Section Overview

Professional Development

Inverse Variation Functions — Lesson 12-1

Why? Inverse variation functions are rational functions, which are used to model many real-world situations such as the frequency at which a guitar string vibrates.

Inverse Variation

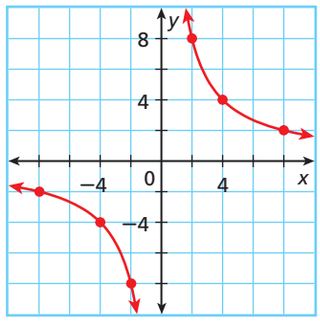
$y = \frac{k}{x}$ and $xy = k$, where k is a nonzero constant.

Example:

$y = \frac{16}{x}$

x	-16	-8	-4	-2	2	4	8	16
y	-1	-2	-4	-8	8	4	2	1

The product of x and y is always 16.



Graphing Rational Functions — Lesson 12-2

Why? Viewing the graph of a rational function allows you to view the function's behavior at a glance.

Identifying Asymptotes

A rational function in the form $y = \frac{a}{x + b} + c$

vertical asymptote: $x = -b$

horizontal asymptote: $y = c$

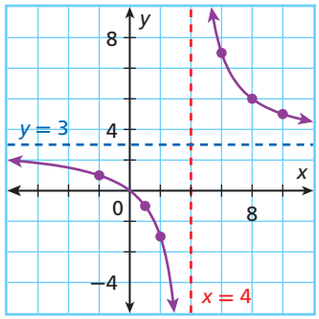
Example:

$y = \frac{12}{x - 4} + 3$ or $y = \frac{12}{x + (-4)} + 3$

vertical asymptote: $x = 4$

horizontal asymptote: $y = 3$

x	$y = \frac{12}{x - 4} + 3$
-2	1
1	-1
2	-3
4	excluded value
6	9
8	6
10	5



Simplifying Rational Expressions — Lesson 12-3

Why? When a situation requires operations on rational functions, knowing how to simplify the result allows us to interpret the function more easily.

$$\frac{x^2 - 3x - 18}{x^2 - 10x + 24}$$

$$\frac{(x + 3)(x - 6)}{(x - 6)(x - 4)}$$

$$\frac{(x + 3)\cancel{(x - 6)}}{\cancel{(x - 6)}(x - 4)}$$

$$\frac{x + 3}{x - 4},\ x \neq 4,\ x \neq 6$$

The expression is undefined when the denominator is zero, so any x that makes the denominator zero is an **excluded value**.

$$x^2 - 10x + 24 = 0$$
$$(x - 6)(x - 4) = 0$$

Excluded values: $x = 6$ and $x = 4$