Name _____ Date _____ Class _____

Graphing More Complicated Rational Functions
Reteach

Characteristics of Rational Functions

Vertical asymptotes	Zeros of denominator
Holes	Shared zeros of numerator and denominator
x-intercepts	Zeros of numerator
y-intercept	Value of function at $x = 0$, $f(0)$

Example

Find the vertical asymptote(s), hole(s), x-intercept(s), and y-intercept of: $f(x) = \dfrac{x^2 + 2x - 15}{x^2 - x - 6}$

Step 1 Write function in factored form.

$$f(x) = \frac{x^2 + 2x - 15}{x^2 - x - 6}$$

$$= \frac{(x + 5)(x - 3)}{(x - 3)(x + 2)}$$

Step 2 Find zeros of numerator and denominator.

Zeros of numerator: $x = -5$; $x = 3$
Zeros of denominator: $x = 3$; $x = -2$

Step 3 Find $f(0)$.

$$f(0) = \frac{0^2 + 2(0) - 15}{0^2 - 0 - 6} = \frac{5}{3}$$

Vertical Asymptote	Hole	x-intercept	y-intercept
$x = -2$	$x = 3$	$(-5, 0)$	$\left(0, \dfrac{5}{3}\right)$

Find the vertical asymptote(s), holes, x-intercept(s), and y-intercept of the functions.

1. $f(x) = \dfrac{x + 6}{x^2 - 4x - 12}$

Vertical Asymptote(s): _____

Hole(s): _____

x-intercept(s): _____

y-intercept: _____

2. $f(x) = \dfrac{x^2 + 7x + 12}{x^2 + 2x - 8}$

Vertical Asymptote(s): _____

Hole(s): _____

x-intercept(s): _____

y-intercept: _____

3. $f(x) = \dfrac{x^2 - 1}{x - 4}$

Vertical Asymptote(s): _____

Hole(s): _____

x-intercept(s): _____

y-intercept: _____

4. $f(x) = \dfrac{x + 2}{x^2 + 2}$

Vertical Asymptote(s): _____

Hole(s): _____

x-intercept(s): _____

y-intercept: _____