1.4 EXERCISES

Exercises 1–18 are designed to give you practice in learning how to do some basic operations on your calculator. Perform the indicated operations and give as many digits in your answer as shown on your calculator display. (The number of displayed digits may vary depending on the model used.)

1. $39.7 + (8.2 - 4.1)$

2. $2.8 \times (3.2 - 1.1)$

3. $\sqrt{5.56440921}$

4. $\sqrt{37.38711025}$

5. $\sqrt[3]{418.508992}$

6. $\sqrt[3]{700.227072}$

7. 2.67^2

8. 3.49^3

9. 5.76^5

10. 1.48^6

11. $\dfrac{14.32 - 8.1}{2 \times 3.11}$

12. $\dfrac{12.3 + 18.276}{3 \times 1.04}$

13. $\sqrt[5]{1.35}$

14. $\sqrt[6]{3.21}$

15. $\dfrac{\pi}{\sqrt{2}}$

16. $\dfrac{2\pi}{\sqrt{3}}$

17. $\sqrt[4]{\dfrac{2143}{22}}$

18. $\dfrac{12{,}345{,}679 \times 72}{\sqrt[3]{27}}$

19. Choose any number consisting of five digits. Multiply it by 9 on your calculator. Now add the digits in the answer. If the sum is more than 9, add the digits of this sum, and repeat until the sum is less than 10. Your answer will always be 9. Repeat the exercise with a number consisting of six digits. Does the same result hold?

20. Use your calculator to *square* the following two-digit numbers ending in 5: 15, 25, 35, 45, 55, 65, 75, 85. Write down your results, and examine the pattern that develops. Then use inductive reasoning to predict the value of 95^2. Write an explanation of how you can mentally square a two-digit number ending in 5.

By examining several similar computation problems and their answers obtained on a calculator, we can use inductive reasoning to make conjectures about certain rules, laws, properties, and definitions in mathematics. Perform each calculation and observe the answers. Then fill in the blank with the appropriate response. (Justification of these results will be discussed later in the book.)

21. $(-3) \times (-8)$; $(-5) \times (-4)$; $(-2.7) \times (-4.3)$

Multiplying two negative numbers gives a _____ product.
(negative/positive)

22. $5 \times (-4)$; -3×8; $2.7 \times (-4.3)$

Multiplying a negative number and a positive number gives a _____ product.
(negative/positive)

23. 5.6^0; π^0; 2^0; 120^0; $.5^0$

Raising a nonzero number to the power 0 gives a result of _____.

24. 1^2; 1^3; 1^{-3}; 1^0; 1^{13}

Raising 1 to any power gives a result of _____.

25. $1/7$; $1/(-9)$; $1/3$; $1/(-8)$

The sign of the reciprocal of a number is _____ the sign of the number.
(the same as/different from)

26. $5/0$; $9/0$; $\pi/0$; $-3/0$; $0/0$

Dividing a number by 0 gives a(n) _____ on a calculator.

27. $0/8$; $0/2$; $0/(-3)$; $0/\pi$

Zero divided by a nonzero number gives a quotient of _____.

28. $(-3) \times (-4) \times (-5)$; $(-3) \times (-4) \times (-5) \times (-6) \times (-7)$; $(-3) \times (-4) \times (-5) \times (-6) \times (-7) \times (-8) \times (-9)$

Multiplying an *odd* number of negative numbers gives a _____ product.
(positive/negative)

29. $(-3) \times (-4)$; $(-3) \times (-4) \times (-5) \times (-6)$; $(-3) \times (-4) \times (-5) \times (-6) \times (-7) \times (-8)$

Multiplying an *even* number of negative numbers gives a _____ product.
(positive/negative)

30. $\sqrt{-3}$; $\sqrt{-5}$; $\sqrt{-6}$; $\sqrt{-10}$

Taking the square root of a negative number gives a(n) _____ on a calculator.

31. Find the decimal representation of 1/6 on your calculator. Following the decimal point will be a 1 and a string of 6s. The final digit will be a 7 if your calculator *rounds off* or a 6 if it *truncates*. Which kind of calculator do you have?

32. Choose any three-digit number and enter the digits into a calculator. Then enter them again to get a six-digit number. Divide this six-digit number by 7. Divide the result by 13. Divide the result by 11. What is your answer? Explain why this happens.

33. Choose any digit except 0. Multiply it by 429. Now multiply the result by 259. What is your answer? Explain why this happens.

34. Choose two natural numbers. Add 1 to the second and divide by the first to get a third. Add 1 to the third and divide by the second to get a fourth. Add 1 to the fourth and divide by the third to get a fifth. Continue this process until you discover a pattern. What is the pattern?

When a four-function or scientific calculator (not a graphing calculator, however) is turned upside down, the digits in the display correspond to letters of the English alphabet as follows:

$0 \leftrightarrow$ O $\quad 3 \leftrightarrow$ E $\quad 7 \leftrightarrow$ L

$1 \leftrightarrow$ I $\quad 4 \leftrightarrow$ h $\quad 8 \leftrightarrow$ B

$2 \leftrightarrow$ Z $\quad 5 \leftrightarrow$ S $\quad 9 \leftrightarrow$ G.

For each of the following, perform the indicated calculation on a four-function or scientific calculator. Then turn your calculator upside down to read the word that belongs in the blank in the accompanying sentence.

35. $(100 \div 20) \times 14{,}215{,}469$

One of the biggest petroleum companies in the world is _____.

36. $\dfrac{10 \times 10{,}609}{\sqrt{4}}$

"It's got to be the _____."

37. $60^2 - \dfrac{368}{4}$

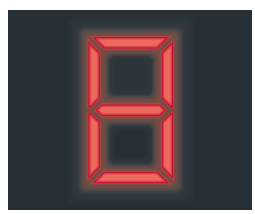
The electronics manufacturer _____ produces the Wave Radio.

38. $187^2 + \sqrt{1600}$

Have you ever read *Mother* _____ nursery rhymes?

39. Make up your own exercise similar to Exercises 35–38.

40. Displayed digits on most calculators usually show some or all of the parts in the pattern shown in the figure. For the digits 0 through 9:
(a) Which part is used most frequently?
(b) Which part is used the least?
(c) Which digit uses the most parts?
(d) Which digit uses the fewest parts?



Give an appropriate counting number answer to each question in Exercises 41–44. (Find the smallest counting number that will work.)

EXERCISES

41. ***Pages to Store Trading Cards*** A plastic page designed to hold trading cards will hold up to 9 cards. How many pages will be needed to store 431 cards?

42. ***Drawers for Videocassettes*** A sliding drawer designed to hold videocassettes has 18 compartments. If Chris wants to house his collection of 204 Disney videotapes, how many such drawers will he need?

43. ***Containers for African Violets*** A gardener wants to fertilize 400 African violets. Each container of fertilizer will supply up to 30 plants. How many containers will she need to do the job?

44. ***Fifth-Grade Teachers Needed*** Lake Harbor Middle School has 155 fifth-grade students. The principal, Cheryl Arabie, has decided that each fifth-grade teacher should have a maximum of 24 students. How many fifth-grade teachers does she need?

In Exercises 45–50, use estimation to determine the choice closest to the correct answer.

EXERCISES

45. ***Price per Acre of Land*** In order to build a "millennium clock" on Mount Washington in Nevada that would tick once each year, chime once each century, and last at least 10,000 years, the nonprofit Long Now Foundation purchased 80 acres of land for $140,000. Which one of the following is the closest estimate to the price per acre?
A. $1000 **B.** $2000 **C.** $4000 **D.** $11,200

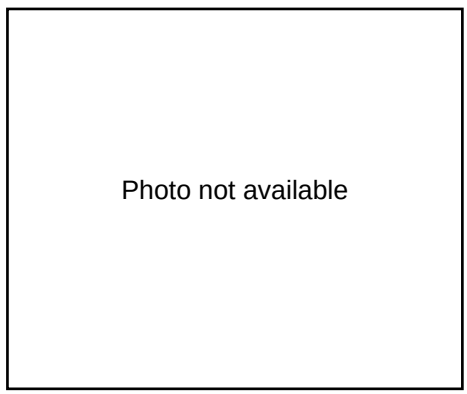
46. ***Time of a Round Trip*** The distance from Seattle, Washington, to Springfield, Missouri, is 2009 miles. About how many hours would a round trip from Seattle to Springfield and back take a bus that averages 50 miles per hour for the entire trip?
A. 60 **B.** 70 **C.** 80 **D.** 90

47. ***People per Square Mile*** Hale County in Texas has a population of 34,671 and covers 1005 square miles. About how many people per square mile live in Hale County?
A. 35 **B.** 350 **C.** 3500 **D.** 35,000

48. ***Revolutions of Mercury*** The planet Mercury takes 88.0 Earth days to revolve around the sun once. Pluto takes 90,824.2 days to do the same. When Pluto has revolved around the sun once, about how many times will Mercury have revolved around the sun?
A. 100,000 **B.** 10,000 **C.** 1000 **D.** 100

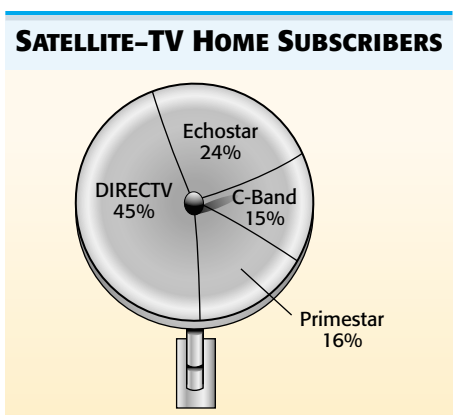
49. ***Rushing Average*** In 1998, Terrell Davis of the Denver Broncos rushed for 2008 yards in 392 attempts. His approximate number of yards gained per attempt was _____ .
A. 1/5 **B.** 50 **C.** 4 **D.** 5

50. ***Area of the Sistine Chapel*** The Sistine Chapel in Vatican City measures 40.5 meters by 13.5 meters.



Which one of the following is the closest approximation to its area?
A. 110 meters **B.** 55 meters
C. 110 square meters **D.** 600 square meters

Satellite Television Market Share *The 1999 market share for satellite television home subscribers is shown in the chart.*



Source: Skyreport.com; *USA Today.*

The total number of users reached 12,000,000 *in August 1999. Use this information and the pie chart to work Exercises 51–54.*

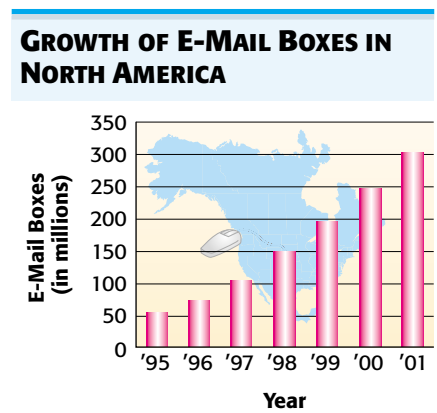
51. Which provider had the largest share of the home subscriber market in August 1999? What was that share?

52. Determine the number of home subscribers to Primestar in August 1999.

53. C-Band is associated with "large dishes" while all other subscribers have "small dishes." How many subscribers had small dishes?

54. How many more subscribers did Primestar have than C-Band?

Growth of E-mail *The latter half of the 1990s was characterized by incredible growth in a new method of communication: electronic mail ("e-mail"). The accompanying bar graph shows the number of e-mail boxes in North America for the years 1995–2001. Use the graph to answer the questions in Exercises 55–58.*



Source: IDC research.

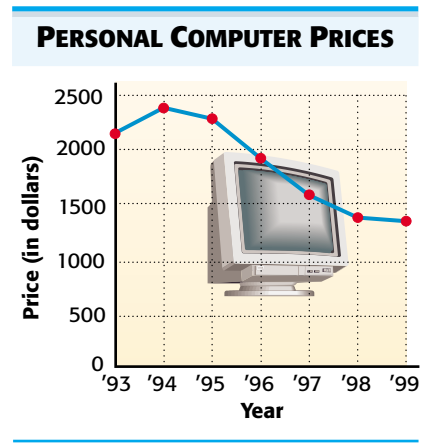
55. How many e-mail boxes were there in 1998?

56. By how many did the number of e-mail boxes grow between 1995 and 2001?

57. In what year was the number of e-mail boxes 150 million?

58. Suppose that the number of boxes in 2002 increased the same amount from the previous year as it did in 2001. What would have been the number of boxes in 2002?

Prices for Personal Computers *The accompanying line graph at the right shows average prices for personal computers (PCs) for the years 1993 through 1999. Use this information to answer the questions in Exercises 59–62.*



Source: CNW Marketing/Research; *USA Today.*

EXERCISES

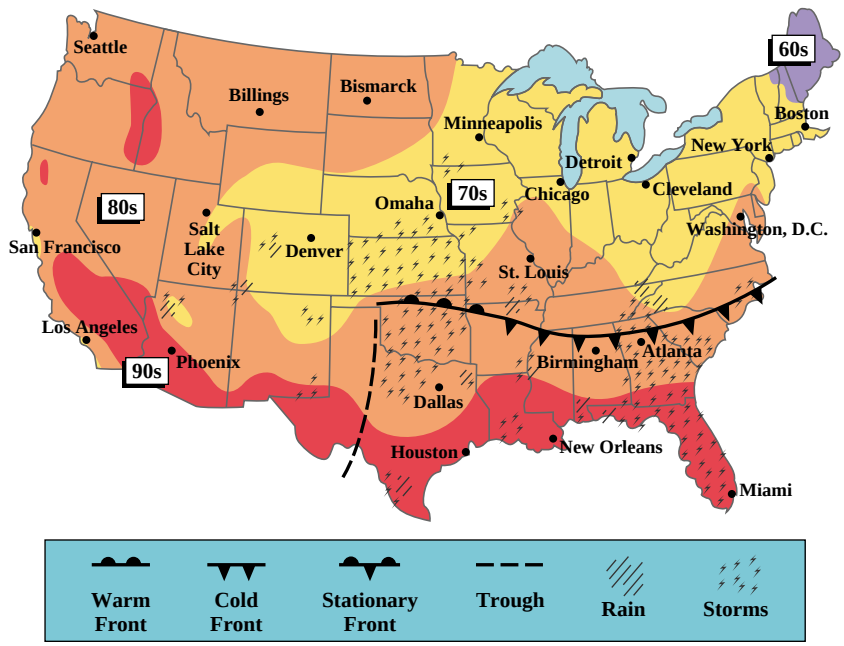
59. Between which years did the average price of a PC increase?

60. What has been the general trend in average PC prices since 1994?

61. What were the average PC prices in 1996 and in 1999?

62. About how much did PC prices decline between 1994 and 1999?

Weather Prediction *The map shows the predicted weather information for a summer day in July. Use the map and the accompanying legend to answer the questions in Exercises 63–68.*



63. Which temperature range (that is, 60s, 70s, 80s, or 90s) would we expect for Detroit?

64. What type of front is moving toward Atlanta?

65. Assuming that you think anything over 80° is hot, how would you describe the weather for Miami? Use at least two descriptive words.

66. Augusta is the capital of a northeastern state. In what temperature range will Augusta be?

67. In what state is a trough located?

68. Is there a good chance that a baseball game between the Yankees and the Indians, to be played at Jacobs Field in Cleveland, will be rained out?