

1. 다음 수들을 소수로 나타낼 때 순환하지 않는 무한소수가 되는 것은?

① $0.\dot{6} + \sqrt{3}$

② $\frac{3}{\sqrt{4}}$

③ $\sqrt{0.25}$

④ $\frac{1}{3}$

⑤ $\sqrt{\frac{9}{4}}$

해설

② $\frac{3}{2}$ ③ $\frac{1}{2}$ ④ $\frac{1}{3} = 0.3333 \cdots$ ⑤ $\frac{3}{2}$

2. 다음 식을 간단히 한 것 중 값이 나머지 한 개와 다른 하나를 고르면?

$\textcircled{\tiny{㉠}} \quad 10 \div \sqrt{10} \div \sqrt{5}$

$\textcircled{\tiny{㉡}} \quad 4 \div \frac{1}{\sqrt{10}} \div 4\sqrt{5}$

$\textcircled{\tiny{㉢}} \quad \frac{\sqrt{3}}{\sqrt{5}} \div \frac{1}{\sqrt{20}} \div \sqrt{6}$

$\textcircled{\tiny{㉣}} \quad \sqrt{3} \div \sqrt{5} \div \frac{\sqrt{6}}{\sqrt{20}}$

$\textcircled{\tiny{㉤}} \quad \sqrt{9} \div \sqrt{75} \div \frac{1}{\sqrt{3}}$

①

㉠

②

㉣

③

㉡

④

㉤

⑤

㉢

해설

$\textcircled{\tiny{㉠}} \quad 10 \div \sqrt{10} \div \sqrt{5}$
 $= \frac{10}{\sqrt{10} \times \sqrt{5}} = \frac{\sqrt{100}}{\sqrt{50}} = \sqrt{2}$

$\textcircled{\tiny{㉣}} \quad \sqrt{3} \div \sqrt{5} \div \frac{\sqrt{6}}{\sqrt{20}}$
 $= \frac{\sqrt{3}}{\sqrt{5}} \times \frac{\sqrt{20}}{\sqrt{6}} = \sqrt{2}$

$\textcircled{\tiny{㉡}} \quad 4 \div \frac{1}{\sqrt{10}} \div 4\sqrt{5}$
 $= \frac{4 \times \sqrt{10}}{4\sqrt{5}} = \sqrt{2}$

$\textcircled{\tiny{㉤}} \quad \sqrt{9} \div \sqrt{75} \div \frac{1}{\sqrt{3}}$
 $= \frac{\sqrt{9} \times \sqrt{3}}{\sqrt{75}} = \frac{3}{5}$

$\textcircled{\tiny{㉢}} \quad \frac{\sqrt{3}}{\sqrt{5}} \div \frac{1}{\sqrt{20}} \div \sqrt{6}$
 $= \frac{\sqrt{3} \times \sqrt{20}}{\sqrt{5} \times \sqrt{6}} = \frac{\sqrt{4}}{\sqrt{2}} = \sqrt{2}$

3. 다음 수를 근호 안의 수가 가장 작은 자연수가 되도록 $a\sqrt{b}$ 의 꼴로 나타낸 것 중 옳은 것은?

① $\sqrt{\frac{5}{9}} = \frac{5\sqrt{5}}{3}$ ② $\sqrt{0.05} = \frac{\sqrt{5}}{20}$ ③ $\sqrt{0.24} = \frac{\sqrt{6}}{5}$
④ $\sqrt{\frac{4}{81}} = \frac{\sqrt{2}}{7}$ ⑤ $\sqrt{\frac{12}{16}} = \frac{\sqrt{3}}{4}$

해설

① $\sqrt{\frac{5}{9}} = \frac{\sqrt{5}}{3}$
② $\sqrt{0.05} = \frac{\sqrt{5}}{10}$
④ $\sqrt{\frac{4}{81}} = \frac{2}{9}$
⑤ $\sqrt{\frac{12}{16}} = \frac{\sqrt{3}}{2}$

4. $\sqrt{108} - \sqrt{48} - \sqrt{27} + \sqrt{24}$ 를 $a\sqrt{3} + b\sqrt{6}$ 의 꼴로 고칠 때, $a - b$ 의 값은?

① -3 ② -1 ③ 0 ④ 1 ⑤ 3

해설

$$\begin{aligned} & \sqrt{108} - \sqrt{48} - \sqrt{27} + \sqrt{24} \\ &= 6\sqrt{3} - 4\sqrt{3} - 3\sqrt{3} + 2\sqrt{6} \\ &= -\sqrt{3} + 2\sqrt{6} \\ \therefore a - b &= -1 - 2 = -3 \end{aligned}$$

5. 다항식 $(m+n)^2 - 2(m+n)m - 8m^2$ 을 다항식 두 개의 곱으로 나타낼 때 일차식들의 합은?

① 0 ② $-2n$ ③ $m+n$ ④ $2n$ ⑤ $2m$

해설

$m+n = X$ 로 치환하면

$$\begin{aligned} X^2 - 2mX - 8m^2 &= (X - 4m)(X + 2m) \\ &= (m + n - 4m)(m + n + 2m) \\ &= (n - 3m)(3m + n) \end{aligned}$$

$$\therefore (n - 3m) + (3m + n) = 2n$$

6. 다음 중 $(x^2-2x-5)(x^2-2x-6)-6$ 이 $(x+a)(x+b)(x+c)(x+d)$ 로 인수분해 될 때, $a+b+c+d$ 의 값은?

① -4 ② -10 ③ 7 ④ 10 ⑤ 4

해설

$$\begin{aligned}x^2-2x &= t \text{ 라 하면} \\(t-5)(t-6)-6 \\&= t^2-11t+24 \\&= (t-3)(t-8) \\&= (x^2-2x-3)(x^2-2x-8) \\&= (x-3)(x+1)(x+2)(x-4) \\\therefore a+b+c+d &= -3+1+2-4 = -4\end{aligned}$$

7. $(x-1)(x-3)(x-5)(x-7)+k$ 가 완전제곱식이 되도록 상수 k 의 값은?

① 2

② 4

③ 6

④ 11

⑤ 16

해설

$$\begin{aligned} & (x-1)(x-7)(x-3)(x-5)+k \\ &= (x^2-8x+7)(x^2-8x+15)+k \\ & x^2-8x=A \text{로 놓으면,} \\ & (A+7)(A+15)+k \\ &= A^2+22A+105+k=(A+11)^2 \\ & \therefore 105+k=11^2=121 \\ & \therefore k=16 \end{aligned}$$

8. 실수 a, b 에 대하여 $a < 0, ab < 0$ 일 때, $\sqrt{(2a-b)^2} + \sqrt{a^2} - \sqrt{(b-a)^2}$ 을 간단히 하면?

① $-4a + 2b$

② $-2a - 2b$

③ $-2a + 2b$

④ $-2a$

⑤ $4a - 2b$

해설

$a < 0, b > 0$ 이므로 $2a - b < 0, b - a > 0$

$$\sqrt{(2a-b)^2} + \sqrt{a^2} - \sqrt{(b-a)^2}$$

$$= |2a - b| + |a| - |b - a|$$

$$= -2a + b - a - b + a = -2a$$

9. $0 < a < 1$ 일 때, 다음 보기 중 옳은 것은 몇 개인가?

보기

- $\textcircled{\text{㉠}} \ a < \sqrt{a}$
- $\textcircled{\text{㉡}} \ a < \frac{1}{a}$
- $\textcircled{\text{㉢}} \ \sqrt{a^2} = a$
- $\textcircled{\text{㉣}} \ \frac{1}{a} < \sqrt{a}$

- ① 없다
- ② 1 개
- ③ 2 개
- ④ 3 개**
- ⑤ 4 개

해설

$0 < a < 1$ 이므로 $a = \frac{1}{4}$ 라고 생각하고 대입하면

$\textcircled{\text{㉠}} \ \frac{1}{4} < \sqrt{\frac{1}{4}} \left(= \frac{1}{2} \right) \text{ (○)}$

$\textcircled{\text{㉡}} \ \frac{1}{4} < \frac{1}{\frac{1}{4}} (= 4) \text{ (○)}$

$\textcircled{\text{㉢}} \ a > 0$ 이므로 $\sqrt{a^2} = a \text{ (○)}$

$\textcircled{\text{㉣}} \ \frac{1}{\frac{1}{4}} (= 4) > \sqrt{\frac{1}{4}} = \frac{1}{2} \text{ (×)}$

$\therefore \textcircled{\text{㉠}}, \textcircled{\text{㉡}}, \textcircled{\text{㉢}}$

10. 두 실수 a, b 가 $a = \sqrt{8} - 3$, $b = -\sqrt{7} + \sqrt{8}$ 일 때, 다음 중 옳은 것은?

① $a - b > 0$

② $b - a < 0$

③ $b + \sqrt{7} > 3$

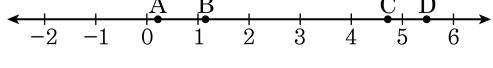
④ $ab > 0$

⑤ $a + 1 > 0$

해설

$$\begin{aligned} a - b &= \sqrt{8} - 3 - (-\sqrt{7} + \sqrt{8}) \\ \textcircled{1} \quad &= \sqrt{7} - 3 \\ &= \sqrt{7} - \sqrt{9} < 0 \\ \therefore a - b &< 0 \\ b - a &= -\sqrt{7} + \sqrt{8} - (\sqrt{8} - 3) \\ \textcircled{2} \quad &= -\sqrt{7} + 3 \\ &= \sqrt{9} - \sqrt{7} > 0 \\ \therefore b - a &> 0 \\ \textcircled{3} \quad (\text{좌변}) &= b + \sqrt{7} = -\sqrt{7} + \sqrt{8} + \sqrt{7} = \sqrt{8} \\ (\text{우변}) &= 3 = \sqrt{9} \\ \therefore b + \sqrt{7} &< 3 \\ \textcircled{4} \quad a &= \sqrt{8} - 3 = \sqrt{8} - \sqrt{9} < 0 \\ b &= \sqrt{8} - \sqrt{7} > 0 \\ \therefore ab &< 0 \\ a + 1 &= (\sqrt{8} - 3) + 1 \\ \textcircled{5} \quad &= \sqrt{8} - 2 \\ &= \sqrt{8} - \sqrt{4} > 0 \\ \therefore a + 1 &> 0 \end{aligned}$$

11. 다음 수직선 위의 점 A, B, C, D에 대응하는 수는 $\sqrt{12}+2, 3\sqrt{2}-4, 4-2\sqrt{2}, 3+\sqrt{3}$ 이다. 점 A, B, C, D에 대응하는 수를 각각 a, b, c, d 라 할 때, 다음 중 틀린 것은?



- ① $a+b=\sqrt{2}$ ② $c+d=3\sqrt{3}+5$
③ $3(a+b)>c+d$ ④ $b-a>0$
⑤ $c-d<0$

해설

$$\begin{aligned}\sqrt{12}+2 &= 5. \times \times \times \leftarrow d \\ 3\sqrt{2}-4 &= 0. \times \times \times \leftarrow a \\ 4-2\sqrt{2} &= 1. \times \times \times \leftarrow b \\ 3+\sqrt{3} &= 4. \times \times \times \leftarrow c \\ \textcircled{3} \quad a+b &= \sqrt{2} \rightarrow 3(a+b) = 3\sqrt{2} \\ c+d &= 3\sqrt{3}+5 \\ \therefore 3(a+b)-(c+d) &= 3\sqrt{2}-(3\sqrt{3}+5) \\ &= \sqrt{18}-\sqrt{27}-5 < 0 \\ \therefore 3(a+b) &< c+d\end{aligned}$$

12. $8\sqrt{22} \times \sqrt{\frac{26}{11}}$ 을 계산하여 근호 안의 수가 가장 작은 수가 되도록 $a\sqrt{b}$ 꼴로 나타낼 때, $a - b$ 의 값을 구하면?

① 1 ② 3 ③ 5 ④ 7 ⑤ 9

해설

$$8\sqrt{22} \times \sqrt{\frac{26}{11}} = 8\sqrt{\frac{11 \times 2 \times 2 \times 13}{11}} = 16\sqrt{13}$$

$$\therefore a = 16, b = 13$$

$$\therefore a - b = 16 - 13 = 3$$

13. 다음 중 옳지 않은 것은?

- ① $\sqrt{32} - 2\sqrt{24} - \sqrt{2}(1 + 2\sqrt{3}) = 3\sqrt{2} - 6\sqrt{6}$
- ② $\frac{3}{\sqrt{2}}(3 + 2\sqrt{6}) - 3\left(\sqrt{3} + \frac{\sqrt{2}}{2}\right) = 3\sqrt{2} + 3\sqrt{3}$
- ③ $\sqrt{6}(\sqrt{24} - 3\sqrt{2}) = 12 - 6\sqrt{3}$
- ④ $\sqrt{(-6)^2} + (-2\sqrt{2})^2 - \sqrt{3}\left(2\sqrt{48} - \sqrt{\frac{1}{3}}\right) = -10 + \sqrt{3}$
- ⑤ $\frac{4}{\sqrt{2}} - \sqrt{2}(2 - \sqrt{2}) = 2$

해설

① $\sqrt{32} - 2\sqrt{24} - \sqrt{2}(1 + 2\sqrt{3})$
 $= 4\sqrt{2} - 4\sqrt{6} - (\sqrt{2} + 2\sqrt{6})$
 $= 4\sqrt{2} - 4\sqrt{6} - \sqrt{2} - 2\sqrt{6}$
 $= 3\sqrt{2} - 6\sqrt{6}$

② $\frac{3}{\sqrt{2}}(3 + 2\sqrt{6}) - 3\left(\sqrt{3} + \frac{\sqrt{2}}{2}\right)$
 $= \frac{9}{\sqrt{2}} + 6\sqrt{3} - 3\sqrt{3} - \frac{3\sqrt{2}}{2}$
 $= \frac{9\sqrt{2}}{2} + 6\sqrt{3} - 3\sqrt{3} - \frac{3\sqrt{2}}{2}$
 $= 3\sqrt{2} + 3\sqrt{3}$

③ $\sqrt{6}(\sqrt{24} - 3\sqrt{2})$
 $= \sqrt{6}(2\sqrt{6} - 3\sqrt{2})$
 $= 2 \times (\sqrt{6})^2 - \sqrt{6} \times 3\sqrt{2}$
 $= 12 - 3\sqrt{12} = 12 - 6\sqrt{3}$

④ $\sqrt{(-6)^2} + (-2\sqrt{2})^2 - \sqrt{3}\left(2\sqrt{48} - \sqrt{\frac{1}{3}}\right)$
 $= 6 + 8 - \sqrt{3}\left(8\sqrt{3} - \frac{1}{\sqrt{3}}\right)$
 $= 14 - 24 + 1 = -9$

⑤ $\frac{4}{\sqrt{2}} - \sqrt{2}(2 - \sqrt{2})$
 $= \frac{4\sqrt{2}}{2} - 2\sqrt{2} + 2 = 2$

14. $\sqrt{x} = a - 1$ 이고, $-1 < a < 3$ 일 때, $\sqrt{x+4a} + \sqrt{x-4a+8}$ 을 간단히 하면?

① 1 ② 2 ③ 3 ④ 4 ⑤ 5

해설

$$\begin{aligned} & \sqrt{x} = a - 1 \text{ 의 양변을 제곱하면 } x = (a - 1)^2 \\ & \sqrt{a^2 + 2a + 1} + \sqrt{a^2 - 6a + 9} \\ &= \sqrt{(a + 1)^2} + \sqrt{(a - 3)^2} \\ &= |a + 1| + |a - 3| \\ &= a + 1 - a + 3 = 4 \end{aligned}$$

15. 다음 중 $x^2y^2 - x^2y - xy^2 + xy$ 의 인수는?

- ① $x - 1$ ② $x + 1$ ③ $y + 1$ ④ $x + y$ ⑤ $x - y$

해설

$$\begin{aligned}x^2y^2 - x^2y - xy^2 + xy &= xy(xy - x - y + 1) \\&= xy\{x(y - 1) - (y - 1)\} \\&= xy(x - 1)(y - 1)\end{aligned}$$