



Fractions

LEARNING OBJECTIVES

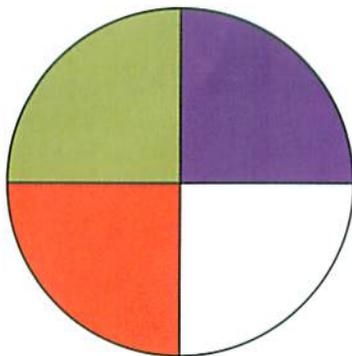
On completion of the materials provided in this chapter, you will be able to perform computations accurately by mastering the following mathematical concepts:

- 1 Changing an improper fraction to a mixed number
- 2 Changing a mixed number to an improper fraction
- 3 Changing a fraction to an equivalent fraction with the lowest common denominator
- 4 Changing a mixed number to an equivalent fraction with the lowest common denominator
- 5 Adding fractions having the same denominator, having unlike denominators, or involving whole numbers and unlike denominators
- 6 Subtracting fractions having the same denominator, having unlike denominators, or involving whole numbers and unlike denominators
- 7 Multiplying fractions and mixed numbers
- 8 Dividing fractions and mixed numbers
- 9 Reducing a complex fraction
- 10 Reducing a complex fraction involving mixed numbers



Study the introductory material for fractions. The processes for the calculation of fraction problems are listed in steps. Memorize the steps for each type of calculation before beginning the work sheet. Complete the work sheet at the end of this chapter, which provides extensive practice in the manipulation of fractions. Check your answers. If you have difficulties, go back and review the steps for that type of calculation. When you feel ready to evaluate your learning, take the first posttest. Check your answers. An acceptable score (number of answers correct) as indicated on the posttest signifies that you are ready for the next chapter. An unacceptable score signifies a need for further study before you take the second posttest.

A **fraction** indicates the number of equal parts of a whole. For example, $\frac{3}{4}$ means three of four equal parts.



The **denominator** indicates the number of parts into which a whole has been divided. The denominator is the number *below* the fraction line. The **numerator** designates the number of parts that you have of a divided whole. It is the number *above* the fraction line. The line also indicates division to be performed and can be read as “divided by.” The example $\frac{3}{4}$, or three fourths, can therefore be read as “three divided by four.” In other words the numerator is “divided by” the denominator. The numerator is the **dividend**, and the denominator is the **divisor**. When numbers are multiplied, the answer is the **product**. When numbers are divided, the answer is the **quotient**.

A fraction can often be expressed in smaller numbers without any change in its real value. This is what is meant by the direction “Reduce to lowest terms.” The reduction is accomplished by dividing both numerator and denominator by the same number.

EXAMPLE 1: $\frac{6}{8}$

a. $6 \div 2 = 3$

b. $8 \div 2 = 4$

c. $\frac{6}{8} = \frac{3}{4}$

EXAMPLE 2: $\frac{3}{9}$

a. $3 \div 3 = 1$

b. $9 \div 3 = 3$

c. $\frac{3}{9} = \frac{1}{3}$

EXAMPLE 3: $\frac{4}{10}$

a. $4 \div 2 = 2$

b. $10 \div 2 = 5$

c. $\frac{4}{10} = \frac{2}{5}$

There are several different types of fractions. A **proper fraction** is one in which the numerator is smaller than the denominator. A proper fraction is sometimes called a *common* or *simple fraction*.

EXAMPLES: $\frac{2}{3}$, $\frac{1}{8}$, $\frac{5}{12}$

An **improper fraction** is a fraction in which the numerator is larger than or equal to the denominator.

EXAMPLES: $\frac{8}{7}$, $\frac{6}{6}$, $\frac{4}{2}$

A **complex fraction** is one that contains a fraction in its numerator, its denominator, or both.

EXAMPLES: $\frac{2\frac{1}{3}}{3}$, $\frac{2}{\frac{1}{2}}$, $\frac{\frac{3}{4}}{\frac{3}{8}}$

Sometimes a fraction is seen in conjunction with a whole number. This combination is called a **mixed number**.

EXAMPLES: $2\frac{3}{8}$, $4\frac{1}{3}$, $6\frac{1}{2}$



IMPROPER FRACTIONS

Changing an Improper Fraction to a Mixed Number

1. Divide the numerator by the denominator.
2. Place any remainder over the denominator and write this proper fraction beside the whole number found in step 1.

EXAMPLE 1: $\frac{5}{3}$

$$\begin{array}{l} \text{a. } 3 \overline{)5} \text{ remainder } 2 = 1\frac{2}{3} \\ \text{b. } \frac{3}{2} \end{array}$$

EXAMPLE 2: $\frac{7}{2}$

$$\begin{array}{l} \text{a. } 2 \overline{)7} \text{ remainder } 1 = 3\frac{1}{2} \\ \text{b. } \frac{6}{1} \end{array}$$

When an improper fraction is reduced, it will *always* result in a mixed number or a whole number.

Changing a Mixed Number to an Improper Fraction

1. Multiply the denominator of the fraction by the whole number.
2. Add the product to the numerator of the fraction.
3. Place the sum over the denominator.

EXAMPLE 1: $3\frac{1}{4}$

a. $4 \times 3 = 12$

b. $12 + 1 = 13$

c. $3\frac{1}{4} = \frac{13}{4}$

EXAMPLE 2: $1\frac{3}{8}$

a. $8 \times 1 = 8$

b. $8 + 3 = 11$

c. $1\frac{3}{8} = \frac{11}{8}$

EXAMPLE 3: $2\frac{7}{10}$

a. $10 \times 2 = 20$

b. $20 + 7 = 27$

c. $2\frac{7}{10} = \frac{27}{10}$

ALERT

If fractions are to be added or subtracted, it is necessary for their *denominators to be the same*.

LOWEST COMMON DENOMINATOR

Computations are facilitated when the lowest common denominator is used. The term **lowest common denominator** is defined as the smallest whole number that can be divided evenly by all denominators within the problem.

When trying to determine the lowest common denominator, first observe whether one of the denominators in the problem is evenly divisible by each of the other denominators. If so, this will be the lowest common denominator for the problem.

EXAMPLE 1: $\frac{2}{3}$ and $\frac{5}{12}$

You find that 12 is evenly divisible by 3; therefore 12 is the lowest common denominator.

EXAMPLE 2: $\frac{1}{2}$ and $\frac{3}{8}$

You find that 8 is evenly divisible by 2; therefore 8 is the lowest common denominator.

EXAMPLE 3: $\frac{2}{7}$ and $\frac{5}{14}$ and $\frac{1}{28}$

You find that 28 is evenly divisible by 7 and 14; therefore 28 is the lowest common denominator.

Changing a Fraction to an Equivalent Fraction with the Lowest Common Denominator

1. Divide the lowest common denominator by the denominator of the fraction to be changed.
2. Multiply the quotient by the numerator of the fraction to be changed.
3. Place the product over the lowest common denominator.

EXAMPLE 1: $\frac{2}{3} = \frac{?}{12}$

a. $12 \div 3 = 4$

b. $4 \times 2 = 8$

c. $\frac{2}{3} = \frac{8}{12}$

EXAMPLE 2: $\frac{1}{2} = \frac{?}{8}$

a. $8 \div 2 = 4$

b. $4 \times 1 = 4$

c. $\frac{1}{2} = \frac{4}{8}$

EXAMPLE 3: $\frac{2}{7} = \frac{?}{14}$

a. $14 \div 7 = 2$

b. $2 \times 2 = 4$

c. $\frac{2}{7} = \frac{4}{14}$

Changing a Mixed Number to an Equivalent Fraction with the Lowest Common Denominator

1. Change the mixed number to an improper fraction.
2. Divide the lowest common denominator by the denominator of the fraction.
3. Multiply the quotient by the numerator of the improper fraction.
4. Place the product over the lowest common denominator.

EXAMPLE 1: $1\frac{3}{4}$ and $\frac{5}{12}$

a. $1\frac{3}{4} = \frac{?}{12}$

$4 \times 1 = 4$

$4 + 3 = 7$

b. $\frac{7}{4} = \frac{?}{12}$

$12 \div 4 = 3$

c. $3 \times 7 = 21$

d. $1\frac{3}{4} = \frac{21}{12}$

EXAMPLE 2: $3\frac{2}{3}$ and $\frac{4}{9}$

a. $3\frac{2}{3} = \frac{?}{9}$

$3 \times 3 = 9$

$9 + 2 = 11$

b. $\frac{11}{3} = \frac{?}{9}$

$9 \div 3 = 3$

c. $3 \times 11 = 33$

d. $3\frac{2}{3} = \frac{33}{9}$

If one of the denominators in the problem is not the lowest common denominator for all, you must look further. One suggestion is to multiply two of the denominators together and if possible use that number as the lowest common denominator.

EXAMPLE: $3\frac{1}{2}$ and $\frac{2}{3}$

Multiply the two denominators: $2 \times 3 = 6$

a. $3\frac{1}{2} = \frac{?}{6}$

$2 \times 3 = 6$

$6 + 1 = 7$

b. $\frac{7}{2} = \frac{?}{6}$

c. $6 \div 2 = 3$

d. $3 \times 7 = 21$

e. $3\frac{1}{2} = \frac{21}{6}$

a. $\frac{2}{3} = \frac{?}{6}$

b. $6 \div 3 = 2$

c. $2 \times 2 = 4$

d. $\frac{2}{3} = \frac{4}{6}$



Another method is to multiply one of the denominators by 2, 3, or 4. Determine whether the resulting number can be used as a common denominator.

EXAMPLE: $\frac{3}{4}$ and $\frac{1}{8}$ and $\frac{5}{12}$

Multiply the denominator 8 by 3: $8 \times 3 = 24$

a. $\frac{3}{4} = \frac{?}{24}$

a. $\frac{1}{8} = \frac{?}{24}$

a. $\frac{5}{12} = \frac{?}{24}$

b. $24 \div 4 = 6$

b. $24 \div 8 = 3$

b. $24 \div 12 = 2$

c. $6 \times 3 = 18$

c. $3 \times 1 = 3$

c. $2 \times 5 = 10$

d. $\frac{3}{4} = \frac{18}{24}$

d. $\frac{1}{8} = \frac{3}{24}$

d. $\frac{5}{12} = \frac{10}{24}$

ADDITION OF FRACTIONS

Addition of Fractions Having the Same Denominator

1. Add the numerators.
2. Place the sum over the common denominator.
3. Reduce to lowest terms.

EXAMPLE 1: $\frac{1}{7} + \frac{2}{7} = \underline{\hspace{2cm}}$

a. $\frac{1}{7} + \frac{2}{7} =$

b. $\frac{1+2}{7} =$

c. $\frac{3}{7}$

EXAMPLE 2: $\frac{1}{8} + \frac{3}{8} = \underline{\hspace{2cm}}$

a. $\frac{1}{8} + \frac{3}{8} =$

b. $\frac{1+3}{8} =$

c. $\frac{4}{8} = \frac{1}{2}$

Addition of Fractions with Unlike Denominators

1. Change the fractions to equivalent fractions with the lowest common denominator.
2. Add the numerators.
3. Place the sum over the lowest common denominator.
4. Reduce to lowest terms.

EXAMPLE 1: $\frac{2}{3} + \frac{1}{5} = \underline{\hspace{2cm}}$

To find the lowest common denominator, multiply the two denominators together.

$$3 \times 5 = 15$$

Change each fraction to an equivalent fraction with 15 as the denominator.

a. $\frac{2}{3} = \frac{?}{15}$

a. $\frac{1}{5} = \frac{?}{15}$

$15 \div 3 = 5$

$15 \div 5 = 3$

$5 \times 2 = 10$

$3 \times 1 = 3$

$\frac{2}{3} = \frac{10}{15}$

$\frac{1}{5} = \frac{3}{15}$

b. $\frac{10}{15} + \frac{3}{15} =$

c. $\frac{10+3}{15} = \frac{13}{15}$

EXAMPLE 2: $\frac{1}{6} + \frac{1}{4} + \frac{1}{3} = \underline{\hspace{2cm}}$

To find a common denominator, try multiplying two of the denominators together and check to see whether that number is divisible by the other denominator.

$$4 \times 3 = 12$$

Is 12 divisible by the other denominator, 6? The answer is YES.

a. $\frac{1}{6} = \frac{?}{12}$

$$12 \div 6 = 2$$

$$2 \times 1 = 2$$

$$\frac{1}{6} = \frac{2}{12}$$

a. $\frac{1}{4} = \frac{?}{12}$

$$12 \div 4 = 3$$

$$3 \times 1 = 3$$

$$\frac{1}{4} = \frac{3}{12}$$

a. $\frac{1}{3} = \frac{?}{12}$

$$12 \div 3 = 4$$

$$4 \times 1 = 4$$

$$\frac{1}{3} = \frac{4}{12}$$

b. $\frac{2}{12} + \frac{3}{12} + \frac{4}{12} =$

c. $\frac{2+3+4}{12} = \frac{9}{12}$

d. $\frac{9}{12} = \frac{3}{4}$ (reduced to lowest terms)

Addition of Fractions Involving Whole Numbers and Unlike Denominators

1. Change the fractions to equivalent fractions with the lowest common denominator.
2. Add the numerators.
3. Place the sum over the lowest common denominator.
4. Reduce to lowest terms.
5. Write the reduced fraction next to the sum of the whole numbers.

EXAMPLE 1: $1\frac{1}{3} + 2\frac{3}{8} = \underline{\hspace{2cm}}$

To find the lowest common denominator, multiply the two denominators together.

$$3 \times 8 = 24$$

Change the fractions $\frac{1}{3}$ and $\frac{3}{8}$ to equivalent fractions with 24 as their denominators.

a. $\frac{1}{3} = \frac{?}{24}$

$$24 \div 3 = 8$$

$$8 \times 1 = 8$$

$$\frac{1}{3} = \frac{8}{24}$$

a. $\frac{3}{8} = \frac{?}{24}$

$$24 \div 8 = 3$$

$$3 \times 3 = 9$$

$$\frac{3}{8} = \frac{9}{24}$$

b. $1\frac{8}{24} + 2\frac{9}{24} =$

c. $1\frac{8}{24}$

$$+ 2\frac{9}{24}$$

d. $3\frac{17}{24}$

EXAMPLE 2: $5\frac{1}{2} + 3\frac{3}{10} =$ _____

Because 10 is evenly divisible by 2, 10 is the lowest common denominator. Therefore $\frac{1}{2}$ needs to be changed to an equivalent fraction with 10 as the denominator.

a. $\frac{1}{2} = \frac{?}{10}$

$$10 \div 2 = 5$$

$$5 \times 1 = 5$$

$$\frac{1}{2} = \frac{5}{10}$$

b. $5\frac{5}{10} + 3\frac{3}{10} =$

c. $5\frac{5}{10}$

$$+ 3\frac{3}{10}$$

d. $8\frac{8}{10} = 8\frac{4}{5}$ (reduced to lowest terms)

SUBTRACTION OF FRACTIONS

Subtraction of Fractions Having the Same Denominator

1. Subtract the numerator of the **subtrahend** (the number being subtracted) from the numerator of the **minuend** (the number from which another number is subtracted).
2. Place the difference over the common denominator.
3. Reduce to lowest terms.

EXAMPLE 1: $\frac{6}{8} - \frac{4}{8} =$ _____

a. $\frac{6}{8} - \frac{4}{8} =$

b. $\frac{6-4}{8} =$

c. $\frac{2}{8} = \frac{1}{4}$ (reduced to lowest terms)

EXAMPLE 2: $\frac{7}{12} - \frac{1}{12} =$ _____

a. $\frac{7}{12} - \frac{1}{12} =$

b. $\frac{7-1}{12} =$

c. $\frac{6}{12} = \frac{1}{2}$ (reduced to lowest terms)

Subtraction of Fractions with Unlike Denominators

1. Change the fractions to equivalent fractions with the lowest common denominator.
2. Subtract the numerator of the subtrahend from that of the minuend.
3. Place the difference over the lowest common denominator.
4. Reduce to lowest terms.

EXAMPLE 1: $\frac{2}{3} - \frac{1}{6} =$ _____

The lowest common denominator is 6, because 6 is evenly divisible by 3. Therefore the fraction $\frac{2}{3}$ needs to be changed to an equivalent fraction with 6 as the denominator.

a. $\frac{2}{3} = \frac{?}{6}$

$$6 \div 3 = 2$$

$$2 \times 2 = 4$$

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

b. $\frac{4}{6} - \frac{1}{6} =$

c. $\frac{4-1}{6} =$

d. $\frac{3}{6} = \frac{1}{2}$ (reduced to lowest terms)

EXAMPLE 2: $7/10 - 3/5 =$ _____

The lowest common denominator is 10, because 10 is evenly divisible by 5. Therefore the fraction $3/5$ needs to be changed to an equivalent fraction with 10 as the denominator.

a. $\frac{3}{5} = \frac{?}{10}$

$10 \div 5 = 2$

$2 \times 3 = 6$

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

b. $\frac{7}{10} - \frac{6}{10} =$

c. $\frac{7-6}{10} = \frac{1}{10}$

Subtraction of Fractions Involving Whole Numbers and Unlike Denominators

1. Change the fractions to equivalent fractions with the lowest common denominator.
2. Subtract the numerator of the subtrahend from that of the minuend, borrowing 1 from the whole number if necessary.
3. Place the difference over the lowest common denominator.
4. Reduce to lowest terms.
5. Write the reduced fraction next to the difference of the whole numbers.

EXAMPLE 1: $3\frac{2}{3} - 1\frac{1}{4} =$ _____

The lowest common denominator is 12 (determined by multiplying 3×4). Each fraction needs to be changed to an equivalent fraction with 12 as the common denominator.

a. $\frac{2}{3} = \frac{?}{12}$

$12 \div 3 = 4$

$4 \times 2 = 8$

$\frac{2}{3} = \frac{8}{12}$

a. $\frac{1}{4} = \frac{?}{12}$

$12 \div 4 = 3$

$3 \times 1 = 3$

$\frac{1}{4} = \frac{3}{12}$

b. $3\frac{8}{12} - 1\frac{3}{12} =$

c. $3\frac{8}{12}$

$-1\frac{3}{12}$

d. $2\frac{5}{12}$

EXAMPLE 2: $8\frac{1}{2} - 3\frac{4}{7} =$ _____

The lowest common denominator is 14 (determined by multiplying 2×7). Each fraction needs to be changed to an equivalent fraction with 14 as the common denominator.

a. $\frac{1}{2} = \frac{?}{14}$

$14 \div 2 = 7$

$7 \times 1 = 7$

$\frac{1}{2} = \frac{7}{14}$

a. $\frac{4}{7} = \frac{?}{14}$

$14 \div 7 = 2$

$2 \times 4 = 8$

$\frac{4}{7} = \frac{8}{14}$

b. $8\frac{7}{14} - 3\frac{8}{14} =$



To perform the subtraction, it is necessary to borrow 1 from the whole number. “One” for this problem can be expressed as $\frac{14}{14}$. Therefore $8\frac{7}{14} = 7\frac{21}{14}$. Now the mathematics may be completed.

$$\begin{array}{r} \text{c. } 8\frac{7}{14} \\ - 3\frac{8}{14} \\ \hline \end{array} = \begin{array}{r} \text{d. } 7\frac{21}{14} \\ - 3\frac{8}{14} \\ \hline 4\frac{13}{14} \end{array}$$

MULTIPLICATION OF FRACTIONS

1. Multiply the numerators.
2. Multiply the denominators.
3. Place the product of the numerators over the product of the denominators.
4. Reduce to lowest terms.

EXAMPLE 1: $\frac{2}{3} \times \frac{3}{5} =$ _____

$$\frac{2}{3} \times \frac{3}{5} =$$

a. $\frac{2 \times 3}{3 \times 5} = \frac{6}{15}$

b. $\frac{6}{15} = \frac{2}{5}$ (reduced to lowest terms)

EXAMPLE 2: $\frac{4}{9} \times \frac{4}{5} =$ _____

$$\frac{4}{9} \times \frac{4}{5} =$$

a. $\frac{4 \times 4}{9 \times 5} = \frac{16}{45}$ (reduced to lowest terms)

The process of multiplying fractions may be shortened by **canceling**. In other words, numbers common to the numerators and denominators may be divided or canceled out.

EXAMPLE 1: $\frac{2}{3} \times \frac{3}{5} =$ _____

$$\frac{2}{\cancel{3}} \times \frac{\cancel{3}}{5} = \frac{2 \times 1}{1 \times 5} = \frac{2}{5}$$

EXAMPLE 3: $\frac{2}{6} \times \frac{3}{4} =$ _____

$$\frac{\cancel{2}}{\cancel{6}} \times \frac{\cancel{3}}{\cancel{4}} = \frac{1 \times 1}{2 \times 2} = \frac{1}{4}$$

EXAMPLE 2: $\frac{7}{20} \times \frac{2}{5} \times \frac{3}{14} =$ _____

$$\frac{\cancel{7}}{20} \times \frac{\cancel{2}}{5} \times \frac{3}{\cancel{14}} =$$

$$\frac{1 \times 1 \times 3}{10 \times 5 \times 2} = \frac{3}{100}$$

Multiplication of Mixed Numbers

1. Change each mixed number to an improper fraction.
2. Multiply the numerators.
3. Multiply the denominators.
4. Place the product of the numerators over the product of the denominators.
5. Reduce to lowest terms.

ALERT

*Remember the denominator of a whole number is *always* 1.

$$6 = \frac{6}{1}$$

$$12 = \frac{12}{1}$$

EXAMPLE 1: $1\frac{1}{2} \times 2\frac{1}{4} =$ _____

a. $\frac{3}{2} \times \frac{9}{4} =$

b. $\frac{3 \times 9}{2 \times 4} = \frac{27}{8} = 3\frac{3}{8}$ (reduced to lowest terms)

EXAMPLE 2: $2 \times 3\frac{5}{6} =$ _____

a. $\frac{2}{1} \times \frac{23}{6} =$

b. $\frac{2}{1} \times \frac{23}{6} =$

c. $\frac{1 \times 23}{1 \times 3} = \frac{23}{3} = 7\frac{2}{3}$ (reduced to lowest terms)

DIVISION OF FRACTIONS

1. Invert (or turn upside down) the divisor.
2. Multiply the two fractions.
3. Reduce to lowest terms.

EXAMPLE 1: $\frac{2}{3} \div \frac{6}{8} =$ _____

$$\frac{2}{3} \div \frac{6}{8} =$$

a. $\frac{2}{3} \times \frac{8}{6} =$

b. $\frac{2}{3} \times \frac{8}{6} = \frac{1 \times 8}{3 \times 3} = \frac{8}{9}$

c. $\frac{2}{3} \times \frac{8}{6} = \frac{1 \times 8}{3 \times 3} = \frac{8}{9}$

EXAMPLE 2: $\frac{3}{4} \div \frac{8}{9} =$ _____

$$\frac{3}{4} \div \frac{8}{9} =$$

a. $\frac{3}{4} \times \frac{9}{8} =$

b. $\frac{3 \times 9}{4 \times 8} = \frac{27}{32}$

c. $\frac{3 \times 9}{4 \times 8} = \frac{27}{32}$

Division of Mixed Numbers

1. Change each mixed number to an improper fraction.
2. Invert (or turn upside down) the divisor.
3. Multiply the two fractions.
4. Reduce to lowest terms.

EXAMPLE 1: $1\frac{3}{4} \div 2\frac{1}{8} =$ _____

a. $\frac{7}{4} \div \frac{17}{8} =$

b. $\frac{7}{4} \times \frac{8}{17} = \frac{7 \times 2}{1 \times 17} = \frac{14}{17}$

c. $\frac{7}{4} \times \frac{8}{17} = \frac{7 \times 2}{1 \times 17} = \frac{14}{17}$

EXAMPLE 2: $\frac{1}{7} \div 7 =$ _____

a. $\frac{1}{7} \div \frac{7}{1} =$

b. $\frac{1}{7} \times \frac{1}{7} = \frac{1 \times 1}{7 \times 7} = \frac{1}{49}$

c. $\frac{1}{7} \times \frac{1}{7} = \frac{1 \times 1}{7 \times 7} = \frac{1}{49}$

REDUCTION OF A COMPLEX FRACTION

1. Rewrite the complex fraction as a division problem.
2. Invert (or turn upside down) the divisor.
3. Multiply the two fractions.
4. Reduce to lowest terms.

EXAMPLE 1: $\frac{3}{8} / \frac{1}{4} = \underline{\hspace{2cm}}$

a. $\frac{3}{8} \div \frac{1}{4} =$

b. $\frac{3}{8} \times \frac{4}{1} =$

c. $\frac{3}{8} \times \frac{4}{1} = \frac{3 \times 1}{2 \times 1} = \frac{3}{2} = 1\frac{1}{2}$ (reduced to lowest terms)

EXAMPLE 2: $\frac{1}{2} / \frac{2}{7} = \underline{\hspace{2cm}}$

a. $\frac{1}{2} \div \frac{2}{7} =$

b. $\frac{1}{2} \times \frac{7}{2} =$

c. $\frac{1 \times 7}{2 \times 2} = \frac{7}{4} = 1\frac{3}{4}$ (reduced to lowest terms)

Reduction of a Complex Fraction with Mixed Numbers

1. Rewrite the complex fraction as a division problem.
2. Change the mixed numbers to improper fractions.
3. Invert (or turn upside down) the divisor.
4. Multiply the two fractions.
5. Reduce to lowest terms.

EXAMPLE 1: $2\frac{1}{2} / 1\frac{1}{3} = \underline{\hspace{2cm}}$

a. $2\frac{1}{2} \div 1\frac{1}{3} =$

b. $\frac{5}{2} \div \frac{4}{3} =$

c. $\frac{5}{2} \times \frac{3}{4} =$

d. $\frac{5 \times 3}{2 \times 4} = \frac{15}{8} = 1\frac{7}{8}$ (reduced to lowest terms)

EXAMPLE 2: $3\frac{3}{4} / 2\frac{1}{6} = \underline{\hspace{2cm}}$

a. $3\frac{3}{4} \div 2\frac{1}{6} =$

b. $\frac{15}{4} \div \frac{13}{6} =$

c. $\frac{15}{4} \times \frac{6}{13} =$

d. $\frac{15 \times 6}{4 \times 13} = \frac{45}{26} = 1\frac{19}{26}$ (reduced to lowest terms)



WORK SHEET

DIRECTIONS: Change the following improper fractions to mixed numbers.

1. $\frac{4}{3} =$ _____

2. $\frac{6}{2} =$ _____

3. $\frac{16}{5} =$ _____

4. $\frac{13}{4} =$ _____

5. $\frac{15}{10} =$ _____

6. $\frac{9}{8} =$ _____

7. $\frac{10}{6} =$ _____

8. $\frac{26}{12} =$ _____

9. $\frac{21}{6} =$ _____

10. $\frac{11}{8} =$ _____

11. $\frac{7}{2} =$ _____

12. $\frac{112}{100} =$ _____

DIRECTIONS: Change the following mixed numbers to improper fractions.

1. $1\frac{1}{2} =$ _____

2. $3\frac{3}{4} =$ _____

3. $2\frac{2}{3} =$ _____

4. $2\frac{5}{6} =$ _____

5. $1\frac{3}{5} =$ _____

6. $3\frac{4}{7} =$ _____

7. $4\frac{7}{8} =$ _____

8. $3\frac{7}{100} =$ _____

9. $2\frac{7}{10} =$ _____

10. $6\frac{5}{8} =$ _____

11. $1\frac{3}{5} =$ _____

12. $4\frac{1}{4} =$ _____

DIRECTIONS: Add and reduce fractions to lowest terms.

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

2. $\frac{2}{5} + \frac{3}{7} =$ _____

3. $3\frac{1}{8} + \frac{2}{3} =$ _____

4. $2\frac{1}{2} + \frac{3}{4} =$ _____

5. $2\frac{1}{4} + 3\frac{3}{5} =$ _____

6. $1\frac{6}{13} + 1\frac{2}{3} =$ _____

7. $1\frac{1}{2} + 3\frac{3}{4} + 2\frac{3}{8} =$ _____

8. $4\frac{3}{11} + 2\frac{1}{2} =$ _____

9. $2\frac{2}{3} + 3\frac{7}{9} =$ _____

10. $1\frac{3}{10} + 4\frac{2}{5} + \frac{2}{3} =$ _____

11. $3\frac{1}{2} + 2\frac{5}{6} + 2\frac{2}{3} =$ _____

12. $5\frac{5}{6} + 2\frac{2}{5} =$ _____

DIRECTIONS: Subtract and reduce fractions to lowest terms.

1. $\frac{2}{3} - \frac{3}{7} =$ _____

2. $\frac{7}{8} - \frac{5}{16} =$ _____

3. $\frac{9}{16} - \frac{5}{12} =$ _____

4. $1\frac{1}{3} - \frac{5}{6} =$ _____

5. $2\frac{17}{20} - 1\frac{3}{4} =$ _____

6. $5\frac{1}{4} - 3\frac{5}{16} =$ _____

7. $5\frac{3}{8} - 4\frac{3}{4} =$ _____

8. $3\frac{1}{4} - 1\frac{11}{12} =$ _____

9. $6\frac{1}{2} - 3\frac{7}{8} =$ _____

10. $4\frac{1}{6} - 2\frac{3}{4} =$ _____

11. $5\frac{2}{3} - 3\frac{7}{8} =$ _____

12. $2\frac{5}{16} - 1\frac{3}{8} =$ _____

DIRECTIONS: Multiply and reduce fractions to lowest terms.

1. $\frac{1}{3} \times \frac{4}{5} =$ _____

2. $\frac{7}{8} \times \frac{2}{3} =$ _____

3. $6 \times \frac{2}{3} =$ _____

4. $\frac{3}{8} \times 4 =$ _____

5. $2\frac{1}{3} \times 3\frac{3}{4} =$ _____

6. $4\frac{3}{8} \times 2\frac{5}{7} =$ _____

7. $2\frac{5}{12} \times 5\frac{1}{4} =$ _____

8. $\frac{3}{4} \times 2\frac{3}{8} =$ _____

9. $\frac{3}{8} \times \frac{4}{5} \times \frac{2}{3} =$ _____

10. $\frac{1}{10} \times \frac{3}{100} =$ _____

11. $3\frac{1}{2} \times 1\frac{5}{6} =$ _____

12. $2\frac{4}{9} \times 1\frac{3}{11} =$ _____

DIRECTIONS: Divide and reduce fractions to lowest terms.

1. $1\frac{2}{3} \div 3\frac{1}{2} =$ _____

2. $5\frac{1}{2} \div 2\frac{1}{2} =$ _____

3. $3\frac{1}{2} \div 2\frac{1}{4} =$ _____

4. $4\frac{3}{8} \div 1\frac{3}{4} =$ _____

5. $3\frac{1}{2} \div 1\frac{6}{7} =$ _____

6. $\frac{9}{10} \div \frac{2}{3} =$ _____

7. $3 \div 1\frac{5}{6} =$ _____

8. $6\frac{2}{3} \div 1\frac{7}{10} =$ _____

9. $\frac{7}{8} \div \frac{1}{4} =$ _____

10. $6\frac{1}{2} \div 2\frac{5}{6} =$ _____

11. $5\frac{1}{2} \div 2\frac{2}{3} =$ _____

12. $2\frac{2}{3} \div 1\frac{7}{9} =$ _____

ANSWERS ON PP. 501-502.

NAME _____

DATE _____

ACCEPTABLE SCORE 29

YOUR SCORE _____



POSTTEST 1



DIRECTIONS: Perform the indicated calculations and reduce fractions to lowest terms.

1. $\frac{2}{3} + \frac{4}{9} =$ _____

2. $\frac{3}{8} + \frac{1}{3} =$ _____

3. $2\frac{3}{4} + 2\frac{1}{3} =$ _____

4. $2\frac{2}{3} + \frac{3}{7} =$ _____

5. $\frac{3}{4} + \frac{3}{100} =$ _____

6. $4\frac{2}{5} + 3\frac{3}{4} =$ _____

7. $4\frac{1}{6} + \frac{2}{3} + 2\frac{3}{4} =$ _____

8. $1\frac{3}{10} - \frac{2}{5} =$ _____

9. $2\frac{1}{2} - 1\frac{2}{3} =$ _____

10. $\frac{5}{7} - \frac{1}{2} =$ _____

11. $3\frac{1}{2} - 1\frac{9}{16} =$ _____

12. $2\frac{5}{7} - 1\frac{2}{9} =$ _____

13. $9\frac{1}{5} - 3\frac{1}{2} =$ _____

14. $2\frac{1}{4} - \frac{7}{9} \div \frac{2}{3} =$ _____

15. $\frac{3}{4} \times \frac{6}{7} =$ _____

16. $3 \times \frac{4}{5} =$ _____

17. $\frac{2}{9} \times 9 =$ _____

18. $2\frac{3}{4} \times 1\frac{1}{6} =$ _____

19. $1\frac{1}{4} \times 2\frac{2}{3} =$ _____

20. $10\frac{1}{2} \times 1\frac{2}{5} =$ _____

21. $5\frac{6}{7} \times \frac{3}{5} =$ _____

22. $\frac{1}{4} \times 3\frac{1}{2} =$ _____

23. $\frac{2}{3} \div \frac{5}{8} =$ _____

24. $\frac{1}{5} \div \frac{1}{50} =$ _____

25. $\frac{1}{3} \div \frac{1}{2} =$ _____

26. $\frac{5}{6} \div \frac{2}{3} =$ _____

27. $\frac{1}{5} / \frac{1}{3} =$ _____

28. $1\frac{1}{5} / \frac{8}{9} =$ _____

29. $\frac{3}{4} / \frac{1}{6} =$ _____

30. $3\frac{1}{8} / 2\frac{3}{4} =$ _____

ANSWERS ON P. 502.

NAME _____

DATE _____

ACCEPTABLE SCORE **29**

YOUR SCORE _____



POSTTEST 2



DIRECTIONS: Perform the indicated calculations and reduce fractions to lowest terms.

1. $\frac{1}{4} + \frac{5}{6} =$ _____

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

3. $\frac{2}{3} + 2\frac{3}{7} =$ _____

4. $1\frac{7}{8} + 3\frac{2}{5} =$ _____

5. $1\frac{3}{4} + \frac{5}{8} + 2\frac{5}{12} =$ _____

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

7. $1\frac{5}{14} + 2\frac{3}{21} =$ _____

8. $\frac{4}{9} - \frac{1}{3} =$ _____

9. $2\frac{3}{4} - \frac{7}{8} =$ _____

10. $3\frac{1}{2} - 1\frac{2}{3} =$ _____

11. $3\frac{5}{8} - 1\frac{5}{16} =$ _____

12. $7\frac{1}{3} - 5\frac{5}{6} =$ _____

13. $7\frac{7}{10} - 3\frac{4}{5} =$ _____

14. $3\frac{4}{15} - 2\frac{2}{3} =$ _____

15. $\frac{2}{7} \times \frac{2}{3} =$ _____

16. $3\frac{4}{9} \times 1\frac{4}{5} =$ _____

17. $2 \times \frac{2}{3} =$ _____

18. $\frac{5}{6} \times 2\frac{1}{3} =$ _____

19. $\frac{1}{100} \times \frac{1}{10} =$ _____

20. $6\frac{3}{4} \times 5\frac{1}{3} =$ _____

21. $2\frac{5}{8} \times 1\frac{1}{3} =$ _____

22. $3\frac{1}{2} \times 3\frac{3}{14} =$ _____

23. $\frac{3}{4} \div \frac{8}{9} =$ _____

24. $1\frac{1}{2} \div 1\frac{6}{7} =$ _____

25. $2\frac{1}{3} \div \frac{3}{8} =$ _____

26. $\frac{1}{7} \div 7 =$ _____

27. $\frac{5}{6} / 1\frac{1}{3} =$ _____

28. $1\frac{1}{2} / 2\frac{2}{7} =$ _____

29. $2\frac{1}{4} / 1\frac{1}{3} =$ _____

30. $\frac{3}{8} / \frac{3}{9} =$ _____

ANSWERS ON P. 502.



For additional practice problems, refer to the Mathematics Review section of *Drug Calculations Companion*, Version 4, on Evolve.