What you will learn about:
Graphs of Linear Inequalities

LINEAR INEQUALITY

A linear inequality is an inequality that can be written in one of the following forms:

\[ Ax + By > C \quad Ax + By \geq C \quad Ax + By < C \quad Ax + By \leq C \]

where \( A \) and \( B \) are not both zero.

Determine whether each ordered pair is a solution to the inequality \( y > x + 4 \):

<table>
<thead>
<tr>
<th>a) (0, 0)</th>
<th>b) (1, 6)</th>
<th>c) (2, 6)</th>
<th>d) (5, 15)</th>
<th>e) (-8, 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 &gt; 0 + 4</td>
<td>6 &gt; 1 + 4</td>
<td>6 &gt; 2 + 4</td>
<td>15 &gt; 5 + 4</td>
<td>12 &gt; -8 + 4</td>
</tr>
<tr>
<td>O &gt; 4</td>
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<td>O &gt; 4</td>
</tr>
<tr>
<td>No Solution</td>
<td>Yes</td>
<td>Not Solution</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

\[ Ax + By < C \quad Ax + By > C \]

Boundary line is not included in solution. Boundary line is included in solution.

The boundary line shown is \( y \leq 2x - 1 \). Write the inequality shown by the graph.
The boundary line shown is \( y = -2x + 3 \). Write the inequality shown by the graph.

\[
\begin{align*}
0 & \geq -2(4)+3 \\
0 & \geq -5 \\
y & \geq -2x+5
\end{align*}
\]

The boundary line shown is \( 2x + 3y = 6 \). Write the inequality shown by the graph.

\[
\begin{align*}
\quad & > \\
2(0)+3(0) & = 6 \\
0 & < 6 \\
2x+3y & < 6
\end{align*}
\]

Graph the linear inequality \( y \geq \frac{3}{4}x - 2 \).

\[
y = \frac{3}{4}x-2 \\
0 \geq \frac{3}{4}(0)-2 \\
0 \geq -2 \checkmark
\]
Graph the linear inequality \( y \geq \frac{5}{2}x - 4 \).

\[
0 \geq \frac{5}{2}(0) - 4 \\
0 \geq -4 \checkmark
\]

Graph the linear inequality \( y < \frac{2}{3}x - 5 \).

\[
0 < \frac{2}{3}(0) - 5 \\
0 < -5
\]

Graph the linear inequality \( x - 2y < 5 \).

\[
x - 2y < 5 \\
-2y < -x + 5 \\
y > \frac{1}{2}x - \frac{5}{2}
\]

\[
x - \frac{5}{1} = 5 \\
(x, 0)
\]

\[
y = \frac{5}{-2} = (0, \frac{-5}{2})
\]

\[
0 - 2(0) < 5 \\
0 < 5
\]
Graph the linear inequality \(2x - 3y \leq 6\).

\[
X = \frac{c}{a} = \frac{6}{3} = (2,0) \\
Y = \frac{c}{-b} = \frac{6}{-3} = (0,-2)
\]

\(2(2) - 3(0) \leq 6\) 
\(0 \leq 6\)

Graph the linear inequality \(y \leq -4x\).

\(b = 0\) 
\(m = -\frac{4}{1}\)

\((1,0)\) 
\(0 \leq -4(1)\)
\(0 \leq -4\)

Graph the linear inequality \(2x - 4y > 0\)

\(X = \frac{a}{-b} = \frac{2}{4} = (0.5,0)\) 
\(m = -\frac{A}{B} = -\frac{2}{4} = -\frac{1}{2}\)

\((1,0)\) 
\(2(1) - 4(0) > 0\)
\(2 > 0\)

Graph the linear inequality \(y > 3\).

\(Y = 3\)
Graph the linear inequality $x < 1$.

Find the feasible region.

$x \geq 1$
$y \leq 6$
$y \geq x - 2$

Find the feasible region.

$2x + y \geq 4$
$x - y < -1$