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

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

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

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

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

Tip
Write the positive term before the negative

Simplify the fractions.

$\frac{36a^2 + 27a}{3a}$

$\frac{24pq - 32p^2}{4p}$

$\frac{30b^2 + 72b}{-3b}$

Simplify the following.

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

$\frac{5x + 3}{10} + \frac{2x - 2}{4}$

$\frac{4m + 2}{8} - \frac{1 - m}{6}$

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Tip
Write the positive term before the negative

Simplify the fractions.

$$\frac{36a^2 + 27a}{3a}$$

$$\frac{36a^2 + 27a}{3a} = \frac{9a(4a+3)}{3a}$$

$$= \frac{{}^{3}\cancel{9a}(4a+3)}{\cancel{3a}}$$

$$= 3(4a+3)$$

$$\frac{24pq - 32p^2}{4p}$$

$$\frac{24pq - 32p^2}{4p} = \frac{{}^{2}\cancel{8p}(3q - 4p)}{4p}$$

$$= 2(3q - 4p)$$

$$\frac{30b^2 + 72b}{-3b}$$

$$\frac{30b^2 + 72b}{-3b} = \frac{{}^{2}\cancel{6b}(5b + 12)}{-\cancel{3b}^{1}}$$

$$= -2(5t + 12)$$

Simplify the following.

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

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

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

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

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

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

$$\frac{5x + 3}{10} + \frac{2x - 2}{4}$$

$$\frac{5x + 3}{10} + \frac{2x - 2}{4} = \frac{2(5x + 3)}{20} + \frac{5(2x - 2)}{20}$$

$$= \frac{10x + 6 + 10x - 10}{20}$$

$$= \frac{20x - 4}{20}$$

$$= \frac{\cancel{4}(5x - 1)}{5\ \cancel{20}}$$

$$= \frac{5x - 1}{5}$$

$$\frac{4m + 2}{8} - \frac{1 - m}{6}$$

$$\frac{4m + 2}{8} - \frac{1 - m}{6} = \frac{3(4m + 2)}{24} - \frac{4(1 - m)}{24}$$

$$= \frac{12m + 6 + 4 - 4m}{24}$$

$$= \frac{8m + 10}{24}$$

$$= \frac{\cancel{2}(4m + 5)}{12\ \cancel{24}}$$

$$= \frac{4m + 5}{12}$$