Linear Inequalities in Two Variables

$y < x + 4$

$2x - 3y \geq 14$

What is it? (Looks like an equation with <, >)

Finding solutions

$(2, 5)$

$5 < 2 + 4$

$5 < 6$

TRUE

$2(2) - 3(5) \geq 14$

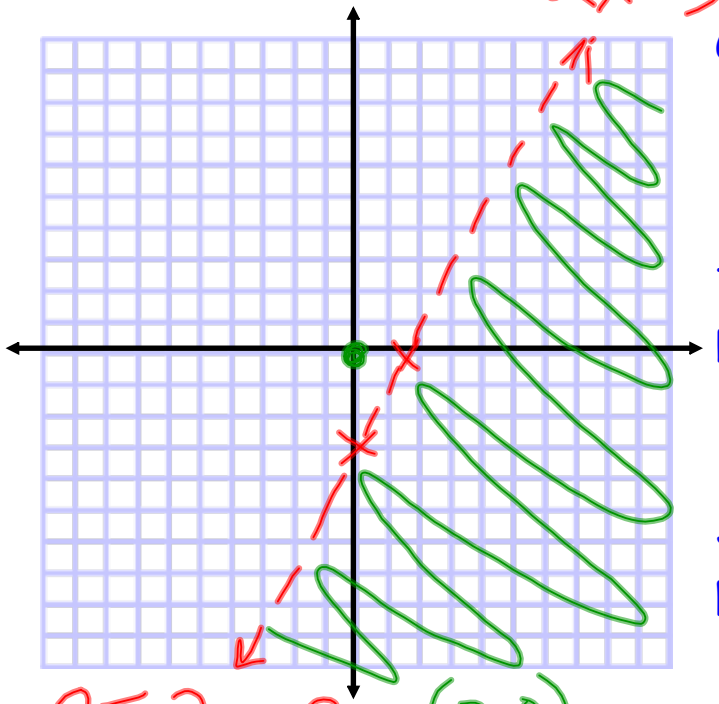
$4 - 15 \geq 14$

$-11 \geq 14$

FALSE

Graphing Linear Inequalities

$y < 2x - 3$ $y = 2x - 3$



Graph the equivalent equation
- dotted line for <, >
- solid line for <=, >=

Test a point away from the boundary

Shade the appropriate 1/2 plane

X	Y
0	-3
3/2	0

$y = 2(0) - 3$

$y = -3$

$0 = 2x - 3$

$3 = 2x$

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

(0,0)

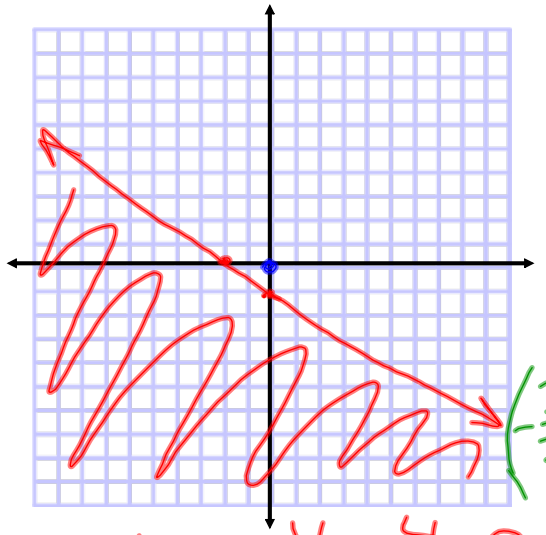
$0 < 2(0) - 3$

$0 < -3$

FALSE

Graphing Linear Inequalities, cont.

$2x + 3y <= -4$ $3y \leq -4-2x$ $y \leq -\frac{4}{3}-\frac{2}{3}x$



Or - after graphing the line, solve for y and use the direction of the inequality to determine which 1/2 plane to shade

$0 = -\frac{4}{3}-\frac{2}{3}x$

$\left(-\frac{3}{2}\right)\ \frac{4}{3} = -\frac{2}{3}x\left(-\frac{3}{2}\right)$

x	y
0	$-\frac{4}{3}$
-2	0

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

$y = -\frac{4}{3}-\frac{2}{3}(0)$

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

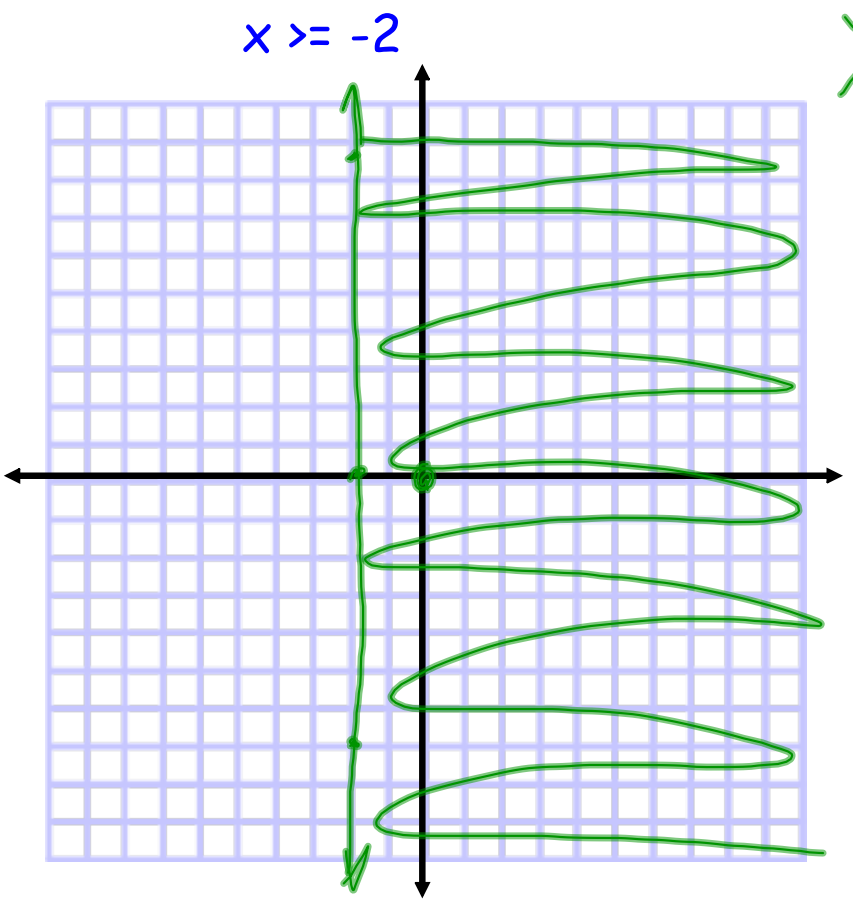
$-\frac{12}{6} = x$

$-2 = x$

$0 \leq -\frac{4}{3}-\frac{2}{3}(0)$

$0 \leq -\frac{4}{3}$ FALSE

Graphing Linear Inequalities - one variable



$x = -2$

Graph the equivalent line

Test a coordinate and shade OR use the direction of the inequality to determine which 1/2 plane to shade

$(0,0)$ $0 \geq -2$

TRUE

Tell whether the ordered pair is a solution of the inequality.

1. $x + y > -9$; $(0, 0)$
2. $x - y \geq 8$; $(14, 9)$
3. $2x - y > 4$; $(-6, -15)$
4. $2x + y > -5$; $(-5, 12)$
5. $5x + 2y \leq 8$; $(-3, 6)$
6. $4x - 3y \geq -5$; $(6, 8)$

1) $0+0>-9$

$0>-9$ T

2) $14-9\geq 8$

$5\geq 8$ F

3) $-12+15>4$

$3>4$ F

4) $-10+12>-5$

$2>-5$ T

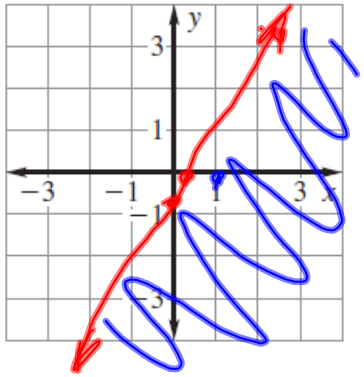
5) $-15+12\leq 8$

$-3\leq 8$ T

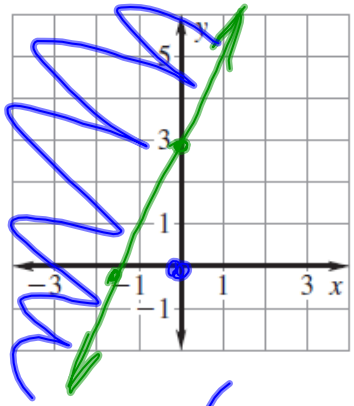
6) $24-24\geq -5$

$0\geq -5$ T

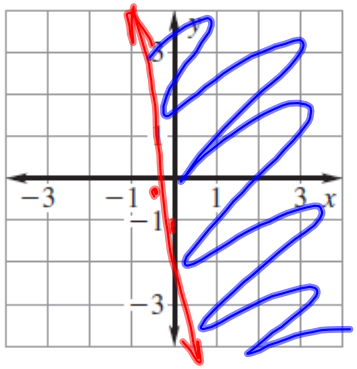
13. $4y \leq 6x - 2$



14. $5y \leq 10x + 15$



15. $6y + 3 \geq -18x$



$5y \leq 10x+15$

$y \leq 2x+3$

#14

$(0,0)$ $0=2(0)+3$

$0=3$ F

$y=2x+3$

$y=2(0)+3$

$y=3$

x	y
0	3
$-\frac{3}{2}$	0

$0=2x+3$

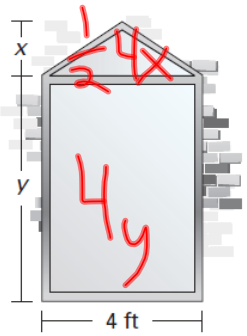
$-3=2x$

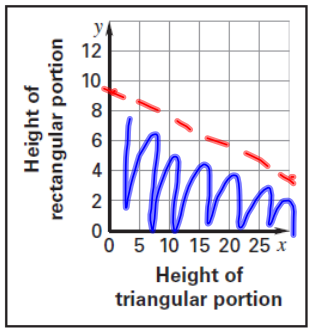
$\frac{-3}{2}=x$

Window The area of the window shown is less than 42 square feet. Let x and y represent the heights of the triangular and rectangular portions of the window, respectively.

a. Write and graph an inequality that describes the different dimensions of the window.

b. Could the height of the triangular portion be 2 feet and the height of the rectangular portion be 8 feet?





YES

Area $< 42\text{ ft}^2$

x = Height of triangle

y = Height of rectangle

4 ft = width

$\frac{1}{2}(4)(x) + 4y < 42$

$2x + 4y < 42$

$4y < -2x + 42$

$y < -\frac{1}{2}x + 10\frac{1}{2}$

Homework:

p. 409; 3-12 by 3, 17-33 by 3, 53, 57, 58