7.6 Solve Systems of Linear Inequalities

TEKS A.1.D, A.1.E;
2A.3.A, 2A.3.B

Before	You graphed linear inequalities in two variables.
Now	You will solve systems of linear inequalities in two variables.
Why	So you can find a marching band's competition score, as in Ex. 36.

Key Vocabulary
- system of linear inequalities
- solution of a system of linear inequalities
- graph of a system of linear inequalities

A **system of linear inequalities** in two variables, or simply a *system of inequalities*, consists of two or more linear inequalities in the same variables. An example is shown.

$$x - y > 7 \quad \text{Inequality 1}$$
$$2x + y < 8 \quad \text{Inequality 2}$$

A **solution of a system of linear inequalities** is an ordered pair that is a solution of each inequality in the system. For example, $(6, -5)$ is a solution of the system above. The **graph of a system of linear inequalities** is the graph of all solutions of the system.

KEY CONCEPT   For Your Notebook

Graphing a System of Linear Inequalities

STEP 1 **Graph** each inequality (as you learned to do in Lesson 6.7).

STEP 2 **Find** the intersection of the half-planes. The graph of the system is this intersection.

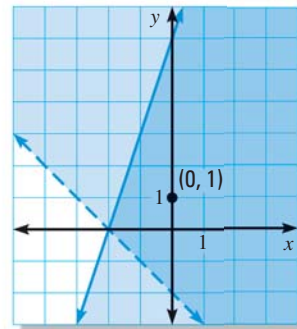### EXAMPLE 1   Graph a system of two linear inequalities

Graph the system of inequalities.
$$y > -x - 2 \quad \text{Inequality 1}$$
$$y \leq 3x + 6 \quad \text{Inequality 2}$$

REVIEW GRAPHING INEQUALITIES
For help with graphing a linear inequality in two variables, see p. 405.

Solution

Graph both inequalities in the same coordinate plane. The graph of the system is the intersection of the two half-planes, which is shown as the darker shade of blue.

CHECK Choose a point in the dark blue region, such as $(0, 1)$. To check this solution, substitute 0 for x and 1 for y into each inequality.

$$1 \overset{?}{>} 0 - 2 \qquad 1 \overset{?}{\leq} 0 + 6$$
$$1 > -2 \checkmark \qquad 1 \leq 6 \checkmark$$

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