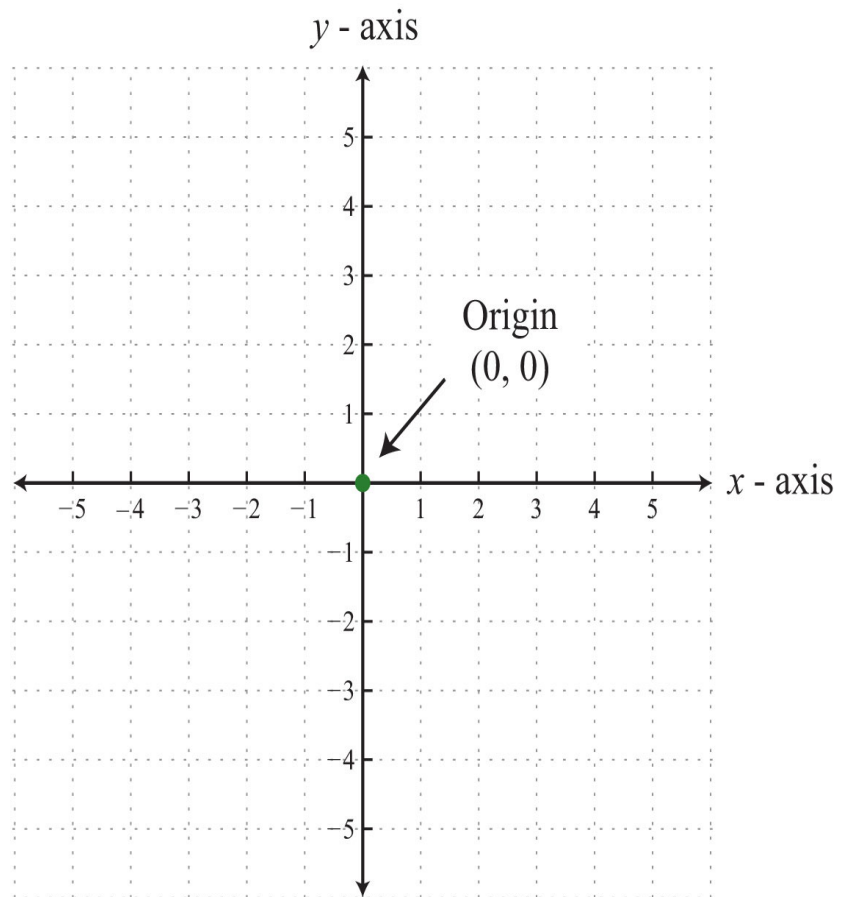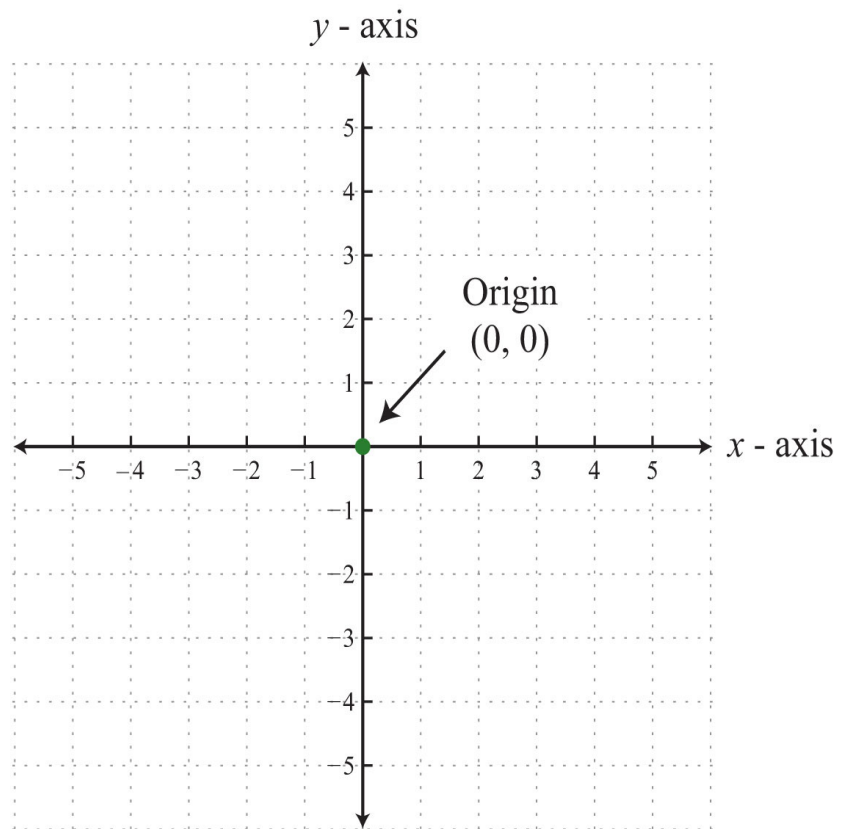# 6.1
Graphing Linear Inequalities in Two Variables
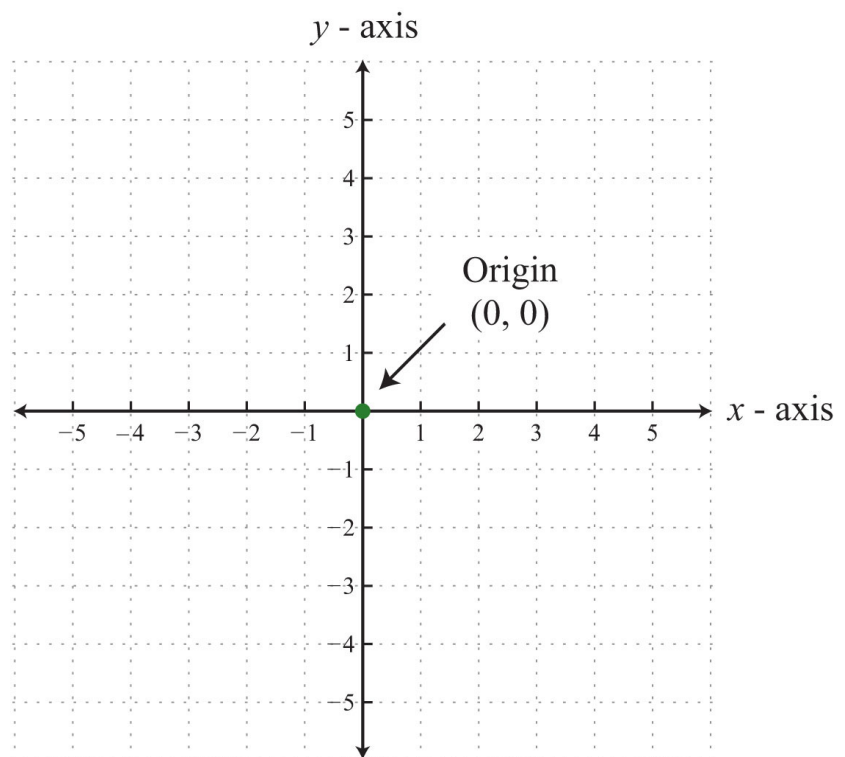
Q. Graph of a linear equation is a……………..?

Q. Determine the solution set of x + y = 4, and display it on a graph.

Q. Determine the solution set of x + y ≥ 4, and display it on a graph.

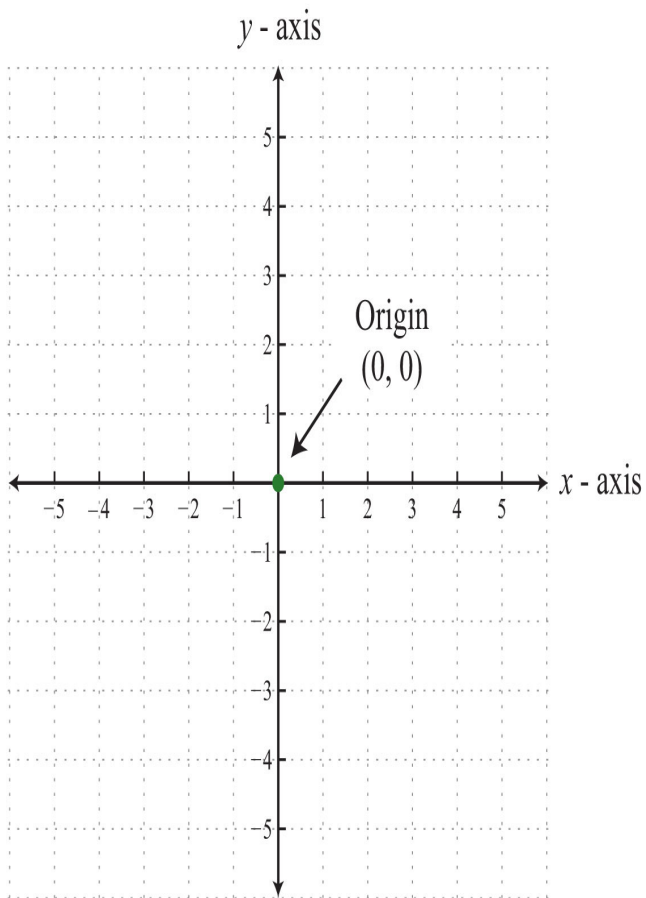*y* - axis

Origin
(0, 0)

−5 −4 −3 −2 −1   1   2   3   4   5

x - axis

Q. Determine the solution set of x + y ≤ 4, and display it on a graph.

y - axis

Origin
(0, 0)

−5 −4 −3 −2 −1   1   2   3   4   5

x - axis

Conclusion

Graph of a linear equation is a …...?	Graph of a linear inequality is a …..?

y - axis

Origin
$(0, 0)$

x - axis

y - axis

Origin
$(0, 0)$

x - axis
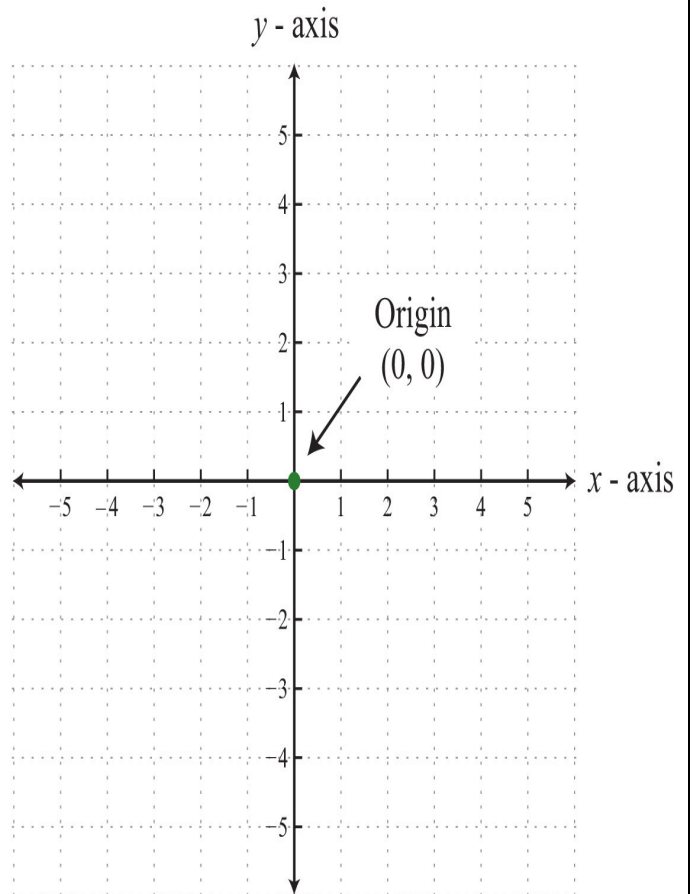
6.1

Ex. 1. Graph the solution set for the given linear inequality: $-2x + 5y \geq 10$

**Step. 1.** Write down the corresponding linear equation: $-2x + 5y = 10$
 (It will represent the boundary of the solution set.)

Step.2. Domain & range : all real numbers ($x \in R$, $y \in R$) (See the bottom of the page)

Step.3. Determine 'x' and 'y' intercepts:

To determine 'x' intercept:	To determine 'y' intercept:
Plug-in y=0 in the equation, and solve for 'x'	Plug-in x=0 in the equation, and solve for 'y'
$-2x + 5y = 10$	$-2x + 5y = 10$
$-2x + 5(0) = 10$	$-2(0) + 5y = 10$
$-2x = 10$	$5y = 10$
$x = -5$	$y = 2$
'x' intercept = - 5	'y' intercept = 2

Step. 4. Graph the boundary line.(Using the 'x' and 'y' intercepts)
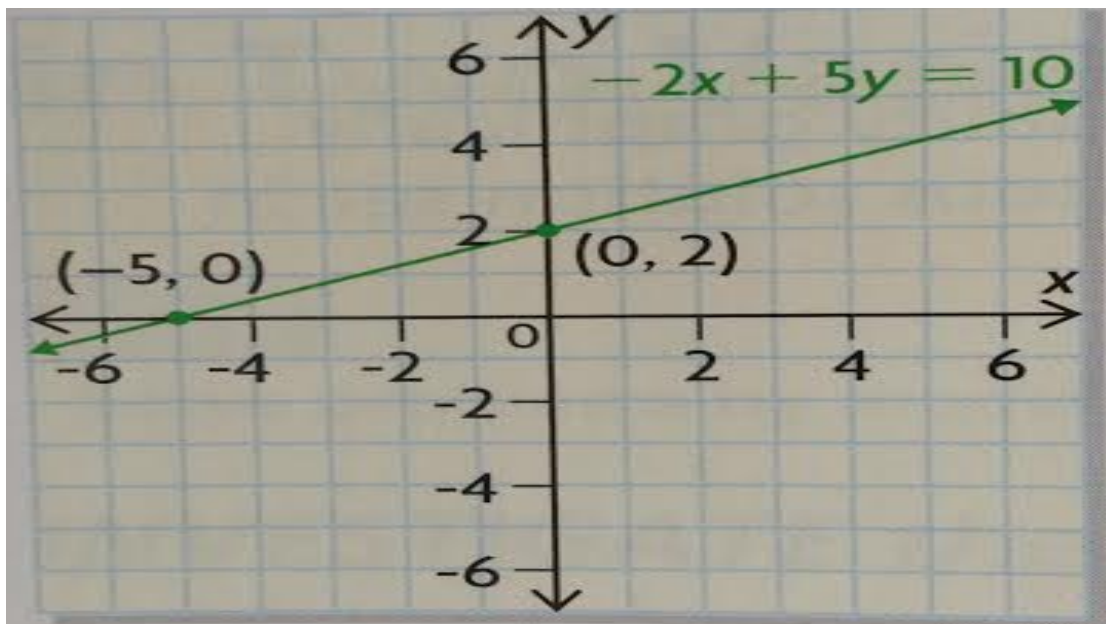
Step.5. Determine which half plane, above or below the boundary line, represents the solution region for the linear inequality.

Test:
Pick any point above or below the boundary line. I have picked (0,0) which is below the boundary line.

-2x + 5y $\geq$ 10
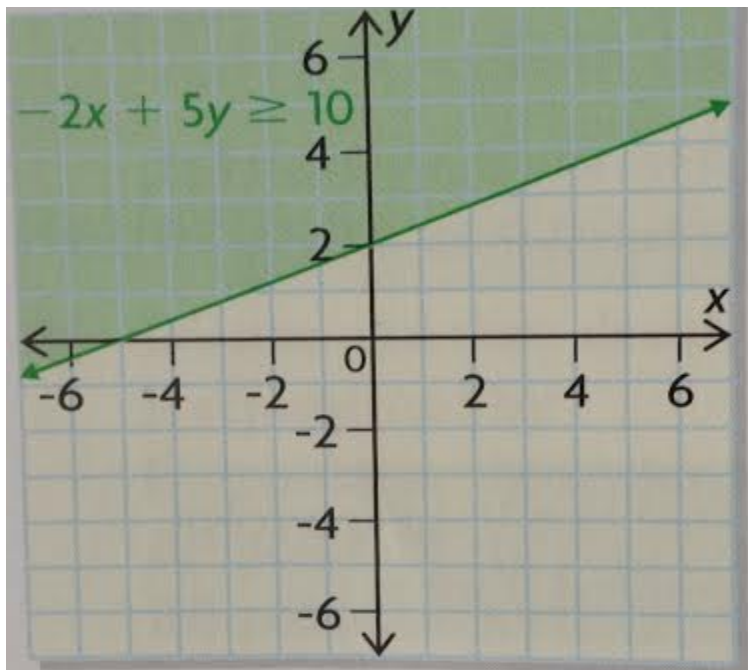
-2(0) + 5(0) $\geq$ 10

0 + 0 $\geq$ 10

0 $\geq$ 10

which is not true.

Therefore, the solution set is above the boundary line.

Step. 6. Shade the correct half plane on the graph.

The boundary line is solid because the solution region includes all the points on the boundary line.

Classwork

Determine the solution set of the given linear inequality and display it on a graph.

   $4x + 3y \geq -12$

6f (P.304)

Home Work

5acd

Ex. 2. Graph the solution set for the given linear inequality:

$\{ (x, y) \mid -3y + 6 \geq -6 + y, \ x \in I, y \in I \}$

Sol. $-3y + 6 \geq -6 + y$

|	
$-3y + 6 \geq -6 + y$ $-3y + 6 + 6 \geq -6 + y + 6$ $-3y + 12 \geq y$ $-3y + 12 + 3y \geq y + 3y$ $12 \geq 4y$ $3 \geq y$ $y \leq 3$	The given inequality is not in simplified form, so I am just simplifying it. It means, I am isolating variables on one side and the constants on the other side.

Step. 1. Write down the corresponding linear equation:

    $y = 3$

Step.2. Domain & Range : all integers ($x \in I, y \in I$)

Step.3. Determine 'x' and 'y' intercepts:

To determine 'x' intercept:	To determine 'y' intercept:
Plug-in, y=0 in the equation, and solve for 'x'	Plug-in, x=0 in the equation, and solve for 'y'
y = 3	y = 3
No 'x' intercept	'y' intercept = 3

Step. 4. Graph the boundary line. (Using the 'x' and 'y' intercepts)
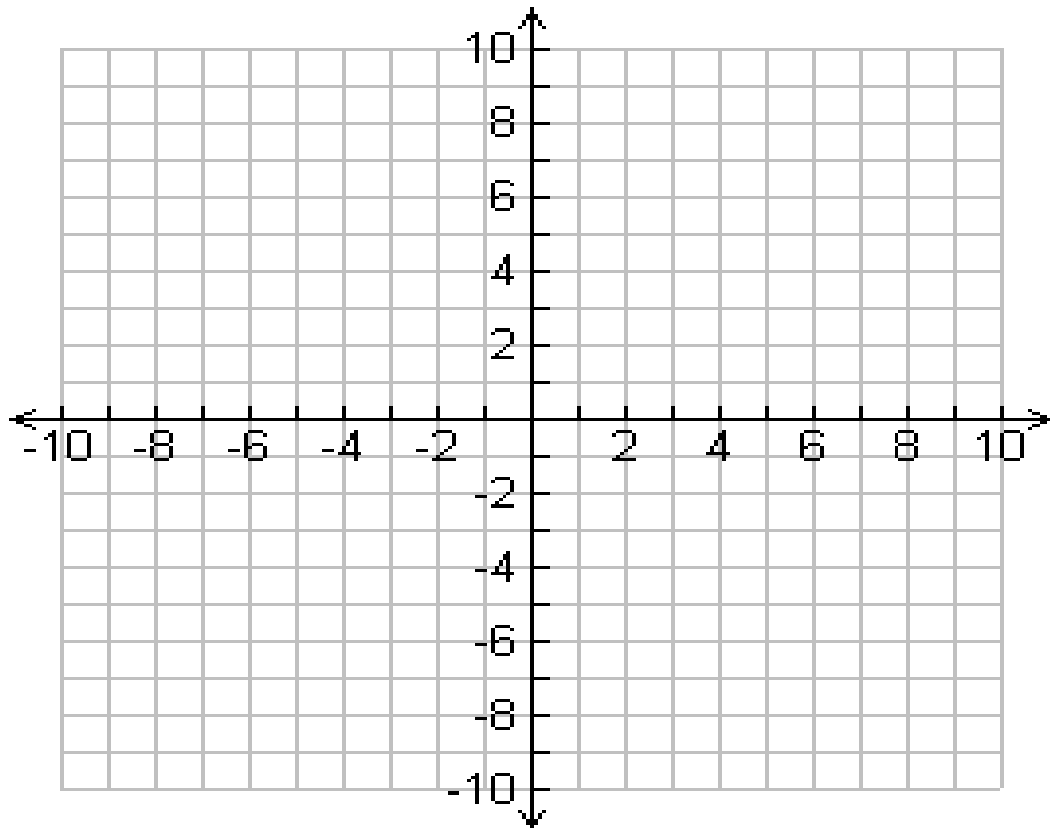
Step.5. Determine which half plane, above or below the boundary line, represents the solution region for the linear inequality.

Test:
Pick any point above or below the boundary line. I have picked (0,0) which is below the boundary line.
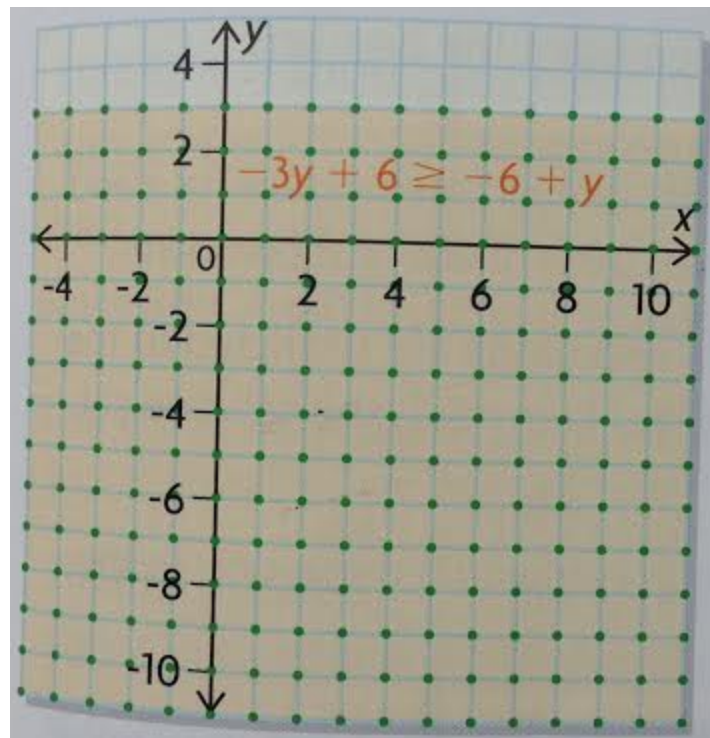
$y \leq 3$

$0 \leq 3$

which is true.

Therefore, the solution set is below the boundary line.

Step. 6. Mark dots on the points with the integer coordinates on the correct half plane and the boundary line.

The graph shows the inequality $-3y + 6 \geq -6 + y$ plotted on a coordinate plane.

Classwork # 6 bc (P.304)

Home Work # 4, 6d (P.304)

Summary

Step. 1. Write down the corresponding linear equation.

Step.2. Domain & range.

Step.3. Determine 'x' and 'y' intercepts.

Step. 4. Graph the boundary line.(Using the 'x' and 'y' intercepts)

Step.5. Determine which half plane, above or below the boundary line, represents the solution region for the linear inequality.

Step. 6. Shade / Stipple the correct half plane on the graph.