Section 7.2 Multiplying and Dividing Rational Expressions

Multiplying Rational Expressions: If P, Q, R and S are polynomials, where Q is not zero and S is not zero, then

$$\frac{P}{Q} \bullet \frac{R}{S} = \frac{PR}{QS}$$

Steps for multiplying rational expressions:

1. Factor all numerators and denominators completely.
2. Divide numerators and denominators by common factors.
3. Multiply the remaining factors in the numerators and multiply the remaining factors in the denominators.

NOTE: You do not need a common denominator to multiply rational expressions,

Example 1: Multiply the given expressions, and simplify your result.

a. $\frac{x-2}{x+3} \bullet \frac{2x+6}{5x-10}$

b. $\frac{x-3}{x+7} \bullet \frac{3x+21}{3x-9}$

c. $\frac{2y}{3y-y^2} \bullet \frac{2y^2-9y+9}{8y-12}$

Note: Portions of this document are excerpted from the textbook *Introductory and Intermediate Algebra for College Students* by Robert Blitzer.

Dividing Rational Expressions: If P, Q, R and S are polynomials, where Q is not zero, R is not zero and S is not zero, then

$$\frac{P}{Q} \div \frac{R}{S} = \frac{P}{Q} \bullet \frac{S}{R} = \frac{PS}{QR}$$

To find the quotient of two rational expressions, invert the divisor and multiply.

Example 2: Divide the given expressions. Simplify your result.

a. $\frac{x+5}{7} \div \frac{4x+20}{7} = \frac{x+5}{7} * \frac{7}{4x+20} = ?$

b. $\frac{4}{x-6} \div \frac{40}{7x-42}$

c. $\frac{x^2+x}{x^2-4} \div \frac{x^2-1}{x^2+5x+6}$

d. $\frac{3y+12}{y^2+3y} \div \frac{y^2+y-12}{9y-y^3}$

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Answers Section 7.2

Example 1:

a. $\frac{2}{5}$

b. 1

c. $-\frac{1}{2}$

Example 2:

a. $\frac{1}{4}$

b. $\frac{7}{10}$

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

d. –3