

Answer graphs to Exercises 7–32, 34–37, 39–43, 45–50, 53–60, and 61a are on pages AA29–AA31.

EXERCISE SET 6.5

Concept Check

- What is a half-plane?
A half-plane is the set of points on one side of a line in a plane.
- Is it possible for a system of inequalities to have no solution? If so, give an example. If not, explain why not.
Yes. Examples will vary.
- Is $(3, 4)$ a solution of $-2x + 5y > 11$? Yes
- Is $(-2, 3)$ a solution of $6x + 4y \leq 0$? Yes
- Is $(4, 5)$ a solution of the following system of inequalities?

$$\begin{cases} 3x - 2y \leq 6 \\ x + 3y < 14 \\ x \geq 2, y > 3 \end{cases}$$
 No
- Is $(2, 1)$ a solution of the following system of inequalities?

$$\begin{cases} 2x + 7y \geq 3 \\ -x + 6y \leq 14 \\ x \geq 0, y \geq 2 \end{cases}$$
 No

In Exercises 7 to 28, sketch the graph of each inequality.

- $y \leq -2$
- $x + y > -2$
- $y \geq 2x + 3$
- $y < -2x + 1$
- $2x - 3y < 6$
- $3x + 4y \leq 4$
- $4x + 3y \leq 12$
- $5x - 2y < 8$
- $y < x^2$
- $x > y^2$
- $y \geq x^2 - 2x - 3$
- $y < 2x^2 - x - 3$
- $(x - 2)^2 + (y - 1)^2 < 16$
- $(x + 2)^2 + (y - 3)^2 > 25$
- $\frac{(x - 3)^2}{9} - \frac{(y + 1)^2}{16} > 1$
- $\frac{(x + 1)^2}{25} - \frac{(y - 3)^2}{16} \leq 1$
- $4x^2 + 9y^2 - 8x + 18y \geq 23$
- $25x^2 - 16y^2 - 100x - 64y < 64$
- $y \geq |2x - 4|$
- $y < |x|$
- $y < 2^{x-1}$
- $y > \log_3 x$

In Exercises 29 to 50, sketch the graph of the solution set of each system of inequalities.

- $\begin{cases} 1 \leq x < 3 \\ -2 < y \leq 4 \end{cases}$
- $\begin{cases} -2 < x < 4 \\ y \geq -1 \end{cases}$
- $\begin{cases} x + y \leq 2 \\ x - y < 2 \end{cases}$
- $\begin{cases} 2x - 5y < -6 \\ 3x + y < 8 \end{cases}$

Indicates Try It Exercises

$$33. \begin{cases} 2x - y \geq -4 \\ 4x - 2y \leq -17 \end{cases}$$

No solution

$$34. \begin{cases} 4x + 2y > 5 \\ 6x + 3y > 10 \end{cases}$$

$$35. \begin{cases} 2x + 3y < 6 \\ 3x - 2y \geq -6 \end{cases}$$

$$36. \begin{cases} 3x + 5y \geq -8 \\ 2x - 3y \geq 1 \end{cases}$$

$$37. \begin{cases} y < 2x + 3 \\ y > 2x - 2 \end{cases}$$

$$38. \begin{cases} y > 3x + 1 \\ y < 3x - 2 \end{cases}$$

No solution

$$39. \begin{cases} y > x - 1 \\ y \leq -x^2 + 4 \end{cases}$$

$$40. \begin{cases} y \leq 2x + 7 \\ y > x^2 + 3x + 1 \end{cases}$$

$$41. \begin{cases} x^2 + y^2 \leq 49 \\ 9x^2 + 4y^2 \geq 36 \end{cases}$$

$$42. \begin{cases} y < 2x - 1 \\ y > x^2 - 2x + 2 \end{cases}$$

$$43. \begin{cases} (x - 1)^2 + (y + 1)^2 \leq 16 \\ (x - 1)^2 + (y + 1)^2 \geq 4 \end{cases}$$

$$44. \begin{cases} (x + 2)^2 + (y - 3)^2 > 25 \\ (x + 2)^2 + (y - 3)^2 < 16 \end{cases}$$

No solution

$$45. \begin{cases} \frac{x^2}{4} - \frac{y^2}{16} > 1 \\ \frac{x^2}{16} + \frac{y^2}{4} < 1 \end{cases}$$

$$46. \begin{cases} \frac{(x + 1)^2}{36} + \frac{(y - 2)^2}{25} < 1 \\ \frac{(x + 1)^2}{25} + \frac{(y - 2)^2}{36} < 1 \end{cases}$$

$$47. \begin{cases} 6x + y \geq 30 \\ x + 4y \geq 40 \\ 2x + 3y \geq 60 \\ x \geq 0, y \geq 0 \end{cases}$$

$$48. \begin{cases} 5x + y \leq 9 \\ 2x + 3y \leq 14 \\ x \geq -2, y \geq 2 \end{cases}$$

$$49. \begin{cases} x + 4y \leq 80 \\ x + y \leq 35 \\ 2x + y \leq 60 \\ x \geq 0, y \geq 0 \end{cases}$$

$$50. \begin{cases} 4x + y \geq 13 \\ 3x + 2y \geq 16 \\ x \leq 15, y \leq 12 \end{cases}$$

51. **Physical Fitness** The instructor of an aerobics exercise class for beginners uses the following system of inequalities to find the targeted exercise heart rate ranges for the members of the class.

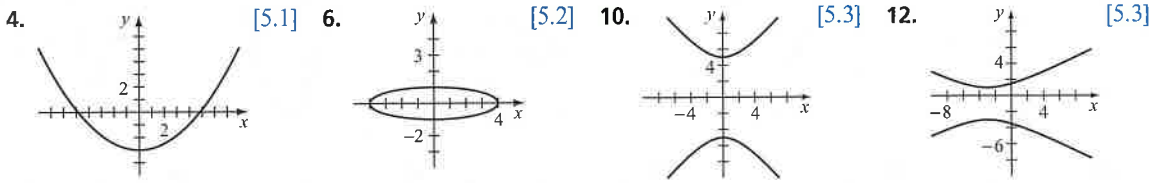
$$\begin{cases} y \geq 0.55(208 - 0.7x) \\ y \leq 0.75(208 - 0.7x) \\ 20 \leq x \leq 50 \end{cases}$$

In this system, y is the person's exercise heart rate in beats per minute and x is the person's age in years. Use the system of inequalities to determine the targeted exercise heart rate range for Ashley, who is 35. Round the minimum and maximum targeted heart rates to the nearest beat per minute. 101 to 138 bpm

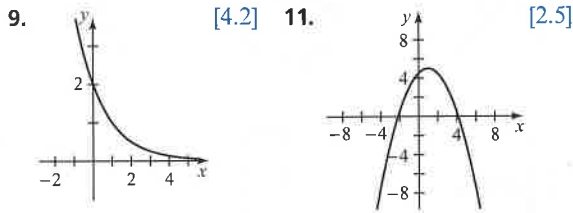
52. **Physical Fitness** The sprinters on a track team use the following system of inequalities to determine their targeted exercise heart rate ranges for their workouts.

$$\begin{cases} y \geq 0.80(208 - 0.7x) \\ y \leq 0.85(208 - 0.7x) \\ 20 \leq x \leq 28 \end{cases}$$

Chapter 5 Test, page 474



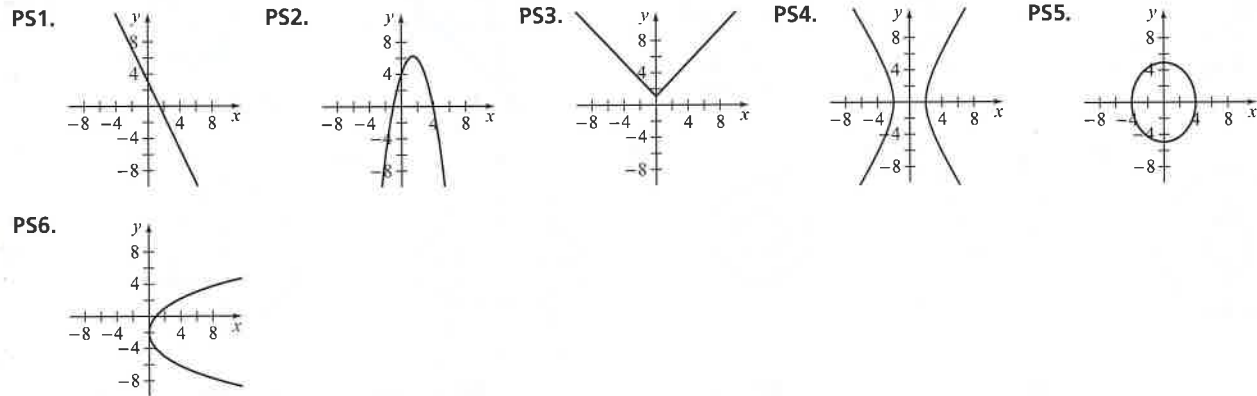
Cumulative Review Exercises, page 475



Exercise Set 6.4, page 514

41. $\frac{1}{5(x+2)} + \frac{4}{5(x-3)}$ 42. $\frac{-1}{4x} + \frac{5}{4(x-4)}$ 43. $\frac{1}{x} + \frac{2}{x^2} + \frac{3}{x^4} + \frac{-2}{x-2}$ 44. $\frac{1}{x-1} - \frac{1}{x+1} + \frac{1}{(x+1)^2}$
 45. $\frac{4}{3(x-1)} + \frac{2x+7}{3(x^2+x+1)}$ 46. $\frac{-1}{x-1} + \frac{1}{x+1} + \frac{x}{x^2-x+1}$ 48. a. $\frac{1}{-3(x^2+4)} + \frac{1}{3(x^2+1)}$ b. $\frac{1}{8(x^2+1)} + \frac{1}{-8(x^2+9)}$
 c. $\frac{1}{x^2+x+1} - \frac{1}{x^2+x+2}$ d. $\frac{1}{5(x^2+2x+4)} - \frac{1}{5(x^2+2x+9)}$

Prepare for This Section (6.5), page 515



In Exercise Set 6.5, the Chapter 6 Review Exercises, and the Chapter 6 Test, the graph of each solution set consists of all points in the gray shaded region and any points adjacent to the region that are on a solid boundary of the region.

Exercise Set 6.5, page 521

