Sec 9-1: Inverse Variation

Inverse Variation: When two quantities have a constant product

1. Three equations for Inverse Variation are:

$y = \frac{k}{x}$, $k = xy$, and $x = \frac{k}{y}$

2. What does the letter k represent?

The variation constant.

3. For Direct Variation, as one quantity increases the other quantity also increases.

For Inverse Variation, as one quantity

increases the other quantity decrease

How do you tell if a table of values produces and inverse variation relationship?

See if xy is a constant product.

a) Inverse Variation? Yes

X	Y	XY
−12	−4	48
−6	−8	48
0.5	96	48
16	3	48

If Yes, k = 48

If Yes, equation is: $xy = 48$ or $x = \frac{48}{y}$ or $y = \frac{48}{x}$

b) Inverse Variation? NO

X	Y	XY
−2	−8	16
3	12	36
5	20	
9	36	

If Yes, k = _____

If Yes, equation is:

c) Inverse Variation? NO

X	Y	XY
5	12	60
6	14	84
7	16	
8	18	

If Yes, k = _____

If Yes, equation is:

X	Y
−4	−36
16	9
24	6
36	4

1. Does this table show inverse variation? Yes

144 144 144 144

2. Find the variation constant. $k = 144$

3. Write an inverse variation equation. $xy = 144$

4. Find the value of x when y is 80

$x \cdot 80 = 144 \Rightarrow x = 1.8$

Suppose that x and y vary inversely. Write a function to model this inverse variation:

x = 30 when y= 9

$xy = 270$

This ordered pair is from an inverse variation relationship. Find the variation constant.

(5, 8)

$k = 40$

Eq

$xy = 40$

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

1. Write an inverse variation equation.

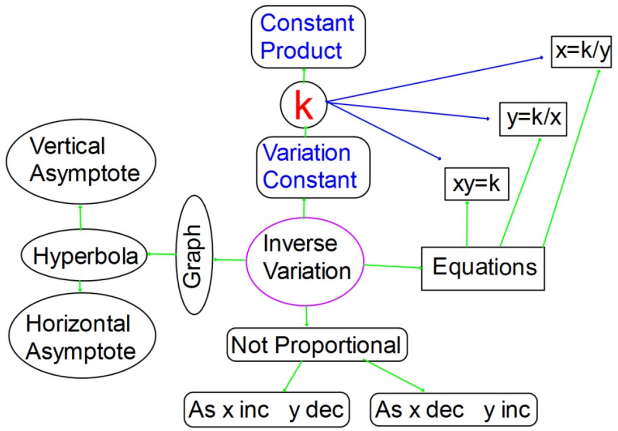
$k = 96$

$xy = 96$

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

$\frac{x \cdot 15}{15} = \frac{96}{15}$

$x = 6.4$ ft/sec^2



Combined Variation: When one variable is related to two or more variables.

Joint Variation:
A kind of Combined Variation when a variable varies directly with two or more variables.

Examples of Combined Variations

Combined Variation	Equation Form
z varies jointly with x and y.	$z = kxy$
z varies jointly with x and y and inversely with w.	$z = \frac{kxy}{w}$
z varies directly with x and inversely with the product wy.	$z = \frac{kx}{wy}$

Model each statement with a variation equation:

1. G varies jointly with M and the square of P and inversely with R.

$G = \frac{kMP^2}{R}$ or $k\frac{mp^2}{R}$

2. W varies directly with the cube of C and inversely with the product of A and the fourth power of B.

$W = \frac{C^3 k}{AB^4}$

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

1. Write a variation equation.

$W = k\frac{M}{Q}$ $\quad 1 = k \cdot \frac{12}{18} \rightarrow k = 1.5$

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

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

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

$W = 0.625$