12.2 Rational Expressions

A ***rational* expression** is an algebraic fraction whose numerator and denominator are polynomials.

no = ~~Solve~~ Simplify

Excluded values: Values that the variable would take on in the denominator that would make the denominator equal 0. Division by zero is undefined.

undefined $\frac{N}{0} = \frac{0}{K}$ 0

Apr 27-9:48 AM

What can denominators not equal, EVER?

State the excluded values for each rational expression.

$\frac{6}{x-3}$ $x-3=0$, $+3\ +3$, $x \neq 3$

$\frac{x+4}{3x+7}$ $3x+7 \neq 0$, $-7\ -7$, $\frac{3x}{3} \neq \frac{-7}{3}$, $x \neq -\frac{7}{3}$

$\frac{2x}{x^2-4}$ $x^2-4=0$, $+4\ +4$, $\sqrt{x^2}=\sqrt{4}$, $x \neq \pm 2$

$(x+2)(x-2)=0$, $x+2=0$ $x-2=0$, $x \neq -2$ $x \neq 2$

$\frac{3x+5}{x^2-5x+6}$ $(x-3)(x-2) \neq 0$, $x-3 \neq 0$ $x-2 \neq 0$, $x \neq 3$ $x \neq 2$

REVIEW

Simplify each rational number.

$\frac{4 \div 2}{6 \div 2} = \frac{2}{3}$

$\frac{24 \div 12}{36 \div 12} = \frac{2}{3}$

$\frac{12 \div 3}{15 \div 3} = \frac{4}{5}$

$\frac{16 \div 8}{40 \div 8} = \frac{2}{5}$

Apr 27-9:41 AM

Examples:

Simplify each rational expression. State all excluded values for each.

Den. $\neq 0$

$\frac{8\cancel{32}x^5y^2}{1\cancel{4}xy^7} = 8x^{5-1}y^{2-7} = 8x^4y^{-5} = \frac{8x^4}{y^5}$

$x \neq 0, y \neq 0$

$\frac{1\cancel{14}a^3b^2}{3\cancel{42}ab^3} = \frac{1}{3}a^{3-1}b^{2-3} = \frac{1}{3}a^2b^{-1} = \frac{a^2}{3b}$

$a \neq 0, b \neq 0$

$\frac{z^2+10z+16}{z+2} = \frac{(z+8)\cancel{(z+2)}}{\cancel{(z+2)}}$

1. factor
2. Excluded
3. cancel factors

$= z+8$

$z+2 \neq 0$

$z \neq -2$

~~cancel~~ factors not terms!

Apr 28-8:03 AM

More Examples:

Simplify each rational expression. State all excluded values for each.

$\frac{4x+8}{x^2+6x+8}$ $\frac{4(x+2)}{(x+4)(x+2)} = \frac{4}{(x+4)}$

$x \neq -4, -2$

$\frac{m^2-36}{m^2-5m-6}$ $\frac{(m+6)(m-6)}{(m-6)(m+1)} = \frac{m+6}{m+1}$

$m \neq 6, -1$

$\frac{x^2-x-20}{x^3+10x^2+24x}$ $\frac{(x-5)(x+4)}{x(x+6)(x+4)} = \frac{x-5}{x(x+6)}$

$x \neq 0, -6, -4$

$x \neq 0 \quad x+6 \neq 0 \quad x+4 \neq 0$

Apr 28-8:08 AM

Common Mistakes:

- Do NOT cancel a term. Factors cancel.
- Write your excluded values BEFORE you cancel factors out.
- Do NOT factor wrong. Check with FOIL!

May 8-7:41 AM

On a separate slip of paper,

Write a summary of what you learned today. Put your name on it and set it on my desk! Then grab your worksheet.

12.2 WS

A) 1, 3, 6, 7, 13, 16, 17, 18, 19

B) odds

C) 1, 2, 4, 5, 8, 9, 11, 13, 16, 19