

# Unit 4 Bare Necessities - Rational Expressions



## Simplifying Rational Expressions

EX1.  $\frac{x^2-16}{x^2+3x-28} = \frac{\cancel{(x-4)}(x+4)}{\cancel{(x-4)}(x+7)} = \frac{x+4}{x+7}$

$\sqrt{x^2} = x$   
 $\sqrt{16} = 4$

$-28$   
 $\wedge$   
 $7x + 4x = 3x$

	$x$	$-4$
$x$	$x^2$	$-4x$
$7$	$7x$	$-28$

## Multiplying Rational Expressions

EX2.  $\frac{\boxed{x}}{\boxed{x+3}} \cdot \frac{\boxed{x^2-5x-24}}{\boxed{x^2-5x}} = \frac{\cancel{x}}{\cancel{x+3}} \cdot \frac{\cancel{(x-8)}\cancel{(x+3)}}{\cancel{x}(x-5)} = \frac{x-8}{x-5}$

$$\begin{array}{r} -24 \\ / \quad \backslash \end{array}$$

$$\begin{array}{r} -8x + 3x = -5x \\ \hline x \quad -8 \end{array}$$

<u>x</u>	<u>x</u> <sup>2</sup>	-8x
3	3x	-24

# Dividing Rational Expressions Keep Change Flip!

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

$$= \frac{x^2+9x+18}{x^2-9} \cdot \frac{x-6}{x+6}$$

$$= \frac{(x+6)(x+3)}{(x+3)(x-3)} \cdot \frac{x-6}{x+6}$$

$$= \frac{x-6}{x-3}$$

18  
 $\swarrow \quad \searrow$   
 $3x + 6x = 9x$

	<u>x</u>	<u>6</u>
<u>x</u>	$x^2$	$6x$
<u>3</u>	$3x$	$18$

$$\sqrt{x^2} = x$$

$$\sqrt{9} = 3$$

## Asymptotes and Holes of Rational Functions

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

Hole @  $x=3$

V.A @  $x=-4$

H.A @  $x=2$

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

No Holes

V.A @  $x=7, 3$

No H.A

$N = D$ ,  $y = \text{coefficients}$

$N > D$ ,  $y = 0$

$N < D$ , none!

$$(x-7)(x-3)$$

$$x^2 - 3x - 7x + 21$$

## Unit 5 Bare Necessities - Exponents and Logarithms



① base of log = base of exponent

Rewriting Exponents and Logarithms

② log = exponent

EX1. Rewrite  $6^3 = 216$  in logarithmic form.

$$\log_{6} 216 = 3$$

EX2. Rewrite  $\log_{2} 16 = 4$  in exponential form.

$$2^4 = 16$$