

## Lesson 7.1&7.2 SU 09

- Objectives:
1. To evaluate rational expressions.
  2. To determine where a rational expression is undefined.
  3. To simplify rational expressions.
  4. To multiply or divide rational expressions.

**Rational Expression:** An expression that can be written in the form  $\frac{P}{Q}$ , where P and Q are polynomials and  $Q \neq 0$ .

**Examples of rational expressions:**

$$\frac{x}{3}, \quad \frac{x^2-9}{x^2-6x+9}, \quad \frac{a^3-8}{a^2-4}$$

where the denominator does  
not equal zero

$x \neq 3$                        $a \neq 2, a \neq -2$

For what values of the variable is  $\frac{3x-2}{x^2-7x+12}$  undefined?

Find every value for the variable that makes the following expressions undefined.

1.  $\frac{3y}{y+7}$

2.  $\frac{2x+7}{x^2-16}$

Evaluate the expression  $\frac{4x-7}{2x+3}$  when  $x = 3$ .

**RULE**  $\frac{PR}{QR} = \frac{P \cdot 1}{Q \cdot 1} = \frac{P}{Q}$ , where P, Q, and R are polynomials  
and Q and R are not 0.

**To simplify a rational expression:**

1. Write out the numerator and denominator in factored form.
2. Divide out all common factors in the numerator and denominator.
3. Multiply the remaining factors in the numerator and denominator.

Simplify:

1.  $\frac{42}{35}$

2.  $\frac{18xy}{24y^2}$

$$3. \frac{-36a^2b^3}{-66a^3b^2}$$

$$4. \frac{x^2-9}{x^2-6x+9}$$

$$5. \frac{6x^2-7x+2}{10x-15x^2}$$

**RULE:**  $-\frac{P}{Q} = \frac{-P}{Q} = \frac{P}{-Q}$  where  $Q \neq 0$

### **Multiplying**

**RULE**  $\frac{P}{Q} \cdot \frac{R}{S} = \frac{PR}{QS}$ , where P,Q,R, and S are polynomials  
and  $Q \neq 0$  and  $S \neq 0$ .

To multiply rational expressions:

1. Write out the numerator and denominator in factored form.
2. Divide out any numerator factors with any matching denominator factors.
3. Multiply numerator by numerator and denominator by denominator
4. Simplify as needed

**Multiply:**

1.  $\frac{4}{7} \cdot \frac{21}{32}$

2.  $\frac{7x^2y}{9xy^3} \cdot \frac{3x^2y^2}{2x^4}$

3.  $\frac{x^2-9}{x^2-x-6} \cdot \frac{x^2+9x+14}{x^2+7x+12}$

$$4. \frac{10n^2 + 21n - 10}{5n^2 + 33n - 14} \cdot \frac{2n^2 + 6n - 56}{2n^2 - 3n - 20}$$

$$5. \frac{4-y}{y^2-16}$$

### Dividing

**RULE**  $\frac{P}{Q} \div \frac{R}{S} = \frac{P \cdot S}{Q \cdot R}$ , where P, Q, R, and S are polynomials  
and  $Q \neq 0$   $R \neq 0$  and  $S \neq 0$ .

To divide rational expressions:

1. Write an equivalent multiplication statement with the reciprocal of the divisor.
2. Write out the numerator and denominator in factored form.
2. Divide out any numerator factors with any matching denominator factors.
3. Multiply numerator by numerator and denominator by denominator
4. Simplify as needed.

**Divide:**

1.  $\frac{4}{9} \div \frac{64}{27}$

2.  $\frac{21t^2 + 22t - 8}{5t^2 - 43t - 18} \div \frac{12t^2 + 7t - 12}{20t^2 - 7t - 6}$

Class work WS 7.1-7.2

Homework Math XL Sections 7.1 and 7.2

DUE BY \_\_\_\_\_