3-2 Study Guide and Intervention

Solving Systems of Inequalities by Graphing

Systems of Inequalities
To solve a system of inequalities, graph the inequalities in the same coordinate plane. The solution of the system is the region shaded for all of the inequalities.

Example: Solve the system of inequalities.
\( y \leq 2x - 1 \) and \( y > \frac{x}{3} + 2 \)

The solution of \( y \leq 2x - 1 \) is Regions 1 and 2.
The solution of \( y > \frac{x}{3} + 2 \) is Regions 1 and 3.
The intersection of these regions is Region 1, which is the solution set of the system of inequalities.

Exercises
Solve each system of inequalities by graphing.

1. \( x - y \leq 2 \)
   \( x + 2y \geq 1 \)

2. \( 3x - 2y \leq -1 \)
   \( x + 4y \geq -12 \)

3. \( |y| \leq 1 \)
   \( x > 2 \)

4. \( y \geq \frac{x}{2} - 3 \)
   \( y < 2x \)

5. \( y < \frac{x}{3} + 2 \)
   \( y < -2x + 1 \)

6. \( y \geq -\frac{x}{4} + 1 \)
   \( y < 3x - 1 \)

7. \( x + y \geq 4 \)
   \( 2x - y > 2 \)

8. \( x + 3y < 3 \)
   \( x - 2y \geq 4 \)

9. \( x - 2y > 6 \)
   \( x + 4y < -4 \)
Solve each system of inequalities by graphing.

1. \( x < 1 \)
   \( y \geq -1 \)

2. \( x \geq -3 \)
   \( y \geq -3 \)

3. \( x \leq 2 \)
   \( x > 4 \)

4. \( y \geq x \)
   \( y \geq -x \)

5. \( y < -4x \)
   \( y \geq 3x - 2 \)

6. \( x - y \geq -1 \)
   \( 3x - y \leq 4 \)

7. \( y < 3 \)
   \( x + 2y < 12 \)

8. \( y < -2x + 3 \)
   \( y \leq x - 2 \)

9. \( x - y \leq 4 \)
   \( 2x + y < 4 \)
Graph each system of inequalities. Find the vertices of the figure formed by each system of inequalities.

1. \[
\begin{align*}
  y &\leq 6 \\
  x &\leq 4 \\
  x &\geq -2 \\
  y &\geq 1
\end{align*}
\]

2. \[
\begin{align*}
  y &\geq 2x - 3 \\
  y &\leq 5 \\
  x &\geq -2
\end{align*}
\]
Graph each system of inequalities. Find the vertices of the figure formed by each system of inequalities.

3. \[
\begin{align*}
    x + 2y &\leq 8 \\
x &\geq 4 \\
y &\geq 1
\end{align*}
\]

Coordinates of Vertices

4. \[
\begin{align*}
    y &\geq x - 5 \\
y &\leq -2x + 4 \\
x &\geq -2
\end{align*}
\]

Coordinates of Vertices