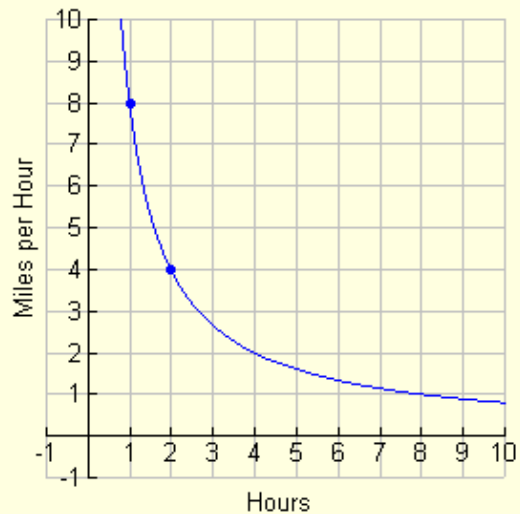


Inverse Variation (The Opposite of Direct Variation)

In an **inverse variation**, the values of the two variables change in an opposite manner - as one value increases, the other decreases.

For instance, a biker traveling at 8 mph can cover 8 miles in 1 hour. If the biker's *speed decreases* to 4 mph, it will take the biker 2 hours (*an increase of one hour*), to cover the same distance.

Inverse variation: when one variable *increases*, the other variable *decreases*.



As speed decreases, the time increases.

Notice the shape of the graph of inverse variation.

If the value of x is increased, then y decreases.

If x decreases, the y value increases. We say that **y varies inversely as the value of x .**

An **inverse variation** between 2 variables, y and x , is a relationship that is expressed as:

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

where the variable k is called the **constant of proportionality**.

As with the direct variation problems, the k value needs to be found using the first set of data.

Find the Constant, k :

The number of hours, h , it takes for a block of ice to melt varies inversely as the temperature, t . If it takes 2 hours for a square inch of ice to melt at 65° , find the constant of proportionality.

Start with the formula: $h = \frac{k}{t}$

Substitute the values :

then solve for k :

Typical Inverse Variation Problem:	In a formula, Z varies inversely as p . If Z is 200 when $p = 4$, find Z when $p = 10$.
	Use the same three process steps that were used in direct variation problems:

1. Set up the formula.
2. Find the missing constant, k , by using the first set of data given.
3. Using the formula and constant, k , find the missing value in the problem.

Inverse Variation Example:	In kick boxing, it is found that the force, f , needed to break a board, varies inversely with the length, l , of the board. If it takes 5 lbs of pressure to break a board 2 feet long, how many pounds of pressure will it take to break a board that is 6 feet long?
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1. Set up the formula.
2. Find the missing constant, k , using the first set of data given.
3. Using the formula and constant, k , find the missing value in the problem.

**Combination
Variation
Example:**

Variable M varies directly as variable t and inversely as variable s .

If $M = 24$ when $t = 3$ and $s = 2$,

find M when $t = 5$ and $s = 8$.

(In combination problems, there is only one constant value, k , used with the direct and inverse variables.)

1. Set up the formula
2. Find the missing constant of proportionality, k .
3. Using the formula and the constant, k , find the new value in the problem