

Direct Variation: As x increases, y increases

or as x decreases, y decreases.

A line with a y-intercept of zero is a direct variation.

A direct variation is represented by the equation $y = kx$ where k is the constant of variation.

Inverse Variation: As x increases \uparrow , y decreases \downarrow

or as x decreases \downarrow , y increases \uparrow

An inverse variation is represented by the equation $y = \frac{k}{x}$

Check to see if the tables below are Inverse Variation:

x	1	2	5	7
y	6	12	30	42

\uparrow NO

x	1	2	3	4
y	2	1	$\frac{2}{3}$	$\frac{1}{2}$

$k = 2 \quad 2 \quad 2 \quad 2$

Yes $y = \frac{2}{x}$

Extra Practice Word Problems

1. y varies inversely as x. Given y = 4 when x = 2. Determine the inverse variation equation. Then determine y when x = 16.

$y = \frac{k}{x} \rightarrow 4 = \frac{k}{2} \rightarrow 8 = k \rightarrow \boxed{y = \frac{8}{x}} \quad y = \frac{8}{16} = \boxed{\frac{1}{2}}$

2. y varies inversely as x. y = 6 and x = 16. Determine the inverse variation equation. Then determine y when x = 4.

$y = \frac{k}{x} \rightarrow 6 = \frac{k}{16} \rightarrow k = 96 \rightarrow \boxed{y = \frac{96}{x}} \rightarrow y = \frac{96}{4} = \boxed{24}$

- * 3. The time, t, required to empty a tank varies inversely as the rate of r, of pumping. If a pump can empty a tank in 2.5 hours at a rate of 400 gallons per minute, how long will it take to empty a tank at 500 gallons per minute?

$t = \frac{k}{r} \rightarrow 2.5 = \frac{k}{400} \rightarrow k = 1000 \rightarrow \boxed{y = \frac{1000}{x}} \quad y = \frac{1000}{500} = \boxed{2 \text{ hrs}}$

4. The force, F, needed to break a board varies inversely with the length, L, of the board. If it takes 24 pounds of pressure to break a board 2 feet long. How many pounds of pressure would it take to break a board that is 5 feet long?

$F = \frac{k}{L} \rightarrow 24 = \frac{k}{2} \rightarrow 48 = k \rightarrow \boxed{F = \frac{48}{L}} \quad F = \frac{48}{5} = \boxed{9.6 \text{ pounds of pressure}}$