Sec 9-4
Simplifying Rational Expressions

- Factor all numerators and denominators
- Cancel factors common to the numerator and denominator
- Restrictions are any values that make the denominator zero at any point (beginning or end)

Simplify. State restrictions on the variable.

$$\frac{4x^4 - 36x^2}{6x^3 - 36x^2 + 54x} = \frac{4x^2(x^2-9)}{6x(x^2-6x+9)} = \frac{4x^2(x+3)(x-3)}{6x(x-3)(x-3)}$$

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

$x \neq 3, 0$

Simplify each.

1. $\frac{16}{45} \cdot \frac{25}{24} = \frac{10}{27}$

2. $\frac{-48}{36} \cdot \frac{28}{-35}$

$\frac{-4}{3} \cdot \frac{4}{-5} = \frac{16}{15}$

3. $\frac{8}{15} \div \frac{44}{21}$ Instead of dividing by a fraction we multiply by the reciprocal.

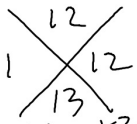
$\frac{8}{15} \cdot \frac{21}{44} = \frac{14}{55}$

Sec 9-4 Simplifying the Product or Quotient of Rational Expressions

- Factor all numerators and denominators
- If mulitplying rational expressions you can cross cancel
- If dividing rational expressions, change to multiplying by the reciprocal so you can cross cancel.
- State restrictions on the variable.

Simplify. State the restrictions on the variables.

$$\frac{8x^4 + 2x^3}{6x^2 - 24x} \cdot \frac{x^2 + x - 6}{4x^2 + 13x + 3}$$



$$\frac{12x^3(4x+1)}{6x(x-4)} \cdot \frac{(x+3)(x-2)}{(x+3)(4x+1)}$$

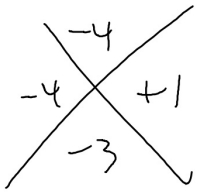
	x	$+3$
$4x$	$4x^2$	$12x$
$+1$	x	$+3$

$$\frac{x^2(x-2)}{3(x-4)}$$

$x \neq 0, 4, -3, \frac{-1}{4}$

Simplify. State the restrictions on the variables.

$$\frac{x^2 - 16}{9x^2 + 18x} \div \frac{x^2 - 3x - 4}{3x^2 + 6x}$$



$$\frac{(x+4)(x-4)}{3x(x+2)} \cdot \frac{3x(x+2)}{(x-4)(x+1)}$$

$$\frac{(x+4)}{3(x+1)}$$

$x \neq -1, 4, -2, 0$