Unit 7 Notes

Checking Solutions of a Linear Inequality

To check whether the ordered pair is a solution of a linear inequality, substitute in the values for *x* and *y* and simplify.

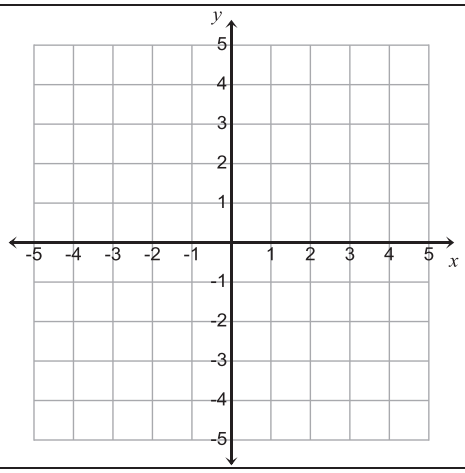
- If you get a **true** statement, then **YES** the ordered pair is a solution.
- If you get a **false** statement, then **NO** the ordered pair is not a solution.

Check whether the ordered pairs below are a solution of $y \leq 3x - 2$.

a. (0, 0) b. (2, 0) c. (2, 3)

Graphing a Linear Inequality

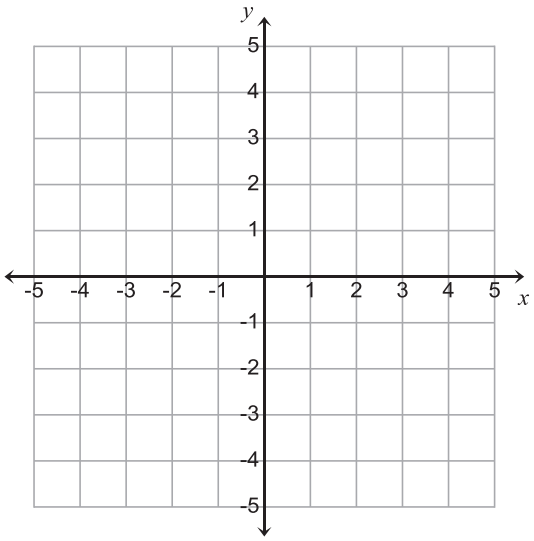
Graph the linear inequality $2x + y \leq 3$.

1. **Rewrite** the equation in slope-intercept form. Remember to reverse the inequality sign if you are multiplying or dividing by a negative number.	
2. **Graph** the equation $y = -2x + 3$ using the slope and the y-intercept. Slope = y-intercept =	
If the inequality sign is $<$ or $>$ then draw a dashed line. 	If the inequality sign is $\leq$ or $\geq$ then draw a solid line.
3. **Pick a point and check** to see if the ordered pair is a solution or not. ➲ If **YES** then shade the side of the line where the point is located. ➲ If **NO** then shade the OTHER side of the line where the point is not.	Let's pick the point $(0, 0)$

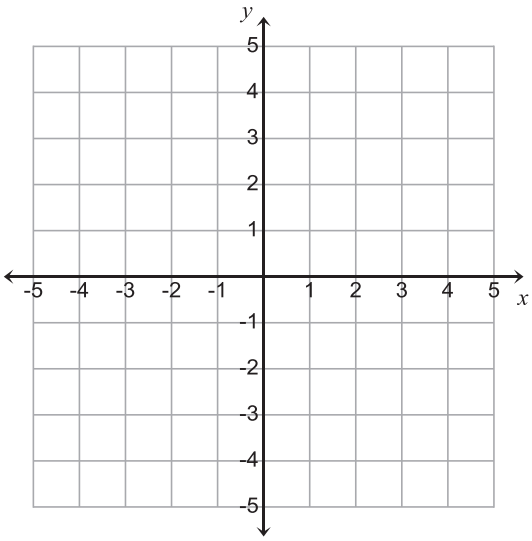
Try These

Graph the solution the following linear inequalities.

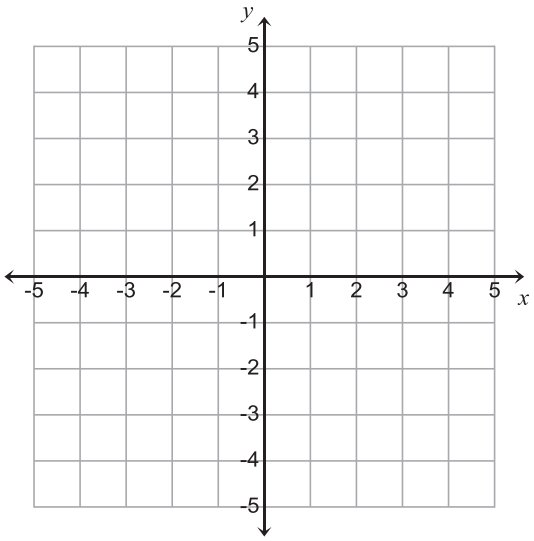
1. $y > x - 2$



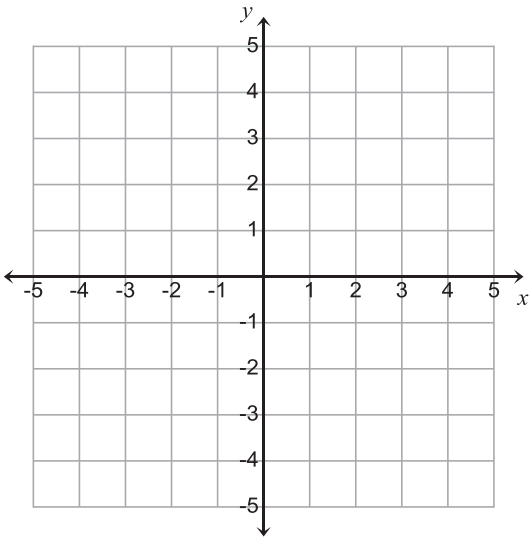
2. $x + y < 3$



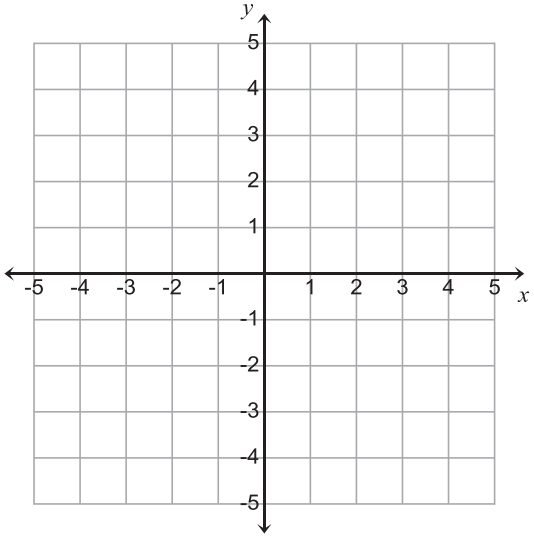
3. $2x - y \geq -4$



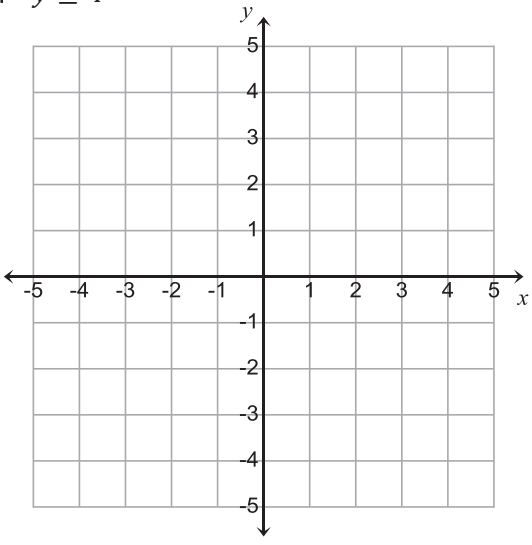
4. $x - 2y \leq -2$



5. $x < -1$



6. $y \geq 4$



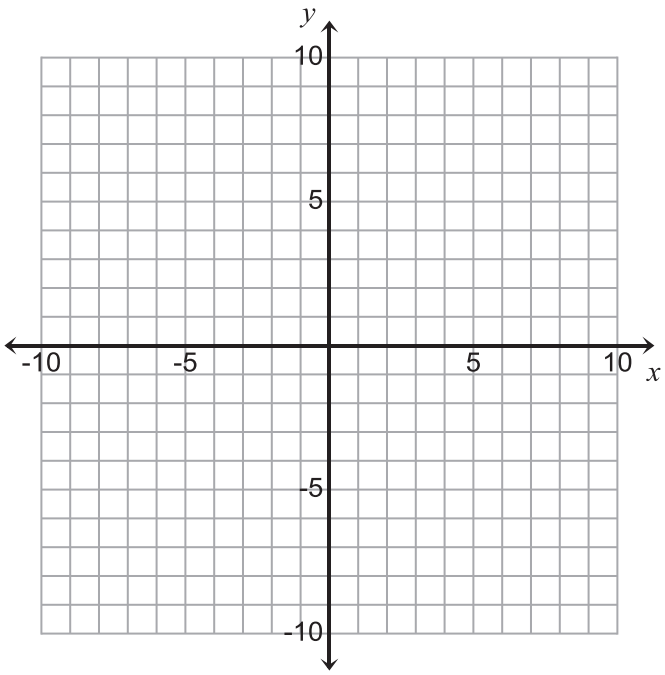
Graphing a System of Linear Inequalities

Steps to Graphing a System of Linear Inequalities	1. Graph the first inequality and shade. 2. Graph the second inequality and shade. ➲ It may be helpful to shade in a different color or in a different direction. 3. Find the overlap of the shading. **This is the solution of the system.** 4. Pick a point in the overlap to check if it is a solution to the system.

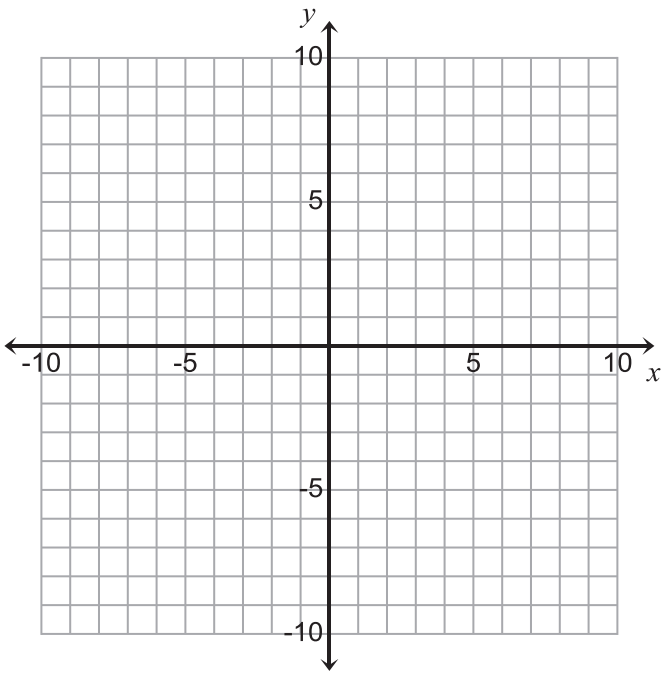
Examples

Graph each system of inequalities.

1. $\begin{cases} y \leq \frac{1}{2}x - 1 \\ y > -x + 3 \end{cases}$



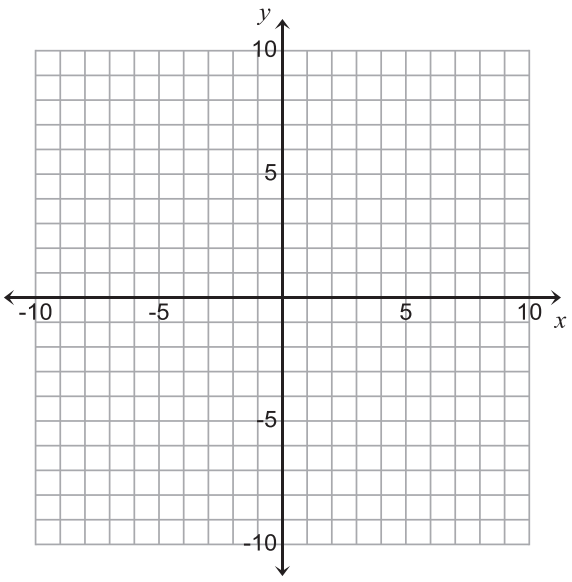
2. $\begin{cases} x - y > 5 \\ x \leq 4 \end{cases}$



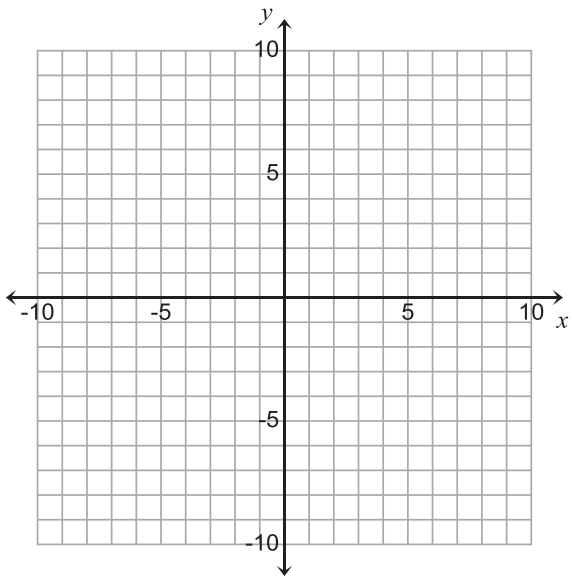
Try These

Solve each system of inequalities by graphing.

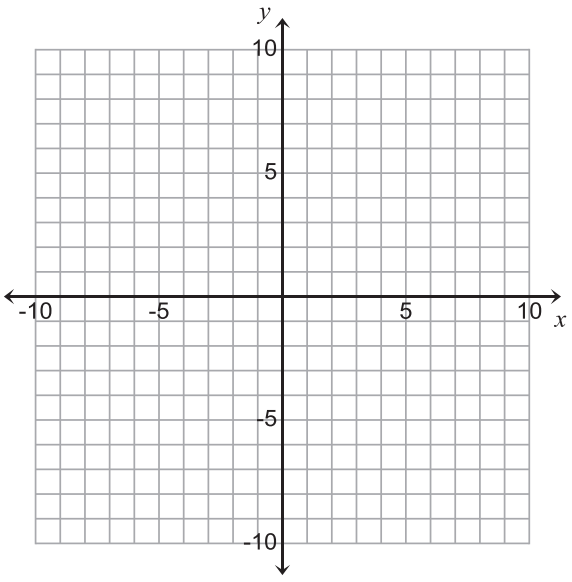
3. $\begin{cases} x \leq 3 \\ x \geq -2 \end{cases}$



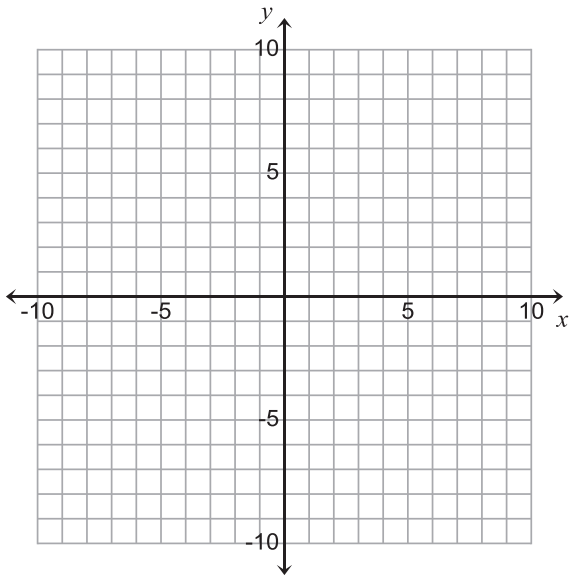
4. $\begin{cases} y + 2 > -x \\ 2y - 6 < -2x \end{cases}$



5. $\begin{cases} y \leq 2x + 1 \\ 2x + y < 1 \end{cases}$



6. $\begin{cases} x \geq 0 \\ y \geq -1 \\ x + y \leq 4 \end{cases}$

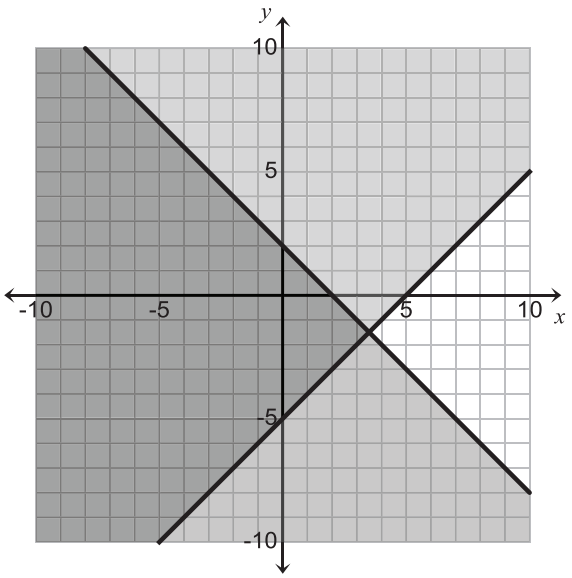


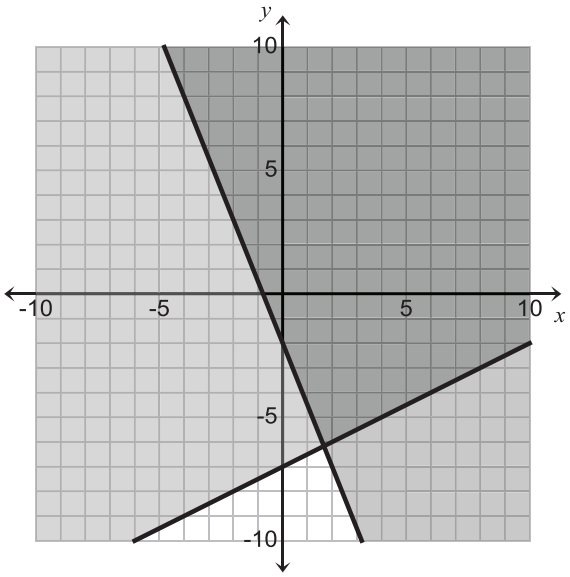
Determining if a Point is a Solution of a System of Linear Inequalities

A point is a solution to a system of inequalities if the point is **located in the overlap of the shading**.

Example

Is the point $(-3, 0)$ a solution to the following system of inequalities?

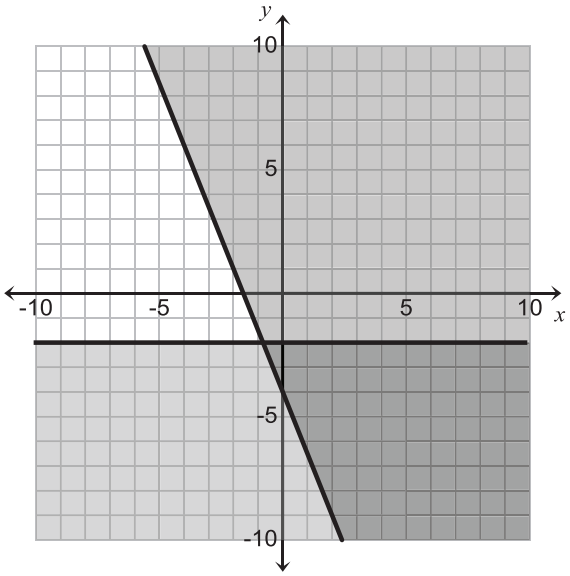




Try These

State whether the following points are solutions of the system of inequalities.

1. $(0, 0)$ _____
2. $(0, -4)$ _____
3. $(4, -6)$ _____
4. $(-4, -6)$ _____
5. $(6, -2)$ _____
6. $(1, -3)$ _____
7. $(-3, 0)$ _____



If a point is a solution to a system of inequalities then **both inequalities will hold true** when we plug in the x and y values.

Examples

1. Is the point $(3, 4)$ a solution to the system $\begin{cases} y > -2x + 1 \\ x - y \geq -5 \end{cases}$

2. Is the point $(-1, 2)$ a solution to the system $\begin{cases} 2x + y \leq 10 \\ y < 3x + 5 \end{cases}$

Try These

Determine if the point $(-3, 4)$ is a solution to the following systems:

3. $\begin{cases} x - y < 0 \\ 2x + 2y \geq -3 \end{cases}$

4. $\begin{cases} y > -2x - 3 \\ x \leq -2y \end{cases}$

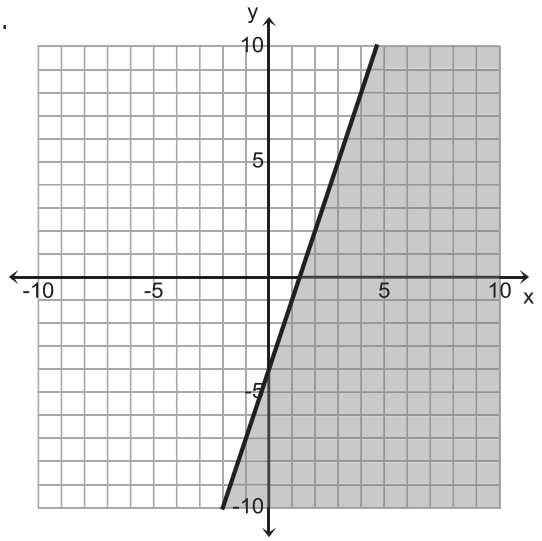
5. $\begin{cases} x + 2y > 5 \\ x + 5y \leq 21 \end{cases}$

6. $\begin{cases} 5x + 2y < 0 \\ -2x - y \geq 2 \end{cases}$

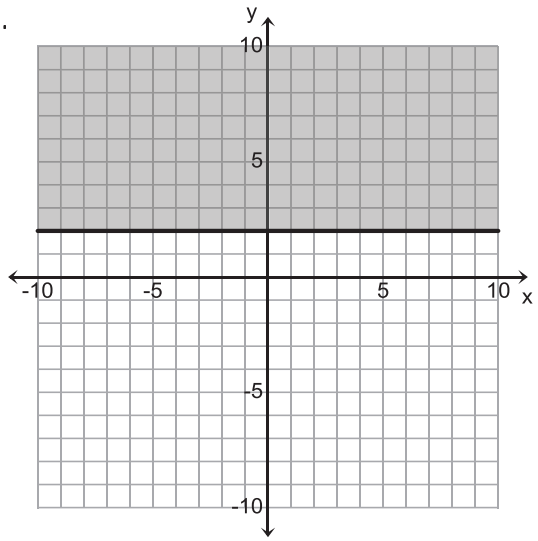
Writing a Linear Inequality from a Graph

Write the linear inequality shown in the graph below.

1.

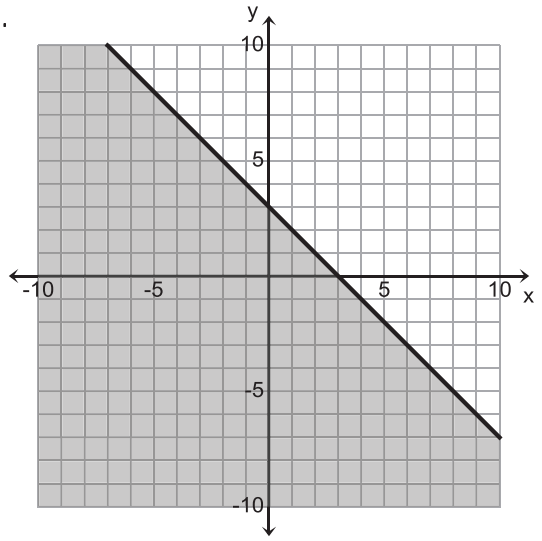


2.

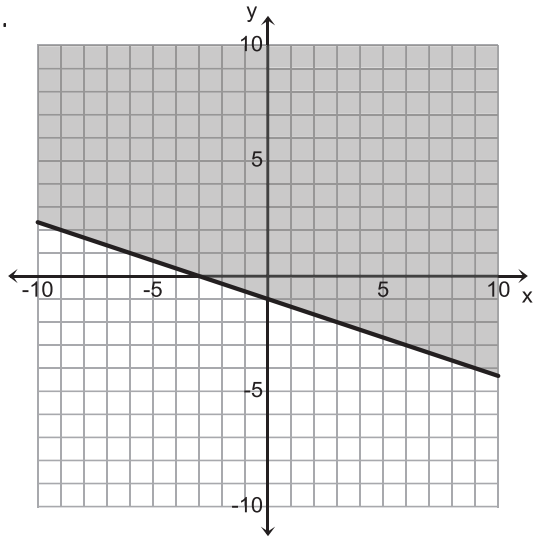


Try These

3.



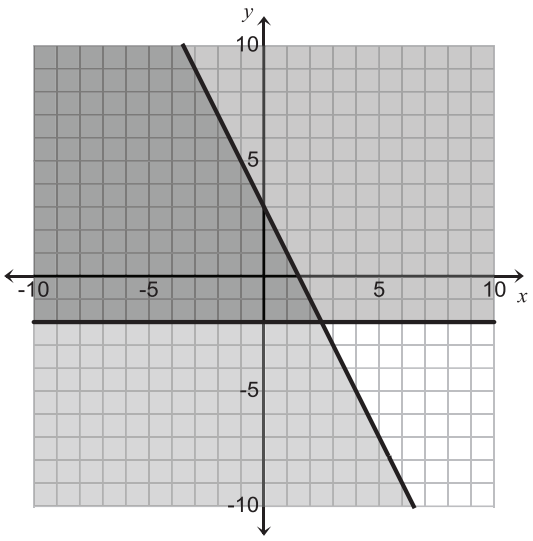
4.



Writing a System of Linear Inequalities from a Graph

Write the system of linear inequalities shown in the graph below.

1.



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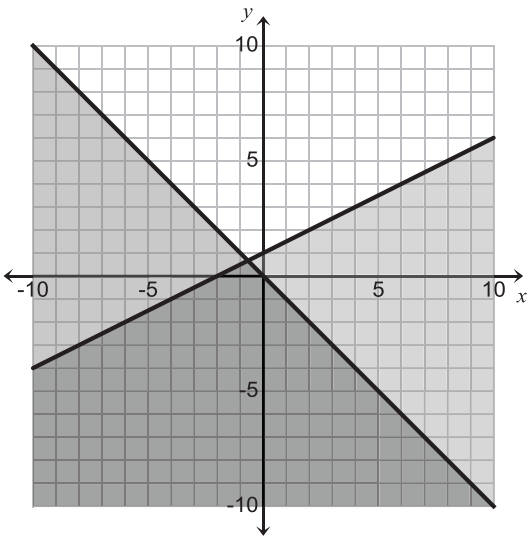
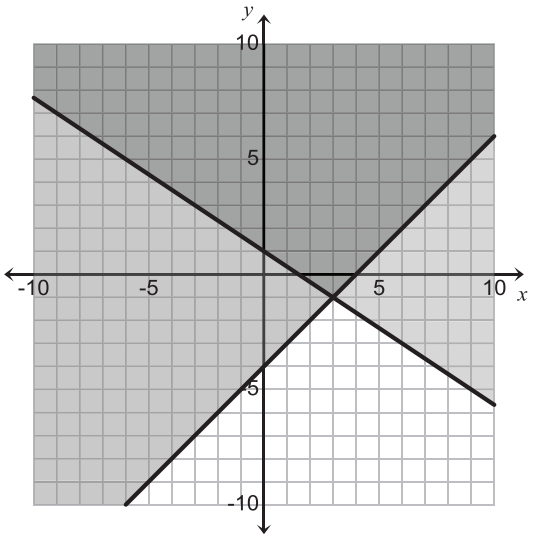


Try These

3.



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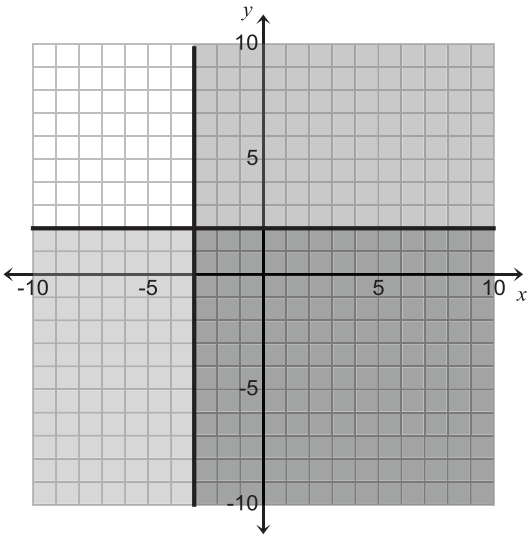


Applications of Linear Inequalities

1. The Theater Club is selling tickets to its annual variety show. Prices are $8 for an adult ticket and $4 for a student ticket. The club needs to raise at least $1000 to pay for costumes and stage sets. The auditorium has a seating capacity of 240. Write and graph a system of inequalities that can be used to determine how many tickets have to be sold for the club to meet its goal.

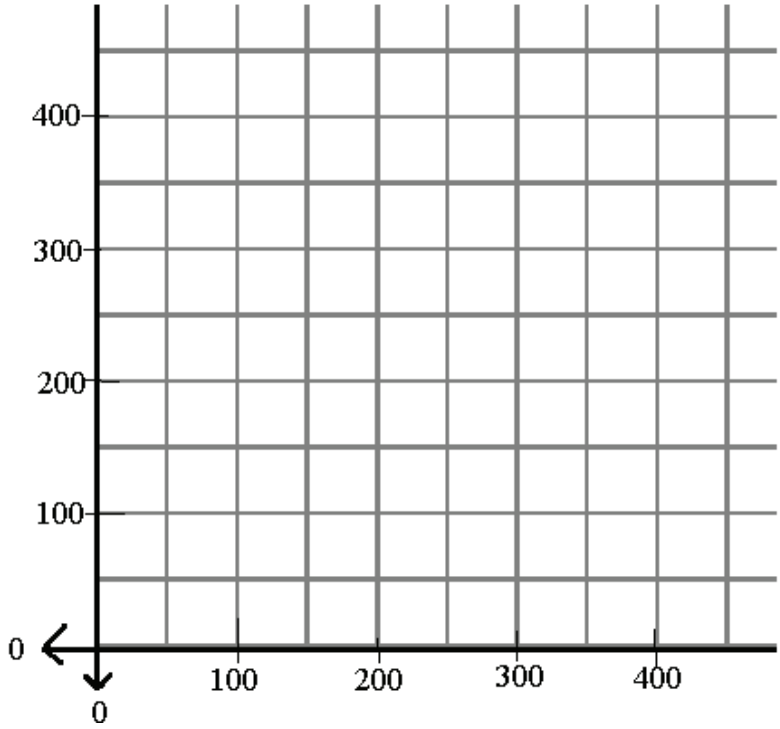
   Inequality #1:

   Inequality #2:

   Inequality #3:

   Inequality #4:

   Graph the solution:



Give one possible combination of adult and student tickets that must be sold for the club to meet its' goal.

2. Wildcat Toyz is a small toy company that specializes in toy cars and toy trucks. The people at Wildcat Toyz are confident they can sell all the toy cars and trucks they made. But there are two constraints that limit their production today:

Wheels: Each car needs 4 wheels. Each truck needs 6 wheels.
Wildcat Toys has 360 wheels in stock

Seats: Each car needs 2 seats. Each truck needs 1 seat.
Wildcat Toys has 100 seats in stock.

Write a system of inequalities to model the situation at Wildcat Toyz today.

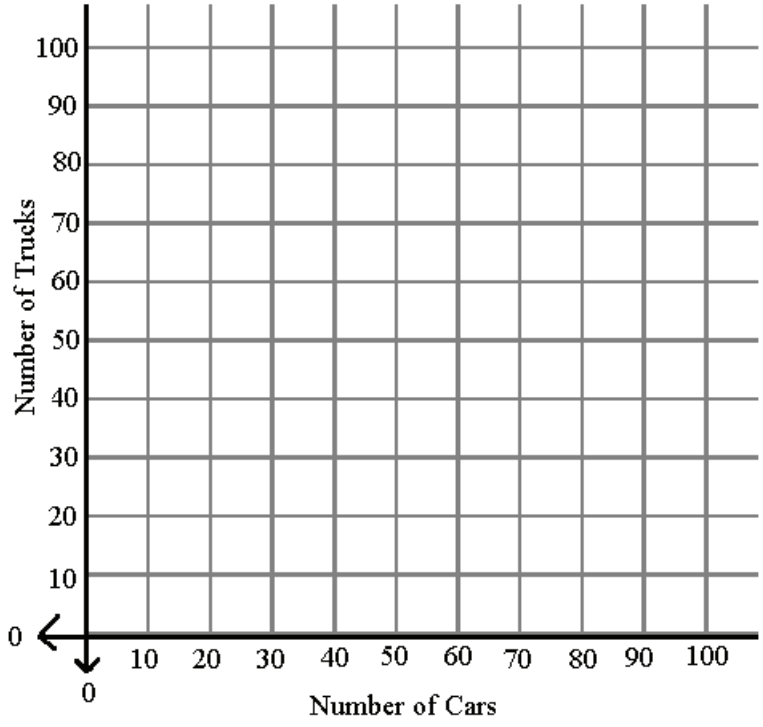
Inequality #1:

Inequality #2:

Inequality #3:

Inequality #4:

Graph the solution:



Give one possible combination of cars and trucks that Wildcat Toyz can produce today.