R.2 Exercises

Concept Check

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

1. If a fraction has a numerator that is equal to or larger than the denominator, it is a/an _____ fraction.
2. A fraction that has a zero in the denominator is considered to be _____.
3. Any whole number can be written in fraction form with denominator _____.
4. Finding a fraction "of" a number requires _____.
5. If all the factors in the numerator or denominator are divided out, then _____ must be used as a factor.
6. Finding _____ factorizations may help in multiplying and reducing at the same time.

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.)

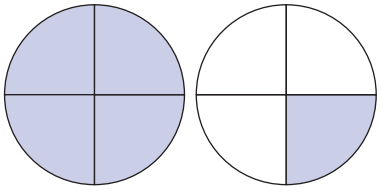
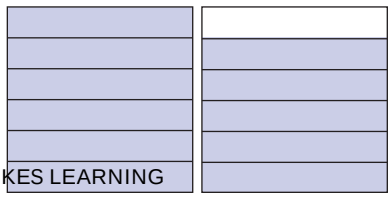
7. In $\frac{11}{13}$, the denominator is 11.
8. $\frac{17}{0}$ is undefined.
9. To find $\frac{1}{2}$ of $\frac{2}{9}$ requires multiplication.
10. The statement $\frac{1}{3}\cdot\frac{2}{5}=\frac{2}{5}\cdot\frac{1}{3}$ is an example of the associative property of multiplication.

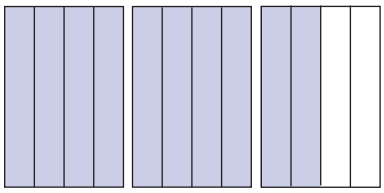
Practice

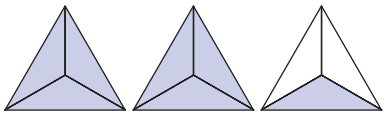
Draw a figure to represent each fraction. .

1. $\frac{1}{3}$
2. $\frac{1}{2}$
3. $\frac{4}{5}$
4. $\frac{3}{4}$

Write a fraction that indicates the shaded parts of each figure. See Example 1.

5. 
6. 

7. 

8. 

Multiply. See Examples 2 through 4.

9. $\frac{1}{7}\cdot\frac{1}{7}$

10. $\frac{2}{5}\cdot\frac{2}{5}$

11. $\frac{0}{4}\cdot\frac{7}{6}$

12. $\frac{2}{1}\cdot\frac{5}{1}$

13. $\frac{3}{5}\cdot\frac{4}{7}$

14. $\frac{2}{3}\cdot\frac{5}{11}$

15. $\frac{5}{8}\cdot\frac{3}{4}$

16. $\frac{7}{6}\cdot\frac{5}{2}$

17. $\frac{1}{2}\cdot\frac{3}{7}\cdot\frac{9}{2}$

18. $\frac{7}{3}\cdot\frac{2}{5}\cdot\frac{1}{9}$

19. $\frac{7}{8}\cdot\frac{7}{9}\cdot\frac{7}{3}$

20. $\frac{8}{5}\cdot\frac{8}{5}\cdot\frac{7}{1}$

21. Find $\frac{2}{3}$ of $\frac{2}{15}$.

22. Find $\frac{4}{7}$ of $\frac{3}{5}$.

23. Find $\frac{1}{3}$ of $\frac{2}{3}$.

24. Find $\frac{1}{4}$ of $\frac{3}{4}$.

Find the missing numerator that will make the fractions equivalent. See Examples 5 and 6.

25. $\frac{3}{4}=\frac{3}{4}\cdot\frac{?}{?}=\frac{?}{12}$

26. $\frac{2}{3}=\frac{2}{3}\cdot\frac{?}{?}=\frac{?}{12}$

27. $\frac{6}{7}=\frac{6}{7}\cdot\frac{?}{?}=\frac{?}{14}$

28. $\frac{5}{8}=\frac{5}{8}\cdot\frac{?}{?}=\frac{?}{40}$

29. $\frac{3}{16}=\frac{3}{16}\cdot\frac{?}{?}=\frac{?}{80}$

30. $\frac{1}{17}=\frac{1}{17}\cdot\frac{?}{?}=\frac{?}{51}$

31. $\frac{7}{26}=\frac{7}{26}\cdot\frac{?}{?}=\frac{?}{52}$

32. $\frac{9}{10}=\frac{9}{10}\cdot\frac{?}{?}=\frac{?}{100}$

33. $\frac{18}{1}=\frac{18}{1}\cdot\frac{?}{?}=\frac{?}{3}$

34. $\frac{1}{5}=\frac{1}{5}\cdot\frac{?}{?}=\frac{?}{75}$

Reduce each fraction to lowest terms. If it is already in lowest terms, simply rewrite the fraction. See Examples 7 and 8.

35. $\frac{3}{9}$

36. $\frac{2}{8}$

37. $\frac{9}{12}$

38. $\frac{6}{20}$

39. $\frac{5}{11}$

40. $\frac{7}{13}$

41. $\frac{0}{25}$

42. $\frac{0}{16}$

43. $\frac{12}{35}$

44. $\frac{27}{56}$

45. $\frac{16}{32}$

46. $\frac{25}{50}$

47. $\frac{42}{63}$

48. $\frac{12}{35}$

49. $\frac{48}{12}$

50. $\frac{72}{36}$

51. $\frac{24}{100}$

52. $\frac{70}{100}$

53. $\frac{150}{135}$

54. $\frac{140}{112}$

Multiply and reduce to lowest terms. See Examples 9 through 11. (**Hint:** Factor before multiplying.)

55. $\frac{1}{3}\cdot\frac{3}{4}$

56. $\frac{3}{7}\cdot\frac{5}{3}$

57. $\frac{2}{3}\cdot\frac{4}{3}$

58. $\frac{3}{5}\cdot\frac{2}{7}$

59. $\frac{5}{16}\cdot\frac{16}{15}$

60. $\frac{14}{9}\cdot\frac{3}{14}$

61. $\frac{7}{8}\cdot\frac{9}{14}$

62. $\frac{8}{10}\cdot\frac{5}{4}$

63. $\frac{2}{21}\cdot\frac{15}{22}$

64. $\frac{3}{16}\cdot\frac{20}{21}$

65. $\frac{15}{27}\cdot\frac{9}{30}$

66. $\frac{25}{9}\cdot\frac{3}{100}$

67. $8\cdot\frac{5}{12}$

68. $9\cdot\frac{7}{24}$

69. $\frac{32}{20}\cdot\frac{13}{9}\cdot\frac{7}{26}$

70. $\frac{20}{32}\cdot\frac{9}{13}\cdot\frac{26}{7}$

71. $\frac{9}{10}\cdot\frac{35}{40}\cdot\frac{25}{15}$

72. $\frac{5}{12}\cdot\frac{56}{42}\cdot\frac{90}{54}$

73. $\frac{17}{100}\cdot\frac{27}{34}\cdot\frac{25}{9}\cdot 6$

74. $\frac{13}{28}\cdot\frac{7}{9}\cdot\frac{45}{39}\cdot 4$

Divide and reduce to lowest terms. See Examples 12 and 13.

75. $\frac{5}{8}\div\frac{3}{5}$

76. $\frac{2}{7}\div\frac{1}{2}$

77. $\frac{2}{3}\div\frac{1}{5}$

78. $\frac{2}{11}\div\frac{1}{7}$

79. $\frac{3}{14}\div\frac{3}{14}$

80. $\frac{5}{8}\div\frac{5}{8}$

81. $\frac{3}{4}\div\frac{4}{3}$

82. $\frac{9}{10}\div\frac{10}{9}$

83. $\frac{15}{20}\div 3$

84. $\frac{14}{20}\div 7$

85. $\frac{25}{40}\div 10$

86. $\frac{36}{80}\div 9$

87. $\frac{7}{8}\div 0$

88. $\frac{15}{64}\div 0$

89. $0\div\frac{5}{6}$

90. $0 \div \frac{1}{2}$

91. $\frac{16}{35} \div \frac{2}{7}$

92. $\frac{15}{27} \div \frac{5}{9}$

93. $\frac{15}{24} \div \frac{25}{18}$

94. $\frac{36}{25} \div \frac{24}{20}$

Applications

Solve.

95. If you had \$20 and you spent \$9 for a hamburger, fries, and a soft drink, what fraction of your money did you spend? What fraction would you still have?

96. In a class of 35 students, 6 students received As on a mathematics exam. What fraction of students received an A? What fraction of students did not receive an A?

97. A software company receives 45 technical support calls in one hour. Twenty-three of the calls are related to customers forgetting their passwords. What fraction of the calls was related to customers forgetting their passwords?

98. A certain brand of plain bagels has 146 calories per bagel. 115 calories come from the carbohydrates in the bagel. What fraction of the calories is from carbohydrates?

99. What fraction of a minute does 43 seconds represent? (**Hint:** There are 60 seconds in a minute.)

100. There are 5280 feet in a mile. What fraction of a mile does 923 feet represent?

101. The product of $\frac{5}{6}$ with another number is $\frac{2}{5}$.

a. Which number is the product?

b. What is the other number?

102. The product of two numbers is 210.

a. If one of the numbers is the fraction $\frac{2}{3}$, do you expect the other number to be larger or smaller than 210?

b. What is the other number?

103. An airplane is carrying 90 passengers. This is $\frac{9}{10}$ of the capacity of the airplane.

a. Is the capacity of the airplane more or less than 90?

b. If you were to multiply 90 times $\frac{9}{10}$ would the product be more or less than 90?

c. What is the capacity of the airplane?

104. The student senate has 75 members, and $\frac{7}{15}$ of these are women. A change in the senate constitution is being considered, and at the present time (before debating has begun), a survey shows that $\frac{3}{5}$ of the women and $\frac{4}{5}$ of the men are in favor of this change.

a. How many women are on the student senate?

b. How many women on the senate are in favor of the change?

c. If the change requires a $\frac{2}{3}$ majority vote in favor to pass, would the constitutional change pass if the vote were taken today?

d. By how many votes would the change pass or fail?

105. The tennis club has 250 members, and they are considering putting in a new tennis court. The cost of the new court is going to involve an assessment of \$200 for each member. Seven-tenths of the members live quite near the club and $\frac{3}{5}$ of them are in favor of the assessment. However, $\frac{2}{3}$ of the members who do not live nearby are not in favor of the assessment.

a. If a vote were taken today, would more than one-half of the members vote for or against the new court?

b. By how many votes would the question pass or fail if more than one-half of the members must vote in favor for the question to pass?

106. There are 3000 students at Mountain High School and $\frac{1}{4}$ of these students are seniors. If $\frac{3}{5}$ of the seniors are in favor of the school forming a debating team and $\frac{7}{10}$ of the remaining students (not seniors) are also in favor of forming a debating team, how many students do not favor this idea?

107. A computer stores data on a hard drive in the form of bits, bytes, and sectors.

- **a.** Each byte is made up of eight bits. What fraction of a byte is a bit?
- **b.** A sector on a hard drive is traditionally 512 bytes. A byte is what fraction of a sector?
- **c.** If a computer stores 159 bytes of data, what fraction of a sector does that amount of data take up?

108. The gas tank of a car holds 14 gallons of gas. What fraction of the tank does 9 gallons of gas take up?

109. A small box will hold 12 books. Kathleen has 35 books to pack into small boxes.

- **a.** Write an improper fraction to describe the number of boxes that will be filled by Kathleen's books.
- **b.** Change the improper fraction from Part **a.** to a mixed number to describe the number of boxes that will be filled by Kathleen's books.

110. A cup holds 8 ounces of liquid. You have 29 ounces of juice to pour into cups.

- **a.** Write an improper fraction to describe the number of cups that will be filled with juice.
- **b.** Change the improper fraction from Part **a.** to a mixed number to describe the number of cups that will be filled with juice.

Writing & Thinking

111. In your own words, list the parts of a fraction and briefly describe the purpose of each part.