

7-5

Graphing Systems of Inequalities

(Pages 394–398)

You can solve **systems of inequalities** by graphing. Recall that the graph of an inequality is a *half-plane*. The intersection of the two half-planes graphed in a system of inequalities represents the solution to the system.

Example

Graph the system of inequalities to find the solution.

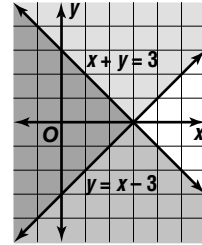
$$x + y \leq 3 \text{ and } y + 3 \geq x$$

Begin by solving each inequality for y . Then, graph each inequality.

$$\begin{array}{l} x + y \leq 3 \\ y \leq -x + 3 \end{array} \quad \text{and} \quad \begin{array}{l} y + 3 \geq x \\ y \geq x - 3 \end{array}$$

The solution to the system includes the ordered pairs in the intersection of the graphs of each inequality. This region is shaded dark gray.

Notice that the boundary lines $y = -x + 3$ and $y = x - 3$ are included in the solution, since the inequalities contained \leq and \geq symbols.

**Try These Together**

Solve each system of inequalities by graphing.

$$\begin{array}{l} 1. \ x > 3 \\ \quad y \leq 5 \end{array}$$

$$\begin{array}{l} 2. \ x \leq 4 \\ \quad y > -1 \end{array}$$

$$\begin{array}{l} 3. \ y - 3 > x \\ \quad y + x < 3 \end{array}$$

$$\begin{array}{l} 4. \ 2y + x < 6 \\ \quad 3x - y > 4 \end{array}$$

HINT: Remember to graph inequalities with $<$ or $>$ with dashed lines because these lines are not included in the solution.

Practice

Solve each system of inequalities by graphing.

$$\begin{array}{l} 5. \ x < 1 \\ \quad y > -4 \end{array}$$

$$\begin{array}{l} 6. \ 2x + y \leq 4 \\ \quad 3x - y \geq 6 \end{array}$$

$$\begin{array}{l} 7. \ y + 2 \leq x \\ \quad 2y + 2 > 2x \end{array}$$

$$\begin{array}{l} 8. \ x + 4 \leq y \\ \quad y > 2 \end{array}$$

9. Algebra Solve by graphing.

$$\begin{array}{l} x - 4y > 11 \\ 3x + y \leq 6 \\ x \geq 0 \end{array}$$

10. Standardized Test Practice A dieter limits a snack to 90 Calories. Which is a possible snack combination of 20-Calorie apricots and 3-Calorie celery stalks?

A 4 apricots
3 celery stalks

B 3 apricots
10 celery stalks

C 2 apricots
8 celery stalks

D all of these