

# Unit 5 Bare Necessities - Rational Expressions

## Simplifying Rational Expressions

Factor, then cancel.

All Together!!

EX1.  $\frac{x^2-16}{x^2+3x-28}$



You Try!!

1.  $\frac{x^2-11x+18}{x^2+2x-8}$

2.  $\frac{2x^2+10x-48}{8x+64}$

# Multiplying Rational Expressions

Factor, then cancel. \*\*Remember, the factors can be in either fraction!!

**All Together!!**

$$\text{EX2. } \frac{x}{x+3} \cdot \frac{x^2-5x-24}{x^2-5x}$$

**You Try!!**

$$3. \frac{x+3}{3x^2+4x-15} \cdot \frac{4x^2-9}{2x+3}$$

$$4. \frac{x-3}{x^2-4} \cdot \frac{x+2}{x^2-6x+9}$$

# Dividing Rational Expressions

Keep, change, flip. Factor, then cancel.

**All Together!!**

$$\text{EX3. } \frac{x^2+9x+18}{x^2-9} \div \frac{x+6}{x-6}$$

**You Try!!**

$$5. \frac{x^2+2x-3}{x^2-5x+4} \div \frac{x^2-9}{x^2-2x-8}$$

$$6. \frac{3x-9}{x^2-x-20} \div \frac{x^2+2x-15}{x^2-25}$$

# Asymptotes and Holes of Rational Functions

Factor, then cancel.

Look ONLY at the denominator!

- Factors that cancel create holes
- Factors that did not cancel create vertical asymptotes

Horizontal asymptotes:

- look for highest exponent in whole problem
- divide those terms

## All Together!!

$$\text{EX4. } f(x) = \frac{2x^2 - x - 15}{x^2 + x - 12} = \frac{(x-3)(2x+5)}{(x+4)(x-3)}$$

$$\text{EX5. } f(x) = \frac{x+7}{x^2 - 10x + 21} = \frac{x+7}{(x-7)(x-3)}$$

## You Try!!

Determine the vertical asymptotes, holes, domain, and horizontal asymptotes.

$$7. f(x) = \frac{2x^2 - 9x - 5}{x^2 + x - 30} = \frac{(2x+1)(x-5)}{(x+6)(x-5)}$$

$$8. f(x) = \frac{x^2 + 5x + 4}{x+4} = \frac{(x+4)(x+1)}{x+4}$$

$$9. f(x) = \frac{5x^2 - 27x - 18}{5x^2 + 43x + 24} = \frac{(x-6)(5x+3)}{(x+8)(5x+3)}$$

$$10. f(x) = \frac{x+6}{x^2 + 8x - 9} = \frac{x+6}{(x-1)(x+9)}$$