

Algebraic Fractions - Addition

This is just like number fraction addition, but with symbols.

To add two fractions you must first find their common denominator. Then convert each to the new denominator and add the new numerators.

The common denominator is found by multiplying the two denominators together.

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

$$12xy$$

In this case, multiply the **3y** by the **4x**. This gives **12xy**.

Now convert each factor to a factor of 12xy by dividing the denominator of each into 12xy and multiplying the result by each numerator(2x,5y)

$$\frac{\frac{2x}{3y} + \frac{5y}{4x}}{\frac{4x(2x) + 3y(5y)}{12xy}}$$
$$= \frac{8x^2 + 15y^2}{12xy}$$

Example #1

$$\begin{aligned} & \frac{4x}{3y} + \frac{2ab}{5c} \\ & \frac{5c(4x) + 3y(2ab)}{15cy} \\ & = \frac{20cx + 6aby}{15cy} \end{aligned}$$

Example #2

$$\begin{aligned} & \frac{x^2}{2c} + \frac{3a^3b}{7xy} \\ & \frac{7xy(x^2) + 2c(3a^3b)}{14cxy} \\ & = \frac{7x^3y + 6a^3bc}{14cxy} \end{aligned}$$

Algebraic Fractions - Subtraction - The method here is similar to addition, except the numerators(top terms) in the new fraction are subtracted.

Example #1

$$\begin{aligned} & \frac{a^2}{5x} - \frac{2b^3y}{3ac} \\ & \frac{3ac(a^2) - 5x(2b^3y)}{15acx} \\ & = \frac{3a^3c - 10b^3xy}{15acx} \end{aligned}$$

Example #2

$$\begin{aligned} & \frac{p^3}{3r^2} - \frac{5q^4r}{3pr} \\ & \frac{p(p^3) - r(5q^4r)}{3pr^2} \\ & = \frac{p^4 - 5q^4r^2}{3pr^2} \end{aligned}$$

Algebraic Fractions - Multiplication - Simply multiply across the denominators and the numerators, keeping them separate. Cancel any terms where possible.

Example #1

$$\frac{3cp^2}{4r^3} \times \frac{6b^4c^2}{5ar^2} = \frac{3cp^2 \times 6b^4c^2}{4r^3 \times 5ar^2} = \frac{18b^4c^3p^2}{20ar^5} = \frac{9b^4c^3p^2}{10ar^5}$$

Example #2

$$\frac{4x^3y^2}{5t^3z} \times \frac{3y^2z^5}{5t^2x} = \frac{4x^3y^2 \times 3y^2z^5}{5t^3z \times 5t^2x} = \frac{12x^3y^4z^5}{25t^5xz} = \frac{12x^2y^4z^4}{25t^5}$$

Algebraic Fractions - Division - Simply invert the term you divide by (the 2nd term), and proceed as for multiplication.

Example #1

$$\begin{aligned} \frac{2b^5x^2z}{5t^2y^3} \div \frac{4b^2z^5}{5xy^2} &= \frac{2b^5x^2z}{5t^2y^3} \times \frac{5xy^2}{4b^2z^5} = \frac{2b^5x^2z \times 5xy^2}{5t^2y^3 \times 4b^2z^5} = \frac{10b^5x^3y^2z}{20b^2t^2y^3z^5} \\ &= \frac{10b^3x^3}{20t^2yz^4} \end{aligned}$$

Example #2

$$\begin{aligned} \frac{5b^2x^3z}{6t^5y^4} \div \frac{7b^2z^2}{3x^3y^3} &= \frac{5b^2x^3z}{6t^5y^4} \times \frac{3x^3y^3}{7b^2z^2} = \frac{5b^2x^3z \times 3x^3y^3}{6t^5y^4 \times 7b^2z^2} \\ &= \frac{15b^2x^6y^3z}{42b^2t^5y^4z^2} = \frac{5x^6}{14t^5yz} \end{aligned}$$