LESSON 6-5

Practice A

Solving Linear Inequalities

Use substitution to tell whether the ordered pair is a solution of the given inequality.

1. (3, 4); $y > x + 2$ — no

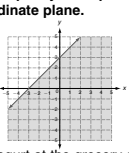
2. (4, 2); $y \leq 2x - 3$ — yes

3. (2, −1); $y < -x$ — no

Rewrite each linear inequality in slope-intercept form. Then graph the solutions in the coordinate plane.

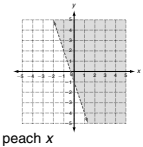
4. $y - x \leq 3$

$y \leq x + 3$



5. $6x + 2y > -2$

$y > -3x - 1$

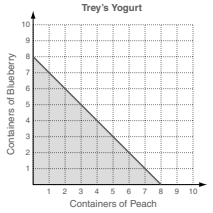


6. Trey is choosing yogurt at the grocery store. The flavors he likes are peach x and blueberry y. His mother said he may choose at most 8 containers of yogurt.

a. Write an inequality to describe the situation.

$x + y \leq 8$

b. Graph the solutions.



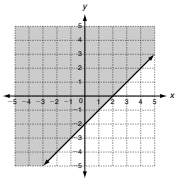
c. Give two possible combinations of peach and blueberry yogurt that Trey can choose.

Possible answer: 2 peach, 6 blueberry

or 4 peach, 3 blueberry

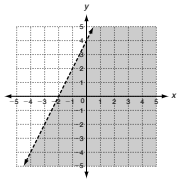
Write an inequality to represent each graph.

7.



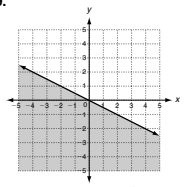
$y \geq x - 2$

8.



$y < 2x + 4$

9.



$y \leq -\frac{1}{2}x$

Copyright © by Holt, Rinehart and Winston. All rights reserved.

LESSON 6-5

Practice B

Solving Linear Inequalities

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

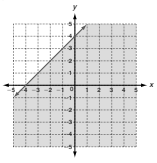
1. (1, 6); $y < x + 6$ — yes

2. (−3, −12); $y \geq 2x - 5$ — no

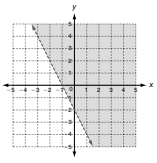
3. (5, −3); $y \leq -x + 2$ — yes

Graph the solutions of each linear inequality.

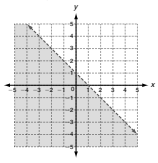
4. $y \leq x + 4$



5. $2x + y > -2$



6. $x + y - 1 < 0$

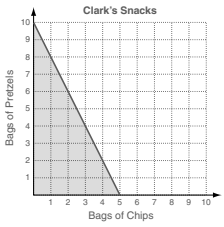


7. Clark is having a party at his house. His father has allowed him to spend at most $20 on snack food. He'd like to buy chips that cost $4 per bag, and pretzels that cost $2 per bag.

a. Write an inequality to describe the situation.

Let x = chips, y = pretzels, $4x + 2y \leq 20$

b. Graph the solutions.



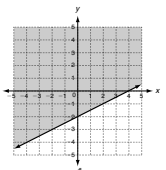
c. Give two possible combinations of bags of chips and pretzels that Clark can buy.

Possible answer: 3 chips, 4 pretzels

or 4 chips, 1 pretzel

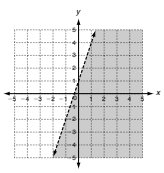
Write an inequality to represent each graph.

8.



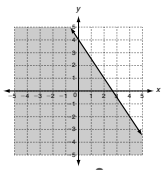
$y \geq \frac{1}{2}x - 2$

9.



$y < 3x + 1$

10.



$y \leq -\frac{3}{2}x + 4$

Copyright © by Holt, Rinehart and Winston. All rights reserved.

LESSON 6-5

Practice C

Solving Linear Inequalities

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

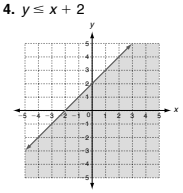
1. (−1, −4); $y \geq 2x - 1$ — no

2. (−6, 2); $y < -x - 4$ — no

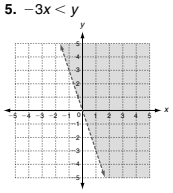
3. (4, −8); $y \leq \frac{1}{2}x + 5$ — yes

Graph the solutions of each linear inequality.

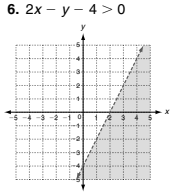
4. $y \leq x + 2$



5. $-3x < y$



6. $2x - y - 4 > 0$

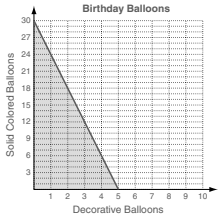


7. Adam is ordering helium balloons for his sister's birthday. He has up to $15 to spend. Decorative balloons cost $3.00 each and solid colored balloons cost $0.50 each.

a. Write an inequality to describe the situation.

x = decorative, y = solid, $3x + 0.5y \leq 15$

b. Graph the solutions.



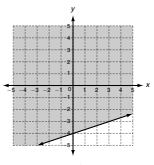
c. Give two possible combinations of decorative and solid colored balloons Adam can order.

Possible answer: 3 decorative, 12 solid

or 2 decorative, 15 solid

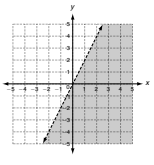
Write an inequality to represent each graph.

8.



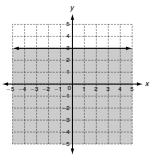
$y \geq \frac{1}{3}x - 4$

9.



$y < 2x$

10.



$y \leq 3$

Copyright © by Holt, Rinehart and Winston. All rights reserved.

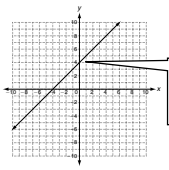
LESSON 6-5

Reteach

Solving Linear Inequalities

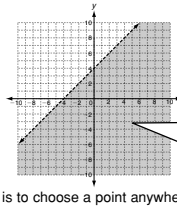
When graphing an equation, the solutions are all the points on the line. When graphing an inequality, the solutions are all the points above or below the line (and may include the line).

Graph $y = x + 4$.



Solutions are **only** on the line.

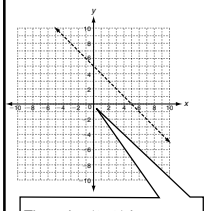
Graph $y < x + 4$.



Solutions are everywhere below the line. Because the line is dashed, the solutions are not on the line.

One method of determining which side to shade is to choose a point anywhere on the graph (except on the line). Then substitute to determine if it makes the inequality true.

The boundary line for the inequality $y > -x + 5$ is graphed below. Shade the correct side.



The point (0, 0) is an easy point to check.

Step 1: Choose a point.

Step 2: Substitute (0, 0) in the inequality $y > -x + 5$.

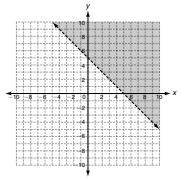
$y > -x + 5$

$0 \stackrel{?}{>} -0 + 5$

$0 \stackrel{?}{>} 5$

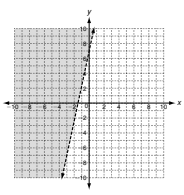
The statement is false.

Step 3: Because (0, 0), which is below the line, resulted in a false statement, it is not a solution. Shade above the line.

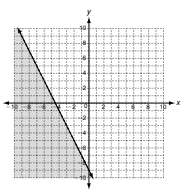


The boundary lines for each inequality are graphed below. Shade the correct side

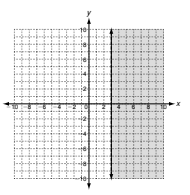
1. $y > 5x + 7$



2. $y < -2x - 9$



3. $x > 3$



Copyright © by Holt, Rinehart and Winston. All rights reserved.

Copyright © by Holt, Rinehart and Winston. All rights reserved.

LESSON 6-5

Reteach

Solving Linear Inequalities (continued)

To graph a linear inequality:

Step 1: Solve the inequality for *y*.

Step 2: Graph the boundary line. If ≤, or ≥ use a solid line. If < or > use a dashed line.

Step 3: Determine which side to shade.

Graph the solutions of $2x + y \leq 4$.

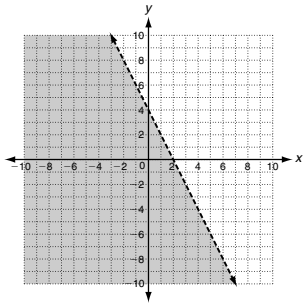
Step 1: Solve for *y*. $2x + y \leq 4$

$-2x \quad -2x$

$y \leq 2x + 4$

Step 2: Graph the boundary line.

Use a solid line for ≤.



Step 3: Determine which side to shade.

Substitute (0, 0) into $2x + y \leq 4$.

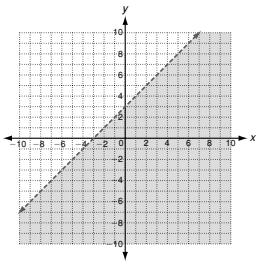
$2x + y \leq 4$

$2(0) + 0 \stackrel{?}{\leq} 4$

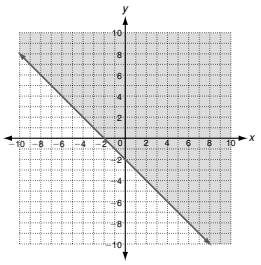
$0 \stackrel{?}{\leq} 4$. The statement is true. Shade the side that contains the point (0, 0).

Graph the solutions of each linear inequality.

4. $y - x < 3$



5. $x + y + 2 \geq 0$



Copyright © by Holt, Rinehart and Winston.
All rights reserved.

LESSON 6-5

Challenge

Graphing Non-Linear Inequalities

To graph non-linear inequalities, follow the steps below.

Step 1: Solve the inequality for *y*.

Step 2: Write the related equation and generate ordered pairs.

Step 3: Plot enough points to see a pattern.

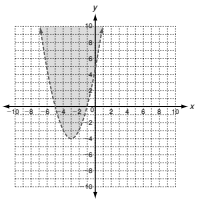
Step 4: Connect the points with a line or curve. Use a solid line for ≤ or ≥. Use a dashed line for < or >.

Step 5: Shade above the line or curve for $y >$ or $y \geq$. Shade below for $y <$ or $y \leq$.

Generate ordered pairs and graph each inequality.

1. $y > (x + 3)^2 - 4$

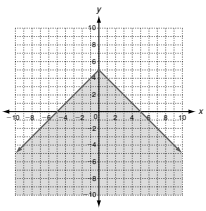
x	Think: $y = (x + 3)^2 - 4$	(*x*, *y*)
−6	$y = (-6 + 3)^2 - 4 = (-3)^2 - 4 = 9 - 4 = 5$	(−6, 5)
−5	$y = (-5 + 3)^2 - 4 = (-2)^2 - 4 = 4 - 4 = 0$	(−5, 0)
−4	$y = (-4 + 3)^2 - 4 = (-1)^2 - 4 = 1 - 4 = -3$	(−4, −3)
−3	$y = (-3 + 3)^2 - 4 = (0)^2 - 4 = 0 - 4 = -4$	(−3, −4)
−2	$y = (-2 + 3)^2 - 4 = (1)^2 - 4 = 1 - 4 = -3$	(−2, −3)
−1	$y = (-1 + 3)^2 - 4 = (2)^2 - 4 = 4 - 4 = 0$	(−1, 0)



2. $|x| + y \leq 5$

Solved for *y*: $y \leq -|x| + 5$

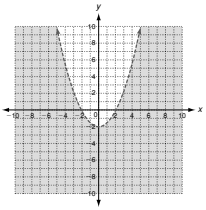
x	Think: $y = -\|x\| + 5$	(*x*, *y*)
−3	$y = -\|-3\| + 5 = -(3) + 5 = -3 + 5 = 2$	(−3, 2)
−2	$y = -\|-2\| + 5 = -(2) + 5 = -2 + 5 = 3$	(−2, 3)
−1	$y = -\|-1\| + 5 = -(1) + 5 = -1 + 5 = 4$	(−1, 4)
0	$y = -\|0\| + 5 = 0 + 5 = 5$	(0, 5)
1	$y = -\|1\| + 5 = -1 + 5 = 4$	(1, 4)
2	$y = -\|2\| + 5 = -2 + 5 = 3$	(2, 3)



3. $2x^2 - 4y > 8$

Solved for *y*: $y < \frac{1}{2}x^2 - 2$

x	Think: $y = \frac{1}{2}x^2 - 2$	(*x*, *y*)
−4	$y = \frac{1}{2}(-4)^2 - 2 = \frac{1}{2}(16) - 2 = 8 - 2 = 6$	(−4, 6)
−2	$y = \frac{1}{2}(-2)^2 - 2 = \frac{1}{2}(4) - 2 - 2 = 0$	(−2, 0)
0	$y = \frac{1}{2}(0)^2 - 2 = \frac{1}{2}(0) - 2 = 0 - 2 = -2$	(0, −2)
1	$y = \frac{1}{2}(1)^2 - 2 = \frac{1}{2}(1) - 2 = \frac{1}{2} - 2 = -1\frac{1}{2}$	$\left(1, -1\frac{1}{2}\right)$
2	$y = \frac{1}{2}(2)^2 - 2 = \frac{1}{2}(4) - 2 = 2 - 2 = 0$	(2, 0)
4	$y = \frac{1}{2}(4)^2 - 2 = \frac{1}{2}(16) - 2 = 8 - 2 = 6$	(4, 6)



Copyright © by Holt, Rinehart and Winston.
All rights reserved.

LESSON 6-5

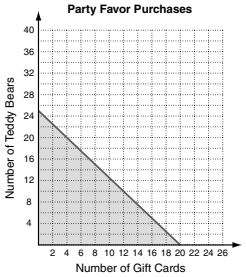
Problem Solving

Solving Linear Inequalities

Write the correct answer.

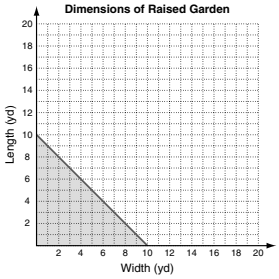
1. Shania would like to give $5 gift cards and $4 teddy bears as party favors. Sixteen people have been invited to the party. Shania has $100 to spend on party favors. Write and graph an inequality to find the number of gift cards *x* and teddy bears *y* Shania could purchase.

$5x + 4y \leq 100$



2. Hank has 20 yards of lumber that he can use to build a raised garden. Write and graph a linear inequality that describes the possible lengths and widths of the garden. If Hank wants the dimensions to be whole numbers only, what dimensions would produce the largest area?

$2x + 2y \leq 20$; 5 yd by 5 yd



Select the best answer.

3. The royalties for the high school play are $250. Tickets to the play cost $5 for students and $8 for nonstudents. What linear inequality describes the number of student and nonstudent tickets that need to be sold so that the drama class can pay the royalties?

(A) $5x + 8y \geq 250$ C $5xy + 8 < 250$

B $5x + 8y > 250$ D $5xy + 8 \geq 250$

4. The inequality $x + y \leq 8$ describes the amounts of two juices Annette combines to make a smoothie. Which is a solution to the inequality?

F (3, 6) H (7, 2)

(G) (6, 1) J (0, 10)

5. A baker is making chocolate and lemon pound cakes. He can make at most 12 cakes at one time. Which inequality describes the situation?

A $x + y > 12$ (C) $x + y \leq 12$

B $x + y \geq 12$ D $x + y < 12$

6. Erasmus is the master gardener for a university. He wants to plant a mixture of purple and yellow pansies at the west entrance to the campus. From past experience, Erasmus knows that fewer than 350 pansies will fit in the planting area. Which inequality describes the situation?

F $x + y \geq 350$ H $x + y \leq 350$

G $x + y > 350$ (J) $x + y < 350$

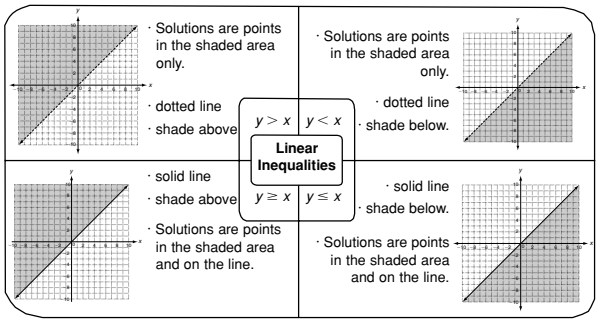
Copyright © by Holt, Rinehart and Winston.
All rights reserved.

LESSON 6-5

Reading Strategies

Use Graphic Aids

There are infinitely many solutions for linear inequalities. That's why the solutions are shown as a graph on a coordinate plane. There are four possible ways to draw the line and shade the correct half plane. These correspond to the four inequality symbols >, ≥, <, ≤.
Use the graphic aid below as a guide.



For each linear inequality, tell whether the graph is a solid or dotted line, and whether the shading is above or below the line.

1. $y \leq x + 7$

solid; below

2. $y > -5x$

dotted; above

3. $y \geq 3x - 2$

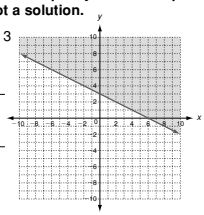
solid; above

Graph each linear inequality. Name one point that is a solution, and one point that is not a solution.

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

solution: (4, 1)

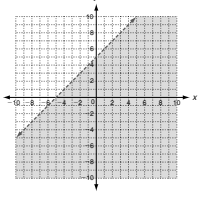
not: (−2, 2)



5. $y < x + 5$

solution: (−3, −3)

not: (2, 7)



Copyright © by Holt, Rinehart and Winston.
All rights reserved.

Copyright © by Holt, Rinehart and Winston.
All rights reserved.