

次の計算を確かめなさい。

$$\sqrt{2} \times \sqrt{2} = 2$$

だから

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

$$\sqrt{3} \times \sqrt{3} = 3$$

だから

$$(-\sqrt{3}) \times (-\sqrt{3}) = 3$$

$$\sqrt{4} \times \sqrt{4} = 4$$

だから

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

$$\sqrt{5} \times \sqrt{5} = 5$$

だから

$$(-\sqrt{5}) \times (-\sqrt{5}) = 5$$

$$\sqrt{A} \times \sqrt{A} = A$$

$$(-\sqrt{A}) \times (-\sqrt{A}) = A$$

$$\sqrt{B} \times \sqrt{B} = B$$

$$(-\sqrt{B}) \times (-\sqrt{B}) = B$$

覚えて言いなさい

計算しなさい。

$$\sqrt{5} \times \sqrt{5} = (5)$$

$$(-\sqrt{5}) \times (-\sqrt{5}) = (5)$$

$$\sqrt{6} \times \sqrt{6} = (6)$$

$$(-\sqrt{6}) \times (-\sqrt{6}) = (6)$$

$$\sqrt{7} \times \sqrt{7} = (7)$$

$$\sqrt{8} \times \sqrt{8} = (8)$$

$$(-\sqrt{10}) \times (-\sqrt{10}) = (10)$$

$$(-\sqrt{12}) \times (-\sqrt{12}) = (12)$$

$$\sqrt{A} \times \sqrt{A} = (A)$$

$$\sqrt{B} \times \sqrt{B} = (B)$$

$$\sqrt{x} \times \sqrt{x} = (x)$$

$$\sqrt{y} \times \sqrt{y} = (y)$$

$$(-\sqrt{A}) \times (-\sqrt{A}) = (A)$$

$$(-\sqrt{B}) \times (-\sqrt{B}) = (B)$$

次の計算を確かめなさい。

答えを隠して速やかに
言えるようにしなさい。

4の平方根	2 と -2
$\frac{4}{9}$ の平方根	$\frac{2}{3}$ と $-\frac{2}{3}$
$\sqrt{3}$ を2乗した数	3
$-\sqrt{5}$ を2乗した数	5
$\sqrt{(-3)^2}$	3
9の正の平方根	3
16の負の平方根	-4
5の平方根	$\sqrt{5}$ と $-\sqrt{5}$
6の正の平方根	$\sqrt{6}$
6の負の平方根	$-\sqrt{6}$

次の数の平方根を示しなさい。

6の平方根

$$\pm\sqrt{6}$$

7の平方根

$$\pm\sqrt{7}$$

8の平方根

$$\pm 2\sqrt{2}$$

12平方根

$$\pm 2\sqrt{3}$$

18の平方根

$$\pm 3\sqrt{2}$$

$\frac{2}{3}$ の平方根

$$\pm\sqrt{\frac{2}{3}}$$

$\frac{1}{4}$ の平方根

$$\pm\frac{1}{2}$$

$\frac{1}{5}$ の平方根

$$\pm\frac{1}{\sqrt{5}}$$

$\frac{2}{5}$ の平方根

$$\pm\frac{\sqrt{2}}{\sqrt{5}} \quad \pm\frac{\sqrt{10}}{5} \quad \pm\sqrt{\frac{2}{5}}$$

$\frac{4}{9}$ の平方根

$$\pm\frac{2}{3}$$

3の(正)の平方根

$$\sqrt{3}$$

3の平方根

$$\sqrt{3} \text{ と } -\sqrt{3}$$

5の正の平方根

$$\sqrt{5}$$

5の平方根

$$\sqrt{5} \text{ と } -\sqrt{5}$$

同じように

Aの正の平方根

$$\sqrt{A}$$

Aの平方根

$$\sqrt{A} \text{ と } -\sqrt{A}$$

Bの正の平方根

$$\sqrt{B}$$

Bの平方根

$$\sqrt{B} \text{ と } -\sqrt{B}$$

同じように

 $\frac{B}{A}$ の正の平方根

$$\sqrt{\frac{B}{A}}$$

 $\frac{B}{A}$ の平方根

$$\sqrt{\frac{B}{A}} \text{ と } -\sqrt{\frac{B}{A}}$$

 $\frac{C}{A}$ の正の平方根

$$\sqrt{\frac{C}{A}}$$

 $\frac{C}{A}$ の平方根

$$\sqrt{\frac{C}{A}} \text{ と } -\sqrt{\frac{C}{A}}$$

覚えて言いなさい。

次の計算を確かめなさい。

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

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

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

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

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

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

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

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

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

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

上計の計算を確かめ
次の計算をしなさい。

$$\sqrt{5} = \frac{2\sqrt{5}}{2}$$

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

$$\sqrt{5} = \frac{\sqrt{10}}{\sqrt{2}}$$

$$\sqrt{5} = \frac{\sqrt{15}}{\sqrt{3}}$$

分数の形で答えなさい。

$$1 \div 2 = \frac{1}{2}$$

$$1 \div 3 = \frac{1}{3}$$

$$1 \div a = \frac{1}{a}$$

$$3 \div 2 = \frac{3}{2}$$

$$3 \div 7 = \frac{3}{7}$$

$$3 \div a = \frac{3}{a}$$

$$a \div 2 = \frac{a}{2}$$

$$a \div 3 = \frac{a}{3}$$

$$a \div b = \frac{a}{b}$$

$$\sqrt{2} \div 3 = \frac{\sqrt{2}}{3}$$

$$\sqrt{2} \div a = \frac{\sqrt{2}}{a}$$

$$\sqrt{2} \div \sqrt{3} = \frac{\sqrt{2}}{\sqrt{3}}$$

$$\sqrt{2} \div \sqrt{5} = \frac{\sqrt{2}}{\sqrt{5}}$$

約分しなさい。

$$\frac{2}{2 \times 3} = \frac{1}{3}$$

$$\frac{3}{2 \times 3} = \frac{1}{2}$$

$$\frac{\sqrt{3}}{2 \times \sqrt{3}} = \frac{1}{2}$$

$$\frac{\sqrt{2}}{\sqrt{2} \times 3} = \frac{1}{3}$$

$$\frac{6\sqrt{2}}{3\sqrt{3}} = 2$$

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

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

商は分数の形でなく答えなさい。

$$\sqrt{2} \times \sqrt{2} = 2 \quad 2 \div \sqrt{2} = \sqrt{2} \quad 3\sqrt{2} \div \sqrt{2} = 3$$

$$\sqrt{2} \times 3 = 3\sqrt{2} \quad 2\sqrt{3} \div 2 = \sqrt{3}$$

$$2 \times \sqrt{2} = 2\sqrt{2} \quad 2\sqrt{3} \div \sqrt{2} = \sqrt{6} \quad 2\sqrt{2} \div \sqrt{2} = 2$$

$$\sqrt{2} \times \sqrt{3} = \sqrt{6} \quad \sqrt{6} \div \sqrt{2} = \sqrt{3} \quad 3 \div \sqrt{3} = \sqrt{3}$$

$$\sqrt{2} \times \sqrt{6} = 3\sqrt{2} \quad \ast 3 \div \sqrt{3} = (\sqrt{3} \times \sqrt{3}) \div \sqrt{3} = \sqrt{3}$$

$$\begin{aligned} -\sqrt{2} \times \sqrt{2} \\ = -2 \end{aligned}$$

$$\begin{aligned} -2 \div (-\sqrt{2}) \\ = \sqrt{2} \end{aligned}$$

$$\begin{aligned} -\sqrt{2} \times (-3) \\ = 3\sqrt{2} \end{aligned}$$

$$\begin{aligned} 2\sqrt{3} \div (-2) \\ = -\sqrt{3} \end{aligned}$$

$$\begin{aligned} 2 \times (-\sqrt{3}) \\ = -2\sqrt{3} \end{aligned}$$

$$\begin{aligned} 2\sqrt{3} \div (-\sqrt{3}) \\ = -2 \end{aligned}$$

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

$$\begin{aligned} -\sqrt{6} \div (-\sqrt{2}) \\ = \sqrt{3} \end{aligned}$$

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

次の計算をしなさい。

$$-\sqrt{10} \times \sqrt{2} = -2\sqrt{5} \quad -\sqrt{15} \times \sqrt{3} = -3\sqrt{5}$$

$$-\sqrt{10} \times (-\sqrt{5}) = -5\sqrt{2} \quad -\sqrt{15} \times (-\sqrt{3}) = 3\sqrt{5}$$

$$\sqrt{10} \times (-3\sqrt{2}) = -6\sqrt{5} \quad -\sqrt{15} \times 2\sqrt{3} = -6\sqrt{5}$$

$$-\sqrt{10} \times \sqrt{18} = -6\sqrt{5} \quad -\sqrt{15} \times (-\sqrt{18}) = 3\sqrt{30}$$

$$-\sqrt{10} \times (-\sqrt{8}) = 4\sqrt{5} \quad -\sqrt{15} \times \sqrt{20} = -10\sqrt{3}$$

$$-\sqrt{10} \times \sqrt{15} = -5\sqrt{6}$$

次の計算をしなさい。

$$\sqrt{2} \div \sqrt{2} = 1$$

$$-\sqrt{8} \div 2 = -\sqrt{2}$$

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

$$(-\sqrt{8}) \div \sqrt{3} = -2$$

$$(-\sqrt{3}) \div \sqrt{3} = -1$$

$$(-\sqrt{12}) \div 2 = -\sqrt{3}$$

$$\begin{aligned} (-\sqrt{3}) \times (-\sqrt{2}) \div \sqrt{2} \\ = \sqrt{3} \end{aligned}$$

$$(-\sqrt{12}) \div (-\sqrt{3}) = 2$$

$$\begin{aligned} \sqrt{3} \times \sqrt{2} \div (-\sqrt{3}) \\ = -\sqrt{2} \end{aligned}$$

$$(-\sqrt{12}) \div \sqrt{3} = -2$$

$$-\sqrt{6} \div \sqrt{2} = -\sqrt{3}$$

$$(-\sqrt{18}) \div (-\sqrt{2}) = 3$$

$$-\sqrt{6} \div (-\sqrt{2}) = \sqrt{3}$$

次の計算をしなさい。

$$\sqrt{2} \times \sqrt{2} = 2$$

$$(\sqrt{2})^2 = 18$$

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

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

$$(-\sqrt{3}) \times (-\sqrt{3}) = 3$$

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

$$(-\sqrt{5}) \times (-\sqrt{5}) = 5$$

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

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

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

$$= 2^2 \times \sqrt{3}$$

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

$$= 12$$

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

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

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

$$= 3^2 \times \sqrt{2}$$

$$= 18$$

$$(-2\sqrt{3})^2 = 12$$

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

約分しなさい。

類似した問題を作り答えなさい

$$\frac{3}{2 \times 2} = \frac{1}{3}$$

$$\frac{3}{2 \times 3} = \frac{1}{2}$$

$$\frac{\sqrt{3}}{2 \times \sqrt{3}} = \frac{1}{3}$$

$$\frac{\sqrt{2}}{\sqrt{2} \times 3} = \frac{1}{3}$$

$$\frac{6\sqrt{2}}{3\sqrt{2}} = 3$$

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

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

次の計算をしなさい。

$$\begin{aligned} & \sqrt{2}(\sqrt{3} + \sqrt{2}) \\ &= \sqrt{6} + 2 \end{aligned}$$

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

$$\begin{aligned} & \sqrt{3}(\sqrt{3} + \sqrt{2}) \\ &= 3 + \sqrt{6} \end{aligned}$$

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

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

$$\begin{aligned} & 2\sqrt{3}(\sqrt{5} - \sqrt{6}) \\ &= 2\sqrt{15} - 6\sqrt{2} \end{aligned}$$

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

$$\begin{aligned} & \sqrt{6}(\sqrt{3} + \sqrt{2}) \\ &= 3\sqrt{2} + 2\sqrt{3} \end{aligned}$$

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

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

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

$$\begin{aligned} & \sqrt{10}(\sqrt{5} - \sqrt{2}) \\ &= 5\sqrt{2} - 2\sqrt{5} \end{aligned}$$

$$\begin{aligned} & 3\sqrt{2}(\sqrt{6} + \sqrt{3}) \\ &= 6\sqrt{3} + 3\sqrt{6} \end{aligned}$$

分配法則を利用して計算しなさい。

$$\begin{aligned} & \sqrt{2}(\sqrt{2}+3) \\ &= 2+3\sqrt{2} \end{aligned}$$

$$\begin{aligned} & (2+3\sqrt{2})\div\sqrt{2} \\ &= \sqrt{2}+3 \end{aligned}$$

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

$$\begin{aligned} & (2\sqrt{3}-6)\div 2 \\ &= \sqrt{3}-3 \end{aligned}$$

$$\begin{aligned} & \sqrt{2}(\sqrt{6}+2) \\ &= 2\sqrt{3}+2\sqrt{2} \end{aligned}$$

$$\begin{aligned} & (2\sqrt{3}+2\sqrt{2})\div\sqrt{2} \\ &= \sqrt{6}+2 \end{aligned}$$

$$\begin{aligned} & \sqrt{3}(\sqrt{2}+\sqrt{3}) \\ &= \sqrt{6}+3 \end{aligned}$$

$$\begin{aligned} & (\sqrt{6}+3)\div\sqrt{3} \\ &= \sqrt{2}+\sqrt{3} \end{aligned}$$

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

$$\begin{aligned} & (2-3\sqrt{2})\div(-\sqrt{2}) \\ &= -\sqrt{2}+3 \end{aligned}$$

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

$$\begin{aligned} & (2\sqrt{3}-6)\div(-2) \\ &= -\sqrt{3}+3 \end{aligned}$$

$$\begin{aligned} & -\sqrt{2}(\sqrt{6}-\sqrt{2}) \\ &= -2\sqrt{3}+2 \end{aligned}$$

$$\begin{aligned} & (2\sqrt{3}+2\sqrt{2})\div(-\sqrt{2}) \\ &= -\sqrt{6}-2 \end{aligned}$$

$$\begin{aligned} & -\sqrt{3}(\sqrt{2}+\sqrt{3}) \\ &= -\sqrt{6}-3 \end{aligned}$$

$$\begin{aligned} & (\sqrt{6}-3)\div(-\sqrt{3}) \\ &= -\sqrt{2}+\sqrt{3} \end{aligned}$$

分配法則を用いて
() を外して示せ

$$2(3 + \sqrt{2})$$

$$= 6 + 2\sqrt{2}$$

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

$$= 6 - 2\sqrt{2}$$

$$-2(3 + \sqrt{2})$$

$$= -6 - 2\sqrt{2}$$

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

$$= -6 + 2\sqrt{2}$$

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

$$= -6 + 3\sqrt{2}$$

$$\sqrt{2}(2 + \sqrt{2})$$

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

$$\sqrt{2}(2 + \sqrt{3})$$

$$= 2\sqrt{2} + 2\sqrt{6}$$

$$\sqrt{2}(\sqrt{2} + \sqrt{3})$$

$$= 2 + \sqrt{6}$$

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

$$= \sqrt{6} - 2$$

簡単な形で示せ。

$$\left(\frac{\sqrt{2}}{\sqrt{5}}\right)^2 = \frac{(\sqrt{2})^2}{(\sqrt{5})^2} = \frac{2}{5}$$

$$\left(\frac{\sqrt{3}}{\sqrt{8}}\right)^2 = \frac{3}{8}$$

$$\left(\sqrt{\frac{2}{5}}\right)^2 = \sqrt{\frac{2}{5}} \times \sqrt{\frac{2}{5}} = \frac{2}{5}$$

$$\left(\frac{\sqrt{6}}{\sqrt{7}}\right)^2 = \frac{6}{7}$$

$$\left(\frac{\sqrt{3}}{\sqrt{5}}\right)^2 = \frac{\sqrt{3^2}}{\sqrt{5^2}} = \frac{3}{5}$$

$$\left(\sqrt{\frac{6}{7}}\right)^2 = \frac{6}{7}$$

$$\left(\sqrt{\frac{3}{5}}\right)^2 = \sqrt{\frac{3}{5}} \times \sqrt{\frac{3}{5}} = \frac{3}{5}$$

$$\left(\sqrt{\frac{3}{100}}\right)^2 = \frac{3}{100}$$

$$\left(\frac{\sqrt{B}}{\sqrt{A}}\right)^2 = \frac{\sqrt{B^2}}{\sqrt{A^2}} = \frac{B}{A}$$

$$\left(\sqrt{\frac{3}{10}}\right)^2 = \frac{3}{10}$$

$$\left(\sqrt{\frac{B}{A}}\right)^2 = \sqrt{\frac{B}{A}} \times \sqrt{\frac{B}{A}} = \frac{B}{A}$$

簡単な形で示せ。

$$\left(\frac{\sqrt{2}}{\sqrt{5}}\right)^2 = \frac{(\sqrt{2})^2}{(\sqrt{5})^2} \frac{2}{5} = \frac{2}{5} \quad \dots \textcircled{1}$$

$$\left(\sqrt{\frac{2}{5}}\right)^2 = \frac{2}{5} \quad \dots \textcircled{2}$$

②の準備
 $(\sqrt{a})^2 = a$

$$\textcircled{1} = \textcircled{2}$$

よって

$$\frac{\sqrt{2}}{\sqrt{5}} = \sqrt{\frac{2}{5}}$$

同様にして

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

正の数A、Bについて

$$\frac{\sqrt{B}}{\sqrt{A}} = \sqrt{\frac{B}{A}}$$

覚えて言いなさい。

次の計算をしなさい。

類似の問題を作り答えなさい。

$$\left(\frac{2}{\sqrt{5}}\right)^2 = \frac{4}{5}$$

$$\left(\frac{3}{\sqrt{5}}\right)^2 = \frac{9}{5}$$

$$\left(\frac{\sqrt{2}}{\sqrt{5}}\right)^2 = \frac{2}{5}$$

$$\left(\frac{\sqrt{3}}{\sqrt{5}}\right)^2 = \frac{3}{5}$$

$$\left(\frac{3\sqrt{2}}{2\sqrt{3}}\right)^2 = \frac{18}{12} = \frac{3}{2}$$

$$\left(\frac{2\sqrt{3}}{3\sqrt{2}}\right)^2 = \frac{2^2 \times 3}{3^2 \times 2} = \frac{2}{3}$$

次の計算をしなさい。

$$\sqrt{2} - \sqrt{2} = 0$$

$$\sqrt{2} \times 3 = 0$$

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

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

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

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

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

$$2\sqrt{2} - 2\sqrt{2} = 0$$

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

$$2\sqrt{2} \times 5 = 5\sqrt{2}$$

$$2\sqrt{2} - 5\sqrt{2} = -3\sqrt{2}$$

$$\sqrt{2} \times (-5) = -5\sqrt{2}$$

$$(-5) - \sqrt{2} = -5\sqrt{2}$$

$$2\sqrt{3} - 5\sqrt{3} = -3\sqrt{3}$$

$$(-5) - (-\sqrt{2}) = 5\sqrt{2}$$

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

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

$$\sqrt{2} \times \sqrt{3} = \sqrt{6}$$

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

$$\sqrt{3} - 3\sqrt{5} = -2\sqrt{5}$$

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

$$\sqrt{7} - 4\sqrt{7} = -3\sqrt{7}$$

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

次の計算をしなさい。

$$\frac{1}{2} + \frac{1}{2} = 1$$

$$\frac{1}{2}\sqrt{2} + \frac{1}{2}\sqrt{2}$$

$$= \sqrt{2}$$

$$\frac{2}{3} + \frac{1}{3} = 1$$

$$\frac{2}{3}\sqrt{2} + \frac{1}{3}\sqrt{2}$$

$$= \sqrt{2}$$

$$\frac{2}{3} + \frac{4}{3} = 2$$

$$\frac{2}{3}\sqrt{2} + \frac{4}{3}\sqrt{2}$$

$$= 2\sqrt{2}$$

$$1 - \frac{1}{3} = \frac{2}{3}$$

$$\sqrt{2} - \frac{1}{3}\sqrt{2}$$

$$= \frac{2}{3}\sqrt{2} \quad \frac{2\sqrt{2}}{3}$$

$$3 - \frac{1}{3} = 2\frac{2}{3} = \frac{8}{3}$$

$$3\sqrt{2} - \frac{1}{3}\sqrt{2}$$

$$= \frac{8}{3}\sqrt{2} \quad \frac{8\sqrt{2}}{3}$$

中学数学では
原則として
帯分数を
使わない

割り切れない場合の
割り算は分数の形で示せ。

$$\sqrt{3} - \sqrt{3} = 0$$

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

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

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

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

$$2\sqrt{3} \times (-5\sqrt{3}) = -30$$

$$\begin{aligned} 2\sqrt{3} - 5\sqrt{3} + 4\sqrt{3} \\ = \sqrt{3} \end{aligned}$$

$$\sqrt{3} \div \sqrt{3} = 1$$

$$\sqrt{3} \div 2 = \frac{\sqrt{3}}{2}$$

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

$$2 \div \sqrt{3} = \frac{2}{\sqrt{3}}$$

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

$$\sqrt{6} \div \sqrt{2} = \sqrt{3}$$

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

$$-\sqrt{6} \div \sqrt{3} = -\sqrt{2}$$

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

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

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

$$\sqrt{3} \div (-2) = -\frac{\sqrt{3}}{2}$$

次の式を確かめなさい。

$$\begin{aligned} & \sqrt{20} \div \sqrt{10} \\ &= \frac{\sqrt{2} \times \sqrt{10}}{\sqrt{10}} \\ &= \sqrt{2} \end{aligned}$$

$x=2\sqrt{3}$ のときの
次の式の値を求めよ

$$2x = 2 \times 2\sqrt{3}$$

$$= 4\sqrt{3}$$

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

$$= 12$$

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

$$= -6\sqrt{3}$$

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

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

$$= 2^3 \times 3 \times \sqrt{3} = 24\sqrt{3}$$

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

$$= 12$$

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

$$= -24\sqrt{3}$$

$$= -8 \cdot 3\sqrt{3}$$

左の式で
 $x=3\sqrt{2}$ のときの
式の値を求めよ

$$2x = 2 \times 3\sqrt{2}$$

$$= 6\sqrt{2}$$

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

$$= 18$$

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

$$= -9\sqrt{2}$$

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

$$= 3^3 \times \sqrt{2}^2 \times \sqrt{2}$$

$$= 54\sqrt{2}$$

$$(-x)^2 = 18$$

$$(-x)^3 = -54\sqrt{2}$$

左のページと同様の式の値を求めよ。

$$x = \sqrt{5} \text{ とき}$$

$$2x = 2\sqrt{5}$$

$$x^2 = \sqrt{5}^2$$

$$= 5$$

$$-3x = -3\sqrt{5}$$

$$x^3 = \sqrt{5}^3$$

$$= 5\sqrt{5}$$

$$(-x)^2 = 5$$

$$(-x)^3 = -5\sqrt{5}$$

$$x = 3\sqrt{2} \text{ とき}$$

$$2x = 2 \cdot 3\sqrt{2}$$

$$= 6\sqrt{2}$$

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

$$= 18$$

$$-3x = -9\sqrt{2}$$

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

$$= 3^3 \cdot 3 \cdot \sqrt{2}^2 \cdot \sqrt{2}$$

$$= 54\sqrt{2}$$

$$(-x)^2 = 18$$

$$(-x)^3 = -54\sqrt{2}$$

$x = \sqrt{2}$ のときの
次の式の値を求めよ

$$2x = 2 \times \sqrt{2} = 2\sqrt{2}$$

$$x^2 = \sqrt{2}^2 = 2$$

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

$$2x + 3x = 5x = 5\sqrt{2}$$

$$\begin{aligned} 2x - 5x &= -3x \\ &= -3\sqrt{2} \end{aligned}$$

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

$$\begin{aligned} (-x)^3 &= (-\sqrt{2})^3 \\ &= -2\sqrt{2} \end{aligned}$$

$$5x + 8x + 2x$$

$$= x$$

$$= -\sqrt{2}$$

左の式で
 $x = \sqrt{3}$ のときの
式の値を求めよ

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

$$x^2 = 3$$

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

$$2x + 3x = 5\sqrt{3}$$

$$2x - 5x = -3\sqrt{3}$$

$$(-x)^2 = 3$$

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

$$5x + 8x + 2x$$

$$= -x$$

$$= -\sqrt{3}$$

$\sqrt{2}$ に $\sqrt{2}$ をかけると2

$$\sqrt{2} \times \sqrt{2} = 2$$

$\sqrt{2}$ に

どのような数をかけると

2になるか

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

$\sqrt{2 \times a}$ の a が

どのような値ならば

$\sqrt{2 \times a} = 2$ となるか。

$$a = 2$$

$\sqrt{2a}$ の a が

どのような数ならば

整数になるか。

(もっと小さい整数の場合)

$$a = 2$$

左の内容を

2を3にかえて示せ

$\sqrt{3}$ に $\sqrt{3}$ をかけると3

$$\sqrt{3} \times \sqrt{3} = 3$$

$\sqrt{3}$ にどのような数かけると

3になるか

$$\sqrt{3} \times (\quad) = 3$$

$\sqrt{3 \times a}$ の a が

どのような値ならば

$\sqrt{3 \times a} = 3$ となるか

$$a = 3$$

$\sqrt{3a}$ の a が

どのような数ならば

整数になるか

(もっとも小さい整数の場合)

$$a = 3$$

$$2^2 \times 3^2 \Rightarrow (2 \times 3)^2$$

$$a^2 \times b^2 \Rightarrow (a \times b)^2$$

しかし

たとえば

$$2^2 \times 3 \text{ では}$$

$$(2 \times 3)^2 \text{ の形には}$$

まとめられない。

$$2^2 \times 3 \text{ に } 3 \text{ をかければ}$$

$$2^2 \times 3 \text{ となり}$$

$$(2 \times 3)^2 \text{ となる。}$$

すなわち

$$12 \text{ に}$$

$$3 \text{ をかけると}$$

$$36 \text{ となり}$$

$$6^2 \text{ と表せる。}$$

Q

12に

できるだけ小さい整数

をかけて

ある数の2乗としたい。

かける整数を求めよ。

$$12 = 2^2 \times 3$$

3

$$\sqrt{12a} \text{ の値を}$$

0でない

できるだけ小さい整数

にしたい。

整数 a の値を求めよ。

$$12a$$

$$= 2 \times 3a$$

a

$\sqrt{2^2 \times 3 \times a}$ の a が

どのような数のとき

$\sqrt{2^2 \times 3a}$ は

整数となるか

(但し、最も小さい場合)

$$a = 3$$

$$12a$$

$$= 2^2 \cdot 3a$$

↑

3

$\sqrt{12a}$ の a が

どのような数のとき

$\sqrt{12}$ は

整数となるか

(最も小さい場合)

以下の場合についても考えよ

$$\sqrt{18a}$$

$$\sqrt{20a}$$

$$\sqrt{28a}$$

$$\sqrt{50a}$$

$$18a = 3^2 \times 2a$$

2

$$20a = 2^2 \times 5a$$

5

$$28a = 2^2 \times 7a$$

7

$$50a = 5^2 \times 2a$$

2

$$\sqrt{4} < \sqrt{a} < \sqrt{9}$$

上の式にあてはまる

整数 a を全て求めなさい。

もちろん

$4 < a < 9$ の

整数 a と

同じ考え方で求められる。

5、6、7、8

$$2 < \sqrt{a} < 3$$

にあてはまる

整数 a を全て求めなさい。

$$2 = \sqrt{4}$$

$$3 = \sqrt{9} \quad \text{よって}$$

上のQと同じ

目標Q

正方形の
1 辺の長さが2倍になると
面積は4倍になります。

では
面積が2倍になると
1 辺は何倍になりますか。

次の表を完成させなさい。

正方形の1 辺	正方形の面積	
1		1
$\sqrt{2}$ (1の $\sqrt{2}$ 倍)	$\sqrt{2} \times \sqrt{2}$	2
$\sqrt{3}$	$\sqrt{3} \times \sqrt{3}$	3
$\sqrt{4} = 2$	2×2	4
$\sqrt{5}$	$\sqrt{5} \times \sqrt{5}$	5
$\sqrt{6}$	$\sqrt{6} \times \sqrt{6}$	6
	求める式	値

正方形の面積	1 辺の長さ
1	1
2	$\sqrt{2}$
3	$\sqrt{3}$
4	2
5	$\sqrt{5}$
6	$\sqrt{6}$

面積が

20 cm²の正方形の

1 辺の長さを求めよ

($2\sqrt{5}$ cm)

面積が

10 cm²の正方形の

1 辺の長さを求めよ

($\sqrt{10}$ cm)

面積が

20 cm²は

10 cm²の

2倍である。

では、

1 辺の長さは

何倍になったか

正方形の1 辺

面積

1 辺

10 cm^2 $\sqrt{10}$ cm
 20 cm^2 $\sqrt{20}$ cm

($\sqrt{20}$) ÷ ($\sqrt{10}$)

= $\sqrt{2}$

$$\text{ア)} \quad \frac{1}{\sqrt{2}} = \frac{1 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\text{イ)} \quad \frac{1}{\sqrt{3}} = \frac{1 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\text{ウ)} \quad \frac{1}{\sqrt{5}} = \frac{1 \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}} = \frac{\sqrt{5}}{5}$$

$$\text{エ)} \quad \frac{1}{\sqrt{a}} = \frac{1 \times \sqrt{a}}{\sqrt{a} \times \sqrt{a}} = \frac{\sqrt{a}}{a}$$

エ) は分母と分子に
 \sqrt{a} をかけています。

分数の

分母と分子に

同じ数をかけても

分数の大きさは

変わらないから、

ア) は

分母と分子に

$\sqrt{2}$ をかけ

イ) は

分母と分子に

$\sqrt{3}$ をかけ

ウ) は

分母と分子に

$\sqrt{5}$ をかけています。

$$\text{カ) } \frac{2}{\sqrt{2}} = \frac{2 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} = \frac{2\sqrt{2}}{2}$$

$$\frac{2}{\sqrt{2}} = \frac{\sqrt{2} \times \sqrt{2}}{\sqrt{2}} = \sqrt{2}$$

法則が見つかったら
数字を変えた問題をつくり答えなさい。

$$\frac{2}{\sqrt{2}} = \frac{\sqrt{2} \times \sqrt{2}}{\sqrt{2}} = \sqrt{2}$$

$$\text{キ) } \frac{3}{\sqrt{3}} \begin{cases} = \frac{3 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{3\sqrt{3}}{3} \\ \downarrow \\ = \frac{\sqrt{3} \times \sqrt{3}}{\sqrt{3}} = \sqrt{3} \end{cases}$$

$$\frac{3}{\sqrt{3}} = \frac{\sqrt{3} \times \sqrt{3}}{\sqrt{3}} = \sqrt{3}$$

$$\frac{5}{\sqrt{5}} = \frac{\sqrt{5} \times \sqrt{5}}{\sqrt{5}} = \sqrt{5}$$

$$\frac{6}{\sqrt{6}} = \frac{\sqrt{6} \times \sqrt{6}}{\sqrt{6}} = \sqrt{6}$$

$$\text{キ) } \frac{a}{\sqrt{a}} \begin{cases} = \frac{a \times \sqrt{a}}{\sqrt{a} \times \sqrt{a}} = \frac{a\sqrt{a}}{a} \\ \downarrow \\ = \frac{\sqrt{a} \times \sqrt{a}}{\sqrt{a}} = \sqrt{a} \end{cases}$$

$$\frac{7}{\sqrt{7}} = \frac{\sqrt{7} \times \sqrt{7}}{\sqrt{7}} = \sqrt{7}$$

$$\frac{a}{\sqrt{a}} = \sqrt{a}$$

$$\frac{b}{\sqrt{b}} = \sqrt{b}$$

約分せずに答えなさい。

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

$$\frac{1 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\frac{1 \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}} = \frac{\sqrt{5}}{5}$$

上にならって
次の分母を分子に
分母と同じ数をかけなさい。

$$\frac{1 \times \boxed{\sqrt{2}}}{\sqrt{2} \times \boxed{\sqrt{2}}} = \frac{\sqrt{2}}{2}$$

$$\frac{1 \times \boxed{\sqrt{3}}}{\sqrt{3} \times \boxed{\sqrt{3}}} = \frac{\sqrt{3}}{3}$$

$$\frac{1 \times \boxed{\sqrt{5}}}{\sqrt{5} \times \boxed{\sqrt{5}}} = \frac{\sqrt{5}}{5}$$

数字をかえて
類似の問題を作り
答えなさい。

$$\frac{1}{\sqrt{6}} = \frac{\sqrt{6}}{6}$$

$$\frac{1}{\sqrt{7}} = \frac{\sqrt{7}}{7}$$

$$\frac{1}{\sqrt{10}} = \frac{\sqrt{10}}{10}$$

$$\frac{1}{\sqrt{a}} = \frac{\sqrt{a}}{a}$$

$$\frac{1}{\sqrt{b}} = \frac{\sqrt{b}}{b}$$

分母に平方根のある数の

2数の大小のくらべ方を示しています。

わかったら、見ずに自力でやっごらんなさい。

	通分せよ	大小を示せ
$\frac{1}{\sqrt{2}} > \frac{1}{\sqrt{3}}$	$\Rightarrow \frac{\sqrt{2}}{2}, \frac{\sqrt{3}}{3}$ $\frac{3\sqrt{2}}{6}, \frac{2\sqrt{3}}{6}$	$\frac{\sqrt{18}}{6} > \frac{\sqrt{12}}{6}$
$\frac{2}{\sqrt{2}} < \frac{3}{\sqrt{3}}$	$\Rightarrow \frac{3\sqrt{2}}{2}, \frac{3\sqrt{3}}{3}$ $\sqrt{2}, \sqrt{3}$ (分母が1でした)	$\sqrt{2} > \sqrt{3}$
$\frac{1}{\sqrt{12}} > \frac{2}{\sqrt{18}}$	$\Rightarrow \frac{1}{2\sqrt{3}}, \frac{2\sqrt{2}}{3\sqrt{2}}$ $\frac{\sqrt{3}}{6}, \frac{\sqrt{2}}{6}$	$\frac{\sqrt{3}}{6} < \frac{\sqrt{8}}{6}$
$\frac{1}{\sqrt{5}} > \frac{1}{\sqrt{6}}$	$\Rightarrow \frac{\sqrt{5}}{5}, \frac{\sqrt{6}}{6}$ $\frac{6\sqrt{5}}{30}, \frac{5\sqrt{6}}{30}$	$\frac{\sqrt{36 \times 5}}{30} > \frac{\sqrt{25 \times 6}}{30}$ $\frac{\sqrt{180}}{30} > \frac{\sqrt{150}}{30}$
$\frac{\sqrt{2}}{3} < \frac{1}{\sqrt{2}}$	$\Rightarrow \frac{\sqrt{3}}{2}, \frac{\sqrt{2}}{2}$ $\frac{2\sqrt{2}}{6}, \frac{3\sqrt{2}}{6}$	$\frac{\sqrt{8}}{6} < \frac{\sqrt{18}}{6}$

	通分せよ	大小を示せ
$\frac{1}{\sqrt{2}}$ 、 $\frac{1}{\sqrt{3}}$	$\frac{1 \times \sqrt{3}}{\sqrt{2} \times 3} = \frac{\sqrt{3}}{\sqrt{6}}$ $\frac{1 \times \sqrt{2}}{\sqrt{3} \times \sqrt{2}} = \frac{\sqrt{2}}{\sqrt{6}}$	$\frac{1}{\sqrt{2}} > \frac{1}{\sqrt{3}}$
$\frac{2}{\sqrt{2}}$ 、 $\frac{3}{\sqrt{3}}$	$\frac{2}{\sqrt{2}} = \sqrt{2}$ $\frac{3}{\sqrt{3}} = \sqrt{3}$	$\frac{2}{\sqrt{2}} < \frac{3}{\sqrt{3}}$
$\frac{1}{\sqrt{12}}$ 、 $\frac{2}{\sqrt{18}}$	$\frac{1}{\sqrt{12}} = \frac{1}{2\sqrt{3}}$ $= \frac{3\sqrt{2}}{2\sqrt{3} \times 3\sqrt{2}} = \frac{3\sqrt{2}}{6\sqrt{6}}$ $\frac{2}{\sqrt{18}} = \frac{2}{3\sqrt{2}}$ $= \frac{2 \times 2\sqrt{3}}{3\sqrt{2} \times 2\sqrt{3}} = \frac{4\sqrt{3}}{6\sqrt{6}}$	$\frac{1}{\sqrt{12}} < \frac{2}{\sqrt{18}}$
$\frac{1}{\sqrt{5}}$ 、 $\frac{1}{\sqrt{6}}$	$\sqrt{5} < \sqrt{6}$ <p>分子が同じ時 分母が大きいほど 小さい</p>	$\frac{1}{\sqrt{5}} > \frac{1}{\sqrt{6}}$
$\frac{\sqrt{2}}{3}$ 、 $\frac{1}{\sqrt{2}}$	$\frac{\sqrt{2}}{3} = \frac{2\sqrt{2}}{6}$ $\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} = \frac{3\sqrt{2}}{6}$	$\frac{\sqrt{2}}{3} < \frac{1}{\sqrt{2}}$

分母の有理化

$$\frac{1}{\sqrt{2}} \quad \frac{3}{\sqrt{2}} \quad \frac{\sqrt{3}}{\sqrt{2}} \quad \text{など}$$

分母が無理数であるとき
分母を有理数にする事を
分母の有理化と言う。

なぜ分母を有理数にするか。

平方根表ができています

$$\sqrt{2} = 1.4142135 \dots$$

$$\sqrt{3} = 1.7320508 \dots$$

$$\sqrt{5} = 2.2360679 \dots$$

$$\sqrt{6} = 2.4494897 \dots$$

$$\sqrt{7} = 2.6457513 \dots$$

$$\sqrt{8} = 2.8284271 \dots$$

$$\sqrt{10} = 3.1622776 \dots$$

などです。

ところが、

$$\frac{1}{\sqrt{2}} \text{とあるとき}$$

$$\sqrt{2} \doteq 1.414 \text{として}$$

この値を求めようとする

$$\frac{1}{1.414} \text{すなわち}$$

$1 \div 1.414$ となって
計算が大変です。

そこで

$$\frac{1}{\sqrt{2}} \text{の分母と分子に}$$

$\sqrt{2}$ をかけます

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

$$= \frac{1.414}{2} \text{とすれば}$$

わりざんも簡単です。

<p>分母の有理化の方法を示しています。 わかったら○でかこみなさい</p>	$\begin{aligned} \textcircled{6} \quad \frac{1}{\sqrt{100}} &= \frac{1}{\sqrt{10}} \\ &= \frac{1}{10} \end{aligned}$	$\begin{aligned} \textcircled{12} \quad \frac{1}{\sqrt{50}} &= \frac{1}{5\sqrt{2}} \\ &= \frac{\sqrt{2}}{10} \end{aligned}$
$\begin{aligned} \textcircled{1} \quad \frac{1}{\sqrt{2}} &= \frac{1 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} \\ &= \frac{\sqrt{2}}{2} \end{aligned}$	$\begin{aligned} \textcircled{7} \quad \frac{1}{\sqrt{200}} &= \frac{1}{10\sqrt{2}} \\ &= \frac{\sqrt{2}}{20} \end{aligned}$	$\begin{aligned} \textcircled{13} \quad \frac{2}{\sqrt{12}} &= \frac{2}{2\sqrt{3}} \\ &= \frac{1}{\sqrt{3}} \\ &= \frac{\sqrt{3}}{3} \end{aligned}$
$\begin{aligned} \textcircled{2} \quad \frac{2}{\sqrt{2}} &= \frac{2\sqrt{2}}{\sqrt{2} \times \sqrt{2}} \\ &= \frac{2\sqrt{2}}{2} \\ &= \sqrt{2} \end{aligned}$	$\begin{aligned} \textcircled{8} \quad \frac{2}{\sqrt{200}} &= \frac{2}{10\sqrt{2}} \\ &= \frac{1 \times \sqrt{2}}{5\sqrt{2} \times \sqrt{2}} \\ &= \frac{\sqrt{2}}{10} \end{aligned}$	$\begin{aligned} \textcircled{14} \quad \frac{\sqrt{7}}{\sqrt{14}} &= \frac{\sqrt{7}}{\sqrt{7} \times \sqrt{2}} \\ &= \frac{1}{\sqrt{2}} \dots \textcircled{1} \sim \end{aligned}$
$\begin{aligned} \textcircled{3} \quad \sqrt{\frac{1}{2}} &= \frac{\sqrt{1}}{\sqrt{2}} \\ &= \frac{\sqrt{2}}{2} \end{aligned}$	$\begin{aligned} \textcircled{9} \quad \frac{3}{\sqrt{18}} &= \frac{3}{3\sqrt{2}} \\ &= \frac{1}{\sqrt{2}} \dots \textcircled{1} \sim \end{aligned}$	$\begin{aligned} \textcircled{15} \quad \frac{21}{\sqrt{14}} &= \sqrt{\frac{3}{2}} \\ &= \frac{\sqrt{3 \times \sqrt{2}}}{\sqrt{2} \times \sqrt{2}} = \frac{\sqrt{6}}{2} \end{aligned}$
$\begin{aligned} \textcircled{4} \quad \frac{1}{2\sqrt{2}} &= \frac{1 \times \sqrt{2}}{2\sqrt{2} \times \sqrt{2}} \\ &= \frac{\sqrt{2}}{4} \end{aligned}$	$\begin{aligned} \textcircled{10} \quad \frac{5}{\sqrt{20}} &= \frac{5}{2\sqrt{5}} \\ &= \frac{5\sqrt{5}}{10} \\ &= \frac{\sqrt{5}}{2} \end{aligned}$	$\begin{aligned} \textcircled{16} \quad \frac{\sqrt{21}}{\sqrt{14}} &= \frac{\sqrt{7} \times \sqrt{3}}{\sqrt{7} \times \sqrt{2}} \\ &= \frac{\sqrt{3}}{\sqrt{2}} \\ &= \frac{\sqrt{6}}{2} \end{aligned}$
$\begin{aligned} \textcircled{5} \quad \frac{2}{\sqrt{8}} &= \frac{2}{2\sqrt{2}} \\ &= \frac{1}{\sqrt{2}} \dots \textcircled{1} \sim \end{aligned}$	$\begin{aligned} \textcircled{11} \quad \frac{3}{\sqrt{24}} &= \frac{3}{2\sqrt{6}} \\ &= \frac{3\sqrt{6}}{12} \\ &= \frac{\sqrt{6}}{4} \end{aligned}$	$\begin{aligned} \textcircled{17} \quad \frac{\sqrt{24}}{\sqrt{15}} &= \frac{\sqrt{7} \times \sqrt{3}}{\sqrt{7} \times \sqrt{2}} \\ &= \frac{\sqrt{3} \times \sqrt{8}}{\sqrt{3} \times \sqrt{5}} = \frac{2\sqrt{10}}{5} \end{aligned}$

分母の有理化

$$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$$

$$\frac{1}{\sqrt{6}} = \frac{\sqrt{6}}{6}$$

$$\frac{1}{\sqrt{7}} = \frac{\sqrt{7}}{7}$$

$$\frac{1}{\sqrt{10}} = \frac{\sqrt{10}}{10}$$

左辺には
分母に無理数が
あります。

右辺は
左辺と同じ大きさで
分母が
無理数ではなく
(有理数に)なっています。

これを

分母の有理化

と言います。

それぞれの式は
どのようにして
分母が有理化されたのか
説明しなさい。

分母を有理化しなさい。

$$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \quad \frac{2}{\sqrt{2}} = \frac{\sqrt{2}}{2} \quad \frac{\sqrt{2} \times \sqrt{2}}{\sqrt{2}} = \sqrt{2}$$

$$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3} \quad \frac{3}{\sqrt{3}} = \frac{\sqrt{3}}{3} \quad \frac{\sqrt{3} \times \sqrt{3}}{\sqrt{3}} = \sqrt{3}$$

$$\frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5} \quad \frac{5}{\sqrt{5}} = \frac{\sqrt{5}}{5} \quad \frac{\sqrt{5} \times \sqrt{5}}{\sqrt{5}} = \sqrt{5}$$

$$\frac{1}{\sqrt{6}} = \frac{\sqrt{6}}{6} \quad \frac{6}{\sqrt{6}} = \frac{\sqrt{6}}{6} \quad \frac{\sqrt{6} \times \sqrt{6}}{\sqrt{6}} = \sqrt{6}$$

$$\frac{1}{\sqrt{7}} = \frac{\sqrt{7}}{7} \quad \frac{7}{\sqrt{7}} = \frac{\sqrt{7}}{7} \quad \frac{\sqrt{7} \times \sqrt{7}}{\sqrt{7}} = \sqrt{7}$$

$$\frac{1}{\sqrt{10}} = \frac{\sqrt{10}}{10} \quad \frac{10}{\sqrt{10}} = \frac{\sqrt{10}}{10} \quad \frac{\sqrt{10} \times \sqrt{10}}{\sqrt{10}} = \sqrt{10}$$

$$\frac{1}{\sqrt{a}} = \frac{\sqrt{a}}{a} \quad \frac{a}{\sqrt{a}} = \frac{\sqrt{a}}{a} \quad \frac{\sqrt{a} \times \sqrt{a}}{\sqrt{a}} = \sqrt{a}$$

分母を有理化しなさい。

$$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\frac{1}{\sqrt{100}} = \frac{1}{10}$$

$$\begin{aligned} \frac{1}{\sqrt{50}} &= \frac{1}{5\sqrt{2}} \\ &= \frac{\sqrt{2}}{10} \end{aligned}$$

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

$$\begin{aligned} \frac{1}{\sqrt{200}} &= \frac{1 \times \sqrt{2}}{10\sqrt{2} \times \sqrt{2}} \\ &= \frac{2}{20} \end{aligned}$$

$$\begin{aligned} \frac{2}{\sqrt{12}} &= \frac{2}{2\sqrt{3}} \\ &= \frac{1}{\sqrt{3}} \\ &= \frac{\sqrt{3}}{3} \end{aligned}$$

$$\sqrt{\frac{1}{2}} = \frac{\sqrt{5}}{5}$$

$$\begin{aligned} \frac{2}{\sqrt{200}} &= \frac{2}{10\sqrt{2}} \\ &= \frac{2 \times \sqrt{2}}{10\sqrt{2} \times \sqrt{2}} \\ &= \frac{\sqrt{2}}{10} \end{aligned}$$

$$\begin{aligned} \frac{\sqrt{7}}{\sqrt{14}} &= \frac{\sqrt{7}}{\sqrt{7 \times 2}} \\ &= \frac{1}{\sqrt{2}} \\ &= \frac{\sqrt{2}}{2} \end{aligned}$$

$$\frac{1}{2\sqrt{2}} = \frac{\sqrt{6}}{6}$$

$$\begin{aligned} \frac{3}{\sqrt{18}} &= \frac{3}{3\sqrt{2}} \\ &= \frac{1}{\sqrt{2}} \\ &= \frac{\sqrt{2}}{2} \end{aligned}$$

$$\begin{aligned} \frac{\sqrt{21}}{\sqrt{14}} &= \frac{\sqrt{7 \times 3}}{\sqrt{7 \times 2}} \\ &= \frac{\sqrt{3}}{\sqrt{2}} \\ &= \frac{\sqrt{6}}{2} \end{aligned}$$

$$\frac{1}{\sqrt{8}} = \frac{\sqrt{7}}{7}$$

$$\begin{aligned} \frac{5}{\sqrt{20}} &= \frac{5}{2\sqrt{5}} \\ &= \frac{\sqrt{5}}{2} \end{aligned}$$

$$\begin{aligned} \frac{\sqrt{24}}{\sqrt{15}} &= \frac{\sqrt{3 \times 2\sqrt{2}}}{\sqrt{3 \times \sqrt{5}}} \\ &= \frac{2\sqrt{2}}{\sqrt{5}} \\ &= \frac{2\sqrt{10}}{5} \end{aligned}$$

分母を有理化しなさい。

$$\frac{\sqrt{2} \times \sqrt{3}}{3 \times \sqrt{2}} = \frac{\sqrt{3}}{2}$$

$$\begin{aligned} \frac{\sqrt{6}}{3\sqrt{2}} &= \frac{\sqrt{3} \times \sqrt{2}}{3\sqrt{2}} \\ &= \frac{\sqrt{3}}{3} \end{aligned}$$

$$\frac{\sqrt{2} \times \sqrt{3}}{3\sqrt{3}} = \frac{\sqrt{2}}{3}$$

$$\frac{\sqrt{6}}{3\sqrt{3}} = \frac{\sqrt{2}}{3}$$

$$\frac{2}{2\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\frac{3}{3\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\frac{3\sqrt{2}}{\sqrt{6}} = \sqrt{3}$$

$$\begin{aligned} \frac{2\sqrt{3}}{\sqrt{6}} &= \frac{2}{\sqrt{2}} \\ &= \sqrt{2} = \frac{2 \times \sqrt{3}}{\sqrt{2} \times \sqrt{3}} \end{aligned}$$

$$\frac{2\sqrt{2}}{\sqrt{6}} = \frac{2\sqrt{3}}{3}$$

$$\begin{aligned} \frac{3\sqrt{3}}{\sqrt{6}} &= \frac{3\sqrt{2}}{2} \\ &= \frac{3 \times \sqrt{3}}{\sqrt{2} \times \sqrt{3}} \end{aligned}$$

$$\sqrt{\frac{2}{3}} = \frac{\sqrt{6}}{3}$$

$$\begin{aligned} \sqrt{\frac{3}{2}} &= \frac{\sqrt{6}}{2} \\ &= \frac{\sqrt{3}}{\sqrt{2}} \end{aligned}$$

$$\sqrt{\frac{2}{9}} = \frac{\sqrt{2}}{3}$$

$$\sqrt{\frac{9}{4}} = \frac{3}{2}$$

平方根表、または
計算機を使って \sqrt{a} の値の表を完成しなさい。

$$\sqrt{2} = 1.41$$

$$\sqrt{10} = 3.162$$

$$\sqrt{3} = 1.73$$

$$\sqrt{11} = 3.316$$

$$\sqrt{4} = 2$$

$$\sqrt{12} = 3.$$

$$\sqrt{5} = 2.236$$

$$\sqrt{13} = 3.$$

$$\sqrt{6} = 2.449$$

$$\sqrt{14} = 3.$$

$$\sqrt{7} = 2.645$$

$$\sqrt{15} = 3.$$

$$\sqrt{8} = 2.828$$

$$\sqrt{16} = 4.$$

$$\sqrt{9} = 3$$

$$2 < \sqrt{a} < 3$$

となる整数 a を示せ。

5、6、7、8

$$3 < \sqrt{a} < 4$$

となる整数 a を示せ。

11、12、13、14、15

次の数を、平方根の数値を使って少数で示しなさい。

$$\begin{aligned} \frac{1}{\sqrt{2}} &= \frac{\sqrt{2}}{\sqrt{2} \times \sqrt{2}} \\ &= \frac{\sqrt{2}}{2} \\ &= \frac{1.414}{2} \end{aligned}$$

$$\frac{\sqrt{2}}{\sqrt{2}} = 1$$

$$\begin{aligned} \frac{\sqrt{3}}{\sqrt{2}} &= \frac{\sqrt{3} \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} \\ &= \frac{\sqrt{6}}{2} \\ &= \frac{2.4495}{2} \end{aligned}$$

$$\begin{aligned} \frac{\sqrt{2}}{\sqrt{3}} &= \frac{\sqrt{2} \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} \\ &= \frac{\sqrt{6}}{3} \\ &= \frac{2.4495}{2} \end{aligned}$$

$$\frac{\sqrt{3}}{\sqrt{3}} = 1$$

$$\begin{aligned} \frac{1}{\sqrt{5}} &= \frac{1 \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}} \\ &= \frac{\sqrt{5}}{5} \\ &= \frac{2.2361}{5} \end{aligned}$$

$$\begin{aligned} \frac{\sqrt{2}}{\sqrt{5}} &= \frac{\sqrt{2} \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}} \\ &= \frac{\sqrt{10}}{5} \\ &= \frac{3.1622}{5} \end{aligned}$$

$$\begin{aligned} \frac{\sqrt{3}}{\sqrt{5}} &= \frac{\sqrt{3} \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}} \\ &= \frac{\sqrt{15}}{5} \\ &= \frac{\sqrt{15}}{5} \end{aligned}$$

$$\begin{aligned} \frac{1}{\sqrt{6}} &= \frac{1 \times \sqrt{6}}{\sqrt{6} \times \sqrt{6}} \\ &= \frac{\sqrt{6}}{6} \\ &= \frac{2.4495}{6} \end{aligned}$$

$$\begin{aligned} \frac{\sqrt{2}}{\sqrt{6}} &= \frac{\sqrt{2}}{\sqrt{2} \times \sqrt{3}} \\ &= \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3} \\ &= \frac{1.7321}{3} \end{aligned}$$

$$\begin{aligned} \frac{\sqrt{3}}{\sqrt{6}} &= \frac{\sqrt{3}}{\sqrt{3} \times \sqrt{2}} \\ &= \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \\ &= \frac{1.4142}{2} \end{aligned}$$

平方根表、または
計算機を使って \sqrt{a} の値の表を完成しなさい。

$\sqrt{2}$ は

1と2の間の大きさです。

$\sqrt{2}$ は

1.4と1.5の間の大きさです。

$\sqrt{2}$ は

1.41と1.42の間の大きさです。

$\sqrt{2}$ は

1.414と1.415の間の大きさです。

$\sqrt{2}$ は

1.4142と1.4143の

間の大きさです。

いつまでいっても終わりません。

でも私たちの 体重にしる

ある長さにしる、それほど

正確でなくともかまわない

事が多いものです。

というより、それがふつうです。

それゆえ

いつも近い値でよし

とされます。

近い値の事を

数学では

きんじち

近似値と呼びます。

平方根については

平方根表が作られてい

ます。

上から ケタまで

示されています。

いくつかの例外を

除いて 近似値です。

$$\sqrt{2} \doteq 1.414$$

$$\sqrt{3} \doteq 1.732$$

$$\sqrt{4} \doteq 2$$

$$\sqrt{5} \doteq 2.236$$

$$\sqrt{6} \doteq 2.449$$

$$\sqrt{7} \doteq 2.64$$

$$\sqrt{8} \doteq 2.828$$

$$\sqrt{9} \doteq 3$$

$$\sqrt{10} \doteq 3.162$$

$$\sqrt{2} \quad \doteq \quad 1.414$$

$$\sqrt{200} = 10\sqrt{2} \quad \doteq \quad 1.414 \times 10$$

$$\sqrt{20000} = 100\sqrt{2} \quad \doteq \quad 1.414 \times 100 = 141.4$$

$$\sqrt{3} \quad \doteq \quad 1.732$$

$$\sqrt{300} = 10\sqrt{3} \quad \doteq \quad 1.732 \times 10 =$$

$$\sqrt{30000} = 100\sqrt{3} \quad \doteq \quad 1.732 \times 100 =$$

$$\sqrt{5} \quad \doteq \quad 2.236$$

$$\sqrt{500} = 10\sqrt{5} \quad \doteq \quad 2.236 \times 10$$

$$\sqrt{50000} = 100\sqrt{5} \quad \doteq \quad 2.236 \times 100$$

$\sqrt{2} \doteq 1.414$ として近似値を求めよ。

$$\begin{aligned} \frac{1}{\sqrt{2}} &= \frac{\sqrt{2}}{2} & \sqrt{\frac{2}{100}} &= \frac{\sqrt{2}}{10} & \sqrt{98} &= 7\sqrt{2} \\ &= \frac{1.414}{2} & &= \frac{1.414}{10} & &= 7 \times 1.414 \\ & & &= 0.1414 & &= \end{aligned}$$

$$\begin{aligned} \sqrt{\frac{1}{2}} &= \frac{1}{\sqrt{2}} & \sqrt{0.02} &= \sqrt{\frac{2}{100}} & \frac{1}{\sqrt{18}} &= \frac{1}{3\sqrt{2}} \\ &= \frac{\sqrt{2}}{2} & & & &= \frac{\sqrt{2}}{6} = \frac{1.414}{6} \\ & & & & &= \end{aligned}$$

$$\begin{aligned} \frac{1}{2\sqrt{2}} &= \frac{\sqrt{2}}{4} & \sqrt{18} &= 3\sqrt{2} & \frac{1}{\sqrt{32}} &= \frac{1}{4\sqrt{2}} \\ &= \frac{1.414}{4} & &= 3 \times 1.414 & &= \frac{\sqrt{2}}{8} = \frac{1.414}{8} \\ & & &= \end{aligned}$$

$$\begin{aligned} \frac{1}{\sqrt{8}} &= \frac{1}{2\sqrt{2}} & \sqrt{32} &= 4\sqrt{2} & \frac{1}{\sqrt{50}} &= \frac{1}{5\sqrt{2}} \\ &= \frac{\sqrt{2}}{4} & &= 4 \times 1.414 & &= \frac{\sqrt{2}}{10} = \frac{1.414}{10} \\ &= \frac{1.414}{4} & &= \end{aligned}$$

$$\begin{aligned} \frac{1}{\sqrt{8}} &= & \sqrt{50} &= 5\sqrt{2} & \frac{1}{\sqrt{72}} &= \frac{1}{6\sqrt{2}} \\ &= \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} & &= 5 \times 1.414 & &= \frac{\sqrt{2}}{12} = \frac{1.414}{12} \\ &= \frac{1.414}{2} & &= \end{aligned}$$

$\sqrt{3} \doteq 1.732$ として近似値を求めよ。

$$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3} \quad \sqrt{\frac{3}{100}} = \frac{\sqrt{3}}{10}$$

$$= \frac{1.732}{3} \quad = \frac{1.732}{10}$$

$$\frac{3}{\sqrt{27}} = \frac{3}{3\sqrt{3}}$$

$$= \frac{1}{\sqrt{3}} = \frac{1}{\sqrt{3}}$$

$$= \frac{1.732}{3}$$

$$\sqrt{\frac{1}{3}} = \frac{1}{\sqrt{3}} \quad \sqrt{0.03} = \sqrt{\frac{3}{100}}$$

$$= \frac{\sqrt{3}}{10} =$$

$$\frac{1}{\sqrt{3}} = \quad \sqrt{27} = 3\sqrt{3}$$

$$= 3 \times 1.732$$

$$=$$

$$\frac{5}{\sqrt{75}} = \frac{5}{5\sqrt{3}}$$

$$= \frac{1}{\sqrt{3}}$$

$$= \quad \sqrt{48} = 4\sqrt{3}$$

$$= 4 \times 1.732$$

$$=$$

$$\frac{\sqrt{3}}{10} = \quad \sqrt{75} = 5\sqrt{3}$$

$$= 5 \times 1.732$$

$$=$$

$$\frac{4}{\sqrt{48}} = \frac{4}{4\sqrt{3}}$$

$$= \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\boxed{\sqrt{2} \div 1.414 \text{ とすると}}$$

$$2\sqrt{2} = 2 \times 1.414 = 2.828$$

$$\sqrt{8}$$

$$= 2\sqrt{2}$$

$$= 2 \times 1.414$$

$$= 2.828$$

$$10\sqrt{2}$$

$$= 10 \times 1.414$$

$$= 14.14$$

$$\sqrt{200}$$

$$= 10\sqrt{2}$$

$$\sqrt{0.02}$$

$$= \sqrt{\frac{\sqrt{2}}{100}}$$

$$= \frac{\sqrt{2}}{\sqrt{100}}$$

$$= \frac{\sqrt{2}}{10}$$

$$= \frac{1.414}{10}$$

$$= 0.1414$$

$$\boxed{\sqrt{20} \div 4.472 \text{ とすると}}$$

$$2\sqrt{20}$$

$$= 2 \times 4.472$$

$$= 8.844$$

$$\sqrt{80}$$

$$= \sqrt{2^2 \times 20}$$

$$= 2\sqrt{20}$$

$$\sqrt{2000}$$

$$= \sqrt{10^2 \times 20}$$

$$= 10\sqrt{20}$$

$$= 10 \times 4.472$$

$$= 44.72$$

$$\sqrt{0.2}$$

$$= \sqrt{\frac{20}{100}}$$

$$= \frac{\sqrt{20}}{10}$$

$$= \frac{4.472}{10}$$

$$= 0.4472$$

$$\frac{1}{\sqrt{2}}$$

$$= \frac{\sqrt{2}}{2}$$

$$= \frac{1.414}{2}$$

$$= 0.707$$

$$\frac{1}{\sqrt{8}}$$

$$= \frac{1}{2\sqrt{2}}$$

$$= \frac{\sqrt{2}}{4}$$

$$= \frac{1.414}{4}$$

$$= 0.3535$$

$$\sqrt{0.05}$$

$$= \sqrt{\frac{50}{100}}$$

$$= \sqrt{\frac{1}{20}}$$

$$= \frac{1}{\sqrt{20}}$$

$$= \frac{4.472}{20}$$

$$= 0.4472$$

$$\sqrt{5} = 2.236$$

$$\sqrt{2} = 1.414$$

$\sqrt{20} = 4.472$ として 次の値を小数で示せ。

$$2\sqrt{2} = 2 \times 1.414 \quad \frac{\sqrt{2}}{10} = \frac{1.414}{10} \quad \sqrt{0.02} = \sqrt{\frac{2}{100}}$$

$$= \quad = \quad = \frac{\sqrt{2}}{10} = \frac{1.414}{10}$$

$$\sqrt{8} = 2\sqrt{2} \quad \frac{\sqrt{2}}{\sqrt{100}} = \frac{\quad}{10} \quad \sqrt{0.2} = \sqrt{\frac{20}{100}}$$

$$= \quad = \quad = \frac{\sqrt{20}}{10} = 0.4472$$

$$\sqrt{18} = 3\sqrt{2} \quad \sqrt{\frac{2}{100}} = \frac{\sqrt{2}}{10} \quad \frac{1}{\sqrt{8}} = \frac{1}{2\sqrt{2}}$$

$$= 3 \times 1.414 \quad = \quad = \frac{\sqrt{2}}{4} = \frac{1.414}{4}$$

$$\frac{\sqrt{8}}{2} = \frac{2\sqrt{2}}{2} \quad \frac{\sqrt{20}}{\sqrt{100}} = \frac{4.472}{10} \quad \sqrt{80} = 4\sqrt{5}$$

$$= \sqrt{2} \quad = 0.4472 \quad = 4 \times 2.236$$

$$=$$

$$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \quad \sqrt{\frac{20}{100}} = \frac{20}{10} \quad \frac{1}{\sqrt{80}} = \frac{1}{4\sqrt{5}}$$

$$= \frac{1.414}{2} \quad = \quad = \frac{\sqrt{5}}{20} = \frac{2.236}{20}$$

無理数の近似値

$$\sqrt{2} \doteq 1.414 \text{ とすると}$$

次の数は いかがか。

$$\sqrt{20} = 4.472 \text{ とすると}$$

次の数は いかがか。

$$2\sqrt{2} = 2 \times 1.414$$

$$= 2.828$$

$$2\sqrt{20} = 2 \times 4.472$$

$$= 8.944$$

$$10\sqrt{2} = 10 \times 1.414$$

$$= 14.14$$

$$10\sqrt{20} = 10 \times 4.472$$

$$= 44.72$$

$$\frac{\sqrt{2}}{10} = \frac{1.414}{10}$$

$$= 0.1414$$

$$\frac{\sqrt{20}}{10} = \frac{4.472}{10}$$

$$= 0.4472??$$

$$\sqrt{\frac{2}{100}} = \frac{\sqrt{2}}{10}$$

$$= 0.1414$$

$$\sqrt{\frac{20}{100}} = \frac{\sqrt{20}}{10}$$

$\sqrt{2} = 1.414$ として 次の値を小数で示せ。

$$\begin{aligned}
 3\sqrt{2} &= 3 \times 1.414 & 5\sqrt{2} - 3\sqrt{2} & & \sqrt{2} \times 10 \\
 &= 4.242 & &= 3 \times 1.414 & = 1.414 \times 10 \\
 & & &= 4.242 & = 14.14
 \end{aligned}$$

$$\begin{aligned}
 2\sqrt{18} & & \frac{\sqrt{2}-1}{2} & & \sqrt{200} \\
 &= 2 \times 3\sqrt{2} & &= \frac{1.414-1}{2} & = 10\sqrt{2} \\
 &= 6 \times 1.414 & &= \frac{1.414-1}{2} & = 14.14
 \end{aligned}$$

$$\begin{aligned}
 \frac{\sqrt{18}}{2} &= \frac{3\sqrt{2}}{2} & \frac{\sqrt{2}-1}{10} & & \frac{\sqrt{2}}{100} \\
 &= \frac{3 \times 1.414}{2} & &= \frac{1.414-1}{10} & = \frac{1.414}{100} \\
 & & &= \frac{0.414}{10} & = 0.01414
 \end{aligned}$$

$$\begin{aligned}
 \frac{2}{\sqrt{2}} &= \frac{\sqrt{2} \times \sqrt{2}}{\sqrt{2}} & &= 0.0414 & \frac{\sqrt{200}}{10} \\
 &= \sqrt{2} & & & = \frac{10\sqrt{2}}{10} \\
 &= 1.414 & & & = 1.414
 \end{aligned}$$

$$\begin{aligned}
 \frac{\sqrt{2}}{3} &= \frac{1.414}{3} & \frac{\sqrt{2}-1}{10} & & \\
 & & &= \frac{2 \times 1.414 - 1}{10} & \\
 & & &= \frac{1.828}{10} & \\
 & & &= 0.1828 &
 \end{aligned}$$

$\sqrt{2}$ の小数部分を
 a とすると
 a はどのような形で
表すことができるか

$$\sqrt{2} \doteq 1.414\dots$$

であるから

小数部分は

$$\sqrt{2} - 1 \text{ と表すことができる。}$$

以下、上記と同様にして
下記無理数の小数部分を
求める式を示せ

$$\begin{aligned} &\sqrt{3} \text{ の小数部分} \\ &= 1.731 - 1 \quad \sqrt{3} - 1 \end{aligned}$$

参考

$$\begin{aligned} \sqrt{4} &= 2 \\ \sqrt{a} &= 3 \\ \sqrt{16} &= 4 \end{aligned}$$

$$\begin{aligned} &\sqrt{5} \text{ の小数部分} \\ &= 2.236 - 2 \quad \sqrt{5} - 1 \end{aligned}$$

$$\begin{aligned} &\sqrt{10} \text{ の小数部分} \\ &= 3.162 - 3 \\ &\quad \sqrt{10} - 3 \end{aligned}$$

$$\begin{aligned} &\sqrt{17} \text{ の小数部分} \\ &= 4.\square\square\square\square - 4 \\ &\quad \sqrt{17} - 4 \end{aligned}$$

$\sqrt{2}$ の小数部分を
 a とすると次の式の
 値はどれだけか。

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

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

$$\begin{aligned} (a-1)^2 &= (\sqrt{2} - 1 - 1)^2 \\ &= (\sqrt{2} - 2)^2 \\ &= (\sqrt{2})^2 - 2 \cdot \sqrt{2} \cdot 2 + 2^2 \\ &= 6 - 4\sqrt{2} \\ &= a^2 - 2a + 1 \\ &= (3 - 2\sqrt{2}) - 2(\sqrt{2} - 1) + 1 \\ &= 3 - 2\sqrt{2} - 2\sqrt{2} + 2 + 1 \\ &= 6 - 4\sqrt{2} \end{aligned}$$

$\sqrt{5}$ の小数部分を a
 整数部分を
 b とするとき
 次の式の値を求めよ

$$\begin{aligned} a &= \sqrt{5} - 2 \\ b &= 2 \end{aligned}$$

$$\begin{aligned} (a+b)^2 &= \{[\sqrt{5} - 2] + 2\}^2 \\ &= (\sqrt{5} - 2 + 2)^2 \\ &= 5 \end{aligned}$$

$$\begin{aligned} (a-b)^2 &= \{[\sqrt{5} - 2] - 2\}^2 \\ &= (\sqrt{5} - 4)^2 \\ &= 21 - 8\sqrt{5} \end{aligned}$$

$$\begin{aligned} a^2 + b^2 &= (\sqrt{5} - 2)^2 + 2^2 \\ &= 5 - 4\sqrt{5} + 4 + 4 \\ &= 13 - 4\sqrt{5} \end{aligned}$$