Objective: I can graph the solution set for a linear inequality. linear

Recall that an inequality is $<$, $>$, $\leq$, or $\geq$. Sϕ inequality

is an expression that uses one of the inequality symbols. Here are some examples of linear

inequalities.

$$y \geq -2x + 1 \qquad 2x + 3y < -6$$

$$x \leq -2 \qquad y > 3$$

Notice that inequalities can be written in standard form or slope-intercept

form, just as linear equations can be.

Our goal today is to graph linear inequalities. It is very similar to graphing a line, except the

inequality does change a few things.

$$y \leq mx+b$$

To graph in slope-intercept form:

1) Plot **b** on the y-axis

2) Use m = $\dfrac{\textbf{rise}}{\textbf{run}}$ to get more points.

3) Draw the line.

4) Shade the solution set.

$$ax+by \geq c$$

To graph in standard form:

1) Find the **x** and **y** intercepts or solve for **y**.

2) Draw the line.

3) Shade the solution set.

X	y
0	
	0

Draw the line:

SOLID: $\geq$ $\leq$

DASHED: $>$ $<$

Shade the solution set:

POSITIVE LINE: *greater* / *less*

NEGATIVE LINE: *greater* / *less*

Ex 1: Graph the inequality: $y < 2x - 3$

$(0, 4)$

$(3, 1)$

$1 < 2(3) - 3$

$1 < 3$
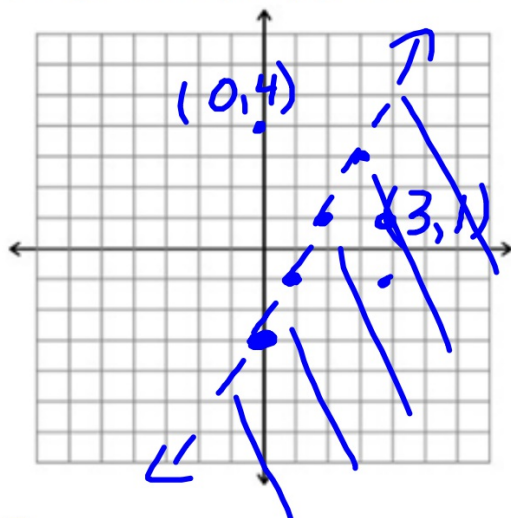
true

$4 < 2(0) - 3$

$4 < -3$ false

1) Plot -3 on y-axis

2) Use $m = \dfrac{2}{1}$

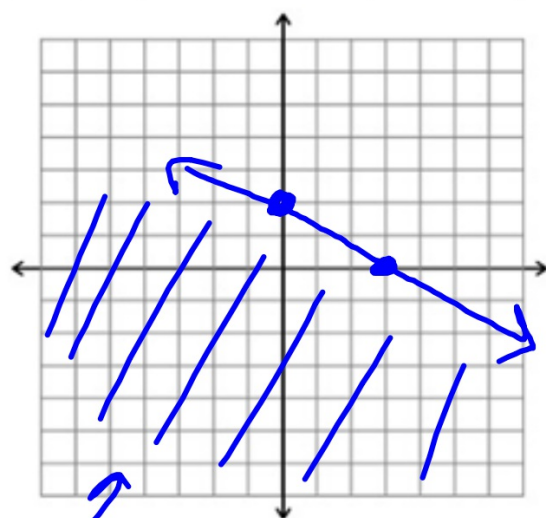3) Solid or dashed line? dashed

b/c $<$

4) Shade above or below?

$<$ less than ↓

Any point in the shaded region is a solution to $y < 2x - 3$.

Ex 2: Graph the inequality: $2x + 3y \leq 6$

Solution area
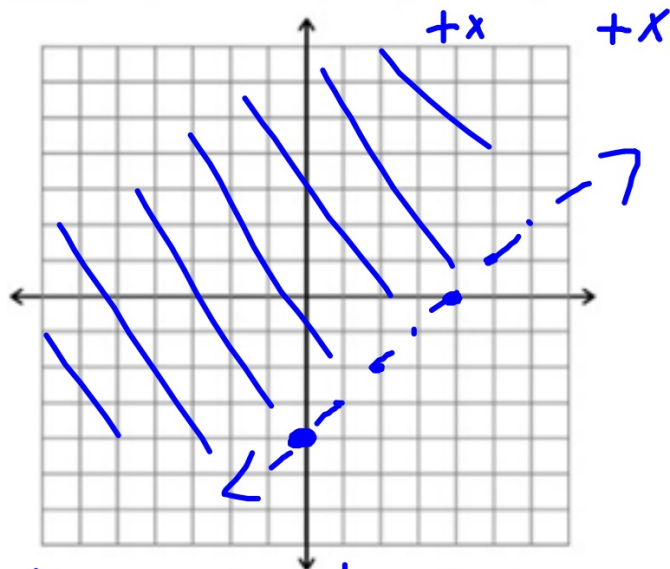
1) Find the intercepts

X	y
0	2
3	0

$3y = 6$
$y = 2$

$2x = 6$
$x = 3$

solid $\leq$

Shade below

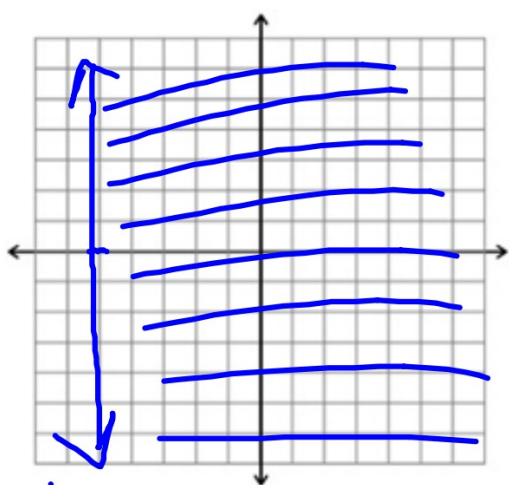$<$

Ex 3: Graph the inequality: $-x + y > -4$

+x   +x

-7

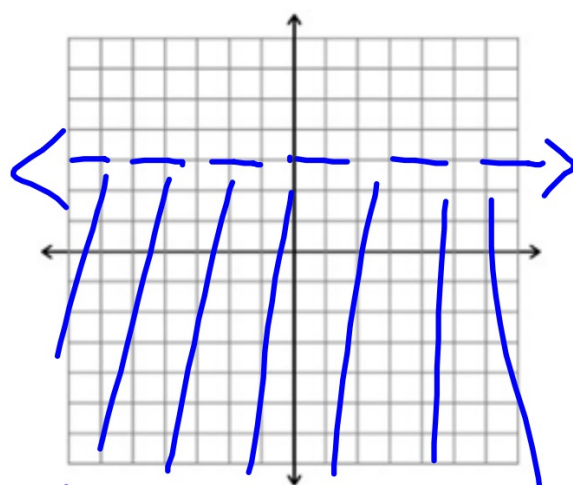> : dashed line
  Shade above

2) Solve for y

$y > x - 4$

OR

x	y
0	-4
4	0

Ex 4: Graph the inequality: $x \geq -5$

thru the x-axis
at -5.
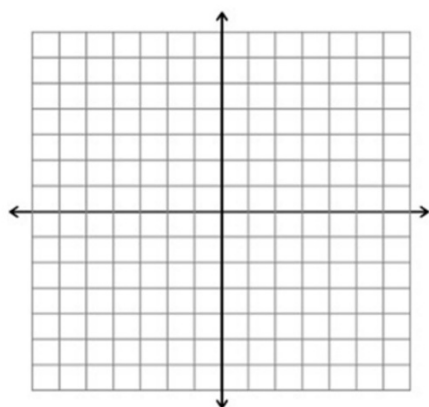solid (or = to)
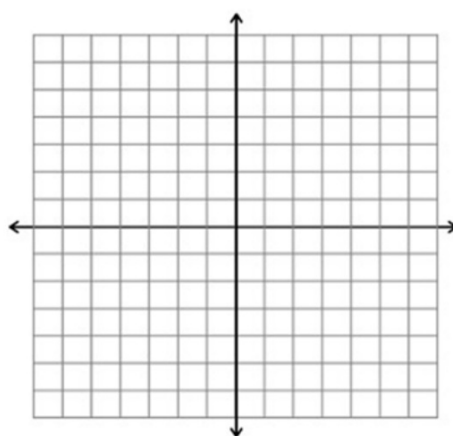greater than

Ex 5: Graph the inequality: $y < 3$

thru the y-axis
at 3.
dashed (no or
= to)
less than

HW page 256 #2, 10, 13-16, 21-24, 27, 29, 31, 33, 35, 42, 43

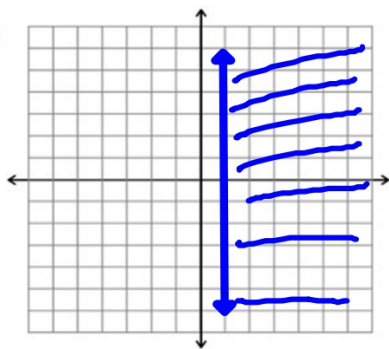**2.** $3x + 2y \geq 6$

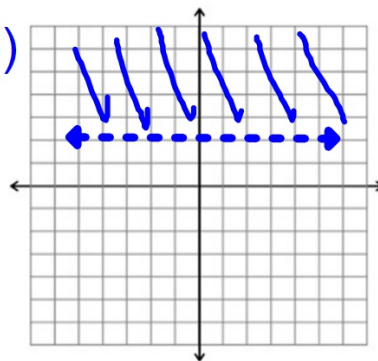**10.** $4x + y > 4$

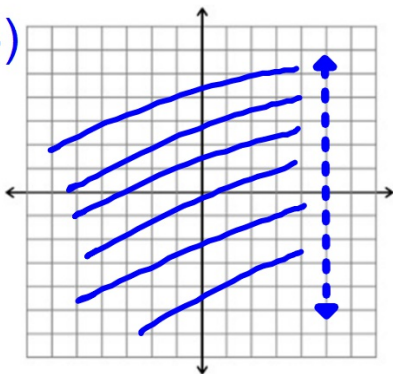**13.** $x \geq 1$ **14.** $x < 5$ **15.** $y > 2$ **16.** $y \leq -4$

13)

14)

15)

16)
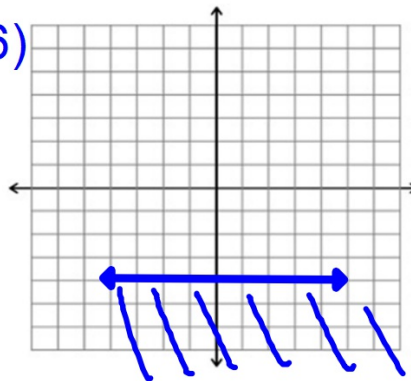
21. $y \leq 3x - 1$ **22.** $y \geq 3x + 2$ **23.** $y \leq -\dfrac{1}{2}x + 2$ **24.** $y < \dfrac{1}{3}x + 3$
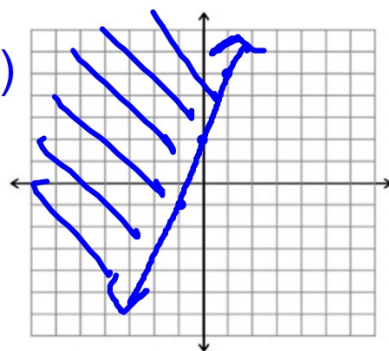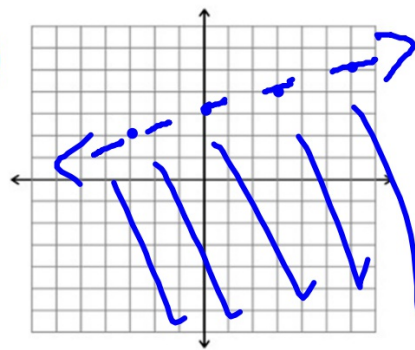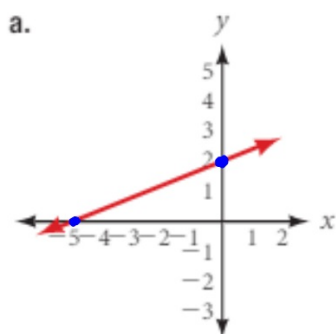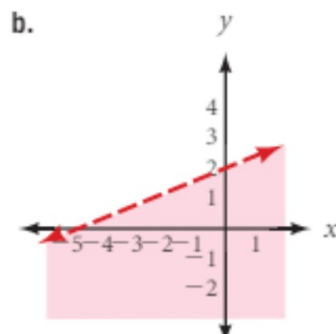
21)

22)

23)
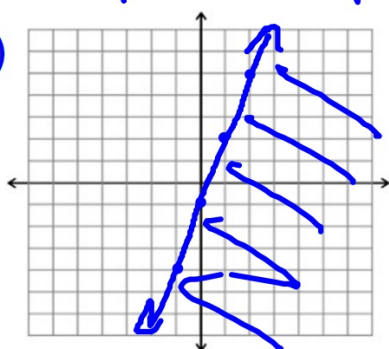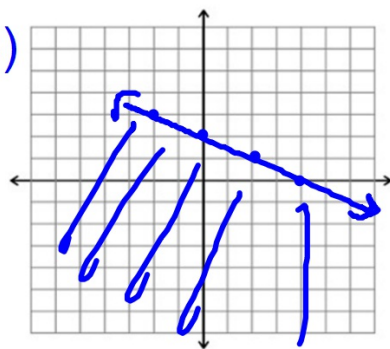
24)

27. Find the equation of the line shown in part *a*, then use this information to find the inequalities whose solution sets are shown in parts *b* and *c*.
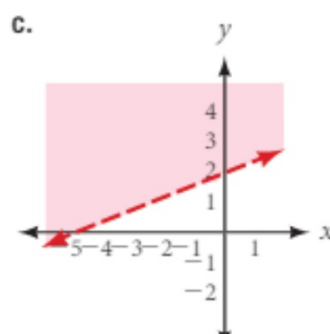
a.

b.

c.

$b = 2$

$m = \dfrac{2}{5}$

$y = \dfrac{2}{5}x + 2$

Dashed line and shaded below

$y < \dfrac{2}{5}x + 2$

Dashed line and shaded above

$y > \dfrac{2}{5}x + 2$

Learning Objectives Assessment

The following problems can be used to help assess if you have successfully met the learning objectives for this section.

29. The boundary for the solution set of $x - 2y > 4$ should be drawn as:

    a. a solid line.

    b. a dashed line.

It should be a DASHED line because we do not have an "equal to" line under the symbol.

Maintaining Your Skills

31. Simplify the expression $7 - 3(2x - 4) - 8$.

7 - 6x + 12 - 8
combine like terms : 7 + 12 - 8
Final answer: -6x + 11   or   11 - 6x

Solve each equation.

33. $-\dfrac{3}{2}x = 12$

Multiply both sides
by the reciprocal.

$-\dfrac{2}{3}\left(-\dfrac{3}{2}x\right) = -\dfrac{2}{3} \cdot 12$

$x = -8$

35. $8 - 2(x + 7) = 2$

8 - 2x - 14 = 2
-6 - 2x = 2
+6   +6

-2x = 8
  x = -4

42. What number is 12% of 2,000?

43. Geometry The length of a rectangle is 5 inches more than 3 times the width. If the perimeter is 26 inches, find the length and width.

42) $x = (0.12)(2000)$
  $x = 240$

43)

3w + 5

w

$26 = 3w+5+3w+5+w+w$
$26 = 8w + 10$
$16 = 8w$
$2 = w$

width = 2 in   and length = 11 in