

Direct Variation

input x	output y	$k = \frac{y}{x}$
-9	3	$\frac{3}{-9} = -\frac{1}{3}$
-3	1	$\frac{1}{-3} = -\frac{1}{3}$
6	-2	$\frac{-2}{6} = -\frac{1}{3}$

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

$\frac{y}{x} = \frac{kx}{x}$ $k = \frac{y}{x}$ $\frac{\text{rise}}{\text{run}}$

$k \rightarrow$ constant of variation

If all k values are the same, then it is an example of direct variation

Determine whether the table is an example of direct variation. If so, find $y = kx$.

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

x	y	$k = \frac{y}{x}$
-8	-6	$\frac{-6}{-8} = \frac{3}{4}$
-2	$-\frac{3}{2}$	$\frac{-\frac{3}{2}}{-2} = \frac{3}{4}$
4	3	$\frac{3}{4}$

Yay!

Divide fractions

$-\frac{3}{2} \div -\frac{2}{1}$ Keep, Change, Flip!
 $\downarrow \downarrow$
 $-\frac{3}{2} * \frac{1}{2} = \frac{3}{4}$

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

1.)

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

Not direct variation Now!

2.)

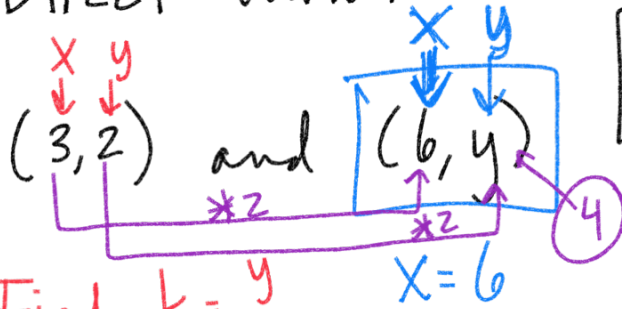
X	y	$k = \frac{y}{x}$
-2	-7	$\frac{-7}{-2} = \frac{7}{2}$
4	14	$\frac{14}{4} = \frac{7}{2}$
6	21	$\frac{21}{6} \div 3 = \frac{7}{2}$

Yay!

$$y = kx$$

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

Direct Variation



$$[y = kx]$$

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

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

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

equation \rightarrow

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

1.) Find k

2.) Find $y = kx$

3.) Plug in values

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

$$\frac{12}{3} = \underline{4}$$

1.) It is direct variation.

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

$$k = \frac{y}{x} \quad \frac{\text{rise}}{\text{run}} \quad \div 3$$

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

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

$$\frac{5}{3} \left(\frac{3}{1} \right) = \frac{15}{3} = \boxed{5}$$

1.) Find k

2.) Find $y = kx$

3.) Plug in values

2.) Direct Variation

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

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

$$[y = kx] \\ (y = -4x)$$

$$y = 12$$

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

$$\boxed{-3 = x}$$

Number Patterns

① 2, 3, ..., 98, 99, ⑩

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

$$\frac{100}{2} = 50 \text{ pairs}$$

$$50(101) =$$

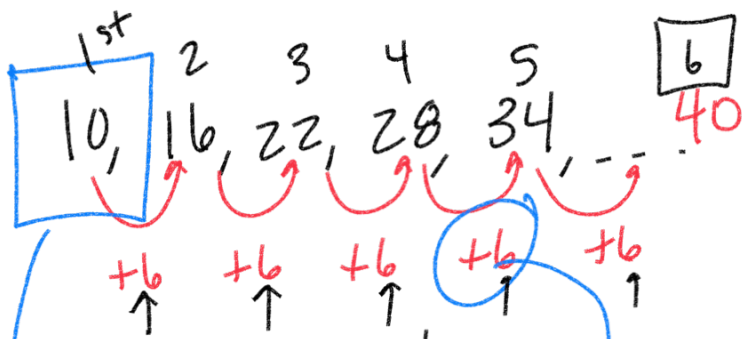
$$\boxed{5050}$$

Fibonacci's Sequence

1, 1, 2, 3, 5, 8, 13, 21, ..., 34, 55

$$13 + 21 = 34$$

$$21 + 34 = 55$$



$6-1=5$
Find the 6th term.

40

Find the 27th term.

$n = \# \text{ of terms}$

Starting # difference

$$\left[\underline{10} + 6(n-1) \right]$$

$n=27$

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

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

Find 12th term

$n=12$

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

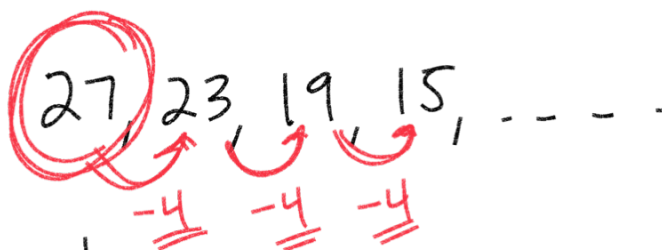
$$10 + 6(12-1)$$

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

Find 100th term

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

$$10 + 6(99) = 10 + 594 = \boxed{604}$$



start difference

$$\left[\begin{array}{c} \downarrow \quad \downarrow \\ \underline{27} - 4(n-1) \end{array} \right]$$

5th term:

10th term:

100th term:

$$5^{\text{th}}: 27 - 4(5-1)$$

$$27 - 4(4)$$

$$27 - 16 = \boxed{11}$$

$$10^{\text{th}}: 27 - 4(10-1)$$

$$27 - 4(9)$$

$$27 - 36 = \boxed{-9}$$

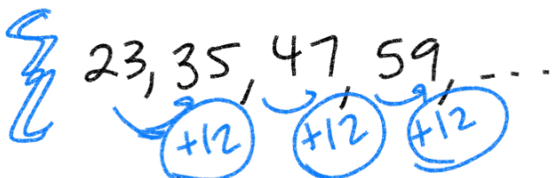
$$100^{\text{th}} \quad 27 - 4(100-1)$$

$$27 - 4(99) = 27 - 396 = \boxed{-369}$$

start difference

$$\begin{array}{c} \downarrow \quad \downarrow \\ 23 + 12(n-1) \end{array}$$

$$23 + 12(784-1)$$



Set up:

784th term

