



## Working with Fractions

### ADDITION AND SUBTRACTION OF FRACTIONS

For fractions having the **same denominator**:

- Add or subtract the numerators.
- Keep the same denominator.

For fractions having **different denominators**:

- Convert to equivalent fractions having their LCD.
- Add or subtract the numerators of the new fractions.
- Keep the LCD as the denominator.

For problems involving **mixed numerals**:

- Add or subtract the fraction parts of the numbers, as above.
  - If you need to borrow:
    - Subtract one from the whole number part of the top number.
    - Add 1 (i.e.,  $\frac{1}{n}$ ) to the fraction part of the top number.
    - Continue with the problem.
  - Add or subtract the whole numbers in the problem.
  - Add the two results at the end.

*Example 1:*

$$\frac{1}{6} + \frac{3}{6} = \frac{4}{6} = \frac{2}{3}$$

*Example 2:*

$$\begin{array}{r} \frac{3}{4} = \frac{6}{8} \\ + \frac{5}{8} = \frac{5}{8} \\ \hline \frac{11}{8} = 1\frac{3}{8} \end{array}$$

*Example 3:*

$$\begin{array}{r} 3\frac{1}{3} = 3\frac{5}{15} = 2\frac{20}{15} \\ -1\frac{2}{5} = 1\frac{6}{15} = 1\frac{6}{15} \\ \hline 1\frac{14}{15} \end{array}$$

### MULTIPLICATION OF FRACTIONS

To multiply a fraction by a **whole number**:

- Multiply the numerator by the whole number.
- Write the result over the denominator.

To multiply a fraction by **another fraction**:

- Multiply the numerators.
- Multiply the denominators.

When a multiplication problem involves a **mixed numeral**, convert it to an improper fraction\* first.

*Example 4:*

$$\frac{3}{5} \times 8 = \frac{24}{5} = 4\frac{4}{5}$$

*Example 5:*

$$\frac{1}{2} \times \frac{7}{8} = \frac{7}{16}$$

*Example 6:*

$$\frac{4}{9} \div \frac{5}{6} = \frac{4}{9} \times \frac{6}{5} = \frac{24}{45} = \frac{8}{15}$$

*Example 7:*

$$\frac{2}{3} \div 8 = \frac{2}{3} \times \frac{1}{8} = \frac{2}{24} = \frac{1}{12}$$

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When a division problem involves a **mixed numeral**, convert it to an improper fraction first. \* For help with converting to improper fractions, see the *Equivalent Fractions worksheet*.

## EXERCISES

A. Add or subtract:

1)  $\frac{3}{7} + \frac{2}{7} =$

3)  $5\frac{7}{8} - 2\frac{5}{8} =$

2)  $\frac{13}{16} - \frac{3}{16} =$

4)  $2\frac{3}{5} + 5\frac{2}{5} =$

B. Add or subtract:

1)  $\frac{1}{5} + \frac{1}{2} =$

5)  $5\frac{1}{4} + \frac{3}{8} =$

2)  $\frac{1}{3} - \frac{2}{7} =$

6)  $8\frac{11}{14} + 7\frac{1}{2} =$

3)  $1\frac{1}{8} + 2\frac{3}{5} =$

7)  $14 - 3\frac{7}{8} =$

4)  $7\frac{1}{2} - 5\frac{4}{15} =$

8)  $14\frac{1}{6} - 11\frac{1}{2} =$

C. Multiply:

1)  $\frac{4}{5} \times 2 =$

5)  $\frac{5}{2} \times \frac{2}{5} =$

2)  $15 \times \frac{2}{5} =$

6)  $\frac{3}{8} \times \frac{16}{21} =$

3)  $\frac{3}{10} \times \frac{5}{6} =$

7)  $5\frac{1}{8} \times 16 =$

4)  $\frac{1}{2} \times \frac{1}{8} =$

8)  $13\frac{1}{3} \times 1\frac{1}{2} =$

D. Divide:

1)  $\frac{8}{27} \div \frac{2}{9} =$

5)  $\frac{1}{2} \div 16 =$

2)  $\frac{3}{5} \div \frac{6}{25} =$

6)  $5\frac{1}{2} \div 11 =$

3)  $\frac{3}{4} \div \frac{9}{16} =$

7)  $5 \div 7\frac{1}{7} =$

4)  $16 \div \frac{1}{2} =$

8)  $5\frac{3}{5} \div 2\frac{1}{2} =$

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## SOLUTIONS

A. (1)  $\frac{5}{7}$  (2)  $\frac{5}{8}$  (3)  $3\frac{2}{8} \rightarrow 3\frac{1}{4}$  (4)  $7\frac{5}{5} \rightarrow 8$

B. (1)  $\frac{2}{10} + \frac{5}{10} = \frac{7}{10}$  (2)  $\frac{7}{21} - \frac{6}{21} = \frac{1}{21}$  (3)  $1\frac{5}{40} + 2\frac{24}{40} = 3\frac{29}{40}$  (4)  $7\frac{15}{30} - 5\frac{8}{30} = 2\frac{7}{30}$

(5)  $5\frac{2}{8} + \frac{3}{8} = 5\frac{5}{8}$  (6)  $8\frac{11}{14} + 7\frac{7}{14} = 15\frac{18}{14} \rightarrow 16\frac{4}{14} \rightarrow 16\frac{2}{7}$  (7)  $13\frac{8}{8} - 3\frac{7}{8} = 10\frac{1}{8}$

(8)  $14\frac{1}{6} - 11\frac{3}{6} \rightarrow 13\frac{7}{6} - 11\frac{3}{6} = 2\frac{4}{6} \rightarrow 2\frac{2}{3}$

C. (1)  $\frac{8}{5} \rightarrow 1\frac{3}{5}$  (2)  $\frac{30}{5} \rightarrow 6$  (3)  $\frac{15}{60} \rightarrow \frac{1}{4}$  (4)  $\frac{1}{16}$  (5)  $\frac{10}{10} \rightarrow 1$  (6)  $\frac{48}{168} \rightarrow \frac{2}{7}$

(7)  $\frac{41}{8} \times \frac{16}{1} = \frac{656}{8} \rightarrow 82$  (8)  $\frac{40}{3} \times \frac{3}{2} = \frac{120}{6} \rightarrow 20$

D. (1)  $\frac{72}{54} \rightarrow 1\frac{18}{54} \rightarrow 1\frac{1}{3}$  (2)  $\frac{75}{30} \rightarrow 2\frac{15}{30} \rightarrow 2\frac{1}{2}$  (3)  $\frac{48}{36} \rightarrow 1\frac{12}{36} \rightarrow 1\frac{1}{3}$

(4)  $\frac{16}{1} \times \frac{2}{1} = \frac{32}{1} \rightarrow 32$  (5)  $\frac{1}{2} \times \frac{1}{16} = \frac{1}{32}$  (6)  $1\frac{1}{2} \times \frac{1}{11} = \frac{11}{22} \rightarrow \frac{1}{2}$

(7)  $\frac{5}{1} \times \frac{7}{50} = \frac{35}{50} \rightarrow \frac{7}{10}$  (8)  $\frac{28}{5} \times \frac{2}{5} = \frac{56}{25} = 2\frac{6}{25}$

