Lesson 7-5

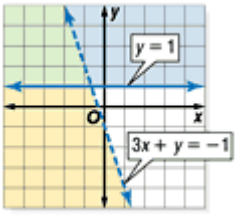
Example 1 Solve by Graphing

Solve the system of inequalities by graphing.

$y \geq 1$

$3x + y < -1$

The solution includes the ordered pairs in the intersection of the graphs of $y \geq 1$ and $3x + y < -1$. This region is shaded in green at the right. The graphs of $y = 1$ and $3x + y = -1$ are boundaries of this region. The graph of $y = 1$ is included in the graph of $y \geq 1$. The graph of $3x + y = -1$ is dashed and is *not* included in the graph of $3x + y < -1$.



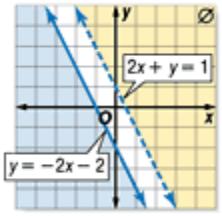
Example 2 No Solution

Solve the system of inequalities by graphing.

$2x + y > 1$

$y \leq -2x - 2$

The graphs of $2x + y = 1$ and $y = -2x - 2$ are parallel lines. Because the two regions have no points in common, the system of inequalities has no solution.



Example 3 Use a System of Inequalities to Solve a Problem

For a child to be eligible to ride the Wild Slide Ride at an amusement park, the following restrictions must be met.

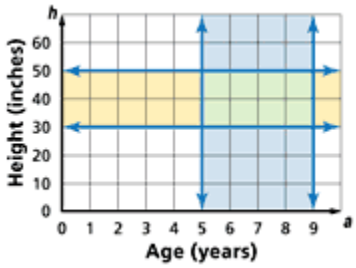
- **between the ages of 5 and 9, inclusive**
- **between 30 and 50 inches in height, inclusive**

Graph the range of children that may ride the Wild Slide Ride.

If a = the age and h = the height, the following inequalities represent the group that can ride.

$5 \le a \le 9$
$30 \le h \le 50$

The solution is the set of all ordered pairs whose graphs are in the intersection of the graphs of these inequalities.

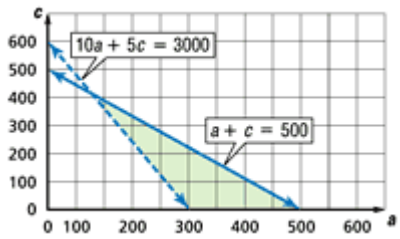


Example 4 Use a System of Inequalities

A group of students are going to put on a play. They will charge adults $10 and children under 12 $5. The auditorium can hold a maximum of 500 people. To make a profit, the students need to make more than $3000. How many tickets can be sold to adults and children to make a profit?

Let a = the number of adult tickets and c = the number of children's tickets. Since both a and c represent numbers of tickets, neither can be a negative number. The following system of inequalities can be used to represent the conditions of this problem.

$a \geq 0$
$c \geq 0$
$a + c \leq 500$
$10a + 5c > 3000$



The solution is the set of all ordered pairs whose graphs are in the intersection of the graphs of these inequalities. This region is shown in green at the right. Only the portion of the region in the first quadrant is used since $a \geq 0$ and $c \geq 0$.

Any point in this region is a possible solution. For example, since (400, 50) is a point in the region, the students could sell 400 adult tickets and 50 childrens tickets. In this case, they would make 400(10) + 50(5) or $4250.