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Dividing Fractions and Mixed Numbers

Dividing fractions and mixed numbers? It sounds daunting, but it's not as tricky as it sounds. In this lesson, we'll learn how to divide fractions and mixed numbers.

Let's Divide

Let's talk about cookies. Baking cookies is a form of chemistry - tasty, sometimes chocolate chip chemistry. But, there also seems to be an awful lot of math involved. This is especially true if you're like me and you don't always have an unlimited supply of every ingredient.

For example, maybe you have only 1 1/2 cups of flour left and you need to modify your recipe so that you maximize your cookie potential. You're going to need to divide fractions. Let's learn more about this critical skill.

Dividing Fractions

To **divide fractions**, we follow three steps. Step one: flip the second fraction. This gives you its reciprocal. Step two: multiply the fractions. This means you multiply the numerators, then the denominators. Finally, step three: simplify as needed.

So, with 9/10 divided by 4/5, we flip the 4/5 to get 5/4. That's its reciprocal. Then, we multiply. 9 * 5 is 45, and 10 * 4 is 40. So, 45/40. We simplify that to 9/8, or 1 1/8.

Practice Dividing Fractions

Let's try a few in context. Let's say you're throwing a party. You have a punch bowl that has 8/9 of a gallon of punch left. If your cups will hold one cup of punch, which is 1/16 of a gallon, how many cups can you fill?

We need to divide 8/9 by 1/16. Okay, first step? Flip the second fraction. So, 1/16 becomes 16/1. Then, multiply 8/9 by 16/1. That's 128/9. That simplifies to 14 2/9. So, you can fill 14 cups and then someone gets stuck with 2/9 of a cup, which isn't great, but 14 people get full cups.

Next up, you're dishing out pizza. Unfortunately, you didn't plan this well. You only have 7/8 of a pizza on hand. You somehow only ordered one pizza and then you ate one slice while filling punch cups. There are 21 people at your party. How much of the pizza will each person get?

This is 7/8 divided by 21. Remember, 21 is the same as 21/1, so to get its reciprocal, we do 1/21. Now, we multiply 7/8 by 1/21. That's 7/168. That simplifies to 1/24. So, everyone gets 1/24 of the pizza. I call the pepperoni slice!

Let's try one more of these. After the pizza debacle, you're rationing your other snacks. You turn to your guacamole, of which you have 4/5 of a pound. You've overanalyzed this a bit and determined that people use about a tablespoon, or 1/32 of a pound, on each chip. How many chips can dip in your guacamole?

This is 4/5 divided by 1/32. Let's flip 1/32 to get 32/1. Then, multiply 4/5 by 32/1. That's 128/5, or 25 3/5. Hmmm... 25 chips. This isn't only a good lesson in dividing fractions; it's also a good lesson in party planning.

Dividing Mixed Numbers

Rather than focus on effective party preparation tips, let's take our fraction division to the next level and discuss dividing mixed numbers. To **divide mixed numbers**, we follow four steps. Step one: convert to improper fractions. So, if we have 3 1/3, we multiply the whole number times the denominator. That's 3 * 3, or 9. Then, add that to the numerator. So, we get 10/3.

Next, we follow the steps to divide fractions. Flip the second one, then multiply, then simplify. So, with 3 1/3 divided by 5 1/2, we convert both to improper fractions. We know 3 1/3 is 10/3. With 5 1/2, 5 * 2 is 10. Add 10 and 1 and get 11/2. Then, we flip that one to get 2/11. So, 10/3 * 2/11. 10 * 2 is 20. 11 * 3 is 33. So, 20/33. That looks like it should simplify, but it actually doesn't. So, we're done!

Practice Dividing Mixed Numbers

Let's try some in context. We're going to leave the party behind and talk about flowers. Let's say you're building a raised flower bed out of some scrap lumber. You have a board that's 10 3/4 feet long. You want pieces that are 2 1/2 feet long for the flower bed. How many pieces can you get?

We divide 10 3/4 by 2 1/2. First, convert to improper fractions. 10 3/4 becomes 43/4. 2 1/2 becomes 5/2. Next, flip 5/2 to get 2/5. Now, multiply 43/4 times 2/5. That's 86/20. That simplifies to 4 3/10. You needed four sides, so you have enough wood!

Ok, now let's say you're planting flowers. You have 6 1/4 square feet of space, and your flowers need 1 1/8 square feet to flourish. How many flowers can you plant?

So, 6 1/4 divided by 1 1/8. 6 1/4 becomes 25/4. 1 1/8 becomes 9/8. We flip 9/8 to get 8/9. And 25/4 times 8/9? 25 * 8 is 200. 4 * 9 is 36. So, we get 200/36. That simplifies to 5 5/9. Well, you can't really plant 5/9 of a flower, but you know you have space for 5 flowers and a little spare room.

After planting your flowers, you decide to make some cookies. Remember when I mentioned those earlier? I haven't stopped thinking about them, and now it's time to solve that problem once and for all. Plus, all that building and planting earned you some cookies, right? You realize you're running a bit low on sugar, though. You have 2 1/5 cups of sugar. Your recipe says each batch requires 1 1/6 cups of sugar. How many batches can you make?

So, 2 1/5 divided by 1 1/6. 2 1/5 becomes 11/5. 1 1/6 becomes 7/6. We flip 7/6 to get 6/7. Then, we multiply 11/5 by 6/7. 11 * 6 is 66. 5 * 7 is 35. 66/35 simplifies to 1 31/35. Oh no! You can definitely make one batch. But then you only have 31/35 of what you need for a second batch. This was definitely a two batch kind of day, so it looks like you'll be asking a neighbor for 4/35 of a cup of sugar. Let's hope you have the 4/35 cups measuring cup handy.

Lesson Summary

In summary, there are three steps involved with **dividing fractions**. First, flip the second fraction to get its reciprocal. Next, multiply the fractions. Finally, simplify as needed. When you want to **divide mixed numbers**, you start by converting them to improper fractions, then follow the steps to divide fractions.

Learning Outcomes

After you have finished with this lesson, you'll be able to:

- List the steps for dividing fractions
- Explain the additional step required when dividing mixed numbers