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# Multiplying Fractions and Mixed Numbers

Multiplying fractions is much more straightforward than adding, subtracting or dividing fractions. In this lesson, learn how it works. We'll also learn how to multiply mixed numbers.

## Fractions of Dollars

How'd you like to earn some money? Let's say I get paid $100 to wash the windows of a skyscraper. But, I'm afraid of heights, so I pay my buddy Larry 1/2 of what I'd get to do it for me. Larry then convinces his brother Darryl to do it for 1/2 of what he'd earn. Darryl convinces his other brother Darryl (whom we call Darryl 2) to do it for 1/2 of what he'd earn. Then, Darryl 2 comes to you and offers you 1/2 of what he'd earn. That's probably worth it, right?

Well, that's 1/2 of 1/2 of 1/2 of 1/2 of $100. 1/2 * 1/2 * 1/2 * 1/2 is 1/16, and 1/16 of $100 is $6.25.

Would you wash the windows of this building for $6.25?

I wouldn't. But, I wouldn't do it for $100, either. And, what did we just do to figure that out? We multiplied fractions! Let's learn more about it without the acrophobia.


## Multiplying Fractions

To **multiply fractions**, we follow three steps. Step one: multiply the numerators; those are the top numbers. Step two: multiply the denominators; those are the bottom numbers. Step three: simplify the fraction, if necessary.

So, if we had 1/4 * 2/5, we start with 1 * 2, which is 2. Then we do 4 * 5, which is 20. Now we have 2/20. We can simplify that to 1/10. So, 1/4 * 2/5 is 1/10. This is just like what we did with the window washing example

## Practice Multiplying Fractions

Let's look at another one in context. Let's say we're in a band, and we're eating before our big gig. We get a mega-super-carnivore pizza. I'm super hungry, so I take 1/2 of it, which is 4 slices. But after eating just 1 slice, which is 1/4 of what I took, I can feel my arteries clogging, so I stop. How much did I eat? I ate 1/4 of 1/2, so let's do 1/4 * 1/2. 1 * 1 is 1. 4 * 2 is 8. So, I ate 1/8 of the pizza.

Okay, now I need to get over my illness, because we're going onstage soon. We're opening the gig for another group. It's a sold-out show at a 3,600-person club. If 5/9 of the total crowd is there early to hear us play, and 1/10 of them buy our t-shirts after being blown away by our awesome sound, how many shirts do we sell?

So, we do 5/9 * 1/10. 5 * 1 is 5, and 9 * 10 is 90. That's 5/90. We can simplify that to 1/18. What is 1/18 of 3,600? It's 200. That's a lot of shirts! Well, it is for us. And, it's enough gas money to get home.

On the way, our drummer spends 2/3 of the trip telling us about his fantasy kickball league. It's pretty boring, and you sleep through a good 7/8 of the story. How much of the trip did you spend sleeping? It's 2/3 * 7/8. 2 * 7 is 14, and 3 * 8 is 24. So, 14/24, which simplifies to 7/12. That's some good shuteye.

## Multiplying Mixed Numbers

Okay, but what do we do if the fractions get more complicated? Let's talk about how we **multiply mixed numbers**. This is a four-step process. Step one: convert to improper fractions. Step two - well, really, we just follow the steps from earlier: multiply the top, multiply the bottom, then simplify.

If we have 3 1/2 * 2 1/4, first we convert to improper fractions. To convert 3 1/2, multiply the whole number times the denominator, that's 3 * 2, or 6, then add that to the numerator. So, that's 7/2. With 2 1/4, we do 2 * 4, or 8, and get 9/4. 7/2 * 9/4? 7 * 9 is 63, and 2 * 4 is 8. So, it's 63/8. That simplifies to 7 7/8.

## Practice Multiplying Mixed Numbers

How about one in context? Let's say I quit the band and start training to make the NBA. I run 3 1/4 miles on Tuesday. If I want to run 2 1/2 times as far on Wednesday, how far will I go?

First, convert to improper fractions. 3 1/4 becomes 13/4. 2 1/2 becomes 5/2. So, we have 13/4 * 5/2. 13 * 5 is 65. 4 * 2 is 8. So, 65/8. That simplifies to 8 1/8. Can I do 8 1/8 miles? I just multiplied mixed numbers, so I think so! Well, actually, there's no proven correlation between multiplying mixed numbers and distance running.

I have another problem. I'm 6'3' '. That's 6 3/12 feet. Tall? Sure, but not NBA tall. Then I meet an old wizard selling magic growing cookies. Magic and cookies? I'm all in. He says they'll make me grow 2 5/6 as tall as I am now. That seems like a random amount, but he's a wizard selling magic cookies, so I go with it. What is 6 3/12 * 2 5/6?

With 6 3/12, we do 6 * 12, which is 72, then add that to 3 to get 75/12. 2 5/6 becomes 17/6. With 75/12 * 17/6, we do 75 * 17, which is 1275. And then 12 * 6, which we know is 72. So, 1275/72. That simplifies to 17 51/72, then to 17 17/24. So, I'll be over 17 feet tall. I'll definitely make the NBA at that height.

Okay, let's do one more. After the magic cookies totally fail to make me even an inch taller, though they were tasty, I get a job feeding animals at the zoo. The lions get 12 2/5 pounds of meat at a time. The tigers get 1 2/3 times that. What do the tigers get? And why does the zoo write their instructions like this? I don't know, but I do know how to figure out the tigers' food. That's important, because no one wants hungry tigers.

12 2/5 converts to 62/5. 1 2/3 converts to 5/3. 62 * 5 is 310. 5 * 3 is 15. So, 310/15. That simplifies to 20 10/15, or 20 2/3. That's a lot of meat, but they're big cats.

## Lesson Summary

In summary, to **multiply fractions**, we follow three steps: first, multiply the numerators; second, multiply the denominators; finally, simplify as needed. With mixed numbers, we start by converting them to improper fractions, then we just multiply the fractions!

## Learning Outcome

You should be able to multiply fractions and mixed numbers after watching this video lesson.