CALCULATORS

Using a Calculator to Add and Subtract Fractions

To add, subtract, multiply, or divide two fractions or mixed numbers, enter the expression as you did when working with whole numbers in Chapter 1, but use the [a b/c] key to enter the fractions or mixed numbers. The result will be given to you in simplified form.

For example, to subtract $\frac{5}{6}-\frac{4}{15}$, press the keys

[5] [a b/c] [6] [−] [4] [a b/c] [1] [5].

Then press [=]. The display will read 17/30 which means $\frac{17}{30}$.

Similarly, to add $4\frac{1}{3}+1\frac{5}{6}$, press the keys

[4] [a b/c] [1] [a b/c] [3] [+] [1] [a b/c] [5] [a b/c] [6]. Then press [=].

The display will read 6 ⌟1/6 which means $6\frac{1}{6}$.

Completion Example Answers

10. $12\frac{15}{20}-7\frac{18}{20}$; $11\frac{35}{20}-7\frac{18}{20}$; $4\frac{17}{20}$

Margin Exercise Answers

1. $11\frac{4}{5}$ **2.** $8\frac{7}{10}$ **3.** $11\frac{3}{35}$ **4.** 17 meters **5.** $4\frac{3}{5}$ **6.** $7\frac{3}{14}$ **7.** $7\frac{5}{11}$ **8.** $6\frac{1}{2}$ **9.** $7\frac{49}{50}$

10. $5\frac{1}{2}$ **11. a.** $4\frac{19}{20}$ minutes **b.** $1\frac{13}{20}$ minutes **12.** $-8\frac{34}{45}$ **13.** $-8\frac{25}{36}$ **14.** 14

15. $\frac{49}{4}$ or $12\frac{1}{4}$ **16.** $\frac{153}{65}$ or $2\frac{23}{65}$

3.7 Exercises

Concept Check

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

1. When adding mixed numbers, if the sum of the fractional parts is more than 1, rewrite this sum as a/an _____ _____ and add it to the sum of the _____ _____.
2. When adding (or subtracting) the fractional parts of mixed numbers, the denominators must be the _____.
3. All answers should be _____, if possible.
4. When subtracting mixed numbers, subtract the _____ parts first, then subtract the _____ _____.
5. When subtracting mixed numbers, if the fraction part being subtracted is larger than the other fraction part, the smaller fraction part must be changed to a/an _____ fraction by borrowing _____ from its whole number.

6. You can always add or subtract with mixed numbers by first changing them to _____ fractions.

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. $3\frac{1}{5}+5\frac{1}{2}=8\frac{7}{10}$

8. When adding (or subtracting) mixed numbers, the final answer should be written as a mixed number.

9. LCDs are not required when adding or subtracting mixed numbers.

10. $12-5\frac{1}{3}=7\frac{1}{3}$

Practice

Add and reduce to lowest terms. Write your answer in mixed number form. See Examples 1 through 3.

1. $6\frac{1}{2}$
$+3\frac{1}{2}$

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

3. 12
$+\frac{3}{4}$

4. 15
$+\frac{9}{10}$

5. $11\frac{1}{7}$
$+9\frac{3}{4}$

6. $8\frac{1}{6}$
$+13\frac{3}{5}$

7. $3\frac{1}{4}+7\frac{1}{8}$

8. $11\frac{3}{4}+2\frac{5}{16}$

9. $5\frac{1}{7}+3\frac{1}{3}$

10. $2\frac{1}{5}+6\frac{1}{3}$

11. $5\frac{1}{10}+7\frac{1}{4}$

12. $6\frac{4}{9}+12\frac{1}{15}$

13. $5\frac{3}{10}+2\frac{1}{14}$

14. $4\frac{1}{6}+13\frac{9}{10}$

15. $8\frac{2}{9}+4\frac{1}{27}$

16. $5\frac{1}{8}+6\frac{3}{16}$

17. $9\frac{1}{8}+3\frac{7}{12}$

18. $2\frac{5}{8}+6\frac{5}{6}$

19. $3\frac{2}{3}$
$14\frac{1}{10}$
$+5\frac{1}{5}$

20. $3\frac{5}{8}$
$3\frac{1}{12}$
$+10\frac{1}{4}$

21. $1\frac{2}{7}+7\frac{1}{2}+2\frac{3}{5}$

22. $3\frac{1}{20}+7\frac{1}{15}+2\frac{3}{10}$

Subtract and reduce to lowest terms. Write your answer in mixed number form. See Examples 5 through 10.

23. $4\frac{5}{12}$
$\underline{-3}$

24. $3\frac{5}{8}$
$\underline{-2}$

25. $7\frac{9}{10}$
$\underline{-3\frac{3}{10}}$

26. $14\frac{5}{8}$
$\underline{-11\frac{3}{8}}$

27. $5\frac{11}{12}$
$\underline{-1\frac{1}{4}}$

28. $6\frac{1}{2}$
$\underline{-2\frac{3}{14}}$

29. $5\frac{4}{5}$
$\underline{-2\frac{1}{4}}$

30. $7\frac{9}{10}$
$\underline{-4\frac{1}{7}}$

31. $20\frac{1}{2}-3\frac{1}{2}$

32. $17\frac{1}{4}-12\frac{1}{4}$

33. $13\frac{5}{8}-6\frac{11}{20}$

34. $17\frac{8}{9}-4\frac{2}{15}$

35. $18\frac{7}{8}-2\frac{2}{3}$

36. $15\frac{1}{2}-2\frac{1}{3}$

37. $6-\frac{1}{2}$

38. $10-\frac{9}{10}$

39. $7-6\frac{2}{3}$

40. $5-4\frac{1}{5}$

41. $14\frac{7}{10}$
$\underline{-3\frac{4}{5}}$

42. $21\frac{3}{4}$
$\underline{-14\frac{7}{12}}$

43. $18\frac{3}{7}$
$\underline{-15\frac{2}{3}}$

44. $7\frac{1}{5}$
$\underline{-3\frac{1}{2}}$

Perform each operation and reduce to lowest terms. Write your answer in mixed number form. See Examples 12 and 13.

45. $-3-2\frac{3}{8}$

46. $-7-4\frac{2}{5}$

47. $-6\frac{1}{2}-5\frac{3}{4}$

48. $-17\frac{2}{3}+14\frac{2}{15}$

49. $-2\frac{1}{4}-3\frac{1}{5}$

50. $-1\frac{1}{3}-3\frac{1}{7}$

51. $-6\frac{1}{2}-\left(-10\frac{3}{4}\right)$

52. $-7\frac{3}{8}-\left(-4\frac{3}{16}\right)$

53. $-9\frac{1}{9}+2\frac{5}{18}$

54. $-7\frac{1}{15}+1\frac{2}{3}$

55. $-16\frac{3}{4}-11\frac{5}{6}$

56. $-30\frac{5}{6}-20\frac{2}{15}$

57. $-2\frac{1}{6}-\left(-15\frac{3}{5}\right)$

58. $-5\frac{2}{3}-\left(-12\frac{1}{4}\right)$

59. $-12\frac{1}{2}-17\frac{2}{5}-15\frac{1}{4}$

60. $-6\frac{1}{3}-8\frac{3}{7}-4\frac{1}{9}$

Applications

Solve.

61. A bus trip is made in three parts. The first part takes $2\frac{1}{3}$ hours, the second part takes $2\frac{1}{2}$ hours, and the third part takes $3\frac{3}{4}$ hours. How long does the entire trip take?

62. A construction company was contracted to build three sections of highway. One section was $20\frac{7}{10}$ kilometers, the second section was $3\frac{4}{10}$ kilometers, and the third section was $11\frac{6}{10}$ kilometers. What was the total length of the highway built?

63. A quadrilateral (four-sided figure) has sides that measure $3\frac{1}{2}$ inches, $2\frac{1}{4}$ inches, $3\frac{5}{8}$ inches, and $2\frac{3}{4}$ inches. What is the total distance around the quadrilateral?

64. A pentagon (five-sided figure) has sides of $3\frac{3}{8}$ centimeters, $5\frac{1}{2}$ centimeters, $6\frac{1}{4}$ centimeters, $9\frac{1}{10}$ centimeters, and $4\frac{7}{8}$ centimeters. What is the perimeter in centimeters of the pentagon?

65. Among the top 20 highest grossing movies of 2021, A *Quiet Place Part II* earned $\$160\frac{1}{10}$ million, Ghostbusters: Afterlife earned $\$122\frac{3}{10}$ million, and Free Guy earned $\$121\frac{3}{5}$ million. What was the total earnings of these three films in 2021?

66. A carpenter buys boards of five widths at the lumber yard. The widths, in inches, are $3\frac{1}{2}, 9\frac{1}{4}, 11\frac{1}{14}, 7\frac{1}{4}$, and $5\frac{1}{2}$. If he bought one of each of these boards, what would be the total width of the boards if they were lined up next to each other?

67. On average, the air that we inhale includes $1\frac{1}{4}$ parts water and the air we exhale includes $5\frac{9}{10}$ parts water. How many more parts water are in the exhaled air?

68. A person who is running will burn about $14\frac{7}{10}$ calories each minute and a person who is walking will burn about $5\frac{1}{2}$ calories each minute. How many more calories does a runner burn per minute than a walker?

69. Sara can paint a room in $3\frac{3}{4}$ hours, and Emily can paint a room of the same size in $4\frac{1}{5}$ hours. How many hours are saved by having Sara paint a room of this size?

70. A teacher graded two sets of test papers. The first set took $3\frac{3}{4}$ hours to grade and the second set took $2\frac{3}{5}$ hours. How much faster did she grade the second set?

71. Mike takes $1\frac{1}{2}$ hours to clean a pool and Tom takes $2\frac{1}{3}$ hours to clean the same pool. How much longer does it take Tom to clean the pool?

72. A certain stock was selling for $43\frac{7}{8}$ dollars per share. One month later it was selling for $48\frac{1}{2}$ dollars per share. How much did the stock increase in price?

73. A salesman drove $5\frac{3}{4}$ hours one day and $6\frac{1}{2}$ hours the next day. How much more time did he spend driving on the second day?

74. A board is 16 feet long. If two pieces are cut from the board, one $6\frac{3}{4}$ feet long and the other $3\frac{1}{2}$ feet long, what is the length of the remaining piece of the original board?

75. Jade wants to lose 10 pounds and she currently weighs 180. During the first month of her weight loss routine, she loses $3\frac{1}{4}$ pounds. During the second month she loses $3\frac{1}{2}$ pounds. How much more weight does she need to lose?

76. Mr. Johnson originally weighed 240 pounds. During each month of six months of dieting and exercise he lost $5\frac{1}{2}$ pounds, $2\frac{3}{4}$ pounds, $4\frac{5}{16}$ pounds, $1\frac{3}{4}$ pounds, $2\frac{5}{8}$ pounds, and $3\frac{1}{4}$ pounds. What did he weigh at the end of the six months?

77. The 5 top-grossing concert tours of 2021 are shown in the table.

Band/Artist	Concert Tour Revenue (in millions of dollars)
The Rolling Stones	$115\frac{1}{2}$
Harry Styles	$86\frac{7}{10}$
Weezer, Fall Out Boy, and Green Day	$67\frac{3}{10}$
Eagles	$59\frac{1}{5}$
Dead & Company	$50\frac{1}{5}$

Source:"Rolling Stones, Harry Styles Were Top-Grossing Tours of 2021," Forbes, December 14, 2021, www.forbes.com/sites/marisadellatto/2021/12/14/rolling-stones-harry-styles-were-top-grossing-tours-of-2021.

a. What total amount did these five concert tours earn?

b. How much more did Harry Styles earn than the Eagles?

c. How much more did The Rolling Stones earn than Weezer, Fall Out Boy, and Green Day?

78. A carpenter wants to build a single stand-alone bookshelf that will include two shelves, a top, a bottom, and two sides. He will need three pieces of lumber each $3\frac{1}{4}$ feet long (for the two shelves and a bottom), one piece $3\frac{3}{4}$ feet long for the top and two pieces each $3\frac{1}{2}$ feet long for the sides. At the local home supply store, the lumber needed comes in lengths of 8 feet and 12 feet.

a. How many pieces of 12 feet will he need to buy to build the bookshelf?

b. Would he have been better off to buy lengths of 8 feet?

Writing & Thinking

79. In subtracting with mixed numbers explain why fractional parts should be subtracted before the whole numbers.

80. Give an example when you might add or subtract mixed numbers (other than in class).

81. Truncated mixed numbers are the whole number part of a mixed number. For example, 4 is the truncated mixed number of $4\frac{3}{5}$. Using truncated mixed numbers, estimate each of the following products mentally.

a. $2\frac{1}{7}\cdot 3\frac{5}{8}$ **b.** $20\frac{1}{7}\cdot 30\frac{5}{8}$ **c.** $200\frac{1}{7}\cdot 300\frac{5}{8}$

82. Of your three estimated answers in the previous exercise, which one do you think is closest to the actual product? Why?

83. Using truncated mixed numbers, estimate each of the following differences mentally.

a. $15\frac{6}{7}-11\frac{3}{4}$ **b.** $136\frac{17}{40}-125\frac{23}{30}$ **c.** $945\frac{1}{10}-845\frac{3}{100}$

84. Consider the following problem: The product of two numbers is $16\frac{1}{2}$. If one of the numbers is $2\frac{3}{4}$, what is the other number?

a. Rewrite the problem using truncated mixed numbers and solve this new problem.

b. Does this technique make it easier for you to understand the original problem? Why or why not?

c. What is the solution to the original problem?