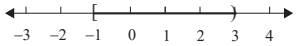
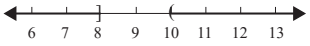
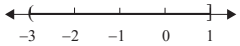
Margin Exercise Answers

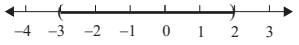
1. a. $A \cup B = \{1,2,4,6,8\}$ **b.** $A \cap B = \{2,4,8\}$ **2. a.** $M \cup N = \left\{-4,-3,-2,-1,0,\frac{1}{3},5,6.4,9\right\}$;
b. $M \cap N = \{-4,-1\}$ **3.** $F \cup G = \{-3,-2,-1,1,2,3\}$; $F \cap G = \varnothing$

4. 

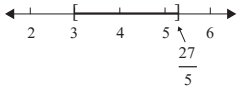
5. 

6. 

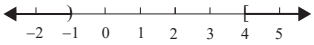
$(-3,1]$

7. 

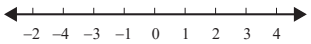
$(-3,2)$

8. 

$\left[3,\frac{27}{5}\right]$

9. 

$(-\infty,-1) \cup [4,\infty)$

10. 

$(-\infty,\infty)$

9.8 Exercises

Concept Check

Fill-in-the-Blank. Complete each sentence using information found in this section.

1. The items in a set are called _____.
2. The word _____ is used to indicate union and the word _____ is used to indicate intersection.
3. In set-builder notation, the vertical bar | is read "_____ _____."
4. Two inequalities related by *and* or *or* are called _____ inequalities.
5. A set is in _____ form if the elements are listed within braces, such as $A = \{1,2,3,5,8,...\}$.
6. If the elements in a set cannot be counted, the set is said to be _____.

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

7. The union of two sets is the set of all elements that belong to both sets.
8. The intersection of two sets is the set of elements that belong to just one set or the other, but not both.
9. A null set contains no elements.
10. The solution set of a compound inequality containing *and* is the union of the solution sets of the two inequalities.

Practice

Find the union and the intersection of the two given sets. See Examples 1 through 3.

1. $A = \{2,4,6,8\}$, $B = \{1,2,3,4\}$
2. $R = \{-1,0,1\}$, $S = \{-2,-1,1,2\}$

3. $P = \{-4, -2, 0, 2, 4, 6\}$, $Q = \{-3, -1, 0, 1\}$

4. $A = \{10, 15, 20, 25\}$, $B = \{6, 8, 10, 12\}$

5. $E = \{1, 2, 4, 8, 16, 32\}$, $F = \{1, 4, 16, 64\}$

6. $C = \{-10, -6, -2, 0, 5, 7\}$, $D = \{-10, -2, 0, 1, 3, 5\}$

Graph each set of numbers on a real number line. See Examples 4 and 5.

7. $\{x \mid x > 3 \text{ or } x \le 2\}$

8. $[-5, -1]$

9. $(3, 8)$

10. $[-7, -4)$

11. $(-\infty, -6]$

12. $(4, \infty)$

13. $(-\infty, 5)$

14. $(-\infty, 4]$

Graph each set of numbers on a real number line.

15. $\{x \mid x \text{ is a whole number less than } 3\}$

16. $\{x \mid x \text{ is an integer with } |x| \le 3\}$

17. $\{x \mid x \text{ is a prime number less than } 20\}$

18. $\{x \mid x \text{ is a positive whole number divisible by } 0\}$

Use set-builder notation to indicate each set of numbers as described.

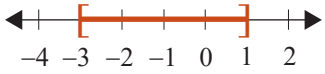
19. The set of all real numbers between 3 and 5, including 3

20. The set of all real numbers between -4 and 4

21. The set of all real numbers greater than or equal to -2.5

22. The set of all real numbers between -1.8 and 5, including both of these numbers

The graphs of intervals of real numbers are given. **a.** Use set-builder notation to indicate the interval of numbers shown in each graph. **b.** Use interval notation to represent the graph.

23.


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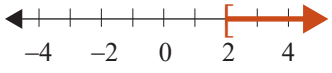

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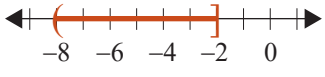

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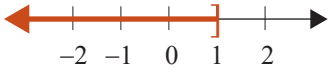
27.


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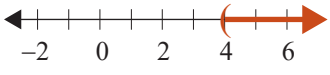

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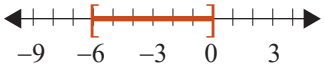
30.


Solve each compound inequality and graph its solution set. Write each solution set using interval notation. See Examples 6 through 10.

31. $\{x \mid x + 3 > 2 \text{ and } x - 1 < 5\}$

32. $\{x \mid x < -1 \text{ or } 2x + 1 \ge 3\}$

33. $\{x \mid 3x - 1 \le 5 \text{ or } x + 2 \ge 8\}$

34. $\{x \mid 5x > 15 \text{ and } x + 3 < 10\}$

35. $\{x \mid 4x+3>-1 \text{ and } -2x+5>5\}$

36. $\{x \mid 12>-2x-6 \text{ or } x+3\le 2\}$

37. $\{x \mid -13\le 3x+3 \text{ and } 0\ge 2x-1\}$

38. $\{x \mid -6x+2\le 5 \text{ and } 2x+1<2\}$

39. $\{x \mid -0.8\le -4x+0.8 \text{ or } 0.3x\ge 1.5\}$

40. $\left\{x \mid -4\le \frac{1}{2}x-1 \text{ and } \frac{2}{3}x-1<5\right\}$

41. $-4<x+5<6$

42. $2\le -x+2\le 6$

43. $3\ge 4x-3\ge -1$

44. $13>3x+4>-2$

45. $1\le \frac{2}{3}x-1\le 9$

46. $-2\le \frac{1}{2}x-5\le -1$

47. $14>-2x-6>4$

48. $-11\ge -3x+2>-20$

49. $-1.5<2x+4.1<3.5$

50. $0.9<3x+2.4<6.9$

Writing & Thinking

51. Explain what is meant by the terms *and* and *or* when describing compound inequalities.