

## Lesson 11-3

## Dividing Rational Expressions

**N**ow that you are familiar with how to multiply and simplify rational expressions, it is time to try dividing. Since rational expressions are just complicated rational numbers, or fractions, any previous work you've done with fractions should be very helpful here.

Example 1:

$$\begin{aligned} \frac{2a}{a+3} \div \frac{a+7}{a+3} &= \\ &= \frac{2a}{a+3} \cdot \frac{a+3}{a+7} \quad (\text{multiply by reciprocal}) \\ &= \frac{2 \cdot a \cdot (a+3)}{(a+3)(a+7)} \quad (\text{keep in factored form}) \\ &= \frac{2 \cdot a \cdot \cancel{(a+3)}}{\cancel{(a+3)}(a+7)} \quad (a+3) \text{ is GCF} \\ &= \frac{2a}{a+7} \end{aligned}$$

Example 2:

$$\begin{aligned} \frac{x}{x+2} \div \frac{x^2}{x^2+5x+6} &= \\ &= \frac{x}{x+2} \cdot \frac{x^2+5x+6}{x^2} \quad (\text{multiply by reciprocal}) \\ &= \frac{x \cdot (x+2)(x+3)}{(x+2) \cdot x \cdot x} \quad (\text{keep in factored form}) \\ &= \frac{\cancel{x}(x+2)(x+3)}{(x+2) \cdot \cancel{x} \cdot x} \quad x(x+2) \text{ is GCF} \\ &= \frac{x+3}{x} \end{aligned}$$

Find each quotient. Simplify the resulting rational expression completely.

1.  $\frac{a^2b^3c}{m^2y^2} \div \frac{a^2bc^3}{m^3y^2} =$

2.  $\frac{5x^2}{7} \div \frac{10x^3}{21} =$

3.  $\frac{a}{a+3} \div \frac{a+11}{a+3} =$

4.  $\frac{m+7}{m} \div \frac{m+7}{m+3} =$

5.  $\frac{3m+15}{m+4} \div \frac{3m}{m+4} =$

6.  $\frac{3x-3}{x+2} \div (x-1) =$

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7.  $\frac{4z+8}{z+3} \div (z+2) =$

8.  $\frac{x+3}{x+1} \div (x^2+5x+6) =$

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9.  $\frac{2x+4}{x^2+11x+18} \div \frac{x+1}{x^2+14x+45} =$

10.  $\frac{k+3}{m^2+4m+4} \div \frac{2k+6}{m+2} =$

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11.  $\frac{2x+6}{x+5} \div \frac{2}{x+5} =$

12.  $\frac{y^2+5y+6}{y^2-y-12} \div \frac{y+2}{y^2+y-20} =$

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13.  $\frac{m^2+m-6}{m^2+8m+15} \div \frac{m^2-m-2}{m^2+9m+20} =$

14.  $\frac{2x^2+7x-15}{x+2} \div \frac{2x-3}{x^2+5x+6} =$