Acc. Geom/Algebra II

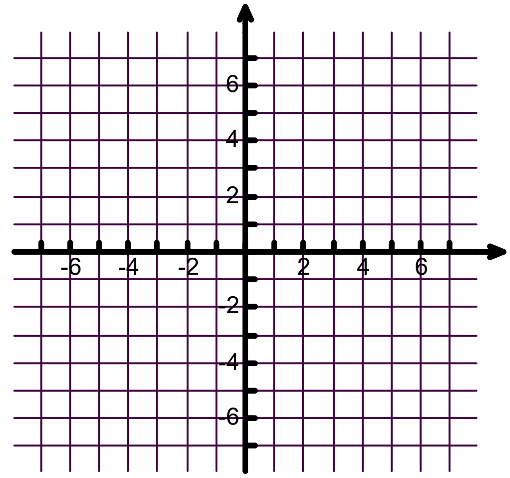
Name___________________________

Graphing Rational Functions Part 2 Notes

Period ________Date ______________

REVIEW: $F(x) = \dfrac{2x-5}{x+3}$ will have

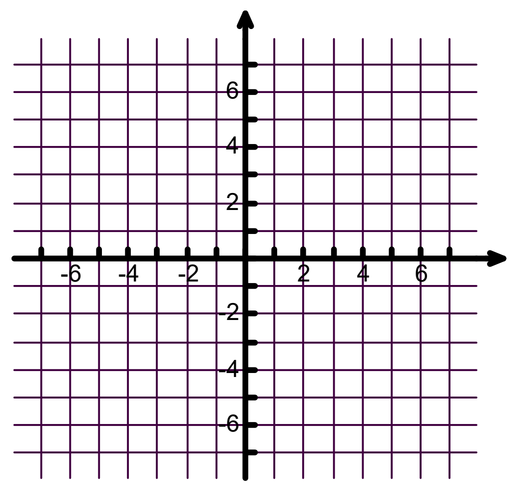
a vertical asymptote at __________________,
a horizontal asymptote at ________________,
an x-intercept at ________________________,
and a y-intercept at _____________________.
Use this information to sketch $F(x)$ to the right.
Use long division to divide $2x - 5$ by $x + 3$ below:



How does this long division explain the transformations that have happened to $y = 1/x$ to produce the graph of $f(x)$?

Consider: $G(x) = \dfrac{4x+4}{x^2-4}$. It has

vertical asymptotes at __________________,
a horizontal asymptote at ________________,
a y-intercept at ________, and x-intercept at ________
Use this information to sketch this graph to the right.



Now look at: $H(x) = \dfrac{x^3-x}{x^2-x-2}$

It will have a hole at _________________, a vertical asymptote at _________________,
x-intercepts at _____________________, a y-intercept at ________________________, and no horizontal asymptote. Why?

Sketch $H(x)$ on your calculator. What happens to $H(x)$ as $x \Rightarrow \infty$?

Now sketch $y2 = x + 1$ on your calculator. What really happens as $x \Rightarrow \infty$?

$H(x)$ has a **slant asymptote** because as $x \Rightarrow \infty$, $H(x) \Rightarrow x + 1$.
Use long division to find that slant asymptote.

Continued **on the back**

Consider: K(x) = $\dfrac{x^2 - 5x + 4}{x + 3}$

You already know that the vertical asymptote is _______________,

The x-intercepts are _______________, and the y-intercepts are _______________.

This function has **no** holes because . . .

Now, **use long division** to rewrite K(x) as a "mixed fraction".

A **slant asymptote**, like a horizontal asymptote is a line* that a graph approaches as $x \Rightarrow \infty$.

Therefore, as $x \Rightarrow \infty$ in the mixed fraction above, what do the y values approach?

*or other function

This line is the slant asymptote.

Find the **slant asymptotes** of these three functions:

A) f(x) = $\dfrac{3x^2 + 5x - 7}{x + 3}$ B) y = $\dfrac{x^3 + 6x^2 - 2x + 7}{x^2 + 2x - 4}$ C) g(x) = $\dfrac{x^3 + 4x^2 - 5x}{x - 2}$

As you can see from example C) above, sometimes "slant asymptotes" aren't lines.

What type of function is the asymptote in part C?

How did the equation of the original rational function predict this result?

What conclusions can you draw from this exercise?