

反射テスト 平方根 指数法則 代入 02

1. 次の計算をせよ。(S級1分30秒, A級2分50秒, B級4分20秒, C級6分)

(1) $x = 2 + \sqrt{2}$, $y = 2 - \sqrt{2}$ のとき,

$$\frac{2}{3}x^3y^3 \div \left(-\frac{4}{3}x^3y^2\right)^2 \times \frac{x^4y^2}{3}$$

(2) $a = 2\sqrt{6} - 3\sqrt{3}$, $b = 2\sqrt{6} + 3\sqrt{3}$ のとき,

$$\left(-\frac{1}{2}a^3b^2\right)^5 \div \left(\frac{1}{3}a^3b^6\right)^3 \div \left(-\frac{\sqrt{6}a^4}{8b^3}\right)^2$$

2. 次の計算をせよ。(S級1分55秒, A級3分30秒, B級5分, C級7分)

(1) $x = 4 + 2\sqrt{2}$, $y = 4 - 2\sqrt{2}$ のとき,

$$\frac{2}{3}x^4y^3 \div \left(-\frac{2}{3}x^4y^3\right)^2 \times \left(-\frac{x^5y^4}{18}\right)$$

(2) $a = 3\sqrt{2} - 2\sqrt{6}$, $b = 3\sqrt{2} + 2\sqrt{6}$ のとき,

$$\left(-\frac{2}{3}a^4b^2\right)^4 \div \left(-\frac{1}{6}a^4b^6\right)^3 \div \left(-\frac{4\sqrt{6}a^3}{3b^4}\right)^2$$

反射テスト 平方根 指数法則 代入 02 解答解説

1. 次の計算をせよ。(S級1分30秒, A級2分50秒, B級4分20秒, C級6分)

★文字式のかけ算・割り算

- ① () を外す.
- ② **なるべく早く全体の「+」「-」を決定する.**
- ③ 係数の計算をする.
- ④ 文字ごとに計算をする.

★文字式への代入 代入は文字式の計算の後.

(1) $x = 2 + \sqrt{2}$, $y = 2 - \sqrt{2}$ のとき,

$$\begin{aligned} & \frac{2}{3}x^3y^3 \div \left(-\frac{4}{3}x^3y^2\right)^2 \times \frac{x^4y^2}{3} \\ &= \frac{2x^3y^3}{3} \div \left(+\frac{16x^6y^4}{9}\right) \times \frac{x^4y^2}{3} \\ &= \frac{2x^3y^3}{3} \times \frac{9}{16x^6y^4} \times \frac{x^4y^2}{3} \\ &= \frac{xy}{8} \\ &= \frac{1}{8} \times (2 + \sqrt{2})(2 - \sqrt{2}) \\ &= \frac{1}{8} \times (2^2 - \sqrt{2}^2) = \frac{1}{8} \times 2 = \frac{1}{4} \end{aligned}$$

(2) $a = 2\sqrt{6} - 3\sqrt{3}$, $b = 2\sqrt{6} + 3\sqrt{3}$ のとき,

$$\begin{aligned} & \left(-\frac{1}{2}a^3b^2\right)^5 \div \left(\frac{1}{3}a^3b^6\right)^3 \div \left(-\frac{\sqrt{6}a^4}{8b^3}\right)^2 \\ &= -\frac{a^{15}b^{10}}{32} \div \left(+\frac{a^9b^{18}}{27}\right) \div \left(+\frac{6a^8}{64b^6}\right) \\ &= -\frac{a^{15}b^{10}}{32} \times \frac{27}{a^9b^{18}} \times \frac{32b^6}{3a^8} \\ &= -\frac{9}{a^2b^2} \\ &= -9 \div (ab)^2 \\ &= -9 \div \{(2\sqrt{6} - 3\sqrt{3})(2\sqrt{6} + 3\sqrt{3})\}^2 \\ &= -9 \div \{(2\sqrt{6})^2 - (3\sqrt{3})^2\}^2 \\ &= -9 \div (24 - 27)^2 = -1 \end{aligned}$$

2. 次の計算をせよ。(S級1分55秒, A級3分30秒, B級5分, C級7分)

(1) $x = 4 + 2\sqrt{2}$, $y = 4 - 2\sqrt{2}$ のとき,

$$\begin{aligned} & \frac{2}{3}x^4y^3 \div \left(-\frac{2}{3}x^4y^3\right)^2 \times \left(-\frac{x^5y^4}{18}\right) \\ &= \frac{2x^4y^3}{3} \div \left(+\frac{4x^8y^6}{9}\right) \times \left(-\frac{x^5y^4}{18}\right) \\ &= -\frac{2x^4y^3}{3} \times \frac{9}{4x^8y^6} \times \frac{x^5y^4}{18} \\ &= -\frac{xy}{12} \\ &= -\frac{1}{12} \times (4 + 2\sqrt{2})(4 - 2\sqrt{2}) \\ &= -\frac{1}{12} \times \{4^2 - (2\sqrt{2})^2\} = -\frac{1}{12} \times 8 = -\frac{2}{3} \end{aligned}$$

(2) $a = 3\sqrt{2} - 2\sqrt{6}$, $b = 3\sqrt{2} + 2\sqrt{6}$ のとき,

$$\begin{aligned} & \left(-\frac{2}{3}a^4b^2\right)^4 \div \left(-\frac{1}{6}a^4b^6\right)^3 \div \left(-\frac{4\sqrt{6}a^3}{3b^4}\right)^2 \\ &= +\frac{16a^{16}b^8}{81} \div \left(-\frac{a^{12}b^{18}}{216}\right) \div \left(+\frac{96a^6}{9b^8}\right) \\ &= -\frac{16a^{16}b^8}{81} \times \frac{216}{a^{12}b^{18}} \times \frac{3b^8}{32a^6} \\ &= -\frac{4}{a^2b^2} \\ &= -4 \div (ab)^2 \\ &= -4 \div \{(3\sqrt{2} - 2\sqrt{6})(3\sqrt{2} + 2\sqrt{6})\}^2 \\ &= -4 \div \{(3\sqrt{2})^2 - (2\sqrt{6})^2\}^2 \\ &= -4 \div (18 - 24)^2 = -\frac{4}{36} = -\frac{1}{9} \end{aligned}$$