Life of Fred

Fractions

Stanley F. Schmidt, Ph.D.

Polka Dot Publishing

for Goodness' sake

or as J.S. Bach—who was
never noted for his plain
English—often expressed it:

Ad Majorem Dei Gloriam

(to the greater glory of God)

A Note to Students

This is the story of one day in Fred's life. He's five years old, but he does some things that many fifty-five-year-olds have never done. Just turn to page 14 when you are ready to start reading about his adventures.

FOR NOW

When you read about what Fred is doing, go as fast as you like, but when you get to the math, please [illegible]. Math is more condensed than English. Most people have to read the math parts more than once in order to fully understand them. If you take your time, it will be enjoyable.

For now, put aside your calculators. Until you get to algebra, one of the most important things you learn is your addition and multiplication facts. Adults who never learned what 7×8 equals are at a disadvantage.

Once you get to algebra, you can take your calculator out of the drawer and use it all you like.

It is not necessary to get rid of your calculator. Just store it somewhere.

YOUR FUTURE

After this book, there are six more *Life of Fred books*

- ✯ Decimals and Percents
- ✯ Beginning Algebra
- ✯ Advanced Algebra
- ✯ Geometry
- ✯ Trigonometry
- ✯ Calculus

after which, you can

- ✯ transfer to any university as a junior* and
- ✯ declare a major in mathematics.

✶ A junior at a university is a third-year college student.

A Note to Teachers

You know what arithmetic books look like. They are all pretty much alike. Using very few words, they give a couple of examples and then have the students do a hundred identical problems. Then they give another couple of examples and another hundred problems. And for students, arithmetic becomes as much fun as cleaning up their rooms, eating yams, or going to the dentist.

The authors often hope that they can fool their readers by throwing in a couple of irrelevant pictures of happy children at play.

Will these pictures make kids love math?

This book, *Life of Fred: Fractions*, takes a slightly✶✶ different approach. It tells a story—a story of one day in the life of a five-and-a-half-year-old boy. All of the math arises out of Fred's life. All of it is motivated—right down to when Fred (in chapter 23) is working at the PieOne pizza place, and he's trying to decide whether to put the tomatoes on the pizza before or after it's cooked, and we get the commutative law.

FACTS ABOUT THE BOOK

Each chapter is a lesson. Thirty-two chapters = 32 lessons.

At the end of each chapter is a *Your Turn to Play*, which gives an opportunity for the student to work with the material just presented. The answers are all supplied. The questions are not all look-alike questions. Some of them require . . . thought!

✶ "Slightly" in the sense that fish swim slightly better than rocks.

Many of the *Your Turn to Play* questions reach back and review previous topics, in addition to covering the current material. A lot of review is built into the book.

At the end of every four or five chapters is **The Bridge**, ten questions reviewing everything learned up to that point in the book. If students want to get on to the next chapter, they need to show *mastery* of what has been covered so far. If they don't succeed on the first try, there is a second set of ten questions—a second try—for them to attempt. And a third try. And a fourth try. And a fifth try. Lots of chances to cross the bridge.

At the end of the book is **The Final Bridge**, fifteen questions. Again, there are five tries offered.

Life of Fred: Fractions covers a lot more than just how to add, subtract, multiply, and divide fractions. If you'll take a peek at the table of contents, you'll see how much is covered. Have you ever wondered why, when you divide fractions, $\frac{2}{3} \div \frac{3}{4}$ becomes $\frac{2}{3} \times \frac{4}{3}$? Very few arithmetic books tell you *why*—they just say that it's a rule. Fred will give you reasoning behind the rule.

Like all of the books in the *Life of Fred* series, the emphasis is on how to learn by reading. Let the book do most of the teaching. You can relax. As students progress through high school, college, and graduate school, they find that less and less is learned in the classroom lecture format. Increasingly, it's the written word that does the teaching. Things changed after Gutenberg.✶✶✶

I guess this should also be mentioned: this book is very silly.

CHOICES YOU GET TO MAKE

The answers to all of the questions in the bridge tests are given in the back of the book. You can leave them there, or you can tear or cut them out so that your students can't "take a peek" at the answers. Each situation is different. You know your own situation.

✶ Johannes Gutenberg figured out how to use movable type to print books. In 1455 he printed theBible.

I have suggested that once students get nine out of ten problems right on one of the bridge tests, they can move on to the next chapter. (If you want to take a look at the first bridge tests, turn to pages 36–40.) One alternative is to require them to do all five tests on each bridge regardless of how well they do on the first try. The drawback to demanding completion of all five tries is that there is less motivation to get the answers right.

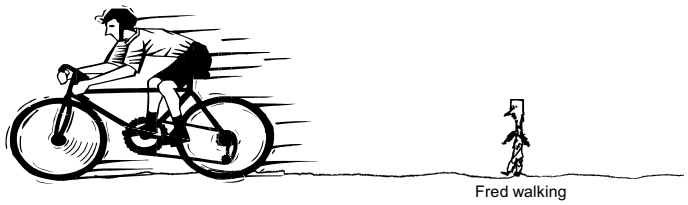
A third approach—a compromise—is to require that they get nine out of ten problems right on two of the five tries before they move on to the next chapter.

Contents

Chapter One
Less Than

When Fred first arrived at KITTENS University he could barely walk. That was because he was only nine months old. A student named Betty became his friend, and she would often carry little Fred so that he could get to class on time.

But that was many years ago. Fred is now 5½ years old. He's no longer a baby who needs to be carried. He walks to class.

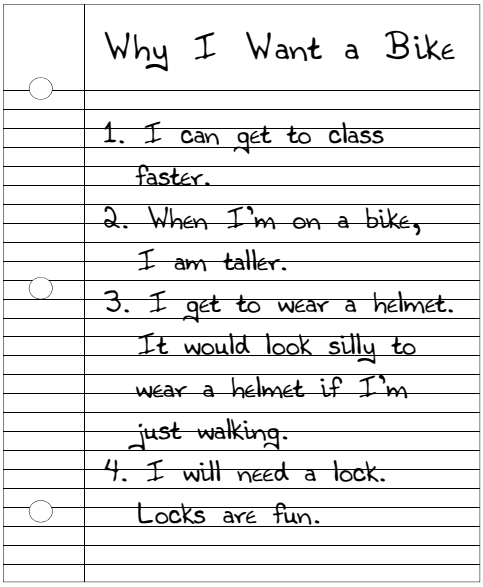

Fred walking

Now that he's 5½ years old, he sees things that he never noticed before. He notices that a lot of students ride bikes. They can go fast. They get to wear helmets, and that looks cool.

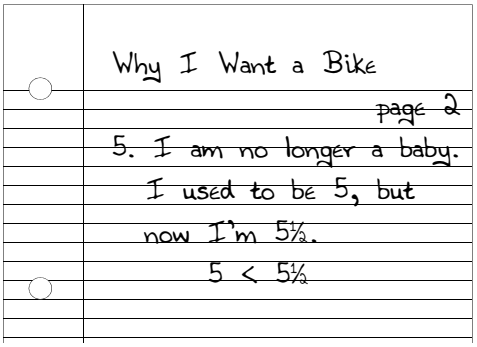
Fred thinks to himself, I want a bike!

When he was only five years old, he was very happy just walking. But now that he is 5½, he is older.

Fred stopped and took a piece of paper out of his pocket. He started making a list.



Fred took out a second piece of paper and continued his list.



Wait! Stop! You, my reader, shout. ***I don't get it. What does 5 < 5½ mean?***

This is a very silly book. This is a book in which you, the reader, can talk back to me, the author. When you are talking to me you use ***this type font.*** When I am telling the story I use Times New Roman type font. When Fred is thinking, he uses this type font.

Fred knows a lot of math. Sometimes he uses math symbols instead of English words. Instead of writing "Five is less than five and a half," he wrote "5 < 5½."

The symbol "<" means "is less than."

For example, 3 < 8

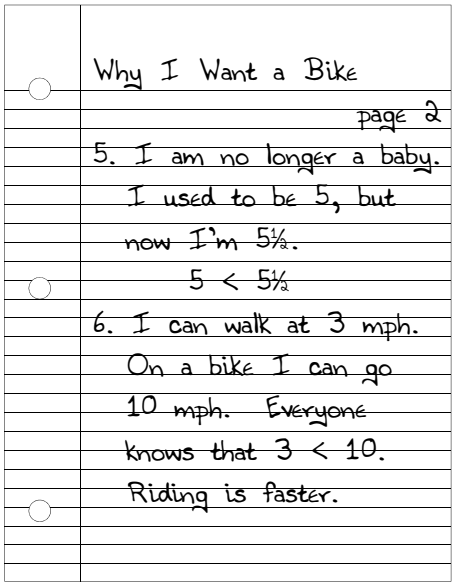
20 < 40

0 < 12 and

4 < 390724902304237230049.

It's NOT true that 9 < 7.

Now let's continue watching Fred make his list.


Why I Want a Bike

page 2

5. I am no longer a baby. I used to be 5, but now I'm 5½.

5 < 5½

6. I can walk at 3 mph. On a bike I can go 10 mph. Everyone knows that 3 < 10. Riding is faster.

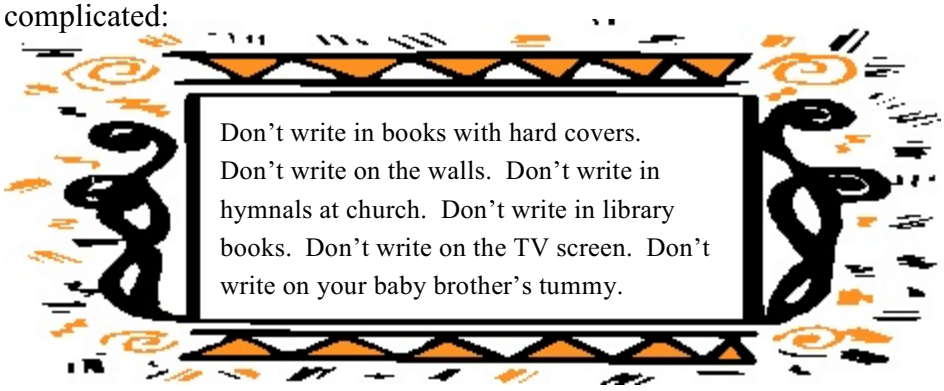
Before you yell ***stop!*** again . . .

mph
means
miles per hour

Now it is your turn, my reader, to do some writing. Please get out a piece of paper. When you were a baby, you may have had books that you wrote in. Those workbooks gave you a problem like 2 + 3 = ____ and you would write in the book: 2 + 3 = 5.

You are no longer a baby. This book, *Life of Fred: Fractions*, could be considered a pre-algebra book. If you write in this book, you will mess it up for any younger brothers or sisters who want to read it.

The rule for writing in books—and elsewhere--- could be very complicated:


Don't write in books with hard covers. Don't write on the walls. Don't write in hymnals at church. Don't write in library books. Don't write on the TV screen. Don't write on your baby brother's tummy.

Instead, here is an easy rule:

Write only in books you bought with your own money.

Do you have your piece of paper yet?

At the end of every chapter in this book is *Your Turn to Play*. It is a chance for you to write.

There are three important ways that people learn: reading, hearing, and writing.

Just silently reading the math or just hearing someone read it aloud is not enough. *Your Turn to Play* gives you a chance to learn by writing.

Your Turn to Play

1. On your paper, write the three words that finish this sentence: *The symbol < stands for. . .*
2. Is 88 < 92 true or false?
3. Is 100 < 12 true or false?
4. Is $5 < 5\frac{1}{2}$ true or false? ☺☺☺☺☺ $\overset{?}{<}$ ☺☺☺☺☺☹
5. Fill in any number that makes this true: 14 < __?__.
6. Fill in any number that makes this true: __?__ < 3.
7. Add 389 + 772.
8. Make a guess. If < means "is less than," what does > mean?

Answers

1. *The symbol < stands for "is less than."*
2. 88 < 92 is true.
3. 100 < 12 is false.

4. $5 < 5\frac{1}{2}$ is true.

5. Your answer might be different from mine. I wrote $14 < 397972$. You may have written 15 or 16 or 17 or 14½ or 14.001. Any of these is correct.

6. Your answer might be different from mine. I wrote $2\frac{1}{2} < 3$. You may have written 0 or 1 or 2.

7. Most people put one number on top of the other (arrange them vertically) before they add them.

$$\begin{array}{r} 389 \\ +\ 772 \\ \hline 1161 \end{array}$$

8. $>$ means the opposite of $<$. $<$ means "is less than."

$>$ means "is greater than."

All of these are true:

$8 > 4$

$1089723949237 > 2$

$2 < 1089723949237$

$9 > 0$

$5\frac{1}{2} > 5$

Have you ever heard the saying: *The pen is mightier than the sword*? This means that the written word is more powerful than a physical weapon. The saying first appeared in its present form in the play *Richelieu* in 1839:

> *Beneath the rule of men entirely great,*
> *The pen is mightier than the sword.* (Act II)

But many people expressed that idea before 1839:

"The tongue is mightier than the blade." —Greek poet Euripides in 400s BC.

". . . many wearing rapiers are afraid of goose quills." —Shakespeare in *Hamlet* in 1600.

In mathematics, we might express it:

Pen > Sword

The Bridge

from Chapters 1–24 to Chapter 25

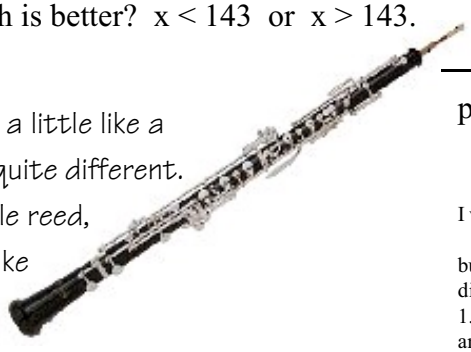
second try

1. Convert $73\frac{1}{3}$ to an improper fraction.
2. Stanthony put $8\frac{7}{8}$ oz. of lamb food in little lamb's bowl.

She ate $4\frac{2}{3}$ oz. How much was left in her bowl?

3. Reduce as much as possible $\frac{42}{54}$
4. On Joe's plate was a $\frac{3}{4}$ lb hamburger, $\frac{1}{8}$ lb. of French fries, and $\frac{1}{2}$ lb. of ketchup. How much did all that weigh?

5. Write in Roman numerals the numbers from 21 to 30.
6. Find the LCM of 6 and 9.
7. Draw something that has exactly two lines of symmetry.
8. Write out in words: 57,983,000,000.
9. Suppose you have x dollars in your pocket and you want to buy a oboe that cost \$143. Which is better? $x < 143$ or $x > 143$.



Made of wood. Looks a little like a clarinet, but sounds quite different. The oboe uses a double reed, and many oboists make their own reeds. Many times, sad melodies are played by the oboe in an orchestra.

pronounced
OH-bo

I was going to write
OH-bow
but there are two different *bow* words:
1. bow and arrow
and
2. bow down.

10. Change $\frac{992}{34}$ to a mixed number.

The Bridge

from Chapters 1–24 to Chapter 25

third try

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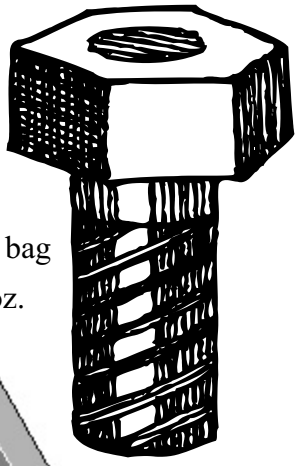
1. Once, for lunch Fred had $\frac{1}{4}$ oz. of lettuce, $\frac{1}{8}$ oz. of hamburger, and $2\frac{1}{2}$ oz. of onion. (He was really in the mood for onions.) How much did he eat?

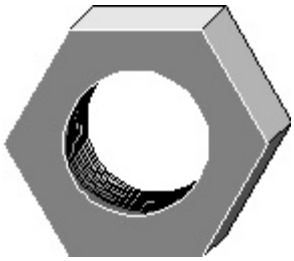
2. For this problem, we'll say that the circumference of a circle is equal to $3\frac{1}{7}$ times the diameter. What would be the circumference of a circle whose diameter is equal to $11\frac{1}{10}$ feet?

3. $55\frac{1}{8} + 27\frac{3}{4} = ?$

4. Cardinal or ordinal? When Fred pulled the third bag of nuts and bolts out of his pocket, he knew that *third* is a(n) _____ number.

5. Cardinal or ordinal? When Fred pulled the third bag of nuts and bolts out of his pocket, it weighed $4\frac{2}{3}$ oz. He knew that $4\frac{2}{3}$ is a(n) _____ number.





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

7. If little lamb says "Baa!" five times each minute, how many times would she say "Baa!" in six hours?

8. $\frac{6}{7} - \frac{2}{3} = ?$

9. Divide CXXXVI by XVII and give your answer in Roman numerals.

10. Change $\frac{276}{38}$ to a mixed number.

Index