Learning Objective: To multiply, divide, add, and subtract algebraic fractions.

Equations with Algebraic Fractions
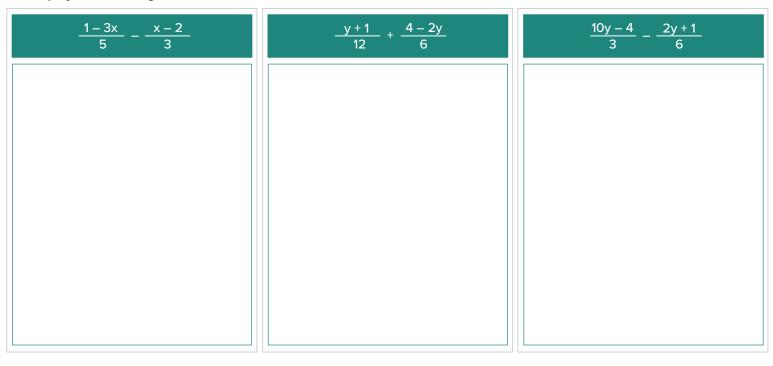
To add or subtract algebraic fractions:

- Find the lowest common denominator (LCD)
- Form equivalent fractions using the LCD
- Add or subtract the numerators
- Simplify the fraction by factorising and cancelling

Example

Simplify

$$\frac{x-2}{3} - \frac{2x-3}{4} = \frac{4(x-2)}{12} - \frac{3(2x-3)}{12}$$

$$= \frac{4(x-2) - 3(2x-3)}{12}$$

$$= \frac{4x - 8 - 6x + 9}{12}$$

$$= \frac{1 - 2x}{12}$$

i **Tip**
Write the positive term before the negative

Simplify the fractions.

$\dfrac{20a^2 - 30ab}{10a}$	$\dfrac{16x^2 - 20xy}{4x}$	$\dfrac{15x^2 - 20xy}{5x}$

Simplify the following.

$\dfrac{1-3x}{5} - \dfrac{x-2}{3}$	$\dfrac{y+1}{12} + \dfrac{4-2y}{6}$	$\dfrac{10y-4}{3} - \dfrac{2y+1}{6}$

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Simplify the fractions.

$$\frac{20a^2 - 30ab}{10a}$$

$$\frac{16x^2 - 20xy}{4x}$$

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$$\frac{20a^2 - 30ab}{10a} = \frac{10a(2a - 3b)}{10a}$$
$$= 2a - 3b$$

$$\frac{16x^2 - 20xy}{4x} = \frac{4x(4x - 5y)}{4x}$$
$$= 4x - 5y$$

$$\frac{15x^2 - 20xy}{5x} = \frac{5x(3x - 4y)}{5x}$$
$$= 3x - 4y$$

Simplify the following.

$$\frac{1 - 3x}{5} - \frac{x - 2}{3}$$

$$\frac{y + 1}{12} + \frac{4 - 2y}{6}$$

$$\frac{10y - 4}{3} - \frac{2y + 1}{6}$$

$$\frac{1 - 3x}{5} - \frac{x - 2}{3} = \frac{3(1 - 3x)}{15} - \frac{5(x - 2)}{15}$$

$$= \frac{3 - 9x - 5(x - 2)}{15}$$

$$= \frac{3 - 9x - 5x + 10}{15}$$

$$= \frac{13 - 14x}{15}$$

$$\frac{y + 1}{12} + \frac{4 - 2y}{6} = \frac{2(y + 1)}{24} + \frac{3(4 - 2y)}{24}$$

$$= \frac{2y + 2 + 12 - 6y}{24}$$

$$= \frac{14 - 4y}{24}$$

$$= \frac{2(7 - 2y)}{12 \; 24}$$

$$= \frac{7 - 2y}{12}$$

$$\frac{10y - 4}{3} - \frac{2y + 1}{6} = \frac{2(10y - 4)}{6} - \frac{2y + 1}{6}$$

$$= \frac{20y - 8 - (2y + 1)}{6}$$

$$= \frac{20y - 8 - 2y - 1}{6}$$

$$= \frac{18y - 9}{6}$$

$$= \frac{^{3}9(2y - 1)}{2 \; 6}$$

$$= \frac{3(2y - 1)}{2}$$