

Algebra I Notes

11.1 Simplifying Rational Expressions

Objective: To simplify rational expressions.

Warm-Up: Simplify each radical expression.

1. $2\sqrt{24x^2}$

2. $3\sqrt{6y^3} \cdot 2\sqrt{2y}$

3. $\sqrt{\frac{3}{5m}}$

DEFINITION

An expression in the form $\frac{\text{polynomial}}{\text{polynomial}}$ is a _____

Example 1 Simplify each rational expression. State any excluded values.

a. $\frac{21a^2}{7a^3}$

b. $\frac{18d^2}{4d+8}$

c. $\frac{2n-3}{6n-9}$

Example 2 Simplify $\frac{40(x+2)(x+3)}{5(x+2)(x+5)}$

Example 3 Simplify each rational expression. State any excluded values.

a. $\frac{3x-6}{x^2+x-6}$

b. $\frac{6c+12}{c^2+5c+6}$

c. $\frac{a^2-3a+2}{3-3a^2}$

d. $\frac{16+16m+3m^2}{m^2-3m-28}$

Example 4 Simplify each rational expression. State any excluded values.

a.
$$\frac{2x^3 - 2x^2 + 5x - 5}{2x^3 + 4x^2 + 5x + 10}$$

b.
$$\frac{6x^3 + 3x^2 - 4x - 2}{3x^3 - 9x^2 - 2x + 6}$$

Example 5 Application

A square has side length $(6x + 2)$ m. A rectangle with width $(3x + 1)$ m has the same area as the square. What is the length of the rectangle?

Algebra I Notes

11.2 Multiplying and Dividing Rational Expressions

Objectives: To multiply and divide rational expressions.
To simplify complex fractions.

Warm-Up: Simplify each expression. State any excluded values.

1. $\frac{m + 6}{m^2 - m - 42}$

2. $\frac{4 - x^2}{x - 2}$

RECALL: Multiplying fractions $\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$ where $b \neq 0$ and $d \neq 0$.

Example 1 Multiply each rational expression. State any excluded values.

a. $\frac{6a^2}{a^2} \cdot \frac{-2}{a^3}$

b. $\frac{x + 3}{x} \cdot \frac{x - 5}{x + 3}$

Example 2 Multiply each rational expression. State any excluded values.

a. $\frac{x+5}{7x-21} \cdot \frac{14x}{x^2+3x-10}$

b. $\frac{2m+5}{3m-6} \cdot (m^2 + m - 6)$

RECALL: Dividing fractions $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$ where $b \neq 0$, $c \neq 0$, and $d \neq 0$.

Example 3 Divide each rational expression. State any excluded values.

a. $\frac{x}{x+y} \div \frac{xy}{x+y}$

b. $\frac{x^2-25}{4x+28} \div \frac{x-5}{x^2+9x+14}$

PRACTICE: Multiply or divide each rational expression. State any excluded values.

$$1. \frac{\frac{3x^2 + 2x + 1}{8x}}{\frac{12x^2 + 8x + 4}{16x}}$$

$$2. \frac{3x^2}{x+2} \cdot \frac{x^2 + 3x + 2}{x}$$

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

$$4. \frac{3x^2 - 12x}{5x} \div (x^2 - 3x - 4)$$