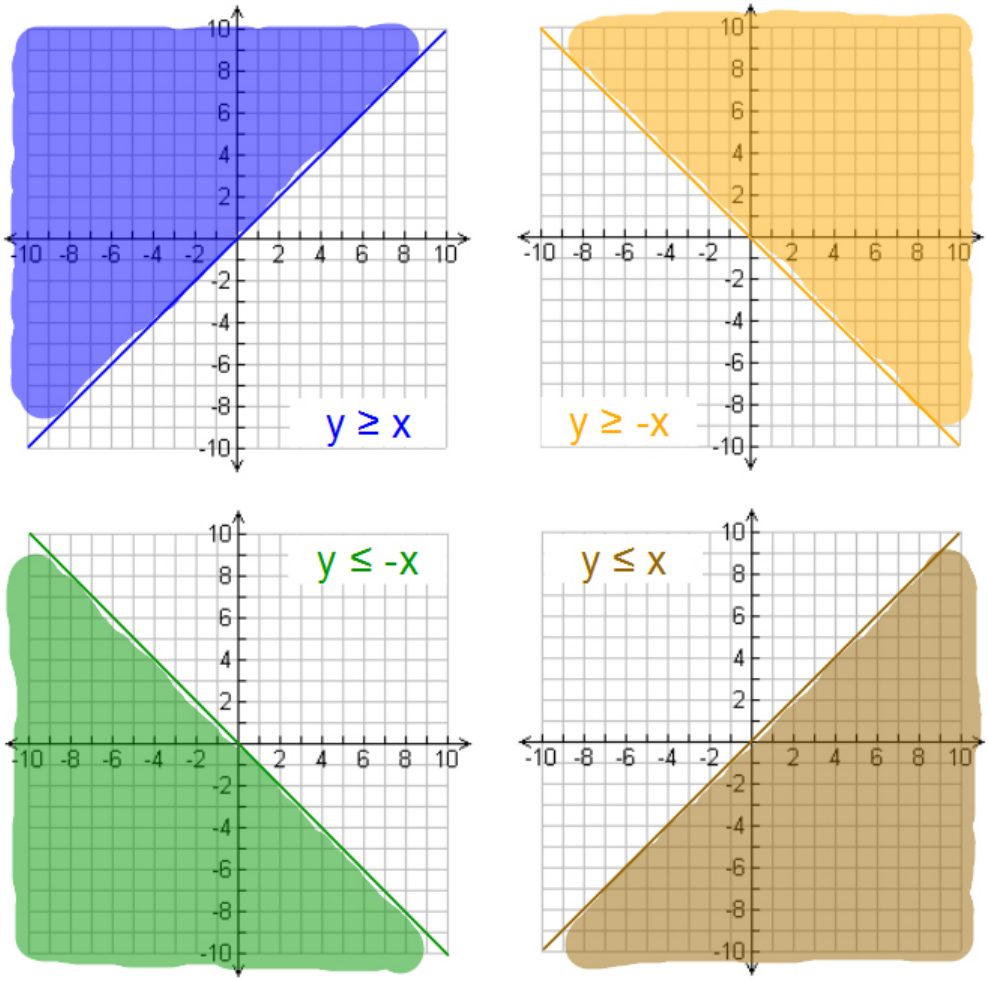
Graphing Linear Inequalities Pattern Activity

In this activity, students discover the pattern behind the four basic inequalities: $y \geq x$, $y \geq -x$, $y \leq -x$, $y \leq x$. You can also use strictly greater than and less than inequalities for this activity: $y > x$, $y > -x$, $y < -x$, $y < x$. This activity can be modified to be used as an instructional activity or it can be used as an activity after instruction. Students could choose to do this activity in color using colored pencils, but the activity can be done with regular graphite pencils.

Materials

- 25 sheets of graph paper (one for each student)
- Colored pencils
- Interactive whiteboard or overhead projector
- Slide or transparency with four coordinate planes (ability to hide two grids while working on the other two so the pattern created by all four is not revealed until the students complete theirs and open up the paper)



Procedure

Pass out graph paper and instruct students orally while demonstrating the following steps.

Part I

1. Fold your paper in half and then in half again. Unfold your paper to see that it is divided into four sections separated by creases. We are going to graph four inequalities, each in one section.
2. Refold your paper once. Orient your paper so that the folded edge is down and the open edge is up.
3. Look for the crease that splits this portion of your paper in half. At the bottom, just to the left of the crease, write $y \geq x$. On the other side of the crease, also at the bottom, write $y \geq -x$.
4. Graph both of these inequalities, $y \geq x$ in the left-hand section and $y \geq -x$ in the right-hand section.

Circulate around the room and observe students. Remind them to complete the graph by shading. Give students a few minutes to graph the inequalities before moving on.

You can see that the shading for both of these graphs goes up because these inequalities are both greater than.

You can also see that the shaded region for one of the graphs goes to the left while the shaded region for the other goes to the right. What do you think accounts for this quality?

Write that down. When the slope is positive, the shading goes to the left. When the slope is negative, the shading goes to the right.

Part II

5. Leave the paper folded but flip it over. This time, orient it so the folded edge is up and the open edge is down.
6. Look for the crease that splits this portion of your paper in half. At the bottom, just to the left of the crease, write $y \leq -x$. On the other side of the crease, also at the bottom, write $y \leq x$.
7. Graph both of these inequalities, $y \leq -x$ in the left-hand section and $y \leq x$ in the right-hand section. *Give students a few minutes to graph. Circulate.*
8. Open your paper up.

Look at the graph of $y \leq -x$. How does the shading compare to the graph of $y \geq -x$ in terms of the "leftness" or "rightness" of the shading? Is the sign of the slope the only factor that accounts for the direction of the shading?

The sign of the slope and the sign of the inequality determine the horizontal direction of the shading.