

NOTES: Section 11.2 – Direct and Inverse Variation

Goals: #1 - I can identify and write direct and inverse variation equations and graph them.

Homework: Section 11.2 Worksheet



Warm Up:

1. Solve the proportion using cross multiplication.

a. $\frac{x-3}{18} \neq \frac{3}{x}$

$$x(x-3) = 54$$

$$x^2 - 3x = 54$$

$$x^2 - 3x - 54 = 0$$

$$x^2 - 9x + 6x - 54 = 0$$

$$x(x-9) + 6(x-9) = 0$$

$$(x-9)(x+6) = 0$$

$$\begin{array}{c} -54 \\ \wedge \\ -9 + 6 = -3 \end{array}$$

$$\begin{array}{l} x = 9 \\ x = -6 \end{array}$$

b. $\frac{x}{x-3} \neq \frac{x+6}{x}$

$$x(x) = (x-3)(x+6)$$

$$x^2 = x^2 + 6x - 3x - 18$$

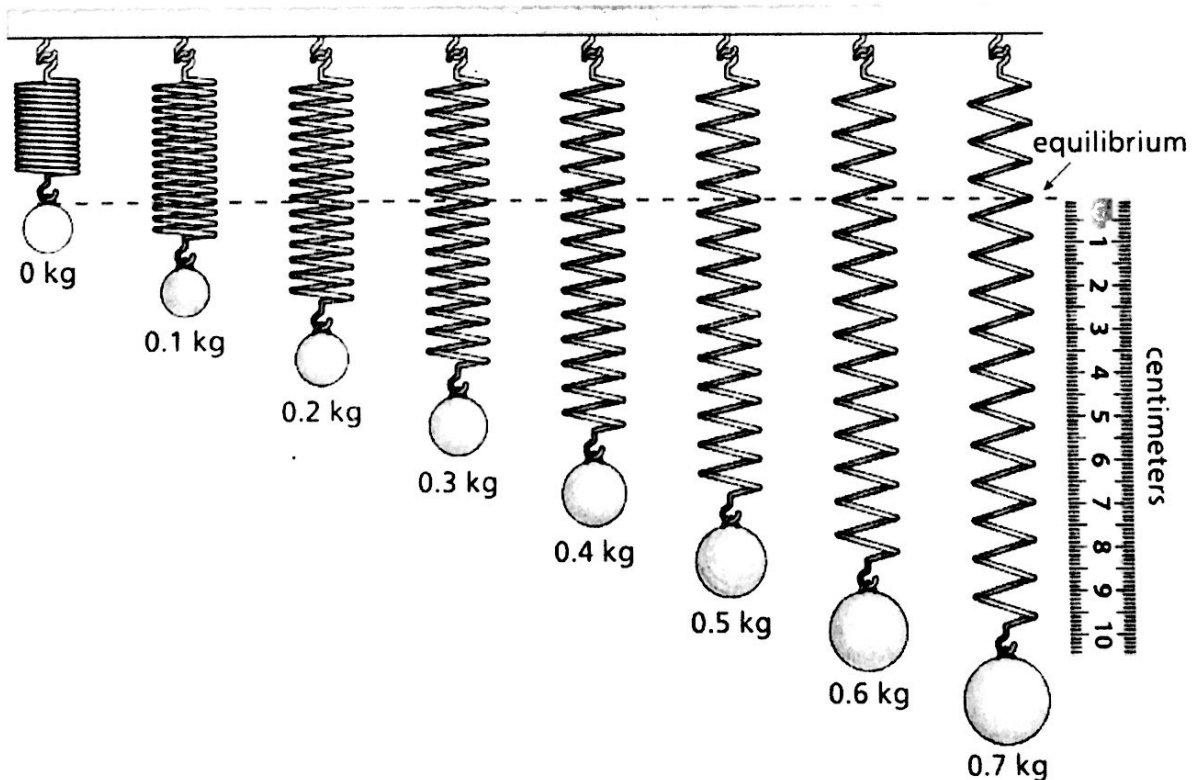
$$x^2 = x^2 + 3x - 18$$

$$0 = 3x - 18$$

$$3x = 18$$

$$x = 6$$

Exploration #1: Work with a partner and answer the following questions. You hang different weights from the same spring.

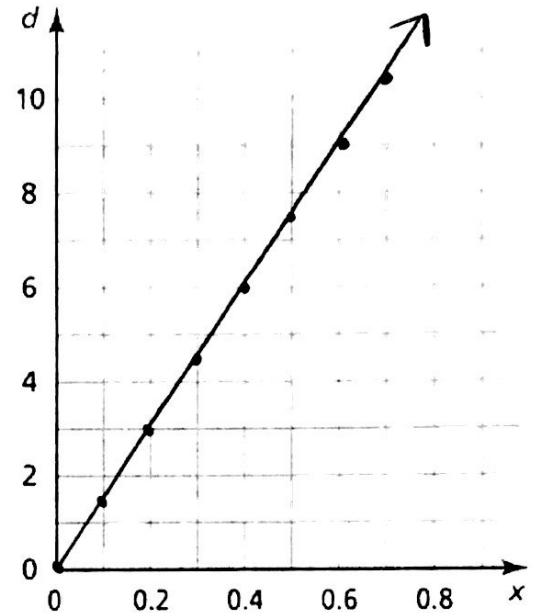


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1. Complete the table:

Weight (x)	0.1	0.2	0.3	0.4	0.5	0.6	0.7
Distance (d)	1.5	3	4.5	6	7.5	9	10.5

2. Plot the points from your table on the graph below:



3. Write an equation that represents this relationship.

$$y = 15x$$

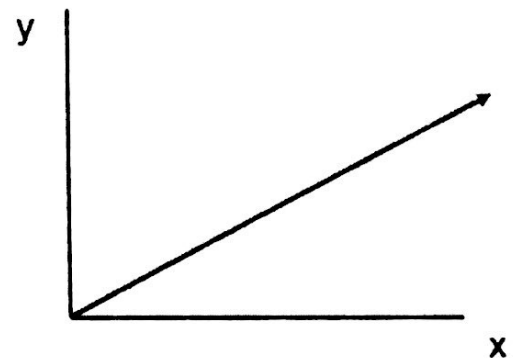
Notes:

Direct variation:

The variables x and y vary directly if for a constant k

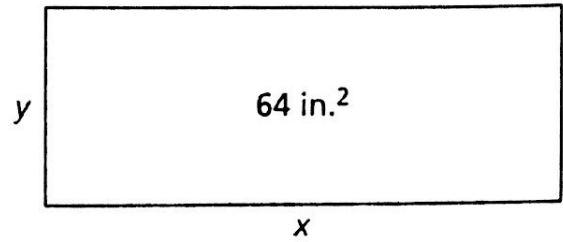
$$y = kx$$

↑
constant



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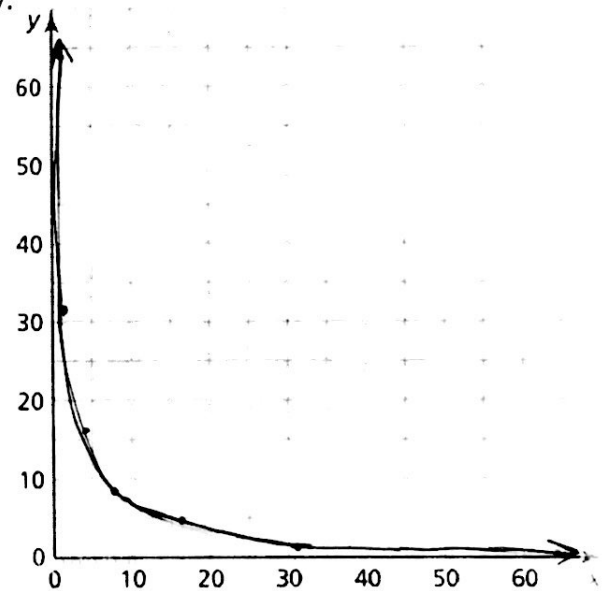
Exploration #2: Work with a partner. The table shows the length x (in inches) and the width y (in inches) of a rectangle. The area of each rectangle is 64 square inches.



1. Complete the table:

Length (x)	1	2	4	8	16	32	64
Width (y)	64	32	16	8	4	2	1

2. Plot the points from your table on the graph below:



3. Write an equation that represents this relationship.

$$y = \frac{64}{x}$$

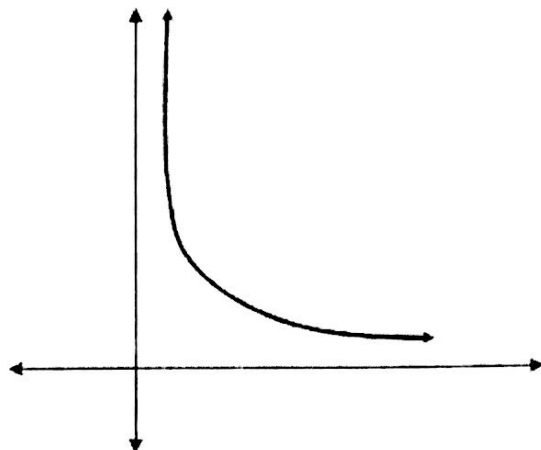
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Notes:

inverse variation:

The variables x and y vary inversely if for a constant k

$$y = \frac{k \rightarrow \text{constant}}{x}$$



Example #1:

1. Find an equation that relates x and y such that x and y vary directly, and $y = 4$ when $x = 2$.

$$\begin{aligned} y &= kx \\ 4 &= k(2) \\ k &= 2 \end{aligned}$$

$$\boxed{y = 2x}$$

2. Find an equation that relates x and y such that x and y vary inversely, and $y = 4$ when $x = 2$.

$$\begin{aligned} y &= \frac{k}{x} \\ 4 &= \frac{k}{2} \\ k &= 8 \end{aligned}$$

$$\boxed{y = \frac{8}{x}}$$

You practice:

1. Suppose $y = 6$ when $x = 2$. Find an equation that relates x and y such that:

a. x and y vary directly.

$$y = kx$$

$$6 = k(2)$$

$$k = 3$$

$$y = 3x$$

b. x and y vary inversely.

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

$$6 = \frac{k}{2}$$

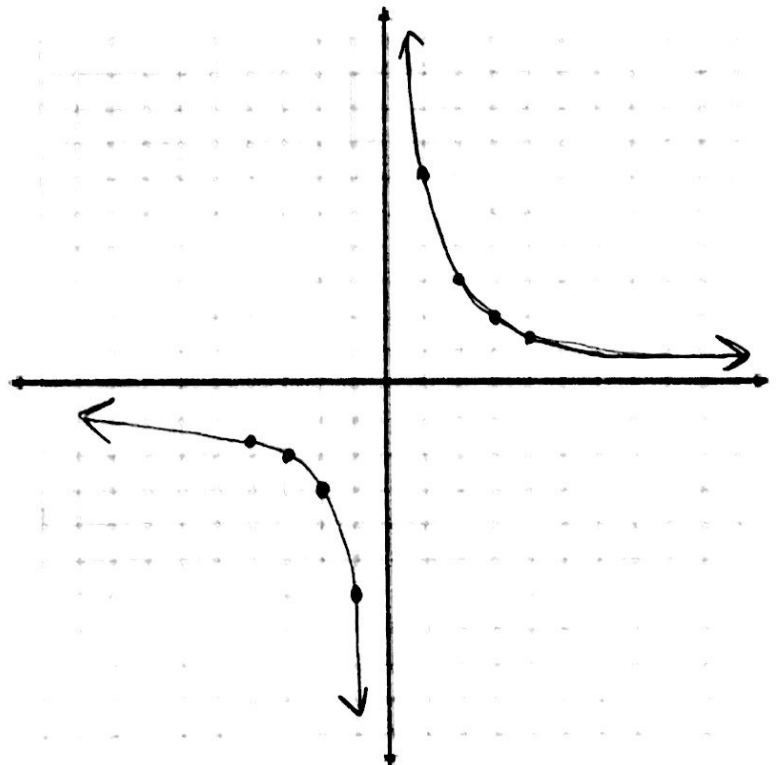
$$k = 12$$

$$y = \frac{12}{x}$$

Example #2: Make a table of values and graph. State whether x and y vary directly or inversely.

1. $y = \frac{6}{x}$

x	y
-4	-1.5
-3	-2
-2	-3
-1	-6
0	—
1	6
2	3
3	2
4	1.5



varies inversely