

Example 1- Simplify $\frac{5x^2-15x}{10x^2}$

Step 1- Make the expression a single fraction

This step is already done.

Step 2- Completely factor the numerator (GCF, binomials/trinomials/special products)

$$5x^2 - 15x = 5x(x - 3)$$

Step 3- Completely factor the denominator (GCF, binomials/trinomials/special products)

This step is already done.

Step 4- Reduce common factors

$$\frac{5x^2 - 15x}{10x^2} = \frac{5x(x - 3)}{10x^2} = \boxed{\frac{x - 3}{2x}}$$

Example 2- Simplify $\frac{m^2-m-2}{m^2+m}$

Step 1- Make the expression a single fraction

This step is already done.

Step 2- Completely factor the numerator (GCF, binomials/trinomials/special products)

$$m^2 - m - 2 = (m - 2)(m + 1)$$

Step 3- Completely factor the denominator (GCF, binomials/trinomials/special products)

$$m^2 + m = m(m + 1)$$

Step 4- Reduce common factors

$$\frac{m^2 - m - 2}{m^2 + m} = \frac{(m - 2)(m + 1)}{m(m + 1)} = \boxed{\frac{m - 2}{m}}$$

Example 3- Simplify $\frac{w^2-5w+6}{w^2-7w+12}$

Step 1- Make the expression a single fraction

This step is already done.

Step 2- Completely factor the numerator (GCF, binomials/trinomials/special products)

$$w^2 - 5w + 6 = (w - 3)(w - 2)$$

Step 3- Completely factor the denominator (GCF, binomials/trinomials/special products)

$$w^2 - 7w + 12 = (w - 3)(w - 4)$$

Step 4- Reduce common factors

$$\frac{w^2 - 5w + 6}{w^2 - 7w + 12} = \frac{(w - 3)(w - 2)}{(w - 3)(w - 4)} = \boxed{\frac{w - 2}{w - 4}}$$

Example 4- Simplify $(r^2 - 5r + 4)(r - 4)^{-2}$

Step 1- Make the expression a single fraction

We will deal with the negative exponent to make a single fraction.

$$(r^2 - 5r + 4)(r - 4)^{-2} = \frac{r^2 - 5r + 4}{(r - 4)^2}$$

Step 2- Completely factor the numerator (GCF, binomials/trinomials/special products)

$$r^2 - 5r + 4 = (r - 4)(r - 1)$$

Step 3- Completely factor the denominator (GCF, binomials/trinomials/special products)

This step is already done.

Step 4- Reduce common factors

$$\frac{r^2 - 5r + 4}{(r - 4)^2} = \frac{(r - 4)(r - 1)}{(r - 4)(r - 4)} = \boxed{\frac{r - 1}{r - 4}}$$

Example 5- Simplify $\frac{x^2+2x-8}{(2-x)(4+x)}$

Step 1- Make the expression a single fraction

This step is already done.

Step 2- Completely factor the numerator (GCF, binomials/trinomials/special products)

$$x^2 + 2x - 8 = (x + 4)(x - 2)$$

Step 3- Completely factor the denominator (GCF, binomials/trinomials/special products)

This step is already done.

Step 4- Reduce common factors

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

But we aren't done. We can factor -1 out of $2 - x$... watch what happens!

$$(2 - x) = -1(-2 + x) = -1(x - 2)$$

Now we can rewrite the denominator

$$\frac{x - 2}{2 - x} = \frac{x - 2}{-1(x - 2)} = \frac{x - 2}{-1(x - 2)} = \frac{1}{-1} = \boxed{-1}$$