展開　演習編　解答

展開公式　一覧

$(a+b)(c+d) = ac+ad+bc+bd$
$(x+a)(x+b) = x^2+(a+b)x+ab$
$(a+b)^2 = a^2+2ab+b^2$
$(a-b)^2 = a^2-2ab+b^2$
$(a+b)(a-b) = a^2-b^2$
$(ax+b)(cx+d) = acx^2+(ad+bc)x+bd$
$(a+b)^3 = a^3+3a^2b+3ab^2+b^3$
$(a-b)^3 = a^3-3a^2b+3ab^2-b^3$
$(a+b)(a^2-ab+b^2) = a^3+b^3$
$(a-b)(a^2+ab+b^2) = a^3-b^3$
$(a+b+c)^2 = a^2+b^2+c^2+2ab+2bc+2ca$
$(a+b+c)(a^2+b^2+c^2-ab-bc-ca) = a^3+b^3+c^3-3abc$

1　以下の式を展開せよ.

(1)　$(x-1)^2$

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

(2)　$(x+6)^2$

$$\begin{aligned}(x+6)^2 &= (x+6)(x+6)\\ &= x^2+6x+6x+36\\ &= x^2+12x+36\end{aligned}$$

(3)　$(x-2)(x+3)$

$$\begin{aligned}(x-2)(x+3) &= x^2+3x-2x-6\\ &= x^2+x-6\end{aligned}$$

(4)　$(2x-3)^2$

$$\begin{aligned}&(2x-3)^2\\ &= (2x-3)(2x-3)\\ &= 4x^2-6x-6x+9\\ &= 4x^2-12x+9\end{aligned}$$

(5) $(x+5y)(x+y)$

$$\begin{aligned}&(x+5y)(x+y)\\&=x^2+xy+5xy+5y^2\\&=x^2+6xy+5y^2\end{aligned}$$

(6) $(x+3)(x-3)$

$$\begin{aligned}&(x+3)(x-3)\\&=x^2-3x+3x-9\\&=x^2-9\end{aligned}$$

(7) $(5x-y)(x-6y)$

$$\begin{aligned}&(5x-y)(x-6y)\\&=5x^2-30xy-xy+6y^2\\&=5x^2-31xy+6y^2\end{aligned}$$

(8) $-(3x-2y)(6x-y)$

$$\begin{aligned}&-(3x-2y)(6x-y)\\&=-(18x^2-3xy-12xy+2y^2)\\&=-(18x^2-15xy+2y^2)\\&=-18x^2+15xy-2y^2\end{aligned}$$

(9) $(x+2a)(5x-a)$

$$\begin{aligned}&(x+2a)(5x-a)\\&=5x^2-ax+10ax-2a^2\\&=5x^2+9ax-2a^2\end{aligned}$$

(10) $3(x+2)(-x+1)$

$$\begin{aligned}&3(x+2)(-x+1)\\&=3(-x^2+x-2x+2)\\&=3(-x^2-x+2)\\&=-3x^2-3x+6\end{aligned}$$

(11) $(x+y+z)^2$

$$\begin{aligned}(x+y+z)^2&=(x+y+z)(x+y+z)\\&=x^2+xy+xz+yx+y^2+yz+zx+zy+z^2\\&=x^2+y^2+z^2+2xy+2yz+2zx\end{aligned}$$

(12) $(2x-1)(3x^2+2)$

$$\begin{aligned}(2x-1)(3x^2+2)&=6x^3+4x-3x^2-2\\&=6x^3-3x^2+4x-2\end{aligned}$$

(13) $3x(x^2+1)(x+1)$

$$\begin{aligned}3x(x^2+1)(x+1)&=3x(x^3+x^2+x+1)\\&=3x^4+3x^3+3x^2+3x\end{aligned}$$

(14) $(2x+y)(2x^2-3xy-y^2)$

$$\begin{aligned}(2x+y)(2x^2-3xy-y^2)&=4x^3-6x^2y-2xy^2+2x^2y-3xy^2-y^3\\&=4x^3-4x^2y-5xy^2-y^3\end{aligned}$$

(15) $(x+2)(x^2-3x+1)$

$$\begin{aligned}(x+2)(x^2-3x+1)&=x^3-3x^2+x+2x^2-6x+2\\&=x^3-x^2-5x+2\end{aligned}$$

(16)　$(x-1)^2(x+1)^2$

$$\begin{aligned}(x-1)^2(x+1)^2 &= \{(x-1)(x+1)\}^2 \\ &= (x^2-1)^2 \\ &= x^4-2x^2+1\end{aligned}$$

(17)　$(x^2+y^2)(x+y)(x-y)$

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

(18)　$(x^2+x-1)(x^2+x+1)$

両方のかっこ内に共通の x^2+x を 1 つのかたまりとして計算する.

$$\begin{aligned}(x^2+x-1)(x^2+x+1) &= \{(x^2+x)-1\}\{(x^2+x)+1\} \\ &= (x^2+x)^2-1 \\ &= x^4+4x^3+x^2-1\end{aligned}$$