Lesson 8.4 Warm Up (Clickers)

1. Identity the asymptotes of $f(x) = \frac{3}{2x - 8} + 5$.

2. Find the horizontal asymptote(s) of $f(x) = \frac{3x - 5}{2x^2 + 9}$

3. Given $f(x) = 2x - 9$ and $g(x) = 3x^2$, find $f(g(x))$.

Lesson 8.4 Rational Expressions

Essential Understanding: You can use much of what you know about multiplying and dividing fractions to multiply and divide rational expressions.

A rational expression is the quotient of two polynomials. You will find that, at different times, it is helpful to think of rational expressions as ratios, as fractions, or as quotients.

A rational expression is in simplest form when its numerator and denominator are polynomials that have no common divisors.

In simplest form	Not in simplest form
$\frac{x + 1}{x - 1}, \frac{x^2 + 3x + 2}{x + 3}$	$\frac{x}{x^2}, \frac{3(x - 3)}{x - 3}, \frac{x^2 - x - 6}{x^2 + x - 2}$

You simplify a rational expression by dividing out the common factors in the numerator and the denominator. Factoring the numerator and denominator will help you find the common divisors.

A rational expression and any simplified form must have the same domain in order to be equivalent.

$\frac{x^2 - x - 6}{x^2 + x - 2} = \frac{(x - 3)(x + 2)}{(x - 1)(x + 2)}$ and $\frac{x - 3}{x - 1}, x \neq -2$, are equivalent.

Ex. What is $\frac{x^2 + 7x + 10}{x^2 - 3x - 10}$ in simplest form? State any restrictions the variable.

Ex. What is the rational expression in simplest form?
State any restrictions on the variables.

a. $\frac{24x^3y^2}{-6x^2y^3}$

b. $\frac{x^2 + 2x - 8}{x^2 - 5x + 6}$

1 What is the rational expression in simplest form?

$$\frac{4x-12}{x^2-9}$$

2 What is the rational expression in simplest form?

3 What is the rational expression in simplest form?

$$\frac{12-4x}{x^2-9}$$

Ex. What is the product $\frac{x^2 + x - 6}{x - 5} \cdot \frac{x^2 - 25}{x^2 + 4x + 3}$ in simplest form? State any restrictions on the variable.

Ex. What is the product $\frac{2x - 8}{x^2 - 16} \cdot \frac{x^2 + 5x + 4}{x^2 + 8x + 16}$ in simplest form? State any restrictions on the variable.

4 What is the product in simplest form?

$$\frac{x^2-3x+2}{x+2} \times \frac{x^2-36}{x^2+5x-6}$$

Ex. What is the quotient $\frac{2 - x}{x^2 + 2x + 1} \div \frac{x^2 + 3x - 10}{x^2 - 1}$ in simplest form? State any restrictions on the variable.

5 Ex. What is the quotient in simplest form?

$$\frac{x^2+5x+4}{x^2+x-12} \div \frac{x^2-1}{2x^2-6x}$$