平方根・２重根号 No.1

次の式の2重根号を外して簡単にしなさい。

(1) $\sqrt{3 + 2\sqrt{2}}$  (2) $\sqrt{7 - 2\sqrt{10}}$

(3) $\sqrt{5 + \sqrt{24}}$  (4) $\sqrt{5 - \sqrt{21}}$
平方根・2重根号 No.1（解答）

(1) \[ \sqrt{3 + 2\sqrt{2}} \]
\[ = \sqrt{(2 + 1) + 2\sqrt{2} \cdot 1} \]
\[ = \sqrt{2} + 1 \]

(2) \[ \sqrt{7 - 2\sqrt{10}} \]
\[ = \sqrt{(5 + 2) - 2\sqrt{5} \cdot 2} \]
\[ = \sqrt{5} - \sqrt{2} \]

(3) \[ \sqrt{5 + \sqrt{24}} \]
\[ = \sqrt{5 + 2\sqrt{6}} \]
\[ = \sqrt{(3 + 2) + 2\sqrt{3} \cdot 2} \]
\[ = \sqrt{3} + \sqrt{2} \]

(4) \[ \sqrt{5 - \sqrt{21}} \]
\[ = \sqrt{\frac{10 - 2\sqrt{21}}{2}} \]
\[ = \sqrt{\frac{(7 + 3) - 2\sqrt{7} \cdot 3}{2}} \]
\[ = \frac{\sqrt{7} - \sqrt{3}}{\sqrt{2}} \]
\[ = \frac{\sqrt{14} - \sqrt{6}}{2} \]
平方根・2重根号 No.2

次の式の2重根号を外して簡単にしなさい。

(1) \( \sqrt{8 - 2\sqrt{15}} \)  (2) \( \sqrt{6 - \sqrt{35}} \)

(3) \( \sqrt{9 + 2\sqrt{14}} \)  (4) \( \sqrt{12 + \sqrt{64}} \)
平方根・2重根号 No.2（解答）

(1) $\sqrt{8 - 2\sqrt{15}}$
    \[= \sqrt{(5 + 3) - 2\sqrt{5 \cdot 3}}\]
    \[= \sqrt{5 - \sqrt{3}}\]

(2) $\sqrt{6 - \sqrt{35}}$
    \[= \sqrt{\frac{12 - 2\sqrt{35}}{2}}\]
    \[= \sqrt{\frac{(7 + 5) - 2\sqrt{7 \cdot 5}}{\sqrt{2}}}\]
    \[= \frac{\sqrt{7 - \sqrt{5}}}{\sqrt{2}}\]
    \[= \frac{\sqrt{14 - \sqrt{10}}}{2}\]

(3) $\sqrt{9 + 2\sqrt{14}}$
    \[= \sqrt{(7 + 2) + 2\sqrt{7 \cdot 2}}\]
    \[= \sqrt{7 + \sqrt{2}}\]

(4) $\sqrt{12 + \sqrt{80}}$
    \[= \sqrt{12 + 2\sqrt{20}}\]
    \[= \sqrt{(10 + 2) + 2\sqrt{10 \cdot 2}}\]
    \[= \sqrt{10 + \sqrt{2}}\]
    \[= \sqrt{10 + \sqrt{2}}\]