

**8.2 Day 1**  
**Multiplying and Dividing**  
**Rational Expressions**

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Goal: Simplify, Multiply, and Divide Rational Expressions

Apr 21-11:00 AM

In Lesson 8-1, you worked with inverse variation functions such as  $y = \frac{5}{x}$ . The expression on the right side of this equation is a *rational expression*. A **rational expression** is a quotient of two polynomials. Other examples of rational expressions include the following:

Identify the excluded values of the following rational expressions.

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

$\frac{x + 3}{x - 7}$   
 $x \neq 7$

$\frac{10}{2x - 6}$   $x \neq 3$   
 $2x - 6 = 0$   
 $+6 \quad +6$   
 $\frac{2x}{2} = \frac{6}{2}$

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**Simplify. Identify any x-values for which the expression is undefined.**

1.  $\frac{5x^4}{6x^3}$   $x \neq 0$

2.  $\frac{2(x+2)(x-1)}{(x+3)(x-1)}$   $x \neq -3, 1$

$\frac{x+2}{x+3}$

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**Simplify. Identify any x-values for which the expression is undefined.**

3.  $\frac{16x^3}{8x^2 + 8} = 0$   
 $8x^2 = -8$   
 $x^2 = -1$   
 No excluded value

4.  $\frac{216x^3}{8(x^2+1)}$   $x \neq \pm 2i$

5.  $\frac{(3x+2)(2x+1)}{(3x+2)(2x-3)}$   
 $3x+2=0$   
 $x \neq -2/3, 3/2$

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Multiplying Rational Expressions
1. Factor all numerators and denominators completely.
2. Divide out common factors of the numerators and denominators.
3. Multiply numerators. Then multiply denominators.
4. Be sure the numerator and denominator have no common factors other than 1.

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**Multiply. Assume that all expressions are defined.**


6.  $\frac{x^3}{3xy^2} \cdot \frac{5}{8xy^5}$   
 $\frac{5x^3}{3y^5}$

7.  $\frac{4(x+5)}{(x+3)(x-1)}$   
 $\frac{-1}{4(x+3)}$

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**Multiply. Assume that all expressions are defined.**

8.  $\frac{x}{15} \cdot \frac{20}{x^2} = \frac{2x^3}{3}$

9.  5

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You can also divide rational expressions. Recall that to divide by a fraction, you multiply by its reciprocal.

$\frac{1}{2} \div \frac{3}{4} = \frac{1}{2} \cdot \frac{4}{3} = \frac{2}{3}$

**Divide. Assume that all expressions are defined.**

$\frac{5x^4}{8xy^2} \div \frac{8y^2}{3} = \frac{15x^4y^3}{3}$

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**Divide. Assume that all expressions are defined.**

12.  $\frac{(2x+1)(x-4)}{x^2-9} \div \frac{4x^2-1}{8x^2-28x+12}$

$\frac{4(x-4)}{(x+3)}$

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**Divide. Assume that all expressions are defined.**

13.  $\frac{x^4 - 9x^2}{x^2 - 4x + 3} \div \frac{x^4 + 2x^3 - 8x^2}{x^2 - 16}$

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Assignment: p. 580 #2-14, 40, 41

2.  $\frac{2x^6}{2(x-3)} = \frac{2x^6}{(x-3)}$   $x \neq 3$

3.  $\frac{(4x^2+13x-5)}{(3x-1)(2x-7)}$   $x \neq \frac{1}{3}, x \neq \frac{7}{2}$

May 6-12:37 PM