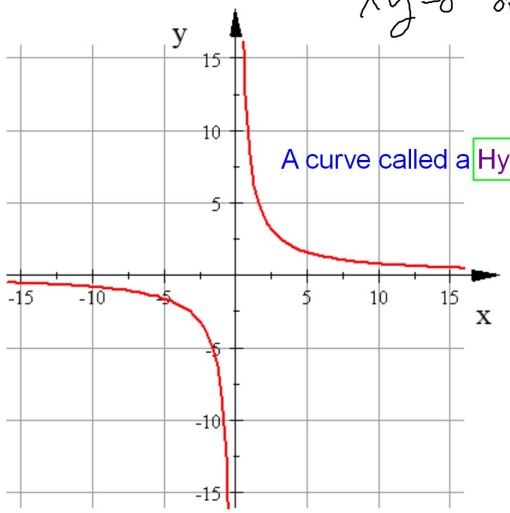
The graph of Inverse Variation.

$xy = 8$ or $y = \frac{8}{x}$

x	y
0.5	16
1	8
2	4
4	2
8	1
10	0.8
16	0.5



A curve called a Hyperbola

The point (9,4) is on the graph of ....

1. of a Direct (xy) Variation relationship.
   Find the variation constant.

$$k = \frac{y}{x} = \frac{4}{9} = .\overline{4}$$

2. of an Inverse Variation relationship.
   Find the variation constant.

$$k = xy = 9 \cdot 4 = 36$$

Use this pair of points. (12,15) & (x,6)

1. These points come from a Direct Variation relationship.
   Find the value of x.

$$k = \frac{y}{x} = \frac{15}{12} = \frac{6}{x} \quad x =$$

2. These points come from an Inverse Variation relationship.
   Find the value of x.

$$xy = xy$$
$$12 \cdot 15 = x6$$
$$30 = x$$

A varies directly with the cube of B.

$$k = \frac{A}{B^3} \quad \text{or} \quad A = kB^3$$

1. A is 36 when B is 2. Find the variation constant.

$$k = \frac{36}{2^3} = \frac{36}{8} = 4.5$$

2. Model this relationship with a variation equation.

$$A = 4.5B^3$$

3. Find the value of A when B is -6

$$A = 4.5(-6)^3 = -972$$

A quantity can vary with more than one variable--Combined Variation

Write a variation equation to model each statement.

1. G varies directly with M and N but inversely with B

$G = \frac{kmN}{B}$

2. Q varies directly with the square of R and inversely with the product of T and V.

$Q = \frac{kR^2}{TV}$

3. M varies directly with E and G but inversely with the cube of A. $M = \frac{kEG}{A^3}$

Another way to say "varies directly with E and G" is...jointly with E and G.

How would you say the following relationship:

$$B = \frac{kC^3D}{H^2}$$

B varies directly with the cube of C and D but inversely with the square of H.

4. R varies directly with the square root of M and inversely with the cube of N. R=1.875 when M=36 and N=2.

Find M when R=4 and N=5.

$R = \frac{k \cdot \sqrt{M}}{N^3}$

$1.875 = \frac{k\sqrt{36}}{8} \rightarrow 1.875 = k \cdot \frac{6}{8}$

$k = 2.5$

$4 = \frac{2.5\sqrt{M}}{125}$ M=40,000

5. The volume of a cylinder varies directly with the square of the radius of the Base and the height of the cylinder.

$V = kr^2h$

The volume of a cylinder whose base has a radius of 5 in and a height of 8 in is 628 in^3

$628 = k(5)^2 8$

$3.14 = k$

- Find the variation constant $k = 3.14$
- Write a variation equation $V = 3.14r^2h$
- Find the volume of a cylinder with Base whose radius is 6 in and height of 10 in.

$V = 3.14(36)10 = 1130.4\ in^3$

6. T varies jointly with M and the square of C but inversely with the cube of R.
T = 168.75 when C = 5, M = 12 and R = 2.
Find the variation constant and write this variation equation.

$T = \frac{KMC^2}{R^3}$

$168.75 = \frac{300K}{8}$ · 8

$\frac{168.75}{300} = K$

$K = 4.5$

$T = \frac{4.5MC^2}{R^3}$

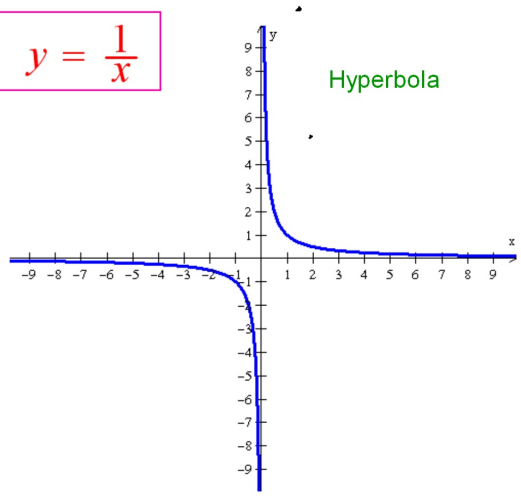
You should now be able to finish Hwk #24

The Reciprocal Function:

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

The branches are in which quadrants?

I & III



Graph in a standard window these three functions:

$Y_1 = \frac{1}{x}$ $Y_2 = \frac{5}{x}$ $Y_3 = \frac{10}{x}$

Note how they differ.

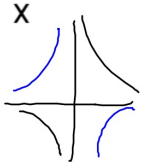
What happens to the graph as the value of the numerator increases?

graphs are farther from origin

Vertical Stretch factor

Graph in a standard window these three functions:

$$Y_1 = \frac{1}{x} \qquad Y_2 = \frac{-4}{x} \qquad Y_3 = \frac{-12}{x}$$



Note how they differ.

What happens to the location of the brances when the numerator is negative?

Q II & IV

X-axis Refl