DIRECT VARIATION

A **Direct Variation** is a specific relationship in which there is a constant ratio $\left(\frac{y}{x}\right)$ between all ordered pairs.

Direct Variation Equations are written in the form $y = kx$

finding The Constant (k)

Identify the constant of the ordered pairs below. Then, write the equation to represent the relationship.

1) {(1, 4), (2, 8), (3, 12), (4, 16)}

$k = 4$ $\quad y = 4x$

2) {(-6, 3), (-4, 2), (0, 0), (2, -1)}

$k = -\frac{1}{2}$ $\quad y = -\frac{1}{2}x$

3)

x	y
-12	-8
-6	-4
0	0
3	2

$k = \frac{2}{3}$ $\quad y = \frac{2}{3}x$

4)

x	-4	-1	3	5
y	12	3	-9	-15

$k = -3$ $\quad y = -3x$

Identifying equations

Identify the equations below that represent a direct variation. If yes, identify the constant of variation.

5) $y = 3x$ — yes ($k = 3$)

6) $y = \frac{4}{5}x$ — yes

7) $y = 2$ — no

8) $\frac{2y}{2} = \frac{5x}{2}$ $\quad y = \frac{5}{2}x$ — yes ($k = \frac{5}{2}$)

9) $y = x - 4$ — no

10) $y = -x$ $\quad y = -1x$ — yes ($k = -1$)

11) $\frac{2y}{2} = \frac{x}{2}$ $\quad y = \frac{1}{2}x$ — yes ($k = \frac{1}{2}$)

12) $4x + 2y = 6$

$-4x \quad -4x$

$\frac{2y}{2} = \frac{-4x}{2} + \frac{6}{2}$

$y = -2x + 3$

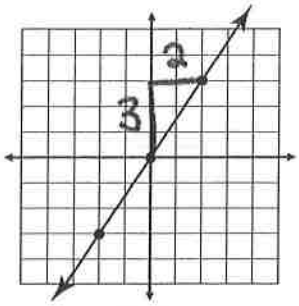
no

13) $5x + y = 0$ $\quad y = -5x$ — yes ($k = -5$)

Identifying graphs

Identify the graphs below that represent a direct variation. If yes, identify the constant of variation.

14)

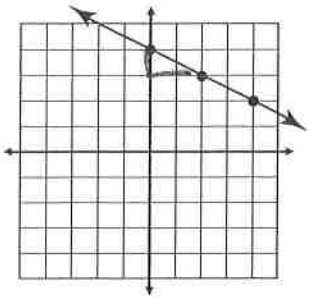


$y = \frac{3}{2}x + 0$

$y = \frac{3}{2}x$

k yes

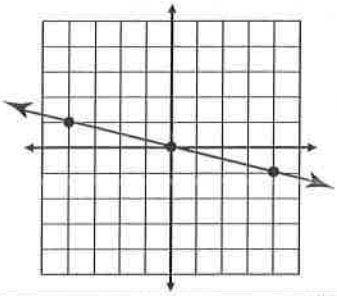
15)



$y = -\frac{1}{2}x + 4$

no

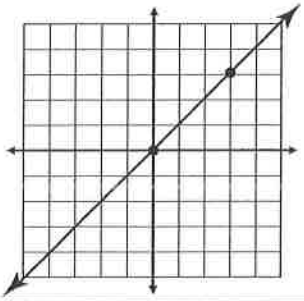
16)



$y = -\frac{1}{4}x$

yes

17)



$y = x$

yes

Finding missing values

If the following ordered pairs represent a direct variation, find the missing value. $\frac{y}{x} = \frac{y}{x}$

18) (2, -4) and (-6, y)

$\frac{-4}{2} = \frac{y}{-6}$

$2y = 24$

$y = 12$

19) (4, 16) and (x, 24)

$\frac{16}{4} = \frac{24}{x}$

$16x = 96$

$x = 6$

20) (12, y) and (4, 7)

$\frac{y}{12} = \frac{7}{4}$

$4y = 84$

$y = 21$

21) (x, -16) and (6, 24)

$\frac{-16}{x} = \frac{24}{6}$

$24x = -96$

$x = -4$

22) If y = -18 when x = 3, find x when y = 30

$\frac{-18}{3} = \frac{30}{x}$

$-18x = 90$

$x = -5$

23) If y = 80 when x = 32, find x when y = 100

$\frac{80}{32} = \frac{100}{x}$

$80x = 3200$

$x = 40$

24) If y = 10 when x = -4, find y when x = 12

$\frac{y}{12} = \frac{10}{-4}$

$-4y = 120$

$y = -30$

25) If y = -7 when x = -28, find y when x = 20

$\frac{-7}{-28} = \frac{y}{20}$

$-28y = -140$

$y = 5$