

Rational Expressions

10th Grade

Fractions with algebra in them — and the values that are forbidden.

A rational expression is a fraction of polynomials. Factor first, cancel common factors, and exclude anything that makes the original denominator zero.

$$(x^2 - 9)/(x + 3) = x - 3, x \neq -3$$

$$(x^2 - 9)/(x + 3)$$

Factor the top as $(x+3)(x-3)$.

$$x - 3, x \neq -3$$

Multiply

Cancel across before multiplying.

factor, cancel, multiply

Divide

Same rule as numeric fractions.

flip the second, then multiply

Add or subtract

Exactly like numeric fractions.

common denominator first

THE COMMON MISTAKE

✗ **cancelling $(x + 3)/(x + 5)$ to $3/5$**

✓ **you cannot cancel terms, only factors**

Cancelling works across multiplication, never across addition.

The restriction comes from the ORIGINAL denominator, before any cancelling.