



# MATHEMATICS 704

## RATIONAL NUMBERS

### CONTENTS

<b>I. COMMON FRACTIONS . . . . .</b>	<b>2</b>
<b>Proper Fractions . . . . .</b>	<b>2</b>
<b>Improper Fractions . . . . .</b>	<b>6</b>
<b>Mixed Numbers . . . . .</b>	<b>8</b>
<b>II. DECIMAL FRACTIONS . . . . .</b>	<b>13</b>
<b>Methods . . . . .</b>	<b>13</b>
<b>Fractions as Decimals . . . . .</b>	<b>16</b>
<b>Percent . . . . .</b>	<b>18</b>
<b>III. APPLICATIONS . . . . .</b>	<b>23</b>
<b>Fractions . . . . .</b>	<b>23</b>
<b>Decimals . . . . .</b>	<b>28</b>
<b>Percents . . . . .</b>	<b>33</b>

<b>Author:</b>	<b>Richard J. Flemming, M.A.</b>
<b>Editor-in-Chief:</b>	Richard W. Wheeler, M.A.Ed.
<b>Editor:</b>	Robin Hintze Kreutzberg, M.B.A.
<b>Consulting Editor:</b>	Robert L. Zenor, M.A., M.S.
<b>Revision Editor:</b>	Alan Christopherson, M.S.



Alpha Omega Publications®

804 N. 2nd Ave. E., Rock Rapids, IA 51246-1759

© MCMXCVI by Alpha Omega Publications, Inc. All rights reserved.

LIFEPAC is a registered trademark of Alpha Omega Publications, Inc.

All trademarks and/or service marks referenced in this material are the property of their respective owners. Alpha Omega Publications, Inc. makes no claim of ownership to any trademarks and/or service marks other than their own and their affiliates', and makes no claim of affiliation to any companies whose trademarks may be listed in this material, other than their own.



# RATIONAL NUMBERS

The study of rational numbers is really the study of fractions. This LIFE PAC<sup>®</sup> includes a complete study of rational numbers and covers common fractions, decimal fractions, percent, and applications of rational numbers.

## OBJECTIVES

**Read these objectives.** The objectives tell you what you will be able to do when you have successfully completed this LIFE PAC.

When you have finished this LIFE PAC, you should be able to:

1. Define and use proper fractions.
2. Define and use improper fractions.
3. Define and use mixed numbers.
4. Define and use decimal fractions.
5. Convert fractions to decimals.
6. Define and use percent.
7. Solve fraction application problems.
8. Solve decimal application problems.
9. Solve percent application problems.

**Survey the LIFE PAC.** Ask yourself some questions about this study. Write your questions here.

---

---

---

---

---

---

---

---

---

---

## I. COMMON FRACTIONS

### OBJECTIVES

1. Define and use proper fractions.
2. Define and use improper fractions.
3. Define and use mixed numbers.

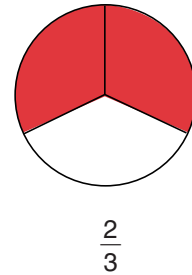
When rational numbers are written as one whole number over another whole number, they are called common fractions. In this part of the LIFEPAAC, you will study proper fractions, improper fractions, and mixed numbers, all of which are also common fractions.

### PROPER FRACTIONS

In this section, you should learn important terms and will discover equivalent fractions, fractions in lowest terms, and fractions in higher terms.

### IMPORTANT TERMS

What makes up a fraction? Two-thirds is a fraction. It is usually written  $\frac{2}{3}$ . The two tells how many parts, and the three tells how big the parts are. The original number was cut into three parts. Notice the circle is divided into three parts with two shaded. A proper fraction has a numerator of lesser value than its denominator.



### DEFINITIONS

A *rational number* is a number that can be written as a ratio of two whole numbers. It is usually written as a fraction. In a fraction, the upper number is called the *numerator* or *dividend*.

In a fraction, the lower number is called the *denominator* or *divisor*.

In a *common fraction*, the numerator is a whole number, and the denominator is a whole number other than zero.

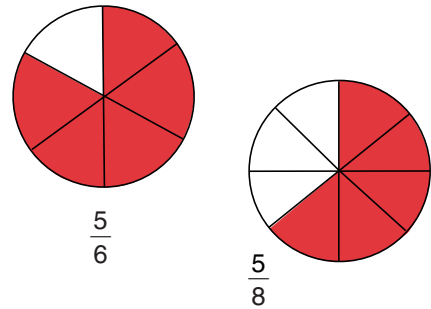
In a *proper fraction*, the numerator is less than the denominator.

**Model 1:** Five-sixths is a fraction. Write it using numerals and explain what each part means.

In numerals, the fraction is  $\frac{5}{6}$ .

Five tells how many parts, and six tells the size of each part.

**Model 2:** Explain why  $\frac{5}{6}$  is greater than  $\frac{5}{8}$ .  
Six equal size parts are larger than eight equal parts; therefore,  $\frac{5}{6}$  is greater than  $\frac{5}{8}$ .



**▶▶▶ Compete these activities.**

- 1.1 One-half is a fraction. Write it using numerals, and explain what each part stands for. \_\_\_\_\_
- 1.2 Four-fifths is a fraction. Write it using numerals, and explain what each part stands for. \_\_\_\_\_
- 1.3 The whole is cut into nine equal-size parts and four parts are yours. What fraction do your parts represent? \_\_\_\_\_
- 1.4 The whole is cut into fifteen equal-size parts and four parts are yours. What fraction do your parts represent? \_\_\_\_\_
- 1.5 Compare the fractions in Problems 1.3 and 1.4. Explain why one is larger than the other. \_\_\_\_\_
- 1.6 In Problem 1.5, explain why one fraction is smaller than the other. \_\_\_\_\_

**EQUIVALENT PROBLEMS**

Fractions that simplify to the same numerical value are called *equivalent fractions*.

The fraction  $\frac{2}{3}$  can be written  $\frac{4}{6}$ ,  $\frac{6}{9}$ ,  $\frac{8}{12}$ , and so on because all of these fractions have a value of  $\frac{2}{3}$ .

**DEFINITION**

*Equivalent fractions* are fractions with the same numerical value.

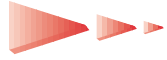
**Model 1:** Give a fraction equivalent to  $\frac{1}{2}$ .

One answer is  $\frac{2}{4}$ ; another answer is  $\frac{3}{6}$ , etc.

**Model 2:** Show why  $\frac{8}{10}$  is the same as  $\frac{4}{5}$ .

You can write  $\frac{8}{10}$  as  $\frac{2 \times 4}{2 \times 5}$ , and  $\frac{2}{2} = 1$ ;

therefore,  $\frac{8}{10} = \frac{4}{5}$ .



**Complete these items.**

1.7 Give a fraction equivalent to  $\frac{3}{7}$ .

\_\_\_\_\_

1.8 Give a fraction equivalent to  $\frac{11}{14}$ .

\_\_\_\_\_

1.9 How many fractions are equivalent to  $\frac{1}{2}$ ?

\_\_\_\_\_

1.10 Show why  $\frac{10}{12}$  is the same as  $\frac{5}{6}$ .

\_\_\_\_\_

1.11 Show why  $\frac{16}{24}$  is the same as  $\frac{2}{3}$ .

\_\_\_\_\_

1.12 Which one of the following fractions is not equivalent to the rest?

$\frac{1}{2}$ ,  $\frac{2}{4}$ ,  $\frac{3}{6}$ ,  $\frac{4}{9}$ ,  $\frac{5}{10}$ ,  $\frac{6}{12}$

\_\_\_\_\_

## FRACTIONS IN LOWEST TERMS

Equivalent fractions can be used to help reduce fractions to lowest terms.

Remember  $\frac{4}{6} = \frac{2 \times 2}{2 \times 3} = 1 \times \frac{2}{3} = \frac{2}{3}$ ; therefore,  $\frac{4}{6} = \frac{2}{3}$ . A fraction is

reduced to lowest terms when the numerator and denominator cannot both be evenly divided by the same number.

**Model 1:** Reduce  $\frac{6}{8}$  to lowest terms.

$$\frac{6}{8} = \frac{2 \times 3}{2 \times 4} = 1 \times \frac{3}{4} = \frac{3}{4}$$

**Model 2:** Reduce  $\frac{24}{36}$  to lowest terms.

$$\frac{24}{36} = \frac{12 \times 2}{12 \times 3} = 1 \times \frac{2}{3} = \frac{2}{3}$$