

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

① a

② $a^{\frac{4}{3}}$

③ a^2

④ a^4

⑤ a^5

해설

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

2. $\log_8 0.25 = x$ 를 만족하는 x 의 값은?

① 1

② $-\frac{1}{3}$

③ $-\frac{2}{3}$

④ $-\frac{1}{4}$

⑤ $-\frac{3}{4}$

해설

$$\log_8 0.25 = x \text{에서 } 8^x = 0.25$$

$$(2^3)^x = \frac{1}{4} \quad \therefore 2^{3x} = 2^{-2}$$

$$\therefore 3x = -2$$

$$\therefore x = -\frac{2}{3}$$

3. $\frac{\sqrt[3]{250} - \sqrt[3]{54}}{2\sqrt[3]{4}} = 2^k$ 이 성립할 때, k 의 값은?

① $-\frac{2}{3}$

② $-\frac{1}{3}$

③ $\frac{1}{3}$

④ $\frac{2}{3}$

⑤ 1

해설

$$\begin{aligned} \text{(주어진식)} &= \frac{5\sqrt[3]{2} - 3\sqrt[3]{2}}{2\sqrt[3]{2^2}} \\ &= \frac{2\sqrt[3]{2}}{2\sqrt[3]{2^2}} \\ &= 2^{\frac{1}{3} - \frac{2}{3}} = 2^{-\frac{1}{3}} \end{aligned}$$

$$\therefore k = -\frac{1}{3}$$

4. $a = 5 \times 729^x$ 일 때, 27^x 을 a 에 관한 식으로 나타내면?

① $\left(\frac{a}{5}\right)^{\frac{1}{4}}$

② $\left(\frac{a}{5}\right)^{\frac{1}{2}}$

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

④ $\left(\frac{a}{2}\right)^{\frac{1}{3}}$

⑤ $\left(\frac{a}{2}\right)^{\frac{1}{2}}$

해설

$$a = 5 \times 729^x = 5 \times (3^6)^x = 5 \times 3^{6x}$$

$$\frac{a}{5} = 3^{6x} = (3^{3x})^2$$

$$\therefore 3^{3x} = \left(\frac{a}{5}\right)^{\frac{1}{2}}$$

$$\therefore 27^x = 3^{3x} = \left(\frac{a}{5}\right)^{\frac{1}{2}}$$

5. $\log_3 2 = a$ 일 때, $\log_{\sqrt{12}} 9$ 를 a 로 나타내면?

① $\frac{2}{2a+1}$

② $\frac{4}{2a+1}$

③ $\frac{2}{a+1}$

④ $\frac{2}{a+2}$

⑤ $\frac{4}{a+2}$

해설

$$\log_{\sqrt{12}} 9$$

$$= \frac{\log_3 9}{\log_3 \sqrt{12}} = \frac{2}{\frac{1}{2} \log_3 (2^2 \cdot 3)}$$

$$= \frac{4}{2(\log_3 2 + 1)} = \frac{4}{2(a+1)} = \frac{2}{a+1}$$

6. $x^{\frac{1}{2}} + x^{-\frac{1}{2}} = 3$ 일 때, $x^2 + x^{-2}$ 의 값을 구하면?

① 33

② 36

③ 43

④ 47

⑤ 49

해설

$$(x^{\frac{1}{2}} + x^{-\frac{1}{2}})^2 = 9$$

$$x + x^{-1} + 2 = 9$$

$$\therefore x + x^{-1} = 7$$

$$(x + x^{-1})^2 = 49$$

$$x^2 + x^{-2} + 2 = 49$$

$$\therefore x^2 + x^{-2} = 47$$

7. $\log_{10} 2 = 0.301$ 일 때,
 $\frac{10(\log_{10} 0.8 - \log_{10} 32 + \log_{10} 8)}{\log_{10} 0.7 + \log_{10} 7 - \log_{10} 49}$ 의 값은?

① 3.01

② 6.02

③ 6.99

④ 9.03

⑤ 10

해설

$$\begin{aligned}
 & \frac{10(\log_{10} 0.8 - \log_{10} 32 + \log_{10} 8)}{\log_{10} 0.7 + \log_{10} 7 - \log_{10} 49} \\
 &= \frac{10(\log_{10} \frac{8}{10} - \log_{10} 32 + \log_{10} 8)}{\log_{10} \frac{7}{10} + \log_{10} 7 - \log_{10} 49} \\
 &= \frac{10 \log_{10} (\frac{8}{10} \times \frac{1}{32} \times 8)}{\log_{10} (\frac{7}{10} \times 7 \times \frac{1}{49})} \\
 &= \frac{10 \log_{10} \frac{2}{10}}{\log_{10} \frac{1}{10}} = \frac{10(\log_{10} 2 - 1)}{\log_{10} 10^{-1}} \\
 &= \frac{10(0.301 - 1)}{-1} = 6.99
 \end{aligned}$$

8. $\log_{x-3}(-x^2+6x-8)$ 이 정의되기 위한 실수 x 의 값의 범위를 구하면?

① $3 < x < 4$

② $5 < x < 7$

③ $-1 < x < 3$

④ $x > 0$

⑤ $2 < x < 5$

해설

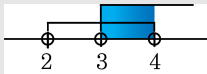
$$x - 3 \neq 1, x - 3 > 0,$$

$$-x^2 + 6x - 8 > 0 \text{ 이므로}$$

$$x \neq 4, x > 3$$

$$x^2 - 6x + 8 < 0$$

$$2 < x < 4$$



$$\therefore 3 < x < 4$$

9. $5^{\log_5 2 + 3 \log_5 3 - \log_5 6}$ 의 값은?

① 1

② 3

③ 5

④ 7

⑤ 9

해설

$$\begin{aligned} & 5^{\log_5 2 + 3 \log_5 3 - \log_5 6} \\ &= 5^{\log_5 2 + \log_5 3^3 - \log_5 6} \\ &= 5^{\log_5 \frac{2 \times 3^3}{6}} = 5^{\log_5 3^2} = 9 \end{aligned}$$

10. 다음 상용로그표를 이용하여 $\log \sqrt[3]{0.123}$ 의 소수 부분을 구하여라.

수	0	1	2	3	4	5	6	7	8	9
1.0	.0000	.0043	.0086	.0128	.0170	.0212	.0253	.0294	.0334	.0374
1.1	.0414	.0453	.0492	.0531	.0569	.0607	.0645	.0682	.0719	.0755
1.2	.0792	.0828	.0864	.0899	.0934	.0969	.1004	.1038	.1072	.1106
1.3	.1139	.1173	.1206	.1239	.1271	.1303	.1335	.1367	.1399	.1430
1.4	.1461	.1492	.1523	.1553	.1584	.1614	.1644	.1673	.1703	.1732

▶ 답 :

▷ 정답 : 0.6966

해설

상용로그표에서 $\log 1.23 = 0.0899$ 이므로

$$\begin{aligned}
 \log \sqrt[3]{0.123} &= \frac{1}{3} \log 0.123 = \frac{1}{3} \log 1.23 \times 10^{-1} \\
 &= \frac{1}{3} (\log 1.23 - 1) = \frac{1}{3} (0.0899 - 1) \\
 &= -0.3034 = -1 + 0.6966
 \end{aligned}$$

따라서 $\log \sqrt[3]{0.123}$ 의 소수 부분은 0.6966이다.