

$(a+b+c)^2$ を展開しなさい #20 その 3 例 2

数学が苦手な人はコツコツ計算しよう…

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$$\begin{aligned} & (a+b+c)^2 \\ = & (a+b+c)(a+b+c) \end{aligned}$$

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数学が苦手な人はコツコツ計算しよう…

$$\begin{aligned}& (a+b+c)^2 \\&= (a+b+c)(a+b+c) \\&= a \cdot a + a \cdot b + a \cdot c + b \cdot a + b \cdot b + b \cdot c + c \cdot a + c \cdot b + c \cdot c \\&= a^2 + ab + ac + ba + b^2 + bc + ca + cb + c^2 \\&= a^2 + ab + ca + ab + b^2 + bc + ca + bc + c^2 \\&= a^2 + b^2 + c^2 + 2ab + 2bc + 2ca \quad \boxed{\text{答}}\end{aligned}$$

置き換えると少しだけ楽になるかも…

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$a+b = A$ とおくと

$$\begin{aligned} & (a+b+2)^2 \\ &= (A + c)^2 \end{aligned}$$

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$$\begin{aligned} & (a+b+2)^2 \\ &= (A+c)^2 \\ &= A^2 + 2A + c + c^2 \end{aligned}$$

置き換えると少しだけ楽になるかも…

$a+b = A$ とおくと

$$\begin{aligned}& (a+b+2)^2 \\&= (A+c)^2 \\&= A^2 + 2Ac + c^2 \quad \text{元に戻す} \\&= (a+b)^2 + 2(a+b)c + c^2\end{aligned}$$

置き換えると少しだけ楽になるかも…

$a+b = A$ とおくと

$$\begin{aligned}& (a+b+2)^2 \\&= (A+c)^2 \\&= A^2 + 2A c + c^2 \quad \text{元に戻す} \\&= (a+b)^2 + 2(a+b)c + c^2 \\&= a^2 + 2ab + b^2 + 2ac + 2bc + c^2 \quad \boxed{\text{答}}\end{aligned}$$

余力がある人は暗記すればよいが…

$$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$$

無理な人はあきらめましょう

こうすれば少しあはマシ？

$$\begin{aligned} & (\textcolor{red}{\bullet} + \textcolor{blue}{\triangle} + \textcolor{green}{\square})^2 \\ &= \underbrace{\textcolor{red}{\bullet}^2 + \textcolor{blue}{\triangle}^2 + \textcolor{green}{\square}^2}_{2\times \text{乗}} + \underbrace{2 \textcolor{red}{\bullet}\textcolor{blue}{\triangle} + 2 \textcolor{blue}{\triangle}\textcolor{green}{\square} + 2 \textcolor{green}{\square}\textcolor{red}{\bullet}}_{2\times \text{かけ算}} \end{aligned}$$

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例題

$$(a+3b+2)^2$$

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$$\begin{aligned} & (\textcolor{red}{\bullet} + \textcolor{blue}{\triangle} + \textcolor{green}{\square})^2 \\ &= \underbrace{\textcolor{red}{\bullet}^2 + \textcolor{blue}{\triangle}^2 + \textcolor{green}{\square}^2}_{2 \times \text{乗}} + \underbrace{2 \textcolor{red}{\bullet}\textcolor{blue}{\triangle} + 2 \textcolor{blue}{\triangle}\textcolor{green}{\square} + 2 \textcolor{green}{\square}\textcolor{red}{\bullet}}_{2 \times \text{かけ算}} \end{aligned}$$

例題

$$(\textcolor{red}{a} + 3\textcolor{blue}{b} + 2)^2$$

こうすれば少しあはマシ？

$$(\textcolor{red}{\bullet} + \textcolor{blue}{\triangle} + \textcolor{green}{\square})^2 = \underbrace{\textcolor{red}{\bullet}^2 + \textcolor{blue}{\triangle}^2 + \textcolor{green}{\square}^2}_{2 \times \text{乗}} + \underbrace{2 \textcolor{red}{\bullet} \textcolor{blue}{\triangle} + 2 \textcolor{blue}{\triangle} \textcolor{green}{\square} + 2 \textcolor{green}{\square} \textcolor{red}{\bullet}}_{2 \times \text{かけ算}}$$

例題

$$(\textcolor{brown}{a} + 3b + 2)^2 = \underbrace{\textcolor{brown}{a}^2 + (3b)^2 + 2^2}_{2 \times \text{乗}} + \underbrace{2\textcolor{brown}{a} \cdot 3b + 2 \cdot 3b \cdot 2 + 2 \cdot 2 \cdot \textcolor{brown}{a}}_{2 \times \text{かけ算}}$$

こうすれば少しあはマシ？

$$\begin{aligned} & (a+3b+2)^2 \\ &= \underbrace{a^2 + (3b)^2 + 2^2}_{2 \times \text{乗}} + \underbrace{2a \cdot 3b + 2 \cdot 3b \cdot 2 + 2 \cdot 2 \cdot a}_{2 \times \text{かけ算}} \\ &= a^2 + 9b^2 + 4 + 6ab + 12b + 4a \quad \boxed{\text{答}} \end{aligned}$$

こうすれば少しあはマシ？

$$\begin{aligned} & (\bullet + \triangle + \square)^2 \\ &= \underbrace{\bullet^2 + \triangle^2 + \square^2}_{2 \text{ 乗}} + \underbrace{2 \bullet \triangle + 2 \triangle \square + 2 \square \bullet}_{2 \times \text{かけ算}} \end{aligned}$$

こうすれば少しあはマシ？

$$\begin{aligned} & (\textcolor{red}{\bullet} + \textcolor{blue}{\triangle} + \textcolor{green}{\square})^2 \\ &= \underbrace{\textcolor{red}{\bullet}^2 + \textcolor{blue}{\triangle}^2 + \textcolor{green}{\square}^2}_{2 \times \text{乗}} + \underbrace{2 \textcolor{red}{\bullet}\textcolor{blue}{\triangle} + 2 \textcolor{blue}{\triangle}\textcolor{green}{\square} + 2 \textcolor{green}{\square}\textcolor{red}{\bullet}}_{2 \times \text{かけ算}} \end{aligned}$$

例題

$$(a+2b-1)^2$$

こうすれば少しあはマシ？

$$\begin{aligned} & (\bullet + \triangle + \square)^2 \\ &= \underbrace{\bullet^2 + \triangle^2 + \square^2}_{2 \text{ 乗}} + \underbrace{2 \bullet \triangle + 2 \triangle \square + 2 \square \bullet}_{2 \times \text{かけ算}} \end{aligned}$$

例題

$$\begin{aligned} & (a + 2b - 1)^2 \\ &= \left(\color{red}{a} + \color{blue}{2b} + \color{green}{(-1)} \right)^2 \end{aligned}$$

こうすれば少しあはマシ？

$$\begin{aligned} & (\textcolor{red}{\bullet} + \textcolor{blue}{\triangle} + \textcolor{green}{\square})^2 \\ &= \underbrace{\textcolor{red}{\bullet}^2 + \textcolor{blue}{\triangle}^2 + \textcolor{green}{\square}^2}_{2 \times \text{乗}} + \underbrace{2 \textcolor{red}{\bullet} \textcolor{blue}{\triangle} + 2 \textcolor{blue}{\triangle} \textcolor{green}{\square} + 2 \textcolor{green}{\square} \textcolor{red}{\bullet}}_{2 \times \text{かけ算}} \end{aligned}$$

例題

$$\begin{aligned} & (a + 2b - 1)^2 \\ &= \left(\textcolor{red}{a} + \textcolor{blue}{2b} + (-1) \right)^2 \\ &= \underbrace{\textcolor{red}{a}^2 + (\textcolor{blue}{2b})^2 + (-1)^2}_{2 \times \text{乗}} + \underbrace{2 \textcolor{red}{a} \cdot \textcolor{blue}{2b} + 2 \cdot \textcolor{blue}{2b} \cdot (-1) + 2 \cdot (-1) \cdot \textcolor{red}{a}}_{2 \times \text{かけ算}} \end{aligned}$$

こうすれば少しあはマシ？

$$\begin{aligned}(a+2b-1)^2 \\&= \left(a+2b+(-1)\right)^2 \\&= a^2 + (2b)^2 + (-1)^2 + 2a \cdot 2b + 2 \cdot 2b \cdot (-1) + 2 \cdot (-1) \cdot a \\&= a^2 + 4b^2 + 1 + 4ab - 4b - 2a\end{aligned}$$

答