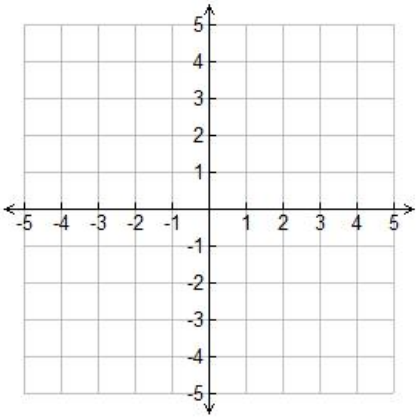
A **linear inequality** is describes an area of the coordinate plane that has a boundary line. Every point in that region is a solution of the inequality.

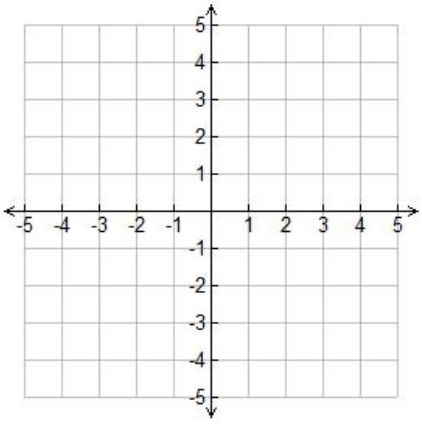
- The graph of a linear inequality is the set of points that represent all of the possible solutions of that inequality. An equation defines a **boundary,** which divides the coordinate plane into two **half-planes.**
- The boundary may or may not be included in the graph of an inequality. When it is included, the solution is a **closed half-plane.** When not included, the solution is an **open half-plane.**

Ex. 1) Graph each inequality using the slope-intercept form.

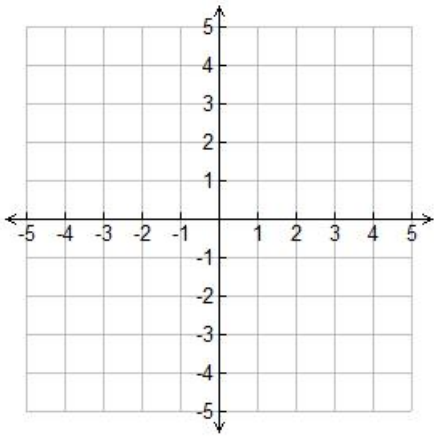
(a) $y < \frac{1}{2}x + 3$



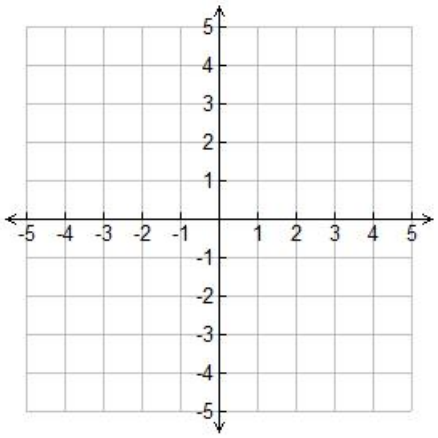
(b) $y \geq 2$



(c) $3x - 4y \geq 12$

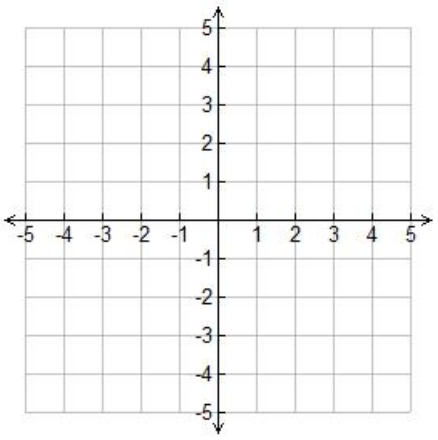


(d) $x - 2y - 5 \leq 0$

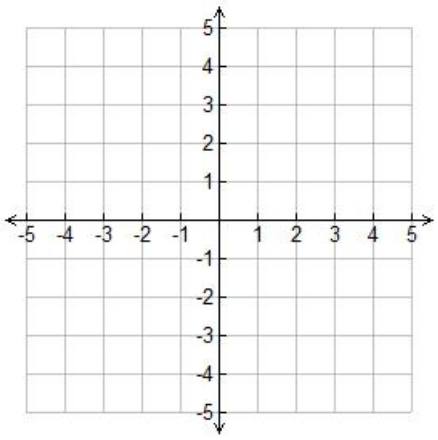


Ex. 2) Graph each inequality using the intercepts.

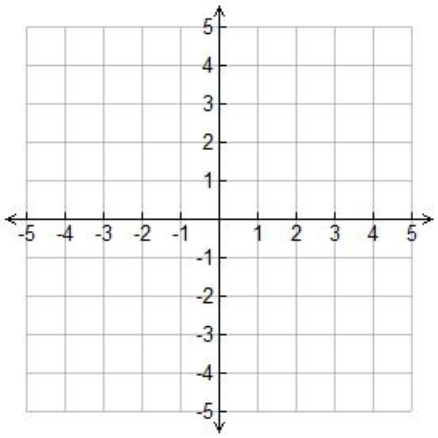
(a) $2x + 3y \geq 6$



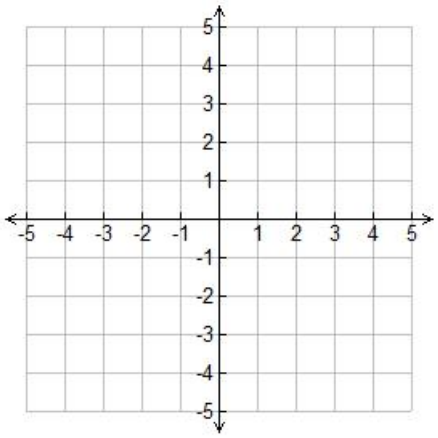
(b) $\frac{1}{2}(6x - 2y) \geq 4$



(c) $-\frac{1}{3}x+\frac{1}{5}y\le -1$



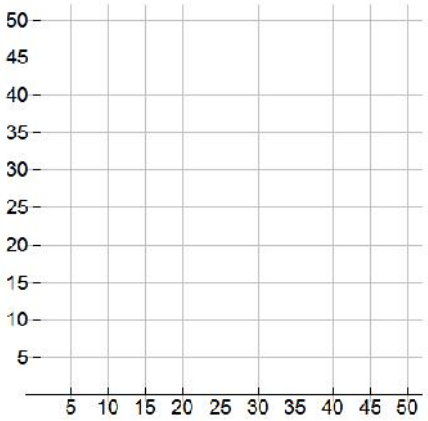
(d) $\frac{9-3y}{2}\ge 6x$



Solving Applied Problems

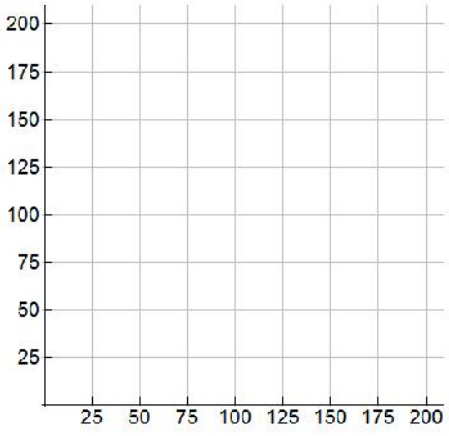
Note: The following steps are useful in developing a technique for solving applied problems.
Step 1: Read the problem carefully until you understand what is given and what is to be found.
Step 2: Assign a variable to represent the unknown value. You may use diagrams or tables as needed.
Step 3: Write an equation or inequality using the variable expressions.
Step 4: Solve the equation/inequality. (Isolate the variable on the left side of the equals/inequality sign)
Step 5: State the answer in context and with appropriate units. (Does it seem reasonable?)

Ex. 3) A local theater charges \$7.50 for adult tickets and \$5.00 for discount tickets. The theater needs to make at least \$240 to cover the rent of the building. How many of each type of ticket must be sold to make a profit? If 20 discount tickets are sold, how many adult tickets must be sold?



Ex. 4) The senior class sells hamburgers and hot dogs at a football game and makes a profit of \$1.75 on each hamburger and \$1.25 on each hot dog. The class would like a profit of at least \$280. Let *x* represent the number of hamburgers and *y* represent the number of hot dogs sold.

a) Write and graph an inequality for the profit the senior class wants to make.



b) If the senior class sells 100 hot dogs and 50 hamburgers, will the class make its goal?