Learning Math with Kayla

Book 6: Learning about improper fractions and mixed numbers

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. Her math teacher, Mr. Williams, decides a tutor would be the best way to help Kayla learn her math.

In this sixth book, Kayla tells her tutor, Ms. Gibbs, that she had trouble concentrating while doing her math homework so she decided just to quit doing math altogether. Ms. Gibbs suggests things she can do to help her concentrate.

Kayla also expresses doubts about whether she is smart enough to learn all the math Ms. Gibbs is teaching her. To help her regain her confidence, Ms. Gibbs reviews the math covered in previous books. After Kayla regains her confidence, Ms. Gibbs teaches her about improper fractions and mixed numbers.

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 along with Kayla.

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

About Kayla

I have been asked if Kayla is a real person. She and others in the book are composites of the many kids I have tutored plus myself as a kid *and* as an adult. I remember getting mixed up adding and subtracting unlike fractions as do many of the kids I tutor.

When it came to changing improper fractions to mixed numbers, I found it helpful to make a division bracket right next to the divisor and extend the dividing line, to help me remember which part of the improper fraction was the divisor.

And as a kid, there were lots of things I wondered about. There is one thing in particular which prompted me to include what Kayla was wondering about in this book. If you are wondering about what I wondered about, you can read about it on Kayla's website (www.learningwithkayla.org).

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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 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.

Vicki lives with her husband, Ed, in Sarasota, FL.

Acknowledgements

Tom Swartz of Black Oyster Press has generously donated his time and energy to the Hurtova Foundation mission.

Thanks to Charles Daniel for the excellent job he does in proofreading the text. His expertise in math and grammar ensures that both kinds of errors are minimized in the Kayla Books.

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

My homework problem

Today is tutoring day. I used to look forward to seeing Ms. Gibbs on Thursdays and learning some new math, but not anymore. And I'll tell you why. It's because I'm not doing my math homework the way I'm *supposed* to be doing it. In fact, I'm not doing it at all!

And you know what else? I don't care. You see, I don't like math! I did before but now I don't! I just don't!

I remember I used to sit on my chair in the kitchen for fifteen minutes - sometimes a little longer, and that whole time I worked on my math. I was starting to feel that maybe I was smart. But that was when I liked math.

Well, now I don't like math and I know I'm not smart. And I'll tell you why.

The other day - let's see, that was Tuesday - I was supposed to add fractions with different denominators - they're called unlike fractions. I was supposed to add five-sixths and one-half. Here's how I did it:

$$\frac{5}{6} + \frac{1}{2} = \frac{6}{8}$$

and then I saw that I could simplify it so I did:

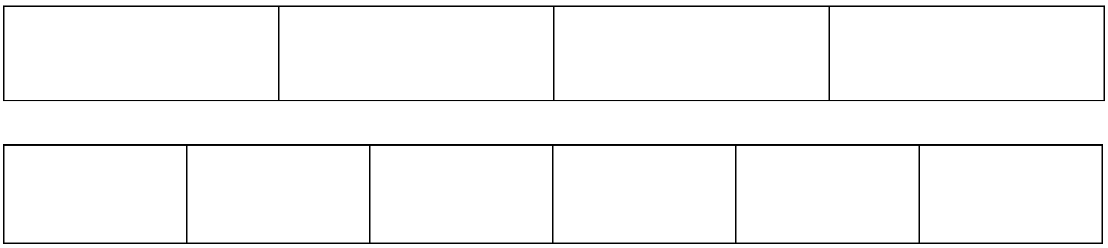
$$\frac{6}{8} = \frac{3}{4}$$

Reader, one of these equations is wrong.

If you know which one it is, put a big X through it.
If you're not sure, just keep reading and when you find out, please go back and put an X through the one that's wrong.

I knew that I made a mistake because I know that three-fourths is smaller than five-sixths. You see, when you add fractions together, the answer is supposed to get bigger. Well, my answer got smaller. And I know that's not right!

Actually, I wasn't all the way sure that it was smaller, so I drew two fraction bars and after I colored them in, I could easily see that three-fourths was smaller. Yep, I was right, so that's how I knew I was wrong.



Reader, please color three-fourths of the first bar and five-sixths of the second. so you can see too.

And then I remembered about adding kittens and puppies. I looked back and saw I added sixths and halves. Those are *names*, just like kittens and puppies, and I can't add them together. And besides, I'm *never* supposed to add the denominators together – not *ever*. Oh, no! I did *everything* wrong!

And that's when I decided that math is too hard for me.   There are just too many things to remember.

And then I got to thinking: why do I need to learn about fractions anyway? I never use them in real life, only in school and that's not real life. I figured if I didn't try to do my math, I wouldn't feel so dumb. So I just quit!

Maybe I'll just draw pictures in my math class like I used to - or maybe I might read stories in my math class like my momma used to.

I wasn't really planning to go to the tutor room today, but Mr. Williams told me to go, so I went. Now that I'm here, I don't know what to do!

Oh, no, I hear Ms. Gibbs coming. What should I do?

"Good afternoon Kayla, how are you today?" Ms. Gibbs asked.

"I'm fine," I answered.

“Well you don’t look fine to me, Kayla. Is there something the matter?”

“Well,” I said, but then I stopped. While I was wondering if I should tell Ms. Gibbs about what happened this week, I blurted it all out. I wasn’t really planning to tell her but then - well I just did!

“Oh, Ms. Gibbs,” I said, “I didn’t do all my homework, I didn’t do even half of it.” And then I started to cry a little, not really bawling or anything like that, just weeping a little. I couldn’t help it.

“Why Kayla, whatever is the matter?” Ms. Gibbs asked. “Is the math I’m teaching you too hard?”

“Well, yes - I mean no,” I answered.

Then I tried to explain to Ms. Gibbs. "If I concentrate real hard, I can understand it but then I start thinking of something else and then I have trouble thinking about my math. I still sat in my chair for the whole fifteen minutes every day – well, every day except yesterday.

"I didn't do any homework yesterday because - well because, you see, the day before I made a big mistake. Two mistakes, really. That's when I decided fractions really don't make any sense, so I quit - I just quit!"

"I understand," Ms. Gibbs said, and she sounded like she really understood.

"You do?" I asked, surprised.

"Yes, I do. Let me tell you what I do when I have trouble concentrating."

Chapter 2

What Ms. Gibbs does

“You see, Kayla, I have homework too.”

“You have homework?” I asked. “But you’re a grown-up. I didn’t think grown-ups even went to school.”

“Well as a grown-up, I don’t *have* to go school. Schools are for learning and I go to school because there are so many things I want to learn.

“Right now, I’m taking a class in 19th century American history. It’s about the time leading up to the Civil War, the Civil War, and the Reconstruction Period,” Ms. Gibbs explained.

“Oh, that’s Black History. We learned all about that during Black History month,” I said.

Ms. Gibbs corrected me, “It’s not *just* Black History, it’s *American* history and it includes *all* of the people who lived in the United States at that time - Blacks, Whites, Native Americans and other ethnic groups as well. There is much to learn about that time in history and Kayla, you didn’t learn *all* about it, you were just introduced to it.”

“Oh,” that’s all I said. I didn’t know what else to say. Ms. Gibbs sounded real serious-like and I was afraid of saying something wrong. I think I already did!

But then she said, “So now let me tell you what I do about my homework.”

Oh, good! Ms. Gibbs is starting to sound like herself again.

“As I was saying,” Ms. Gibbs continued, “I want to learn about 19th Century American history. My teacher said that if we want to take part in the discussions, we need to prepare ourselves well by reading the assigned material.”

“I looked at all the material I would need to read - there was a lot of it - and that’s when I decided I would need to read and study about an hour each evening. I made that a priority.”

“A priority?” I asked.

“Yes, a priority. That means I decided that history is important to me, more important than some of the other things that I do. So in order to accomplish my goal I make sure I read and study for an hour each day.”

“An hour? An hour is a very long time,” I said.

“Yes, it is a long time - it usually goes by very fast, but there are times when I have trouble concentrating, just like you sometimes do. When that happens I go back a little and review. If I’m still having trouble concentrating, there are some other things I do. I’ll tell you what they are and you can decide what you might do to help yourself.”

I didn’t say anything. I just listened to what Ms. Gibbs was telling me.

“Now since my goal is to read one hour each evening, the very first thing I do is write down the time I begin.”

“Hey, that’s what I do too,” I said, but then I added kinda quiet-like, “Well that’s what I *used* to do.”

Ms. Gibbs nodded her head and continued, “Sometimes I’d just get a drink of water; other times I’d take a walk, and sometimes I’d work on one of my Sudoku puzzles.”

“Sudoku? My momma has a Sudoku book!” I exclaimed. “She sometimes works puzzles before she goes to sleep.”

“Yes, working puzzles can be very relaxing.” And then Ms. Gibbs said, serious-like, “Now Kayla, *please* let me finish.

“After I get a drink of water, or work for a bit on a puzzle, I get back to my reading. I note the time so I can be sure I read for at least one hour.

“Now there are times I’d like to continue working on my Sudoku puzzle. When that happens, I just remind myself what my priority is. It’s certainly *not* to finish a Sudoku puzzle, it’s to learn history. So I put the Sudoku book down and go back to my reading.”

Gee, I wonder if Ms. Gibbs can show me how to work one of those Sudoku puzzles. I don’t think this is a good time to ask her though. Maybe later.

Ms. Gibbs continued, “Having completed my reading for the day gives me a sense of accomplishment. I feel a lot better than I would have if I didn’t finish what I had planned to do.”

Gee, I remembered that I *used* to feel good after I did my math homework too.

“Learning history is just one of my priorities. I have other priorities too,” Ms. Gibbs said.

You do? I asked.

“Why yes”, Ms. Gibbs answered. “Another one of my priorities is you.”

“Me? I’m a priority?”

“Why of course you are! Every Wednesday evening, I think about what I plan to teach you on our tutoring day.

“I try to anticipate the materials I might need and put them in my folder. Now sometimes I’m tired but I’m never too tired for you,” Ms. Gibbs said with a smile.

Gee, I didn’t realize I was a priority for Ms. Gibbs. If she takes time to prepare for me, then maybe I should take time to prepare for her by doing my homework. Fifteen minutes isn’t all *that* long.

“Now tell me about the problem that you got stuck on,” Ms. Gibbs said.

I explained to Ms. Gibbs what I did. I told her I didn’t think my answer was right so I drew two fraction bars and that’s when I knew it was wrong. -   and that’s when I quit doing my homework altogether.

“Why Kayla, that was very clever of you to check your answer by drawing the fraction bars! You knew enough to recognize that you were wrong. You just got discouraged, that’s all. Everyone gets discouraged at some time.”

That got me starting to think about something I’ve been wondering about. If I don’t ask Ms. Gibbs now, I’ll probably never ask her and then I’ll probably never know until I’m a grown-up. So…I just asked her.

Chapter 3

What Kayla wonders about

“Fractions aren’t real, are they?”

“Why Kayla, whatever do you mean?” Ms. Gibbs asked.

“Well, it’s like this,” I explained, “I was wondering if fractions are just something grown-ups tell kids about but - but they’re not real. You know - like Santa Claus and the Tooth Fairy and things like that.”

“Like Santa Claus! And the Tooth Fairy!” Ms. Gibbs exclaimed.

I quickly added, “It’s OK if fractions aren’t real. I don’t mind, and don’t worry. I’ll keep trying to study about them if you want me to. But…well, it was just something I was wondering about.”

And then I hesitated before I said, kinda quiet-like, “You’re not supposed to tell me, are you?”

“Kayla, please tell me why you think fractions aren’t real. And, of course, I will tell you whatever you need to know.”

“Well it’s like this: I know that one-half is supposed to be bigger than one-third but it’s not really, is it? For instance, one-third of a big pizza is bigger than one-half of a small pizza.

“And what about if I draw a bunch of lines in a pizza picture. That changes everything - doesn’t it?

“So fractions really are just something kids are supposed to learn in school but they don’t really mean anything, do they? And that’s what I mean when I say they’re not real!”

Ms. Gibbs answered, “Kayla, fractions are a good way we can talk about something less than one, like half of a banana or half of a pizza. If the “one” you’re talking about is small, like a small pizza, then one-half of a small pizza is small. But if you’re talking about one-half of a large pizza, then that’s much bigger.

“You can understand that one-half of a small pizza is smaller than one-half of a large one. Can’t you?

I nodded my head a little but I was still thinking.

“Kayla, I think this is a good time to review fractions and other math you have learned. Let’s spend this afternoon just reviewing,” Ms. Gibbs said. “Then next week, you’ll feel more confident about what you know and be better prepared to learn something brand new.”

Chapter 4

The Review

“Let’s start at the very beginning. Let’s start with adding and subtracting like fractions,” Ms. Gibbs said - and that’s right where we started.

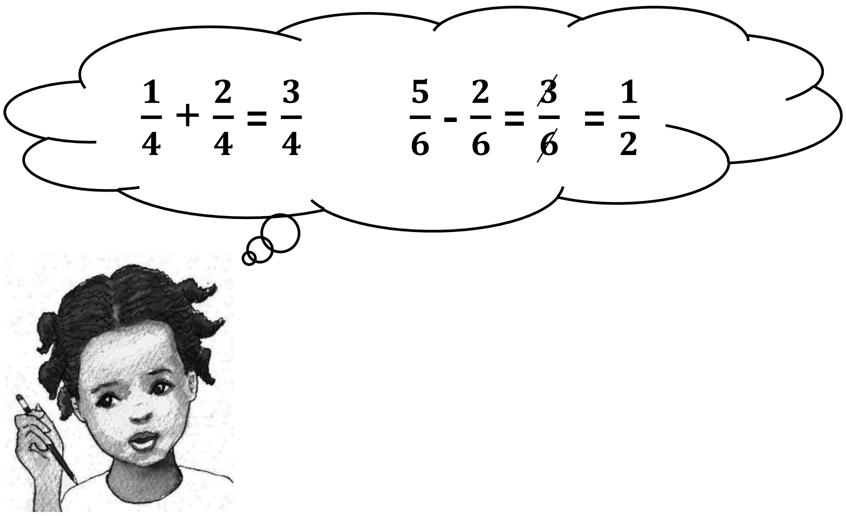
“Since like fractions have the same denominators, you just need to add the numerators:

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

and

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

and you *never* add the denominators!”



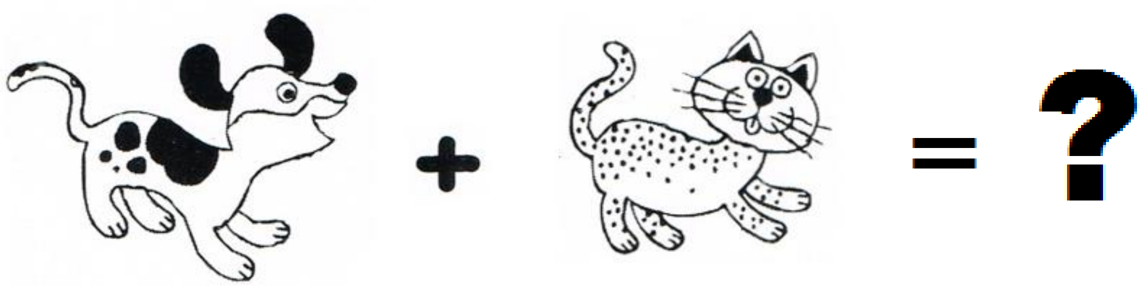
I saw that I could simplify three-sixths even before Ms. Gibbs wrote it down.

“Are you following me Kayla?” Ms. Gibbs asked.

I nodded my head, yes. I could see these fractions in my head and they're making sense to me.

"But when the denominators are different, you just can't add the numerators, can you?" Ms. Gibbs asked.

I shook my head, no. "Why that would be like adding a puppy and a kitten!"



"Yes, that's right," Ms. Gibbs answered with a smile. So if you want to add:

$$\frac{3}{4} + \frac{1}{3}$$

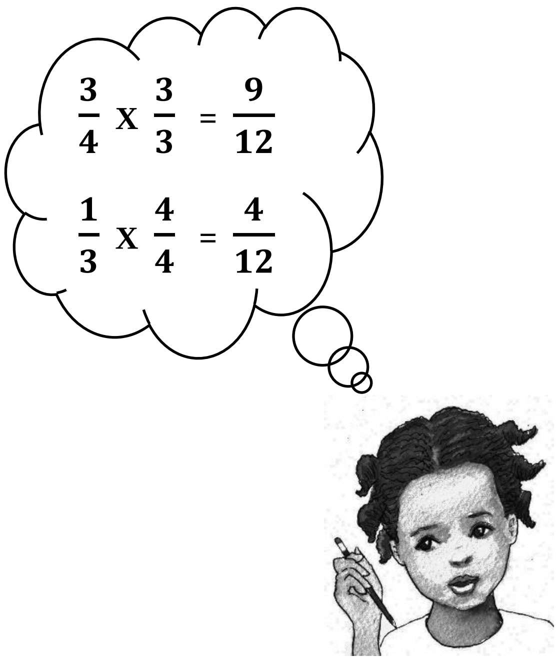
what would you have to do first?"

"Find a common denominator," I answered. Then right away I added, "And I can see that it's twelve. I don't know how I knew that multiplying the denominators was the better way to find a common denominator, but I just did!"

"Yes, that *is* the better way for these fractions. So now we have twelve for the denominator for both fractions, and the next step is…?"

"Make equivalent fractions," I answered.

Ms. Gibbs nodded her head. I could see the equivalent fractions in my head even before Ms. Gibbs finished writing them!



This is what Ms. Gibbs wrote:

$$\frac{3}{4} \text{ x } \frac{3}{3} = \frac{9}{12}$$

$$\frac{1}{3} \text{ x } \frac{4}{4} = \frac{4}{12}$$

Yep, she got it right!

Now for the easy part. Just add the like fractions:

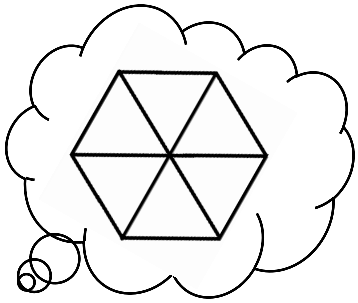
$$\frac{9}{12} + \frac{4}{12} = \frac{13}{12}$$

“So three-fourths plus one-third is the same as nine-twelfths plus four-twelfths, and that equals thirteen-twelfths,” I said. “Gee! That sounds complicated, but if I just follow *all* the steps it isn’t so hard.”

Reader, if you want to review all the steps, they begin on page 14.
It isn’t so hard.

“That’s right, Kayla,” Ms. Gibbs said. “Now let’s use a hexagon to see how well you can visualize the next few fractions.

“First try to imagine a hexagon that’s divided into six sections.”



I remembered what a hexagon looks like and I could imagine it divided into six sections.

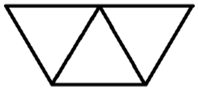
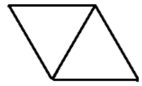
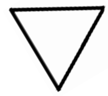
Then Ms. Gibbs said, “How much is one-half plus one-third of that hexagon?”

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

I tried to imagine what one-half plus one-third of a hexagon looks like, but I couldn’t.

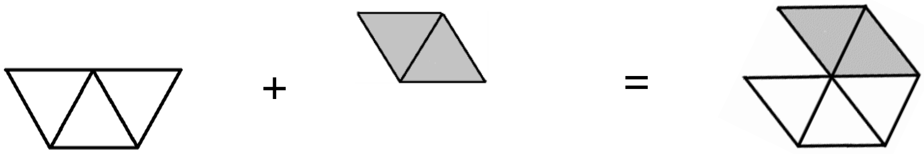
Ms. Gibbs must have noticed the puzzled look on my face. She reached in her folder and took out some colored pieces of paper and said, “Here, I have pieces of hexagons to help you see more clearly. You can think of a hexagon as made up of six equal-sized triangles. So one-half of a hexagon is three triangles, one-third of a hexagon is two triangles, and one-sixth of a hexagon is one triangle.”

For a hexagon, we can equate these fractions and shapes:

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

“Hey, maybe I can show these hexagon pieces to Cleveland and maybe we can practice our fractions with them.”

“That’s a good idea, Kayla, but right now I want you to focus on this problem. One-half of a hexagon is three triangles, and if we add one-third, which is two triangles, we have a total of five triangles:



And then Ms. Gibbs did the math.

“This is a case where simply multiplying the two denominators together to get a common denominator is the faster and easier way to go. Two times three is six, so six is our common denominator.

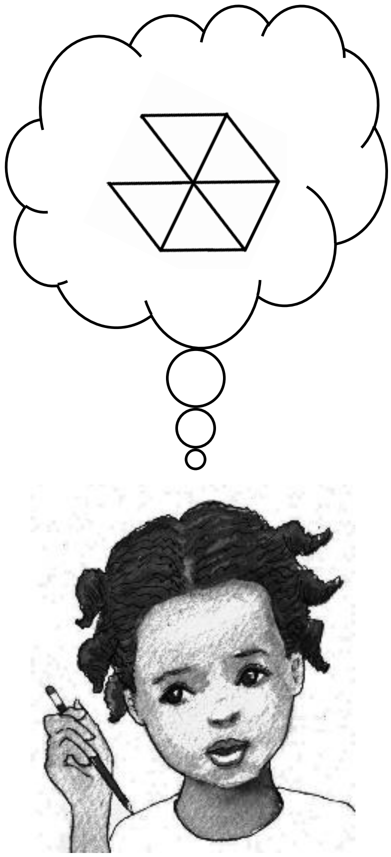
“Now we create the equivalent fractions”:

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

She continued: “And now the easy part, just add the like fractions:”

$$\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$$

I nodded my head as Ms. Gibbs was writing the equation. Yes, now I can see that this fraction, five-sixths can be pictured as five triangles.

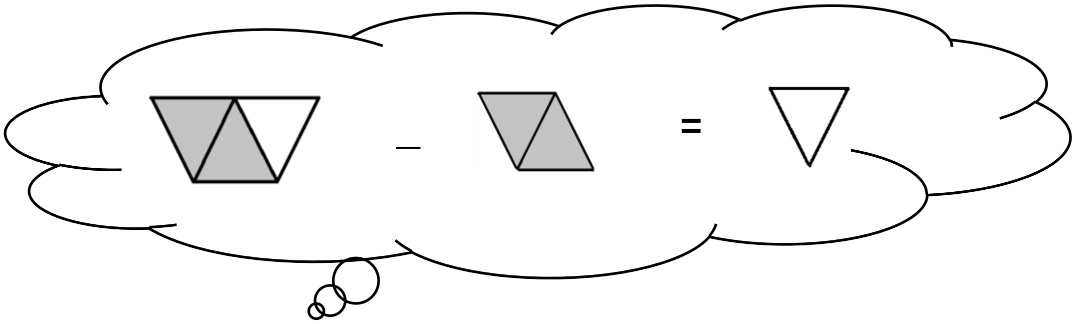


“Let’s do a subtraction problem using these hexagons,” Ms. Gibbs said, can you subtract one-third from one-half?” And she wrote:

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

Well, if I just thought about numbers, I'd have to do the math, but if I think about parts of hexagons, I can see the answer right away.

Because one-half is three triangles and one-third is two triangles, the answer has to be just one triangle, which is one-sixth. So I said to Ms. Gibbs, "That's easy, the answer is one-sixth!



"That's right, Kayla!" Ms. Gibbs exclaimed. Hexagons can be helpful for visualizing some fraction problems, but it's always best to understand the math that goes along with them. So please do the math for this problem."

OK, I thought to myself, I can do this. These are the same two fractions we just added, but now we're subtracting them. So the equivalent fractions are the same:

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

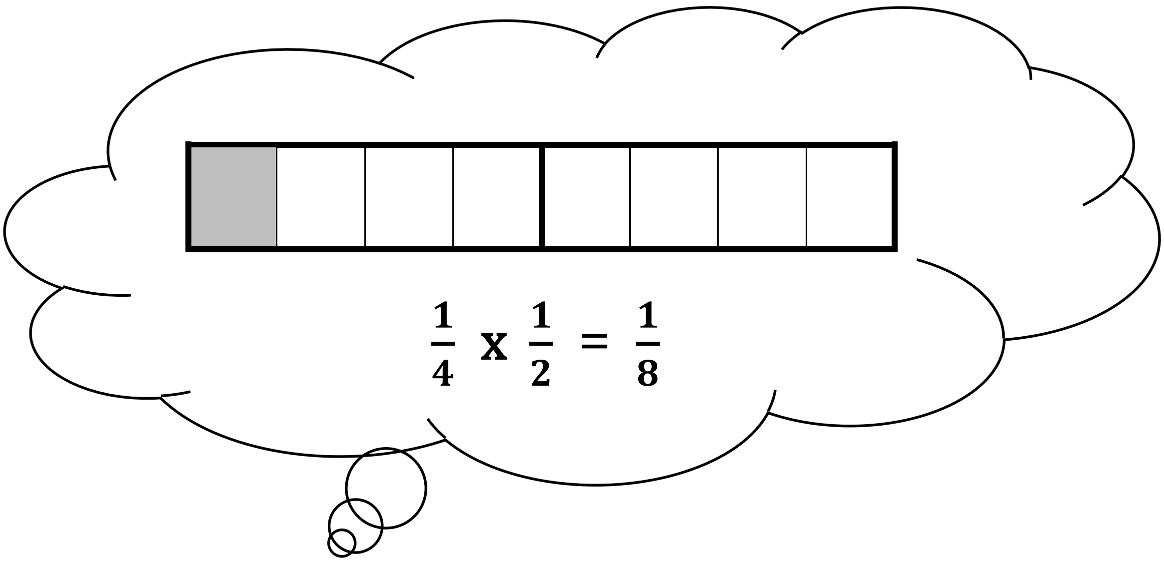
And that's the same answer I got using those triangles. I knew they *should* be the same, but it's nice to see they really *are* the same.

"Very good, Kayla! Now let's move on to multiplying fractions.

"You know when multiplying fractions, it doesn't matter if the denominators are different or if they're same. You just multiply them together. And of course you multiply the numerators together too. That's all there is to it."

And then Ms. Gibbs asked if I remembered that when you're doing fractions, "of" tells you to multiply. I nodded my head.

"What is one-fourth of one-half?" she asked.



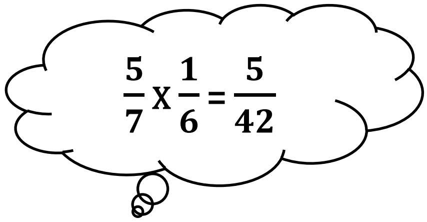
$$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$$

I pictured these fractions in my head, and confidently answered, "It's one-eighth."

Ms. Gibbs nodded her head, and then wrote:

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

Hmm. I couldn't picture this in my head but I did remember that seven times six is forty-two so the answer must be…hmm... five over forty-two. I don't think it can be simplified.



And Ms. Gibbs finished the equation:

$$\frac{5}{7} \text{ X } \frac{1}{6} = \frac{5}{42}$$

I was right, it can't be simplified because if it could, Ms. Gibbs would have done it.

And then Ms. Gibbs reviewed that trick, oops, I mean that short-cut, of multiplying multiples of ten. She asked me if I remembered how to multiply multiples of ten.

"Yes, I remember... Multiply the numbers, but without the zeroes at the end. Then count the total number of zeroes - only the ones at the ends - and just add those zeroes to the right-hand side:

$$1{,}000 \text{ X } 50 = 50{,}000$$

$$700 \text{ X } 8{,}000 = 5{,}600{,}000$$

$$1{,}050 \text{ X } 10 = 10{,}500$$

I knew the answers even before Ms. Gibbs finished writing them down - I even got the commas in the right places.

Then Ms. Gibbs reviewed multiplying large numbers. She wrote:

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  482
 X369
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and asked me, “Kayla, do you know that the six isn’t really a six?”

“Yes, I remember, it’s a sixty, because it’s in the tens place. So when I’m ready to multiply by sixty, I’ll just need to add the zero on the right and then I can just multiply by a plain old six,” I answered.

And then I quickly added, “And the three isn’t really a three; it’s three hundred, so I need to add *two* zeroes on the third line and then multiply by a plain old three”:

```
    482
   x369
   4338
  28920
 144600
 177858
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While Ms. Gibbs was multiplying and adding, I was multiplying and adding right along with her on my own paper. I made sure to keep my columns straight and guess what: we both got the same answer and at the *very same time*!

“Kayla, you will probably use a calculator when multiplying large numbers like this. But it is good that you know how to multiply them with just pencil and paper – and to *understand* the logic behind it.

“Now for your multiplication grid, Kayla. Do you remember how much three times three is?”

“Three squared equals nine,” I said. I knew the number three was squared so I just said it that way. And I didn’t wait for her to ask me those two other square numbers I learned. “And four squared equals sixteen and five squared equals twenty-five”:

$$3^2 = 9 \qquad 4^2 = 16 \qquad 5^2 = 25$$

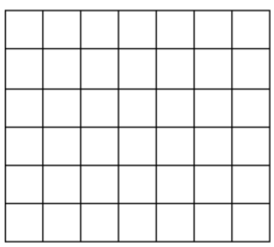
“That’s very good Kayla! You must have done some studying this last week, and all the weeks before. You have almost all of your math down-pat.”

I nodded my head. Yes, I thought to myself. I was studying all the way up to last Monday and I guess I learned a lot. You see, it wasn’t until Tuesday that I got discouraged and quit.

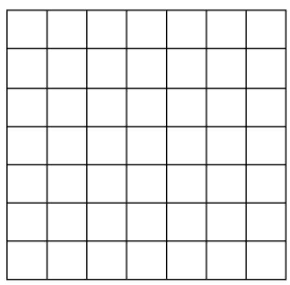
From now on, I’m going to make sure I study math every day. I’m going to make math a priority. I have other priorities too. I’ll tell you about them later. But right now I have to pay attention to Ms. Gibbs because right now, learning math is my priority.

“I have three more square numbers for you to learn.” Ms. Gibbs said. “They are six squared, seven squared, and eight squared and they look like this:

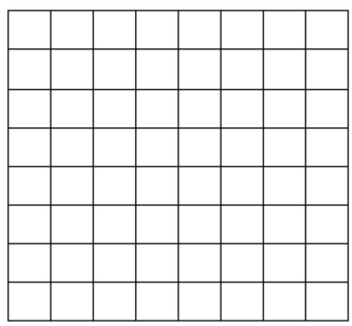
$6 \times 6 = 36$



$7 \times 7 = 49$



$8 \times 8 = 64$



“Please put these equations on this little piece of paper and if you learn them well, next week you’ll be able to put three more numbers in your grid.

“And Kayla, when you finish writing on that paper and filling in your grid with those three numbers, we’ll be all done for this week.”

Hey, look how I wrote out the three squared numbers, to remind me what that little 2 means:

$6^2 = 6 \times 6 =$	36
$7^2 = 7 \times 7 =$	49
$8^2 = 8 \times 8 =$	64

And then I put the three squared numbers that I had already learned into my grid!

I thanked Ms. Gibbs, but…but I had one more question to ask. It was something I was wondering about for a long, long time.

Should I ask her? While I was wondering if I should ask her, I just asked her.

Chapter 5

One more question

“Ms. Gibbs, do you think I’m smart?”

“Why of course I think you’re smart,” she answered, and then asked, “Why would you think otherwise?”

“Well it’s like this,” I answered. “You see, sometimes I think I’m smart and other times I think I’m not so smart, so I don’t know what I am. Smart…or maybe…well, maybe I’m just dumb!”

“Kayla, a lot of people have the wrong idea of what being smart is. Some people think it’s something you’re born with but, for the most part, it’s not.

“Everyone in your school can learn math and reading and history and a whole lot more. But, sad to say, too many students do poorly in these subjects. How well a student does in school is dependent on a lot of things, but one thing always stands out: If you think you’re smart and capable of learning hard subjects, you’re much more likely to study and learn those hard subjects.

“Now in the past, it was a common belief that girls weren’t very good in math so most girls didn’t study much math in high school and in college. And because girls seldom studied much math, nearly all math professors in college were men. And because nearly all math professors were men, it made it seem that men were much better in math than women were.

“Why would anyone think that? You’re smart in math and so is Mr. Williams. It doesn’t really matter if you’re a girl or a boy - or a woman or a man. Does it?

“No, it doesn’t matter at all. But it does matter what other people think about you, and more importantly, what you think about yourself.

“Some people, even today, think that black people are not as smart as white people, and that’s not true either, is it?” Ms. Gibbs asked.

“Well...there *is* one black boy that’s really smart, but all the rest of the really smart kids in my math class are white.”

“Why do you think that's the way it is?”

Well, I thought for a minute but couldn’t come up with an answer. I just shrugged my shoulders.

“There are several reasons for this. One is that white students usually have more opportunity to learn. Many times, their parents are better educated so they are able to teach their children more. And many times, the schools are better in the neighborhoods where more white people live.

“Another reason may be that some students - and that includes students of *all* racial backgrounds - think that what they are studying has no meaning for them. Look how well most young people learn how to use computers and cell phones. They put time and energy into learning about them, and they become expert at using them. For many older people, however, computers and cell phones seem very complicated and they have difficulty with them.

“But a *very* important reason is that some students just don’t think they’re smart, so they don’t study as much as they should.

“If you think that something is important and useful to you, *and* you think you’re smart enough, then you will put time and energy into learning about it. It is difficult for many young people to see the importance of math.”

Well, I know I go to a good school. And I remember that when I thought I was kinda smart I used to study more.

Ms. Gibbs thinks I’m smart enough to learn hard math, so I must be because she’s real smart. From now on, I’m going to make studying fifteen minutes a day a priority. Come to think of it, it was already a priority for me up until last Tuesday…I just didn’t know to call it that!

Chapter 6

Improper fractions and mixed numbers

"Kayla, as I've been saying all along, fractions are a good way to talk about things that are less than one, like half of a banana."

I nodded my head.

Ms. Gibbs continued, "Well, here's something to think about: Supposing bananas were cut in half and a boy ate three halves. Now, there are two ways to express that amount. You can simply say three-halves, or you can say one and one-half. Almost everyone would say one and one-half, now wouldn't they?"

I nodded my head, but just a little. I wasn't so sure what I would say.

"But in math, the expression "three-halves" is sometime used. Three-halves is an *improper* fraction because it's numerator is larger than its denominator":

$$\frac{3}{2} \text{ is an improper fraction}$$

Improper fractions? I heard about those kinds of fractions before but didn't understand them. *This* time, I'm going to pay attention so I can really learn about them.

"As I said, the more common way of talking about what the boy ate would be that he ate one and one-half bananas. One and one-half is a mixed number because it has both a whole number and a fraction. The boy ate one whole banana and one-half more.

$1\frac{1}{2}$ is a mixed number

"I want you to have a good understanding of both improper fractions and mixed numbers and I want you to be able to convert one into the other. Let's begin by taking a look at that homework problem you got stuck on." Ms. Gibbs remembered what it was and wrote it out for me to solve:

$$\frac{5}{6} + \frac{1}{2} =$$

I didn't make the same mistake I did before. I could see right away that they were unlike fractions, so the first thing I had to do was to make them into like fractions.

And right away, I saw that I could use six for the common denominator. Since one of the fractions already had a six for the denominator, I knew I just had to make an equivalent fraction for the one-half so that's what I did:

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

Now the easy part; I just add them up:

$$\frac{5}{6} + \frac{3}{6} = \frac{8}{6}$$

"As you can see, Kayla, the numerator is larger than the denominator and that makes it an improper fraction," Ms. Gibbs said. It represents something *greater* than one.

“Now I’m going to show you how to change an improper fraction into a mixed number. Please pay attention.

“This fraction line between the numerator and the denominator is also called a dividing line:

$$\Longrightarrow \quad \frac{8}{6}$$

“The denominator is the divisor; can you remember that?”

“Hey, ‘denominator’ and ‘divisor’ both begin with ‘d.’ I can use that as a mnemonic device so I won’t get mixed up!”

“Well, no,” Ms. Gibbs said, “You see, the numerator becomes the dividend and that begins with ‘d’ too.

“Let me show you what I did when I was just about your age so I wouldn’t get mixed up. I first made a division bracket right next to the divisor and extended the dividing line. Then I put the eight inside the division bracket. Then right away, I put a line through the numerator because I already used it for the dividend. Here’s what it looks like:

$$\begin{array}{l} \underline{\not{8}\qquad} \\ 6)\,8 \end{array}$$

After Ms. Gibbs set up the division problem she asked me to divide. So that‘s what I did:

$$\begin{array}{l} \underline{\not{8}\;\; 1\ \mathrm{R2}} \\ 6)\,8 \end{array}$$

“Yes,” Ms. Gibbs said, “but rather than having a remainder of two, use the remainder for the numerator and use the divisor for the denominator of the fraction that goes with the whole number.”

“Huh?”

Ms. Gibbs showed me what she meant. She used the remainder, two, as the numerator and the divisor, six, as the denominator. So the answer would be:

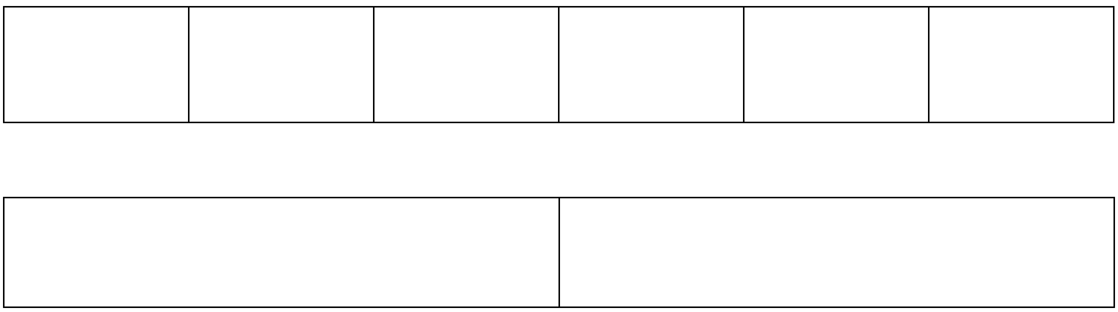
$$1\frac{2}{6}$$

Pretty tricky! I’m not sure I can remember all that.

But while I was worrying about remembering what Ms. Gibbs did, I saw that I could simplify the fraction, two-sixths, so I did:

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

“That’s right, Kayla, the final answer is one and one-third: $1\frac{1}{3}$
And to help you see what this mixed number looks like, here are the two fraction bars from the original problem:



“Kayla, please color in five-sixths of the first one and one-half of the second one to represent the fractions in your homework problem.”

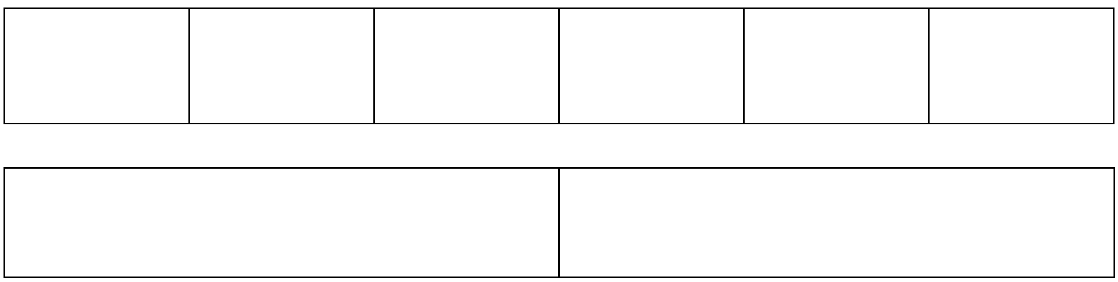
Reader, please color these two fraction bars the way Ms. Gibbs wants Kayla to.

"Now can you see that five-sixths plus one-half equals one and one-third?" Ms. Gibbs asked.

I couldn't see it. But wait! If I take three of the sections that I colored from the top fraction bar and move them to the other half of the bottom fraction bar, there will be only two colored sections left in the top one.

So the bottom fraction bar will be full – that's one – and the top fraction bar will have two colored out of six – that's two-sixths, which I just simplified to one-third!

Let me recolor those fraction bars that way:



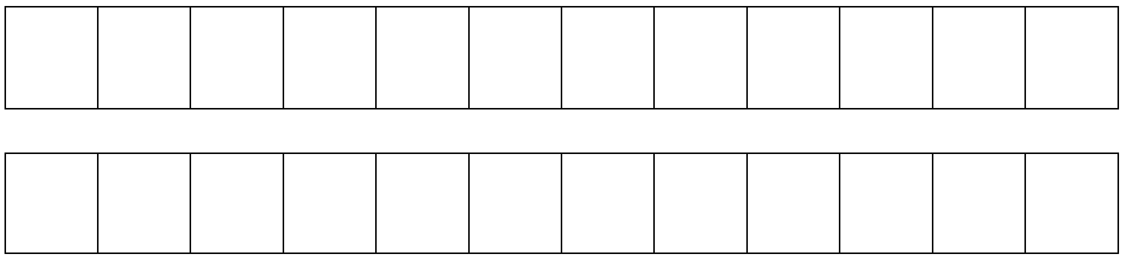
Reader, please recolor the fraction bars the way Kayla wants to.

"Now here's a problem from your review," Ms. Gibbs said, "You added three-fourths plus one-third and the answer was thirteen-twelfths":

$$\frac{3}{4} + \frac{1}{3} = \frac{13}{12}$$

Reader, if you want to see all the steps Kayla used to solve this problem, go back and look on pages 14 and 15.

"Now, using these two fraction bars, each divided into twelve boxes, show me how three-fourths and one-third equals thirteen-twelfths":



I think I can do this. One-fourth of this fraction bar is three boxes, so three-fourths must be three times that, or nine boxes. So I colored nine boxes in the first fraction bar.

One-third of twelve is just four. But instead of coloring all four boxes in the second bar, I colored three in the first bar and the last one in the second.

The answer is one and one-twelfth. I can see that's a better answer than thirteen-twelfths, even though it's really the same thing.

Reader, please color the fraction bars the way Kayla did, so you can see too.

"Kayla, adding improper fractions is just the same as adding proper fractions," Ms. Gibbs said, "If the denominators are the same, you just add the numerators. But if the denominators are different..."

Ms. Gibbs hesitated. I finished her sentence because I knew that's what she wanted me to do, so I just did: "I have to make equivalent fractions!"

"That's right, Kayla," Ms. Gibbs replied. "Now please add five-fourths and five-fourths."

$$\frac{5}{4} + \frac{5}{4} = \frac{10}{4}$$

Ten-fourths is an improper fraction, so I need to change it into a mixed number. I can do that. First I set up my division problem:

$$\begin{array}{r} \underline{10\quad\;\;} \\ 4\,\overline{)\,10} \end{array}$$

Then I divide. Four goes into ten two times, with a remainder of two. I'll take that remainder and use it for my numerator. Then I'll take the divisor, four, and use it for my denominator:

$$\begin{array}{r} \underline{10\quad 2\tfrac{2}{4}} \\ 4\,\overline{)\,10} \end{array}$$

My answer is…wait! I can simplify it. My final answer is two and one-half:

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

I wanted to draw fraction bars so I could really see how five-fourths and five-fourths equal two and one-half, but I didn't have time.

Right away, Ms. Gibbs gave me another problem to solve.

"Now can you tell me how much eight-sixths minus three-fourths is?" Ms. Gibbs asked.

$$\frac{8}{6} - \frac{3}{4} =$$

First I need to make equivalent fractions. At first I was just going to multiply six times four to get - let's see - that's twenty-four, but…

But then I saw that twelve could work too, so that's what I used to make the unlike fractions into equivalent fractions:

$$\frac{8}{6} \text{ X } \frac{2}{2} = \frac{16}{12}$$

$$\frac{3}{4} \text{ X } \frac{3}{3} = \frac{9}{12}$$

So my equivalent fractions are sixteen-twelfths and nine-twelfths, and now I just have to subtract:

$$\frac{16}{12} - \frac{9}{12} = \frac{7}{12}$$

"Good for you, Kayla! Now, please multiply these improper fractions":

$$\frac{5}{3} \text{ X } \frac{7}{2} =$$

I was *almost* going to make equivalent fractions because the denominators were different, but then I remembered that when you *multiply*, it doesn't matter if the denominators are different or the same. You just multiply them across, and the numerators, too:

$$\frac{5}{3} \text{ x } \frac{7}{2} = \frac{35}{6}$$

And then I made a mixed number. First I made my division bracket:

$$\begin{array}{l} \not{35} \\ 6\,\overline{)\,35} \end{array}$$

Then I divided: Six goes into thirty-five five times, with five left over. I used the remainder, five, as the numerator, and the divisor, six, as the denominator. So the mixed number is:

$$\begin{array}{l} \not{35} \quad 5\frac{5}{6} \\ 6\,\overline{)\,35} \end{array}$$

I can't simplify five-sixths, so my final answer is: $5\frac{5}{6}$.

Ms. Gibbs nodded her head and said, "Kayla, I can see that you understand the relationship between improper fractions and mixed numbers. I'm glad!"

She continued, "Here's how to add or subtract mixed numbers. Just do the math for the fractions and the whole numbers *separately*, and then combine the answers. Let me show you.

If I want to add:

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

I simply add the fractions together to get two-thirds. Then I add the whole numbers together to get two. When I combine these results, I get two and two-thirds:

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

Do you see that, Kayla?”

I nodded my head. I could see what Ms. Gibbs did, and it didn’t seem so hard.

Then Ms. Gibbs said, “Now I’m going to subtract these two mixed numbers:

$$4\frac{5}{6} - 3\frac{2}{6}$$

“As you can see, subtracting the fractional parts, five-sixths minus two-sixths, gives me three-sixths. Subtracting the whole numbers, four minus three, gives me one. So I just have to combine these two results to get my answer, one and three-sixths, which I can simplify to one and one-half:

$$4\frac{5}{6} - 3\frac{2}{6} = 1\frac{3}{6} = 1\frac{1}{2}$$

“Do you understand, Kayla?”

I nodded my head. I was watching what Ms. Gibbs was doing because I want to really learn this new math. And besides, I bet she’s going to ask me to do one all by myself.

Then Ms. Gibbs wrote out another problem, and said, “Let me see you do this one all by yourself. I’d like you to add:

$$2\frac{4}{5} + 3\frac{1}{5}$$

Ok, I can do this. First I add the fractions: four-fifths and one-fifth equal five-fifths, which equals one. I'll add that one to the whole numbers, two and three to get six …

$$1 + 2 + 3 = 6$$

…and then… "Hey, what happened to my fraction?"

"There is no fraction, Kayla. The fractions in the problem add up to one with nothing left over so your answer is not a mixed number, it's the whole number, six! You did everything right:

$$2\frac{4}{5} + 3\frac{1}{5} = 6$$

"Let's see you do one more," Ms. Gibbs said as she wrote this problem down:

$$5\frac{2}{5} - 1\frac{1}{3}$$

OK. Two-fifths and one-third are unlike fractions, so I have to find a common denominator. If I multiply the denominators together I get fifteen. That's the lowest common denominator – I think:

$$5 \text{ X } 3 = 15$$

Now I have to make equivalent fractions, and this is how I do it:

$$\frac{2}{5} \text{ X } \frac{3}{3} = \frac{6}{15} \quad \text{and} \quad \frac{1}{3} \text{ X } \frac{5}{5} = \frac{5}{15}$$

And then I just subtract the like fractions to get one-fifteenth:

$$\frac{6}{15} - \frac{5}{15} = \frac{1}{15}$$

Oh, I forgot the whole numbers! Five minus one is four. When I combine this with my fraction, I get my final answer:

$$5\frac{2}{5} - 1\frac{1}{3} = 4\frac{1}{15}$$

“That’s exactly right, Kayla,” Ms. Gibbs said, “I can see you have a good understanding of adding and subtracting improper fractions and mixed numbers.

“To *multiply* mixed numbers, you first convert them into improper fractions. Here’s how to do it.

“The denominator of the new, improper, fraction is the same as the denominator in the mixed number. To get the new numerator, first multiply the denominator of the fractional part times the whole number. Then add the old numerator to that,” Ms. Gibbs explained.

“As always, the words make it sound much more difficult than it is, so let me show you some examples.

“I’ll convert one and two-thirds into an improper fraction. The denominator will be three, because that’s the denominator of the original fraction. Then I multiply the denominator, three, times the whole number, one, and add the old numerator, two, to get the new numerator. So my answer is five-thirds:

$$1\frac{2}{3} = \frac{3\ x\ 1+2}{3} = \frac{5}{3}$$

“Here’s another: I’ll convert five and three-eighths into an improper fraction. The denominator will be eight, and the numerator will be eight times five plus three, or forty-three”:

$$5\frac{3}{8} = \frac{8\ x\ 5+3}{8} = \frac{43}{8}$$

Ms. Gibbs is right, it isn’t so hard. I probably can do it myself.

Ms. Gibbs must have read my mind, because the very next thing she said was…

“Kayla, I think you can do this yourself. Convert this mixed number into an improper fraction”:

$$7\frac{5}{6}$$

OK, I can do this. First I write down the same denominator for my improper fraction. Then for the new numerator, I multiply six times seven; that’s forty-two, and then I add the old numerator, five, and that makes forty-seven:

$$7\frac{5}{6} = \frac{6\ x\ 7+5}{6} = \frac{47}{6}$$

“That’s very good Kayla!” Ms. Gibbs said, “Now you can use this new knowledge to multiply mixed numbers.

“Once you have converted the mixed numbers into improper fractions, treat them just as you would if they were proper fractions: Simply multiply across.

“Now please multiply together the same two mixed numbers you just subtracted for me:”

$$5\frac{2}{5} \text{ x } 1\frac{1}{3}$$

OK. First I convert these mixed numbers to improper fractions:

$$5\frac{2}{5} = \frac{5 \; x \; 5+2}{5} = \frac{27}{5} \quad \text{and} \quad 1\frac{1}{3} = \frac{3 \; x \; 1+1}{3} = \frac{4}{3}$$

so I can write this problem like this:

$$\frac{27}{5} \text{ x } \frac{4}{3}$$

Now I just have to multiply across. The numerator is going to be a pretty big number, but I know how to find it. I used pencil and paper to multiply twenty-seven times four, and I got **108**. Five times three is fifteen, so my answer is:

$$\frac{27}{5} \text{ X } \frac{4}{3} = \frac{108}{15}$$

To convert this back to a mixed number, I need to divide. Oh, no, that's long division! I get mixed up doing long division. What do I do now?

Ms. Gibbs took out her calculator and said, "Kayla, I'll use my calculator for these big numbers. We can talk about long division another time. Today I want you to focus on mixed numbers and improper fractions."

She punched the numbers in and said, "Fifteen goes into one hundred and eight seven times, with a remainder of three. Please tell me what the mixed number is."

Well, the whole number is seven, and to get the fraction, we put the remainder over the divisor. But three over fifteen can be simplified, because three goes into fifteen five times. So my final answer can be written:

$$5\frac{1}{6} \text{ x } 3\frac{2}{3} = 7\frac{3}{15} = 7\frac{1}{5}$$

“Very good, Kayla, you did everything right. I can see you’re able to focus on this new math and that’s why you’re doing so well.

“You’ve been working on your math about fifteen minutes each day – every day until last Tuesday – and I can see that you have your math almost down-pat. This new math we just covered didn’t seem so hard for you, did it Kayla?”

I shook my head. No, it didn’t seem so hard.

Ms. Gibbs handed me my homework papers. I thanked her and left the room.

As I was walking down the hall, I was thinking…

You know - I *did* have most of my math down-pat. And that must be why the new math I just learned didn’t seem so hard. Ms. Gibbs must be right: I *am* pretty smart!

Reviewing what I learned

Hey, did I fool you? I bet you thought the first chapter with the title "My Homework Problem" was about a problem I was having with my math homework. Well it wasn't. It was a problem I was having just *doing* my homework. Get it?

Since the whole of Chapter 4 was a review, I'm not going to review all that math again. But I am going to review one little part of it - the part about multiplying multiples of ten.

You see, I've noticed kids in middle school and even sometimes in high school multiplying multiples of ten the long way, so I'm going to review how to do them the short-cut way. And I hope you'll do it the short-cut way from now on.

Any number that ends in a zero is a multiple of **10.** Take seventy, that's seven multiplied by **10.** Seven hundred is seven multiplied by one hundred, or seven times **10** times **10.** Now suppose you want to multiply **42** by **100.** All you have to do is multiply all the numbers *except the zeros at the end.* That's easy: **42 X 1** = **42.** Then count the zeros at the end - there are two. Then just add the two zeros to **42** - and don't forget the comma. So:

$$42 \text{ X } 100 = 4{,}200$$

Now take **5,000**. That's five multiplied by a thousand. Suppose you want to multiply **5,000** by **5**. Just multiply **5 X 5** - that's easy, it's **25**. Then add the three zeros. Your answer is:

$$5{,}000 \text{ X } 5 = 25{,}000$$

One more: This is a little tricky. Suppose you want to multiply **1,020** times **2,000**. First, multiply the numbers without the zeros *at* *the end*: $\mathbf{102 \text{ X } 2}$ = $\mathbf{204.}$ Then add the zeros at the end. There are four of them, so:

$$\mathbf{1{,}020 \text{ X } 2{,}000 = 2{,}040{,}000}$$

The zero in the middle of 102 isn't at the end, so when you count up the zeros at the end, don't count that one. Get it?

If you know how to multiply this short-cut way, it's much easier and faster than that long way, isn't it? So why not multiply multiples of ten this short-cut way? I have some in the practice problems so you'll get a lot of practice.

Now I'm just going to review the new math I learned today. Improper fractions are ones where the numerator is bigger than the denominator. That's what makes them different from proper fractions. Improper fractions can be converted into mixed numbers, and mixed numbers can be converted back into improper fractions.

A mixed number is one that has a whole number and a proper fraction. Mixed numbers are easier to picture in your head than improper fractions, so that's why it's often helpful to make this change.

Try it yourself. Isn't it easier to picture one and one-twelfth of a pizza than thirteen-twelfths? Well, that's why you change an improper fraction to a mixed number - it's easier to picture.

Suppose you have this fraction:

$$\mathbf{\frac{14}{4}}$$

It's an improper fraction, so to help you picture it better, make it into a mixed number. Watch me do it. First I make a division bracket and then I just divide. And watch what I do with the remainder, two. I use it for the numerator in the answer. Then I use the divisor for the denominator. Like this:

$$\begin{array}{l} 14 \quad 3\frac{2}{4} \\ 4\,)\,14 \end{array}$$

But that's not the final answer because you can simplify the proper fraction. Remember, if you can make the numbers in the fraction smaller without changing the value. then do it:

$$\frac{2 \div 2}{4 \div 2} = \frac{1}{2}$$

so the final answer is $\mathbf{3\,\frac{1}{2}}$.

Now what's easier to picture in your head: $\mathbf{14/4}$ pizzas or $\mathbf{3\frac{1}{2}}$ pizzas? It's the mixed number, isn't it?

Here's another one: Suppose you have the fraction,

$$\frac{26}{5}$$

Right away, you know that's an improper fraction because the numerator is larger than the denominator. To make it into a mixed number, make that bracket, then divide. Did you use the remainder for the numerator and the divisor for the denominator? You were supposed to. This is how I did it:

$$\begin{array}{l} 26 \quad 5\frac{1}{5} \\ 5\,)\,26 \end{array}$$

I didn't have to simplify the fraction because it didn't need simplifying.

Now watch this: I'm going to change that mixed number, five and one-fifth, back into an improper fraction. First I multiply five times five, that's twenty-five. Then I add the one from the old numerator to get my new numerator, twenty-six. The new denominator is the same as the old one, five.

$$5\frac{1}{5} = \frac{5\ x\ 5+1}{5} = \frac{26}{5}$$

Isn't that neat? We get the same thing we started with!

Just one more:

$$\frac{36}{6}$$

First, I make the bracket and divide:

$$\begin{array}{r} \not{3}\not{6}\ \ \ 6 \\ \hline 6\,)\,36 \end{array}$$

There was no remainder so I couldn't make a fraction. When you divide an improper fraction and it doesn't have a remainder, then the answer is a whole number. It's easier to picture six pizzas in your head rather than $36/6$. isn't it? That's why when you want to picture how big an improper fraction is, it's always good to change it into a mixed number.

Practice problems

1. Convert the improper fractions to mixed numbers, and convert the mixed numbers to improper fractions. Make sure all the fractions in your answers are simplified.

1a. $\frac{12}{7}$

1b. $2\frac{1}{2}$

1c. $\frac{18}{6}$

1d. $\frac{22}{4}$

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

1f. $\frac{70}{7}$

1g. $\frac{8}{5}$

1h. $\frac{19}{9}$

1i. $2\frac{2}{7}$

1j. $\frac{36}{5}$

1k. $\frac{100}{10}$

1l. $7\frac{3}{7}$

2. Here are some multiples of ten for you to multiply. Make sure you do them the short-cut way, and try to do them in your head. Don't forget to put in all the commas.

2a. **10 X 560** =

2b. **400 X 41** =

2c. **1010 X 100** =

2d. **82 X 8,000** =

2e. **55 X 50** =

2f. **72 X 2,000** =

2g. $\mathbf{202 \text{ X } 4{,}000}$ =

2h. $\mathbf{40 \text{ X } 30{,}000}$ =

2i. $\mathbf{90 \text{ X } 110}$ =

2j. $\mathbf{1030 \text{ X } 30}$ =

2k. $\mathbf{51 \text{ X } 500}$ =

2l. $\mathbf{800 \text{ X } 80{,}000}$ =

If you had any trouble multiplying multiples of ten, review what I wrote in this book on page 21. If you *still* have trouble, review **Place values** starting on page 19 in Book 4. Don't worry if you don't get it right way, you will after you practice - so just practice.

3. Here are some problems with unlike fractions. Before you add or subtract them, you need to first make them into like fractions. Remember there are two ways to do that. The first way is just to multiply the denominators together and use that answer for your common denominator. The second way is to find a common multiple and use that number for your common denominator. If you know which method is better for a problem, just use that method. If you're not sure, then use both ways and you'll soon see which way is better. Then just add or subtract these like fractions. Oh, and make sure you simplify your answer.

3a. $\mathbf{\frac{5}{6}} + \mathbf{\frac{2}{3}} =$

3b. $\mathbf{\frac{3}{4}} - \mathbf{\frac{2}{5}} =$

3c. $\mathbf{\frac{4}{9}} - \mathbf{\frac{1}{3}} =$

3d. $\frac{7}{9}$ - $\frac{2}{5}$ =

3e. $\frac{1}{10}$ + $\frac{2}{12}$ =

3f. $\frac{6}{16}$ - $\frac{1}{8}$ =

Did you figure out which way is the better way to make like fractions? If not, you just need more practice.

4. Here are some mixed numbers for you to add, subtract or multiply. For these, you decide for yourself which is the better way to get the answers, and make sure you simplify them when possible.

4a. $2\frac{2}{5}$ + $1\frac{3}{10}$ =

4b. $2\frac{1}{2}$ x $1\frac{1}{2}$ =

4c. $3\frac{1}{3}$ - $2\frac{1}{3}$ =

4d. $2\frac{3}{8}$ - $1\frac{1}{6}$ =

4e. $5\frac{1}{2}$ x $3\frac{1}{3}$ =

4f. $4\frac{3}{7}$ + $2\frac{1}{6}$ =

Did you know which way was the best way to get the answer right away? If not, you just need more practice.

5. Here are some hexagon problems. Remember what a hexagon looks like? If you don't, look on page 16. And do you remember about the six triangles? That's on page 16 too.

Think of a hexagon. Try to picture these equations in your head, with each fraction made up of hexagon parts. (You might find "Hexagon Fractions" on my website helpful.) If you can't do that, just solve them any way you want.

5a. $\frac{1}{3} + \frac{1}{3}$ =

5b. $\frac{2}{3} - \frac{1}{6}$ =

5c. $1 - \frac{4}{6}$ =

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

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

5f. $\frac{5}{6} + \frac{5}{6}$ =

6. Solve these equations. Watch the signs. Remember, when multiplying it's OK if the denominators are different. Make sure you simplify your answers.

6a. $\frac{3}{7}$ X $\frac{4}{6}$ =

6b. $\frac{4}{6}$ + $\frac{1}{2}$ =

6c. $\frac{7}{8}$ - $\frac{1}{4}$ =

6d. $\frac{3}{9}$ X $\frac{1}{3}$ =

6e. $\frac{7}{12}$ - $\frac{1}{4}$ =

6f. $\frac{5}{6}$ X $\frac{6}{6}$ =

Something extra

The word "priority" is a noun. It comes from the Latin word meaning "before."   It's something that you think is important enough to put "before" other things. And priorities can change whenever you change your mind about what's most important to you.

When I'm doing my math, then math is my priority. I focus on whatever kind of math I'm learning.   If I have trouble focusing, I just get a drink of water, or take a little walk and then I go back and make sure I finish up my math.

Oh, also, I write down the time I start and the time I take a little break. If I didn't, I wouldn't know when my 15 minutes were up, now would I? I study math for 15 minutes every day - even Sundays. That's because math is a priority for me!

Basketball is a priority too. When I play basketball with my friends, I never, ever think about math or anything else, because right then, basketball is my priority.

My priority right now is finishing up writing about the word "priority," so that's what I'll do. I just want to say, I hope math will become a priority for you. Maybe it is already!

Hey, do you know that I'm a priority for Ms. Gibbs? That means *I'm* more important than something else that's not a priority for her.

Answers

1a. $\frac{12}{7} = 1\frac{5}{7}$

1b. $2\frac{1}{2} = \frac{5}{2}$

1c. $\frac{18}{6} = 3$

1d. $\frac{22}{4} = 5\frac{1}{2}$

1e. $4\frac{1}{3} = \frac{13}{3}$

1f. $\frac{70}{7} = 10$

1g. $\frac{8}{5} = 1\frac{3}{5}$

1h. $\frac{19}{9} = 2\frac{1}{9}$

1i. $2\frac{2}{7} = \frac{16}{7}$

1j. $\frac{36}{5} = 7\frac{1}{5}$

1k. $\frac{100}{10} = 10$

1l. $7\frac{3}{7} = \frac{52}{7}$

2a. 10 X 560 = 5,600

2b. 400 X 41 = 16,400

2c. 1,010 X 100 = 101,000

2d. 82 X 8,000 = 656,000

2e. 55 X 50 = 2,750

2f. 72 X 2,000 = 144,000

2g. 202 X 4,000 = 808,000

2h. 40 X 30,000 = 1,200,000

2i. 90 X 110 = 9,900

2j. 1030 X 30 = 30,900

2k. 51 X 500 = 25,500

2l. 800 X 80,000 = 64,000,000

Can you read that last answer? It's sixty-four million!

3a. $\frac{5}{6} + \frac{2}{3} = \frac{5}{6} + \frac{4}{6} = \frac{9}{6} = 1\frac{3}{6} = 1\frac{1}{2}$ **6** is a multiple of **3**

3b. $\frac{3}{4} - \frac{2}{5} = \frac{15}{20} - \frac{8}{20} = \frac{7}{20}$ First way

3c. $\frac{4}{9} - \frac{1}{3} = \frac{4}{9} - \frac{3}{9} = \frac{1}{9}$ **9** is a multiple of **3**

3d. $\frac{7}{9} - \frac{2}{5} = \frac{35}{45} - \frac{18}{45} = \frac{17}{45}$ First way

3e. $\frac{1}{10} + \frac{2}{12} = \frac{6}{60} + \frac{10}{60} = \frac{16}{60} = \frac{4}{15}$ Second way

3f. $\frac{6}{16} - \frac{1}{8} = \frac{6}{16} - \frac{2}{16} = \frac{4}{16} = \frac{1}{4}$ **16** is a multiple of **8**

Did you figure out which way is the better way to make like fractions?

4a. $2\frac{2}{5} + 1\frac{3}{10} = \frac{12}{5} + \frac{13}{10} = \frac{24}{10} + \frac{13}{10} = \frac{37}{10} = 3\frac{7}{10}$

4b. $2\frac{1}{2} \text{ x } 1\frac{1}{2} = \frac{5}{2} \text{ x } \frac{3}{2} = \frac{15}{4} = 3\frac{3}{4}$

4c. $3\frac{1}{3} - 2\frac{1}{3} = 1$

4d. $2\frac{3}{8} - 1\frac{1}{6}$ Fractional part: $\frac{3}{8} - \frac{1}{6} = \frac{9}{24} - \frac{4}{24} = \frac{5}{24}$

Whole number part: $2 - 1 = 1$

Answer = $1\frac{5}{24}$

4e. $5\frac{1}{2} \text{ x } 3\frac{1}{3} = \frac{11}{2} \text{ x } \frac{10}{3} = \frac{110}{6} = 18\frac{2}{6} = 18\frac{1}{3}$

4f. $4\frac{3}{7} + 2\frac{1}{6}$ Fractional part: $\frac{3}{7} + \frac{1}{6} = \frac{18}{42} + \frac{7}{42} = \frac{25}{42}$

Whole number part: $4 + 2 = 6$

Answer = $6\frac{25}{42}$

Did you know which way was the better way right away? If not, you just need more practice.

5a. $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$

5b. $\frac{2}{3} - \frac{1}{6} = \frac{1}{2}$

5c. $1 - \frac{4}{6} = \frac{1}{3}$

5d. $\frac{5}{6} - \frac{1}{2} = \frac{1}{3}$

5e. $1 + \frac{2}{6} = 1\frac{1}{3}$

5f. $\frac{5}{6} + \frac{5}{6} = 1\frac{2}{3}$

6a. $\frac{3}{7} \text{ X } \frac{4}{6} = \frac{12}{42} = \frac{2}{7}$

6b. $\frac{4}{6} + \frac{1}{2} = \frac{7}{6} = 1\frac{1}{6}$

6c. $\frac{7}{8} - \frac{1}{4} = \frac{5}{8}$

6d. $\frac{3}{9} \text{ X } \frac{1}{3} = \frac{3}{27} = \frac{1}{9}$

6e. $\frac{7}{12} - \frac{1}{4} = \frac{4}{12} = \frac{1}{3}$

6f. $\frac{5}{6} \text{ X } \frac{6}{6} = \frac{30}{36} = \frac{5}{6}$

About Tutoring Math

One great thing about being a tutor is that you're able to form a close relationship with the student you're tutoring. A student may then ask you something they wouldn't ask anyone else - like Kayla did in the beginning of Chapter three, "Fractions aren't real, are they?" or in Chapter five, "Do you think I'm smart?"

If students think what they're learning in school is not relevant to their lives, or if they feel they're not smart enough to learn what is being taught, then it follows that they wouldn't bother putting the time and effort into learning. Your job as tutor is to help them see otherwise.

Learning what is taught in school is a big part of a child's journey through life. It can be very rewarding to be a part of that journey.