

Lesson 5.6:

Direct Variation

5.6 Notes

Get out your spiral notebooks!
(and graph paper and a ruler!)

Essential Question

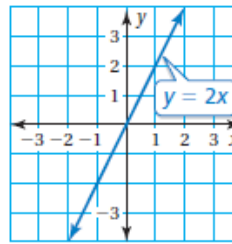
How can you use a graph to show the relationship between two quantities that vary directly? How can you use an equation?

Key Idea *looks like a proportion
(straight line, through origin)

Direct Variation

Words Two quantities x and y show **direct variation** when $y = kx$, where k is a number and $k \neq 0$. The number k is called the **constant of proportionality**.

Graph The graph of $y = kx$ is a line with **slope** of k that passes through the origin. So, two quantities that show direct variation are in a proportional relationship.



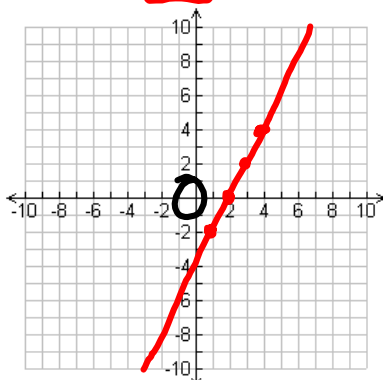
we haven't learned about slope

Example 1:

Tell whether x and y show direct variation. Explain your reasoning.

a.

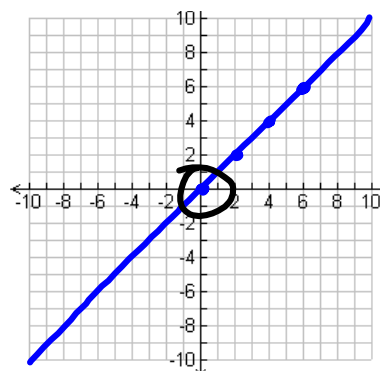
x	1	2	3	4
y	-2	0	2	4



No-not through the origin

b.

x	0	2	4	6
y	0	2	4	6



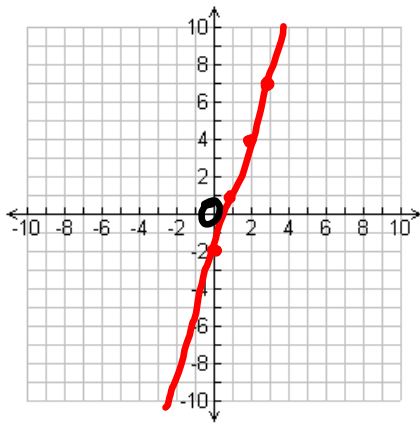
Yes-straight line through the origin

Tell whether x and y show direct variation. Explain your reasoning.

1.

x	y
0	-2
1	1
2	4
3	7

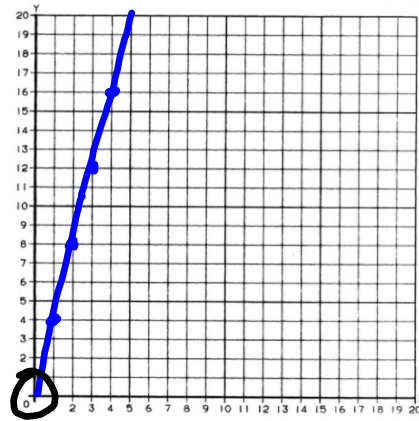
No - not through the origin



2.

x	y
1	4
2	8
3	12
4	16

Yes - straight line through the origin



Example 2: ① Solve for y ② $y = kx$?

Tell whether x and y show direct variation. Explain your reasoning.

a. $y + 1 = 2x$

$$\begin{array}{r|l} -1 & -1 \\ \hline y & = 2x - 1 \end{array}$$

No, we have a "-1" after $y = 2x$.

b. $\frac{1}{2}y = x$

$$\begin{array}{r|l} \div \frac{1}{2} & \div \frac{1}{2} \\ \hline y & = x \div \frac{1}{2} \end{array}$$

$$y = 2x$$

Yes, $k = 2$

Tell whether x and y show direct variation. Explain your reasoning.

3. $xy = 3$

$$\begin{array}{r|l} \div x & \div x \\ \hline y & \frac{3}{x} \end{array}$$

No, We are dividing by x

4. $x = \frac{1}{3}y$

$$\begin{array}{r|l} \div \frac{1}{3} & \div \frac{1}{3} \\ \hline x \div \frac{1}{3} & = y \\ x \cdot 3 & \end{array}$$

$$3x = y$$

Yes, $k=3$

5. $y + 1 = x$

$$\begin{array}{r|l} -1 & -1 \\ \hline y & = x - 1 \end{array}$$

No, we have "-1" after $y=x$

Example 4:

The variables x and y vary directly. Use the values to find the constant of proportionality. Then write an equation that relates x and y .

$y = 72; x = 3$

$\hookrightarrow k$

$$y = kx$$

$$72 = k \cdot 3$$

$$\begin{array}{r|l} \div 3 & \div 3 \\ \hline 24 = k & \end{array}$$

$$24 = k \rightarrow y = 24x$$

The variables x and y vary directly. Use the values to find the constant of proportionality. Then write an equation that relates x and y .

$\hookrightarrow k$

6. $y = 45; x = 40$

$$y = kx$$
$$45 = k \cdot 40$$
$$\begin{array}{r|l} \div 40 & \div 40 \\ \hline 1.125 = k & \end{array}$$
$$y = 1.125x$$