3.3 EXERCISES

HOMEWORK KEY

- ○ = **WORKED-OUT SOLUTIONS** on p. WS5 for Exs. 9, 19, and 37
- ★ = **STANDARDIZED TEST PRACTICE** Exs. 2, 3, 26, 27, 36, and 39
- ◆ = **MULTIPLE REPRESENTATIONS** Ex. 37

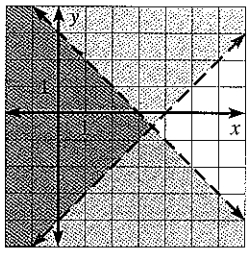
SKILL PRACTICE

1. **VOCABULARY** What must be true in order for an ordered pair to be a solution of a system of linear inequalities?

2. ★ **WRITING** *Describe* how to graph a system of linear inequalities.

EXAMPLES 1, 2, and 3 on pp. 168–169 for Exs. 3–16

3. ★ **MULTIPLE CHOICE** Which system of inequalities is represented by the graph?



(A) $x + y > 3$, $-x + y < -4$

(B) $-x + y \geq -4$, $x + y \leq 3$

(C) $-2x + y > -4$, $2x + y < 3$

(D) $-x + y > -4$, $x + y < 3$

SYSTEMS OF TWO INEQUALITIES **Graph the system of inequalities.**

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

5. $x \leq 2$, $y \leq 5$

6. $y \geq 5$, $y \leq 1$

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

8. $y < 10$, $y > |x|$

9. $4x - 4y \geq -16$, $-x + 2y \geq -4$

10. $-x \geq y$, $-x + y \geq -5$

11. $y > |x| - 4$, $3y < -2x + 9$

12. $x + y \geq -3$, $-6x + 4y < 14$

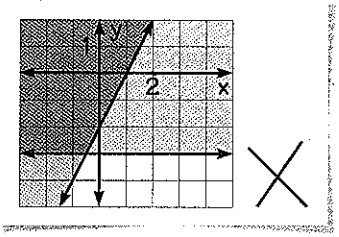
13. $2y < -5x - 10$, $5x + 2y > -2$

14. $3x - y > 12$, $-x + 8y > -4$

15. $x - 4y \leq -10$, $y \leq 3|x - 1|$

16. **ERROR ANALYSIS** *Describe* and correct the error in graphing the system of inequalities.

$y \geq -3$
$y \leq 2x - 2$



EXAMPLE 4 on p. 170 for Exs. 17–25

SYSTEMS OF THREE OR MORE INEQUALITIES **Graph the system of inequalities.**

17. $x < 6$, $y > -1$, $y < x$

18. $x \geq -8$, $y \leq -1$, $y < -2x - 4$

19. $3x + 2y > -6$, $-5x + 2y > -2$, $y < 5$

20. $x + y < 5$, $2x - y > 0$, $-x + 5y > -20$

21. $x \geq 2$, $-3x + y < -1$, $4x + 3y < 12$

22. $y \geq x$, $x + 3y < 5$, $2x + y \geq -3$

23. $y \geq 0$, $x > 3$, $x + y \geq -2$, $y < 4x$

24. $x + y < 5$, $x + y > -5$, $x - y < 4$, $x - y > -2$

25. $x \leq 10$, $x \geq -2$, $3x + 2y < 6$, $6x + 4y > -12$

26. ★ **MULTIPLE CHOICE** Which quadrant of the coordinate plane contains no solutions of the system of inequalities?

$$y \leq -|x - 3| + 2$$
$$4x - 5y \leq 20$$

Ⓐ Quadrant I Ⓑ Quadrant II Ⓒ Quadrant III Ⓓ Quadrant IV

27. ★ **OPEN-ENDED MATH** Write a system of two linear inequalities that has $(2, -1)$ as a solution.

ABSOLUTE VALUE SYSTEMS **Graph the system of inequalities.**

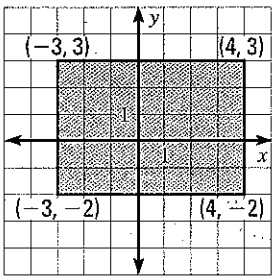
28. $y < |x|$
$y > -|x|$

29. $y \leq |x - 2|$
$y \geq |x| - 2$

30. $y \leq -|x - 3| + 2$
$y > |x - 3| - 1$

CHALLENGE **Write a system of linear inequalities for the shaded region.**

31.



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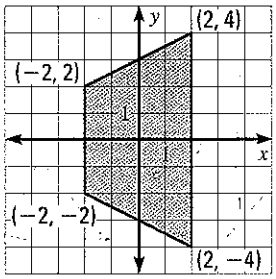

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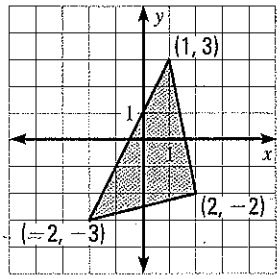

PROBLEM SOLVING

EXAMPLE 4 on p. 170 for Exs. 34–39

34. **SUMMER JOBS** You can work at most 20 hours next week. You need to earn at least \$92 to cover your weekly expenses. Your dog-walking job pays \$7.50 per hour and your job as a car wash attendant pays \$6 per hour. Write a system of linear inequalities to model the situation.

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35. **VIDEO GAME SALE** An online media store is having a sale, as described in the ad shown. Use the information in the ad to write and graph a system of inequalities for the regular video game prices and possible sale prices. Then use the graph to estimate the range of possible sale prices for games that are regularly priced at \$20.

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36. ★ **SHORT RESPONSE** A book on the care of tropical fish states that the pH level of the water should be between 8.0 and 8.3 pH units and the temperature of the water should be between 76°F and 80°F. Let x be the pH level and y be the temperature. Write and graph a system of inequalities that describes the proper pH level and temperature of the water. *Compare* this graph to the graph you would obtain if the temperatures were given in degrees Celsius.

○ = WORKED-OUT SOLUTIONS on p. WS1 ★ = STANDARDIZED TEST PRACTICE ◆ = MULTIPLE REPRESENTATIONS

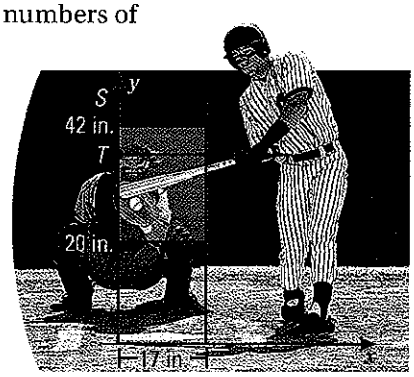
37. ◆ **MULTIPLE REPRESENTATIONS** The Junior-Senior Prom Committee must consist of 5 to 8 representatives from the junior and senior classes. The committee must include at least 2 juniors and at least 2 seniors. Let x be the number of juniors and y be the number of seniors.

a. Writing a System Write a system of inequalities to describe the situation.

b. Graphing a System Graph the system you wrote in part (a).

c. Finding Solutions Give two possible solutions for the numbers of juniors and seniors on the prom committee.

38. BASEBALL In baseball, the strike zone is a rectangle the width of home plate that extends from the batter's knees to a point halfway between the shoulders S and the top T of the uniform pants. The width of home plate is 17 inches. Suppose a batter's knees are 20 inches above the ground and the point halfway between his shoulders and the top of his pants is 42 inches above the ground. Write and graph a system of inequalities that represents the strike zone.



39. ★ EXTENDED RESPONSE A person's theoretical maximum heart rate (in heartbeats per minute) is $220 - x$ where x is the person's age in years ($20 \leq x \leq 65$). When a person exercises, it is recommended that the person strive for a heart rate that is at least 50% of the maximum and at most 75% of the maximum.

a. Write a system of linear inequalities that describes the given information.

b. Graph the system you wrote in part (a).

c. A 40-year-old person has a heart rate of 158 heartbeats per minute when exercising. Is the person's heart rate in the target zone? *Explain.*

40. CHALLENGE You and a friend are trying to guess the number of pennies in a jar. You both agree that the jar contains at least 500 pennies. You guess that there are x pennies, and your friend guesses that there are y pennies. The actual number of pennies in the jar is 1000. Write and graph a system of inequalities describing the values of x and y for which your guess is closer than your friend's guess to the actual number of pennies.

MIXED REVIEW

Evaluate the expression for the given values of x and y. *(p. 10)*

41. $6x - 8y$ when $x = 4$ and $y = -1$

42. $12x + 3y$ when $x = 4$ and $y = -5$

43. $x^2 - 2xy + 3y$ when $x = -2$ and $y = 3$

44. $4x^2y^2 - xy$ when $x = 5$ and $y = -6$

Solve the inequality. Then graph the solution. *(p. 41)*

45. $x - 8 \leq -5$

46. $5x - 11 > -x + 7$

47. $9x + 2 \geq -3x - 13$

PREVIEW
Prepare for Lesson 3.4 in Exs. 48–53.

Solve the system of linear equations. *(p. 160)*

48. $-5x + y = -11$
$4x - y = 7$

49. $9x + 4y = -7$
$3x - 5y = -34$

50. $4x + 9y = -10$
$8x + 18y = 20$

51. $x - 5y = 18$
$2x + 3y = 10$

52. $16x - 12y = -8$
$8x - 6y = -4$

53. $16x + 5y = -4$
$8x - 2y = 7$