

Learning Math with Kayla

Book 2 Multiplying fractions

Vicki Meyer
Illustrator Sue Lynn Cotton

The Learning Math with Kayla Books

- Book 1 Adding and subtracting like fractions
- Book 2 Multiplying fractions
- Book 3 Learning multiplication facts
- Book 4 Place values, Multiplying large numbers
- Book 5 Adding and subtracting unlike fractions
- Book 6 Learning about improper fractions and mixed numbers
- Book 7 Dividing fractions
- Book 8 Adding and subtracting large numbers
- Book 9 Solving long division problems
- Book 10 Working with decimals and percents
- Book 11 Learning about negative numbers
- Book 12 Problem solving!

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About the Kayla Books

The Kayla books tell the story of a fourth grade girl who has gotten so far behind in her math class that she is not able to understand what her teacher is trying to teach her. So rather than pay attention, she spends her class time drawing pictures. As you will soon see, she gets into trouble for this.

In this second book Kayla's tutor, Ms. Gibbs, begins to teach Kayla how to multiply fractions. She discovers, however, that Kayla does not know many of her multiplication facts. She begins to teach them to her and before Kayla finishes fourth grade, she will have completed an 11 X 11 grid of her multiplication facts.

In the later books in this series, Ms. Gibbs continues to introduce Kayla to much of the math she would need to be more successful in school. Because Kayla practices her math at home, she does become more successful.

There are twelve books in this series. Whether you're a fourth grader, in middle school or in high school, a Mom or Dad or a Grandparent, you can learn math along with Kayla.

The story is told by Kayla, right before she goes off to college.

About the Author

After Vicki raised six really smart kids, she began studying for her Ph.D. in order to keep up with them. She taught at the university level for about 25 years, then began tutoring elementary school students. Vicki soon found a new career for herself, tutoring math for at-risk kids, writing about her experiences, and putting together the Kayla books.

Joan Waite (with Vicki on back cover) is a neighbor and good friend. She is the inspiration for Ms. Gibbs.

Acknowledgements

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And a special thanks to my husband, Ed, for all of his great suggestions, his skillful editing, and especially his patience. I would not be able to complete the books without him.

DEDICATION

To my mother, Phyllis Hurtova, who was prevented from going past the fourth grade by political unrest in Czechoslovakia, yet continued to be a life-long learner.

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Chapter 1

Cleveland

It was math class again. I think Mr. Williams was still trying to teach us fractions although he no longer handed out those fraction papers. And he never, ever had colored pencils. But I did!

Ms. Gibbs said I could take her colored pencils home with me just as long as I brought them back. I use them at home to help me with adding and subtracting fractions. Right now, though, I just want to draw pictures.

I took the colored pencils and a piece of paper out of my bag and drew a picture of that wall - that wall in the room where I meet with Ms. Gibbs. The one with just a whiteboard on it.

In my picture, I drew the whiteboard real small so I could draw lots of flowers all around it. I drew flowers on both sides of the whiteboard, above it and even below it.

While I was drawing, I heard a lot of loud noise in the room. I didn't look up though. I was too busy trying to finish my picture. I was almost, almost finished. Just one more flower and then I'll...

Oh-oh! All of a sudden, I noticed someone standing over me. It was Mr. Williams! Oh, no! He saw me drawing in his math class and he looked cross.

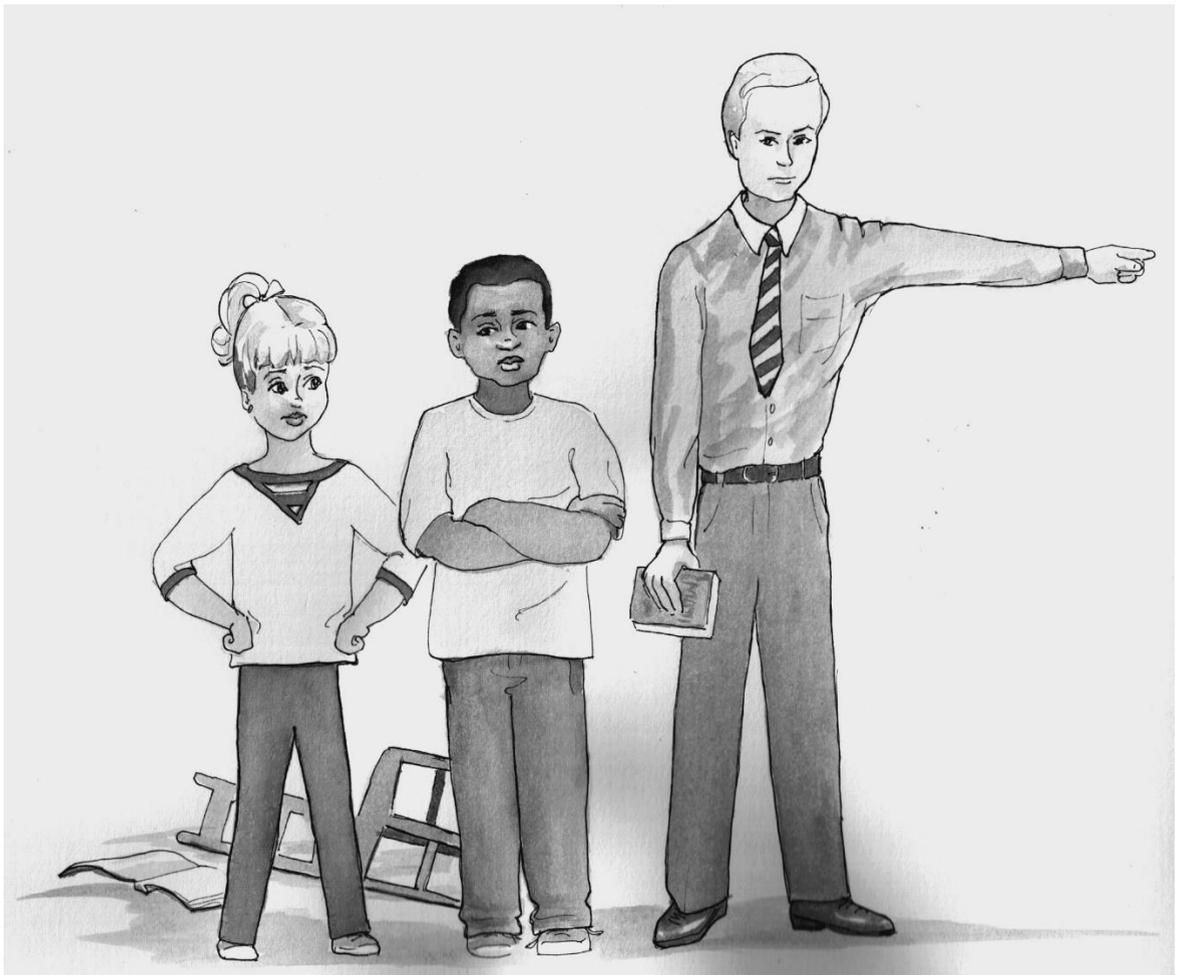
"I think you could spend a little time in Time-out too, young lady," Mr. Williams said. "Mr. Jackson, will you please take BOTH Kayla and Cleveland to the Time-out Room?"

I looked up at Mr. Jackson, the guard at our school. Then I looked over to where I heard the noise. Oh-oh, a chair was knocked over. It was Elizabeth's! What's going on?

Elizabeth's hands were on her hips. She looked angry.

Cleveland's arms were crossed against his chest. He looked sad.

Mr. Williams was pointing toward the door. He looked mad.



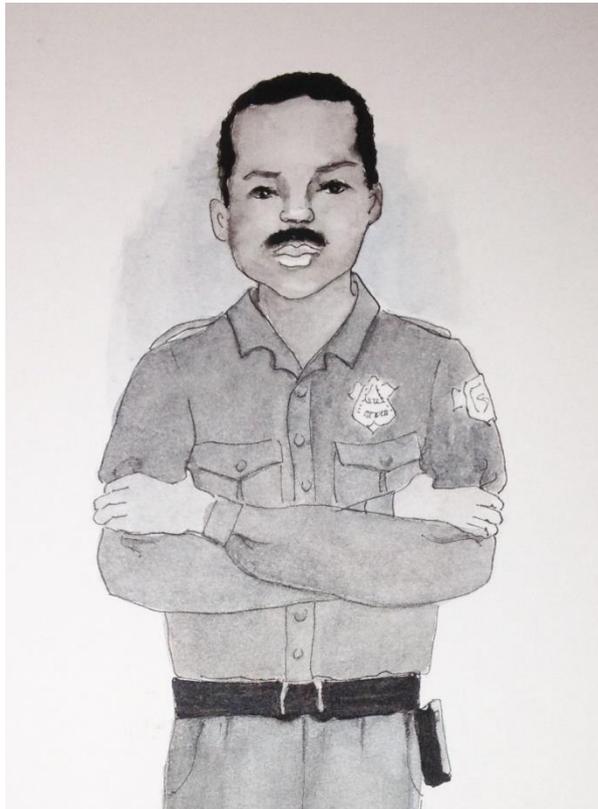
Chapter 2

Time-out!

I stuffed my math worksheet, the one I was supposed to be working on, into my backpack. I quickly grabbed my paper, the one I was drawing on, and stuffed that into my backpack too. And, of course, I couldn't forget my colored pencils!

I walked out the door and followed Mr. Jackson. Cleveland walked behind me.

Mr. Jackson was a big man with a big mustache. He wore a dark blue uniform. When I would see him in the hall, I always kept my head down. I don't know why. I guess I was afraid of him. Now he was taking me to the Time-out Room!



Mr. Jackson led us down a long hall. It was not the same hall Ms. Gibbs and I walked down last Thursday. It was the other hall.

I never had to go to the Time-out Room before but I knew Cleveland did. Hey, where is Cleveland? I turned around and saw he was way behind us. I stopped and waited for him to catch up.

I felt a little less scared walking alongside him, I don't know why.

Neither of us said a word though. We didn't even look at each other.

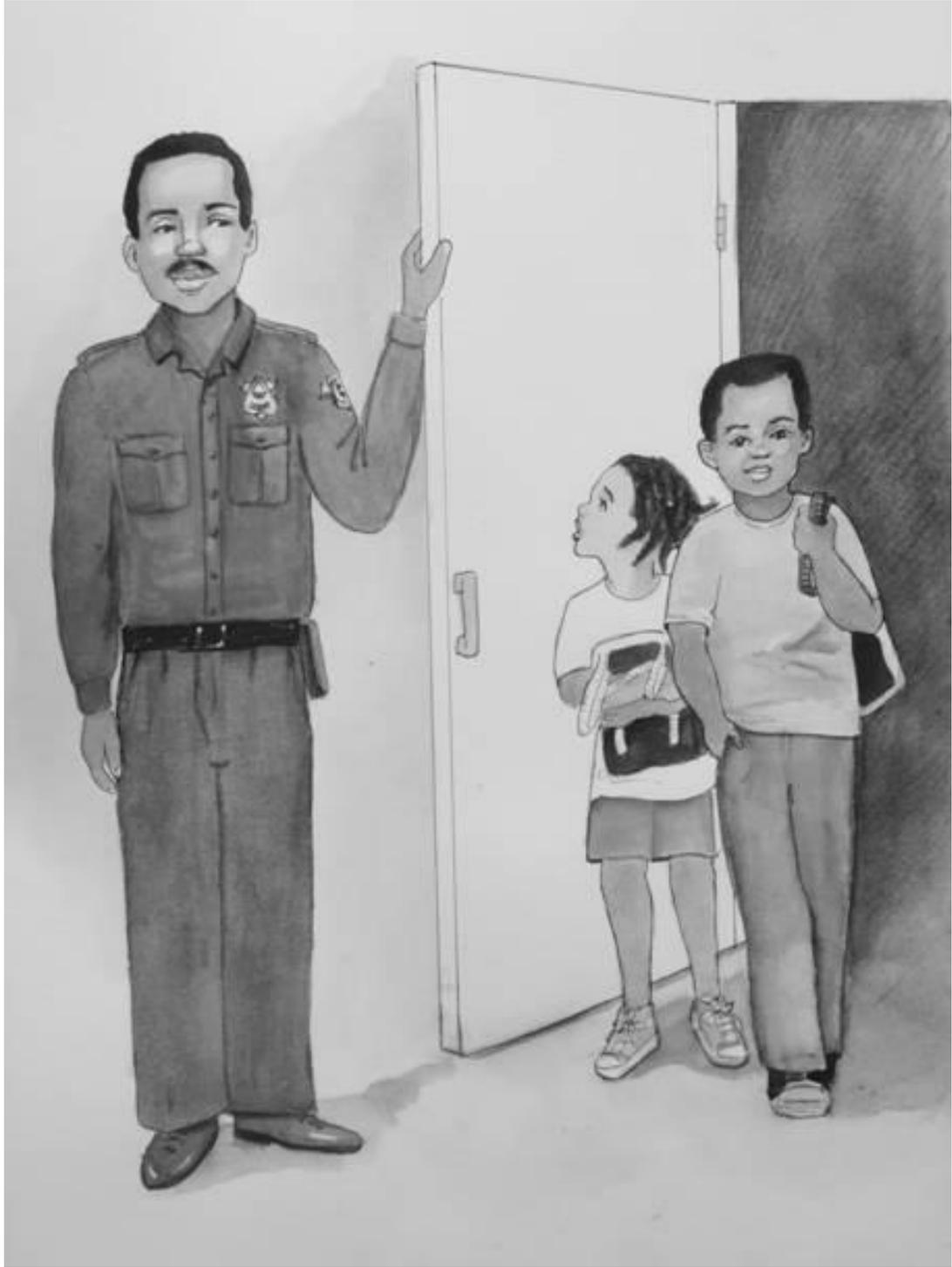
Mr. Jackson waited for us at the end of the hall in front of the Time-out Room door. When we reached the door, he smiled at us, but just a little bit. That made me feel better, but just a little bit.

He then opened the door wide for us. Cleveland walked right into the room and I followed him.

When I heard the door close behind us, I started to feel afraid again. I looked around the room. I didn't know what to do.

I watched Cleveland. He sat down at a table in the back of the room near the door. I sat down at the same table but two seats away.

The only other person in the room was a woman sitting at the desk in front of the room. She watched us as we sat down.



After we were settled in our seats, she said, “Good morning. My name is Mrs. Morales. I have some work to do, so please take out your own work. And *please* keep yourselves busy.”

Cleveland took out a crumpled piece of paper from his backpack. I took out the math paper Mr. Williams gave us this morning. The top of the paper said, “Multiplying fractions.”

I don’t know how to multiply fractions. I have trouble multiplying regular numbers. I do know how to add and subtract fractions though. I wonder, should I just do that?

I don’t think Mr. Williams knows how well I can add and subtract fractions. I have been practicing for a whole week now and I am getting real good at it. Hmm. I wonder...

My eyes wandered around the room as I was wondering about this. The walls looked so bare. I noticed right away that there were no pictures on these walls either. Why, there wasn’t even a whiteboard!

I took out my colored pencils and some paper from my backpack. I know what I’m going to do. I’m going to draw some pictures and I might even hang them up!

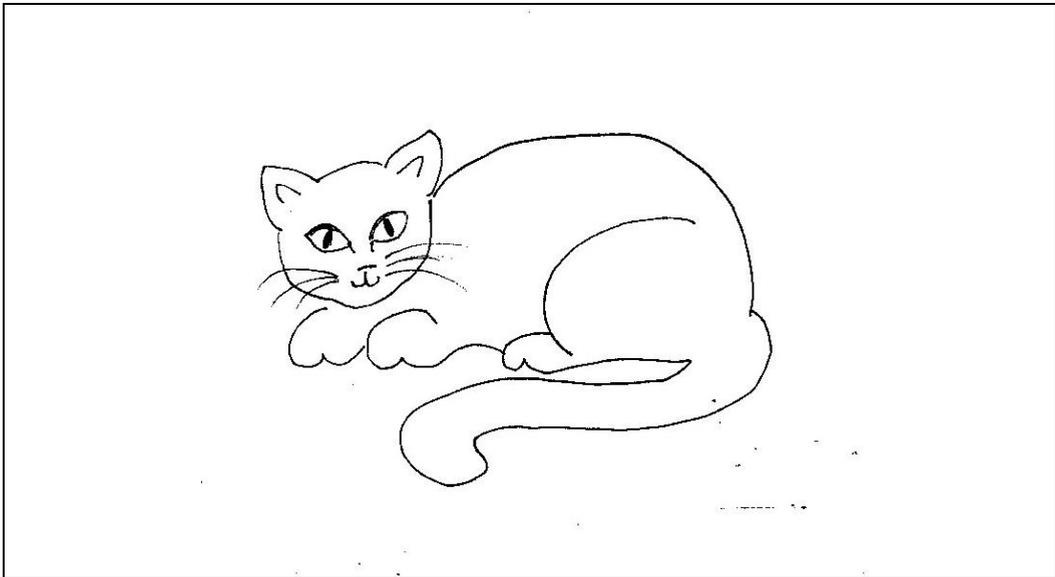
Cleveland sat two seats away from me but I could see he was watching me. I gave him a piece of paper and moved the box of pencils over to let him share it. He moved over to the seat next to me.

He took a black pencil and began to draw. Mrs. Morales didn’t look up. She was busy with her own work.

I drew what I usually draw, flowers with curly designs all around them. I added a couple of fancy numbers. When I finished, I held up my picture to show Cleveland.

He smiled and held up his picture. Wow! It was a picture of a cat. It looked just like a real cat! It was really, really good.

He wasn't quite done with it so I watched him finish it. When he finished, he held it up again for me to see.



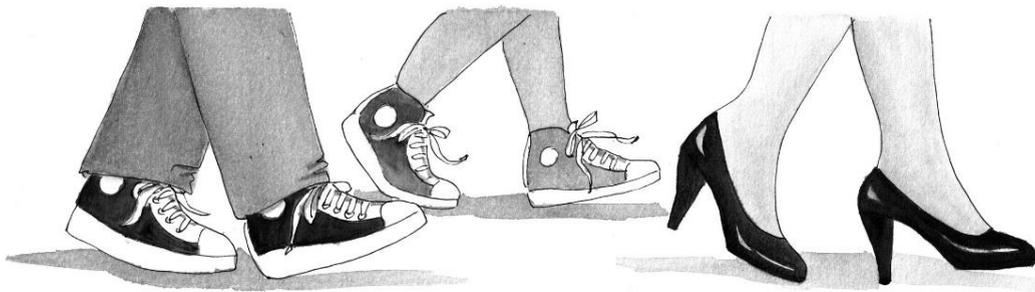
“Wow!” I said, in a loud whisper this time. I was really amazed that Cleveland - that anyone, really - could draw such a nice cat!

Then I thought, Gee, I wish I could draw as well as he does. I wonder if Cleveland would teach me how to draw that cat. Hmm, I wonder if...

My thoughts were interrupted by Mrs. Morales' voice. “Time-out is over,” she said loudly. “Get all your things together. I'll walk you back to your classroom.”

Cleveland and I walked down the hall together right behind Mrs. Morales. Right away I noticed the sound of her shoes. They made a clicking sound. I looked down at them. The heels of her shoes were really high. My shoes didn't sound so loud anymore.

Cleveland's shoes made a soft thud as he walked. He wore high-tops like I did but his were black with orange shoe laces. Mine were grey with bright pink laces.



Reader, please color Cleveland's and Kayla's shoelaces.

We didn't talk. We didn't even look at each other. We just walked.

I wasn't afraid anymore. I think I made a new friend. At least I hope Cleveland will be my new friend. I like the way he drew that cat.

The next day, Ms. Gibbs came to take me to the tutor room. She smiled when she saw me. I didn't smile back though. Instead I held my head down.

I wonder what she'll say about my Time-out. I got in trouble in math class because I was drawing pictures. And I was using her colored pencils! Maybe she'll take them away.

But Ms. Gibbs didn't say anything at all about my Time-out. Hmm. I wonder if she knows about it. Well, I'm not going to tell her!

Chapter 3

Proper names for fraction parts

We first reviewed adding and subtracting fractions. I was getting all of them right – well, almost all of them.

I think Ms. Gibbs noticed how good I was getting, but she didn't really say that. Instead she said, "From now on, we're going to use the proper names for the parts of a fraction. The top number is called the numerator and the bottom number is the denominator. Can you remember that, Kayla?"

I heard those words before but I couldn't remember which one was which. Before I answered, Ms. Gibbs said, "I'll give you a mnemonic device to help you remember."

"A what?"

"A mnemonic device. It's just something that makes it easier for you to remember something. Some people have trouble pronouncing the word "mnemonic" because it begins with an 'm'."

"An 'm'?" I asked, surprised.

"Yes, the 'm' is silent. The origin of the word is Greek and that's why it doesn't follow our rules for pronunciation. The word 'mnemonic' sounds like it begins with an 'n' but it really begins with an 'm'."

Ms. Gibbs printed this big word and printed its pronunciation too:

m n e m o n i c

n u h - m o n' - i c

First I looked at the way Ms. Gibbs spelled it, then I looked at the way it's pronounced. Then I said the word out loud, "mnemonic."

"That's good, you pronounced it correctly and maybe you can learn how to spell it too. It is a nice big word, isn't it?" Ms. Gibbs said.

I just nodded my head yes. I didn't answer Ms. Gibbs out loud because I was saying "mnemonic" to myself over and over again. I wanted to tell my momma that word and I wanted to spell it for her too. She'll be surprised that it begins with an "m."

"Now a good mnemonic device for remembering which number is the denominator is that the denominator begins with a 'd' and so does the word 'down'," Ms. Gibbs explained. "The number that's 'down' is the denominator."

"How can I remember the, uh...top number?" I asked. I had already forgotten what it's called.

"The top number is the numerator. Hmm. Let's see. Can you think of something that can help you remember that word, maybe something that begins with the letter 'n'?" Ms. Gibbs asked.

I thought for just a little bit. "What about 'number'?" I asked.

"Number?" Ms. Gibbs sounded surprised. "Why Kayla, a fraction is made up of two numbers. Why would the word 'number' help you remember that the top number is the numerator?"

“Well the denominator is the number that’s down.” I smiled just a bit when I said that. “That’s the number of sections something is divided into. Oh, or it could be the total number of things in a group, too.

“The numerator is the top number,” I continued, “That’s the number of sections or things we’re talking about. *Num*-ber of sections, *Num*-ber of things,” I repeated with an emphasis on the “*Num*.” “Do you get it?”

Ms. Gibbs looked confused. I don’t think she got it. So I continued to explain.

“Number begins with ‘n’ and so does ‘numerator’. If we’re talking about the number we colored, that’s the numerator and that begins with ‘n’. If we’re talking about the number of big birds among a group of birds, that number would be the numerator and they both begin with ‘n’.”

“Hmmm...Well if that will help you remember...” Ms. Gibbs’ voice trailed off.

Ms. Gibbs sounded just like my momma does when she’s not so sure of something I said or did. I better reassure her. “It will help me remember because it’s my very own mnemonic device,” I explained.

“Yes, it is, it’s your very own.” Ms. Gibbs smiled as she said that. “And that makes it a very good mnemonic device. I’m sure you’ll remember it. Now let’s get on with our lesson.”

Ms. Gibbs took a piece of paper out of her folder and put it in front of us. On the top, it read “Multiplying Fractions.” Hmmm. This is what I was supposed to be doing in my math class today.

Chapter 4

Multiplying fractions

“Today I’m going to show you how to multiply fractions,” Ms. Gibbs said. “But first, I want to show you how to change a whole number into a fraction. It’s very easy.

“Here’s how to do it,” Ms. Gibbs explained. “Take any number; let’s take two for an example. To change two into a fraction, just write the number two, put a line under it and then write a one underneath it. The line is called a fraction line.”

She wrote as she spoke: $\frac{2}{1}$

“See, you have a fraction!” Ms. Gibbs exclaimed.

“You can do that with any whole number, just put a fraction line and a one under it. The value of the whole number doesn’t change.”

Hmmm. Why would someone want to turn a whole number into a fraction? Plain old numbers are easier than fractions.

“Now I think you’re ready to learn how to multiply fractions. You’ll see that it’s very simple.

“You just multiply the numerators together to get the numerator for your answer. Then you multiply the denominators together to get the denominator for your answer,” Ms. Gibbs explained. “It doesn’t matter if the denominators are the same or different. You just multiply them and your answer is the denominator of the answer. That’s all there is to it.”

“Hmmm. That doesn’t seem too hard,” I said.

“No, it’s not hard at all. Are you ready for a simple problem?” Ms. Gibbs asked.

I nodded my head, “Yes.”

The first problem on the paper, “Multiplying Fractions,” was:

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

Hmm. Now I just multiply across. One times one is one, that’s easy. The numerator is one. Four times three is...uh, uh, twelve. That’s the denominator.

“One-twelfth,” I answered.

“That’s right,” Ms. Gibbs said and she wrote:

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

“Here’s another one,” Ms. Gibbs said as she pointed to the next problem on the paper:

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

I again multiplied the numbers in my head and answered out loud, “Three-eighths.” That was easy, too. I wrote:

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

Gee, I didn't know multiplying fractions was so easy!

"Now this next problem is just a little harder. Here is a fraction bar with eight sections in it. As you can see, it's divided in half and each half is divided into four sections. Now supposing you wanted to color only one-fourth of one-half of this fraction bar. What fraction of the whole bar would you color?" Ms. Gibbs asked.



"Huh? I can't do these kinds of problems." I said it kinda quiet-like.

"Well, then why don't you just color $\frac{1}{4}$ of $\frac{1}{2}$ of this fraction bar? You can do that, can't you?" Ms. Gibbs asked.

OK. I'll just look at one half of the fraction bar, not the other half. I could see that it's divided into fourths so I picked up a green pencil and I colored one of the fourths with it.

Reader, please color one of the fourths for Kayla.

I looked up at Ms. Gibbs. She nodded her head, and then asked me to write the equation.

I held up my pencil but I didn't write anything. I didn't know what I was supposed to write.

Kayla, you just colored one fourth of one half. The word "of" in fraction problems tells you to multiply.

“It does?” I asked.

“Of course. Now just suppose there was one banana in your house. Your mother ate one-half of it. How much of the banana did your mother eat?”

Why is Ms. Gibbs asking me how much of the banana my momma ate when she just told me? I answered her anyway because that’s just being polite, “She ate one-half of the banana.”

“Yes, that’s right. See? You said, “one-half of the banana,” but you didn’t realize you were multiplying one-half *times* one banana,” Ms. Gibbs said as she wrote:

$$\frac{1}{2} \times 1 = \frac{1}{2}$$

So when you color one-fourth of one-half and you want to know what fraction that is, all you have to do is multiply one-fourth times one-half. You can do that, can’t you?

OK, so I’ll just put an “X” in place of the word “of.” I wrote:

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

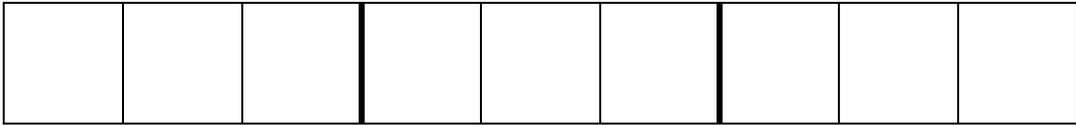
Then I looked up at the fraction bar I just colored and I could see that I just colored one-eighth of the bar.

Reader, look at the fraction bar on page 15.

“Hey, I did it right!” I kinda surprised myself.

“Yes, that’s right,” Ms. Gibbs said, “One-fourth times one-half is one-eighth and as you can see, you colored one-eighth of the fraction bar.

“Here’s another fraction bar and another problem for you:”



Ms. Gibbs set up the equation:

$$\frac{1}{3} \times \frac{1}{3} =$$

And then she said, “This time first solve the equation. Then color in the correct section in the fraction bar.”

I multiplied the numbers in my head and wrote:

$$\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$$

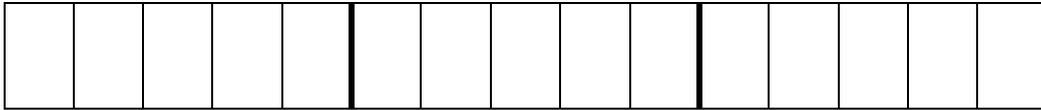
And then I looked at just one-third of the fraction bar and colored one-third of it red.

Reader, please color the section of the fraction bar for Kayla.

I looked at the equation I wrote and then at the fraction bar. Yes, I colored one-third of one-third of the whole bar. I colored one-ninth of it.

I was waiting for Ms. Gibbs to say how good I was.

Instead she just said, “And here’s another fraction bar. I’d like you to please color two-fifths of one-third of it:



“This time you get to choose. What would you like to do first: color the correct sections in the fraction bar, or solve the equation?”

“Hmm. I think I’d like to color first,” I answered.

OK, I’m just going to just pay attention to one-third of the fraction bar and then color two-fifths of the one-third.

So I just colored two sections in the first one-third of the fraction bar with my orange pencil.

Reader, please color two-fifths of one-third for Kayla.

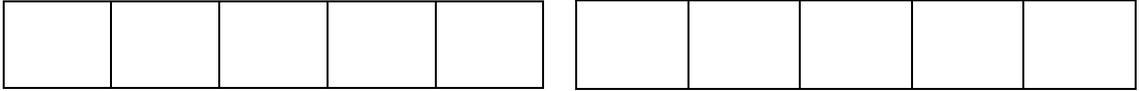
Then I solved the equation: $\frac{2}{5} \times \frac{1}{3} = \frac{2}{15}$

And guess what? I did it right! And this time, I wasn’t even surprised. I’m getting good at this.

“Good!” Ms. Gibbs said. “As you can see, you colored two of the fifteen sections. Then you solved the equation: two-fifths times one-third equals two-fifteenths.

“Now let’s see if you can do this next one:”

Here are two fraction bars. I would like you to color three-fifths of the total number of sections. This time it might be easier for you to solve the equation first.



Let's see... I'm supposed to color three-fifths of two fraction bars. I wrote out the equation like this:

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

I looked up at Ms. Gibbs, waiting for her to give me a little nod. I got the nod but then she said, "Now, let's see how you're going to color this."

I colored one whole fraction bar with a blue pencil, then I hesitated - but just a bit - then I colored one more section in the next fraction bar. I knew I had to color 6 sections, and I did.

Reader, please color the six sections for Kayla.

"Why, that's very good, Kayla!" Ms. Gibbs said. "The reason why you needed to color in a section on the second fraction bar is that this fraction, six-fifths, describes something greater than one. As you can see, the numerator is greater than the denominator. That makes it an 'improper' fraction."

"Improper fraction?" I asked. I heard Mr. Williams saying something about improper fractions but I wasn't paying much attention. I looked up at Ms. Gibbs.

“Kayla, remember when we first talked about fractions? I said a fraction is a good way to talk about something that is less than one,” she explained.

I nodded my head. Yes, I remembered.

“Well, that’s true. Fractions that describe something less than one are called *proper* fractions. There are fractions, though, that describe something more than one, and they are called *improper* fractions.

“This fraction, six-fifths, represents something more than one, and that’s why you had to color more than one fraction bar.”

But then she added, “Let’s leave it at that. I’ll show you what to do with improper fractions another time. Right now I want you to do a little more work on multiplying fractions.

“Now suppose there is a fraction bar divided into eight sections. What is the bottom...oh, I mean, what is the denominator?” Ms. Gibbs asked. I saw her smile just a tiny bit.

“Eight,” I answered confidently.

“Let’s each color two sections of that bar,” Ms. Gibbs said. “And oh, let’s let Mr. Williams color two sections too.”

“Mr. Williams?” I asked, surprised.

“Yes, Mr. Williams,” Ms. Gibbs answered, “Let’s pretend Mr. Williams is here.”

I didn’t know Ms. Gibbs like to pretend. I like to pretend too.

I chose red and blue for my sections. Ms. Gibbs chose yellow and brown. Then she picked up a purple pencil and an orange pencil and began to color two more sections. “I think Mr. Williams would like these colors, don’t you?” Ms. Gibbs asked.

I didn’t answer. Hmmm, I wonder what colors Mr. Williams would choose if he was really here. Gee, I wonder if he would even like to color fraction bars.



Please color the sections for Kayla, Ms. Gibbs and Mr. Williams

“Now each of us colored two-eighths of the fraction bar,” Ms. Gibbs’ voice interrupted my wondering. “What fraction of the bar is colored?”

I looked at the fraction bar and answered right away, “Six-eighths.” I didn’t even have to add them.

But then I wrote the equation anyway because I knew Ms. Gibbs would want me to:

$$\frac{2}{8} + \frac{2}{8} + \frac{2}{8} = \frac{6}{8}$$

“Yes, that’s right! Now let’s do this same problem by multiplying.

“As you know, multiplication is just repeat addition, so instead of adding two-eighths plus two-eighths plus two-eighths, we can simply multiply two-eighths by three and we’ll get the same answer.

“The three of us each colored in two-eighths of the bar,” Ms. Gibbs continued. “Three: that’s Mr. Williams, you and I. I better first make that 3 into a fraction by putting a one under it:

$$\frac{3}{1}$$

“Remember, that’s just a different way of writing three,” Ms. Gibbs continued. “The whole number three and the fraction, three over one, have exactly the same value.

“Now I’ll multiply that by two-eighths, that’s what fraction of the bar we *each* colored, and the answer will be the fraction of the bar that we *all* colored.

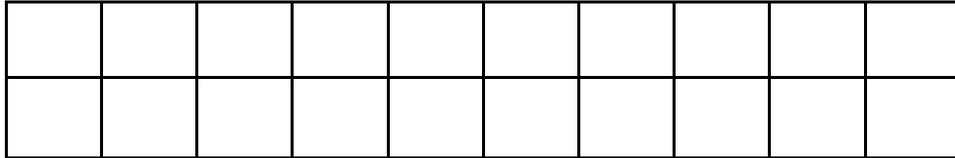
“See?” she smiled widely as she wrote:

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

Hmm. Ms. Gibbs seemed pleased with herself that our answers came out the same. She multiplied what we each colored by three. I just added them all up. Well, it seems to me that adding is much easier than multiplying. I didn’t say that to Ms. Gibbs, though.

But she was watching me. Sometimes I think she can read my mind! She reached into her folder and pulled out a piece of paper with a great big fraction bar on it.

“Now what if nine children were here and each one colored in two sections of this bar. What fraction of the bar would be colored?”



Hmmm. I first counted the sections of the bar by twos. There were twenty sections so right away I knew the denominator was twenty. And I knew that each kid colored two sections, so each kid colored two-twentieths of the whole bar.

I can do this. I started counting again by twos as I pointed to the sections on the fraction bar so I wouldn't get mixed up: two-twentieths, four-twentieths, six-twentieths, eight-twentieths, ten-...

Ms. Gibbs interrupted me, “Kayla, why don't you just multiply?”

“Huh?” I answered.

“How many children colored sections of the bar?” she asked.

“Nine,” I answered.

“And what fraction of the bar did each child color?”

“Two,” I answered again.

“I asked what *fraction* of the bar did each child color?”

“Oh, I mean *two-twentieths*.”

“That’s right,” Ms. Gibbs said. “Now multiply just the same way we did with the last problem.”

I was a little mixed up. But then I looked back at the last problem.

I read the equation. It was: $\frac{3}{1} \times \frac{2}{8} = \frac{6}{8}$

Hmmm. I thought about it, but just for a bit. Then I wrote:

$$\frac{9}{1} \times \frac{2}{20} =$$

I remembered to put the one under the nine. I looked up at Ms. Gibbs to see if I was right.

She just nodded and said, “Go ahead.”

I multiplied across and then hesitantly wrote:

$$\frac{9}{1} \times \frac{2}{20} = \frac{18}{20}$$

“That’s right!” Ms. Gibbs exclaimed with a big smile. “As you can see, if you have bigger numbers, it’s easier to multiply than it is to do repeat addition. Now don’t you agree?”

I slowly nodded my head, “Yes.” I could see it was a little easier but then I still wanted to count them my old way. I just wanted to be sure I got the same answer.

I began counting again: two-twentieths, four-twentieths, six-twentieths, eight-twentieths, ten-twentieths, twelve-twentieths, fourteen-twentieths, sixteen-twentieths, and eighteen-twentieths!

I did get the same answer, my old way and the new way. I can see now the new way, multiplying, is faster when the numbers are bigger. I was glad that I checked it out though. I just wanted to be sure.

“Now see if you can work this next problem without a picture of a fraction bar,” Ms. Gibbs said. “A fraction bar was divided into 12 sections. Let’s pretend I colored three sections and you colored twice as many sections as I did. What fraction of the bar was left uncolored?”

“Huh?” I asked.

“Kayla, you’ll need to multiply, add, and then subtract for this problem. You know what ‘twice’ means, don’t you?” Ms. Gibbs asked.

“Yes, ‘twice’ means double,” I answered.

“Yes that’s right, and ‘double’ just means two times. You’ll just need to multiply what I colored by two to get what you colored. Do you understand?” Ms. Gibbs asked.

“I think so. I think I can figure this out,” I answered.

Let's see, the fraction bar is divided into twelve sections. Ms. Gibbs colored in three and I colored two times that. So to get the fraction that I colored, I multiplied what she colored times two:

$$\frac{3}{12} \times \frac{2}{1} = \frac{6}{12}$$

I looked up at Ms. Gibbs.

"Go ahead," she said encouragingly. "Six-twelfths is what *you* colored."

Oh! OK. I then added what Ms. Gibbs colored:

$$\frac{6}{12} + \frac{3}{12} = \frac{9}{12}$$

That looked right but I again looked up at Ms. Gibbs.

She said, "Go ahead. The problem asks what fraction of the bar is left *uncolored*."

Oh, that's a subtraction problem.

There are twelve sections in the whole fraction bar so I just need to make that into a fraction. I think I can do that! I wrote:

$$\frac{12}{12} - \frac{9}{12} = \frac{3}{12}$$

I tried to sound confident when I said the answer, "Three-twelfths of the fraction bar was left uncolored," but inside I wasn't so sure.

I explained to Ms. Gibbs all that I did. “First I multiplied, then I had to add, then I had to subtract. Did I get it all right?”

“Why, Kayla, yes you did. That’s very good,” Ms. Gibbs said with a big smile.

Then she continued, “Kayla, now let’s quickly finish these last two multiplication problems. It’s getting late.”

The next problem on the paper was: $\frac{3}{5} \times \frac{2}{4} =$

I multiplied across and wrote:

$$\frac{3}{5} \times \frac{2}{4} = \frac{6}{20}$$

The last one on the paper was: $\frac{7}{8} \times \frac{6}{8} =$

Boy, these numbers are getting real big! Let’s see, 7 times 6... I quickly added six sevens, one by one in my head, and wrote the answers on the side of the paper.

7
14
21

I then wrote “42” for the numerator of the answer:

28
35
42

$$\frac{7}{8} \times \frac{6}{8} = \frac{42}{8}$$

Ms. Gibbs was watching me. “Oh-oh!” she said, “I think we need to work on your multiplication facts.”

“It’s forty-two, isn’t it?” I asked. I was sure I was right.

“Yes, you got the right answer. As I said, multiplication is just repeat addition and that’s what you did. You added seven and seven, then added seven again and again. That took too long.

“If you knew your multiplication facts, you would know that seven times six equals forty-two. You wouldn’t need to add the numbers and write them down, you would just know the answer. Wouldn’t that be nice?” Ms. Gibbs asked with a smile.

I didn’t smile back, I just shrugged my shoulders. I quietly said - almost to myself, “I don’t mind adding up numbers. I can do it pretty fast.”

But I think Ms. Gibbs heard me. She said, “Well, next week, we’re going to begin work on your multiplication facts. It won’t be too hard, you’ll see.”

I didn’t say anything. I just frowned.

“It you learn your multiplication facts little by little you’ll see it won’t be too hard at all.” She took out a small piece of paper from her folder and wrote something down on it.

“Kayla, I want you to memorize these two multiplication facts for next time. If you memorize them, you will no longer have to do repeat addition to find out what 7 X 6 is.” She handed me the paper.

This is what was on the paper:

$7 \times 6 =$	42
$6 \times 7 =$	42

“You know it doesn’t matter which number you say first,” Ms. Gibbs said. “If you multiply these two numbers together, the answer is always 42. Now fold the part of the paper back with the forty-two written twice, and put it in your pocket.”

I folded the paper and put it in my pocket.

“I want you to take this paper home, keep it folded just the way it is now, and look at it several times every day. If you can’t remember what the answer is, just unfold it. The answer will be there. Can you do that?” Ms. Gibbs asked.

I nodded my head, “Yes.”

Ms. Gibbs took some more papers from her folder and handed them to me. “Now, here are some problems for you to work at home. I have addition, subtraction, and multiplication problems all mixed up. So watch your signs.”

Ms. Gibbs continued, “Remember: fifteen minutes each evening is all it takes to get your math down-pat. Do you remember what ‘down-pat’ means?”

“Yes, Ms. Gibbs,” I answered. “It’s when you know your math so well you can do harder math and it won’t seem so hard.”

But I didn’t want to do harder math. I just wanted to color fraction bars. Maybe Cleveland will color them with me.

Ms. Gibbs gathered her things and was ready to leave.

“Oh-oh, Ms. Gibbs, I forgot how to pronounce that big word, the one that begins with an “m” but it sounds like it begins with an “n.” Can you please write it down for me? I want to remember it always.”

“Of course,” Ms. Gibbs said as she reached into her folder and took out another small piece of paper.

On it she wrote: m n e m o n i c and nuh-mon'-ic

Chapter 5

Reviewing what I learned

I did remember how to pronounce that big word, “mnemonic,” and how to spell it too. I practiced it over and over and I never forgot it.

And I began to learn my multiplication facts too. That evening before I went to bed, I looked at that little piece of paper. Hmm... Six times seven is forty uh...something. I unfolded the paper. I was right with the first number but I didn't remember the second; it was two. The answer was forty-two. Six times seven is forty-two, and seven times six is forty-two, I said to myself over and over right before I went to sleep.

Now for my review. Today I learned the correct names for the numbers in a fraction. The bottom number is called the denominator. You can remember it because the word denominator begins with a “d” and that's the number that's “down.” That begins with a “d” too.

The top number is called the numerator. The way I remember it is that the numerator is the *num*-ber we're talking about and that begins with an “n” too. Ms. Gibbs seemed confused when I told her that so maybe I should explain it better to you. The numerator is the number you're trying to figure out. You don't need to figure out the denominator, you just count the number something is divided into or the number of things in a group. It's the numerator that you have to figure out. So the top number, the number you're trying to figure out, is called the numerator. Number and numerator both begin with an “n.” That should make it easy to remember, and something that helps you remember stuff is called a mnemonic device.

By the way, mnemonic begins with an “m.” I bet you thought it began with an “n.” I know I did. That’s because it’s Greek or something and they do things differently over there, wherever that is.

Oh, and most of the time fractions are used to describe something less than one. In these fractions the numerator is less than the denominator, and they are called *proper*. But there are fractions that have a numerator *bigger* than the denominator. These fractions describe something *greater* than one, and they are called *improper*. Just remember, fractions that are proper describe something less than one, and all other fractions are improper.

I remember thinking at the time that it’s not so important if the fractions are proper or improper. After all, fractions aren’t like kids. But later, Cleveland and I learned how important it is. I’ll tell you all about that another time.

A handy way to turn a whole number into a fraction is just to put a line underneath it, then put a one underneath that, and presto! You have a fraction. You’ll see that this will come in handy when you’re doing fraction problems.

I have to tell you, though, that after I did a lot of multiplication problems, I no longer needed to turn a whole number into a fraction in that way.

I just knew that when there's a whole number in a fraction problem, that whole number is the numerator and the denominator is one even though it's not really there. But I just worked the problem as if it was. After you do lots of problems, you'll probably just skip putting the one under the number like I did. But it's better to wait awhile so you won't get mixed up.

It's easy to multiply fractions. You just multiply the numerators together and that's the numerator for your answer. Then you multiply the denominators together and that's the denominator for your answer. It doesn't matter if the denominators are the same or if they're different. You just multiply them. Oh, and you need to know that when you hear that one thing is a certain fraction *of* another thing, like $\frac{1}{3}$ of 6, that use of the word "*of*" means "*multiply*" by that fraction:

$$\frac{1}{3} \times 6$$

I used to think adding was easier than multiplying, and it is, for small numbers. But if you do a problem with big numbers both ways, you'll see that multiplying is easier and a whole lot faster than addition. I know because now I'm doing problems with great big numbers and multiplying is a whole lot faster. Believe me!

The next page has some practice problems for you. I didn't draw any fraction bars but maybe you can imagine them. Or, you can draw them yourself and maybe color them too. Make sure you watch the signs!

Practice Problems

$$1a. \frac{1}{4} \times 3 =$$

$$1b. \frac{1}{6} \times \frac{5}{7} =$$

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

$$1d. \frac{1}{8} \times \frac{2}{3} =$$

$$1e. \frac{5}{6} - \frac{2}{6} =$$

$$1f. \frac{1}{3} \times \frac{1}{5} =$$

$$1g. \frac{3}{7} + \frac{2}{7} =$$

$$1h. \frac{9}{10} - \frac{5}{10} =$$

$$1i. \frac{5}{7} \times \frac{2}{6} =$$

$$1j. \frac{3}{8} + \frac{7}{8} =$$

$$1k. \frac{3}{4} \times \frac{3}{4} =$$

$$1l. \frac{4}{10} \times \frac{10}{4} =$$

Hey, did you notice you needed to multiply 6 x 7 a couple of times? I hope you didn't do repeat addition like I used to do!

2. Imagine a fraction bar divided into 10 sections with a line dividing it in half. So really there are five sections in each half. Now imagine coloring three-fifths of one half of the whole fraction bar. Please write the equation showing what fraction of the whole fraction bar you would have colored (if you really had a fraction bar):

3. Imagine a fraction bar divided into twelve sections with a line dividing it in half. Now imagine coloring one-third of one-half of the fraction bar. Please write the equation showing how much of the whole fraction bar you would color:

4. Imagine two fractions bars, each divided into six sections. Now imagine coloring three-fourths of the total number of fraction bars. Please write the equation showing how much of the fraction bars you would color: (If you get mixed up, look at how I did a similar problem on page 19.)

5. Two fraction bars were each divided into six sections. Please color $\frac{5}{6}$ of the total number of fraction bars. Please write the equation showing how much of the fraction bars you would color:

Are your answers for both #4 and #5 improper fractions?
They're supposed to be!

6. A big fraction bar was divided into 12 sections. Four of us colored two sections each.

What fraction of the bar did each of us color? _____

Write the equation showing which fraction of the bar was colored altogether:

Hey, did you multiply? You were supposed to!

Write the equation showing which fraction of the bar was left uncolored:

7. A big fraction bar was divided into 20 sections. Five kids colored in four sections each.

What fraction of the bar did each of us color? _____

Write the equation showing which fraction of the bar was colored altogether:

Was any of the fraction bar left uncolored? _____

8. A fraction bar was divided into 16 sections. Cleveland colored in five sections and I colored in three sections.

Write the equation showing which fraction of the bar was colored altogether:

Write the equation showing which fraction of the bar was left uncolored:

9. A pizza was divided into eight pieces. I ate two pieces, and Cleveland ate twice as much pizza as I ate.

What fraction of the pizza did Cleveland eat? _____

Write the equation showing what fraction of the pizza was eaten altogether:

Write the equation showing what fraction of the pizza was left over:

10. Ms. Gibbs, Mr. Williams, and Cleveland came over to my house for a pizza party. We bought a really giant pizza. It was divided into sixteen pieces! I ate two pieces, Ms. Gibbs ate one more piece than I did, Cleveland ate one more piece than Ms. Gibbs did and Mr. Williams ate two more pieces than Cleveland did. After we ate our pizza there was a knock at the door. It was Mr. Jackson. “Any pizza left over for me?” he asked.

First, write an equation to show what fraction of the pizza was eaten before Mr. Jackson came over:

What fraction of the pizza was left over for Mr. Jackson?

You know I’m just pretending, don’t you? Imagine, Ms. Gibbs, Mr. Williams and Mr. Jackson coming to a pizza party at MY house! That would be pretty funny. It’s a good problem though, don’t you think?

That’s all for now. Don’t forget to check my web site:

www.learningwithkayla.org

for more problems. Remember to work on your math fifteen minutes a day. When you get these problems down-pat, join me in my next book and you can work with me on my multiplication grid. It’s not too hard - actually, it’s kinda fun. I didn’t think so at first, but once I could see all the boxes filling in, it got to be a game – well, sorta.



Something Extra

Did you like the word “mnemonic”? I use mnemonic devices all the time to help me remember things - like a telephone number or something new I learned in class. It works! I have never forgotten, not once, that the name of the top number in a fraction is the numerator. I bet you won't either.

If you like the word “mnemonic” and want to remember it, maybe you can write it out on a piece of paper like Ms. Gibbs did for me. It's fun to say and it's fun to use.

Cleveland and I made up a very funny mnemonic device to help us remember how to work word problems. I bet you'll think it's funny too. You can make up some funny mnemonic devices that will help you remember important stuff.

See you in my next book!

Answers to Problems on page 34

$$1a. \frac{3}{4}$$

$$1g. \frac{5}{7}$$

$$1b. \frac{5}{42}$$

$$1h. \frac{4}{10}$$

$$1c. \frac{2}{15}$$

$$1i. \frac{10}{42}$$

$$1d. \frac{2}{24}$$

$$1j. \frac{10}{8}$$

$$1e. \frac{3}{6}$$

$$1k. \frac{9}{16}$$

$$1f. \frac{1}{15}$$

$$1l. \frac{40}{40} = 1$$

Hey, did you notice that the answer to 1j is an improper fraction?

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

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

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

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

$$6. \frac{2}{12}, \quad \frac{4}{1} \times \frac{2}{12} = \frac{8}{12}, \quad \frac{12}{12} - \frac{8}{12} = \frac{4}{12}$$

$$7. \frac{4}{20}, \quad \frac{5}{1} \times \frac{4}{20} = \frac{20}{20} = 1, \quad \text{No}$$

$$8. \frac{5}{16} + \frac{3}{16} = \frac{8}{16}, \quad \frac{16}{16} - \frac{8}{16} = \frac{8}{16}$$

$$9. \frac{2}{1} \times \frac{2}{8} = \frac{4}{8}, \quad \frac{2}{8} + \frac{4}{8} = \frac{6}{8}, \quad \frac{8}{8} - \frac{6}{8} = \frac{2}{8}$$

$$10. \frac{2}{16} + \frac{3}{16} + \frac{4}{16} + \frac{6}{16} = \frac{15}{16}, \quad \frac{16}{16} - \frac{15}{16} = \frac{1}{16}$$

Poor Mr. Jackson...

About Tutoring Math

I hope you're thinking a little more about tutoring math. You can think of tutoring as simply sharing what you know. If you're an adult and are relearning this math or a kid who is learning it for the first time, think of sharing what you've learned with someone else. There are many kids like Kayla who are way behind in their math and are afraid that it's too hard for them. Find ways to make math easier for them like Ms. Gibbs did for Kayla on pages 15 and 16. By giving them the help and encouragement they need, you can make a difference in a child's life.