

Write the numbers in each list in numerical order, from least to greatest. Use a calculator as necessary. See Examples 1 and 2.

1.  $\sqrt{8}, -4, -\sqrt{3}, -2, -5, \sqrt{6}, 3$

2.  $\sqrt{2}, -1, 4, 3, \sqrt{8}, -\sqrt{6}, \sqrt{7}$

3.  $\frac{3}{4}, \sqrt{2}, \frac{7}{5}, \frac{8}{5}, \frac{22}{15}$

4.  $-\frac{9}{8}, -3, -\sqrt{3}, -\sqrt{5}, -\frac{9}{5}, -\frac{8}{5}$

5.  $|-8|, |-9|, |-6|$

6.  $-|7|, -|-2|, -|-9|$

7. What is wrong with writing the statement " $x < 2$  or  $x > 5$ " as  $5 < x < 2$ ?

8. Students often say "Absolute value is always positive." Is this true? Explain your answer.

**Concept Check** Decide whether each statement is true or false. If false, correct the statement so it is true.

9.  $|5 - 7| = |5| - |7|$

10.  $|(-3)^3| = -|3^3|$

11.  $|-5| \cdot |4| = |-5 \cdot 4|$

12.  $\frac{|-8|}{|2|} = \frac{-8}{2}$

13.  $|a - b| = |a| - |b|$ , if  $b > a > 0$ .

14. If  $a$  is negative, then  $|a| = -a$ .

Evaluate each expression. See Example 2.

15.  $|-9|$

16.  $|-12|$

17.  $|\frac{4}{5}|$

18.  $-\left|\frac{27}{2}\right|$

Let  $x = -4$  and  $y = 2$ . Evaluate each expression. See Examples 3, 5, and 6.

19.  $|2x|$

20.  $|-3y|$

21.  $|x - y|$

22.  $|2x + 5y|$

23.  $|3x + 4y|$

24.  $|-5y + x|$

25.  $\frac{|2y| - 3|x|}{|xy|}$

26.  $\frac{4|x| + 4|y|}{|x|}$

27.  $\frac{|-8y + x|}{-|x|}$

28.  $\frac{|x| + 2|y|}{5 + x}$

Write each expression without absolute value bars. See Example 3.

29.  $|\pi - 3|$

30.  $|\pi - 5|$

31.  $|y - 3|$ , if  $y < 3$

32.  $|x - 4|$ , if  $x > 4$

33.  $|2k - 8|$ , if  $k < 4$

34.  $|3r - 15|$ , if  $r > 5$

35.  $|x - y|$ , if  $x < y$

36.  $|x - y|$ , if  $x > y$

37.  $|3 + x^2|$

38.  $|x^2 + 4|$

Justify each statement by giving the correct property of absolute value. Assume all variables represent real numbers. See Example 5.

39.  $|m| = |-m|$

40.  $|-k| \geq 0$

41.  $|-3| \cdot |-5| = |15|$

42.  $|8| \cdot |-4| = |-32|$

43.  $|k - m| \leq |k| + |-m|$

44.  $|5 + x| \leq |5| + |x|$

45.  $|12 + 11r| \geq 0$

46.  $\left|\frac{-12}{5}\right| = \frac{|-12|}{|5|}$