

平方根 [根号をふくむ式の展開]

<演習問題>

次の計算をせよ。

(1) $\sqrt{2}(\sqrt{3} + \sqrt{5})$

(2) $\sqrt{2}(3 + \sqrt{7})$

(3) $\sqrt{3}(\sqrt{3} + \sqrt{6})$

(4) $\sqrt{2}(4\sqrt{6} + \sqrt{18})$

(5) $\sqrt{5}(10\sqrt{10} + 3\sqrt{15})$

(6) $(\sqrt{3} + 5)^2$

(7) $(\sqrt{7} - 2)^2$

(8) $(\sqrt{6} + 2)(\sqrt{6} - 2)$

(9) $(\sqrt{6} + 2)(\sqrt{6} + 5)$

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

(11) $(\sqrt{7} + \sqrt{6})(\sqrt{7} - \sqrt{6})$

(12) $(\sqrt{15} - \sqrt{6})^2$

(13) $(\sqrt{5} + 7)(\sqrt{5} - 1)$

(14) $(3\sqrt{6} + \sqrt{3})(\sqrt{2} + 4)$

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次の計算をせよ。

(1) $\sqrt{2}(\sqrt{3} + \sqrt{5})$

$$\begin{aligned}\sqrt{2}(\sqrt{3} + \sqrt{5}) &= \sqrt{2 \times 3} + \sqrt{2 \times 5} \\ &= \sqrt{6} + \sqrt{10}\end{aligned}$$

(2) $\sqrt{2}(3 + \sqrt{7})$

$$\begin{aligned}\sqrt{2}(3 + \sqrt{7}) &= \sqrt{2} \times 3 + \sqrt{2 \times 7} \\ &= 3\sqrt{2} + \sqrt{14}\end{aligned}$$

(3) $\sqrt{3}(\sqrt{3} + \sqrt{6})$

$$\begin{aligned}\sqrt{3}(\sqrt{3} + \sqrt{6}) &= \sqrt{3 \times 3} + \sqrt{3 \times 6} \\ &= 3 + 3\sqrt{2}\end{aligned}$$

(4) $\sqrt{2}(4\sqrt{6} + \sqrt{18})$

$$\begin{aligned}\sqrt{2}(4\sqrt{6} + \sqrt{18}) &= 4\sqrt{2 \times 6} + \sqrt{2 \times 18} \\ &= 8\sqrt{3} + 6\end{aligned}$$

(5) $\sqrt{5}(10\sqrt{10} + 3\sqrt{15})$

$$\begin{aligned}\sqrt{5}(10\sqrt{10} + 3\sqrt{15}) &= 10\sqrt{5 \times 10} + 3\sqrt{5 \times 15} \\ &= 50\sqrt{2} + 15\sqrt{3}\end{aligned}$$

(6) $(\sqrt{3} + 5)^2$

$$\begin{aligned}(\sqrt{3} + 5)^2 &= (\sqrt{3})^2 + 2 \times \sqrt{3} \times 5 + 5^2 \\ &= 3 + 10\sqrt{3} + 25 \\ &= 28 + 10\sqrt{3}\end{aligned}$$

(7) $(\sqrt{7} - 2)^2$

$$\begin{aligned}(\sqrt{7} - 2)^2 &= (\sqrt{7})^2 - 2 \times \sqrt{7} \times 2 + 2^2 \\ &= 7 - 4\sqrt{7} + 4 \\ &= 11 - 4\sqrt{7}\end{aligned}$$

(8) $(\sqrt{6} + 2)(\sqrt{6} - 2)$

$$\begin{aligned}(\sqrt{6} + 2)(\sqrt{6} - 2) &= (\sqrt{6})^2 - 2^2 \\ &= 6 - 4 \\ &= 2\end{aligned}$$

(9) $(\sqrt{6} + 2)(\sqrt{6} + 5)$

$$\begin{aligned}(\sqrt{6} + 2)(\sqrt{6} + 5) &= (\sqrt{6})^2 + (2 + 5)\sqrt{6} + 2 \times 5 \\ &= 6 + 7\sqrt{6} + 10 \\ &= 16 + 7\sqrt{6}\end{aligned}$$

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

$$\begin{aligned}(\sqrt{3} + \sqrt{7})^2 &= (\sqrt{3})^2 + 2 \times \sqrt{3} \times \sqrt{7} + (\sqrt{7})^2 \\ &= 3 + 2\sqrt{21} + 7 \\ &= 10 + 2\sqrt{21}\end{aligned}$$

(11) $(\sqrt{7} + \sqrt{6})(\sqrt{7} - \sqrt{6})$

$$\begin{aligned}(\sqrt{7} + \sqrt{6})(\sqrt{7} - \sqrt{6}) &= (\sqrt{7})^2 - (\sqrt{6})^2 \\ &= 7 - 6 \\ &= 1\end{aligned}$$

(12) $(\sqrt{15} - \sqrt{6})^2$

$$\begin{aligned}(\sqrt{15} - \sqrt{6})^2 &= (\sqrt{15})^2 - 2 \times \sqrt{15} \times \sqrt{6} + (\sqrt{6})^2 \\ &= 15 - 6\sqrt{10} + 6 \\ &= 21 - 6\sqrt{10}\end{aligned}$$

(13) $(\sqrt{5} + 7)(\sqrt{5} - 1)$

$$\begin{aligned}(\sqrt{5} + 7)(\sqrt{5} - 1) &= (\sqrt{5})^2 + (7 - 1)\sqrt{5} \\ &\quad + 7 \times (-1) \\ &= 5 + 6\sqrt{5} - 7 \\ &= -2 + 6\sqrt{5}\end{aligned}$$

(14) $(3\sqrt{6} + \sqrt{3})(\sqrt{2} + 4)$

$$\begin{aligned}(3\sqrt{6} + \sqrt{3})(\sqrt{2} + 4) &= 3\sqrt{6 \times 2} + 3\sqrt{6} \times 4 \\ &\quad + \sqrt{3 \times 2} + \sqrt{3} \times 4 \\ &= 6\sqrt{3} + 12\sqrt{6} \\ &\quad + \sqrt{6} + 4\sqrt{3} \\ &= 10\sqrt{3} + 13\sqrt{6}\end{aligned}$$