

Direct Variation

$$y = kx$$

$k =$  constant of variation

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

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

slope

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

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

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

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

Keep,  
Change,  
Flip!

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

$$\downarrow \quad \downarrow \quad \downarrow$$

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

1.)

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

not direct variation

2.)

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

$y = kx$

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

### Direct Variation



1.) Find k

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

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

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

$$y = kx$$

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

2.) Get equation.

3.) Plug in 2<sup>nd</sup> pt  
 $(6, y) \quad x = 6$

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

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



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

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

$y = kx$

$x = 3$

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

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

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

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

$y = 12$

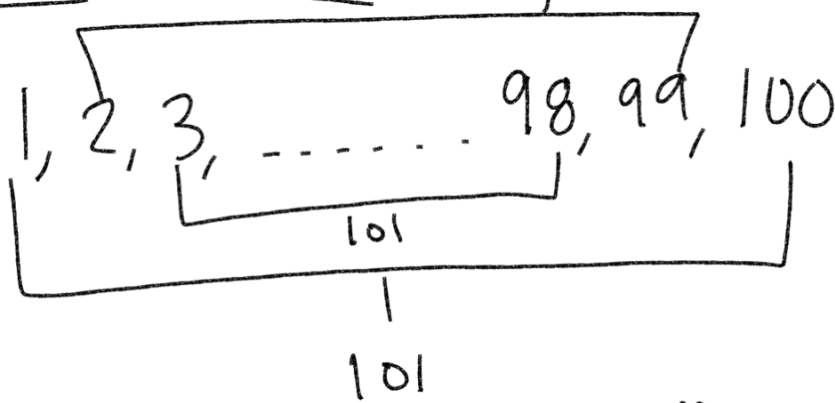
$$k = -4$$

$$y = -4x$$

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

$$x = -3$$

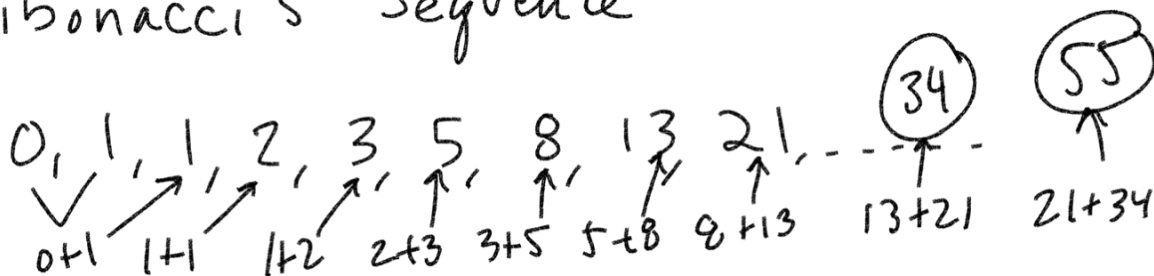
## Number Patterns 101



$$50(101)$$

$$5050$$

## Fibonacci's Sequence



① ② ③ ④ ⑤  
10, 16, 22, 28, 34, ...

+6 +6 +6 +6

$n = \#$  of terms

Find 27<sup>th</sup> terms

start # + Difference

↓

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

$$n = 27$$

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

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

12<sup>th</sup> term  $n = 12$

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

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

100<sup>th</sup> term  $n = 100$

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

$$10 + 6(99)$$

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

$$[ 27, 23, 19, 15 ]$$

-4      -4      -4

5<sup>th</sup> term =  
 $27 - 4(5-1)$   
 $27 - 4(4) = 27 - 16 = \boxed{11}$

10<sup>th</sup> term =  
 $n=10$   
 $27 - 4(n-1)$   
 $27 - 4(10-1) = 27 - 4(9) = 27 - 36 = \boxed{-9}$

100<sup>th</sup> term =  
 $27 - 4(n-1)$   
 $27 - 4(100-1)$   
 $27 - 4(99)$   
 $27 - 396 = \boxed{-369}$

Find difference

Get the formula

start # + difference  $(n-1)$

$$\sum \downarrow 27 - 4(\underline{n-1}) \approx$$