CHAPTER 4

Algebra Review

EXAMPLE 1 Distance Formula

Find the distance between the points $(-4, 3)$ and $(-7, 8)$.

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(-7 - (-4))^2 + (8 - 3)^2} \\ &= \sqrt{(-3)^2 + (5)^2} \\ &= \sqrt{34} \end{aligned}$$

EXERCISES

Find the distance between the points.

1. $(3, 6), (0, -2)$ **2.** $(5, -2), (-6, 5)$ **3.** $(-3, 4), (1, 4)$

4. $(-6, -6), (-3, -2)$ **5.** $(8, -2), (-3, -6)$ **6.** $(-8, 5), (-1, 1)$

EXAMPLE 2 Combining Like Terms

Simplify.

$$\begin{aligned} & 8x^2 + 16xy - 3x^2 + 3xy - 3x \\ & 8x^2 - 3x^2 + 16xy + 3xy - 3x && \text{Group like terms.} \\ & 5x^2 - 3x + 19xy && \text{Simplify.} \end{aligned}$$

EXERCISES

Simplify.

7. $6x + 11y - 4x + y$ **8.** $-5m + 3q + 4m - q$ **9.** $-3p - 4t - 5t - 2p$

10. $9x - 22y + 18x - 3y$ **11.** $3x^2y - 5xy^2 + 6x^2y$ **12.** $5x^2 + 2xy - 7x^2 + xy$

EXAMPLE 3 Solving Equations with Variables on Both Sides

Solve.

$$\begin{aligned} 6a - 12 &= 5a + 9 \\ a - 12 &= 9 && \text{Subtract } 5a \text{ from each side.} \\ a &= 21 && \text{Add 12 to each side.} \end{aligned}$$

EXERCISES

Solve the equation.

13. $3x + 5 = 2x + 11$ **14.** $-14 + 3a = 10 - a$ **15.** $8m + 1 = 7m - 9$

16. $y - 18 = 6y + 7$ **17.** $2s + 1 = 7s + 1$ **18.** $3a - 12 = -6a - 12$

19. $-2t + 10 = -t$ **20.** $11q - 6 = 3q + 8q$ **21.** $-7x + 7 = 2x - 11$

EXAMPLE 4 Solving Inequalities

Solve.

a. $5x - 4 \geq 4x + 6$

b. $10 - 7x < 24$

When you multiply or divide each side of an inequality by a *negative* number, you must *reverse* the inequality symbol to maintain a true statement.

a. $5x - 4 \geq 4x + 6$
$x - 4 \geq 6$
$x \geq 10$

b. $10 - 7x < 24$
$-7x < 14$
$x > -2$

EXERCISES

Solve the inequality.

22. $-x + 2 > 7$

23. $c - 18 < 10$

24. $-5 + m < 21$

25. $x - 5 < 4$

26. $z + 6 > -2$

27. $-3x + 4 \leq -5$

28. $5 - 2x < -3x - 6$

29. $-m + 3 \geq -4m + 6$

30. $2b + 4 > -3b + 7$

31. $13 - 6x > 10 + 4x$

32. $4z + 8 \leq 12$

33. $14 - 5t \geq 28$

34. $6 - 3r < 24$

35. $16 - 12x \leq 28$

36. $-3x + 11 \geq 32$

EXAMPLE 5 Absolute Value Equations and Inequalities

Solve.

a. $|x + 8| = 4$
$x + 8 = 4$ *or*
$x + 8 = -4$
$x = -4$ *or* $x = -12$

b. $|x - 5| \geq 20$
$x - 5 \geq 20$ *or*
$x - 5 \leq -20$
$x \geq 25$ *or* $x \leq -15$

c. $|x + 1| < 3$
$x + 1 < 3$ *and*
$x + 1 > -3$
$x < 2$ *and* $x > -4$
$-4 < x < 2$

EXERCISES

Solve.

37. $|x + 5| = 12$

38. $|x - 2| = 10$

39. $|5 - x| = 3$

40. $|1 - x| = 6$

41. $|x + 3| = 17$

42. $|-5x + 2| = 7$

43. $|2x - 3| = 11$

44. $|7x + 8| = 20$

45. $|-4x + 5| = 13$

46. $|3x + 8| = 4$

47. $|x + 13| \geq 23$

48. $|x - 6| > 8$

49. $|x - 2| \leq 8$

50. $|15 - x| \geq 7$

51. $|16 - x| < 4$

52. $|6x - 4| < 8$

53. $|-2x + 4| \leq 10$

54. $|9x - 6| \leq 21$

55. $|11x - 11| \geq 33$

56. $|2x + 3| > 13$

57. $|10x + 20| < 40$

58. $|4x - 6| > 14$

59. $|x + 2| \geq 4$

60. $|5x - 9| < 14$

61. $|11x + 1| > 21$

62. $|-7x - 2| \leq -21$

63. $|3x - 2| > 10$

64. $|12x + 16| \leq 20$

65. $|5x + 8| \geq -32$

66. $7 + |x + 1| \leq 8$