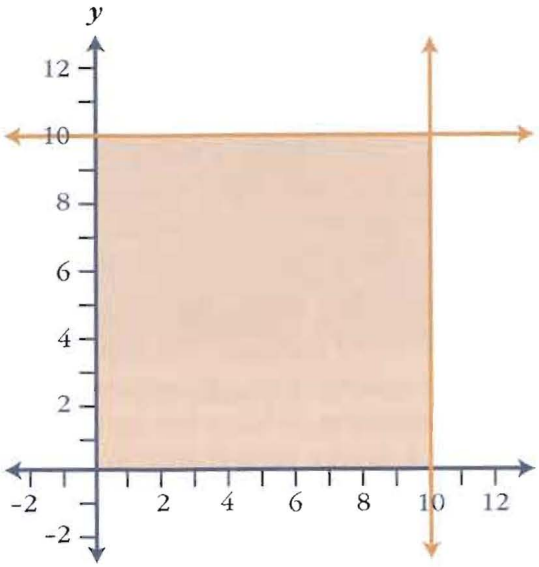
Find My Region

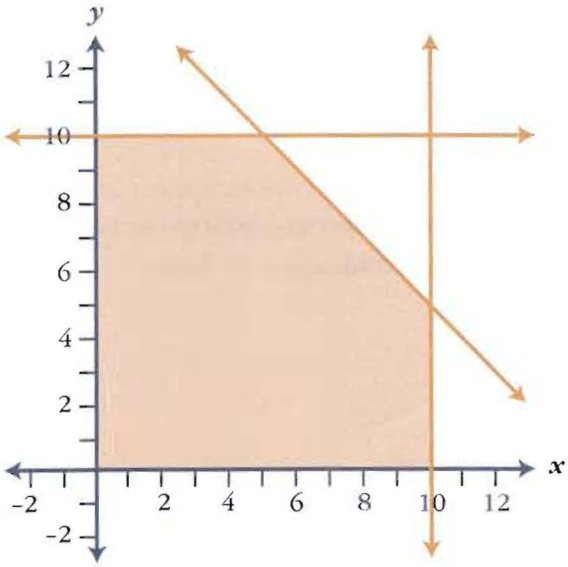
This activity is a game for two people, so the first step is to find a partner.

Setting Up a Feasible Region

Each of you needs to define a feasible region using an inequality.

You should both start with the square region in the first quadrant bounded by the inequalities $x \geq 0, x \leq 10, y \geq 0$, and $y \leq 10$. This is the shaded area shown in the graph at the right.





Then each of you needs to choose an inequality to restrict the region further. For example, if you choose the inequality $x + y \leq 15$, your new region will be the shaded area in the graph at the left.

You should sketch your region on a sheet of graph paper.

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Guessing Each Other's Inequalities

Do not tell your partner what your inequality is or show him or her the region you have created. The goal of the game is to figure out what inequality the other player has used.

Sit back to back with your partner so that neither of you can see the other's region. You will each need a blank piece of graph paper to keep track of information you gather about your partner's region.

Here are the rules.

- Take turns guessing a point in your partner's region. For example, you might say, "I guess (3, 6)." (Because you both start with the inequalities $x \geq 0$, $x \leq 10$, $y \geq 0$, and $y \leq 10$, you should only guess points within the square region these inequalities define.)
- Each time one of you guesses a point, the other player will say "inside," "outside," or "boundary," depending on whether the point guessed is inside the region, outside the region, or on one of the boundary lines of the region. For instance, for the region sketched above, (9, 6) would be a boundary point, (5, 7) would be an inside point, and (8, 9) would be an outside point.
- When it is your turn to guess a point, you can choose instead to guess your partner's inequality. For example, you might say, "I guess that $x + y \leq 15$ is your inequality." Your partner must answer truthfully whether your guess is equivalent to his or her inequality. If it is not, it becomes your partner's turn. You do not get a chance to guess a point.
- The winner of the game is the first player to correctly guess the other player's inequality.

Important: When the other player guesses an inequality, you must check whether it is equivalent to the inequality you used. For example, if the other player guesses "$x + y \leq 15$" and you used "$2x + 2y \leq 30$," you must say that this is a correct guess.

Advanced Version

You can make this game more challenging by having each player choose two or three inequalities (in addition to the four inequalities defining the square).