


## Section 4.3: Multiplying and Dividing Rational Expressions

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### Multiplying Rational Expressions

Multiplying rational expressions follows the same procedure as multiplying rational numbers, however you have to determine the non-permissible values for the variables.

Recall:  $\frac{3}{4} \times \frac{6}{9} = \frac{18}{36} = \frac{1}{2}$



You can also **reduce first** before you multiply.

#### When Multiplying Rational Expressions, you should:

1. Factor the numerators and denominators of both expressions, if possible.
2. Identify the non-permissible values.
3. Reduce like factors.
4. Write the product and state the restrictions.

*Example 1:* (ex. 1, p. 233)

Simplify:  $\frac{2x^2 - 12x}{15x} \cdot \frac{5x}{x - 6}$

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**Your Turn:** Simplify each of the following:

a)  $\frac{40x^2 - 20x}{18x} \cdot \frac{30x}{x-5}$

b)  $\frac{18x^3 - 12x}{5x - 15x^2} \cdot \frac{1 - 9x^2}{24x^2}$

### Dividing Rational Expressions

The rule for dividing rational expressions is the same as dividing rational numbers,

#### Multiply by the Reciprocal

Recall:  $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1} = \frac{6}{4} = \frac{3}{2}$

#### When Dividing Rational Expressions, you should:

1. Factor the numerators and denominators of both expressions, if possible.
2. Identify the non - permissible values.

**Remember to consider both the numerator and denominator of the second rational expression (divisor) when identifying NPVs.**

3. Multiply by the reciprocal.
4. Reduce like factors.
5. Write the quotient and state the restrictions.

*Example 2:* (ex. 2, p. 234)

Simplify each quotient and state the restrictions.

a)  $\frac{x-5}{3x^2-9x} \div \frac{5}{6x-18}$

b)  $\frac{2w}{24w+4w^2} \div \frac{6w^2-6w}{9w^3+54w^2}$

**Your Turn:** Simplify each of the following:

a)  $\frac{30x^2+15x}{x-3} \div \frac{2x^3+x^2}{x^2-3x}$

b)  $\frac{25-x^2}{3x^2+6x} \div \frac{7x-35}{x^2-4}$



*Example 3:*

Simplify:

$$\frac{\frac{x^2 - 16}{2x^2 - 10x}}{\frac{4x^3 + 16x^2}{x^2 - 5x}}$$

Practice Questions:

p. 238 - 239, #1ab, 2bc, 3cd, 4ad, 5b, 6bd, 7bd