

**MULTIPLYING AND DIVIDING RATIONAL EXPRESSIONS**  
**ALGEBRA 2 WITH TRIGONOMETRY**

Multiplication of rational expressions follows the same principles as those involved in simplifying them. The process is illustrated in *Exercise #1* with both a numerical and algebraic fraction. Notice the parallels.

**Exercise #1:** Simplify each of the following rational expressions by factoring completely. For the numerical fraction, make sure to prime factor all numerators and denominators.

(a)  $\frac{6}{8} \cdot \frac{10}{3}$

(b)  $\frac{x^2 - 4}{x^2 - x - 6} \cdot \frac{3x^2 + 15x}{6x^2 - 12x}$

The ability to “cross-cancel” with fractions is a result of the two facts: (1) to multiply fractions we multiply their respective numerators and denominators and (2) multiplication is commutative. The keys to multiplication, then, are the same as that for simplifying – factor and then reduce.

**Exercise #2:** Simplify each of the following products.

(a)  $\frac{8y^7}{5x^3} \cdot \frac{10x^2}{6y^3}$

(b)  $\frac{6x^2y^3}{4x^5y^2} \cdot \frac{10xy^2}{9x^5y^7}$

(c)  $\frac{2x^2 + 12x}{4x + 8} \cdot \frac{x^2 - 4x - 12}{x^2 - 36}$

(d)  $\frac{9 - x^2}{2x^3 - 6x^2} \cdot \frac{4x^2 - 4x}{x^2 + 2x - 3}$



Division of rational expressions continues to follow from what you have seen in previous courses. Since division by a fraction can always be thought of in terms of multiplying by its reciprocal, these problems simply involve an additional step.

**Exercise #3:** Perform each of the following division problems. Express all answers in simplest form.

(a)  $\frac{15x^2}{6y^5} \div \frac{5x^8}{2y^7}$

(b)  $\frac{30y^6}{20x^3} \div \frac{24y^2}{8x}$

(c)  $\frac{x^2 + 2x - 8}{8x - 16} \div \frac{x^2 - 16}{2x + 10}$

(d)  $\frac{9x^2 - 1}{3x^2 + 7x + 2} \div \frac{5 - 15x}{x^2 - 5x - 14}$

**Exercise #4:** When  $\frac{x^2 - 25}{3x}$  is divided by  $\frac{x + 5}{9x}$  the result is

(1)  $\frac{x + 5}{27x}$

(3)  $\frac{x - 20}{3}$

(2)  $3x - 15$

(4)  $9x - 5$



Name: \_\_\_\_\_

Date: \_\_\_\_\_

**MULTIPLYING AND DIVIDING RATIONAL EXPRESSIONS**  
**ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK**

**SKILLS**

1. Express each of the following products in simplest form.

(a)  $\frac{12x^4}{5y^8} \cdot \frac{15y}{30x^2}$

(b)  $\frac{14a^2}{15b^9} \cdot \frac{10b^3}{21a^6}$

(c)  $\frac{4x^3}{9z^5} \cdot \frac{3y^7}{10x^2} \cdot \frac{30z^2}{8y^3}$

2. Write each of the following products in simplest form.

(a)  $\frac{9x^2 - 16}{12x + 16} \cdot \frac{8x + 8}{3x^2 - x - 4}$

(b)  $\frac{x^2 - x - 12}{x^2 + 8x + 15} \cdot \frac{x^2 + 2x - 15}{16 - x^2}$

(c)  $\frac{2x^2 + 7x - 4}{8x^3 - 4x^2} \cdot \frac{12x^2 - 24x}{x^2 + 6x + 8}$

(d)  $\frac{x^2 - 7x - 8}{1 - x^2} \cdot \frac{3x^2 - 4x + 1}{9x^2 - 1}$



3. When  $\frac{24x^{10}}{2y}$  is divided by  $\frac{36x^2}{6y^8}$  the result is

(1)  $2x^8y^7$

(3)  $\frac{x^8}{3y^7}$

(2)  $\frac{3x^5}{2y^7}$

(4)  $\frac{x^4}{2y^7}$

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4. Express the result of each division problem below in simplest form.

(a)  $\frac{5x^3 - 10x^2}{10x^2 + 40x} \div \frac{x^2 - 5x + 6}{x^2 + x - 12}$

(b)  $\frac{24 - 18x}{9x^2 - 16} \div \frac{2x^2 + 2x}{3x^2 + 7x + 4}$

(c)  $\frac{x^2 - 6x + 8}{3x^4 - 6x^3} \div \frac{4x^2 - 1}{2x^3 - x^2}$

(d)  $\frac{49 - x^2}{x^2 - 9x + 14} \div \frac{x^2 + 2x - 35}{6 - 3x}$

