Lesson 6-7

Example 1 Graph an Inequality

Graph $2(x - y) < 8$.

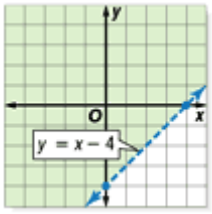
Step 1 Solve for y in terms of x.

$2(x - y) < 8$	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.

Real-World EXAMPLE

Example 2 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?

Explore You know the amount Kami makes per necklace and per pair of earrings and how much she wants to make.

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

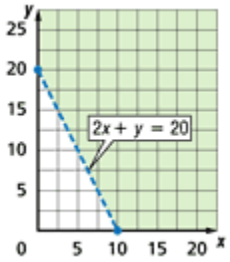
$2	times	number of necklaces	plus	$1	times	number of earrings	more than	$20
2	·	x	+	1	·	y	>	20

Solve Solve for y in terms of x.

$2x + y > 20$ Original inequality

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

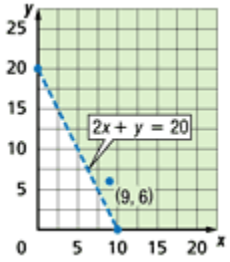
$y > 20 - 2x$ Simplify.



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.

Check 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.