5.7 Start Thinking

Graph the linear inequalities $y < -x + 4$ and $y > 3x - 9$ on the same coordinate plane. What does the area shaded for both inequalities represent? What does the area shaded for just one of the inequalities represent? Is there any area that is not shaded for either inequality? If so, what does that area represent?

Choose an ordered pair that is in the area shaded for both inequalities and plug the values into the inequalities. What happens? Choose an ordered pair that is in the area not shaded for either inequality and plug the values into the inequalities. What happens?

5.7 Warm Up

Graph the inequality.

1. $y \geq -1$

2. $4x - 5y < 3$

3. $7x - 4y \geq -9$

4. $-5x - 6y > 14$

5. $\frac{x}{5} - y < 2$

6. $y \geq 2$

5.7 Cumulative Review Warm Up

Solve the inequality.

1. $2y + 8 \leq 16$

2. $10 - q \geq 14$

3. $4p \leq 16$

4. $10(2g + 3) \geq 10 \bullet 3g$

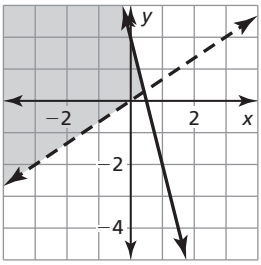
5. $7(x + 6) \leq 2(5x)$

6. $z + (-8) > 6$

Name _____ Date _____

5.7 Practice A

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 7–12, graph the system of linear inequalities.

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

8. $y \geq 1$
$y < 4$

9. $y \geq -2x$
$y > 1$

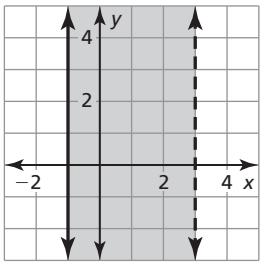
10. $y \leq x + 2$
$y > x - 2$

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

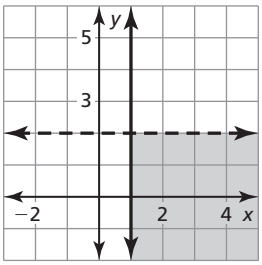
12. $3x + y \leq 0$
$-2x + y > -1$

In Exercises 13 and 14, write a system of linear inequalities represented by the graph.

13.



14.



15. 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.

Name_____ Date _____

5.7 Practice B

In Exercises 1 and 2, tell whether the ordered pair is a solution of the system of linear inequalities.

1. $(2, 0)$; $y > x - 5$, $y \leq 2x + 1$

2. $(1, 4)$; $y < 2x + 2$, $y \geq -3x + 4$

In Exercises 3–8, graph the system of linear inequalities.

3. $x + y \leq 2$, $y \leq 1$

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

5. $x - y < 3$, $-x - y \geq -1$

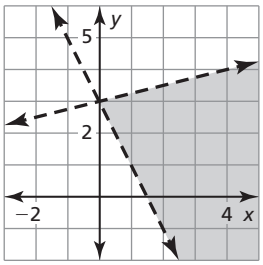
6. $y \leq \frac{1}{3}x + 2$, $y > -\frac{1}{2}x + 5$

7. $x > -2$, $y < 3$, $y \geq 2x - 1$

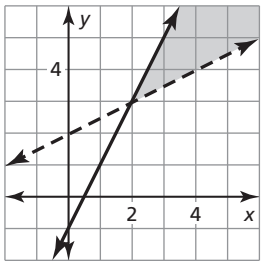
8. $x + y > 4$, $x - y < -1$, $y > 7$

In Exercises 9 and 10, write a system of linear inequalities represented by the graph.

9.



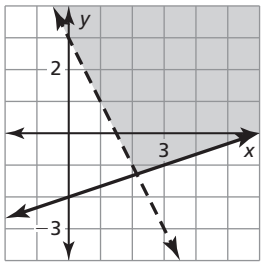
10.



11. Describe and correct the error in graphing the system of inequalities.

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

$y < -2x + 3$



12. 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.

Name _____ Date _____

5.7 Enrichment and Extension

Using Linear Programming

Example: A toy manufacturer wants to minimize the cost to produce two lines of toy airplanes. Because of the supply of materials, no more than 40 flying bats can be built each day, and no more than 60 flying falcons can be built each day. There are enough workers to build at least 70 toy airplanes each day. It costs \$12 to build a flying bat and \$8 to build a flying falcon. How many flying bats and falcons should be produced to minimize the cost, while still making production on both toys? What is the minimum possible cost each day?

Let x represent the number of flying bats.

Let y represent the number of flying falcons.

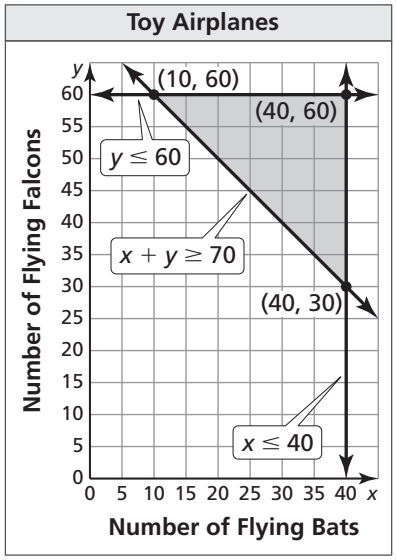
$0 \le x \le 40$

$0 \le y \le 60$

$x + y \ge 70$

$f(x, y) = 12x + 8y$

(x, y)	$12x + 8y$	$f(x, y)$
$(40, 30)$	$12(40) + 8(30)$	\$720
$(10, 60)$	$12(10) + 8(60)$	\$600
$(40, 60)$	$12(40) + 8(60)$	\$960



10 flying bats and 60 flying falcons;
Minimum Cost: \$600

1. You are treating two of your friends to the movies tonight. Your parent gives you \$70. Tickets are \$7 each. At the candy counter, you are buying snacks and drinks for your friends as they find seats. Snacks are \$2 each, and drinks are \$2.25. You are trying to decide what combination of snacks and drinks are possible given the money remaining. You can only carry 4 drinks on a tray by yourself.

a. Write a system of inequalities for this situation, using x for the number of snacks and y for bottles of water purchased.

b. Graph the system and find the vertices.

c. Indicate on the graph what combinations of snacks and drinks are possible. Explain your reasoning in-depth.

d. Does every point within the feasible region represent a valid solution in this context? Why or why not?

e. Denote one combination that is possible and one that is not. Explain your reasoning.

f. Prove each of your answers to part (e) algebraically.

Name_____ Date _____

5.7 Puzzle Time

What Do You Call The Tending Of Rabbits?

Write the letter of each answer in the box containing the exercise number.

Tell whether the ordered pair is a solution of the system of linear inequalities.

1. $(-7, 6)$; $y > 5$, $y \leq -x + 4$

E. yes **F.** no

2. $(8, -8)$; $y < 9$, $y > -2x + 8$

Q. yes **R.** no

3. $(9, -10)$; $y \leq -x + 9$, $y \geq -2x + 12$

D. yes **E.** no

4. $(-4, -4)$; $y > 3x + 5$, $y \leq \frac{1}{2}x + 6$

A. yes **B.** no

Match the system of inequalities with its graph.

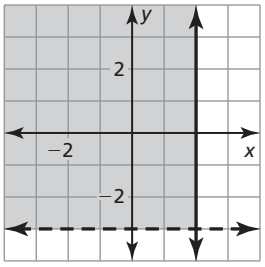
5. $y < 5$, $y \geq x - 1$

6. $y > -3$, $x \leq 2$

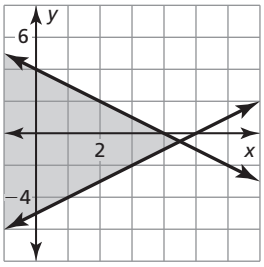
7. $y \geq x - 2$, $y \leq x + 2$

8. $x + y \leq 4$, $x - y \leq 5$

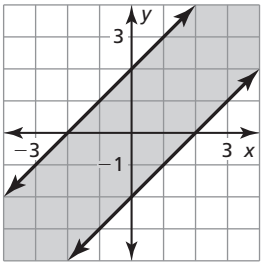
R.



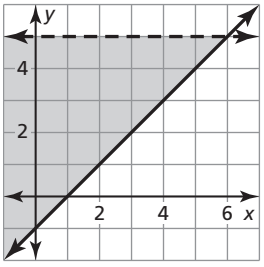
H.



C.



A.



8	5	6	3		7	4	2	1