

FOIL method exercises (ver.241029)

[Pattern 1] x without coefficient x に係数が無いパターン

Ex.) Expand and simplify $(x + 2)(x - 5)$

Step 1: Circle the terms 項を丸で囲む

$$(\textcircled{x} \textcircled{+ 2}) (\textcircled{x} \textcircled{- 5})$$

Step 2: Expand with FOIL method FOIL 法で展開する

First

$$(\textcircled{x} \textcircled{}) (\textcircled{x} \textcircled{}) = x^2$$

F	O	I	L
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Outer

$$(\textcircled{x} \textcircled{}) (\textcircled{} \textcircled{- 5}) = x^2 - 5x$$

F	O	I	L
---	---	---	---

Inner

$$(\textcircled{} \textcircled{+ 2}) (\textcircled{x} \textcircled{}) = x^2 - 5x + 2x$$

F	O	I	L
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Last

$$(\textcircled{} \textcircled{+ 2}) (\textcircled{} \textcircled{- 5}) = x^2 - 5x + 2x - 10$$

F	O	I	L
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Step 3: Combine the O and I terms O と I の項を合わせる

$$\begin{aligned} & x^2 - 5x + 2x - 10 \\ = & x^2 - 3x - 10 \end{aligned}$$

Answer $x^2 - 3x - 10$

Expand and simplify 展開し、項をまとめなさい

$$\begin{aligned}
 (1) \quad (x + 2)(x + 5) &= \frac{x^2}{F} + \frac{5x}{O} + \frac{2x}{I} + \frac{10}{L} \\
 &= \frac{x^2}{F} + \frac{7x}{O+I} + \frac{10}{L}
 \end{aligned}$$

$$\begin{aligned}
 (2) \quad (x + 2)(x - 5) &= \frac{x^2}{F} - \frac{5x}{O} + \frac{2x}{I} - \frac{10}{L} \\
 &= \frac{x^2}{F} - \frac{3x}{O+I} - \frac{10}{L}
 \end{aligned}$$

$$\begin{aligned}
 (3) \quad (x - 2)(x + 5) &= \frac{x^2}{F} + \frac{5x}{O} - \frac{2x}{I} - \frac{10}{L} \\
 &= \frac{x^2}{F} + \frac{3x}{O+I} - \frac{10}{L}
 \end{aligned}$$

$$\begin{aligned}
 (4) \quad (x - 2)(x - 5) &= \frac{x^2}{F} - \frac{5x}{O} - \frac{2x}{I} + \frac{10}{L} \\
 &= \frac{x^2}{F} - \frac{7x}{O+I} + \frac{10}{L}
 \end{aligned}$$

FOIL method exercises (ver.241029)

[Pattern 2] x with coefficient x に係数があるパターン

Ex.) Expand and simplify $(3x + 2)(4x - 5)$

Step 1: Circle the terms 項を丸で囲む

$$(\textcircled{3x} \textcircled{+ 2}) (\textcircled{4x} \textcircled{- 5})$$

Step 2: Expand with FOIL method FOIL 法で展開する

First

$$(\textcircled{3x} \text{ }) (\textcircled{4x} \text{ }) = \frac{12x^2}{\text{F} \quad \text{O} \quad \text{I} \quad \text{L}}$$

Outer

$$(\textcircled{3x} \text{ }) (\text{ } \textcircled{- 5}) = \frac{12x^2}{\text{F}} - \frac{15x}{\text{O}} \quad \text{I} \quad \text{L}$$

Inner

$$(\text{ } \textcircled{+ 2}) (\textcircled{4x} \text{ }) = \frac{12x^2}{\text{F}} - \frac{15x}{\text{O}} + \frac{8x}{\text{I}} \quad \text{L}$$

Last

$$(\text{ } \textcircled{+ 2}) (\text{ } \textcircled{- 5}) = \frac{12x^2}{\text{F}} - \frac{15x}{\text{O}} + \frac{8x}{\text{I}} - \frac{10}{\text{L}}$$

Step 3: Combine the O and I terms O と I の項を合わせる

$$\begin{aligned} & \frac{12x^2 - 15x + 8x - 10}{=} \\ & = 12x^2 - \underline{7x} - 10 \end{aligned}$$

Answer $12x^2 - 7x - 10$

Expand and simplify 展開し、項をまとめなさい

$$\begin{aligned}
 (5) \quad (3x + 2)(x + 5) &= \frac{3x^2}{F} + \frac{15x}{O} + \frac{2x}{I} + \frac{10}{L} \\
 &= \frac{3x^2}{F} + \frac{17x}{O+I} + \frac{10}{L}
 \end{aligned}$$

$$\begin{aligned}
 (6) \quad (x + 2)(4x + 5) &= \frac{4x^2}{F} + \frac{5x}{O} + \frac{8x}{I} + \frac{10}{L} \\
 &= \frac{4x^2}{F} + \frac{13x}{O+I} + \frac{10}{L}
 \end{aligned}$$

$$\begin{aligned}
 (7) \quad (3x + 2)(4x + 5) &= \frac{12x^2}{F} + \frac{15x}{O} + \frac{8x}{I} + \frac{10}{L} \\
 &= \frac{12x^2}{F} + \frac{23x}{O+I} + \frac{10}{L}
 \end{aligned}$$

$$\begin{aligned}
 (8) \quad (3x - 2)(4x + 5) &= \frac{12x^2}{F} + \frac{15x}{O} - \frac{8x}{I} - \frac{10}{L} \\
 &= \frac{12x^2}{F} + \frac{7x}{O+I} + \frac{10}{L}
 \end{aligned}$$

$$\begin{aligned}
 (9) \quad (3x - 2)(4x - 5) &= \frac{12x^2}{F} - \frac{15x}{O} - \frac{8x}{I} + \frac{10}{L} \\
 &= \frac{12x^2}{F} - \frac{23x}{O+I} + \frac{10}{L}
 \end{aligned}$$

[Level 1]

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

$$2) (x + 2)(x + 3) = x^2 + 3x + 2x + 6 = x^2 + 5x + 6$$

$$3) (x + 1)(x + 5) = x^2 + 5x + x + 5 = x^2 + 6x + 5$$

[Level 2]

$$4) (x - 3)(x + 5) = x^2 + 5x - 3x - 15 = x^2 + 2x - 15$$

$$5) (x - 6)(x + 2) = x^2 + 2x - 6x - 12 = x^2 - 4x - 12$$

$$6) (x + 4)(x - 2) = x^2 - 2x + 4x - 8 = x^2 + 2x - 8$$

$$7) (x + 1)(x - 5) = x^2 - 5x + x - 5 = x^2 - 4x - 5$$

$$8) (x - 1)^2 = (x - 1)(x - 1) = x^2 - x - x + 1 = x^2 - 2x + 1$$

$$9) (x - 2)(x - 3) = x^2 - 3x - 2x + 6 = x^2 - 5x + 6$$

[Level 3]

$$10) (2x + 1)(x + 3) = 2x^2 + 6x + x + 3 = 2x^2 + 7x + 3$$

$$11) (x + 4)(3x + 5) = 3x^2 + 5x + 12x + 20 = 3x^2 + 17x + 20$$

$$12) (2x + 4)(3x + 6) = 6x^2 + 12x + 12x + 24 = 6x^2 + 24x + 24$$

[Level 4]

$$13) \quad (2x - 3)(x + 2) = 2x^2 + 4x - 3x - 6 = 2x^2 + x - 6$$

$$14) \quad (3x - 5)(x + 1) = 3x^2 + 3x - 5x - 5 = 3x^2 - 2x - 5$$

$$15) \quad (x + 4)(5x - 2) = 5x^2 - 2x + 20x - 8 = 5x^2 + 18x - 8$$

$$16) \quad (x + 2)(3x - 8) = 3x^2 - 8x + 6x - 16 = 3x^2 - 2x - 16$$

$$17) \quad (2x - 1)(x - 3) = 2x^2 - 6x - x + 3 = 2x^2 - 7x + 3$$

$$18) \quad (x - 5)(3x - 2) = 3x^2 - 2x - 15x + 10 = 3x^2 - 17x + 10$$

$$19) \quad (3x + 2)(4x - 1) = 12x^2 - 3x + 8x - 2 = 12x^2 + 5x - 2$$

$$20) \quad (5x + 1)(2x - 2) = 10x^2 - 10x + 2x - 2 = 10x^2 - 8x - 2$$

$$21) \quad (4x - 2)(5x + 3) = 20x^2 + 12x - 10x - 6 = 20x^2 + 2x - 6$$

$$22) \quad (2x - 6)(3x + 5) = 6x^2 + 10x - 18x - 30 = 6x^2 - 8x - 30$$

$$23) \quad (2x - 3)(4x - 5) = 8x^2 - 10x - 12x + 15 = 8x^2 - 22x + 15$$