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12-3 Simplifying Rational Expressions.....#

Objectives

Simplify rational expressions.
Identify excluded values of rational expressions.

Q: Why was the number so happy to get accepted into the Rational Expression Club?

A: It didn't want to be excluded.

Apr 10-3:35 PM

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

$$\frac{x^2}{x^2+4}$$

The value of the polynomial expression in the denominator **cannot be zero** since division by zero is undefined.

Remember... $\frac{3}{0} = \text{und}$ $\frac{12}{0} = \text{und}$

****This means that rational expressions may have excluded values.****

Mar 17-9:41 AM

Why are some values excluded?

Find any excluded values of the rational expression

$$\frac{6}{g+4}$$

$g + 4 = 0$ Set the denominator equal to 0.
 $g = -4$ Solve for g by subtracting 4 from each side.

The excluded value is -4.

Mar 17-10:03 AM

Find any excluded values of each rational expression

$$\frac{12}{t+5}$$

$t \neq -5$

$$\frac{3b}{b^2+5b}$$

$b(b+5)$
 $b \neq 0$ $b \neq -5$

$$\frac{y-2}{y^2+5y+4}$$

$(y+4)(y+1)$
 $y \neq -4$ $y \neq -1$

Mar 17-10:06 AM

Your turn (left page)...

Find any excluded values of each rational expression

$$\frac{2x+1}{x^2-15x}$$

$x(x-15)$
 $x \neq 0$ $x \neq 15$

$$\frac{3k^2}{k^2+7k+12}$$

$(k+3)(k+4)$
 $k \neq -3$ $k \neq -4$

Mar 17-10:11 AM

A rational expression is in its **simplest form** when the numerator and denominator have no common factors except 1.

Remember that to simplify fractions you can **divide out common factors** that appear in both the numerator and the denominator. You can do the same to simplify rational expressions.

Mar 17-10:07 AM

Simplify each rational expression, if possible. Identify any excluded values.

$$\frac{2r^3}{14r^4} = \frac{2 \cdot 7r^3}{2 \cdot 7r^4} = \frac{r^3}{7}; r \neq 0$$

Factor 14.
Divide out common factors. Note that if $r = 0$, the expression is undefined.
Simplify. The excluded value is 0.

$r \neq 0$

Mar 17-10:08 AM

Simplify each rational expression, if possible. Identify any excluded values.

$$\frac{6n^2 + 3n}{2n+1} = \frac{3n(2n+1)}{2n+1} = 3n; n \neq -\frac{1}{2}$$

$$\frac{12p}{3p-2} = \frac{3p \cdot 4}{3p-2}; p \neq \frac{2}{3}$$

Caution: Be sure to use the original denominator when finding excluded values. The excluded values may not be "seen" in the simplified denominator.

Mar 17-10:08 AM

Simplify each rational expression, if possible. Identify any excluded values.

$$\frac{5-5m}{5-15m} = \frac{5(1-m)}{5(1-3m)} = \frac{1-m}{1-3m}; m \neq 0, m \neq \frac{1}{3}$$

$$\frac{3n}{n-2}; n \neq 2$$

$$\frac{6p^3 + 12p}{p^2 + 2}$$

Mar 17-10:08 AM

From now on in this chapter, you may assume that the values of the variables that make the denominator equal to 0 are excluded values.

You do not need to include excluded values in your answers UNLESS THEY ARE ASKED FOR. aka read the directions!!!

Mar 17-10:09 AM

Simplify each rational expression, if possible.

$$\frac{x^2 + 5x + 6}{(x+2)(x+3)} = \frac{(x+2)(x+3)}{(x+2)(x+3)} = 1; x \neq -2, x \neq -3$$

$$\frac{w^2 - 8w + 12}{(w-6)(w-2)} = \frac{(w-6)(w-2)}{(w-6)(w-2)} = 1; w \neq 6, w \neq 2$$

$$\frac{1}{x+3}$$

$$\frac{r+2}{r^2 + 7r + 10}$$

Mar 17-10:10 AM

Assignment: p. 870 #1-15, 28-30

- both polynomials
- $\frac{5}{m}; m \neq 0$
- $\frac{x+2}{x^2-8x} = \frac{x+2}{x(x-8)}; x \neq 8, x \neq 0$
- $\frac{p^2}{p^2-2p-15} = \frac{p^2}{(p-5)(p+3)}$
- $\frac{4a^2}{8a}; a \neq 0; \frac{a}{2}$
-

Mar 17-10:10 AM

$2d(d+6)$

6. $\frac{2d^2+12d}{d+6}$ $\boxed{2d}$
 $\boxed{d \neq -6}$

7. $\boxed{\frac{2}{y+3}}$ $\boxed{y \neq -3}$

8, 9, 10
11-15 \rightarrow not find excluded
Simply ONLY

Apr 15-9:57 AM