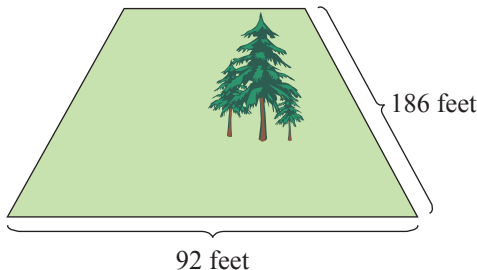


8. Calculate the area of an elementary school playground that is in the shape of a rectangle that is 52 yd wide and 73 yd long.

**Example 8 Application: Calculating the Area of a Rectangle**

Calculate the area of a rectangular plot of land with the dimensions shown here.



**Solution**

To find the area, we multiply  $186 \text{ ft} \cdot 92 \text{ ft}$ .

$$\begin{array}{r}
 186 \\
 \times 92 \\
 \hline
 372 \\
 16,740 \\
 \hline
 17,112 \text{ sq ft}
 \end{array}$$

The area of the plot of land is 17,112 sq ft.

**Now work margin exercise 8.**

**Completion Example Answers**

2. a. 1; multiplicative identity property    b. 5; commutative property of multiplication  
 c. 5; associative property of multiplication    d. 0; multiplication property of 0

**Margin Exercise Answers**

1. a. Commutative property of multiplication    b. Multiplication property of 0    c. Multiplicative identity property    d. Associative property of multiplication  
 2. a.  $n = 14$ ; Commutative property of multiplication    b.  $x = 25$ ; Multiplicative identity property    c.  $t = 0$ ; Multiplication property of 0    d.  $y = 1$ ; Associative property of multiplication  
 3. a.  $3 \cdot 10 + 3 \cdot 6 = 30 + 18 = 48$   
 b.  $5 \cdot 7 + 5 \cdot 4 = 35 + 20 = 55$     4. 90    5. 884    6. 480    7. a. 4500    b. 18,000    c. 200,000    d. 48,000,000  
 8. 3796 sq yd

# 1.3 Exercises

## Concept Check

**Fill-in-the-Blank.** Complete each sentence using information found in this section.

1. When numbers are multiplied, the answer is called the \_\_\_\_\_.
2. Another way of looking at multiplication is as if it were repeated \_\_\_\_\_.
3. When a number is multiplied by 0, the answer is always \_\_\_\_\_.
4.  $7 \cdot 12 = 12 \cdot 7$  is an example of the \_\_\_\_\_ property of multiplication.

5. According to the associative property of multiplication, the \_\_\_\_\_ of the numbers can be changed.
6. To find the area of a rectangle, multiply the \_\_\_\_\_ by the \_\_\_\_\_.

**True/False.** Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

7. The numbers being multiplied are called the divisors.
8. According to the multiplicative identity,  $1 \cdot 25 = 52$ .
9. According to the distributive property,  $4 \cdot (7 + 2) = 4 \cdot 7 + 4 \cdot 2$ .
10. The associative property of multiplication indicates that length can be multiplied by width or width can be multiplied by length to get the same answer.

## Practice

Multiply. See Examples 4 through 6.

- |  |   |  |
|--|---|--|
| 1. $\begin{array}{r} 84 \\ \times 2 \\ \hline \end{array}$   | 12. $\begin{array}{r} 76 \\ \times 26 \\ \hline \end{array}$  | 23. $\begin{array}{r} 420 \\ \times 104 \\ \hline \end{array}$   |
| 2. $\begin{array}{r} 21 \\ \times 6 \\ \hline \end{array}$   | 13. $51 \cdot 83$   | 24. $\begin{array}{r} 210 \\ \times 301 \\ \hline \end{array}$   |
| 3. $\begin{array}{r} 27 \\ \times 6 \\ \hline \end{array}$   | 14. $35 \cdot 84$   | 25. $\begin{array}{r} 4321 \\ \times 765 \\ \hline \end{array}$  |
| 4. $\begin{array}{r} 48 \\ \times 9 \\ \hline \end{array}$   | 15. $(17)(62)$  | 26. $\begin{array}{r} 3517 \\ \times 284 \\ \hline \end{array}$  |
| 5. $2(427)$  | 16. $(74)(31)$  | 27. $\begin{array}{r} 3463 \\ \times 1743 \\ \hline \end{array}$ |
| 6. $3(108)$  | 17. $\begin{array}{r} 106 \\ \times 72 \\ \hline \end{array}$ | 28. $\begin{array}{r} 4251 \\ \times 2386 \\ \hline \end{array}$ |
| 7. $4 \cdot 702$   | 18. $\begin{array}{r} 207 \\ \times 83 \\ \hline \end{array}$ | 29. $13 \cdot 7 \cdot 0$   |
| 8. $3 \cdot 503$   | 19. $\begin{array}{r} 114 \\ \times 25 \\ \hline \end{array}$ | 30. $(96)(0)(4)$   |
| 9. $\begin{array}{r} 44 \\ \times 40 \\ \hline \end{array}$  | 20. $\begin{array}{r} 116 \\ \times 21 \\ \hline \end{array}$ | 31. $830 \cdot 10 \cdot 1$                                       |
| 10. $\begin{array}{r} 93 \\ \times 30 \\ \hline \end{array}$ | 21. $\begin{array}{r} 430 \\ \times 50 \\ \hline \end{array}$ | 32. $(260)(70)(1)$   |
| 11. $\begin{array}{r} 42 \\ \times 56 \\ \hline \end{array}$ | 22. $\begin{array}{r} 180 \\ \times 30 \\ \hline \end{array}$ |  |

For each statement, state the property of multiplication illustrated and show that the statement is true by performing the multiplication. See Example 1.

33.  $8 \cdot 0 = 0$

34.  $0 \cdot 17 = 0$

35.  $2 \cdot (3 \cdot 6) = (2 \cdot 3) \cdot 6$

36.  $3 \cdot (1 \cdot 7) = (3 \cdot 1) \cdot 7$

37.  $2 \cdot (6 \cdot 8) = 2 \cdot (8 \cdot 6)$

38.  $2 \cdot (3 \cdot 6) = (2 \cdot 3) \cdot 6$

39.  $5 \cdot 1 = 5$

40.  $1 \cdot 19 = 19$

For each statement, use your knowledge of the properties of multiplication to find the value of the variable that will make the statement true. State the property illustrated. See Example 2.

41.  $(3 \cdot 2) \cdot 7 = 3 \cdot (x \cdot 7)$

42.  $(5 \cdot 10) \cdot y = 5 \cdot (10 \cdot 7)$

43.  $25 \cdot a = 0$

44.  $0 \cdot 51 = n$

45.  $34 \cdot n = 34$

46.  $1 \cdot p = 26$

47.  $8 \cdot 10 = 10 \cdot x$

48.  $r \cdot 5 = 5 \cdot 9$

Multiply using the technique of multiplying by powers of ten. See Example 7.

49.  $30 \cdot 30$

50.  $50 \cdot 50$

51.  $25 \cdot 100$

52.  $47 \cdot 1000$

53.  $20 \cdot 200$

54.  $50 \cdot 700$

55.  $20 \cdot 8000$

56.  $40 \cdot 2000$

57. 
$$\begin{array}{r} 3000 \\ \times 500 \\ \hline \end{array}$$

58. 
$$\begin{array}{r} 7000 \\ \times 800 \\ \hline \end{array}$$

59. 
$$\begin{array}{r} 80,000 \\ \times 4,000 \\ \hline \end{array}$$

60. 
$$\begin{array}{r} 90,000 \\ \times 7,000 \\ \hline \end{array}$$

Rewrite each expression by using the distributive property and then simplify. See Example 3.

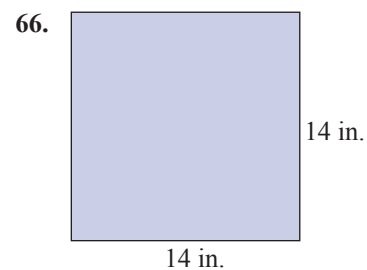
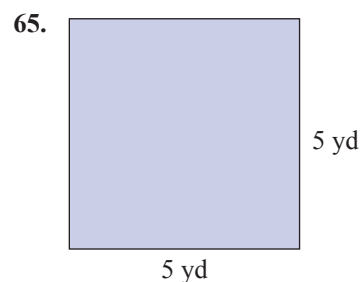
61.  $3(9+7)$

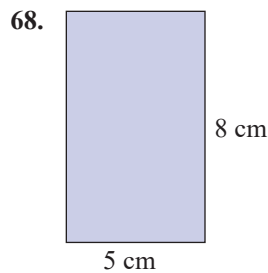
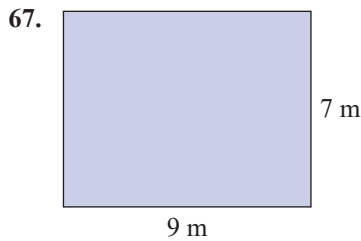
62.  $9(2+9)$

63.  $6(3+11)$

64.  $7(8+4)$

Calculate the area of each rectangle. See Example 8.





## Applications

Solve.

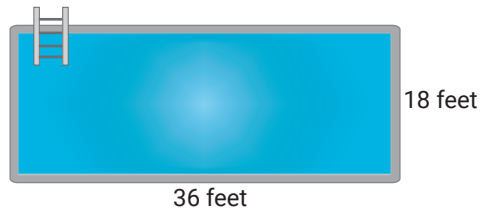
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69. The Math Club members decided to attend the national meeting of the NCTM (National Council of Teachers of Mathematics) and had a book sale to raise money for the event. Registration fees were \$85 per member and the club had 35 members. How much money did the club need to raise for registration fees?
70. Students at the local community college must pay \$83 for a math textbook. If there are 43 students in the class, find the total amount the class will spend on textbooks.
71. A network television station has approximately 18 minutes of commercial time in each hour. How many minutes of commercial time does the network have in a one-day programming schedule of 20 hours? In one week?
72. A group of 15 friends are gathering at a restaurant. The restaurant is having a special where each person can order a three-course meal for \$35. If all 15 friends order this special, how much will the total bill going be?
73. If one regular pack of candy contains 250 calories, how many calories are there in 37 packs of the same candy?
74. A sandwich shop buys 372 loaves of bread for the week. If each loaf of bread has 24 slices, how many slices of bread were purchased?
75. Your company bought 18 new cars, each with air conditioning and anti-lock brakes, at a price of \$15,800 per car. How much did your company pay for these cars?
76. According to the US Fish and Wildlife Service, migratory birds are imported at a value of about \$19 each. Suppose that about 800,000 live birds are imported each year. What is the total value of these imported birds?

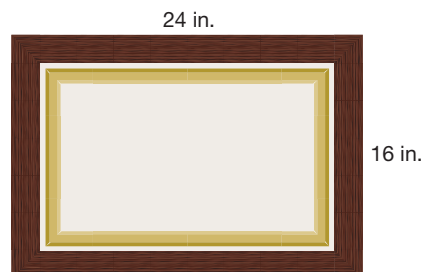
The menu prices (to the nearest dollar) for certain items at a local fast food restaurant are shown in the table. Use this table to answer the following questions

Item	Price(\$)
Bacon Cheeseburger	4
Hamburger	3
French Fries	2
Onion Rings	3
Soda	1
Milkshake	2
Cookie	1

77. Sally and her two friends ordered 2 bacon cheeseburgers, 1 hamburger, 3 orders of French fries, and 3 milkshakes. What was the total cost of their order?
78. George is hungry and can't decide what to order. He is trying to decide between
- 2 bacon cheeseburgers, 1 order of onion rings, 1 soda, and 2 cookies; or
  - 1 bacon cheeseburger, 2 orders of French fries, 1 milkshake, and 1 cookie.
- Which of the two orders is more expensive? By how much?
79. A rectangular pool measures 36 feet long by 18 feet wide. Find the area of the pool in square feet.

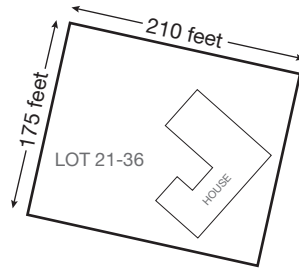


80. A painting is mounted in a rectangular frame (16 inches by 24 inches) and hung on a wall. How many square inches of wall space will the framed painting cover?



81. Cheyenne has been commissioned by her city to paint a mural on the side of a brick building and must calculate the area of the wall so she can plan and scale her mural. The side of the building measures 120 feet tall and 84 feet wide. Find the area of the mural.

82. A rectangular lot for a house measures 210 feet long by 175 feet wide. Find the area of the lot in square feet.



## Writing & Thinking

83. Explain, in your own words, what the zero-factor law indicates.
84. Explain, in your own words, why 1 is called the multiplicative identity.
85. Name the property that uses both multiplication and addition and give an example of it.
86. Give an example of when you might use multiplication (other than in a class).