Is this table an example of Direct Variation or Inverse Variation?

X	Y	$\frac{Y}{X}$
-2.4	3.24	-1.35
3.6	-4.86	"
8.5	-11.475	"
12	-16.2	"

Since there is a constant ratio this table represents Direct Variation

Write a Variation Equation

$\frac{y}{x} = -1.35$ or $y = -1.35x$

What does the graph of this relation look like?

Line through the origin

Is this relationship Direct Variation, Inverse Variation, or neither?

X	Y	XY
-12	-2	24
-4	-6	24
1.2	20	24
16	1.5	24

Since there is a constant product this table represents Inverse Variation.

X	Y
-12	-2
-4	-6
1.2	20
16	1.5

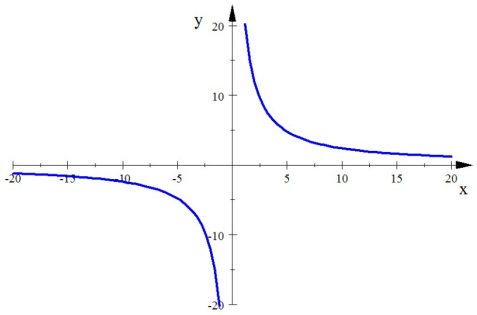
What is the equation of this Inverse Variation?

$XY = 24$ or $y = \frac{24}{x}$

Graph this equation with a graphing calculator using the following window:

x:[-20, 20] y:[-20, 20]

The graph of Inverse Variation is called: a Hyperbola

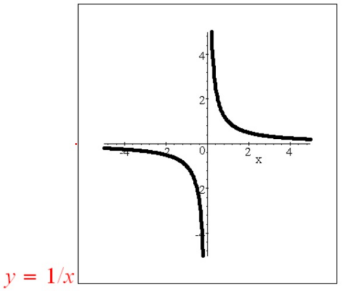


$$y = \frac{24}{x}$$

Why is there two parts to this graph?

Since there is a restriction on x, you can never use zero for x, the graph doesn't exist there and creates a break in the graph.

Each part of this graph is referred to as a BRANCH



$y = 1/x$

Asymptotes: Lines that a graph approaches more and more closely the further from the origin you are.

$y = \frac{24}{x}$

Vertical Asymptotes:

$x = 0$

the graph approaches the y-axis the further above and below the origin you move.

Horizontal Asymptotes:

$y = 0$

The graph approaches the x-axis the further to the right and left of the origin you move.

$\frac{1}{x}$

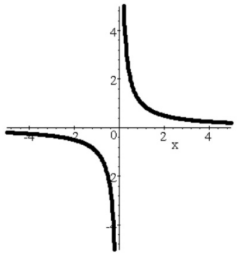
What happens to the value of a fraction as the denominator gets bigger and bigger?

The fraction becomes a smaller and smaller number

What happens to the value of a fraction as the denominator gets smaller and smaller?

The fraction becomes a bigger and bigger number.

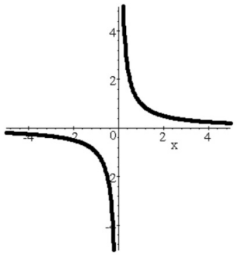
Why does the graph behave like it does near a vertical asymptote?



$$y = \frac{1}{x}$$

X can never be zero for this equation. If you use values of x closer and closer to zero (smaller and smaller x values) the fraction becomes a larger and larger number. This means as the denominator becomes smaller and smaller the value of y becomes larger and larger which makes the graph get higher (for pos values) and lower (for negative values).

Why does the graph flatten out and approach a horizontal asymptote the further to the right and leave you move?



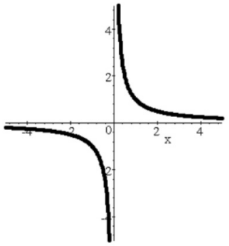
$$y = \frac{1}{x}$$

When you move farther left and right you are using bigger and bigger positive and negative values for x. Since the denominator is getting bigger and bigger the value of the fraction is getting smaller and smaller, essentialy it gets closer and closer to zero. This means for larger values of x the parent function $y = \frac{1}{x}$ becomes y = 0.

Inverse Variation: $y = \frac{k}{x}$

Is also called the Reciprocal Function.

The Parent Reciprocal Funciton is: $y = \frac{1}{x}$



It has two branches which are in the 1st and 3rd quadrants.

On your graphing calculator graph the parent function:

Use the following WINDOW: x [-5,5] y [-5,5]

$$Y_1 = \frac{1}{x}$$

In Y_2 graph other recripocal functions using different values for a

Describe how the graph of $y = \frac{a}{x}$ changes for different values of a.

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

a is pos:

Branches are in 1st & 3rd Quad

a is neg:

Branches are in 2nd & 4th Quad

a is large:

Branches are further from origin

a is small:

Branches are are closer to the origin