

『数が苦』を『数楽』に その1

単項式と多項式の乗法

3年 組 番 氏名

次の計算をなさい。

$$\begin{aligned} \textcircled{1} \quad & 3x(x+y) \\ & = 3x^2 + 3xy \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & 4y(2x+3y) \\ & = 8xy + 12y^2 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad & x(5x+y) \\ & = 5x^2 + xy \end{aligned}$$

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

$$\begin{aligned} \textcircled{5} \quad & 3a(5a-2b) \\ & = 15a^2 - 6ab \end{aligned}$$

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

$$\begin{aligned} \textcircled{7} \quad & (2a+3b) \times (-3a) \\ & = -6a^2 - 9ab \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad & (3x-5y) \times (-4x) \\ & = -12x^2 + 20xy \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad & (m-n) \times 3m \\ & = 3m^2 - 3mn \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad & (-4x-y) \times (-x) \\ & = 4x^2 + xy \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad & \frac{x}{2}(6x+2y) \\ & = 3x^2 + xy \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad & \frac{4}{3}m(6m-9n) \\ & = 8m^2 - 12mn \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad & (-10x+5y) \times \left(-\frac{2}{5}y\right) \\ & = 4xy - 2y^2 \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad & 2a(-3a+5b-2) \\ & = -6a^2 + 10ab - 4a \end{aligned}$$

$$\begin{aligned} \textcircled{15} \quad & (-x-4y+1) \times (-2x) \\ & = 2x^2 + 8xy - 2x \end{aligned}$$

『数が苦』を『数楽』に その2

多項式と単項式の除法①

3年 組 番 氏名

次の計算をなさい。

$$\begin{aligned} \textcircled{1} \quad & (4x^2 - 6xy) \div 2x \\ & = 2x - 3y \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & (6x^2 + 3xy) \div 3x \\ & = 2x + y \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad & (-2a^2 - ab) \div a \\ & = -2a - b \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad & (20mx - 5m) \div 5m \\ & = 4x - 1 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad & (-9xy + 6xy^2) \div (-3xy) \\ & = 3 - 2y \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad & (-4x^2 - 10xy) \div (-2x) \\ & = 2x + 5y \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad & (49mn + 28m) \div (-7m) \\ & = -7n - 4 \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad & (-a^2 - ab) \div (-a) \\ & = a + b \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad & (2x^2 - 4xy) \div 8x \\ & = \frac{x}{4} - \frac{y}{2} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad & (-3mn + 5m) \div 15m \\ & = -\frac{n}{5} + \frac{1}{3} \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad & (-4x^2 - 6xy) \div (-8x) \\ & = \frac{x}{2} + \frac{3}{4}y \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad & (6ab - 9b) \div 12b \\ & = \frac{a}{2} - \frac{3}{4} \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad & (6m^2 + 3mn - 9m) \div 3m \\ & = 2m + n - 3 \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad & (-8x^2 - 16xy + 6x) \div (-2x) \\ & = 4x + 8y - 3 \end{aligned}$$

$$\begin{aligned} \textcircled{15} \quad & (x^2y - xy - x) \div (-x) \\ & = -xy + y + 1 \end{aligned}$$

『数が苦』を『数楽』に その3

多項式と単項式の除法① (単項式が分数)

3年 組 番 氏名

次の計算をなさい。

$$\begin{aligned}\textcircled{1} \quad & (6x^2 + 8xy) \div \frac{2}{3}x \\ &= (6x^2 + 8xy) \times \frac{3}{2x} \\ &= 3x + 12y\end{aligned}$$

$$\begin{aligned}\textcircled{2} \quad & (4x^2 - 6xy) \div \frac{2}{5}x \\ &= (4x^2 - 6xy) \times \frac{5}{2x} \\ &= 10x - 15y\end{aligned}$$

$$\begin{aligned}\textcircled{3} \quad & (-7xy + 14y^2) \div \frac{7}{2}y \\ &= (-7xy + 14y^2) \times \frac{2}{7y} \\ &= -2x + 4y\end{aligned}$$

$$\begin{aligned}\textcircled{4} \quad & (-12m^3 - 8mn) \div \frac{4}{3}m \\ &= (-12m^3 - 8mn) \times \frac{3}{4m} \\ &= -9m^2 - 6n\end{aligned}$$

$$\begin{aligned}\textcircled{5} \quad & (5x^2 + 10xy) \div \left(-\frac{5}{4}x\right) \\ &= (5x^2 + 10xy) \times \left(-\frac{4}{5x}\right) \\ &= -4x - 8y\end{aligned}$$

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

$$\begin{aligned}\textcircled{7} \quad & (-4m^2n + 6mn) \div \left(-\frac{2}{3}mn\right) \\ &= (-4m^2n + 6mn) \times \left(-\frac{3}{2mn}\right) \\ &= 6m - 9\end{aligned}$$

$$\begin{aligned}\textcircled{8} \quad & (-x^2y - xy) \div \left(-\frac{xy}{3}\right) \\ &= (-x^2y - xy) \times \left(-\frac{3}{xy}\right) \\ &= 3x + 3\end{aligned}$$

$$\begin{aligned}\textcircled{9} \quad & (4x^2y - xy^2 + 2x) \div \frac{2}{3}x \\ &= (4x^2y - xy^2 + 2x) \times \frac{3}{2x} \\ &= 6xy - \frac{3}{2}y^2 + 3\end{aligned}$$

$$\begin{aligned}\textcircled{10} \quad & (-6m^2n + 12n - 9mn^2) \div \left(-\frac{3}{2}n\right) \\ &= (-6m^2n + 12n - 9mn^2) \times \left(-\frac{2}{3n}\right) \\ &= 4m^2 - 8 + 6mn\end{aligned}$$

『数が苦』を『数楽』に その4

多項式と多項式の乗法①

3年 組 番 氏名

次の計算をなさい。

$$\begin{aligned} \textcircled{1} \quad & (x+3)(y+2) \\ & = xy + 2x + 3y + 6 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & (x+5)(y+1) \\ & = xy + x + 5y + 5 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad & (x+2)(y-8) \\ & = xy - 8x + 2y - 16 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad & (x+5)(y-4) \\ & = xy - 4x + 5y - 20 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad & (x-6)(y+3) \\ & = xy + 3x - 6y - 18 \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad & (x-1)(y+1) \\ & = xy + x - y - 1 \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad & (x-5)(y-9) \\ & = xy - 9x - 5y + 45 \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad & (x-7)(y-8) \\ & = xy - 8x - 7y + 56 \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad & (2a+3)(3a+2) \\ & = 6a^2 + 4a + 9a + 6 \\ & = 6a^2 + 13a + 6 \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad & (7a+2)(a-2) \\ & = 7a^2 - 14a + 2a - 4 \\ & = 7a^2 - 12a - 4 \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad & (3x-1)(4x+6) \\ & = 12x^2 + 18x - 4x - 6 \\ & = 12x^2 + 14x - 6 \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad & (2y-5)(y-8) \\ & = 2y^2 - 16y - 5y + 40 \\ & = 2y^2 - 21y + 40 \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad & (x-1)(2x-1) \\ & = 2x^2 - x - 2x + 1 \\ & = 2x^2 - 3x + 1 \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad & (5a+5)(5a-5) \\ & = 25a^2 - 25a + 25a - 25 \\ & = 25a^2 - 25 \end{aligned}$$

『数が苦』を『数楽』に その5

多項式と多項式の乗法② (片方の項が3つのとき)

3年 組 番 氏名

次の計算をなさい。

$$\begin{aligned}\textcircled{1} \quad & (x-y)(4x-3y+1) \\ & = 4x^2 - 3xy + x - 4xy + 3y^2 - y \\ & = 4x^2 - 7xy + x + 3y^2 - y\end{aligned}$$

$$\begin{aligned}\textcircled{2} \quad & (a+1)(a+2b+1) \\ & = a^2 + 2ab + a + a + 2b + 1 \\ & = a^2 + 2ab + 2a + 2b + 1\end{aligned}$$

$$\begin{aligned}\textcircled{3} \quad & (x+y)(2x-y-3) \\ & = 2x^2 - xy - 3x + 2xy - y^2 - 3y \\ & = 2x^2 + xy - 3x - y^2 - 3y\end{aligned}$$

$$\begin{aligned}\textcircled{4} \quad & (3a+2b-1)(2a+3) \\ & = 6a^2 + 9a + 4ab + 6b - 2a - 3 \\ & = 6a^2 + 7a + 4ab + 6b - 3\end{aligned}$$

$$\begin{aligned}\textcircled{5} \quad & (4x+3y-1)(3x-2y) \\ & = 12x^2 - 8xy + 9xy \\ & \quad - 6y^2 - 3x + 2y \\ & = 12x^2 + xy - 6y^2 - 3x + 2y\end{aligned}$$

$$\begin{aligned}\textcircled{6} \quad & (2x+3y)(x-4y+1) \\ & = 2x^2 - 8xy + 2x \\ & \quad + 3xy - 12y^2 + 3y \\ & = 2x^2 - 5xy + 2x - 12y^2 + 3y\end{aligned}$$

$$\begin{aligned}\textcircled{7} \quad & (a-3)(a-3b-2) \\ & = a^2 - 3ab - 2a - 3a + 9b + 6 \\ & = a^2 - 3ab - 5a + 9b + 6\end{aligned}$$

$$\begin{aligned}\textcircled{8} \quad & (-2x+3y+2)(-x-2y) \\ & = 2x^2 + 4xy - 3xy \\ & \quad - 6y^2 - 2x - 4y \\ & = 2x^2 + xy - 6y^2 - 2x - 4y\end{aligned}$$

$$\begin{aligned}\textcircled{9} \quad & (3a+3b+3)(a-1) \\ & = 3a^2 - 3a + 3ab - 3b + 3a - 3 \\ & = 3a^2 + 3ab - 3b - 3\end{aligned}$$

$$\begin{aligned}\textcircled{10} \quad & (-2x-3)(x-3y+6) \\ & = -2x^2 + 6xy - 12x \\ & \quad - 3x + 9y - 18 \\ & = -2x^2 + 6xy - 15x + 9y - 18\end{aligned}$$

『数が苦』を『数楽』に その7

乗法公式② $(x + a)^2 = x^2 + 2ax + a^2$

3年 組 番 氏名

次の計算をなさい。

$$\begin{aligned} \textcircled{1} \quad (x + 1)^2 \\ = x^2 + 2x + 1 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad (x + 5)^2 \\ = x^2 + 10x + 25 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad (x + 3)^2 \\ = x^2 + 6x + 9 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad (y + 10)^2 \\ = y^2 + 20y + 100 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad (x - 2)^2 \\ = x^2 - 4x + 4 \end{aligned}$$

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

$$\begin{aligned} \textcircled{7} \quad (y - 4)^2 \\ = y^2 - 8y + 16 \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad (x - 1)^2 \\ = x^2 - 2x + 1 \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad \left(x + \frac{1}{2}\right)^2 \\ = x^2 + x + \frac{1}{4} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad \left(x - \frac{3}{4}\right)^2 \\ = x^2 - \frac{3}{2}x + \frac{9}{16} \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad (2x + 3)^2 \\ = 4x^2 + 12x + 9 \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad (3x + 1)^2 \\ = 9x^2 + 6x + 1 \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad (2y - 5)^2 \\ = 4y^2 - 20y + 25 \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad (4y - 2)^2 \\ = 16y^2 - 16y + 4 \end{aligned}$$

$$\begin{aligned} \textcircled{15} \quad (x + 2y)^2 \\ = x^2 + 4xy + 4y^2 \end{aligned}$$

『数が苦』を『数楽』に その6

乗法公式① $(x+a)(x+b) = x^2 + (a+b)x + ab$

3年 組 番 氏名

次の計算をなさい。

$$\begin{aligned} \textcircled{1} \quad & (x+6)(x+2) \\ & = x^2 + 8x + 12 \end{aligned}$$

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

$$\begin{aligned} \textcircled{3} \quad & (x+2)(x-4) \\ & = x^2 - 2x - 8 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad & (x+9)(x-3) \\ & = x^2 + 6x - 27 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad & (x-4)(x+1) \\ & = x^2 - 3x - 4 \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad & (x-8)(x+2) \\ & = x^2 - 6x - 16 \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad & (x-6)(x-3) \\ & = x^2 - 9x + 18 \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad & (x-7)(x-8) \\ & = x^2 - 15x + 56 \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad & \left(x + \frac{1}{3}\right) \left(x - \frac{1}{2}\right) \\ & = x^2 + \left(\frac{1}{3} - \frac{1}{2}\right)x + \frac{1}{3} \times \left(-\frac{1}{2}\right) \\ & = x^2 - \frac{1}{6}x - \frac{1}{6} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad & \left(x - \frac{3}{4}\right) \left(x - \frac{1}{2}\right) \\ & = x^2 + \left(-\frac{3}{4} - \frac{1}{2}\right)x - \frac{3}{4} \times \left(-\frac{1}{2}\right) \\ & = x^2 - \frac{5}{4}x + \frac{3}{8} \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad & (2x+1)(2x+2) \\ & = 4x^2 + (1+2) \times 2x + 1 \times 2 \\ & = 4x^2 + 6x + 2 \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad & (3x-1)(3x+2) \\ & = 9x^2 + (-1+2) \times 3x - 1 \times 2 \\ & = 9x^2 + 3x - 2 \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad & (4x+2)(4x-5) \\ & = 16x^2 + (2-5) \times 4x + 2 \times (-5) \\ & = 16x^2 - 12x - 10 \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad & (2x-4)(2x-6) \\ & = 4x^2 + (-4-6) \times 2x - 4 \times (-6) \\ & = 4x^2 - 20x + 24 \end{aligned}$$

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

『数が苦』を『数楽』に その7

乗法公式② $(x + a)^2 = x^2 + 2ax + a^2$

3年 組 番 氏名

次の計算をなさい。

$$\begin{aligned} \textcircled{1} \quad (x + 1)^2 \\ = x^2 + 2x + 1 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad (x + 5)^2 \\ = x^2 + 10x + 25 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad (x + 3)^2 \\ = x^2 + 6x + 9 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad (y + 10)^2 \\ = y^2 + 20y + 100 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad (x - 2)^2 \\ = x^2 - 4x + 4 \end{aligned}$$

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

$$\begin{aligned} \textcircled{7} \quad (y - 4)^2 \\ = y^2 - 8y + 16 \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad (x - 1)^2 \\ = x^2 - 2x + 1 \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad \left(x + \frac{1}{2}\right)^2 \\ = x^2 + x + \frac{1}{4} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad \left(x - \frac{3}{4}\right)^2 \\ = x^2 - \frac{3}{2}x + \frac{9}{16} \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad (2x + 3)^2 \\ = 4x^2 + 12x + 9 \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad (3x + 1)^2 \\ = 9x^2 + 6x + 1 \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad (2y - 5)^2 \\ = 4y^2 - 20y + 25 \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad (4y - 2)^2 \\ = 16y^2 - 16y + 4 \end{aligned}$$

$$\begin{aligned} \textcircled{15} \quad (x + 2y)^2 \\ = x^2 + 4xy + 4y^2 \end{aligned}$$

『数が苦』を『数楽』に その8

乗法公式③ $(x + a)(x - a) = x^2 - a^2$

3年 組 番 氏名

次の計算をなさい。

$$\begin{aligned} \textcircled{1} \quad & (x + 3)(x - 3) \\ & = x^2 - 9 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & (x + 4)(x - 4) \\ & = x^2 - 16 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad & (y + 1)(y - 1) \\ & = y^2 - 1 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad & (a + 5)(a - 5) \\ & = a^2 - 25 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad & (x - 6)(x + 6) \\ & = x^2 - 36 \end{aligned}$$

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

$$\begin{aligned} \textcircled{7} \quad & (y - 9)(y + 9) \\ & = y^2 - 81 \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad & (a - 10)(a + 10) \\ & = a^2 - 100 \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad & \left(x + \frac{1}{3}\right)\left(x - \frac{1}{3}\right) \\ & = x^2 - \frac{1}{9} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad & \left(x - \frac{2}{5}\right)\left(x + \frac{2}{5}\right) \\ & = x^2 - \frac{4}{25} \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad & (3x + 1)(3x - 1) \\ & = 9x^2 - 1 \end{aligned}$$

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

$$\begin{aligned} \textcircled{13} \quad & (3x + 3y)(3x - 3y) \\ & = 9x^2 - 9y^2 \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad & (2a + b)(2a - b) \\ & = 4a^2 - b^2 \end{aligned}$$

$$\begin{aligned} \textcircled{15} \quad & (-x + 3)(-x - 3) \\ & = x^2 - 9 \end{aligned}$$

『数が苦』を『数楽』に その9

置き換えを使った展開（共通なものを1つの文字にする）

3年 組 番 氏名

次の計算をなさい。

① $(x + y + 2)(x + y + 3)$

$$x + y = M \text{ とする}$$

$$= (M + 2)(M + 3)$$

$$= M^2 + 5M + 6$$

$$= (x + y)^2 + 5(x + y) + 6$$

$$= x^2 + 2xy + y^2 + 5x + 5y + 6$$

② $(x + y + 2)(x + y - 5)$

$$x + y = M \text{ とする}$$

$$= (M + 2)(M - 5)$$

$$= M^2 - 3M - 10$$

$$= (x + y)^2 - 3(x + y) - 10$$

$$= x^2 + 2xy + y^2 - 3x - 3y - 10$$

③ $(x - y - 1)(x - y + 4)$

$$x - y = M \text{ とする}$$

$$= (M - 1)(M + 4)$$

$$= M^2 + 3M - 4$$

$$= (x - y)^2 + 3(x - y) - 4$$

$$= x^2 - 2xy + y^2 + 3x - 3y - 4$$

④ $(x - y - 2)(x - y - 6)$

$$x - y = M \text{ とする}$$

$$= (M - 2)(M - 6)$$

$$= M^2 - 8M + 12$$

$$= (x - y)^2 - 8(x - y) + 12$$

$$= x^2 - 2xy + y^2 - 8x + 8y + 12$$

⑤ $(2x + y + 4)^2$

$$2x + y = M \text{ とする}$$

$$= (M + 4)^2$$

$$= M^2 + 8M + 16$$

$$= (2x + y)^2 + 8(2x + y) + 16$$

$$= 4x^2 + 4xy + y^2 + 16x + 8y + 16$$

⑥ $(x - 3y + 1)^2$

$$x - 3y = M \text{ とする}$$

$$= (M + 1)^2$$

$$= M^2 + 2M + 1$$

$$= (x - 3y)^2 + 2(x - 3y) + 1$$

$$= x^2 - 6xy + 9y^2 + 2x - 6y + 1$$

⑦ $(x - 2y - 5)^2$

$$x - 2y = M \text{ とする}$$

$$= (M - 5)^2$$

$$= M^2 - 10M + 25$$

$$= (x - 2y)^2 - 10(x - 2y) + 25$$

$$= x^2 - 4xy + 4y^2 - 10x + 20y + 25$$

⑧ $(3x + y - 4)^2$

$$3x + y = M \text{ とする}$$

$$= (M - 4)^2$$

$$= M^2 - 8M + 16$$

$$= (3x + y)^2 - 8(3x + y) + 16$$

$$= 9x^2 + 6xy + y^2 - 24x - 8y + 16$$

⑨ $(x + y + 4)(x + y - 4)$

$$x + y = M \text{ とする}$$

$$= (M + 4)(M - 4)$$

$$= M^2 - 16$$

$$= (x + y)^2 - 16$$

$$= x^2 + 2xy + y^2 - 16$$

⑩ $(2x - 2y - 2)(2x - 2y + 2)$

$$2x - 2y = M \text{ とする}$$

$$= (M - 2)(M + 2)$$

$$= M^2 - 4$$

$$= (2x - 2y)^2 - 4$$

$$= 4x^2 - 8xy + 4y^2 - 4$$

『数が苦』を『数楽』に その10

いろいろな式の展開

3年 組 番 氏名

次の計算をなさい。

$$\begin{aligned}\textcircled{1} \quad & 2(x-3)^2 - (x-2)(x-4) \\ &= 2(x^2 - 6x + 9) - (x^2 - 6x + 8) \\ &= 2x^2 - 12x + 18 - x^2 + 6x - 8 \\ &= x^2 - 6x + 10\end{aligned}$$

$$\begin{aligned}\textcircled{2} \quad & 2(x-1)^2 - (x+2)(x-3) \\ &= 2(x^2 - 2x + 1) - (x^2 - x - 6) \\ &= 2x^2 - 4x + 2 - x^2 + x + 6 \\ &= x^2 - 3x + 8\end{aligned}$$

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

$$\begin{aligned}\textcircled{4} \quad & (x-4)(x+3) + (x-2)^2 \\ &= x^2 - x - 12 + x^2 - 4x + 4 \\ &= 2x^2 - 5x - 8\end{aligned}$$

$$\begin{aligned}\textcircled{5} \quad & 2(x+2)^2 - (x+3)(x-3) \\ &= 2(x^2 + 4x + 4) - (x^2 - 9) \\ &= 2x^2 + 8x + 8 - x^2 + 9 \\ &= x^2 + 8x + 17\end{aligned}$$

$$\begin{aligned}\textcircled{6} \quad & (2a+b)(a-b) - (a-2b)^2 \\ &= 2a^2 - 2ab + ab - b^2 - (a^2 - 4ab + 4b^2) \\ &= 2a^2 - 2ab + ab - b^2 - a^2 + 4ab - 4b^2 \\ &= a^2 + 3ab - 5b^2\end{aligned}$$

$$\begin{aligned}\textcircled{7} \quad & (2a+5)(2a-5) + (a+8)(a+2) \\ &= 4a^2 - 25 + (a^2 + 10a + 16) \\ &= 4a^2 - 25 + a^2 + 10a + 16 \\ &= 5a^2 + 10a - 9\end{aligned}$$

『数が苦』を『数楽』に その11

共通な因数をくくり出す因数分解

3年 組 番 氏名

次の式を因数分解しなさい。

$$\begin{aligned} \textcircled{1} \quad & a x - a y \\ & = a (x - y) \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & x^2 - 5x \\ & = x (x - 5) \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad & m a + 4 m \\ & = m (a + 4) \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad & a b - a \\ & = a (b - 1) \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad & 5 x^2 - 7 x \\ & = x (5 x - 7) \end{aligned}$$

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

$$\begin{aligned} \textcircled{7} \quad & 4 x - 8 y \\ & = 4 (x - 2 y) \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad & 12 x^2 - 4 x \\ & = 4 x (3 x - 1) \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad & m x - m y + m z \\ & = m (x - y + z) \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad & 4 x^2 - 12 x y + x y^2 \\ & = x (4 x - 3 y + y^2) \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad & m^2 n + m n^2 - m n \\ & = m n (m + n - 1) \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad & 4 x^2 y^2 + 12 x^2 \\ & = 4 x^2 (y^2 + 3) \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad & 10 x^2 + 5 x y - 15 x z \\ & = 5 x (2 x + y - 3 z) \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad & 3 a x - 9 a y + 12 a \\ & = 3 a (x - 3 y + 4) \end{aligned}$$

$$\begin{aligned} \textcircled{15} \quad & -4 a x^2 + 2 a x - 6 a \\ & = 2 a (-2 x^2 + x - 3) \end{aligned}$$

『数が苦』を『数楽』に その12

因数分解① $x^2 + (a + b)x + ab = (x + a)(x + b)$

3年 組 番 氏名

次の式を因数分解しなさい。

$$\begin{aligned} \textcircled{1} \quad & x^2 + 8x + 7 \\ & = (x + 1)(x + 7) \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & x^2 + 6x + 8 \\ & = (x + 2)(x + 4) \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad & a^2 + 5a + 6 \\ & = (a + 2)(a + 3) \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad & x^2 - 6x + 8 \\ & = (x - 2)(x - 4) \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad & x^2 - 9x + 20 \\ & = (x - 4)(x - 5) \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad & x^2 - 8x + 12 \\ & = (x - 2)(x - 6) \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad & x^2 + 2x - 8 \\ & = (x + 4)(x - 2) \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad & x^2 + 6x - 16 \\ & = (x + 8)(x - 2) \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad & a^2 + 8a - 48 \\ & = (a + 12)(a - 4) \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad & x^2 - x - 6 \\ & = (x - 3)(x + 2) \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad & x^2 - 2x - 8 \\ & = (x - 4)(x + 2) \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad & x^2 - 5x - 24 \\ & = (x - 8)(x + 3) \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad & x^2 + 18 - 11x \\ & = x^2 - 11x + 18 \\ & = (x - 2)(x - 9) \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad & x^2 - 10 - 3x \\ & = x^2 - 3x - 10 \\ & = (x - 5)(x + 2) \end{aligned}$$

$$\begin{aligned} \textcircled{15} \quad & -16 + 6x + x^2 \\ & = x^2 + 6x - 16 \\ & = (x + 8)(x - 2) \end{aligned}$$

『数が苦』を『数楽』に その13

因数分解② $x^2 + 2ax + a^2 = (x + a)^2$ $x^2 - 2ax + a^2 = (x - a)^2$

3年 組 番 氏名

次の式を因数分解しなさい。

① $x^2 + 6x + 9$
 $= (x + 3)^2$

② $x^2 + 10x + 25$
 $= (x + 5)^2$

③ $x^2 + 8x + 16$
 $= (x + 4)^2$

④ $x^2 + 12x + 36$
 $= (x + 6)^2$

⑤ $x^2 + 2x + 1$
 $= (x + 1)^2$

⑥ $x^2 - 6x + 9$
 $= (x - 3)^2$

⑦ $x^2 - 4x + 4$
 $= (x - 2)^2$

⑧ $x^2 - 14x + 49$
 $= (x - 7)^2$

⑨ $a^2 - 2a + 1$
 $= (a - 1)^2$

⑩ $x^2 - 10x + 25$
 $= (x - 5)^2$

⑪ $16x^2 + 8x + 1$
 $= (4x + 1)^2$

⑫ $4x^2 + 12xy + 9y^2$
 $= (2x + 3y)^2$

⑬ $49x^2 - 28x + 4$
 $= (7x - 2)^2$

⑭ $9x^2 - 6xy + y^2$
 $= (3x - y)^2$

⑮ $x^2 + \frac{2}{3}x + \frac{1}{9}$
 $= \left(x + \frac{1}{3}\right)^2$

『数が苦』を『数楽』に その14

因数分解③ $x^2 - a^2 = (x + a)(x - a)$

3年 組 番 氏名

次の式を因数分解をなさい。

$$\begin{aligned} \textcircled{1} \quad x^2 - 9 \\ = (x + 3)(x - 3) \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad a^2 - 4 \\ = (a + 2)(a - 2) \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad x^2 - 16 \\ = (x + 4)(x - 4) \end{aligned}$$

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

$$\begin{aligned} \textcircled{5} \quad x^2 - 100 \\ = (x + 10)(x - 10) \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad x^2 - 81 \\ = (x + 9)(x - 9) \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad x^2 - 49 \\ = (x + 7)(x - 7) \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad a^2 - 36 \\ = (a + 6)(a - 6) \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad 9m^2 - 1 \\ = (3m + 1)(3m - 1) \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad 4x^2 - 4 \\ = 4(x + 1)(x - 1) \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad 100 - 9y^2 \\ = (10 + 3y)(10 - 3y) \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad x^2 - y^2 \\ = (x + y)(x - y) \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad x^2 - 0.09 \\ = (x + 0.3)(x - 0.3) \end{aligned}$$

$$\begin{aligned} \textcircled{14} \quad 25x^2 - 9y^2 \\ = (5x + 3y)(5x - 3y) \end{aligned}$$

$$\begin{aligned} \textcircled{15} \quad x^2 - \frac{1}{25} \\ = \left(x + \frac{1}{5}\right) \left(x - \frac{1}{5}\right) \end{aligned}$$

『数が苦』を『数楽』に その15

置き換えを使った因数分解

3年 組 番 氏名

次の式を因数分解しなさい。

$$\begin{aligned} \textcircled{1} \quad & (x+2)^2 + 3(x+2) - 4 \\ & x+2=M \text{とする} \\ & = M^2 + 3M - 4 \\ & = (M+4)(M-1) \end{aligned} \quad \nearrow \quad \begin{aligned} & = (x+2+4)(x+2-1) \\ & = (x+6)(x+1) \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & (x+1)^2 + 5(x+1) + 4 \\ & x+1=M \text{とする} \\ & = M^2 + 5M + 4 \\ & = (M+4)(M+1) \end{aligned} \quad \nearrow \quad \begin{aligned} & = (x+1+4)(x+1+1) \\ & = (x+5)(x+2) \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad & (x-9)^2 - (x-9) - 6 \\ & x-9=M \text{とする} \\ & = M^2 - M - 6 \\ & = (M-3)(M+2) \end{aligned} \quad \nearrow \quad \begin{aligned} & = (x-9-3)(x-9+2) \\ & = (x-12)(x-7) \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad & (x+6)^2 - 10(x+6) + 25 \\ & x+6=M \text{とする} \\ & = M^2 - 10M + 25 \\ & = (M-5)^2 \end{aligned} \quad \nearrow \quad \begin{aligned} & = (x+6-5)^2 \\ & = (x+1)^2 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad & (x+5)^2 - 9 \\ & x+5=M \text{とする} \\ & = M^2 - 9 \\ & = (M+3)(M-3) \end{aligned} \quad \nearrow \quad \begin{aligned} & = (x+5+3)(x+5-3) \\ & = (x+8)(x+2) \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad & (x-5)^2 - 7(x-5) + 12 \\ & x-5=M \text{とする} \\ & = M^2 - 7M + 12 \\ & = (M-3)(M-4) \end{aligned} \quad \nearrow \quad \begin{aligned} & = (x-5-3)(x-5-4) \\ & = (x-8)(x-9) \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad & (x-2)^2 + 14(x-2) + 49 \\ & x-2=M \text{とする} \\ & = M^2 + 14M + 49 \\ & = (M+7)^2 \end{aligned} \quad \nearrow \quad \begin{aligned} & = (x-2+7)^2 \\ & = (x+5)^2 \end{aligned}$$

『数が苦』を『数楽』に その16

素因数分解

3年 組 番 氏名

次の数を素因数分解しなさい。

① $12 = 2^2 \times 3$

$$\begin{array}{r} 2 \overline{) 12} \\ \underline{2} \\ 2 \\ \underline{6} \\ 6 \\ \underline{6} \\ 0 \end{array}$$

③ $42 = 2 \times 3 \times 7$

$$\begin{array}{r} 2 \overline{) 42} \\ \underline{2} \\ 2 \\ \underline{21} \\ 21 \\ \underline{21} \\ 0 \end{array}$$

⑤ $22 = 2 \times 11$

$$\begin{array}{r} 2 \overline{) 22} \\ \underline{2} \\ 0 \\ \underline{22} \\ 0 \end{array}$$

⑦ $24 = 2^3 \times 3$

$$\begin{array}{r} 2 \overline{) 24} \\ \underline{2} \\ 2 \\ \underline{12} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

⑨ $81 = 3^4$

$$\begin{array}{r} 3 \overline{) 81} \\ \underline{3} \\ 3 \\ \underline{27} \\ 27 \\ \underline{27} \\ 0 \end{array}$$

⑪ $540 = 2^2 \times 3^3 \times 5$

$$\begin{array}{r} 2 \overline{) 540} \\ \underline{2} \\ 2 \\ \underline{270} \\ 270 \\ \underline{270} \\ 0 \end{array}$$

⑬ $240 = 2^4 \times 3 \times 5$

$$\begin{array}{r} 2 \overline{) 240} \\ \underline{2} \\ 2 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

② $60 = 2^2 \times 3 \times 5$

$$\begin{array}{r} 2 \overline{) 60} \\ \underline{2} \\ 3 \\ \underline{30} \\ 30 \\ \underline{30} \\ 0 \end{array}$$

④ $56 = 2^3 \times 7$

$$\begin{array}{r} 2 \overline{) 56} \\ \underline{2} \\ 2 \\ \underline{28} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

⑥ $20 = 2^2 \times 5$

$$\begin{array}{r} 2 \overline{) 20} \\ \underline{2} \\ 0 \\ \underline{20} \\ 0 \end{array}$$

⑧ $40 = 2^3 \times 5$

$$\begin{array}{r} 2 \overline{) 40} \\ \underline{2} \\ 2 \\ \underline{20} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

⑩ $36 = 2^2 \times 3^2$

$$\begin{array}{r} 2 \overline{) 36} \\ \underline{2} \\ 1 \\ \underline{18} \\ 18 \\ \underline{18} \\ 0 \end{array}$$

⑫ $180 = 2^2 \times 3^2 \times 5$

$$\begin{array}{r} 2 \overline{) 180} \\ \underline{2} \\ 9 \\ \underline{90} \\ 90 \\ \underline{90} \\ 0 \end{array}$$

⑭ $1056 = 2^5 \times 3 \times 11$

$$\begin{array}{r} 2 \overline{) 1056} \\ \underline{2} \\ 5 \\ \underline{528} \\ 528 \\ \underline{528} \\ 0 \end{array}$$