frac{3}{2}} - \sqrt{\frac{2}{3}} &= \frac{\sqrt{3}}{\sqrt{2}} - \frac{\sqrt{2}}{\sqrt{3}} = \frac{\sqrt{3} \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} - \frac{\sqrt{2} \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} \\
 &= \frac{\sqrt{6}}{2} - \frac{\sqrt{6}}{3} = \frac{3\sqrt{6} - 2\sqrt{6}}{6} = \frac{\sqrt{6}}{6}
 \end{aligned}$$

6.

$$(1) \quad (3 + 2\sqrt{2})(3 - 2\sqrt{2}) = 3^2 - (2\sqrt{2})^2 = 9 - 4\sqrt{4} = 9 - 8 = 1$$

$$\begin{aligned}
 (2) \quad (5\sqrt{2} - 1)^2 &= (5\sqrt{2})^2 - 2 \times 5\sqrt{2} \times 1 + 1^2 \\
 &= 25\sqrt{4} - 10\sqrt{2} + 1 = 50 - 10\sqrt{2} + 1 \\
 &= 51 - 10\sqrt{2}
 \end{aligned}$$

$$\begin{aligned}
 (3) \quad (\sqrt{7} - 1)(2\sqrt{7} + 3) &= 2\sqrt{49} + 3\sqrt{7} - 2\sqrt{7} - 3 \\
 &= 14 + 3\sqrt{7} - 2\sqrt{7} - 3 \\
 &= 11 + \sqrt{7}
 \end{aligned}$$

$$\begin{aligned}
 (4) \quad (\sqrt{5} - 2)(3 - \sqrt{5}) &= 3\sqrt{5} - \sqrt{25} - 3 + 2\sqrt{5} \\
 &= 3\sqrt{5} - 5 - 3 + 2\sqrt{5} \\
 &= 5\sqrt{5} - 8
 \end{aligned}$$

$$\begin{aligned}
 (5) \quad (4 + \sqrt{3})(4 + 2\sqrt{3}) &= 4^2 + 3\sqrt{3} \times 4 + 2\sqrt{9} \\
 &= 16 + 12\sqrt{3} + 6 \\
 &= 22 + 12\sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 (6) \quad (3\sqrt{6} + 2\sqrt{3})(3\sqrt{6} - 2\sqrt{3}) &= (3\sqrt{6})^2 - (2\sqrt{3})^2 \\
 &= 9\sqrt{36} - 4\sqrt{9} \\
 &= 54 - 12 = 42
 \end{aligned}$$

7.

$$\begin{array}{cccc}
 \frac{2}{3} & \sqrt{\frac{2}{3}} & \frac{\sqrt{2}}{3} & \frac{2}{\sqrt{3}} \\
 \downarrow & & \downarrow & \downarrow \\
 \sqrt{\frac{4}{9}} & & \frac{\sqrt{2}}{\sqrt{9}} & \frac{\sqrt{4}}{\sqrt{3}} \\
 & & \downarrow & \downarrow \\
 & & \sqrt{\frac{2}{9}} & \sqrt{\frac{4}{3}}
 \end{array}$$

中身で勝負！

$$\begin{array}{cccc}
 \frac{4}{9} & \frac{2}{3} = \frac{6}{9} & \frac{2}{9} & \frac{4}{3} = \frac{12}{9} \\
 \textcircled{2} & \textcircled{3} & \textcircled{1} & \textcircled{4}
 \end{array}$$

8.

$$\sqrt{12a} = \sqrt{2 \times 2 \times 3 \times a} \quad \text{カップルをつくれ！}$$

a = 3 にするとカップルができてめでたしめでたし。

9.

$$x = \sqrt{3} - \sqrt{2} \quad y = \sqrt{3} + \sqrt{2}$$

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

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

$$(1) (x + y)^2 = (2\sqrt{3})^2 = 4\sqrt{9} = 12 \quad (2) xy = (\sqrt{3} - \sqrt{2})(\sqrt{3} + \sqrt{2})$$

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

$$= \sqrt{9} - \sqrt{4} = 3 - 2 = 1$$

$$(3) x^2 - y^2 = (x + y)(x - y) = 2\sqrt{3} \times (-2\sqrt{2}) = -4\sqrt{6}$$

10.

(1) リボンと考えましょう。

半径 2 cm の円のリボンと半径 8 cm の円のリボン

をつないで 1 つの円を作るのです。

$$2\pi \times 2 + 2\pi \times 8 = 4\pi + 16\pi = 20\pi$$

$$2\pi x = 20\pi \quad x = 10$$

(2) 鉄のワイヤーと考えましょう。

半径 2 cm の鉄のワイヤーと半径 8 cm の鉄のワイヤーを溶かして

新しいワイヤーを作ります。

$$\pi x^2 = 4\pi + 64\pi = 68\pi$$

$$x^2 = 68$$

$$x = \sqrt{68} = 8.24 \quad 8 \text{ cm } 2 \text{ mm}$$