Applications

For Exercises 1–12, use your algorithms to find each sum without using a calculator.

    1. $^{+}12 + {}^{+}4$ **2.** $^{+}12 + {}^{-}4$ **3.** $^{-}12 + {}^{+}4$

    4. $^{-}7 + {}^{-}8$ **5.** $^{+}4.5 + {}^{-}3.8$ **6.** $^{-}4.5 + {}^{+}3.8$

    7. $^{-}250 + {}^{-}750$ **8.** $^{-}6200 + {}^{+}1200$ **9.** $^{+}0.75 + {}^{-}0.25$

    10. $^{+}\frac{2}{3} + {}^{-}\frac{1}{6}$ **11.** $^{-}\frac{5}{12} + {}^{+}\frac{2}{3}$ **12.** $^{-}\frac{8}{5} + {}^{-}\frac{3}{5}$

13. Find each sum.

    a. $^{+}3.8 + {}^{+}2.7$

    b. $^{-}3.8 + {}^{-}2.7$

    c. $^{-}3.8 + {}^{+}2.7$

    d. $^{+}3.8 + {}^{-}2.7$

14. Write an addition number sentence that matches each diagram.

    a.

    b.

    c.

    d.
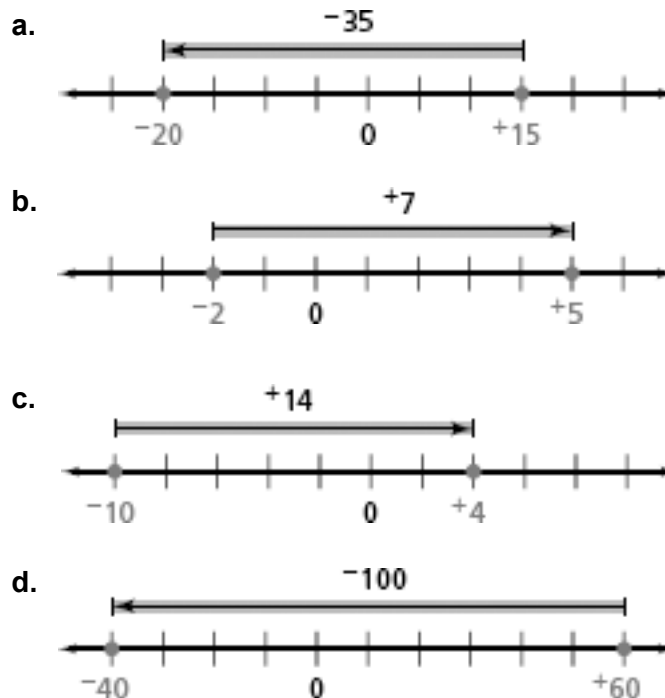
For Exercises 15 and 16, use the chip board below. The chip board has 10 black chips and 13 red chips.
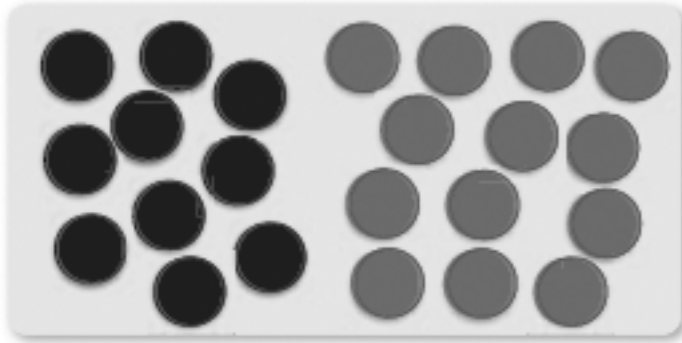
15. What is the value shown on the board?

16. Write a number sentence to represent each situation. Then find the new value of the chip board.

    a. Remove 5 red chips from the original board.

    b. Then add 5 black chips.

    c. Then add 4 black chips and 4 red chips.

17. Use properties of addition to find each value.

    a. $^{+}43 + {}^{-}47 + {}^{-}43$ **b.** $^{+}5.2 + {}^{-}5.2 + {}^{-}\frac{4}{7}$ **c.** $^{+}5\frac{2}{5} + {}^{+}\frac{3}{7} + {}^{-}5\frac{2}{5}$

For Exercises 18–29, use your algorithms to find each difference without using a calculator. Show your work.

18. $^{+}12 - {}^{+}4$ **19.** $^{+}12 - {}^{+}12$ **20.** $^{-}12 - {}^{+}12$

21. $^{-}7 - {}^{+}8$ **22.** $^{+}45 - {}^{-}40$ **23.** $^{+}45 - {}^{-}50$

24. $^{-}25 - {}^{-}75$ **25.** $^{-}62 - {}^{-}12$ **26.** $^{+}0.8 - {}^{-}0.5$

27. $\dfrac{^{+}1}{2} - \dfrac{^{+}3}{4}$ **28.** $\dfrac{^{-}2}{5} - \dfrac{^{+}1}{5}$ **29.** $\dfrac{^{-}7}{10} - \dfrac{^{+}4}{5}$

30. Find each value without using a calculator.

    a. $^{+}12 + {}^{-}12$ **b.** $^{+}4 - {}^{+}12$ **c.** $^{-}12 - {}^{+}4$

    d. $^{-}12 - {}^{-}12$ **e.** $^{-}12 + {}^{-}12$ **f.** $^{-}12 + {}^{+}12$

For Exercises 31–36, find each value.

31. $^{+}50 + {}^{-}35$

32. $^{+}50 - {}^{-}20$

33. $^{-}19 - {}^{+}11$

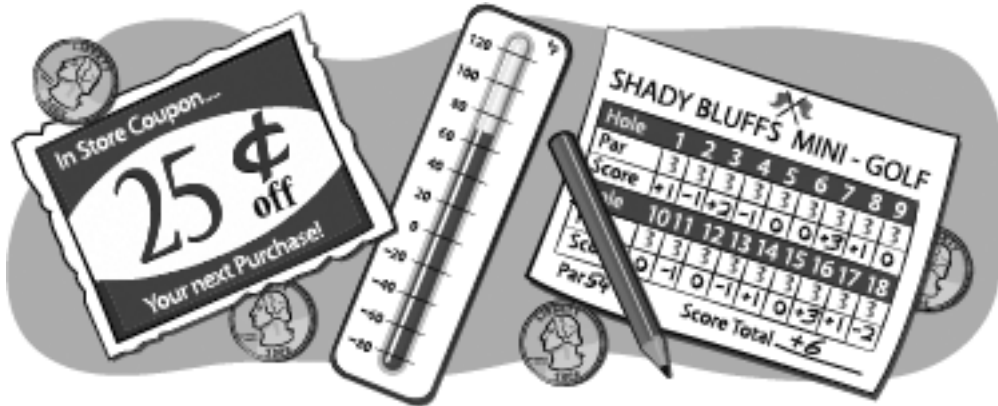**34.** $^{-}30 - {}^{+}50$

35. $^{-}35 + {}^{-}15$

36. $^{+}12 + {}^{-}18$

37. For each part below, write a problem about temperature, money, or game scores that can be represented by the number sentence.

   a. $^{+}7 - {}^{-}4 = {}^{+}11$

   b. $^{-}20 + n = {}^{+}30$

   c. $^{-}n + {}^{-}150 = {}^{-}450$

38. Without doing any calculations, decide which expression is greater. Explain your reasoning.

   a. $5,280 + {}^{-}768$ or $5,280 - {}^{-}768$

   b. $1,760 - {}^{-}880$ or $1,760 - 880$

   c. $1,500 + 3,141$ or $1,500 - {}^{-}3,141$

39. Without doing any calculations, determine which of the following results are positive and which are negative. Explain your reasoning.

   a. $^{-}23 + 19$

   b. $3.5 - {}^{-}2.7$

   c. $^{-}3.5 - {}^{-}2.04$

   d. $3.1 + {}^{-}6.2$

40. Find each missing part.

	Start With	Rule	End With
a.	⚫⚫	⬜	⚫⚫⚫⚫⚫⚫⚫
b.	⚫⚫⚫	⬜	⚫⚫⚫
c.	⬜	Add 5 ⚪	⚫⚫⚫
d.	⬜	Subtract 5 ⚫	⚫⚫

For Exercises 41–46, find each sum or difference. Show your work.

41. $15 + {}^-10$

42. ${}^-20 - 14$

43. $200 - {}^-125$

44. ${}^-20 - {}^-14$

45. ${}^-200 + 125$

46. $7 - 12$

47. Below is part of a time line with three years marked.

    2003   2013   2023
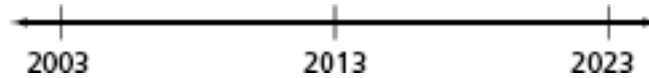
    a. Write two sentences in words that refer to the year 2013. One should relate 2013 to 2003, and the other should relate 2013 to 2023.

    b. Write two number sentences that refer to the year 2013. One should relate 2013 to 2003, and the other should relate 2013 to 2023.

    c. Describe how these two number sentences are alike and different.

48. Compute each of the following.

    a. $3 + {}^-3 + {}^-7$

    b. $3 - 3 - 7$

    c. ${}^-10 + {}^-7 + {}^-28$

    d. ${}^-10 - {}^-7 - {}^-28$

    e. $7 - 8 + {}^-5$

    f. $7 + {}^-8 - 5$

    g. ${}^-97 + {}^-35 - 10$

    h. ${}^-97 - 35 + {}^-10$

    i. What can you conclude about the relationship between subtracting a positive number and adding a negative number with the same absolute value? In other words, what is the relationship between a $(-\,^+)$ situation and a $(+\,^-)$ situation?

49. Compute each of the following.

    a. $3 - {}^-3 - {}^-7$

    b. $3 + 3 + 7$

    c. ${}^-10 - {}^-7 - {}^-28$

    d. ${}^-10 + 7 + 28$

    e. $7 + 8 + 5$

    f. $7 - {}^-8 - {}^-5$

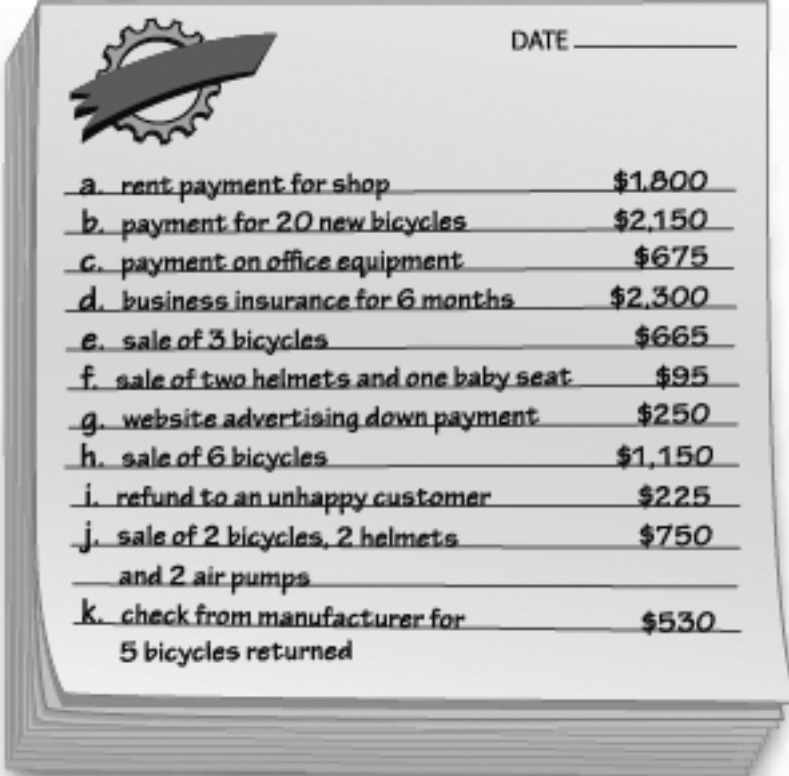   **g.** ${}^-97 - {}^-35 - 10$

    h. ${}^-97 + 35 + {}^-10$

    i. What can you conclude about the relationship between subtracting a negative number and adding a positive number with the same absolute value? In other words, what is the relationship between a $(-\,^-)$ situation and a $(+\,^+)$ situation?

Multiple Choice In each set of calculations, one result is different from the others. Find the different result without doing any calculations.

50. A. $54 + {}^{-}25$ **B.** $54 - 25$

    C. $25 - 54$ **D.** ${}^{-}25 + 54$

51. F. ${}^{-}6.28 - {}^{-}3.14$ **G.** ${}^{-}6.28 + 3.14$

    H. $3.14 + {}^{-}6.28$ **J.** ${}^{-}3.14 - {}^{-}6.28$

52. A. $534 - 275$ **B.** $275 - 534$

    C. ${}^{-}534 + 275$ **D.** $275 + {}^{-}534$

53. F. $175 + {}^{-}225$ **G.** $225 - 175$

    H. $175 - 225$ **J.** ${}^{-}225 + 175$

54. Fill in the missing information for each problem.

    a. $5 + \dfrac{3}{4} = \blacksquare$ **b.** $\dfrac{4}{8} + (-6) = \blacksquare$ **c.** $-3\dfrac{3}{4} - \left(-\dfrac{3}{4}\right) = \blacksquare$

    d. $2\dfrac{2}{3} - \dfrac{1}{3} = \blacksquare$ **e.** $-2 + \blacksquare = -2\dfrac{1}{2}$ **f.** $-4.5 + \blacksquare = -5$

55. Multiple Choice Which is the correct addition and subtraction fact family for $-2 + 3 = 1$?

A.	**B.**	**C.**	**D.**
$-2 + 3 = 1$	$-2 + 3 = 1$	$-2 + 3 = 1$	$1 - 3 = -2$
$-2 + 1 = 3$	$3 - 2 = 1$	$1 - 3 = -2$	$1 - (-2) = 3$
$3 - 1 = 2$	$3 - 1 = 2$	$1 - (-2) = 3$	$3 - 1 = 2$

56. For each of the following, write a related equation. Then find the value of .

    a. $n - 7 = 10$ **b.** $-\dfrac{1}{2} + n = -\dfrac{5}{8}$ **c.** $\dfrac{2}{3} - n = -\dfrac{7}{9}$

57. Are ${}^{+}8 - {}^{+}8$ and $8 - 8$ equal? Explain.

58. Are ${}^{+}100 - {}^{+}99$ and $100 - 99$ equal? Explain.

59. Are the expressions in each group below equivalent? If so, which form makes the computation easiest?

    a. $8 + {}^{-}10$ **b.** $3 + {}^{-}8$

        $8 - {}^{+}10$ $3 - {}^{+}8$

        $8 - 10$ $3 - 8$

Connections

60. The Spartan Bike Shop keeps a record of their business transactions. They start their account at zero dollars. Write a number sentence to represent each transaction. Then find the new balance.

a.	rent payment for shop	$1,800
b.	payment for 20 new bicycles	$2,150
c.	payment on office equipment	$675
d.	business insurance for 6 months	$2,300
e.	sale of 3 bicycles	$665
f.	sale of two helmets and one baby seat	$95
g.	website advertising down payment	$250
h.	sale of 6 bicycles	$1,150
i.	refund to an unhappy customer	$225
j.	sale of 2 bicycles, 2 helmets and 2 air pumps	$750
k.	check from manufacturer for 5 bicycles returned	$530

DATE _____

For Exercises 61 and 62, write a number sentence for each situation. Then answer the question.

61. The air temperature drops from 94°F to 72°F in 15 minutes. What is the change in temperature?

62. The Teacher's Pets team has 50 points in Math Fever. They miss a question worth 200 points. What is their new score?

63. Find four different numbers, in order from least to greatest, that lie between the two given numbers.

a. ⁻4.5 and ⁻3.5

b. ⁻0.5 and 0.5

Extensions

64. Which numbers, when added to –15, give a sum

    a. greater than 0?

    b. less than 0?

    c. equal to 0?

65. Use a number line to find the distance between each pair of numbers.

    a. $^+8-^+4$ **b.** $^-8-^+4$

    c. $^+8-^-4$ **d.** $^-8-^-4$

    e. $^-3\frac{1}{2}+{}^+\frac{3}{4}$ **f.** $^+5.4-^-1.6$

66. Find each absolute value.

    a. $\left|^+8-^+4\right|$ **b.** $\left|^-8-^+4\right|$

    c. $\left|^+8-^-4\right|$ **d.** $\left|^-8-^-4\right|$

    e. $\left|-3\frac{1}{2}-{}^+\frac{3}{4}\right|$ **f.** $\left|^+5.4-^-1.6\right|$

    g. Compare the results of parts (a)–(f) with the distances found in Exercise 65. What do you notice? Why do you think this is so?

67. Replace *n* with a number to make each statement true.

    a. $n + {}^-18 = 16$

    b. $^-24 - n = 12$

    c. $43 + n = {}^-12$

    d. $^-20 - n = {}^-50$

68. The table shows the profits or losses (in millions of dollars) earned by three companies from 2004 to 2013. Find the range of the annual results and the overall profit (or loss) for each company over that time period.

Top 3 Market Competitors

	Company	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13
a.	Sands Motor	−5.3	−4.8	−7.2	−2.1	1.4	6.5	3.2	−3.5	10.2	2.4
b.	Daily Trans	6.0	3.4	−5.8	−12.3	−20.3	−1.5	2.5	9.8	19.4	32.1
c.	Sell to You	120	98	−20	−40	−5	85	130	76	5	−30

69. Starting from 0, write an addition sentence for the diagrams below.

a.

b.