EXERCISES

Practice and Problem Solving

For more practice, see *Extra Practice*.

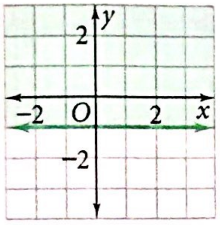
Practice by Example

Example 1 (page 371)

Determine whether point P is a solution of the linear inequality.

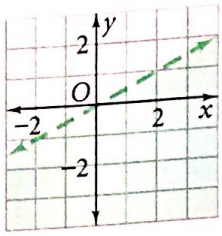
1. $y \leq -2x + 1; P(2, 2)$
2. $x < 2; P(1, 0)$
3. $y \geq 3x - 2; P(0, 0)$
4. $y > x - 1; P(0, 1)$
5. $y \geq -\frac{2}{5}x + 4; P(0, 0)$
6. $y > \frac{5}{3}x - 4; P(0, 1)$

Choose the linear inequality that describes each graph.

7. 

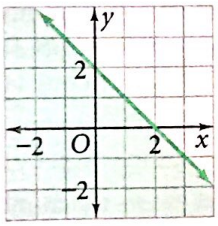
A. $y \geq -1$

B. $y \leq -1$

8. 

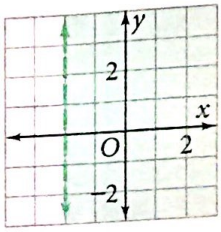
A. $y > \frac{1}{2}x$

B. $y < \frac{1}{2}x$

9. 

A. $y \geq -x + 2$

B. $y \leq -x + 2$

10. 

A. $x > -2$

B. $x < -2$

Graph each linear inequality.

11. $y \leq \frac{1}{4}x - 1$
12. $y \geq \frac{1}{4}x - 1$
13. $y < -4x - 1$
14. $y \geq 4x - 1$
15. $y < 5x - 5$
16. $y \leq \frac{2}{5}x - 3$
17. $y \leq -3x$
18. $y \geq -\frac{1}{2}x$

Example 2 (page 371)

Write each linear inequality in slope-intercept form. Then graph the inequality.

19. $2x - 3y \geq 7$
20. $5x - 3y \leq 6$
21. $4x - 6y \geq 16$
22. $-4y - 6x > 8$

Example 3 (page 372)

23. **Budget** Suppose you are shopping for crepe paper to decorate the school gym for a dance. Gold crepe paper costs \$5 per roll, and blue crepe paper costs \$3 per roll. Your budget allows you to spend at most \$48 for crepe paper. How many rolls of gold and blue crepe paper can you buy without exceeding your budget?

Let x = the number of rolls of blue crepe paper.
Let y = the number of rolls of gold crepe paper.

a. Write a linear inequality that describes the situation.
b. Graph the linear inequality.
c. Write three possible solutions to the problem.
d. Critical Thinking The point $(-2, 5)$ is a solution of the inequality. Is it a solution of the problem? Explain.

Real-World Connection

The American Academy of Orthopaedic Surgeons suggest that a backpack's weight should not be more than 20% of a student's body weight.

24. **Manufacturing** A company makes nylon and canvas backpacks, as shown at the left. The profit on a nylon backpack is \$3 and the profit on a canvas backpack is \$10. How many backpacks must the company sell to make a profit of more than \$250?

a. Write a linear inequality that describes the situation.
b. Graph the linear inequality.
c. Write three possible solutions to the problem.
d. Critical Thinking Which values are reasonable for the domain and for the range? Explain.

B Apply Your Skills

Graph each linear inequality.

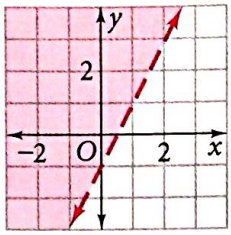
25. $y \leq \frac{2}{5}x + 2$ **26.** $y \geq -\frac{2}{5}x + 2$ **27.** $4x - 5y \leq 10$ **28.** $4x + 5y \leq 10$

29. $4y < 6x + 2$ **30.** $2x + 3y \leq 6$ **31.** $4x - 4y \leq 8$ **32.** $y - 2x < 2$

33. Writing Explain how you can tell from a linear inequality whether you will shade above or below the graph of the boundary line.

Write the inequality shown in each graph.

34.



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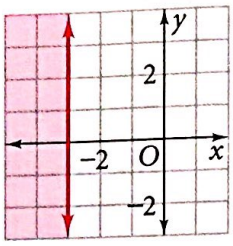

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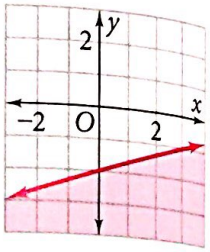


Real-World Connection

In 2000, there were about 12,900 licensed radio stations in the United States.

37. Budget Suppose you work at a local radio station. You are in charge of a $180 budget for new tapes and CDs. Record companies will give you 21 promotional (free) CDs. You can buy tapes for $8 and CDs for $12.

Let x = the number of CDs you buy.
Let y = the number of tapes you buy.

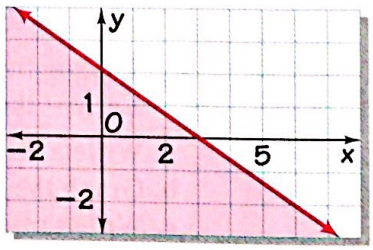
a. Write an inequality that shows the number of tapes and CDs you can buy.
b. Graph the inequality.
c. Is (8, 9) a solution of the inequality? Explain what the solution means.
d. If you buy only tapes and you buy as many as possible, how many new recordings will the station get?

Write the linear inequality described. Then graph the inequality.

38. x is positive. **39.** y is negative.

40. y is not negative. **41.** x is less than y.

42. Error Analysis Jan's graph of the inequality $4x + 6y > 12$ is shown below. What is wrong with the graph?

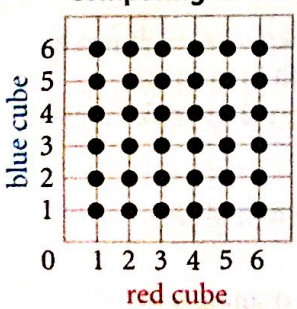


43. Critical Thinking Write an inequality that describes the entire part of the coordinate plane *not* included in the solution of $y \geq x + 2$.

44. Probability Suppose you play a carnival game. You toss one blue and one red number cube. If the number on the blue cube is greater than the number on the red cube, you win a prize. The graph at the left shows all the possible outcomes of tossing the cubes.

a. Copy and shade the graph to show the winning outcomes.
b. Write an inequality that describes the shaded region.
c. What is the probability that you will win a prize?

Comparing Cubes



Problem Solving Hint

For Exercise 45, draw a diagram of a possible garden.

45. **Geometry** You want to fence a rectangular area of your yard for a garden. You plan to use no more than 50 ft of fencing.
   a. Write and graph a linear inequality that describes this situation.
   b. Open-Ended What are two possible sizes for a square garden?
   c. Can you make the garden 12 ft by 15 ft? Justify your answer.

Challenge

For Exercises 46–47, write the inequality that has the solution described.

46. The points $(0, -3)$ and $(8, 5)$ lie on the boundary line, but neither point is a solution. The point $(1, 1)$ is not a solution.

47. The points $(7, 12)$ and $(-3, -8)$ lie on the boundary line, and each point is a solution. The point $(1, 1)$ is also a solution.

48. **a. Open-Ended** Write and graph an inequality in the form $Ax + By > C$, where A, B, and C are all positive.
   b. Write and graph an inequality in the form $Ax + By < C$, where A, B, and C are all positive.
   c. Reasoning Both inequalities are in standard form. Make a conjecture about the inequality symbol and the region shaded.
   d. Would your conjecture in part (c) be different if B were negative?

49. **a.** Is the point $(4, 5)$ a solution of the inequality $y > x - 1$?
   b. Is the point $(4, 5)$ a solution of the inequality $y < 3x$?
   c. Find one other point that is a solution of both inequalities.
   d. Draw a graph that shows all the points that are solutions of both inequalities.