

When you are done with your 7.2 homework you should be able to...

$\pi$  Multiply Rational Expressions.

$\pi$  Divide Rational Expressions.

WARM-UP:

1. Simplify each of the following rational expressions.

a.  $\frac{4x^2 - 25}{2x^2 - 3x - 5}$

b.  $\frac{125m^3 - 1}{75m^3 + 200m^2 - 3m - 8}$

2. Find the product.

$$\frac{12}{45} \cdot \frac{10}{3}$$

3. Find the reciprocal.

a.  $\frac{5}{4}$

b.  $x - 2$

## Steps to Multiply Rational Expressions

Step 1: Factor the polynomials in each numerator and denominator.

Step 2: Use the fact that if  $\frac{a}{b}$  and  $\frac{c}{d}$ ,  $b \neq 0$ ,  $d \neq 0$ , are two rational expressions,

then  $\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$  to multiply the rational expressions.

Step 3: Divide out common factors in the numerator and the denominator. Leave your answer in factored form.

4. Multiply and simplify the result, if possible.

a.  $\frac{m^2 - n^2}{3m - 3n} \cdot \frac{6}{2m + 2n}$

b.  $(x - 3) \cdot \frac{x + 2}{x^2 - 5x + 6}$

c.  $\frac{x^3 - x^2 + x - 1}{x + 1} \cdot \frac{x^2 + 2x + 1}{1 - x^2}$

## Steps to Divide Rational Expressions

Step 1: Multiply the dividend by the reciprocal of the divisor.

Step 2: Factor each polynomial in the numerator and the denominator.

Step 3: Multiply.

Step 4: Divide out common factors in the numerator and the denominator. Leave the remaining factors in factored form.

5. Divide and simplify, if possible.

a. 
$$\frac{4z^2 + 12z + 9}{8z + 16} \div \frac{(2z + 3)^3}{12z + 24}$$

b. 
$$\frac{p^2 - 49}{p^2 - 5p - 14} \div \frac{14 - 5p - p^2}{p - 7}$$

$$c. \frac{x^2 - 81}{x^4 - 81} \div \frac{x^2 + 1}{(x-3)^2} \cdot \frac{x^3 + x}{x^2 - 2x - 3}$$

$$d. \frac{\frac{t^2}{t^2 - 16}}{\frac{t^2 - 3t}{t^2 - t - 12}}$$

When you are done with your 7.3 homework you should be able to...

- $\pi$  Add Rational Expressions with a Common Denominator.
- $\pi$  Subtract Rational Expressions with a Common Denominator.
- $\pi$  Add or Subtract Rational Expressions with Opposite Denominators.

WARM-UP:

6. Find each sum and write in lowest terms.

$$a. \frac{4}{11} + \frac{18}{11}$$

b.  $\frac{1+8}{2+4} + \frac{3+7}{2+4}$

### Steps to Add Rational Expressions with Common Denominators

Step 1: Use the fact that if  $\frac{a}{c}$  and  $\frac{b}{c}$ ,  $c \neq 0$ , are two rational expressions, then

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c} \text{ to add the rational expressions.}$$

Step 2: Simplify the sum by writing the rational expression in lowest terms, if it is not already reduced.

7. Add the rational expressions and simplify the results.

a.  $\frac{5x-3}{x+1} + \frac{x+9}{x+1}$

b.  $\frac{5x}{x^2+1} + \frac{x^2-3x}{x^2+1}$

c.  $\frac{12q}{2p-2q} + \frac{8p}{2p-2q}$

## Steps to Subtract Rational Expressions with Common Denominators

Step 1: Use the fact that if  $\frac{a}{c}$  and  $\frac{b}{c}$ ,  $c \neq 0$ , are two rational expressions, then

$$\frac{a}{c} - \frac{b}{c} = \frac{a-b}{c} \text{ to subtract the rational expressions.}$$

Step 2: Simplify the difference by writing the rational expression in lowest terms, if it is not already reduced.

8. Subtract the rational expressions and simplify the result, if possible.

a.  $\frac{x^2}{x^2-1} - \frac{3x+2}{x^2-1}$

b.  $\frac{x^2-x}{2x} - \frac{2x^2-x}{2x}$

9. Perform the indicated operation and simplify the result, if possible.

a.  $\frac{2s-3t}{s-t} + \frac{6s-4t}{t-s}$

b.  $\frac{n+3}{2n^2-n-3} - \frac{-n^2-3n}{2n^2-n-3}$

c.  $\frac{4}{x-2} \cdot \frac{x-2}{x+2} + \frac{3x-1}{x^2-4}$

d.  $\frac{?}{n^2-1} - \frac{n-3}{n^2-1} = \frac{1}{n+1}$

10. **Applications**

a. Find a rational expression which, when subtracted from  $\frac{6x}{x-3}$  gives a difference of one.

b. Find the perimeter of the rectangle which has a width of  $\frac{2n+3}{2n+1}$  yd and a length of  $\frac{n-3}{2n+1}$  yd.