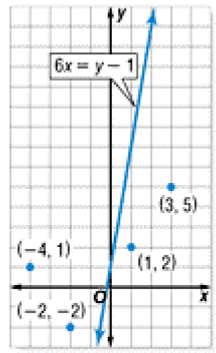
Lesson 6-6

Example 1 Ordered Pairs that Satisfy an Inequality
From the set {(3, 5), (-4, 1), (1, 2), (-2, -2)}, which ordered pairs are part of the solution set for $6x \geq y - 1$?

Use a table to substitute the x and y values of each ordered pair into the inequality.

x	y	$6x \geq y - 1$	True or False
3	5	$6(3) \geq 5 - 1$ $18 \geq 4$	true
-4	1	$6(-4) \geq 1 - 1$ $-24 \geq 0$	false
1	2	$6(1) \geq 2 - 1$ $6 \geq 1$	true
-2	-2	$6(-2) \geq -2 - 1$ $-12 \geq -3$	false



The ordered pairs {(3, 5), (1, 2)} are part of the solution set of $6x \geq y - 1$. In the graph, notice the location of the two ordered pairs that are solutions for $6x \geq y - 1$ in relation to the line.

Example 2 Graph an Inequality
Graph $2(x - y) < 8$.

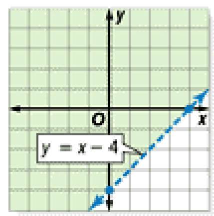
Step 1 Solve for y in terms of x.

$2(x - y) < 8$	Original inequality
$2x - 2y < 8$	Distributive Property
$2x - 2y - 2x < 8 - 2x$	Subtract $2x$ from each side.
$-2y < -2x + 8$	Simplify.
$\frac{-2y}{-2} > \frac{-2x+8}{-2}$	Divide each side by –2 and change < to >.
$y > x - 4$	Simplify.

Step 2 Graph $y = x - 4$. The boundary should be dashed since the inequality is only greater than, not equal to.

Step 3 Select a point in one of the half-planes and test it. Let's use (0, 0).

$y > x - 4$	Original inequality
$0 > 0 - 4$	$x = 0, y = 0$
$0 > -4$	true



Since the statement is true, the half-plane containing the origin is part of the solution. Shade the half-plane.

Check Test a point in the other half-plane, for example, (4, -2).

$y > x - 4$	Original inequality
$-2 > 4 - 4$	$x = 4, y = -2$
$-2 > 0$	false

Since the statement is false, the half-plane containing (4, -2) should not be shaded. The graph of the solution is correct.

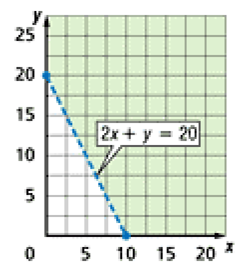
Example 3 Write and Solve an Inequality
Kami earns extra money by making and selling necklaces and earrings. She makes $2 every time she sells a necklace and $1 every time she sells a pair of earrings. She wants to make more than $20 per day on her sales. How many earrings can she sell?

Step 1 Let x equal the profit from necklaces. Let y equal the profit from earrings. Write an open sentence representing this situation.

$2	times	number of necklaces	plus	$1	times	number of earrings	more than	$20
2	·	x	+	1	·	y	>	20

Step 2 Solve for y in terms of x.

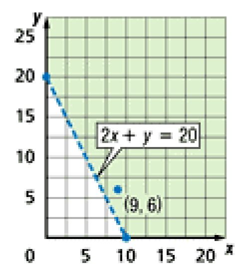
$2x + y > 20$ Original inequality
$2x + y - 2x > 20 - 2x$ Subtract $2x$ from each side.
$y > 20 - 2x$ Simplify.



Step 3 Since the open sentence does not include the equation, graph $y > 20 - 2x$ as a dotted line. Test a point in one of the half-planes, for example (0, 0). Shade the half-plane that does not contain (0, 0) since $0 > 20 - 2(0)$ is false.

Step 4 Examine the solution.

- Ellen cannot sell a negative number of necklaces or earrings. Therefore, the domain and range contain only nonnegative numbers.
- She also cannot sell half a necklace or half of a pair of earrings. Thus, only points in the shaded half-plane whose x-and y-coordinates are whole numbers are possible solutions.



One solution is (9, 6). This represents 9 necklaces and 6 pairs of earrings.