FRACTIONS

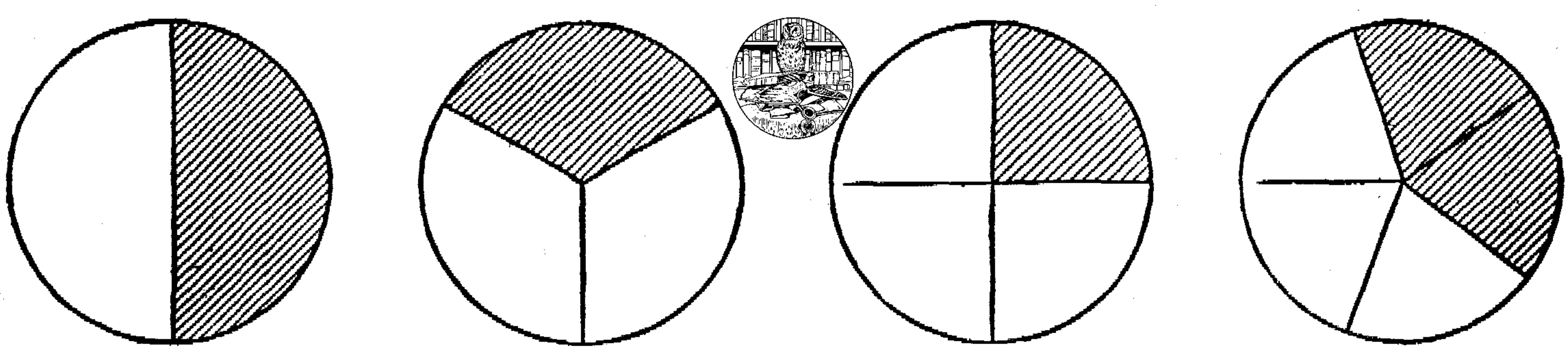
Serial 1976-2 Edition 1

FUNDAMENTAL PROCESSES

REDUCTION OF FRACTIONS

INTRODUCTION

1. Fractions in General.—A **fraction** is one or more of the equal parts into which a whole thing, or unit, is divided. The unit may be anything, as a circle, a dollar, a mile, a plot of land, etc. In Fig. 1 (*a*) is shown a circle divided into two equal



(*a*) (*b*) (*c*) (*d*)

FIG. 1

parts by a straight line, with one of the parts shaded. Each of these parts is a half of the whole circle; that is, each is a fraction of a circle. When the circle is divided into two equal parts, as shown, each part, or fraction, is *one-half*, which is written $\frac{1}{2}$.

Another circle is shown in (*b*), divided into three equal parts. Each of these equal parts is a third, or *one-third*, of the entire circle. This fraction is written $\frac{1}{3}$. The circle in (*c*) is divided into four equal parts, each of which is a fourth, or *one-fourth*, of the whole circle. The fraction *one-fourth* is written $\frac{1}{4}$. The circle in (*d*) is divided into five equal parts, each of which is *one-fifth* of the whole circle. This fraction is written $\frac{1}{5}$. Two of the equal parts in (*d*) are shaded; consequently, the part of the whole circle that is shaded is *two-fifths*, which is written $\frac{2}{5}$. Similarly, in (*b*), there are two parts not shaded, so that the part or fraction not shaded is *two-thirds*, written $\frac{2}{3}$. In (*c*), three of the equal parts are not shaded; consequently, the fraction of the circle that is not shaded is *three-fourths*, or $\frac{3}{4}$.

2. Numerator and Denominator.—From what has just been stated it must be plain that two numbers are needed to write a fraction. The numbers are written one above the other, with a line between them, and each has its own name. A fraction expressed by means of two numbers, one over the other, separated by a line is known as a **common fraction,** to distinguish it from a *decimal fraction*, which will be described in a succeeding Section. The number above the line is called the **numerator** of the fraction and the number below the line is called the **denominator** of the fraction. Every common fraction must have a numerator and a denominator. The denominator shows how many equal parts a thing is divided into, and the numerator shows how many of those equal parts are taken, or considered.

For example, in Fig. 1 (*a*) the shaded part of the circle is $\frac{1}{2}$ of the circle. In the fraction $\frac{1}{2}$, the numerator is 1 and the denominator is 2. The denominator 2 shows that the circle is divided into two equal parts, and the numerator 1 shows that one of those parts is considered. In (*d*), the fraction of the circle that is shaded is $\frac{2}{5}$. The denominator 5 of the fraction shows that the circle is divided into five equal parts, and the numerator 2 shows that the two parts that are shaded are considered. If the unshaded part had been considered, the numerator would have been 3, and the fraction would have been $\frac{3}{5}$, because three of the five equal parts are not shaded.

The numerator and the denominator of a fraction are called the **terms** of a fraction.

3. Effect of Denominator on Value of Fraction.—The larger the denominator of a fraction, the smaller is the fraction, the numerator being the same. This may easily be shown by referring to Fig. 1 (*b*) and (*d*). The fraction represented by one of the equal parts in (*b*) is $\frac{1}{3}$ and that represented by one of the equal parts in (*d*) is $\frac{1}{5}$. The denominator 5 is greater than the denominator 3, but the fraction $\frac{1}{5}$ is smaller than the fraction $\frac{1}{3}$. This can be seen by comparing one of the equal parts in (*d*) with one in (*b*). One of the parts in (*d*), or $\frac{1}{5}$ of the circle, is much smaller than one of the parts in (*b*), or $\frac{1}{3}$ of the circle. Hence, if the numerators of two fractions are equal, the fraction with the smaller denominator is the greater. Thus, of the two fractions $\frac{3}{10}$ and $\frac{3}{4}$, the latter is the greater. But if the denominators are equal, the one with the larger numerator is the greater. Take $\frac{3}{5}$ and $\frac{4}{5}$, for example; in this case the denominators are equal, and $\frac{4}{5}$ is greater than $\frac{3}{5}$ because 4 is greater than 3.

To illustrate the point more fully, it may be supposed that the circle represents some object, such as a cheese or a large cake weighing 60 pounds. Then,

One-half weighs $60 \div 2 = 30$ pounds
One-third weighs $60 \div 3 = 20$ pounds
One-fourth weighs $60 \div 4 = 15$ pounds
One-fifth weighs $60 \div 5 = 12$ pounds
One-sixth weighs $60 \div 6 = 10$ pounds
One-tenth weighs $60 \div 10 = 6$ pounds

Therefore, the larger the denominator of the fraction the smaller is its value. It was said before that $\frac{3}{10}$ is less than $\frac{3}{4}$. In the case of the object weighing 60 pounds, one-tenth weighs 6 pounds, and $\frac{3}{10}$, which is three times $\frac{1}{10}$, weighs $3 \times 6 = 18$ pounds; one-fourth weighs 15 pounds, and $\frac{3}{4}$ weighs $3 \times 15 = 45$ pounds. We thus see in another way that $\frac{3}{10}$ weighs less than $\frac{3}{4}$, or $\frac{3}{10}$ is less than $\frac{3}{4}$.

4. Division Expressed by a Fraction.—A fraction may also be used to express division; for example, $4 \div 5$ may be written $\frac{4}{5}$, which is a fraction; and similarly, $3 \div 16$ may be written $\frac{3}{16}$. The **value** of a fraction is the result obtained by dividing the numerator by the denominator.

5. Proper Fractions and Improper Fractions.—If the numerator of a fraction is less than the denominator, the fraction is called a **proper fraction**; thus, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{1}{16}$, $\frac{3}{10}$ are proper fractions. If the numerator is equal to or greater than the denominator, the fraction is an **improper fraction**; thus, $\frac{2}{2}$, $\frac{5}{5}$, $\frac{16}{12}$, $\frac{12}{4}$, $\frac{28}{7}$ are improper fractions.

6. Prime Numbers and Composite Numbers.—A **prime number** is one that cannot be divided by any number except itself and 1, without a remainder; thus, 1, 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, etc. are prime numbers.

Any number not a prime number is called a **composite number**, and may be considered as the product of two or more prime numbers. Thus, 60 is a composite number, and is equal to the product of the prime numbers 2, 2, 3, and 5; or, $2\times2\times3\times5=60$.

7. Whole Numbers and Mixed Numbers.—A **whole number** is a number that does not contain a fraction. For example, 2, 36, 185, 4,063 are whole numbers. A **mixed number** is a number composed of a whole number and a fraction united. For example, $3\frac{3}{8}$ is a mixed number, being composed of a whole number 3 and a fraction $\frac{3}{8}$. This number is read *three and three-eighths*. It is equal to $3+\frac{3}{8}$, but for convenience the plus sign is omitted in writing it and it appears simply as $3\frac{3}{8}$. The mixed number $10\frac{5}{16}$ is read *ten and five-sixteenths*. A whole number is very frequently called an **integer**. It is also occasionally referred to as an *integral number*.

8. Fractions Smaller or Greater Than 1.—A fraction whose numerator and denominator are equal has a value of 1; thus, $\frac{4}{4}=1$, $\frac{2}{2}=1$, $\frac{8}{8}=1$. If the numerator is less than the denominator, the value of the fraction is less than 1; thus, the value of each of the fractions $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{16}$ is less than 1. If the numerator of the fraction is larger than the denominator, the value of the fraction is more than 1; thus, $\frac{12}{2}=6$, $\frac{10}{5}=2$, $\frac{3}{2}=1\frac{1}{2}$.

SIMPLE REDUCTION

9. Same Fraction in Different Forms.—The form of a fraction may be changed without changing its value; or, in other words, a fraction may be expressed in several ways. The form chosen depends on the number of equal parts into which a thing is divided. This may easily be understood by referring to Fig. 2, which shows three circles of equal size. It is supposed that one-half of each circle is to be taken, but that the circles

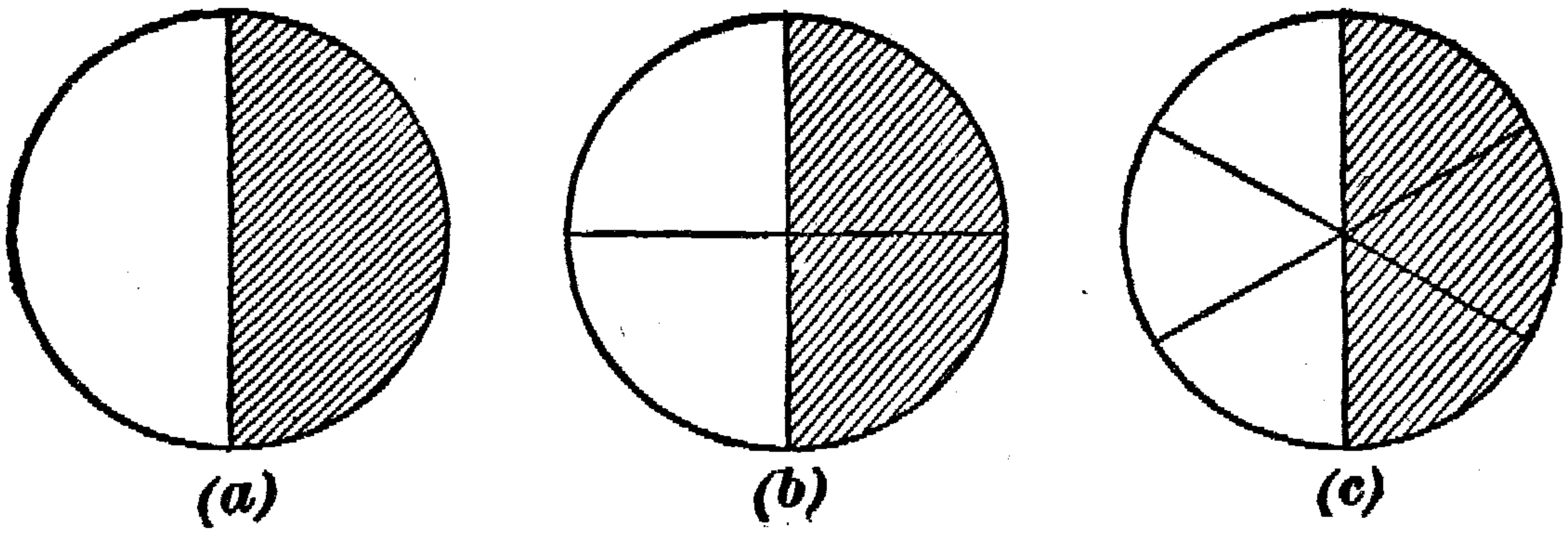


FIG. 2

are not divided into the same number of equal parts. The circle in (*a*) is divided into two equal parts, one of which is shaded; that is, the part shaded is $\frac{1}{2}$ of the whole circle. The circle in (*b*) is divided into four equal parts, two of which are shaded; that is, the shaded portion is $\frac{2}{4}$ of the whole. The circle in (*c*) is divided into six equal parts, three of which are shaded; that is, the shaded portion is $\frac{3}{6}$ of the whole. But, as the three circles are of the same size, and the same amount is shaded in each, it follows that $\frac{1}{2}$, $\frac{2}{4}$, and $\frac{3}{6}$ must be equal to one another, because each one represents the same amount, or one-half of the circle.

10. That fractions of equal value may be expressed in different forms may be further illustrated by Fig. 3, which is an oblong divided into equal spaces. There are 4 squares in a row and there are 6 rows, making 24 squares in all. Hence, each square is 1 twenty-fourth of the whole. As there are 6 rows, one row is 1 sixth of the whole. From this it is seen that 4 twenty-fourths equals 1 sixth, or writing this in figures,

$$\frac{4}{24}=\frac{1}{6}$$

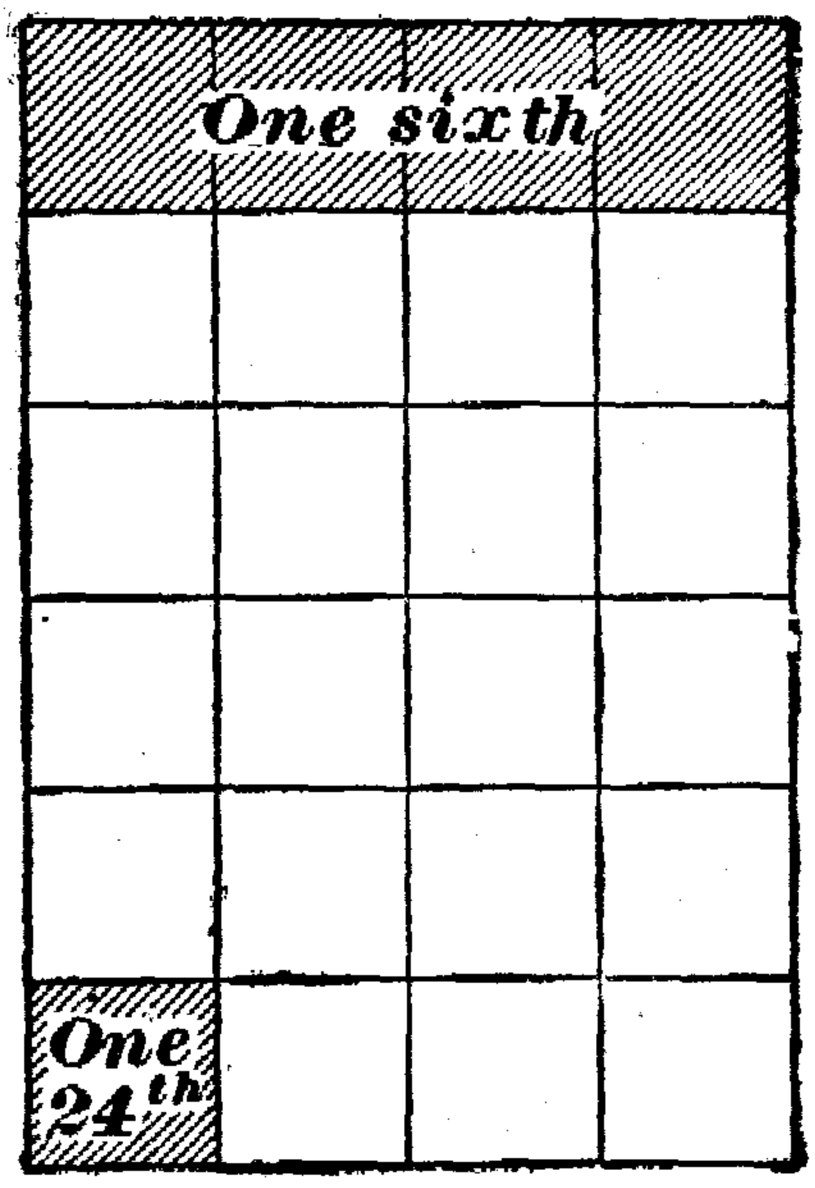


FIG. 3

Since 4 twenty-fourths equals 1 sixth, 8 twenty-fourths equals 2 sixths, 12 twenty-fourths equals 3 sixths, and 20 twenty-fourths equals 5 sixths. It is also seen that 3 rows are equal to 3 sixths; but 3 rows are equal to $3\times4=12$ squares, which is equal to one-half of the oblong. It follows, then, that

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

In each strip running up and down the figure there are 6 squares; but, as there are 4 strips, each strip is 1 fourth of the figure; hence, 6 twenty-fourths equals 1 fourth, or

$$\frac{6}{24}=\frac{1}{4}$$

In two strips, or one-half of the figure, there are 12 squares; hence,

$$\frac{12}{24}=\frac{2}{4}=\frac{1}{2}$$

If the figure is divided into 12 equal parts there will be 2 squares in each part; then,

$$\frac{2}{24}=\frac{1}{12}$$

11. General Principle of Reducing Fractions.—If both terms of a fraction, that is, both numerator and denominator, are multiplied or divided by the same number, the value of the fraction is not changed. For example, suppose that in the fraction $\frac{1}{2}$, both terms are multiplied by 2. Then, $\frac{1\times 2}{2\times 2}=\frac{2}{4}$. The fraction $\frac{2}{4}$ has the same value as $\frac{1}{2}$, as was shown in the preceding article. Again, take $\frac{1}{2}$ and multiply both terms by 3. Then, $\frac{1\times 3}{2\times 3}=\frac{3}{6}$, which has the same value as $\frac{1}{2}$, according to the preceding article. Now take the fraction $\frac{3}{6}$ and divide both terms by 3. Then, $\frac{3\div 3}{6\div 3}=\frac{1}{2}$. But it was shown that $\frac{1}{2}=\frac{3}{6}$, in the preceding article; therefore, by dividing both terms by the same number, the value of the fraction is not changed. This process of changing the form of fractions without changing their values is called **reduction of fractions.**

12. Reducing a Fraction to Higher Terms.—A fraction is reduced to *higher terms* by *multiplying both terms of the fraction by the same number*. For example, $\frac{1}{6}$ is reduced to $\frac{4}{24}$ by multiplying both terms of the fraction by 4. The operation may be written as follows:

$$\frac{1}{6}=\frac{1\times 4}{6\times 4}=\frac{4}{24}$$

That these fractions are equal may be seen from Fig. 3, in which one row is equal to 1 sixth of the whole. Each row contains 4 twenty-fourths; hence, $\frac{1}{6}=\frac{4}{24}$.

As another example, let $\frac{2}{3}$ be changed to $\frac{16}{24}$ by multiplying each term by 8; thus,

$$\frac{2}{3}=\frac{2\times 8}{3\times 8}=\frac{16}{24}$$

If Fig. 3 is divided into three equal parts, and two of the parts are considered, there will be 16 squares in the parts considered, or $\frac{16}{24}$ of the whole figure. This shows that the result just obtained is correct.

13. Reducing a Fraction to Lower Terms.—A fraction is reduced to *lower terms* by *dividing both terms by the same number*. For example, $\frac{20}{24}$ is reduced to $\frac{5}{6}$ by dividing both terms by 4; thus,

$$\frac{20}{24}=\frac{20\div 4}{24\div 4}=\frac{5}{6}$$

In Art. 10 it was shown that 5 sixths was equal to 20 twenty-fourths, thus proving that the preceding reduction is correct.

14. A fraction is reduced to its *lowest terms* when both its numerator and its denominator cannot be divided by the *same* number without a remainder; for example, $\frac{3}{4}$, $\frac{2}{3}$, $\frac{11}{24}$, $\frac{8}{15}$ are fractions reduced to their lowest terms.

EXAMPLE 1.—Reduce $\frac{12}{16}$ to its lowest terms.

SOLUTION.—By trial find the greatest number that will divide 12 and 16 without a remainder. This number is 4.

$$\frac{12}{16}=\frac{12\div 4}{16\div 4}=\frac{3}{4}. \quad \text{Ans.}$$

EXAMPLE 2.—Reduce $\frac{8}{10}$ to its lowest terms.

SOLUTION.—The number that will divide 8 and 10 without a remainder is 2.

$$\frac{8}{10}=\frac{8\div 2}{10\div 2}=\frac{4}{5}. \quad \text{Ans.}$$

15. Reducing a Fraction to One of Equal Value and With a Given Denominator.—In practice, it is often required to change a given fraction to another one of equal value, but with a different denominator. In such cases the following rule applies:

Rule.—*Divide the given denominator by the denominator of the given fraction, and multiply both terms of the fraction by the result.*

EXAMPLE 1.—Reduce $\frac{7}{8}$ to an equal fraction having 96 for a denominator.

SOLUTION.—Both the numerator and the denominator must be multiplied by the same number in order not to change the value of the fraction. The denominator must be multiplied by some number which will, in this case, make the product 96; this number is evidently $96\div 8=12$, because $8\times 12=96$. Hence,

$$\frac{7\times 12}{8\times 12}=\frac{84}{96}. \quad \text{Ans.}$$

EXAMPLE 2.—Reduce $\frac{3}{4}$ to 100ths; that is, to a fraction having 100 for a denominator.

SOLUTION.— $100 \div 4 = 25$; hence,

$$\frac{3\times25}{4\times25}=\frac{75}{100}. \quad \text{Ans.}$$

EXAMPLES FOR PRACTICE

Reduce the following:

(a)	$\frac{7}{16}$ to 128ths.	(a)	$\frac{56}{128}$
(b)	$\frac{24}{132}$ to its lowest terms.	(b)	$\frac{2}{11}$
(c)	$\frac{64}{1000}$ to its lowest terms.	Ans. (c)	$\frac{8}{125}$
(d)	$\frac{5}{7}$ to 49ths.	(d)	$\frac{35}{49}$
(e)	$\frac{13}{16}$ to 10,000ths.	(e)	$\frac{8125}{10000}$

16. Reducing a Whole Number or a Mixed Number to an Improper Fraction.—The process of reducing a whole number or a mixed number to an improper fraction is of importance as it is used to a great extent in the multiplication and division of fractions. The following rule applies:

Rule.—*To reduce a mixed number to an improper fraction, multiply the whole number by the denominator of the fraction, add the numerator to the product, and place the denominator under the result. If it is desired to reduce a whole number to a fraction, multiply the whole number by the denominator of the given fraction, and write the result over the denominator.*

EXAMPLE 1.—Reduce 5 to an improper fraction having 4 as a denominator.

SOLUTION.—There are 4 fourths in 1, because $\frac{4}{4}=1$, and in 5 there will be 5×4 fourths, or 20 fourths; that is, $5\times\frac{4}{4}=\frac{20}{4}$. Ans.

EXAMPLE 2.—Reduce $8\frac{3}{4}$ to an improper fraction.

SOLUTION.—According to the rule,

$$8\tfrac{3}{4}=\frac{8\times4+3}{4}=\frac{32+3}{4}=\frac{35}{4}. \quad \text{Ans.}$$

EXAMPLES FOR PRACTICE

Reduce to improper fractions:

(a) $4\frac{1}{8}$.

(b) $5\frac{3}{16}$.

(c) $10\frac{2}{10}$.

(d) $37\frac{3}{4}$.

(e) $50\frac{4}{5}$.

(f) Reduce 7 to a fraction whose denominator is 16.

Ans. (a) $\frac{33}{8}$ (b) $\frac{83}{16}$ (c) $\frac{102}{10}$ (d) $\frac{151}{4}$ (e) $\frac{254}{5}$ (f) $\frac{112}{16}$

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17. Reducing an Improper Fraction to a Whole or to a Mixed Number.—The result obtained in the multiplication or division of fractions is in many cases in the form of an improper fraction. Preferably, the answer should be in the form of a mixed number. An improper fraction is reduced to a mixed number by applying the following rule:

Rule.—*To reduce an improper fraction to a whole or a mixed number, divide the numerator by the denominator and write the result as in ordinary division.*

EXAMPLE.—Reduce $\frac{21}{4}$ to a mixed number.

SOLUTION.— 4 is contained in 21, 5 times with 1 as a remainder. The latter number is written as the numerator of a fraction with 4 as a denominator. This fraction is added to the whole number. Therefore, $5+\frac{1}{4}$, or $5\frac{1}{4}$, is the mixed number required. Ans.

EXAMPLES FOR PRACTICE

Reduce to whole or mixed numbers:

(a) $\frac{145}{6}$.

(b) $\frac{185}{3}$.

(c) $\frac{701}{6}$.

(d) $\frac{149}{3}$.

(e) $\frac{76}{19}$.

(f) $\frac{125}{25}$.

Ans. (a) $24\frac{1}{6}$ (b) $61\frac{2}{3}$ (c) $116\frac{5}{6}$ (d) $49\frac{2}{3}$ (e) 4 (f) 5

PROCESSES PREPARATORY TO ADDITION AND SUBTRACTION OF FRACTIONS

FINDING LEAST COMMON DENOMINATOR

18. Adding Fractions With Different Denominators. Fractions cannot be added unless they have the same denominator. If the denominators are not the same the fractions must be changed into such forms that they have the same denominator. For instance, $\frac{3}{4}$ may be added to $\frac{1}{4}$, but $\frac{3}{4}$ cannot be added to $\frac{7}{8}$ as the fractions now stand, because the denominators are different; fourths cannot be added to eighths. The reason for this may be seen from the following example:

Suppose that an apple is divided into 4 equal parts, and that 2 of these are each divided into 2 equal parts. It is evident that there are 2 one-fourths and 4 one-eighths. If these parts are added, the sum is 6. But what does this sum represent? It cannot be fourths, for 6 fourths is equal to $\frac{6}{4}=1\frac{1}{2}$, and only 1 apple was divided; neither can it be eighths; for $\frac{6}{8}=\frac{3}{4}$ is less than 1 apple. By reducing the quarters to eighths, there are $\frac{2}{4}=\frac{4}{8}$; on adding these to the other 4 eighths, there are $4+4=8$ eighths. This result must be correct, since $\frac{8}{8}=1$. Another way would be to combine the eighths into quarters. Thus, $\frac{4}{8}=\frac{2}{4}$; then, adding the quarters, there are $2+2=4$ quarters. This result is also correct, since $\frac{4}{4}=1$.

19. Common Denominator.—Several fractions are said to have a **common denominator** when all their denominators are the same, as $\frac{1}{11}$, $\frac{4}{11}$, $\frac{7}{11}$, $\frac{10}{11}$. Two or more fractions having different denominators can be reduced to others having a common denominator by reducing each fraction to higher or lower terms. For example, $\frac{1}{2}$ and $\frac{1}{3}$ can each be reduced to sixths; thus, $\frac{1}{2}=\frac{3}{6}$, because $\frac{1\times3}{2\times3}=\frac{3}{6}$; also $\frac{1}{3}=\frac{2}{6}$, because $\frac{1\times2}{3\times2}=\frac{2}{6}$. Likewise, $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{3}{4}$ can each be reduced to twelfths; thus, $\frac{1}{2}=\frac{6}{12}$, $\frac{1}{3}=\frac{4}{12}$, and $\frac{3}{4}=\frac{9}{12}$.

20. Least Common Denominator.—Fractions with different denominators may have as a common denominator any number that will contain each of the denominators *without a* *remainder;* for example, the fractions $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ can be reduced to twelfths, twenty-fourths, thirty-sixths, or to fractions having as a common denominator any number that will contain 2, 3, and 4 without a remainder. But the **least common denominator** is the *least* number that may be divided by each denominator of the given fractions without a remainder. The following example will illustrate the meaning of this definition:

Let it be supposed that the fractions $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{3}{4}$ are to be reduced to fractions that have the same denominator. As 2, 3, and 4 can be divided into 12 without a remainder, 12 is taken as the common denominator. Thus, $12 \div 2 = 6$, then $\frac{1 \times 6}{2 \times 6} = \frac{6}{12}$; similarly, $\frac{2}{3} = \frac{8}{12}$, and $\frac{3}{4} = \frac{9}{12}$, and the fractions $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{3}{4}$ therefore become $\frac{6}{12}$, $\frac{8}{12}$, and $\frac{9}{12}$. The number 24 could also be used as a common denominator, because it can be divided by 2, 3, or 4 without a remainder. The three fractions would then become $\frac{12}{24}$, $\frac{16}{24}$, and $\frac{18}{24}$, and these values would be the same as $\frac{6}{12}$, $\frac{8}{12}$, and $\frac{9}{12}$. But the point to be noticed is that although 12 and 24 can both be used as common denominators for these three fractions, 12 is the *least* common denominator, because it is the *smallest* number that can be divided by 2, 3, and 4 without leaving a remainder. A series of fractions may have a great many different common denominators, but they can have only *one* least common denominator. In adding or subtracting, fractions are generally reduced to the *least* common denominator. The methods by which fractions are reduced to the least common denominator will be explained in detail further on.

21. Finding the Least Common Denominator by Inspection.—The least common denominator of several fractions may be found either by inspection or by calculation. The method of finding it by inspection will be explained by means of an example taken from practice. For this purpose the foot rule, generally used in English-speaking countries for taking measurements of length, will be considered.

A foot rule is divided into equal parts called *inches*, and each inch is further divided into equal parts called fractions of an inch. A part of a rule showing a common way of dividing the inch is illustrated in Fig. 4. The long line *a* at the middle of the inch divides it into halves. At the middle of the halves are shorter lines *b* and *c* that divide the half inches into halves, making quarter inches, and the quarter inches are still further divided by the lines *d*, *e*, *f*, and *g* into eighths. Finally, the shortest lines divide the eighths, so that there are sixteen equal divisions in 1 inch, and these are called sixteenths. Suppose that the rule is used to measure the length of a block *h*. The end of the rule is put in line with the end of the block, and the other end of the block comes just to the line *a*, which is the half-inch mark; therefore, the block is said to be $\frac{1}{2}$ inch long.

22. Now, suppose that the length of the block *h*, Fig. 4, is to be found in quarters, eighths, or sixteenths of an inch. By looking at the rule, it is seen that there are just two quarter inches between the line *a* and the end of the rule; so the length of the block is two quarter inches or two-fourths of an inch, which is written $\frac{2}{4}$ inch. This is exactly equal to $\frac{1}{2}$ inch, because $\frac{1\times 2}{2\times 2}=\frac{2}{4}$. If the length of the block is expressed in eighths of an inch, it is $\frac{4}{8}$ inch long, because there are four eighth-inch divisions between the line *a* and the end of the rule. Also, the block is $\frac{8}{16}$ inch long, because there are eight sixteenth-inch divisions from the line *a* to the end of the rule. This simply shows that $\frac{1}{2}=\frac{2}{4}=\frac{4}{8}=\frac{8}{16}$. Sometimes rules are divided into thirty-seconds and sixty-fourths of an inch.

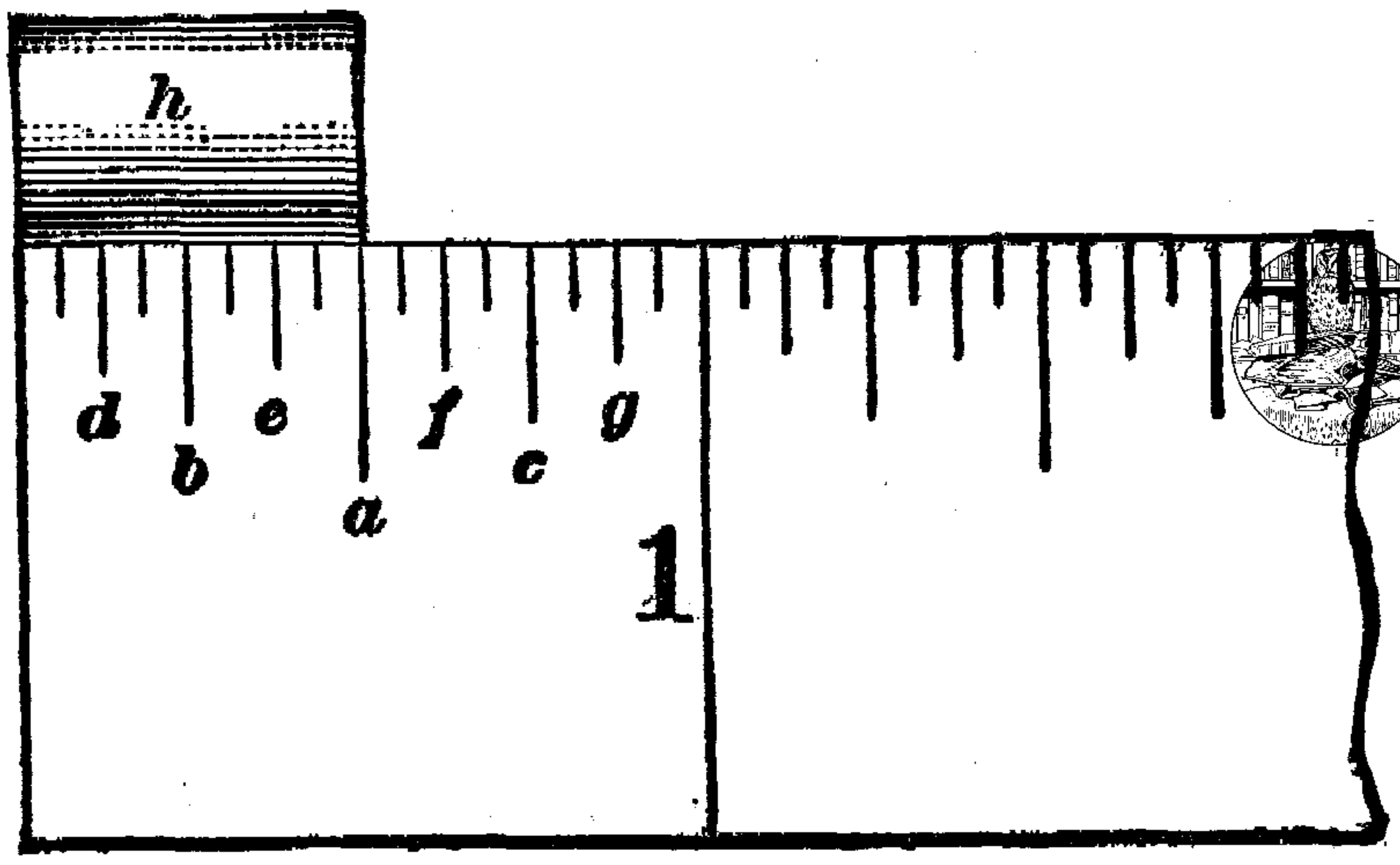

FIG. 4

If a rule similar to Fig. 4 is also divided into thirty-seconds and sixty-fourths of an inch, the fractions considered will be halves, fourths, eighths, sixteenths, thirty-seconds, and sixty-fourths. When a common denominator is to be found for several such fractions, all that is necessary is to take the greatest denominator in the group. For example, in the fractions $\frac{5}{16}$, $\frac{3}{4}$, $\frac{7}{8}$, and $\frac{1}{2}$ the largest denominator is 16, and this is chosen as the least common denominator. Then, $\frac{3}{4}=\frac{12}{16}$, $\frac{7}{8}=\frac{14}{16}$, and $\frac{1}{2}=\frac{8}{16}$. Again, suppose that the fractions are $\frac{27}{64}$, $\frac{3}{8}$, $\frac{7}{32}$, and $\frac{1}{4}$. The largest of