

Lesson 8-5

<u>direct variation</u>	
Definition $y = kx$	Example $y = 7x$ $y = 6x + 12$

constant of variation	
Definition $\frac{y}{x} = \frac{k \cdot x}{x}$ $\frac{y}{x} = k$	Example $(2, 12)$ find constant $y = kx$ $\frac{12}{2} = \frac{k \cdot 2}{2}$ $6 = k$

Determine if each of the following are written as a direct variation.

I Do	We Do	You Do
$y = 4x$ $y = kx$ ✓	$y = 15x + 2$	$y = \frac{1}{2}x$ ✓
$y = \frac{1}{2}x - 2$ $y = kx$	$y = 17x$ ✓	$y = \frac{3}{2}x$ ✓

Determine if each of the following are written as a direct variation.

I Do	We Do	You Do
$\cancel{2x} - 3y = 1$ $\cancel{2x} - 3y = 1$ $\cancel{2x} - 3y = 1$ $-3y = 1 - \cancel{2x} - \cancel{-2x}$ $\cancel{3y} = \frac{1}{3} - \frac{2x}{3}$ $y = \frac{2}{3}x + \frac{1}{3}$ <p style="text-align: center;">NO</p>	$7y = 2x$ $7y = 2x$ $y = \frac{2}{7}x$ <p style="text-align: center;">yes</p>	$y = kx$ $3y + 4x = 8$ $3y + 4x = 8$ $\frac{3y}{3} = \frac{-4x + 8}{3}$ $y = \frac{-4}{3}x + \frac{8}{3}$ <p style="text-align: center;">NO</p>
$y - 7.5x = 0$ $y - 7.5x = 0$ $y = 7.5x$ <p style="text-align: center;">yes</p>	$6y = 3x$ $6y = 3x$ $y = \frac{1}{2}x$ <p style="text-align: center;">yes</p>	$2y + 6x = 12$ $2y + 6x = 12$ $\frac{2y}{2} = \frac{-6x + 12}{2}$ $y = -3x + 6$ <p style="text-align: center;">Oh no!</p>

Example 2: Write an equation of direct variation given that y varies directly with x.

$$y = kx$$

I Do	I Do	We Do
$\begin{array}{l} x \ y \\ (3, 48) \\ \downarrow \\ y = kx \\ 48 = k \cdot 3 \\ \frac{48}{3} = \frac{k \cdot 3}{3} \\ 16 = k \\ \boxed{y = 16x} \end{array}$	$\begin{array}{l} x \ y \\ (10, 15) \\ 5 = \frac{15}{10} = k \cdot \frac{10}{10} \\ \frac{3}{2} = k \\ \boxed{y = 3\frac{1}{2}x} \end{array}$	$\begin{array}{l} x \ y \\ (4, 12) \\ 12 = k \cdot 4 \\ \frac{12}{4} = k \\ 3 = k \\ \boxed{y = 3x} \end{array}$

We Do	You Do	You Do
$\begin{array}{l} x \ y \\ (4, 22) \\ 2 = \frac{22}{4} = k \cdot \frac{4}{4} \\ \frac{11}{2} = k \\ \boxed{y = \frac{11}{2}x} \\ \boxed{y = 5.5x} \\ \boxed{y = 5\frac{1}{2}x} \end{array}$	$\begin{array}{l} x \ y \\ (5, 25) \\ 5 = \frac{25}{5} = k \cdot \frac{5}{5} \\ 5 = k \\ \boxed{y = 5x} \end{array}$	$\begin{array}{l} x \ y \\ (6, 38) \\ 2 = \frac{38}{6} = k \cdot \frac{6}{6} \\ \frac{19}{3} = k \\ \boxed{y = \frac{19}{3}x} \\ \boxed{y = 6\frac{1}{3}x} \end{array}$

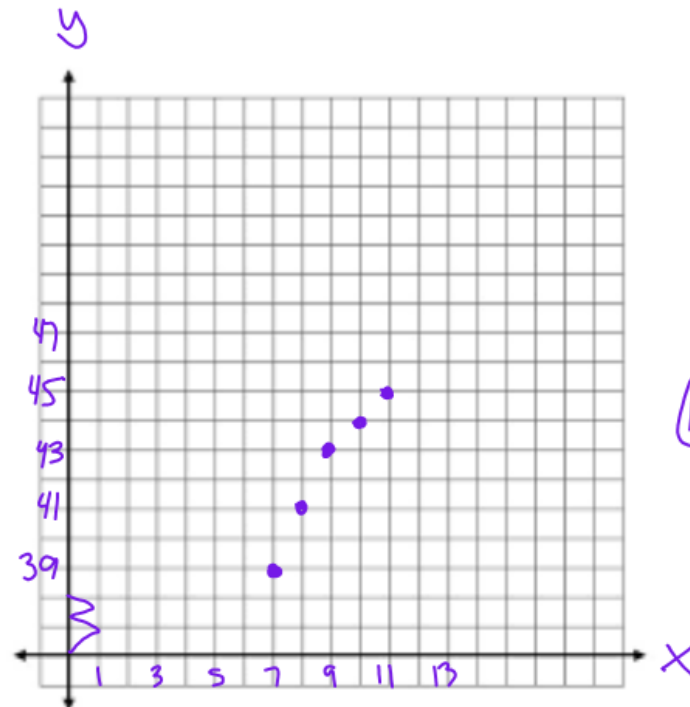
Example 1: Determining Whether a Data Set Varies Directly

Determine whether the data sets show direct variation.

Shoe Sizes					
U.S. Size	7	8	9	10	11
European Size	39	41	43	44	45

Shoe Sizes

European sizes



NO

U.S. Size

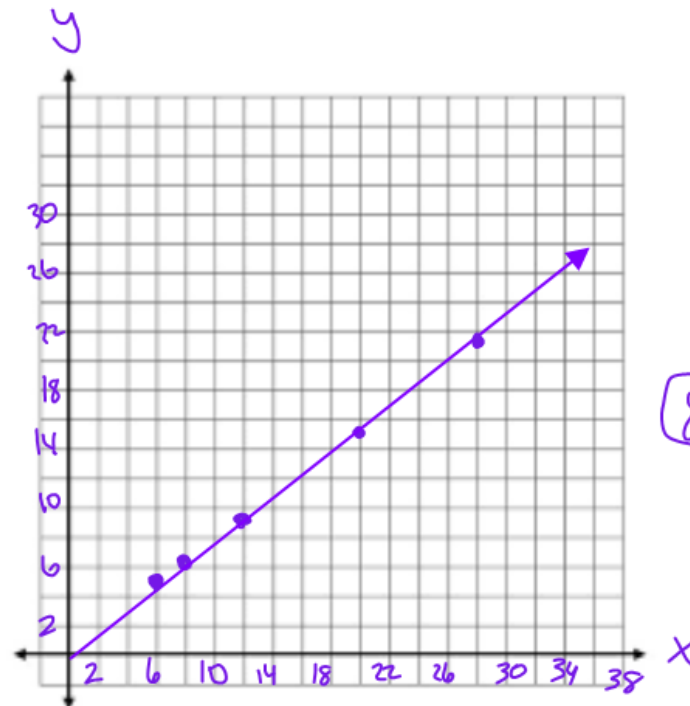
Example 1: Determining Whether a Data Set Varies Directly

Determine whether the data sets show direct variation.

Growth of Plant					
x Weeks	6	8	12	20	28
y Height of Plant	4.5	6	9	15	21

Growth of Plant

height of plant



yes

weeks