

ALGEBRAIC FRACTIONS

[CONTENTS](#)

Worked example

Simplify:

$$x \times x^3$$

$$x \times x^4$$

$$x^2 \times x^4$$

$$x^2 \times x^5$$

$$3x^2 \times x^5$$

$$3x^2 \times 4x^5$$

Your turn

Simplify:

$$2x^3 \times 5x^4$$

$$10x^7$$

Worked example

Simplify:

$$\frac{x^3}{x}$$

$$\frac{x^4}{x}$$

$$\frac{x^4}{x^2}$$

$$\frac{6x^4}{x^2}$$

$$\frac{6x^5}{2x^2}$$

$$\frac{6x^5}{8x^2}$$

$$\frac{6x^5}{12x^2}$$

$$\frac{6x^5}{18x^8}$$

Your turn

Simplify:

$$\frac{8x^7}{12x^3}$$

$$\frac{2x^4}{3}$$

$$\frac{9x^5}{15x^9}$$

$$\frac{3}{5x^4}$$

Worked example

Simplify:

$$\frac{3x^2 \times 5y^3 \times 4x \times 2y^5}{10xy}$$

$$\frac{2x^3 \times 3y^5 \times x^4 \times 5y^2}{6x^2y^3}$$

Your turn

Simplify:

$$\frac{2a^4 \times 7b^3 \times 4a^2 \times 3b^7}{6a^3b^9}$$
$$28a^3b$$

Worked example

Simplify:

$$\frac{5x + 10}{x + 2}$$

$$\frac{x - 7}{5x - 35}$$

Your turn

Simplify:

$$\frac{x - 3}{4x - 12}$$
$$\frac{1}{4}$$

Worked example

Simplify:

$$\frac{(x+2)(x+3)}{2x+6}$$

$$\frac{2x-6}{(x+2)(x-3)}$$

Your turn

Simplify:

$$\frac{(x+3)(x-4)}{2x-8}$$
$$\frac{x+3}{2}$$

Worked example

Simplify:

$$\frac{x^2 + 5x + 6}{x + 2}$$

$$\frac{4x - 12}{x^2 - 5x + 6}$$

Your turn

Simplify:

$$\frac{x^2 - 7x + 10}{3x - 15}$$
$$\frac{x - 2}{3}$$

Worked example

Simplify:

$$\frac{x + 3}{(x + 3)^3}$$

$$\frac{(x - 4)^5}{(x - 4)^2}$$

$$\frac{2x + 10}{(x + 5)^7}$$

Your turn

Simplify:

$$\frac{(x - 5)^2}{(x - 5)^6}$$

$$\frac{1}{(x - 5)^4}$$

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

$$\frac{(x + 5)^2}{3}$$

Worked example

Simplify:

$$\frac{3x^2 + 6x}{15x}$$

$$\frac{5y^2 - 30y^4}{10y^3}$$

Your turn

Simplify:

$$\frac{4x^3 + 12x}{16x^2}$$
$$\frac{x^2 + 3}{4x}$$

Worked example

Simplify:

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

$$\frac{x^2 - 7x - 8}{x^2 - 1}$$

Your turn

Simplify:

$$\frac{x^2 - 6x + 5}{x^2 + 4x - 5}$$
$$\frac{x - 5}{x + 5}$$

Worked example

Simplify:

$$\frac{2x^2 - 5x - 3}{3x^2 - 11x + 6}$$

$$\frac{3x^2 - x - 10}{x^2 - 4}$$

Your turn

Simplify:

$$\frac{3x^2 - 5x - 2}{2x^2 - 7x + 6}$$

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

Worked example

Simplify:

$$\frac{x^2 - 1}{x + 1}$$

$$\frac{x - 2}{x^2 - 4}$$

$$\frac{x^2 - 9}{2x - 6}$$

Your turn

Simplify:

$$\frac{2x + 8}{x^2 - 16}$$
$$\frac{2}{x - 4}$$

Worked example

Simplify:

$$\frac{x+2}{x-3} \times \frac{x-3}{x-2}$$

$$\frac{2x+3}{x-4} \times \frac{2x-8}{2x+1}$$

Your turn

Simplify:

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

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

Worked example

Simplify:

$$\frac{x+2}{x-3} \div \frac{x-2}{x-3}$$

$$\frac{2x+3}{x-4} \div \frac{2x+1}{2x-8}$$

Your turn

Simplify:

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

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

Worked example

Simplify:

$$\frac{(x+2)(3x-4)}{(x-5)(6x+7)} \times \frac{(7x+6)(x-5)}{(4x-3)(x+2)}$$

$$\frac{(x+7)(6x-5)}{(x-4)(3x+2)} \times \frac{(x+4)(3x+2)}{(6x+5)(7x)}$$

Your turn

Simplify:

$$\frac{(x+5)(2x-7)}{(x-4)(3x+1)} \times \frac{(6x+1)(x-4)}{(2x-9)(x+3)}$$

$$\frac{(x+5)(2x-7)(6x+1)}{(3x+1)(2x-9)(x+3)}$$

Worked example

Simplify:

$$\frac{3x^2 - 10x - 8}{6x^2 + 37x - 35} \div \frac{x^2 - 3x - 4}{x^2 - 49}$$

Your turn

Simplify:

$$\frac{2x^2 - 7x - 15}{3x^2 + 10x - 8} \div \frac{2x^2 + x - 3}{x^2 - 16}$$

$$\frac{(x - 5)(x - 4)}{(3x - 2)(x - 1)}$$

Worked example

Simplify:

$$\frac{2x^3 - 5x^2 - 3x}{2x - 6}$$

Your turn

Simplify:

$$\frac{3x^3 - x^2 - 10x}{4x - 8}$$
$$\frac{x(3x + 5)}{4}$$

Worked example

Simplify:

$$\frac{2x^3 + 5x^2 - 3x}{4x^2 - 1}$$

Your turn

Simplify:

$$\frac{3x^3 - x^2 - 10x}{9x^2 - 25}$$

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

Worked example

Write as a single fraction:

$$\frac{1}{x} + \frac{4}{x}$$

$$\frac{8}{3x} - \frac{5}{3x}$$

$$\frac{6}{2x-5} - \frac{2}{2x-5}$$

Your turn

Simplify:

$$\frac{7}{3x-4} + \frac{9}{3x-4}$$

$$\frac{16}{3x-4}$$

Worked example

Write as a single fraction:

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

$$\frac{x - 5}{4} + \frac{2x + 1}{3}$$

Your turn

Simplify:

$$\frac{4x + 5}{2} + \frac{x - 1}{3}$$

$$\frac{14x + 13}{6}$$

Worked example

Write as a single fraction:

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

$$\frac{x - 5}{4} + \frac{3}{2x + 1}$$

Your turn

Simplify:

$$\frac{4x + 5}{2} + \frac{3}{x - 1}$$
$$\frac{4x^2 + x + 1}{2(x - 1)}$$

Worked example

Write as a single fraction:

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

$$\frac{4}{x-5} + \frac{3}{2x+1}$$

Your turn

Simplify:

$$\frac{2}{4x+5} + \frac{3}{x-1}$$
$$\frac{10x+13}{(4x+5)(x-1)}$$

Worked example

Write as a single fraction:

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

$$\frac{x - 5}{4} - \frac{2x + 1}{3}$$

Your turn

Simplify:

$$\frac{4x + 5}{2} - \frac{x - 1}{3}$$
$$\frac{10x + 17}{6}$$

Worked example

Write as a single fraction:

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

$$\frac{x - 5}{4} - \frac{3}{2x + 1}$$

Your turn

Simplify:

$$\frac{4x + 5}{2} - \frac{3}{x - 1}$$
$$\frac{4x^2 + x - 11}{2(x - 1)}$$

Worked example

Write as a single fraction:

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

$$\frac{4}{x-5} - \frac{3}{2x+1}$$

Your turn

Simplify:

$$\frac{2}{4x+5} - \frac{3}{x-1}$$
$$\frac{-10x - 17}{(4x+5)(x-1)}$$

Worked example

Write as a single fraction:

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

$$\frac{4}{(2x + 1)(x - 5)} - \frac{3}{2x + 1}$$

Your turn

Simplify:

$$\frac{2}{4x - 5} - \frac{3}{(x - 1)(4x - 5)}$$

$$\frac{2x - 5}{(x - 1)(4x - 5)}$$

Worked example

Write as a single fraction:

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

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

Your turn

Write as a single fraction:

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

$$\frac{5x + 7}{x + 2}$$

Worked example

Write as a single fraction:

$$3 - (x - 4) \div \frac{x^2 - 16}{x - 5}$$

Your turn

Write as a single simplified fraction:

$$5 - (x - 2) \div \frac{x^2 - 4}{x + 3}$$
$$\frac{4x - 13}{x - 2}$$

Worked example

Write in the form $1 + \frac{a}{x+b}$:

$$\frac{x+3}{x-5}$$

$$\frac{x-2}{x+7}$$

Your turn

Write in the form $1 + \frac{a}{x+b}$:

$$\frac{x-5}{x+2}$$

$$1 - \frac{7}{x+2}$$

Worked example

Simplify:

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

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

Your turn

Simplify:

$$\frac{\frac{5}{3x} + 3}{7 + \frac{2}{3x}}$$

$$\frac{9x + 5}{21x + 2}$$

Worked example

Solve:

$$\frac{2x - 3}{4} = \frac{5x + 6}{7}$$

Your turn

Solve:

$$\frac{7x - 6}{5} = \frac{4x + 3}{2}$$

$$x = -\frac{9}{2}$$

Worked example

Solve:

$$\frac{7x}{2} + \frac{3x}{5} = 4$$

Your turn

Solve:

$$\frac{2x}{3} + \frac{3x}{4} = 5$$

$$x = \frac{60}{17}$$

Worked example

Solve:

$$\frac{7x}{2} - \frac{3x}{5} = 4$$

Your turn

Solve:

$$\frac{2x}{3} - \frac{3x}{4} = 5$$

$$x = -60$$

Worked example

Solve:

$$\frac{1}{x} + \frac{1}{2x} = 3$$

$$\frac{2}{x} - \frac{1}{4x} = 14$$

Your turn

Solve:

$$\frac{5}{6x} - \frac{1}{3x} = 8$$

$$x = \frac{3}{48}$$

Worked example

Solve:

$$\frac{x+3}{2} + \frac{x+4}{5} = 6$$

Your turn

Solve:

$$\frac{x+5}{3} + \frac{x+6}{4} = 2$$

$$x = -2$$

Worked example

Solve:

$$\frac{x+3}{2} - \frac{x+4}{5} = 6$$

Your turn

Solve:

$$\frac{x+5}{3} - \frac{x+6}{4} = 2$$

$$x = \frac{22}{7}$$

Worked example

Solve:

$$\frac{7x + 3}{2} - \frac{3x + 4}{5} = 6$$

Your turn

Solve:

$$\frac{6x + 5}{3} - \frac{3x + 6}{4} = 2$$

$$x = \frac{22}{15}$$

Worked example

Solve:

$$\frac{x+3}{2} + \frac{5}{x+4} = 6$$

Your turn

Solve:

$$\frac{x+5}{3} + \frac{4}{x+6} = 2$$

$$x = -3, x = -2$$

Worked example

Solve:

$$\frac{x+3}{2} - \frac{5}{x+4} = 6$$

Your turn

Solve:

$$\frac{x+5}{3} - \frac{4}{x+6} = 2$$

$$x = \frac{-5 - \sqrt{97}}{2}, x = \frac{-5 + \sqrt{97}}{2}$$

Worked example

Solve:

$$\frac{7x + 3}{2} - \frac{5}{3x + 4} = 6$$

Your turn

Solve:

$$\frac{2x + 5}{3} - \frac{4}{3x + 6} = 2$$

$$x = \frac{-3 - \sqrt{57}}{4}, x = \frac{-3 + \sqrt{57}}{4}$$

Worked example

Solve:

$$\frac{x+3}{x+4} + \frac{2}{x+5} = 7$$

Your turn

Solve:

$$\frac{x+5}{x+3} + \frac{4}{x+2} = 6$$

$$x = -\frac{14}{5}, x = -1$$

Worked example

Solve:

$$\frac{x+3}{x+4} - \frac{2}{x+5} = 7$$

Your turn

Solve:

$$\frac{x+5}{x+4} - \frac{6}{x+3} = 2$$

$$x = -6 - \sqrt{3}, x = -6 + \sqrt{3}$$

Worked example

Solve:

$$\frac{2}{x+3} + \frac{5}{x+4} = 6$$

Your turn

Solve:

$$\frac{2}{x+4} + \frac{6}{x+5} = 3$$

$$x = -\frac{13}{3}, x = -2$$