Algebra 1 Name:

5.7 Explain – Systems of Linear Inequalities - Notes

Essential Question: How can you graph a system of linear inequalities?

Main Ideas/ Questions	Notes/Examples
What You Will Learn	• Check solutions of systems of linear inequalities. • Graph systems of linear inequalities. • Write systems of linear inequalities. • Use systems of linear inequalities to solve real-life problems.
What is a system of inequalities?	**Definition:** 2 or more linear inequalities in the same variables **Remember:** • When graphing, inequalities may be graphed from slope-intercept form or standard form. • When solving an inequality....You MUST "flip" the inequality sign, when multiplying or dividing by a negative. • When graphing an inequality..... Boundary Line: Dashed / Solid Above: > / ≥ Below: < / ≤
What is a solution to a system of inequalities?	**Definition:** An ordered pair that makes ALL inequalities true. (Where the shaded regions overlap.) **Practice:** Tell whether the ordered pair is a solution of the system of linear inequalities. 1. $(2,3)$; $y \geq x + 4$; $y \leq 2x + 4$ → $3 \geq 2+4$, $3 \geq 6$, NO — Not a Solution! 2. $(0,4)$; $y \leq -x + 4$; $y \geq 5x - 3$ → $4 \geq 5(0)-3$, $4 \geq 0-3$, $4 \geq -3$ ✓ — It is a solution. Both work! $4 \leq 0+4$, $4 \leq 4$ ✓

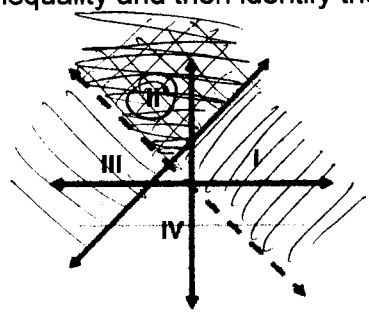
Graphing Systems of Inequalities

Step 1: Graph each inequality in the same coordinate plane.

Step 2: **Finding the solution.....**The region where the shading overlaps or intersection, of the graphs of the inequalities.

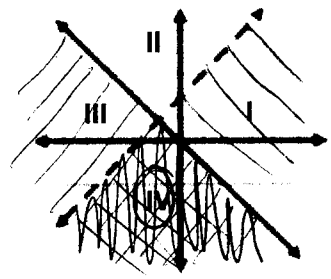
Practice: Each system of inequalities has been graphed except for the shading. Shade the appropriate region for each inequality and then identify the region that the solutions are in.

3. $y \geq x + 2$
$y > -x$



Region: II

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



Region: IV

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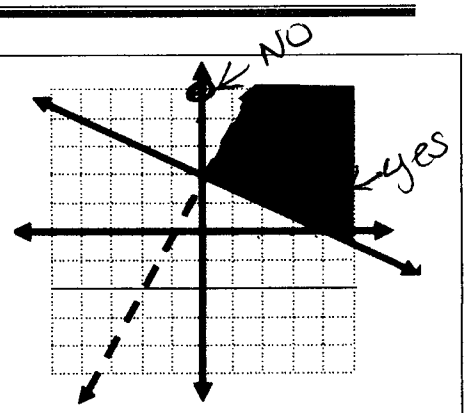
Practice: Determine if the given ordered pair is a solution to the inequality.

5. (4, 1) (YES) NO

6. (0, 5) YES (NO)

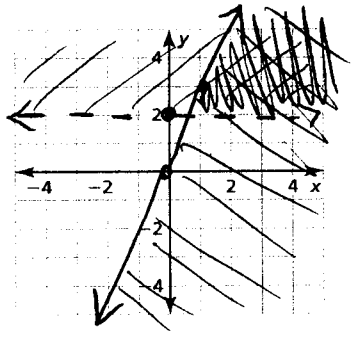


Writing: Explain how you know if an ordered pair is a solution to a system of linear inequalities given a graph.

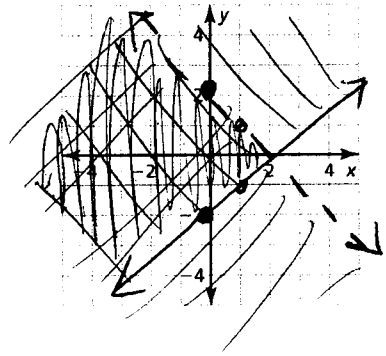
In the shaded region or on a solid boundary line

Practice: Graph the system of linear inequalities.

7. $y > -2$
$y \leq 3x$



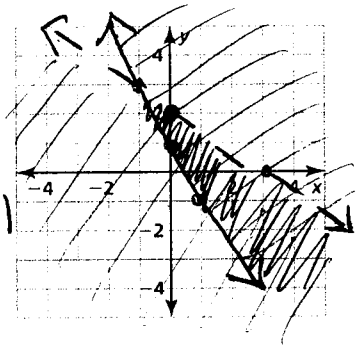
8. $y \geq x - 2$
$y < -x + 2$



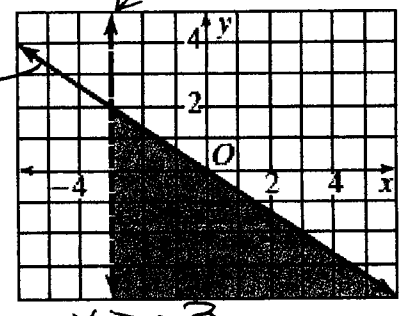
9. $2x + 3y < 6$
$y - 1 \geq -2x$

$2x+3y<6$
$3y<-2x+6$
$y<-\frac{2}{3}x+2$

$y-1\geq-2x$
$y\geq-2x+1$



10. Write a system of linear inequalities represented by the graph.



$x \geq -3$

$m=-\frac{2}{3}$
$b=0$
$y\leq-\frac{2}{3}x+0$

system: $x \geq -3$, $y \leq -\frac{2}{3}x$

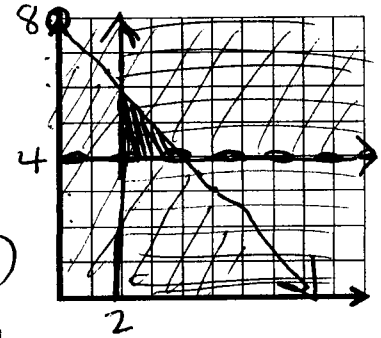
11. **Real-Life:** You have at most 8 hours to spend at the mall and at the beach. You want to spend at least 2 hours at the mall and more than 4 hours at the beach.

a. Write a system that represents the situation. Let x be the number of hours at the mall and let y be the number of hours at the beach.

$x+y\leq 8$, $x\geq 2$ $y>4$

b. Graph the system.

or $y\leq -x+8$

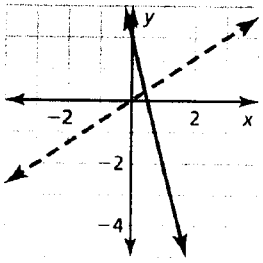


c. How much time can you spend at each location?

example: (3, 5)
3 hrs @ mall,
5 hrs @ beach

Name _____ Date _____

5.7 Systems of Linear Inequalities



In Exercises 1–4, tell whether the ordered pair is a solution of the system of linear inequalities.

1. $(2, 1)$ _____ **2.** $(-3, -2)$ _____ **3.** $(0, 2)$ _____ **4.** $(-1, -4)$ _____

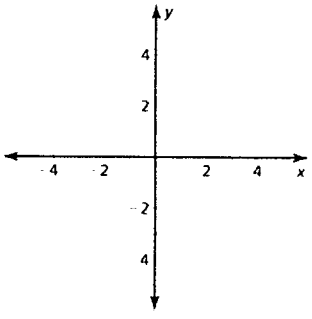
In Exercises 5 and 6, tell whether the ordered pair is a solution of the system of linear inequalities.

5. $(2, -1)$; $y \geq 3$
$y < x + 1$

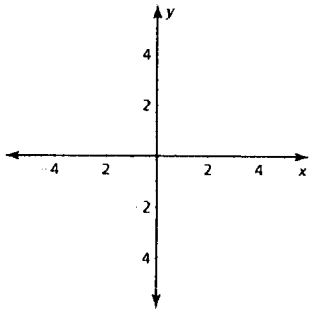
6. $(7, -4)$; $y < 0$
$y < x - 3$

In Exercises 7–13, graph the system of linear inequalities.

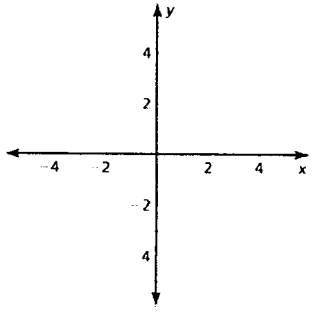
7. $y > 2$
$x < -3$



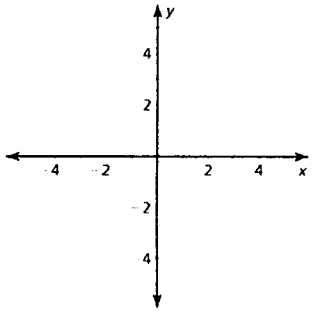
8. $y \leq x + 2$
$y > x - 2$



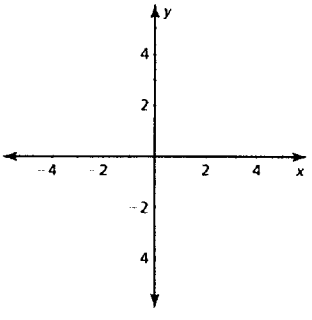
9. $y < 2x$
$y < x + 1$



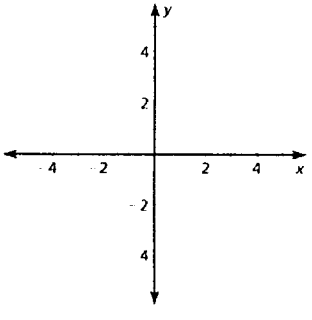
10. $3x + y > 4$
$y < -3x + 1$



11. $x - y < 3$
$-x - y \geq -1$



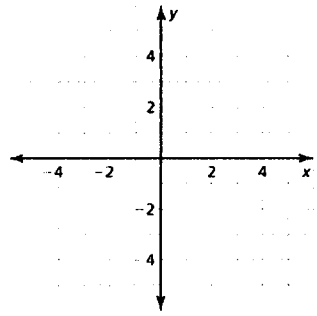
12. $3x + y \leq 0$
$-2x + y > -1$



13. $x > -2$

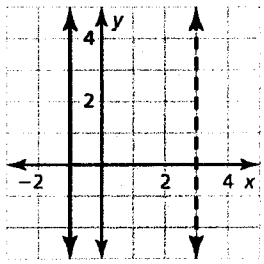
$y < 3$

$y \leq 2x - 1$



In Exercises 14 - 16, write a system of linear inequalities represented by the graph.

14.



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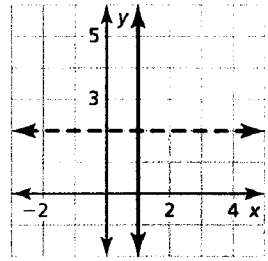
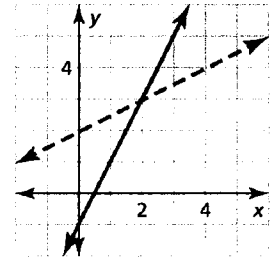
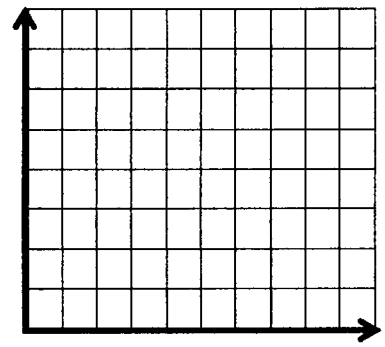


16.



17. You can spend at most \$60 on beads. A bag containing red beads costs \$2 per bag. A bag containing blue beads costs \$3 per bag. You need more bags of blue beads than bags of red beads.

a. Write and graph a system of linear inequalities that represents the situation.

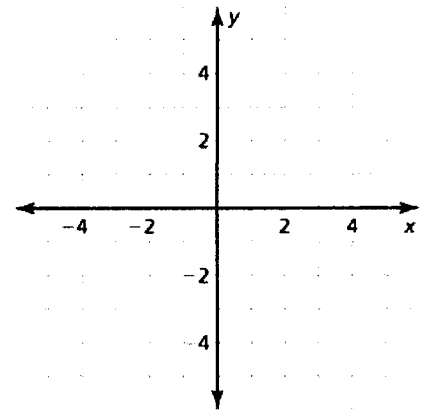


b. Identify and interpret a solution of the system.

c. Use the graph to determine whether you can buy 9 bags of red beads and 12 bags of blue beads.

18. The points $(1, 2)$, $(5, 5)$, $(1, 6)$ are the vertices of a shaded triangle.

a. Write a system of linear inequalities represented by the shaded triangle.



b. Find the area of the triangle.