Unit 2: Solving Equations and Inequalities
Lesson 3: Graphing Linear Inequalities

You and three friends go to lunch at Chick-fil-a. Between the ~~three~~ four of you, you have $15 to spend. How much can you buy? Come up with 2 or 3 different options. (A small soda is $1.45 and 8 piece nuggets are $2.95)

$1.45(x)+2.95(y)\leq 15$

Soda	Chicken	Total
2	3	$11.75
4	3	$14.65
2	4	$14.70
3	3	$12.30

How many different options do you have (total)? ∞

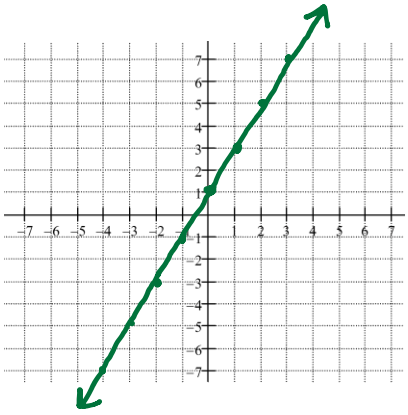
infinite

Write an equation that would represent each of your options.

$1.45(x)+2.95(y)\leq 15$

The solution set of an **equation** is every point on the line. For an **inequality**, the solution set includes the area of the graph separated by the line.

Graph this equation: $y=2x+1$



Now consider $y\leq 2x+1$.

Mark 3 additional points that would be solutions to $y\leq 2x+1$.

We represent the solutions that are not on the line by shading the area of the graph that makes the inequality true.

Graph the inequality: $y\leq 2x+1$

(0,0)

$0\leq 2(0)+1$

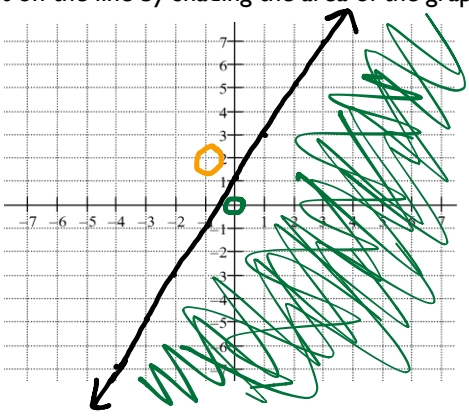
$0\leq 0+1$

$0\leq 1$ True ✓

(-1,2)

$2\leq 2(-1)+1$

$2\leq -2+1$



2 ≤ -1 False

Practice: Determine if the following points are solutions to the function.

1. $y > 3x + 4$ $(2,-4)$

$-4 > 3(2)+4$
$-4 > 6+4$
$-4 > 10$
NO

2. $y \le \frac{1}{2}x - 3$ $(-4,3)$

$3 \le \frac{1}{2}(-4) - 3$
$3 \le -2 - 3$
$3 \le -5$
NO

3. $x + 3y < -4$ $(1,0)$

$1+3(0) < -4$
$1+0 < -4$
$1 < -4$
NO

4. $2x - 3y > 6$ $(5,-2)$

$2(5)-3(-2) > 6$
$10+6 > 6$
$16 > 6$
yes

STEPS TO GRAPHING INEQUALITIES:

1. Graph the line.
2. Decide if the line is going to be solid or dotted.
   - When graphing $\le$ or $\ge$, the line is solid.
   - When graphing $<$ or $>$, the line is dotted.
3. Pick a test point.
   - You must pick a test point that is NOT on your line.
   - The easiest test point is $(0,0)$. If $(0,0)$ is on your line; pick another point.

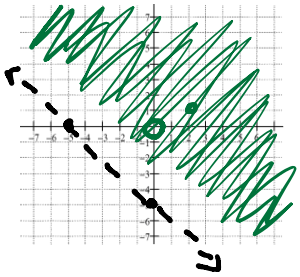
PRACTICE

Graph these inequalities:

$y = mx + b$

$x + y > -5$

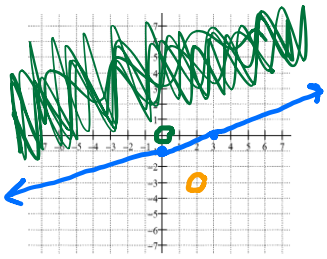
$y = -5$
$x = -5$



Test point: $(0,0)$
$0+0 > -5$
$0 > -5$

Is it a solution?
yes

$x - 3y \le 3$

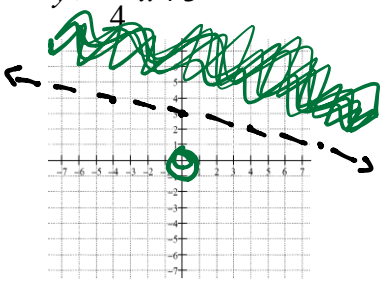


Test point: $(0,0)$
$0 - 3(0) \le 3$
$0 - 0 \le 3$
$0 \le 3$

$(2,-3)$
$2 - 3(-3) \le 3$
$2 + 9 \le 3$
$11 \le 3$
NO

Is it a solution?
yes

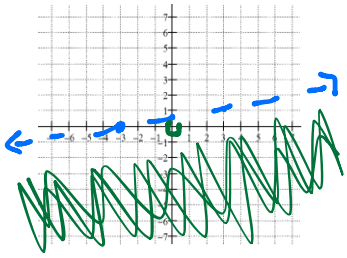
$y > \frac{-1}{4}x + 3$



Test point: $(0,0)$
$0 > -\frac{1}{4}(0) + 3$
$0 > 0 + 3$
$0 > 3$

Is it a solution?
NO

$x - 6y + 3 > 0$

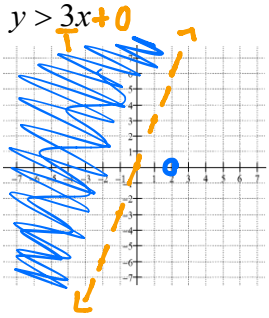


Test point: $(0,0)$
$0 - 6(0) + 3 > 0$
$0 - 0 + 3 > 0$
$3 > 0$

Is it a solution?
yes

y=mx+b

$y > 3x + 0$



Test point: (2,0)

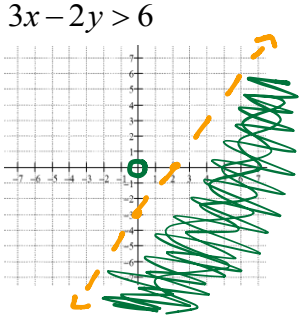
0 > 3(2)

0 > 6

Is it a solution?

no

$3x - 2y > 6$



Test point: (0,0)

3(0) - 2(0) > 6

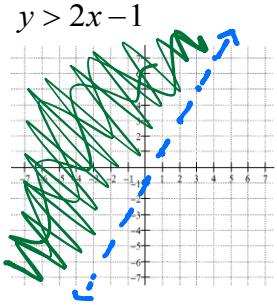
0 - 0 > 6

0 > 6

Is it a solution?

no

$y > 2x - 1$



Test point: (0,0)

0 > 2(0) - 1

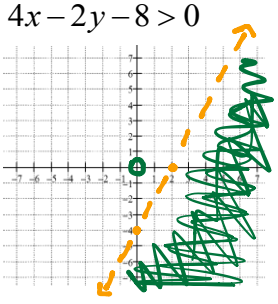
0 > 0 - 1

0 > -1

Is it a solution?

yes

$4x - 2y - 8 > 0$



Test point: (0,0)

4(0) - 2(0) - 8 > 0

0 - 0 - 8 > 0

-8 > 0

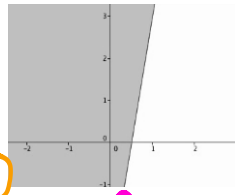
Is it a solution?

no

Which is the correct graph for $y \geq 6x - 3$?

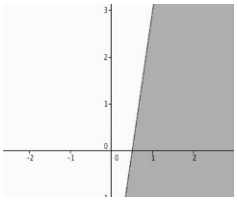
solid

a.



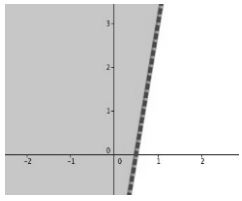
solid

b.



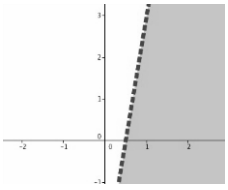
dotted

c.



dotted

d.



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