

Steps:

- ① Factor denominators
- ② Identify any common and uncommon factors in denominators
- ③ Multiply both fractions by all uncommon factors so that the denominators will match
- ④ Add/subtract fractions
- ⑤ Try to reduce/simplify

ex Type 1

$$\frac{3}{10x} + \frac{1}{6x^2}$$

① Factor denominators: $10x = 2 \cdot 5 \cdot x$, $6x^2 = 2 \cdot 3 \cdot x \cdot x$

② Identify common and uncommon factors: 2 and x are common; 5 and $3x$ are uncommon.

③ Multiply both fractions by uncommon factors to match denominators:

$$\frac{3x \cdot 3}{3x \cdot 10x} + \frac{1 \cdot 5}{6x^2 \cdot 5}$$

$$\frac{9x}{30x^2} + \frac{5}{30x^2}$$

④ Add/subtract fractions:

$$\frac{9x}{30x^2} + \frac{5}{30x^2} = \frac{9x+5}{30x^2}$$

⑤ Try to reduce/simplify: The fraction $\frac{9x+5}{30x^2}$ is already in simplest form.

ex Type 2

$$\frac{x}{x^2-9} + \frac{5}{4x-12}$$

① Factor denominators: $x^2-9 = (x+3)(x-3)$ (DOTS), $4x-12 = 4(x-3)$ (GCF)

② Identify common and uncommon factors: $(x-3)$ is common; $(x+3)$ and 4 are uncommon.

③ Multiply both fractions by uncommon factors to match denominators:

$$\frac{x}{(x+3)(x-3)} + \frac{5}{4(x-3)} \cdot \frac{(x+3)}{(x+3)}$$

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

④ Add/subtract fractions:

$$\frac{4x}{4(x+3)(x-3)} + \frac{5x+15}{4(x-3)(x+3)}$$

⑤ Try to reduce/simplify: The fraction $\frac{9x+15}{4(x+3)(x-3)}$ is already in simplest form.

multiply numerators
do not multiply denominators
(we want the denominators to be in fully factored form)

$$\frac{4x}{4(x+3)(x-3)} + \frac{5x+15}{4(x-3)(x+3)}$$

④

$$\frac{9x+15}{4(x+3)(x-3)}$$

⑤ GCF

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