

## 7.11 Exercises

### Concept Check

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

1. If an absolute value expression is isolated on one side of an inequality, the inequality is in \_\_\_\_\_ form.
2. The inequality  $|x - 6| > 5$  means that the \_\_\_\_\_ between  $x$  and 6 is \_\_\_\_\_ than 5.
3. If  $|x| > c$  then  $x < -c$  \_\_\_\_\_  $x > c$ .
4. If an inequality is always true, such as  $|3x - 8| > -6$ , then the solution is all \_\_\_\_\_ numbers.

**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.)

5. If the solution is a union, there are two statements or inequalities, both of which must be true.
6. If the solution to a compound inequality is  $-4 < x < 6$ , then the solution is a union.
7. For a number to have absolute value greater than 2, its distance from 0 must be less than 2.
8. The inequality  $|2x + 9| < -2$  has no solution.

### Practice

Solve each of the absolute value inequalities and graph the solution sets. Write each solution using interval notation. See Examples 1 through 9.

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|---------------------------|---|-----------------------------|
| 1. $ x  \geq -2$          | 11. $ 2x - 1  \geq 2$                               | 21. $ 2x - 9  - 7 \leq 4$   |
| 2. $ x  \geq 3$           | 12. $ 3x + 4  > -8$                                 | 22. $ 3x - 7  + 4 \leq 4$   |
| 3. $ x  \leq \frac{4}{5}$ | 13. $ 3 - 2x  < -2$                                 | 23. $-4 <  6x - 1  + 4$     |
| 4. $ x  \geq \frac{7}{2}$ | 14. $ 4 + 3x  > 5$                                  | 24. $4 \leq  3x + 1  - 6$   |
| 5. $ x - 3  > 2$          | 15. $ 5 + 4x  \leq 3$                               | 25. $5 >  4 - 2x  + 2$      |
| 6. $ y - 4  \leq 5$       | 16. $ 5x - 2  < 8$                                  | 26. $7 >  8 - 5x  + 3$      |
| 7. $ x + 6  \leq 4$       | 17. $ 3x + 4  - 1 < 0$                              | 27. $3 4x + 5  - 5 > 10$    |
| 8. $ x + 2  \leq -4$      | 18. $ 2x - 3  - 3 \leq 0$                           | 28. $6 4x - 7  + 7 > 19$    |
| 9. $ x + 5  \geq 3$       | 19. $\left  \frac{3x}{2} - 4 \right  \geq 5$        | 29. $4 7x + 9  - 3 < 17$    |
| 10. $ x - 1  < 6$         | 20. $\left  \frac{3}{7}y + \frac{1}{2} \right  > 2$ | 30. $2 7x - 3  + 4 \geq 12$ |

## Writing & Thinking

A set of real numbers is described. **a.** Sketch a graph of the set on a real number line. **b.** Represent each set using absolute value notation. **c.** Represent each set using interval notation. If the set is one interval, state what type of interval it is.

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31. The set of real numbers between  $-10$  and  $10$ , inclusive
32. The set of real numbers within  $7$  units of  $4$
33. The set of real numbers more than  $6$  units from  $8$
34. The set of real numbers greater than or equal to  $3$  units from  $-1$
35. The set of real numbers within  $2$  units of  $-5$