

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

① 4

② 6

③ 8

④ 10

⑤ 12

해설

$$x = \frac{2(\sqrt{6}+2)}{(\sqrt{6}-2)(\sqrt{6}+2)} = \frac{2(\sqrt{6}+2)}{2} = \sqrt{6}+2,$$

$$y = \frac{2(\sqrt{6}-2)}{(\sqrt{6}+2)(\sqrt{6}-2)} = \frac{2(\sqrt{6}-2)}{2} = \sqrt{6}-2$$

$$\begin{aligned} & (x+y)^2 - (x-y)^2 \\ &= (\sqrt{6}+2 + \sqrt{6}-2)^2 - (\sqrt{6}+2 - \sqrt{6}-2)^2 \\ &= (2\sqrt{6})^2 - 4^2 = 24 - 16 = 8 \end{aligned}$$

2. $\sqrt{18}+3$ 과 $\sqrt{15}-2$ 중 큰 수를 a , $2\sqrt{7}$ 과 $3\sqrt{2}-1$ 중 작은 수를 b 라고 할 때, $b-a$ 의 값을 구하면?

① 4

② 2

③ 0

④ -2

⑤ -4

해설

$$\textcircled{1} \quad \sqrt{18}+3-(\sqrt{15}-2)=\sqrt{18}+3-\sqrt{15}+2>0$$

$$\therefore \sqrt{18}+3>\sqrt{15}-2$$

$$\textcircled{2} \quad 2\sqrt{7}-(3\sqrt{2}-1)=2\sqrt{7}-3\sqrt{2}+1=\sqrt{28}-\sqrt{18}+1>0$$

$$\therefore 2\sqrt{7}>3\sqrt{2}-1$$

$$\therefore a=\sqrt{18}+3=3\sqrt{2}+3, b=3\sqrt{2}-1$$

$$b-a=3\sqrt{2}-1-(3\sqrt{2}+3)=-4 \text{ 이다.}$$

3. 다음 계산 중 옳은 것은?

$$\textcircled{1} \frac{6}{\sqrt{3}}(\sqrt{3} - \sqrt{2}) + \frac{\sqrt{8} - 2\sqrt{3}}{\sqrt{2}} = 8 + 3\sqrt{2}$$

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

$$\textcircled{3} (\sqrt{63} - \sqrt{35}) \div \sqrt{7} = 2 - \sqrt{5}$$

$$\textcircled{4} \sqrt{3}\left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}}\right) + \sqrt{3}\left(\frac{2\sqrt{2}}{3} - \frac{1}{\sqrt{3}}\right) = \frac{5\sqrt{6}}{6}$$

$$\textcircled{5} \frac{12 + 3\sqrt{6}}{\sqrt{3}} = 4\sqrt{3} + 3\sqrt{2}$$

해설

$$\begin{aligned} \textcircled{1} \quad & \frac{6}{\sqrt{3}}(\sqrt{3} - \sqrt{2}) + \frac{\sqrt{8} - 2\sqrt{3}}{\sqrt{2}} \\ &= \frac{6\sqrt{3}(\sqrt{3} - \sqrt{2})}{3} + \frac{4 - 2\sqrt{6}}{2} \\ &= 2\sqrt{3}(\sqrt{3} - \sqrt{2}) + (2 - \sqrt{6}) = 8 - 3\sqrt{6} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & \sqrt{32} - 2\sqrt{24} - \sqrt{2}(1 + 2\sqrt{3}) \\ &= 4\sqrt{2} - 4\sqrt{6} - \sqrt{2} - 2\sqrt{6} = 3\sqrt{2} - 6\sqrt{6} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad & (\sqrt{63} - \sqrt{35}) \div \sqrt{7} = \frac{\sqrt{63} - \sqrt{35}}{\sqrt{7}} \\ &= \sqrt{9} - \sqrt{5} = 3 - \sqrt{5} \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad & \sqrt{3}\left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}}\right) + \sqrt{3}\left(\frac{2\sqrt{2}}{3} - \frac{1}{\sqrt{3}}\right) \\ &= \left(\frac{\sqrt{3}}{\sqrt{2}} + \frac{\sqrt{3}}{\sqrt{3}}\right) + \left(\frac{\sqrt{3} \times 2\sqrt{2}}{3} - \frac{\sqrt{3}}{\sqrt{3}}\right) \\ &= \left(\frac{\sqrt{2} \times \sqrt{3}}{2} + 1\right) + \left(\frac{2\sqrt{6}}{3} - 1\right) \\ &= \left(\frac{\sqrt{6}}{2} + \frac{2\sqrt{6}}{3}\right) + (1 - 1) = \frac{7\sqrt{6}}{6} \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad & \frac{12 + 3\sqrt{6}}{\sqrt{3}} = \frac{\sqrt{3}(12 + 3\sqrt{6})}{3} \\ &= \frac{12\sqrt{3} + 9\sqrt{2}}{3} = 4\sqrt{3} + 3\sqrt{2} \end{aligned}$$

4. $a - b = \sqrt{3} + 2$ 일 때, $a^2 + b^2 - 2ab - 4a + 4b + 4$ 의 값은?

① 1

② 2

③ 3

④ 4

⑤ 5

해설

$$\begin{aligned}(\text{준식}) &= (a - b)^2 - 4(a - b) + 4 \\&= \{(a - b)^2 - 2\}^2 \\&= \{(\sqrt{3} + 2) - 2\}^2 \\&= 3\end{aligned}$$

5. 넓이가 각각 $\frac{1}{2-\sqrt{3}}$, $\frac{1}{2+\sqrt{3}}$ 인 두 정사각형이 있다. 큰 정사각형의 한 변의 길이를 x , 작은 정사각형의 한 변의 길이를 y 라 할 때, $x^3y + xy^3$ 의 값을 구하면?

① 4

② 8

③ 14

④ $4\sqrt{3}$

⑤ $8\sqrt{3}$

해설

$$x^2 = \frac{1}{2-\sqrt{3}} = 2 + \sqrt{3}, y^2 = \frac{1}{2+\sqrt{3}} = 2 - \sqrt{3}$$

$$(xy)^2 = x^2y^2 = 2^2 - (\sqrt{3})^2 = 1$$

$$xy = 1 (\because x > 0, y > 0)$$

$$\text{따라서, } x^3y + xy^3 = xy(x^2 + y^2) = 1 \times 4 = 4 \text{ 이다.}$$