CHAPTER P Review Exercises

Exercise numbers with a gray background indicate problems that the authors have designed to be solved *without a calculator*.

The collection of exercises marked in red could be used as a chapter test.

In Exercises 1 and 2, find the endpoints and state whether the interval is bounded or unbounded.

1. $[0, 5]$ **2.** $(2, \infty)$

3. Distributive Property Use the distributive property to write the expanded form of $2(x^2 - x)$.

4. Distributive Property Use the distributive property to write the factored form of $2x^3 + 4x^2$.

In Exercises 5 and 6, simplify the expression. Assume that denominators are not zero.

5. $\dfrac{(uv^2)^3}{v^2u^3}$ **6.** $(3x^2y^3)^{-2}$

In Exercises 7 and 8, write the number in scientific notation.

7. The mean distance from Pluto to the Sun is about 3,680,000,000 miles.

8. The diameter of a red blood corpuscle is about 0.000007 meter.

In Exercises 9 and 10, write the number in decimal form.

9. Our solar system is about 5×10^9 years old.

10. The mass of an electron is about 9.1094×10^{-28} g (gram).

11. The data in Table P.9 give the Fiscal 2009 final budget for some Department of Education programs. Using scientific notation and no calculator, write the amount in dollars for the programs.

Table P.9 Fiscal 2009 Budget

Program	Amount
Title 1 district grants	\$14.5 billion
Title 1 school improvement grants	\$545.6 million
IDEA (Individuals with Disabilities Education Act) state grants	\$11.5 billion
Teacher Incentive Fund	\$97 million
Head Start	\$7.1 billion

Source: U.S. Departments of Education, Health and Human Services as reported in Education Week, May 13, 2009.

(a) Title 1 district grants

(b) Title 1 school improvement grants

(c) IDEA state grants

(d) Teacher Incentive Fund

(e) Head Start

12. Decimal Form Find the decimal form for $-5/11$. State whether it repeats or terminates.

In Exercises 13 and 14, find **(a)** the distance between the points and **(b)** the midpoint of the line segment determined by the points.

13. -5 and 14 **14.** $(-4, 3)$ and $(5, -1)$

In Exercises 15 and 16, show that the figure determined by the points is the indicated type.

15. Right triangle: $(-2, 1)$, $(3, 11)$, $(7, 9)$

16. Equilateral triangle: $(0, 1)$, $(4, 1)$, $(2, 1 - 2\sqrt{3})$

In Exercises 17 and 18, find the standard form equation for the circle.

17. Center $(0, 0)$, radius 2

18. Center $(5, -3)$, radius 4

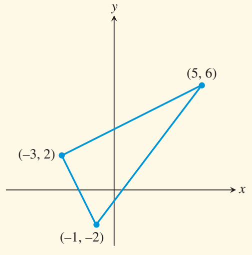
In Exercises 19 and 20, find the center and radius of the circle.

19. $(x + 5)^2 + (y + 4)^2 = 9$

20. $x^2 + y^2 = 1$

21. **(a)** Find the length of the sides of the triangle in the figure.

(b) Writing to Learn Show that the triangle is a right triangle.



22. Distance and Absolute Value Use absolute value notation to write the statement that the distance between z and -3 is less than or equal to 1.

23. Finding a Line Segment with Given Midpoint Let $(3, 5)$ be the midpoint of the line segment with endpoints $(-1, 1)$ and (a, b). Determine a and b.

24. Finding Slope Find the slope of the line through the points $(-1, -2)$ and $(4, -5)$.

25. Finding Point-Slope Form Equation Find an equation in point-slope form for the line through the point $(2, -1)$ with slope $m = -2/3$.

26. Find an equation of the line through the points $(-5, 4)$ and $(2, -5)$ in the general form $Ax + By + C = 0$.

In Exercises 27–32, find an equation in slope-intercept form for the line.

27. The line through $(3, -2)$ with slope $m = 4/5$

28. The line through the points $(-1, -4)$ and $(3, 2)$

29. The line through $(-2, 4)$ with slope $m = 0$

30. The line $3x - 4y = 7$

31. The line through $(2, -3)$ and parallel to the line $2x + 5y = 3$

32. The line through $(2, -3)$ and perpendicular to the line $2x + 5y = 3$

33. SAT Math Scores The SAT scores are measured on an 800-point scale. The data in Table P.10 show the average SAT math score for several years.

Table P.10 Average SAT Math Scores

Year	SAT Math Score
2000	514
2001	514
2002	516
2003	519
2004	518
2005	520
2006	518
2007	515
2008	515

Source: The World Almanac and Book of Facts, The New York Times, June, 2009.

(a) Let $x = 0$ represent 2000, $x = 1$ represent 2001, and so forth. Draw a scatter plot of the data.

(b) Use the 2001 and 2006 data to write a linear equation for the average SAT math score y in terms of the year x. Superimpose the graph of the linear equation on the scatter plot in (a).

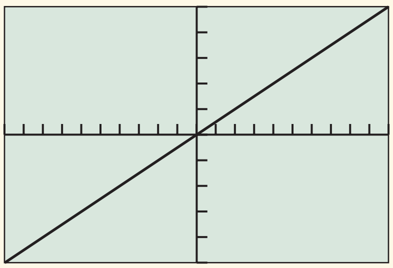
(c) Use the equation in (b) to estimate the average SAT math score in 2007. Compare with the actual value of 515.

(d) Use the equation in (b) to predict the average SAT math score in 2010.

34. Consider the point $(-6, 3)$ and Line L: $4x - 3y = 5$. Write an equation **(a)** for the line passing through this point and parallel to L, and **(b)** for the line passing through this point and perpendicular to L. Support your work graphically.

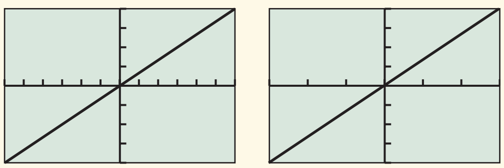
In Exercises 35 and 36, assume that each graph contains the origin and the upper right-hand corner of the viewing window.

35. Find the slope of the line in the figure.



[–10, 10] by [–25, 25]

36. Writing to Learn Which line has the greater slope? Explain.



[–6, 6] by [–4, 4]

(a)

[–15, 15] by [–12, 12]

(b)

In Exercises 37–52, solve the equation algebraically without using a calculator.

37. $3x - 4 = 6x + 5$

38. $\dfrac{x-2}{3} + \dfrac{x+5}{2} = \dfrac{1}{3}$

39. $2(5 - 2y) - 3(1 - y) = y + 1$

40. $3(3x - 1)^2 = 21$

41. $x^2 - 4x - 3 = 0$

42. $16x^2 - 24x + 7 = 0$

43. $6x^2 + 7x = 3$

44. $2x^2 + 8x = 0$

45. $x(2x + 5) = 4(x + 7)$

46. $|4x + 1| = 3$

47. $4x^2 - 20x + 25 = 0$

48. $-9x^2 + 12x - 4 = 0$

49. $x^2 = 3x$

50. $4x^2 - 4x + 2 = 0$

51. $x^2 - 6x + 13 = 0$

52. $x^2 - 2x + 4 = 0$

53. Completing the Square Use completing the square to solve the equation $2x^2 - 3x - 1 = 0$.

54. Quadratic Formula Use the quadratic formula to solve the equation $3x^2 + 4x - 1 = 0$.

In Exercises 55–58, solve the equation graphically.

55. $3x^3 - 19x^2 - 14x = 0$

56. $x^3 + 2x^2 - 4x - 8 = 0$

57. $x^3 - 2x^2 - 2 = 0$

58. $|2x - 1| = 4 - x^2$

In Exercises 59 and 60, solve the inequality and draw a number line graph of the solution.

59. $-2 < x + 4 \le 7$

60. $5x + 1 \ge 2x - 4$

In Exercises 61–72, solve the inequality.

61. $\dfrac{3x-5}{4} \le -1$

62. $|2x - 5| < 7$

63. $|3x + 4| \ge 2$

64. $4x^2 + 3x > 10$

65. $2x^2 - 2x - 1 > 0$

66. $9x^2 - 12x - 1 \le 0$

67. $x^3 - 9x \le 3$

68. $4x^3 - 9x + 2 > 0$

69. $\left|\frac{x+7}{5}\right| > 2$

70. $2x^2 + 3x - 35 < 0$

71. $4x^2 + 12x + 9 \geq 0$

72. $x^2 - 6x + 9 < 0$

In Exercises 73–80, perform the indicated operation, and write the result in the standard form $a + bi$ without using a calculator.

73. $(3 - 2i) + (-2 + 5i)$

74. $(5 - 7i) - (3 - 2i)$

75. $(1 + 2i)(3 - 2i)$

76. $(1 + i)^3$

77. $(1 + 2i)^2(1 - 2i)^2$

78. i^{29}

79. $\sqrt{-16}$

80. $\frac{2 + 3i}{1 - 5i}$

81. Projectile Motion A projectile is launched straight up from ground level with an initial velocity of 320 ft/sec.

(a) When will the projectile's height above ground be 1538 ft?

(b) When will the projectile's height above ground be at most 1538 ft?

(c) When will the projectile's height above ground be greater than or equal to 1538 ft?

82. Navigation A commercial jet airplane climbs at takeoff with slope $m = 4/9$. How far in the horizontal direction will the airplane fly to reach an altitude of 20,000 ft above the takeoff point?

83. Connecting Algebra and Geometry Consider the collection of all rectangles that have length 1 cm more than three times their width w.

(a) Find the possible widths (in cm) of these rectangles if their perimeters are less than or equal to 150 cm.

(b) Find the possible widths (in cm) of these rectangles if their areas are greater than 1500 cm^2.