

# Systems of Inequalities

Thursday, January 9, 2020 3:14 PM

Are  $\textcircled{1}(0, -2)$ ,  $\textcircled{2}(3, -4)$ ,  $\textcircled{3}(-3, -2)$

Solutions to:

a)  $2x - 3y \leq 6$

$\textcircled{1}(0, -2)$

$$2(0) - 3(-2) \leq 6$$

$$6 \leq 6 \quad \checkmark \text{ yes}$$

$\textcircled{2}(3, -4)$

$$2(3) - 3(-4) \leq 6$$

$$6 + 12 \leq 6$$

$$18 \leq 6 \quad \times \text{ no}$$

$\textcircled{3}(-3, -2)$

$$2(-3) - 3(-2) \leq 6$$

$$-6 + 6 \leq 6$$

$$0 \leq 6 \quad \checkmark \text{ yes}$$

b)  $3y > 2x - 6$

$\textcircled{1}(0, -2)$

$$3(-2) > 2(0) - 6$$

$$-6 > -6 \quad \underline{\text{no}}$$

$\textcircled{2}(3, -4)$

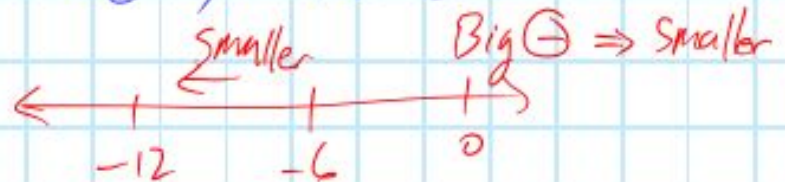
$$3(-4) > 2(3) - 6$$

$$-12 > 0 \quad \underline{\text{no}}$$

$\textcircled{3}(-3, -2)$

$$3(-2) > 2(-3) - 6$$

$$-6 > -12 \quad \underline{\text{yes}}$$



# Graphing Inequalities

a)  $2x - 3y \leq 6$   $\Rightarrow$  start by graphing the line

Isolate for  $y$

$$\div -3 \quad -3y \leq (6 - 2x) \quad \div (-3)$$

$$y \geq -2 + \frac{2}{3}x$$

when we mult/div by neg  $\Rightarrow$  flip

Aside:

$$4 > 2$$

$$+1 \quad +1$$

$$5 > 3$$

$$\times 2 \quad \times 2$$

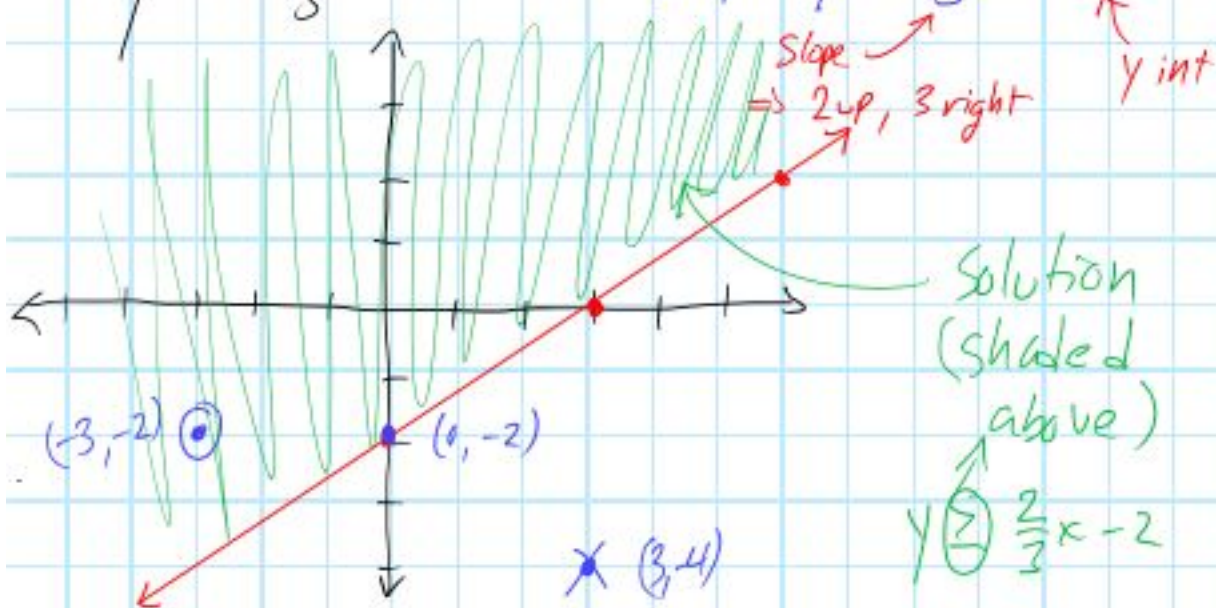
$$10 > 6$$

$$\div (-2) \quad \div (-2)$$

$$-5 < -3$$

not true

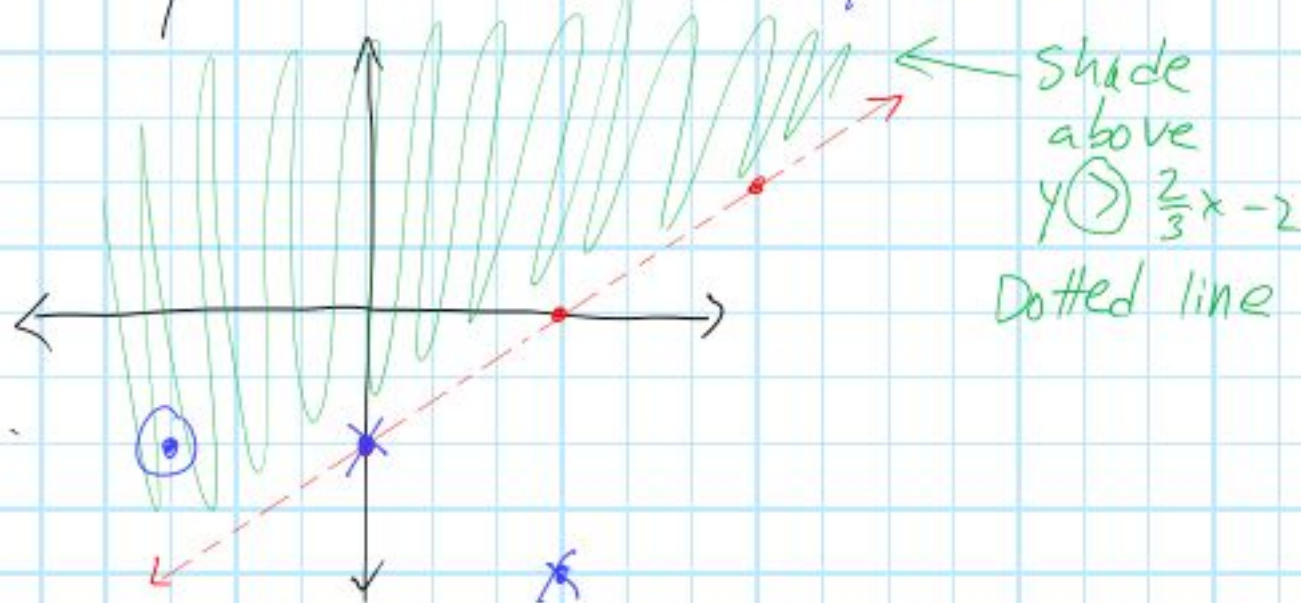
$$y \geq \frac{2}{3}x - 2 \rightarrow \text{Graph } y = \frac{2}{3}x - 2$$



$$b) 3y > 2x - 6$$

$\div 3$

$$y > \frac{2}{3}x - 2 \rightarrow \text{Graph } y = \frac{2}{3}x - 2$$



As a rule:

$y > f(x) \rightarrow$  shade above, dotted line

$y < f(x) \rightarrow$  shade below, dotted line

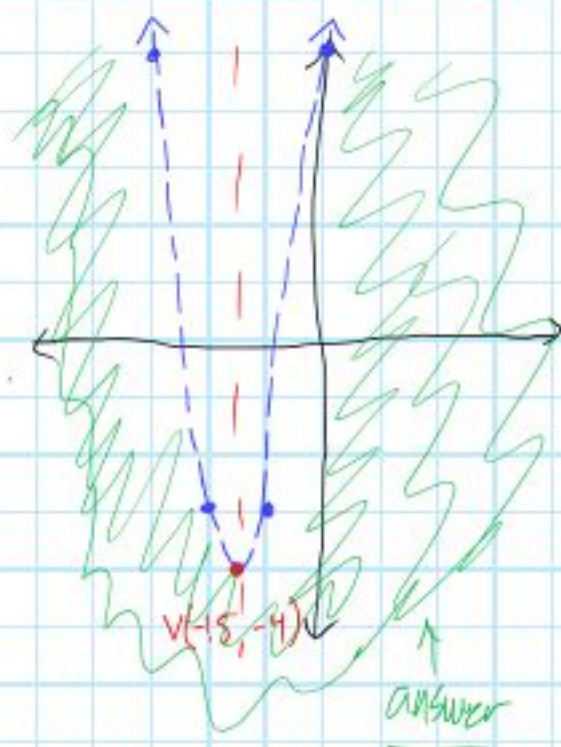
$y \geq f(x) \rightarrow$  Shade above, Solid line

$y \leq f(x) \rightarrow$  shade below, Solid line

(when in doubt, test point)

Ex 2  $y < 4x^2 + 12x + 5 \rightarrow$  Graph  
 $y = 4x^2 + 12x + 5$   
 dotted, below

Parabola: Vertex AND 2 pts on either side



vertex:  $h = \frac{-b}{2a} = \frac{-12}{2(4)}$

$k = \frac{-12}{8} = -\frac{3}{2} = -1.5$

$k = 4(-1.5)^2 + 12(-1.5) + 5$   
 $= -4$

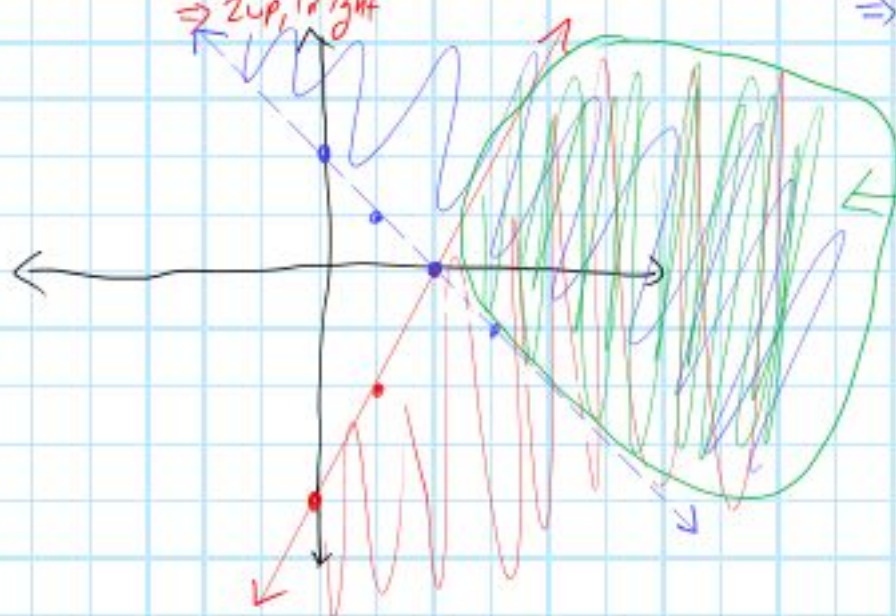
$\rightarrow$  x values close to vertex

$x = 0 \Rightarrow y = 4(0)^2 + 12(0) + 5$   
 $= 5$

$x = -2 \Rightarrow y = 4(-2)^2 + 12(-2) + 5$   
 $= 16 - 24 + 5 = -3$

Ex 3 ①  $y < 2x - 4$   
 Solid, below  
 slope  $\Rightarrow$  2 up, 1 right  
 y-int

②  $y > 2 - x$   
 dotted above  
 y-int  
 slope = -1  
 $\Rightarrow$  1 down, 1 right



Solution  
 overlap