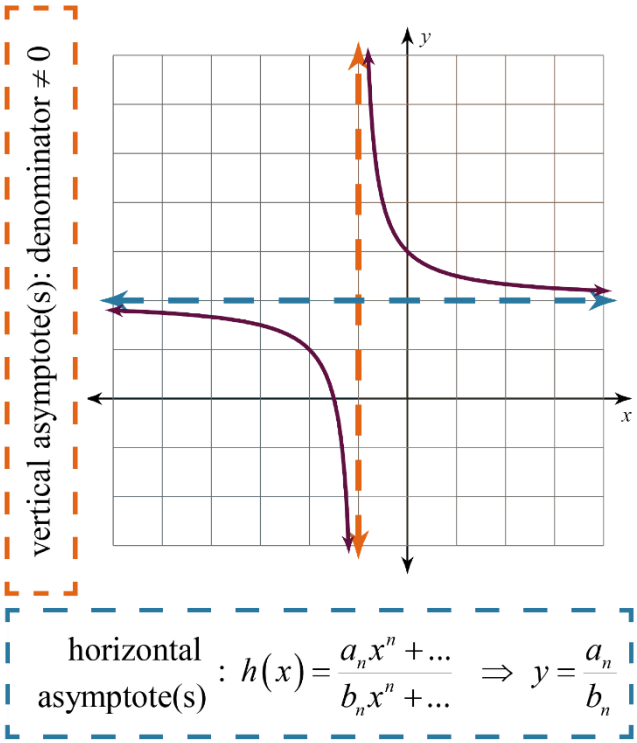
# GRAPHING RATIONAL FUNCTIONS: GUIDED NOTES

## Definitions

Rational function: $\frac{p(x)}{q(x)} = \frac{a_m x^m + \ldots + a_0}{b_n x^n + \ldots + b_0}$

where $p(x)$ and $q(x)$ are polynomials, and $q(x) \neq 0$

Asymptote: A line (often dashed) that a curve approaches but does **not** cross




## How to Graph a Rational Function

**Step 1)** Find the asymptote(s).

- Since the denominator cannot equal zero, find the x-value(s) that cause this. These are the vertical asymptote(s).
- Rewrite the function so that the degree of the top and bottom of the fraction are the same, then write a ratio of the coefficients. This is the horizontal asymptote.

**Step 2)** Sketch the asymptotes with dashed lines.

**Step 3)** Make a table.

- Pick x-values based on the vertical asymptote.

**Step 4)** Plot points and connect dots.

- Be careful to ***not*** cross the asymptotes!

## Examples

Graph the function. Be sure to label the asymptotes.

**1)** $y = \dfrac{-3x+9}{3x-6}$

| $x$ | $y$ |
|---|---|
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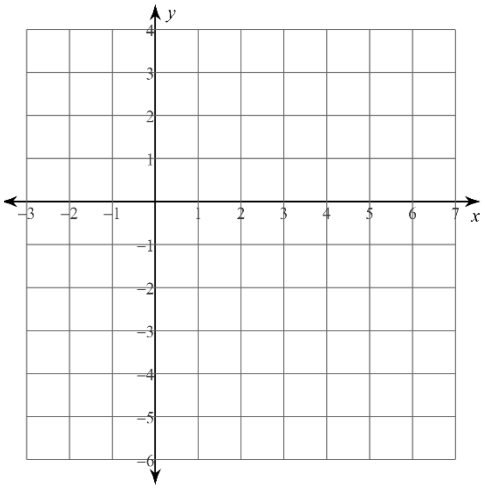


**2)** $y = \dfrac{2}{x+3}+1$

| $x$ | $y$ |
|---|---|
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