

3.18

Graphing a Linear Inequality in the Plane: Problem Type 1

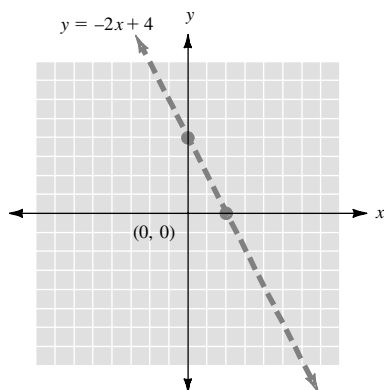
• Example 1

Graph $y < -2x + 4$.

All the points (x, y) satisfying this inequality belong to a half plane bounded by the line with equation

$$y = -2x + 4$$

which is displayed on the graph below.



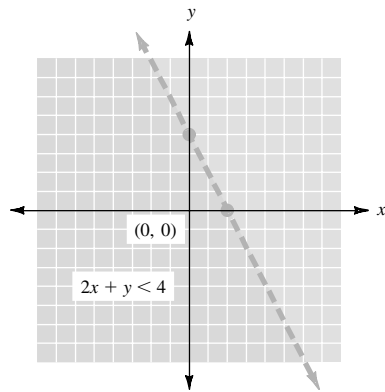
Note that the points satisfying this equation do not belong to the half plane containing the points satisfying the inequality. This is why the equation is represented by a dotted line.

We now need to choose the correct half plane. Choose any convenient test point not on the boundary line. The origin $(0, 0)$ is a good choice because it makes for easy calculation.

Substitute $x = 0$ and $y = 0$ into the inequality.

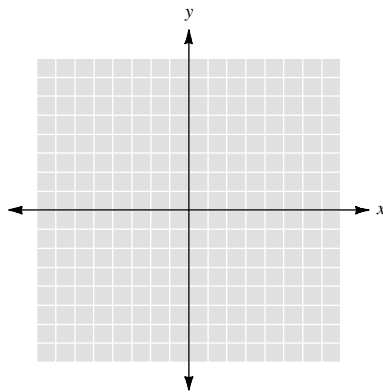
$$\begin{aligned} 0 &< -2 \cdot 0 + 4 \\ 0 &< 0 + 4 \\ 0 &< 4 \quad \text{A true statement} \end{aligned}$$

Since the inequality is *true* for the test point, we shade the half plane containing that test point (here the origin). The origin and all other points *below* the boundary line then represent solutions for our original inequality.



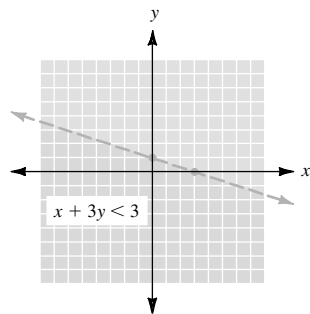
CHECK YOURSELF 1

Graph the inequality $x + 3y < 3$.



CHECK YOURSELF ANSWER

1.



3.18 Exercises

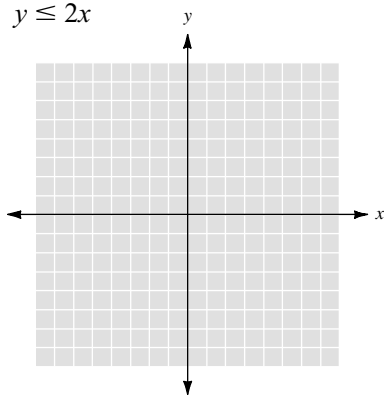
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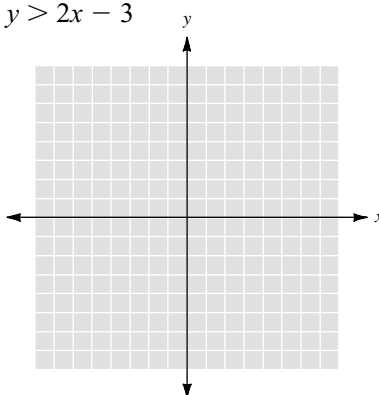
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Graph each of the following inequalities. Make sure to indicate the boundary by a dotted line whenever appropriate.

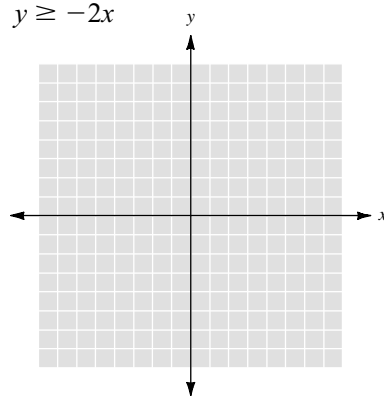
1. $y \leq 2x$



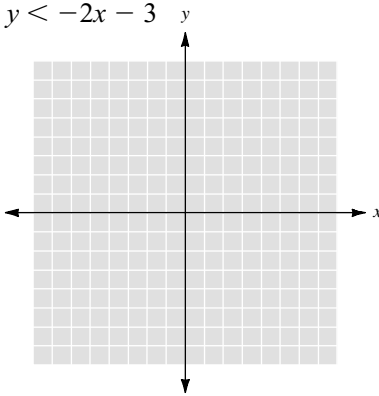
2. $y > 2x - 3$



3. $y \geq -2x$



4. $y < -2x - 3$



5. $y \leq 3x + 4$

