

Direct Variation

$y = kx$ similar to $y = mx$

input x	output y
-9	3
-3	1
6	-2

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

$\frac{3}{-9} \div 3 = -\frac{1}{3}$

$\frac{1}{-3} = -\frac{1}{3}$

$\frac{-2}{6} \div 2 = -\frac{1}{3}$

$\frac{y}{x} = \frac{kx}{x} \quad \left[k = \frac{y}{x} \right]$

k → constant of variation

If all k values are the same, then it is direct variation.

Determine whether table is an example of direct variation, find "k" for each row.

$y = kx$

$y = -\frac{1}{3}x$

Keep, Change, flip!

$-\frac{3}{2} \div -2$
 $\downarrow \quad \downarrow$
 $-\frac{3}{2} * \frac{-1}{2} = \frac{3}{4}$

⇒

x	y	$k = \left[\frac{y}{x} \right]$
-8	-6	$\frac{-6}{-8} \div -2 = \frac{3}{4}$
-2	$-\frac{3}{2}$	$\frac{-\frac{3}{2}}{-2} = \frac{3}{4}$
4	3	$\frac{3}{4}$

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

Yay!

1.)

	x	y	$k = \frac{y}{x}$
⇒	3	-6	$\frac{-6}{3} = -2$ ✓
⇒	5	-10	$\frac{-10}{5} = -2$ ✓
⇒	-2	8	$\frac{8}{-2} = -4$

Now! Not direct variation

2.)

	x	y	$k = \frac{y}{x}$
	-2	-7	$\frac{-7}{-2} = \frac{7}{2}$
	4	14	$\frac{14}{4} = \frac{7}{2}$
⇒	6	21	$\frac{21 \div 3}{6 \div 3} = \frac{7}{2}$

Now!

$y = \frac{7}{2}x$

Direct Variation

$(3, 2)$ and $(6, y)$

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

$k = \frac{2}{3}$

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

$y = \frac{2}{3}(6) = \frac{12}{3} = 4$

$(3, 2)$ and $(6, 4)$

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

- 1.) Find k
- 2.) Find equation
- 3.) Plug in values

1.) It is direct variation. Find $k = \frac{y}{x}$

$(9, 15)$ and $(3, y)$

$k = \frac{y}{x} = \frac{15}{9} \div 3 = \frac{5}{3}$

$x = 3$

$y = \frac{5}{3}x$

$y = \frac{5}{3}(3) = \boxed{5}$

$(9, 15)$ and $(3, y) \rightarrow \boxed{5}$

2.) Direct Variation

$(-2, 8)$ and $(x, 12)$

$k = \frac{y}{x} = \frac{8}{-2} = -4$

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

$y = -4x$

$12 = -4x$

$\frac{12}{-4} = \frac{-4x}{-4}$

$x = \boxed{-3}$

$4x = x + x + x + x$

$4(5) = 5 + 5 + 5 + 5$

$4x = 4 * x$

Number Patterns

1, 2, 3 98, 99, 100

$1 + 100 = 101$ $2 + 99 = 101$ $3 + 98 = 101$

$50(101)$

$\boxed{5050}$

Fibonacci's Sequence

1, 1, 2, 3, 5, 8, 13, 21, ...

$13 + 21 = 34$ $21 + 34 = 55$

$\boxed{34, 55}$

1st 2nd 3rd 4th 5th
10, 16, 22, 28, 34
+6 +6 +6 +6 +6

Find the 6th term:

$$34 + 6 = \boxed{40}$$

$n = \#$ of terms

Find the 27th term

Start # Difference

$$10 + 6(n-1)$$

$$n = 27$$

$$10 + 6(27-1)$$

$$10 + 6(26) = 10 + 156 = \boxed{166}$$

12th term:

$$10 + 6(12-1)$$

$$10 + 6(11) = 10 + 66 = \boxed{76}$$

100th term:

$$n = 100$$

$$10 + 6(100-1)$$

$$10 + 6(99)$$

$$10 + 594 = \boxed{604}$$



5th term

10th term

100th term

5th

Start #

Difference

of terms

$$27 - 4(n-1)$$

$$27 - 4(n-1)$$

$$27 - 4(5-1)$$

$$27 - 4(4)$$

$$27 - 16 = 11$$

10th

$$27 - 4(n-1)$$

$$27 - 4(10-1)$$

$$27 - 4(9)$$

$$27 - 36 = -9$$

100th

$$27 - 4(100-1)$$

$$27 - 4(99)$$

$$27 - 396 = -369$$

23, 35, 47, 59, . . .

Start #	Difference
↓	↓
$23 + 12(n-1)$	

Set up:

$$784^{\text{th}} \text{ term} \longrightarrow 23 + 12(784-1)$$