Algebra I
Lesson 6.5 – Solving Linear Inequalities
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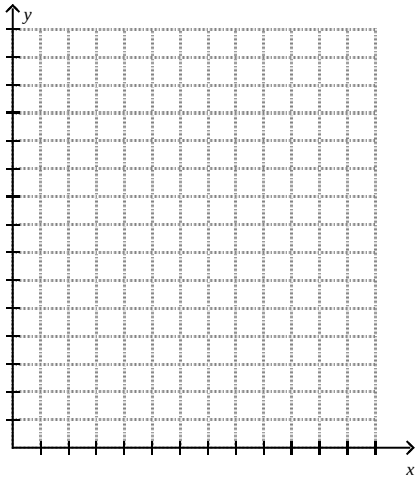
Parties are a lot of fun but do cost money to have. Most often you will have a budget, a limit on how much you can spend. Let's say you have a money limit, you can spend no more than $10.00 on party supplies. Plates will cost $3.00 per package and napkins will cost $2.50 per package. Set up a linear inequality to describe the situation.

- What are your facts?
- How much can you spend? Can you spend $11 on supplies? What about $9 on supplies? Can you spend $10?
- How much do the items you wish to buy cost each?
- Write out a simple statement and then translate into math
- This is an equation in 2 variables. Solve for y, and graph to find your possible solutions.

Cost of plates plus cost of napkins is no more than $10



Check: is the ordered pair $(1,1)$ a solution?

How about $(3,2)$?

1. With an inequality we have a solution set. *The solution will either be*
   - *above the line:* $y > or\ y \geq$,
   - *below the line:* $y < or\ y \leq$.

2. The line graphed, represents the boundary for the possible solutions. The solution will either
   - include the line – **a solid line** which means the points on the line are part of the solution set; $y \geq \ or\ y \leq$
   - not include the line – **a dashed line** which means the points on the line are NOT solutions; $y > \ or\ y <$.

3. The solution set area is traditionally shaded to show all possible solution combinations of (x, y) ordered pairs.

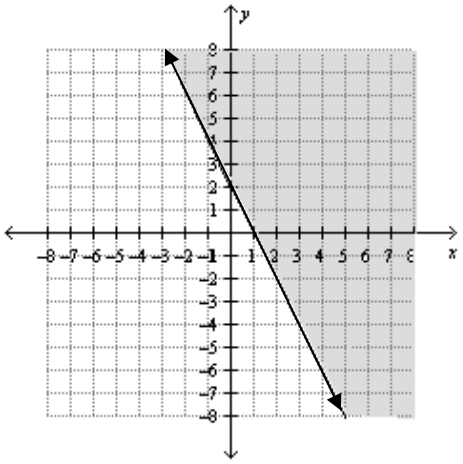
4. An ordered pair that is a solution will be in the shaded area and when put into the inequality will yield a true statement.

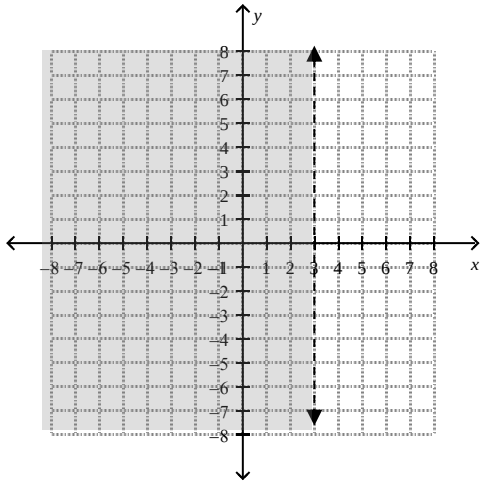
Application problems can be tricky. Are we looking at the whole shaded area as possible solution combinations? OR do we need to consider only the discrete solutions!?! Ask yourself, can we buy ¼ of a package of napkins? Well, the solution area will actually be a set of discrete points. In other words, integer ordered pairs. As another thought, why do I only have a graph for Quadrant I?

We can also work backwards so to say. We can write an inequality to represent a graph.

1. determine the y-intercept and slope
2. write out an equation in slope-intercept form
3. change the equal sign to
    a. $<$ $-shaded\ below\ and\ a\ dashed\ line$
    b. $\leq$ $-shaded\ below\ and\ a\ solid\ line$
    c. $>$ $-shaded\ above\ and\ a\ dashed\ line$
    d. $\geq$ $-shaded\ above\ and\ a\ solid\ line$

Write an inequality to represent each graph.





Tell whether the ordered pair is a solution to the given inequality.

$(-2,0); y < 2x + 4$

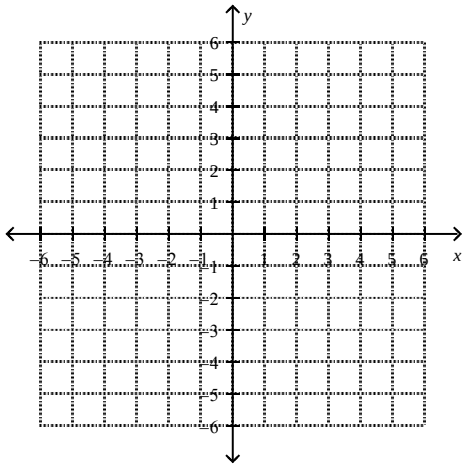
$(0,3); y \leq -3 + x$

$(2,0); y > -2x - 2$

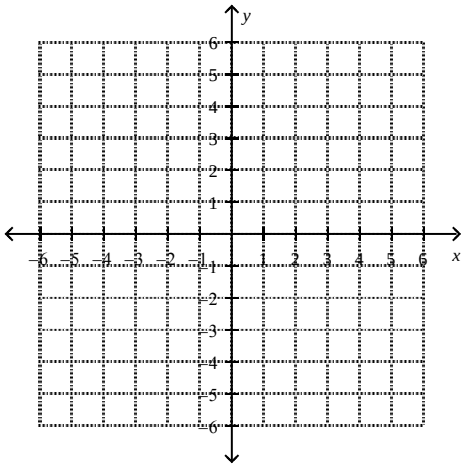
$(4,-3); x \geq 5$

Graph

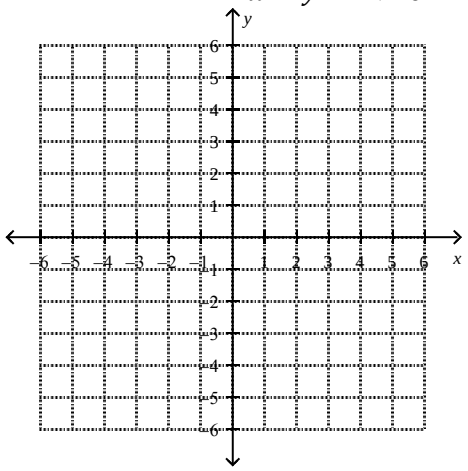
$y < 3x + 4$



$4x - 3y \geq 12$



$2x - y - 4 > 0$



$y \geq -\frac{2}{3}x + 1$