Inverse Variation

Inverse Variation: $y = \frac{a}{x}$ $\quad xy = a$

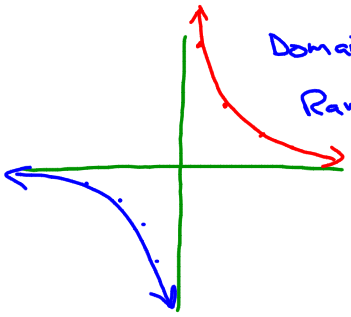
a (or k) is the constant of variation $\quad y = \frac{k}{x} \quad xy = k$

5 pizzas (40 pieces) are shared by a group. The amount of pizza per person varies inversely with the number of people in the group. constant of variation

$y = \frac{40}{x}$

y = slices per person x = # people (40 slices total)

x	1	2	4	5	8	10	20	40	-1	-2	-4
y	40	20	10	8	5	4	2	1	-40	-20	-10



Domain: Real, $x \neq 0$

Range: Real $y \neq 0$

Write an equation for the given relationship.

a. r varies inversely with s $\quad r = \frac{a}{s} \quad r = \frac{k}{s}$

b. z varies jointly with x and the square root of y $\quad z = a x \sqrt{y} \quad z = k x \sqrt{y}$

c. p varies inversely with the cube of q $\quad p = \frac{a}{q^3} \quad p = \frac{k}{q^3}$

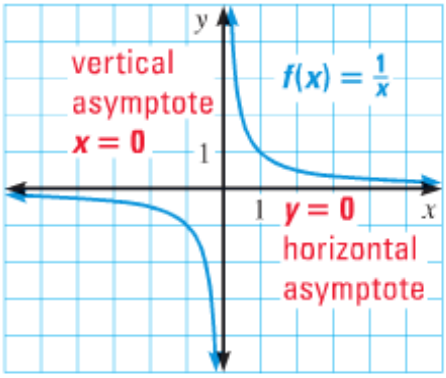
d. m varies directly with the square of n and inversely with p $\quad m = \frac{an^2}{p} \quad m = \frac{kn^2}{p}$

e. z varies jointly with u and v and inversely with the square of w $\quad z = \frac{auv}{w^2} \quad z = \frac{kuv}{w^2}$

134 Simple Rational Functions

Parent Function for Simple Rational Functions

The graph of the parent function $f(x) = \frac{1}{x}$ is a *hyperbola*, which consists of two symmetrical parts called *branches*. The domain and range are all nonzero real numbers.



Any function of the form $g(x) = \frac{a}{x}$ $(a \neq 0)$ has the same asymptotes, domain, and range as the function $f(x) = \frac{1}{x}$.

Translations of Simple Rational Functions

Graph the vertical asymptote at $x = h$ $\qquad y = \frac{a}{x - h} + k$

Graph the horizontal asymptote at $y = k$

Plot two clear points to the left of the asymptote and two clear points to the right.

Connect the pairs of points to create a pair of hyperbola.

$$f(x) = \frac{2}{x - 1} + 3$$

x	y
3	4
2	5
0	1
-1	2