nal Expressions

Simplifying

Multiplying

Dividing

g & Subtracting

plex Fractions

> **Simplified form of a rational expression** – a rational expression in which its numerator and denominator have no ___common___ factors (other than ± 1).

Factor + cancel like (↑) factors

Ex. 1 Simplify $\dfrac{x^2 + 7x + 10}{x^2 - 4}$. State the excluded value(s).

** __factor__ first!!

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

$$\boxed{\frac{x+5}{x-2}}$$ E.V. $x \neq \pm 2$

Try it!

1. $\dfrac{x^2 - 2x - 15}{x^2 + 4x + 3}$

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

E.V: $-1, -3$

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Ex. 2 Multiply rational expressions.

$$\frac{2x^2+4x}{x^2-4x-12} \div \frac{x^2-9x+18}{2x}$$

Pull out ___GCF___ 1st!! Then factor.

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

$$\boxed{x-3}$$

Try it!

2. $$\frac{6x^2+18x}{x^2+x-6} \cdot \frac{x^2-x-2}{x^2-7x-8}$$

sum of cubes: $(a+b)(a^2-ab+b^2)$ diff: $(a-b)(a^2+ab+b^2)$

Ex 3: Multiply a rational expression by a polynomial.

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

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

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

Try it!

3. $$\frac{-2x^2}{x^3-27} \cdot (x^2+3x+9)$$

$$\frac{-2x^2}{(x-3)(x^2+3x+9)} \cdot \frac{x^2+3x+9}{}$$

$$\boxed{\frac{-2x^2}{x-3}}$$

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Ex. 4 Divide rational expressions.

$$\frac{x-5}{9x^2-18x} \div \frac{2x^2-11x+5}{2x^2-5x+2}$$

$$\frac{x-5}{9x(x-2)} \cdot \frac{(2x-1)(x-2)}{(2x-1)(x-5)}$$

**To divide we multiply the 1st expression

by the _reciprocal_ **of the 2nd expression.**

FLIP!

$$\frac{1}{9x}$$

	x	-2
$2x$	$2x^2$	$-4x$
-1	$-1x$	2

Try it!

4. $\dfrac{3}{x+7} \div \dfrac{8x^2-8x}{x^2+6x-7}$ DIY

$$\frac{3}{x+7} \cdot \frac{(x+7)(x-1)}{8x(x-1)}$$

$$\boxed{\frac{3}{8x}}$$

5. $\dfrac{3x^2+4x+1}{x^2-4} \div \dfrac{x+1}{x^2+8x+12}$ DIY

$$\frac{(3x+1)(x+1)}{(x-2)(x+2)} \cdot \frac{(x+6)(x+2)}{x+1}$$

$$\boxed{\frac{(3x+1)(x+6)}{x-2}}$$

Dividing