

1. $\sqrt[3]{9^4} \div \sqrt{3^3} \times \sqrt[6]{\frac{1}{3}}$ 의 값을 구하면?

① 9

② 3

③ $\sqrt{3}$

④ $\frac{\sqrt{3}}{3}$

⑤ $\frac{1}{3}$

해설

$$\begin{aligned}\sqrt[3]{9^4} \div \sqrt{3^3} \times \sqrt[6]{\frac{1}{3}} &= (3^2)^{\frac{4}{3}} \div 3^{\frac{3}{2}} \times (3^{-1})^{\frac{1}{6}} \\ &= 3^{\frac{8}{3} - \frac{3}{2} - \frac{1}{6}} \\ &= 3\end{aligned}$$

2. $\sqrt[3]{a^2} \div \sqrt[3]{a^{-5}} \times (-a^{\frac{2}{3}})^4$ 을 간단히 하면? (단, $a > 0$)

① a

② $a^{\frac{4}{3}}$

③ a^2

④ a^4

⑤ a^5

해설

$$\begin{aligned}\sqrt[3]{a^2} \div \sqrt[3]{a^{-5}} \times (-a^{\frac{2}{3}})^4 &= a^{\frac{2}{3}} \div a^{-\frac{5}{3}} \times a^{\frac{8}{3}} \\ &= a^{\frac{2}{3} - (-\frac{5}{3}) + \frac{8}{3}} \\ &= a^5\end{aligned}$$

3. $\sqrt[5]{3^4} \times 9^{\frac{1}{10}} \times 3^{-1}$ 의 값은?

- ① $\frac{1}{9}$ ② $\frac{1}{3}$ ③ 1 ④ 3 ⑤ 9

해설

$$\begin{aligned}\sqrt[5]{3^4} \times 9^{\frac{1}{10}} \times 3^{-1} &= 3^{\frac{4}{5}} \times 3^{\frac{2}{10}} \times 3^{-1} \\ &= 3^{\frac{4}{5} + \frac{1}{5} - 1} = 3^0 = 1\end{aligned}$$

4. 다음 중 옳은 것은?

① $\sqrt[3]{2}\sqrt{3} = \sqrt[6]{6}$

② $\sqrt[4]{-16} = -2$

③ $\frac{\sqrt[3]{200}}{\sqrt[3]{25}} = 2$

④ $\sqrt[3]{\sqrt{243}} = 3$

⑤ $(\sqrt[8]{1000})^2 = 10$

해설

① $\sqrt[3]{2}\sqrt{3} = \sqrt[6]{2^2}\sqrt[6]{3^3} = \sqrt[6]{2^2 \cdot 3^3} = \sqrt[6]{108}$

② $\sqrt[4]{-16} = x$ 라 하면 $x^4 = -16$ 인 실수 x 는 존재하지 않는다.

③ $\frac{\sqrt[3]{200}}{\sqrt[3]{25}} = \sqrt[3]{8} = \sqrt[3]{2^3} = 2$

④ $\sqrt[3]{\sqrt{243}} = \sqrt[3]{\sqrt{3^5}} = \sqrt[6]{3^5}$

⑤ $(\sqrt[8]{1000})^2 = \sqrt[4]{1000} = \sqrt[4]{10^3}$

5. $(\sqrt[3]{2^4})^{\frac{3}{2}} \times (\sqrt{2})^{\frac{1}{2}} \div \sqrt[4]{2}$ 를 간단히 하면?

① 2

② $2\sqrt{2}$

③ 4

④ $4\sqrt{2}$

⑤ 8

해설

$$\begin{aligned} & (\sqrt[3]{2^4})^{\frac{3}{2}} \times (\sqrt{2})^{\frac{1}{2}} \div \sqrt[4]{2} \\ &= 2^{\frac{4}{3} \times \frac{3}{2}} \times 2^{\frac{1}{2} \times \frac{1}{2}} \div 2^{\frac{1}{4}} \\ &= 2^{2+\frac{1}{4}-\frac{1}{4}} = 4 \end{aligned}$$

6. $\sqrt{10 \cdot \sqrt[3]{10}} \div 5^{\frac{2}{3}}$ 의 값은?

- ① $\sqrt[3]{2}$ ② $\sqrt[3]{4}$ ③ $\sqrt[3]{5}$ ④ $\sqrt[3]{10}$ ⑤ $\sqrt[3]{20}$

해설

$$\begin{aligned} \text{(주어진 식)} &= (10 \cdot 10^{\frac{1}{3}})^{\frac{1}{2}} \div 5^{\frac{2}{3}} = 10^{\frac{2}{3}} \div 5^{\frac{2}{3}} \\ &= 2^{\frac{2}{3}} = \sqrt[3]{4} \end{aligned}$$

7. $\sqrt[3]{-\sqrt{128}}$ 을 간단히 하면?

① 2

② -2

③ $-2\sqrt[4]{2}$

④ $-2\sqrt{2}$

⑤ 허수

해설

$$\sqrt{128} = (2^7)^{\frac{1}{2}} = 2^3 \sqrt{2}$$

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

$$= -2\sqrt[4]{2}$$

8. $\sqrt[3]{\sqrt{64}}$ 를 간단히 하면?

- ① 2 ② 3 ③ 4 ④ 5 ⑤ 6

해설

$$\sqrt[3]{\sqrt{64}} = \sqrt[6]{2^6} = 2$$

9. 식 $\sqrt[3]{24} + 2\sqrt[3]{3} - \sqrt[3]{81}$ 을 간단히 하면?

- ① -2 ② $-\sqrt[3]{3}$ ③ $\sqrt[3]{3}$ ④ $2\sqrt[3]{3}$ ⑤ $3\sqrt[3]{3}$

해설

$$\begin{aligned}\sqrt[3]{24} + 2\sqrt[3]{3} - \sqrt[3]{81} \\&= 2\sqrt[3]{3} + 2\sqrt[3]{3} - 3\sqrt[3]{3} \\&= \sqrt[3]{3}\end{aligned}$$

10. $(\sqrt[5]{2})^4 \times \sqrt[5]{64}$ 의 값을 구하면?

① 1

② 2

③ $\sqrt[5]{128}$

④ 4

⑤ $\sqrt[5]{512}$

해설

$$2^{\frac{4}{5}} \times 2^{\frac{6}{5}} = 2^{\frac{10}{5}} = 2^2 = 4$$

11. $\sqrt[3]{2^7} \div \sqrt[3]{2} \times \sqrt{2^5}$ 을 간단히 하면?

① $\sqrt{2}$

② 2

③ $4\sqrt{2}$

④ 8

⑤ $16\sqrt{2}$

해설

$$\begin{aligned} & 2^{\frac{7}{3}} \div 2^{\frac{1}{3}} \times 2^{\frac{5}{2}} \\ &= 2^{\frac{7}{3}-\frac{1}{3}+\frac{5}{2}} = 2^{\frac{9}{2}} = 16\sqrt{2} \end{aligned}$$

12. $\sqrt[3]{(-2)^3} + \sqrt[4]{(-3)^4}$ 을 간단히 하면?

① -5

② -1

③ 0

④ 1

⑤ 5

해설

$$-2 + 3 = 1$$

13. $\sqrt[5]{32^2} \div (\sqrt[3]{2})^6 - \sqrt{\sqrt{64}}$ 를 간단히 하면?

- ① 2 ② 0 ③ -1 ④ -2 ⑤ -4

해설

$$\begin{aligned} & \sqrt[5]{32^2} \div (\sqrt[3]{2})^6 - \sqrt{\sqrt{64}} \\ &= 2^{\frac{10}{5}} \div 2^{\frac{6}{3}} - 2^{\frac{8}{2}} \\ &= 1 - 1 = 0 \end{aligned}$$

14. 식 $\frac{1}{\sqrt{3}} \times \sqrt{48} \times \sqrt[3]{8}$ 의 값은?

▶ 답 :

▷ 정답 : 8

해설

$$\frac{1}{\sqrt{3}} \times \sqrt{48} \times \sqrt[3]{8} = \frac{1}{\sqrt{3}} \times 4\sqrt{3} \times 2 = 8$$

15. $a > 0, b > 0$ 일 때, $\sqrt[6]{a^2b^3} \times \sqrt{ab} \div \sqrt[3]{a^2b^3}$ 을 간단히 하면?

- ① $\sqrt[6]{a}$ ② $\sqrt[6]{b}$ ③ $\sqrt[6]{ab}$ ④ $\sqrt[6]{a^2b}$ ⑤ $\sqrt[6]{ab^2}$

해설

$$\begin{aligned} & \sqrt[6]{a^2b^3} \times \sqrt{ab} \div \sqrt[3]{a^2b^3} \\ &= (a^2b^3)^{\frac{1}{6}} \times (ab)^{\frac{1}{2}} \div (a^2b^3)^{\frac{1}{3}} \\ &= a^{\frac{1}{3}}b^{\frac{1}{2}} \times a^{\frac{1}{2}}b^{\frac{1}{2}} \div a^{\frac{2}{3}}b = a^{\frac{1}{3}+\frac{1}{2}-\frac{2}{3}}b^{\frac{1}{2}+\frac{1}{2}-1} \\ &= a^{\frac{1}{6}} = \sqrt[6]{a} \end{aligned}$$

16. $\sqrt[2014]{(-2014)^{2014}} + \sqrt[2015]{(-2015)^{2015}}$ 를 간단히 하면?

① -4017

② -1

③ 0

④ 1

⑤ 4017

해설

(준식) $= |-2014| + (-2015) = -1$

17. 16의 네제곱근 중 음수인 것을 a , -27 의 세제곱근 중 실수인 것을 b 라 할 때, ab 의 값은?

① -12

② -6

③ 6

④ 12

⑤ 36

해설

16의 네제곱근 중 음수인 것은

$$-\sqrt[4]{16} = -2 \quad \therefore a = -2$$

-27 의 세제곱근을 x 라 하면

$$x^3 = -27, \quad (x+3)(x^2-3x+9) = 0$$

이때, -27 의 세제곱근 중 실수인 것은 -3 이다.

$$\therefore b = -3$$

$$\therefore ab = (-2) \times (-3) = 6$$

18. $\sqrt[4]{4 + \sqrt{15}} \times \sqrt{\sqrt{5} - \sqrt{3}} \times \sqrt[4]{8}$ 을 간단히 하면?

① 1

② $\sqrt{2}$

③ 2

④ $2\sqrt{2}$

⑤ 4

해설

$$\begin{aligned} & \sqrt[4]{4 + \sqrt{15}} \times \sqrt{\sqrt{5} - \sqrt{3}} \times \sqrt[4]{8} \\ &= \sqrt{\sqrt{\frac{8 + 2\sqrt{15}}{2}}} \times \sqrt{\sqrt{5} - \sqrt{3}} \times \sqrt[4]{8} \\ &= \frac{\sqrt{\sqrt{5} + \sqrt{3}}}{\sqrt{\sqrt{2}}} \times \sqrt{\sqrt{5} - \sqrt{3}} \times \sqrt[4]{8} \\ &= \frac{\sqrt{5 - 3}}{\sqrt[4]{2}} \times \sqrt[4]{8} \\ &= \sqrt{2} \times \sqrt[4]{\frac{8}{2}} \\ &= \sqrt{2} \times \sqrt[4]{4} \\ &= \sqrt{2} \times \sqrt{2} \\ &= 2 \end{aligned}$$

19. $x > 0$, $x \neq 1$ 일 때, $\sqrt[4]{x\sqrt{x^3}} = \sqrt[k]{x^k}$ 을 만족하는 자연수 k 의 값을 구하여라.

▶ 답 :

▷ 정답 : 5

해설

$$\sqrt[4]{x\sqrt{x^3}} = \sqrt[4]{\sqrt{x^2}\sqrt{x^3}} = \sqrt[4]{\sqrt{x^5}} = \sqrt[8]{x^5}$$

20. 양의 실수 a 에 대하여 $\frac{\sqrt[5]{a}}{\sqrt[3]{a}} \times \sqrt[5]{\frac{\sqrt[3]{a}}{\sqrt{a}}} \div \sqrt[3]{\frac{\sqrt[5]{a}}{\sqrt{a}}}$ 의 값은?(단, $a \neq 1$)
- ① $\sqrt[15]{a}$ ② $\frac{1}{\sqrt[15]{a}}$ ③ 1 ④ $\frac{1}{\sqrt[15]{a}}$ ⑤ $\sqrt[15]{a}$

해설

$$\begin{aligned} \frac{\sqrt[5]{a}}{\sqrt[3]{a}} \times \sqrt[5]{\frac{\sqrt[3]{a}}{\sqrt{a}}} \div \sqrt[3]{\frac{\sqrt[5]{a}}{\sqrt{a}}} &= \frac{\sqrt[5]{a}}{\sqrt[3]{a}} \times \sqrt[5]{\frac{\sqrt[3]{a}}{\sqrt{a}}} \times \sqrt[3]{\frac{\sqrt{a}}{\sqrt[5]{a}}} \\ &= \frac{\sqrt[5]{a}}{\sqrt[3]{a}} \times \frac{\sqrt[5]{\sqrt[3]{a}}}{\sqrt[5]{\sqrt{a}}} \times \frac{\sqrt[3]{\sqrt{a}}}{\sqrt[3]{\sqrt[5]{a}}} = \frac{\sqrt[5]{a}}{\sqrt[3]{a}} \times \frac{\sqrt[15]{a}}{\sqrt[15]{a}} \times \frac{\sqrt[15]{a}}{\sqrt[15]{a}} = \frac{1}{\sqrt[15]{a}} \end{aligned}$$

21. $x \geq 0$ 일 때, $\sqrt{x\sqrt{x}\sqrt{x}}$ 를 간단히 하면?

- ① $x\sqrt{x}$ ② $x\sqrt[4]{x}$ ③ $\sqrt[4]{x}$ ④ $\sqrt[8]{x^3}$ ⑤ $\sqrt[8]{x^7}$

해설

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

22. $\sqrt[6]{\frac{\sqrt{2^4}}{\sqrt[3]{5}}} \times \sqrt[9]{\frac{\sqrt{5}}{\sqrt[3]{2^6}}}$ 를 간단히 하여 $\sqrt[n]{4}$ 로 나타낼 때, 자연수 n 의 값은?

- ① 4 ② 6 ③ 9 ④ 12 ⑤ 18

해설

$$\begin{aligned} &\sqrt[6]{\frac{\sqrt{2^4}}{\sqrt[3]{5}}} \times \sqrt[9]{\frac{\sqrt{5}}{\sqrt[3]{2^6}}} = \frac{\sqrt[6]{\sqrt{2^4}}}{\sqrt[6]{\sqrt[3]{5}}} \times \frac{\sqrt[9]{\sqrt{5}}}{\sqrt[9]{\sqrt[3]{2^6}}} \\ &= \frac{\sqrt[12]{2^4}}{\sqrt[18]{5}} \times \frac{\sqrt[18]{5}}{\sqrt[27]{2^6}} \\ &= \frac{\sqrt[3 \times 4]{2^4}}{\sqrt[9 \times 3]{2^{3 \times 2}}} = \frac{\sqrt[3]{2}}{\sqrt[9]{2^2}} \\ &= \frac{\sqrt[9]{2^3}}{\sqrt[9]{2^2}} = \sqrt[9]{\frac{2^3}{2^2}} \\ &= \sqrt[9]{2} = \sqrt[18]{4} \\ &\therefore n = 18 \end{aligned}$$