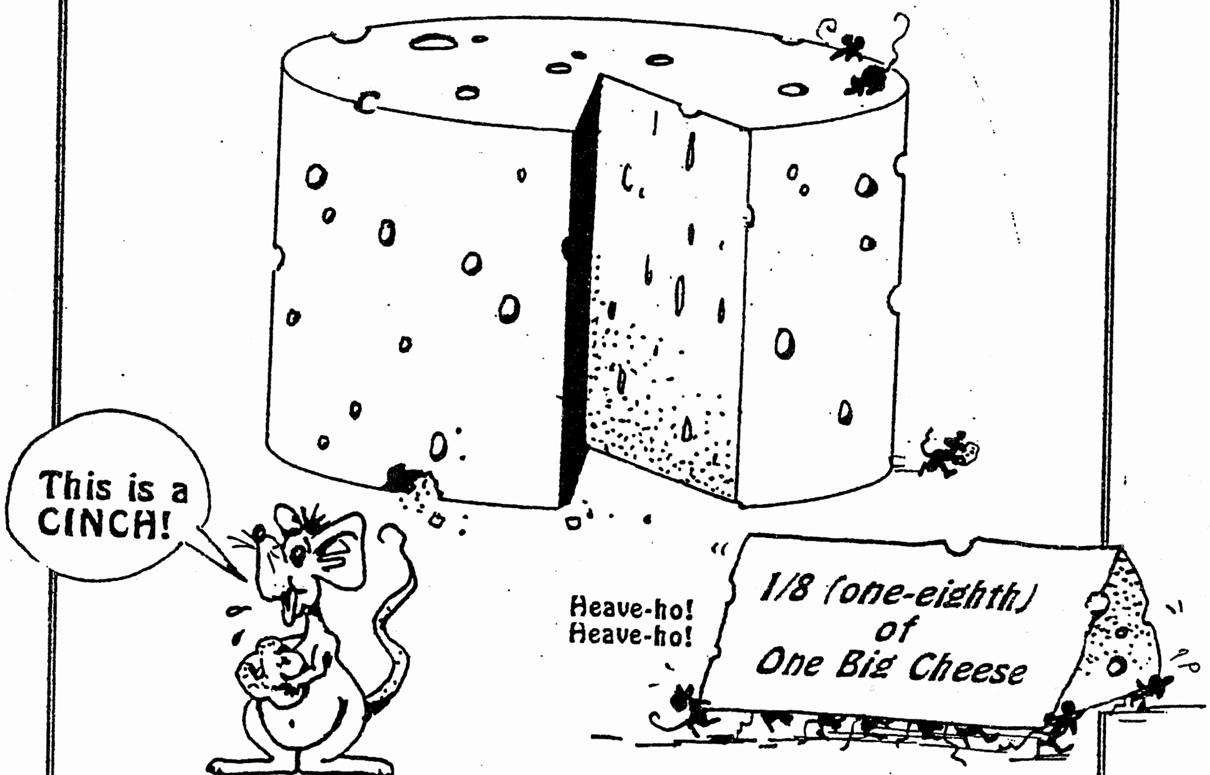
PRINCIPLES OF



FRACTIONS

textbook
PUBLISHERS
PO Box 910517
St George, UT 84791
1-435-238-7702

Principles of Fractions

Textbook Publishers

Introduction to PRINCIPLES OF FRACTIONS

Welcome to the study of mathematics -- *Fractions*!

This math book by Textbook Publishers will be different from any other math book you have studied. Most conventional math books have pages and pages of problems to solve. This book has very few. Here is why.

Math is actually just a TOOL for you to learn an *intrinsic value*. "Intrinsic" means "something inside." An intrinsic value becomes part of your heart and mind. It becomes part of you. The intrinsic value of math is knowing how to THINK AND SELF-GOVERN. This intrinsic value will give you freedom of thought!

To help you learn how to think and self-govern, you will be creating and solving your OWN math problems. Here is why a knowledge of how to do that is so important:

1. When you create and solve your own problems, you are learning how to THINK. Math books which have worksheets created by someone else teach students how to follow instructions, but at the same time students are robbed of the ability to think and reason.

2. When you have learned how to think through math problems, you can then apply math principles in every-day life. For example, you will be able to give accurate change as a cashier, or balance your own check book. No matter what your life's profession is, you will be able to apply math intelligently. You will be GOVERNING YOURSELF.

3. When you create and solve your own math problems, you have not only learned how to think, but you will find that you learn math <u>ten times faster</u> than by filling in the blanks of someone else's problems. This fact has been proven by testing hundreds, even thousands, of students. By reasoning through each math process along the way, you will UNDERSTAND math.

4. When you create and solve your own problems, your individual attitudes of life magically appear. Students who create simple, boring problems for themselves find out that they are not motivated about math. When unmotivated students do the minimums in math, they may also be doing the minimums in other aspects of their lives as well. For them, life itself is often boring. Students who create challenging problems for themselves will excel in math and will become excited about learning to think. Their ATTITUDES about life also become motivational and exciting.

Why It is Important to Understand Principles of Fractions

Some students find that learning fractions is "a whole new world" of math, and many therefore seem to struggle with it. Here is what one author said is the cause of this "anxiety":

"Fractions are difficult because they behave quite differently from whole numbers and produce different results when used in familiar operations." (Sheila Tobias, Overcoming Math Anxiety)

However, when fractions are applied to every-day life, they are simple! You can figure out how to cut one-eighth of a pizza pretty easily. You can measure one-half a cup of milk for a recipe. You can see the difference between 1/4 and 1/2 in a set of teaspooons. You can cut a piece of cake exactly in half and share it with your sister. Figuring fractions this way is much easier than trying to figure them on paper.

A few years ago, the following comment was made by mathematician Lucy Hunt. She points out the intrinsic value of learning and understanding math, and the reason for some students' struggles with fractions.

> ... Informal knowledge [like cutting a pizza evenly] is struggle-free knowledge that a student has gathered from the environment, "intrinsic motivation" (Ginsburg), or other sources. If this can be successfully applied to learning the more formal knowledge [figuring problems on paper] associated with academic mathematics, then a student could more clearly see the connection between the world and disassociated number equations floating on a page.
>
> Students can build on informal knowledge when they match problems represented symbolically [on paper] to problems presented in the context of real-world situations they understand [in life]. This would grab a student's interest. After all, there is a reason math is studied (other than to torture students)... it is an integral part of everyday life. The trick is to convey this.

http://mathforum.org/epigone/geom.pre-college/130/lhunt1-1403040042200001@mac11.whartoncd.swarthmore.edu

In other words, students who can APPLY their knowledge of math in every-day life (specifically fractions), will understand it more completely and thoroughly. It's much more important to be able to use fractions and recognize them rather than just writing a bunch of numbers on a piece of paper.

How Does God Use Fractions?

For many students, the study of fractions becomes more interesting when it can be applied to scriptures and a study of how God uses fractions. Here are a few examples that you can look up in your Topical Guide about fractions as they relate to the scriptures (look up the underlined word):

- How the Degrees of Glory are described
- How the Hosts of Heaven were divided "Before the Foundation of the World"
- How the women were divided in the Parable of the Ten Virgins
- What part of the sun will be darkened at Christ's Second Coming
- How tithing is figured on various amounts
- How to convert cubits to inches and/or feet, in relation to Noah's Ark
- How the money system was figured in the Book of Mormon (see Index)
- How much tax was required by wicked Lamanite rulers (see Index)

All these scriptures involve fractions. You will probably discover other scriptures that relate to fractions of things or people.

As you do the Learning Exercises in this booklet, "Principles of Fractions," you will want to apply the knowledge you already have, and practice the formulas explained with each principle. Although you might not use this advanced knowledge in your profession or later in life, it will be important for you to understand the principles so you can teach them to others. Maybe you or one of your future children will thus become a "Mathematical genius". And mathematical geniuses are simply those who know how **to think and self-govern**.

* * *

Introduction to Fractions

You have probably seen fractions many times in your life and did not realize they were fractions. If you have used recipes in the kitchen, or if you've used a ruler to measure inches and feet or even if you've sung a song--you have used fractions!

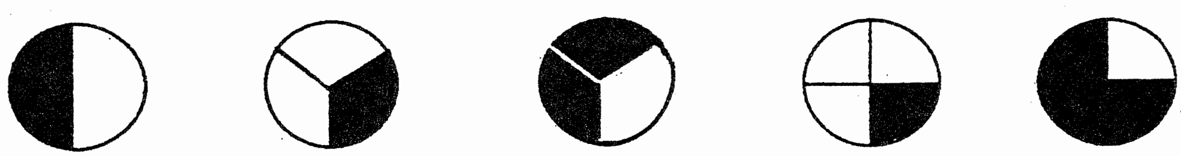
A fraction is simply <u>part</u> **of a whole.** Fractions are **less than number one.** When you cut into your favorite pie to divide it with friends or family, each piece is a fraction--or a part--of the whole pie.

In "Principles of Fractions," you will be learning about using fractions, and how they can be added, subtracted, divided and multiplied.

PRINCIPLE #1

A *FRACTION* IS PART OF A WHOLE.

EXAMPLES OF FRACTIONS



one-half (1/2)   one-third (1/3)   two-thirds (2/3)   one-fourth (1/4)   three-fourths (3/4)

Learning Exercise

Draw five shapes and divide them into fractions, or parts. Write the fraction, as shown above.

So that we can understand how to work with fractions, each part of a fraction is given a name.

The TOP number of the fraction is called the **Numerator.**

The BOTTOM number of the fraction is called the **Denominator.**

The small line which separates the two numbers is called the **Fraction Bar** and can be a straight line like this: — or a diagonal line: /

PRINCIPLE #2

EACH PART OF A FRACTION HAS A NAME.

EXAMPLES

3	*Numerator*	3	*Numerator*
—	*Fraction Bar*	/	*Fraction Bar*
4	*Denominator*	4	*Denominator*

Learning Exercise

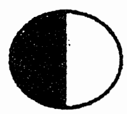
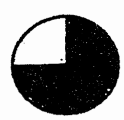
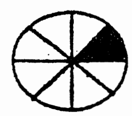
Write five fractions, and name the three parts on each.

In order for a fraction to be true, the numerator must be smaller than the denominator. We call this a **Proper Fraction,** and its value is less than 1—or you might say, "less than whole."

PRINCIPLE #3

WHEN A NUMERATOR IS SMALLER THAN A DENOMINATOR, THE FRACTION IS CALLED A *PROPER FRACTION*.

EXAMPLES OF PROPER FRACTIONS

$1/2$ (one-half) of a pie	$3/4$ (three-fourths) of a pie	$1/8$ (one-eighth) of a pie
		

Learning Exercise

Write ten proper fractions. Draw five of them like a pie.

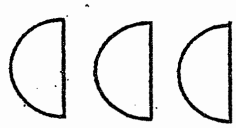
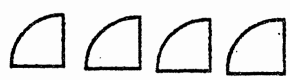
When a fraction's numerator is **larger** than the denominator, we call it an **"Improper Fraction."** When both the numbers in a fraction are *exactly the same,* this is also an improper fraction. We call it a "whole."

For example, if you had a pie cut into eight pieces, but none of the pieces had been eaten yet, you would still have a whole pie. The fraction would be written: $^{8}/_{8}$ (The value is always 1. The value of 1 is considered "improper" because it's not "part" of a whole. It IS whole!)

PRINCIPLE #4

WHEN A NUMERATOR IS THE *SAME AS*, OR *LARGER THAN* THE DENOMINATOR, THE FRACTION IS CALLED AN *IMPROPER FRACTION.*

EXAMPLES OF IMPROPER FRACTIONS

$^{3}/_{2}$ (three halves) of a pie	$^{4}/_{4}$ (four quarters) of a pie	$^{9}/_{8}$ (nine eighths) of a pie
		

Learning Exercise

Write ten improper fractions.
Draw three of them in pie pieces.

When a whole number and a fraction are written together, they become a **mixed number.**

Write the whole number first, then the fraction. Four-and-one-half, for example, is written like this: $4\,{}^{1}/_{2}$

PRINCIPLE #5

A WHOLE NUMBER WITH A FRACTION IS CALLED A *MIXED NUMBER.*

EXAMPLES

$1\,{}^{1}/_{2}$ (one and-a-half pies) $2\,{}^{1}/_{4}$ (two and one-fourth pies)

Learning Exercise

Write ten mixed numbers.
Draw five of them as pies or pizzas
with your favorite toppings!

An improper fraction can be changed to a proper fraction by writing it as a *mixed number*. To do this, follow these two simple steps:

(1) Divide the numerator by the denominator.

(2) Put the remainder over the divisor (which is the denominator), and write the answer as a mixed number.

PRINCIPLE #6

AN IMPROPER FRACTION CAN BECOME A PROPER FRACTION BY RE-WRITING IT AS A *MIXED NUMBER*.

EXAMPLE

WRITE $^8/_5$ AS A MIXED NUMBER

Step 1 -- Divide

$$\begin{array}{r} 1\text{ R }3 \\ 5\overline{)8} \\ \underline{5} \\ 3 \end{array}$$

Step 2 -- Place the remainder over the denominator.

$\boxed{1\ ^3/_5}$

(Note that the numerator is now smaller than the denominator.)

Learning Exercise

Write ten improper fractions and change them to mixed numbers.

To change a mixed number into an improper fraction, follow these two steps:

(1) Multiply the denominator by the whole number.

(2) Add the numerator to the product, and write the answer as an improper fraction.

PRINCIPLE #7

MIXED NUMBERS CAN BE CHANGED INTO IMPROPER FRACTIONS.

EXAMPLE

Change this mixed number into an improper fraction: $5\,{}^{3}/_{8}$

Step 1: $8 \times 5 = 40$ **Step 2**: $40 + 3 = 43$ **Answer:** $\boxed{{}^{43}/_{8}}$

Learning Exercise

Write 15 mixed numbers and change them into improper fractions, using the steps shown above.

*** Optional Review #1 ***