

Direct Variation

$k = \text{constant of variation}$

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

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

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

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

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

$$\frac{-\frac{3}{2}}{-2} = -\frac{3}{2} \div -2 \quad \begin{array}{l} \text{Keep} \\ \text{Change} \\ \text{Flip} \end{array}$$

$$\downarrow \quad \downarrow$$

$$-\frac{3}{2} \times \frac{1}{-2} = \frac{-3}{-4}$$

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

1.)

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

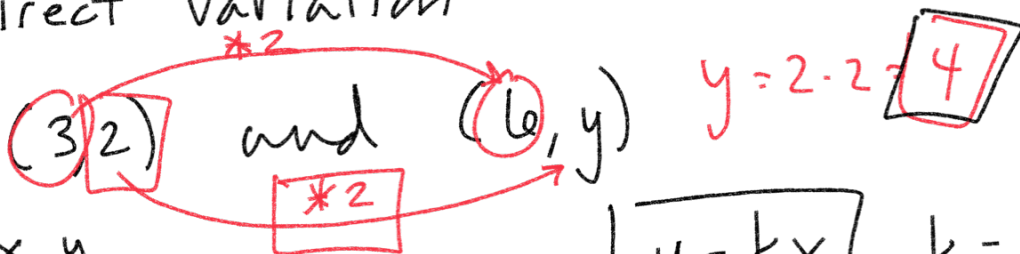
not direct variation

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	$\frac{21}{6} = \frac{7}{2}$

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

Direct Variation



$x \quad y$   
 $(3, 2)$

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

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

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

$y = \frac{2}{3}x \quad (6, y)$

$x = 6$

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

1.)  $(9, 15)$   $(3, y)$

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

$$k = \frac{5}{3}$$

$$y = kx$$

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

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

$$y = \frac{5}{3}(3) = \frac{15}{3} = 5$$

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

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

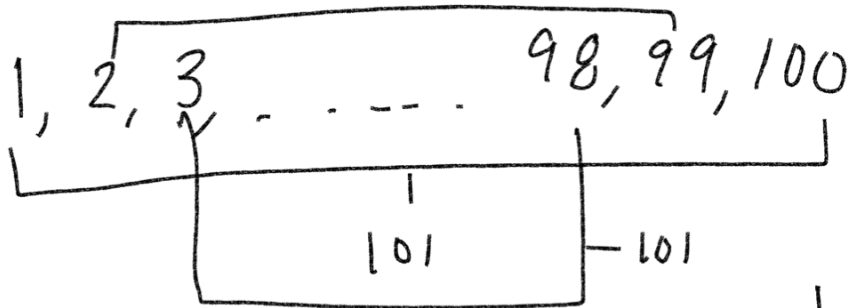
$$y = -4x$$

$$12 = -4x$$

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

$$-3 = x$$

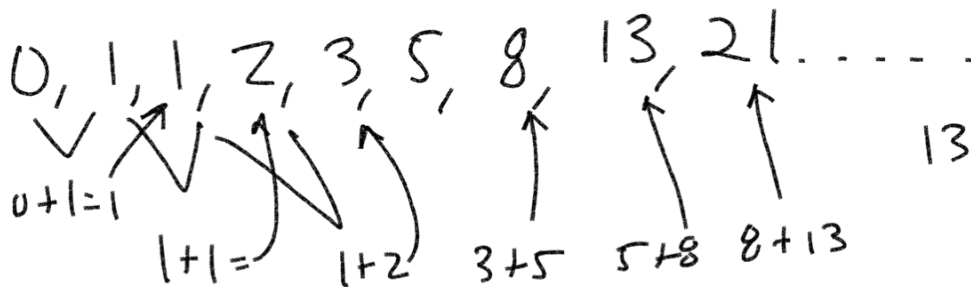
## Number Patterns



$$50(101)$$

$$5050$$

## Fibonacci's Sequence



$$13 + 21 = 34$$

$$21 + 34 = 55$$

$10, 16, 22, 28, 34$   
 $+6 \quad +6 \quad +6 \quad +6$

$n = \#$  of terms

Start # + Difference

↓

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

Find  $27^{\text{th}}$  term

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

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

Find  $12^{\text{th}}$  term

$$10 + 6(12-1) = 10 + 6(11)$$

$$10 + 66 = \boxed{76}$$

Find  $100^{\text{th}}$  term

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

$$10 + 6(99)$$

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

27, 23, 19, 15  
-4 -4 -4

5<sup>th</sup> term = 11  
n=5

10<sup>th</sup> term = -9 n=5

100<sup>th</sup> term = -369

n=10

n=100

Find difference  
Get the formula

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

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

$$27 - 4(4)$$

$$27 - 16 = 11$$

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

$$27 - 4(9)$$

$$27 - 36 = -9$$

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

$$27 - 4(99)$$

$$27 - 396 = -369$$