

**7.3****Multiplying and Dividing Rational Expressions**

For use with Exploration 7.3

**Essential Question** How can you determine the excluded values in a product or quotient of two rational expressions?

**1 EXPLORATION: Multiplying and Dividing Rational Expressions**

**Work with a partner.** Find the product or quotient of the two rational expressions. Then match the product or quotient with its excluded values. Explain your reasoning.

**Product or Quotient****Excluded Values**

a.  $\frac{1}{x-1} \cdot \frac{x-2}{x+1} =$

A. -1, 0, and 2

b.  $\frac{1}{x-1} \cdot \frac{-1}{x-1} =$

B. -2 and 1

c.  $\frac{1}{x-2} \cdot \frac{x-2}{x+1} =$

C. -2, 0, and 1

d.  $\frac{x+2}{x-1} \cdot \frac{-x}{x+2} =$

D. -1 and 2

e.  $\frac{x}{x+2} \div \frac{x+1}{x+2} =$

E. -1, 0, and 1

f.  $\frac{x}{x-2} \div \frac{x+1}{x} =$

F. -1 and 1

g.  $\frac{x}{x+2} \div \frac{x}{x-1} =$

G. -2 and -1

h.  $\frac{x+2}{x} \div \frac{x+1}{x-1} =$

H. 1

**7.3** Multiplying and Dividing Rational Expressions (continued)**2** **EXPLORATION:** Writing a Product or Quotient

**Work with a partner.** Write a product or quotient of rational expressions that has the given excluded values. Justify your answer.

a.  $-1$

b.  $-1$  and  $3$

c.  $-1$ ,  $0$ , and  $3$

**Communicate Your Answer**

- How can you determine the excluded values in a product or quotient of two rational expressions?
- Is it possible for the product or quotient of two rational expressions to have *no* excluded values? Explain your reasoning. If it is possible, give an example.

**7.3****Notetaking with Vocabulary**

For use after Lesson 7.3

In your own words, write the meaning of each vocabulary term.

rational expression

simplified form of a rational expression

**Core Concepts****Simplifying Rational Expressions**Let  $a$ ,  $b$ , and  $c$  be expressions with  $b \neq 0$  and  $c \neq 0$ .

**Property**  $\frac{a\cancel{c}}{b\cancel{c}} = \frac{a}{b}$  Divide out common factor  $c$ .

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**Examples**  $\frac{15}{65} = \frac{3 \cdot \cancel{5}}{13 \cdot \cancel{5}} = \frac{3}{13}$  Divide out common factor 5.

$\frac{4\cancel{(x+3)}}{(x+3)\cancel{(x+3)}} = \frac{4}{x+3}$  Divide out common factor  $x + 3$ .

**Notes:**

**7.3** Notetaking with Vocabulary (continued)**Multiplying Rational Expressions**

Let  $a$ ,  $b$ ,  $c$ , and  $d$  be expressions with  $b \neq 0$  and  $d \neq 0$ .

**Property**  $\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$  Simplify  $\frac{ac}{bd}$  if possible.

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**Example**

$$\frac{5x^2}{2xy^2} \cdot \frac{6xy^3}{10y} = \frac{30x^3y^3}{20xy^3} = \frac{\cancel{10} \cdot 3 \cdot \cancel{x} \cdot x^2 \cdot \cancel{y^3}}{\cancel{10} \cdot 2 \cdot \cancel{x} \cdot \cancel{y^3}} = \frac{3x^2}{2}, x \neq 0, y \neq 0$$

**Notes:****Dividing Rational Expressions**

Let  $a$ ,  $b$ ,  $c$ , and  $d$  be expressions with  $b \neq 0$ ,  $c \neq 0$ , and  $d \neq 0$ .

**Property**  $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$  Simplify  $\frac{ad}{bc}$  if possible.

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**Example**  $\frac{7}{x+1} \div \frac{x+2}{2x-3} = \frac{7}{x+1} \cdot \frac{2x-3}{x+2} = \frac{7(2x-3)}{(x+1)(x+2)}, x \neq \frac{3}{2}$

**Notes:**

**7.3** Notetaking with Vocabulary (continued)**Extra Practice**

In Exercises 1–4, simplify the expression, if possible.

1.  $\frac{2x^3 - 8x^2}{6x^2}$

2.  $\frac{5xy^3 - 2x^2y^2}{x^2y^2}$

3.  $\frac{x^2 - 5x + 4}{x^2 - 2x + 1}$

4.  $\frac{x^3 + 3x^2}{x^2 - 5x - 24}$

In Exercises 5–10, find the product or the quotient.

5.  $\frac{3xy}{xy^2} \cdot \frac{y}{2x}$

6.  $\frac{x + y}{7xy} \div \frac{4x}{y}$

7.  $\frac{x(x + 1)}{x - 2} \div \frac{(x + 1)(x - 6)}{(x - 6)(x - 9)}$

8.  $\frac{x^2 - 2x - 3}{x^2 - 1} \cdot \frac{x^2 - 2x - 63}{x^2 + 4x - 21}$

9.  $\frac{x^2 - 2x}{x + 7} \cdot \frac{x^3 + 8}{x^3 - 4x}$

10.  $\frac{x^2 + 2x - 15}{x^2 - 3x - 40} \div \frac{x^2 + 8x - 9}{x^2 + x - 72}$