

Direct, Inverse, Joint and Combined Variations

Chap. 8
Rational

$$y = \frac{x^2 - 4x + 6}{1 - x}$$

Radical

$$y = \sqrt[4]{x^8} \cdot \sqrt{x^2}$$

↑↑ ↓↓
Direct Variation

$$y = mx + b$$

constant of variation

$$y = kx$$

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

↑↓ ↓↑
Inverse Variation

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

$$k = y \cdot x$$

GPA vs. ACT Score



Direct

% Interest vs. Time to Double Money



Inverse

$$\frac{\text{Rule 72}}{10\%} \rightarrow 7.2$$

Speed vs. Price of Ticket



Direct

$$\frac{72}{1\%} \rightarrow 72$$

Direct/Inverse /Neither--then give constant

$$y = kx \quad y = \frac{k}{x}$$

$$k = \frac{y}{x} \quad y \cdot x = k$$

$$xy = 4.8$$

$$y = \frac{4.8}{x}$$

Inverse

4.8

$$y = 1.5x$$

Direct

1.5

$$y = x + 4$$

Neither

↑	x	5	8	12
↑	y	30	48	60

Neither

$$y = kx$$

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

Direct

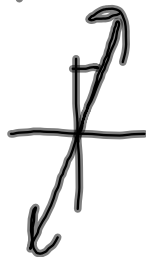
$$y = 6x$$

6

$$k = \frac{30}{5} = 6$$

$$k = \frac{48}{8} = 6$$

$$k = \frac{60}{12} = 6$$



y varies inversely as x and y = 7.5 when x = 2

(write an equation and graph)

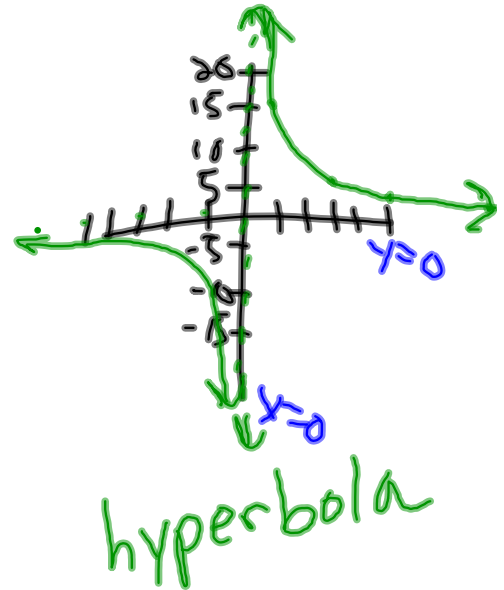
$y = \frac{k}{x}$

$7.5 = \frac{k}{2}$

$15 = k$

$y = \frac{15}{x}$

x	y
0.5	30
1	15
1.5	10
2	7.5
3	5
5	3
15	1



find y when x = 1.2

$$y = \frac{15}{1.2}$$

$$y = 12.5$$

Joint Variation--quantity varies directly as the product of 2 or more other quantities

$$y = kx$$

1. z varies jointly with x and y

$$z = kxy$$

2. y varies jointly as x and z

$$y = kxz$$

Combined Variation--more than one type of variation occurs in the same equation

3. z varies jointly with x and y and inversely as w

$$z = \frac{kxy}{w}$$

4. y varies inversely as the square of x

$$y = \frac{k}{x^2}$$

p. 573 13-22, 24-30, 32-36, 40

- ★ hand in whatever you get done in class
- ★ can work as a table or in small groups
- ★ you only need to hand in one per group
(make sure all names are on it)

Extra Credit WKS--due Today

put them in the wire basket next to my desk