

3.3 Graph Systems of Linear Inequalities

TEKS **a.5, 2A.3.A, 2A.3.B, 2A.3.C**



- Before** You graphed linear inequalities.
- Now** You will graph systems of linear inequalities.
- Why?** So you can model heart rates during exercise, as in Ex. 39.

Key Vocabulary

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

The following is an example of a **system of linear inequalities** in two variables.

$$\begin{aligned} x + y &\leq 8 && \text{Inequality 1} \\ 4x - y &> 6 && \text{Inequality 2} \end{aligned}$$

A **solution** of a system of inequalities is an ordered pair that is a solution of each inequality in the system. For example, $(5, -2)$ is a solution of the system above. The **graph** of a system of inequalities is the graph of all solutions of the system.

KEY CONCEPT

For Your Notebook

Graphing a System of Linear Inequalities

To graph a system of linear inequalities, follow these steps:

- STEP 1** **Graph** each inequality in the system. You may want to use colored pencils to distinguish the different half-planes.
- STEP 2** **Identify** the region that is common to all the graphs of the inequalities. This region is the graph of the system. If you used colored pencils, the graph of the system is the region that has been shaded with every color.

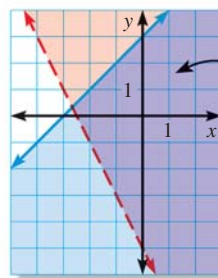
EXAMPLE 1 Graph a system of two inequalities

Graph the system of inequalities.

$$\begin{aligned} y &> -2x - 5 && \text{Inequality 1} \\ y &\leq x + 3 && \text{Inequality 2} \end{aligned}$$

Solution

- STEP 1** **Graph** each inequality in the system. Use **red** for $y > -2x - 5$ and **blue** for $y \leq x + 3$.
- STEP 2** **Identify** the region that is common to both graphs. It is the region that is shaded **purple**.



The graph of the system is the intersection of the red and blue regions.

REVIEW INEQUALITIES

For help with graphing linear inequalities in two variables, see p. 132.

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