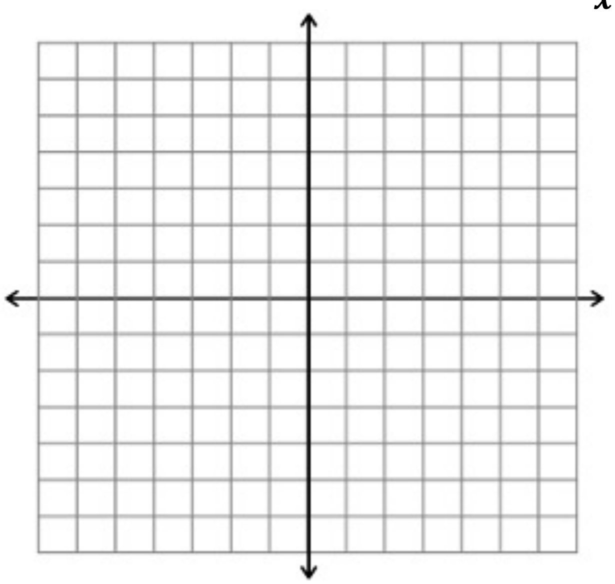
Graphing Rational Functions Day 1

<u>Review:</u>

Simplify. Identify any *x*-values for which the expression is undefined.

$$\frac{x^2 + 5x + 4}{x^2 - 1} \qquad\qquad \frac{x^2 - 8x + 12}{x^2 - 12x + 36}$$

The parent rational function is $f(x) = \frac{1}{x}$



Domain:

Range:

Asymptote(s):

A <u>vertical asymptote</u> is a vertical line that the function cannot cross.

- Where the denominator is equal to 0

A <u>horizontal asymptote</u> follows the end behavior of the rational function.

**** Remember: ASYMPTOTES ARE EQUATIONS**

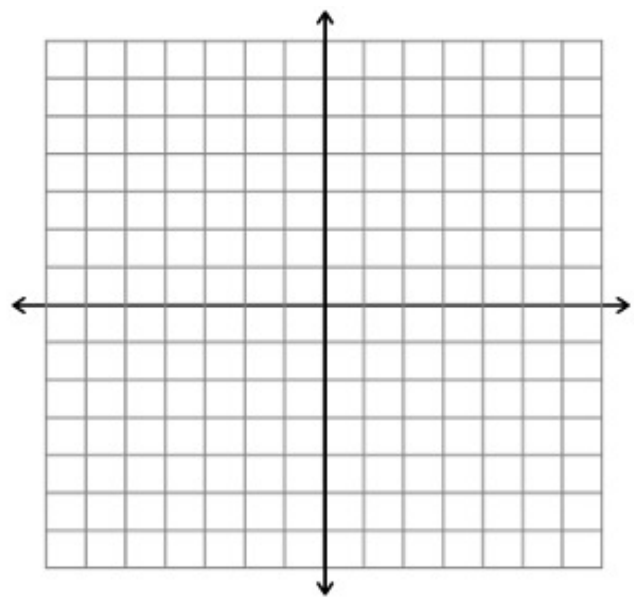
Graphing Rational Functions Day 1

Identify the domain, range, and asymptotes of each function.

1. Graph: $y = \frac{1}{x} + 3$

2. Graph: $y = \frac{1}{x-2}$

3. Graph: $y = \frac{1}{x+1} - 2$



Describe the end behavior of each of the previous problems.

1.

2.

3.

Identify the transformations:

1. $y = \frac{-1}{x} + 1$ **2.** $y = \frac{1}{x-7}$ **3.** $y = \frac{2}{x-2}$

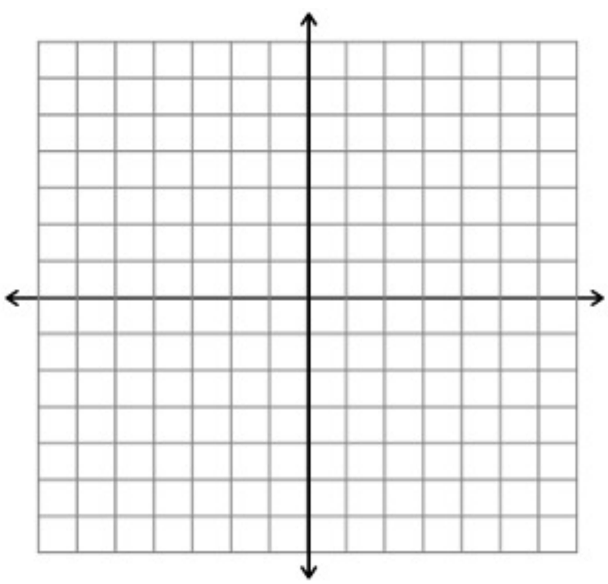
Identify all asymptotes:

1. **2.** **3.**

Example #2:

Graph the function.

$$p(x) = \frac{x - 2}{x^2 + 4x - 12}$$



Holes:

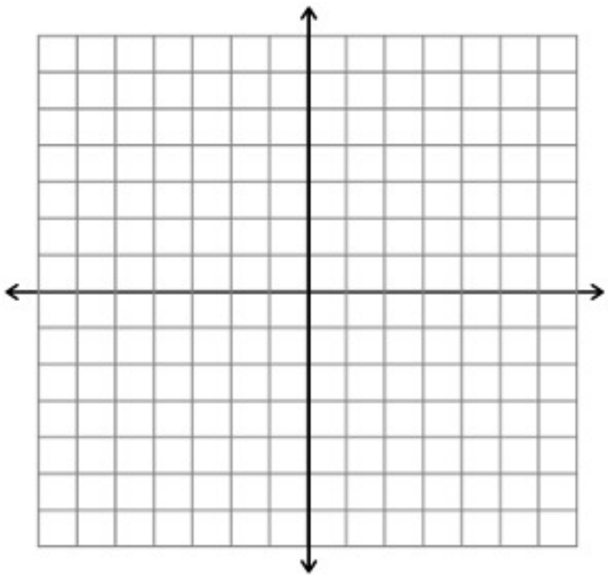
If a rational function has the same factor, (x – b), in both the numerator and denominator, then there is a hole in the graph at the point where x = b.

- A vertical asymptote is NOT the same thing as a hole

Example #3:

Graph and identify any zeros, asymptotes, and holes.

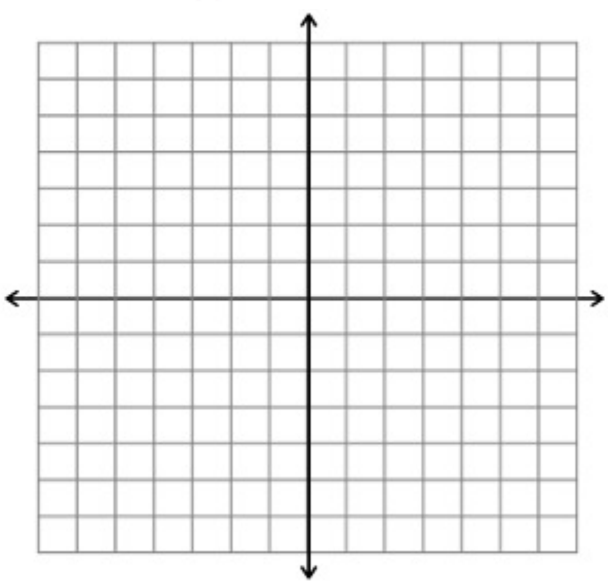
$$k(x) = \frac{4x^4 - 3x^3}{8x - 6}$$



Example #4:

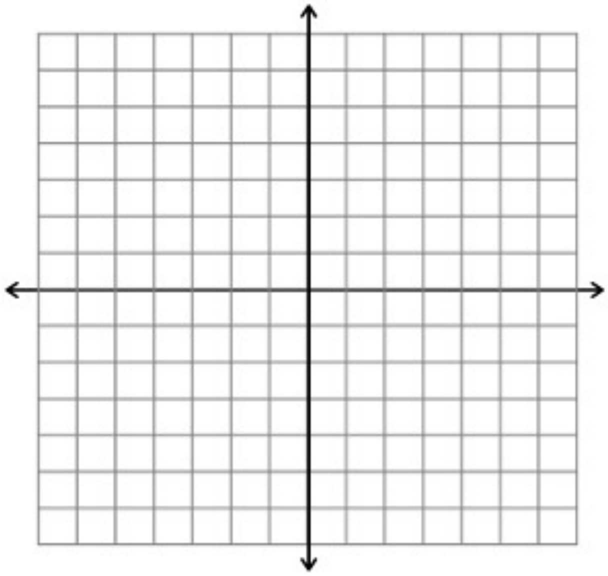
Graph and identify any zeros, asymptotes, and holes.

$$f(x) = \frac{x^2 + 4x - 12}{x - 2}$$



You try: Identify any holes or asymptotes. Then graph.

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



Horizontal Asymptote Rules:

Case #1: When the degree of the numerator is less than the degree of the denominator

Case #2: When the degree of the numerator is greater than the degree of the denominator

Case #3: When the degrees are equal