

2016-j3-p29-63-answer.tex

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____年 ____コース

名前 _____

1. 次の式をくふうして計算しなさい.

$$\begin{aligned}(1) \quad & 25^2 - 15^2 \\ &= (25 + 15) \times (25 - 15) \\ &= 40 \times 10 \\ &= 400\end{aligned}$$

$$\begin{aligned}(2) \quad & 101^2 \\ &= (100 + 1)^2 \\ &= 100^2 + 2 \times 1 \times 100 + 1^2 \\ &= 10201\end{aligned}$$

2. 次の数の平方根をいいなさい.

$$(1) \quad \frac{16}{81}$$

$$\text{答} \quad \frac{4}{9} \text{ と } -\frac{4}{9}$$

$$(2) \quad 2$$

$$\text{答} \quad \sqrt{2} \text{ と } -\sqrt{2}$$

3. 次の数を根号を使わずに表しなさい.

$$(1) \quad \sqrt{25} = \sqrt{5^2} = 5$$

$$(2) \quad -\sqrt{25} = -\sqrt{5^2} = -5$$

$$(3) \quad \sqrt{(-5)^2} = \sqrt{25} = 5$$

$$(4) \quad (\sqrt{6})^2 = 6$$

$$(5) \quad (-\sqrt{6})^2 = 6$$

4. 5 と $\sqrt{21}$ の大小を, 不等号を使って表しなさい.

$$\begin{aligned}5^2 &= 25, (\sqrt{21})^2 = 21 \text{ で, } 25 > 21 \text{ であるから} \\ \sqrt{25} &> \sqrt{21} \text{ すなわち } 5 > \sqrt{21}\end{aligned}$$

5. 次の数を素因数分解しなさい.

$$(1) \quad 30 = 2 \times 3 \times 5$$

$$(2) \quad 28 = 2^2 \times 7$$

6. $\sqrt{63n}$ が自然数となるような自然数 n のうちで, もっとも小さい値を求めなさい.

$\sqrt{63n}$ が自然数になるには, $63n$ が, ある自然数の 2 乗になればよい。

$63 = 3^2 \times 7$ であるから, $3^2 \times 7$ に 7 をかければよい。

$$\text{答} \quad 7$$

7. $a\sqrt{b}$ を $\sqrt{C}$ の形に, $\sqrt{C}$ を $a\sqrt{b}$ の形に表しなさい.

$$\begin{aligned}(1) \quad & 7\sqrt{2} \\ &= \sqrt{49} \times \sqrt{2} \\ &= \sqrt{49 \times 2} \\ &= \sqrt{98}\end{aligned}$$

$$\begin{aligned}(2) \quad & \sqrt{18} \\ &= \sqrt{9 \times 2} \\ &= 3\sqrt{2}\end{aligned}$$

$$\begin{aligned}(3) \quad & \sqrt{108} \\ &= \sqrt{2^2 \times 3^3} \\ &= \sqrt{2^2} \times \sqrt{3^2} \times \sqrt{3} \\ &= 2 \times 3 \times \sqrt{3} \\ &= 6\sqrt{3}\end{aligned}$$

8. 次の計算を下さい.

$$\begin{aligned}(1) \quad & \sqrt{3} \times \sqrt{5} \\ &= \sqrt{3 \times 5} \\ &= \sqrt{15}\end{aligned}$$

$$\begin{aligned}(2) \quad & \frac{\sqrt{125}}{\sqrt{5}} \\ &= \sqrt{\frac{125}{5}} \\ &= \sqrt{25} \\ &= \sqrt{5^2} \\ &= 5\end{aligned}$$

$$\begin{aligned}(3) \quad & \sqrt{\frac{5}{36}} \\ &= \frac{\sqrt{5}}{\sqrt{36}} \\ &= \frac{\sqrt{5}}{6}\end{aligned}$$

$$\begin{aligned}(4) \quad & \sqrt{0.03} \\ &= \sqrt{\frac{3}{100}} \\ &= \frac{\sqrt{3}}{\sqrt{100}} \\ &= \frac{\sqrt{3}}{10}\end{aligned}$$

9. $\sqrt{2} = 1.414$, $\sqrt{20} = 4.472$ として, 次の値を求め下さい.

$$\begin{aligned}(1) \quad & \sqrt{200} \\ &= \sqrt{2 \times 100} \\ &= \sqrt{2} \times \sqrt{10^2} \\ &= \sqrt{2} \times 10 \\ &= 1.414 \times 10 \\ &= 14.14\end{aligned}$$

$$\begin{aligned}(2) \quad & \sqrt{2000} \\ &= \sqrt{20 \times 100} \\ &= \sqrt{20} \times \sqrt{10^2} \\ &= \sqrt{20} \times 10 \\ &= 4.472 \times 10 \\ &= 44.72\end{aligned}$$

$$\begin{aligned}(3) \quad & \sqrt{20000} \\ &= \sqrt{2 \times 10000} \\ &= \sqrt{2} \times \sqrt{100^2} \\ &= \sqrt{2} \times 100 \\ &= 1.414 \times 100 \\ &= 141.4\end{aligned}$$

$$\begin{aligned}(4) \quad & \sqrt{0.2} \\ &= \sqrt{\frac{20}{100}} \\ &= \frac{\sqrt{20}}{\sqrt{100}} \\ &= \frac{\sqrt{20}}{10} \\ &= 4.472 \div 10 \\ &= 0.4472\end{aligned}$$

$$\begin{aligned}(5) \quad & \sqrt{0.02} \\ &= \sqrt{\frac{2}{100}} \\ &= \frac{\sqrt{2}}{\sqrt{100}} \\ &= \frac{\sqrt{2}}{10} \\ &= 1.414 \div 10 \\ &= 0.1414\end{aligned}$$

10. 次の数の分母を有理化しなさい.

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

$$\begin{aligned}(2) \quad & \frac{3}{2\sqrt{6}} \\ &= \frac{3 \times \sqrt{6}}{2\sqrt{6} \times \sqrt{6}} \\ &= \frac{3 \times \sqrt{6}}{2 \times 6} \\ &= \frac{\sqrt{6}}{4}\end{aligned}$$

11. 次の計算をしなさい.

$$\begin{aligned}(1) \quad & \sqrt{12} \times \sqrt{20} \\ &= 2\sqrt{3} \times 2\sqrt{5} \\ &= 2 \times 2 \times \sqrt{3} \times \sqrt{5} \\ &= 4\sqrt{15}\end{aligned}$$

$$\begin{aligned}(2) \quad & \sqrt{15} \times \sqrt{10} \\ &= \sqrt{5 \times 3} \times \sqrt{5 \times 2} \\ &= \sqrt{5 \times 3 \times 5 \times 2} \\ &= \sqrt{5^2 \times 3 \times 2} \\ &= 5\sqrt{6}\end{aligned}$$

$$\begin{aligned}(3) \quad & \sqrt{18} \div \sqrt{7} \\ &= \frac{\sqrt{18}}{\sqrt{7}} \\ &= \frac{3\sqrt{2}}{\sqrt{7}} \\ &= \frac{3\sqrt{2} \times \sqrt{7}}{\sqrt{7} \times \sqrt{7}} \\ &= \frac{3\sqrt{14}}{7}\end{aligned}$$

12. 次の計算をしなさい.

$$\begin{aligned}(1) \quad & 5\sqrt{2} + 3\sqrt{2} \\ &= (5+3)\sqrt{2} \\ &= 8\sqrt{2}\end{aligned}$$

$$\begin{aligned}(2) \quad & \sqrt{5} - 2\sqrt{5} \\ &= (1-2)\sqrt{5} \\ &= -\sqrt{5}\end{aligned}$$

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

$$\begin{aligned}
 (4) \quad & \sqrt{18} + \sqrt{8} \\
 &= 3\sqrt{2} + 2\sqrt{2} \\
 &= 5\sqrt{2}
 \end{aligned}$$

$$\begin{aligned}
 (5) \quad & 5\sqrt{2} + \frac{4}{\sqrt{2}} \\
 &= 5\sqrt{2} + \frac{4 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} \\
 &= 5\sqrt{2} + \frac{4\sqrt{2}}{2} \\
 &= 5\sqrt{2} + 2\sqrt{2} \\
 &= 7\sqrt{2}
 \end{aligned}$$

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

$$\begin{aligned}
 (7) \quad & (\sqrt{3} + 2)(2\sqrt{3} + 1) \\
 &= \sqrt{3} \times 2\sqrt{3} + \sqrt{3} \times 1 + 2 \times 2\sqrt{3} + 2 \times 1 \\
 &= 6 + \sqrt{3} + 4\sqrt{3} + 2 \\
 &= 8 + 5\sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 (8) \quad & (\sqrt{5} + 3)(\sqrt{5} - 1) \\
 &= (\sqrt{5})^2 \times + (3 - 1)\sqrt{5} - 3 \times 1 \\
 &= 5 + 2\sqrt{5} - 3 \\
 &= 2 + 2\sqrt{5}
 \end{aligned}$$

13. $x = \sqrt{3} + 2$, $y = \sqrt{3} - 2$ のとき, $x^2 - xy$ の値を求めなさい.

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

別解

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