3. The graph of Direct Variation is a line

and passes through the origin

The table below shows an Inverse Variation relationship.

X	Y
-16	-1.5
-8	-3
-5	-4.8
-3	-8
-2	-12
-1	-24
20	1.2
16	1.5
10	2.4
4	6
1.6	15
1	24

What is the equation of this Inverse Variation?

$k = xy = 24$

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

Graph of Inverse Variation:

X	Y
-16	-1.5
-8	-3
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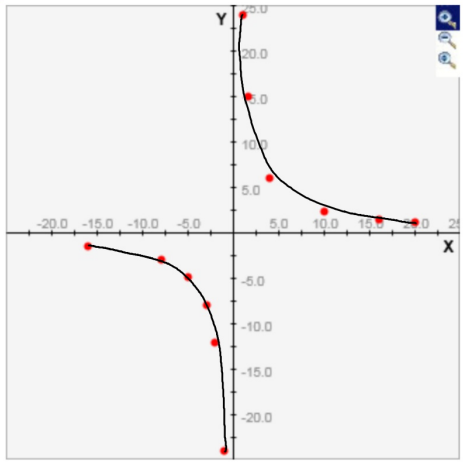
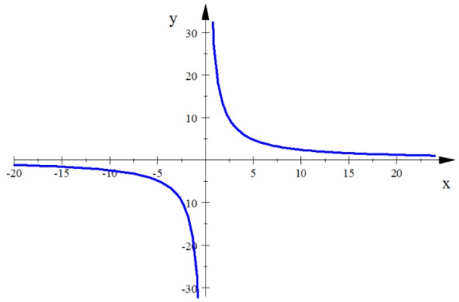
-3	-8
-2	-12
-1	-24
20	1.2
16	1.5
10	2.4
4	6
1.6	15
1	24

Describe what this graph looks like.

Two separate curves.



The graph of Inverse Variation is called: a Hyperbola



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

Why is there two parts to this graph?

You can't use the x-value of zero because the function would be undefined. Therefore, no part of the graph can exist when x=0.

Each part of this graph is referred to as a BRANCH

For a given amount of Force, mass is inversely proportional to acceleration. You accelerated an 8 pound weight 12 ft/sec^2.

$m = \frac{k}{a}$

$k = ma = 96$ lb ft/sec^2

1. Write an inverse variation equation.

$96 = ma$

2. Find the acceleration needed to produce the same force on a 15 pound weight.

$96 = 15a$

$a = 6.4$ ft/s^2

Combined variations.

More than one variation relationship happening at the same time.

W varies directly with M and inversely with Q.
W = 1 when M = 12 and Q =18.

$W = \frac{KM}{Q}$

1. Write a variation equation.

Find k: $1 = \frac{K(12)}{18}$

$K = 1.5$

$W = \frac{1.5M}{Q}$

2. Find W when M = 20 and Q = 48.

$W = \frac{1.5(20)}{48} = 0.625$

R varies jointly with A and the square of E.

Joint Variation means direct variation with more than one variable

$R = KAE^2$

Write a variation equation if R = -90 when A = 2 and E = 3.

$\frac{-90}{18} = \frac{K(2)(3)^2}{18}$

$K = -5$

$R = -5AE^2$

Y varies directly with the cube of Z and inversely with the product of C and D.

$$Y = \frac{kz^3}{CD}$$

Write a direct variation equation if y=25.2 when C=3, D=10, and Z=6.

$$25.2 = \frac{k(6)^3}{(3)(10)}$$

$$k = 3.5$$

$$Y = \frac{3.5z^3}{CD}$$

Find Z when y=1000, c=48, and D=18

$$1000 = \frac{3.5z^3}{(48)(18)}$$

$$62.73 = z$$

Describe this combined variation:

$$P = \frac{5m^3n^2}{r}$$

P varies jointly with the cube of m and the square of n and inversely with r.

These points form a direct variation relationship. Find the missing value.

(8,4) & (20,?)

$$\frac{x}{y} \quad \frac{8}{4} = \frac{20}{y}$$

$$? = 10$$

Find the missing value if these two points are part of an inverse variation relationship.

$$k = (8)(4)$$

$$k = 32 = (20)(y)$$

$$1.6 = ?$$

Suppose x and y vary inversely. Write an Inverse Variation function if x=18 and y=4.

$$xy = k$$

$$(18)(4) = 72 \longrightarrow xy = 72$$

Find x when y = 25

$$\frac{x(25)}{25} = \frac{72}{25}$$

$$x = 2.88$$

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You can now finish Hwk #32. Sec 9-1

Pages 491-492

Problems 9-13, 21, 22, 26, 42, 43, 50