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# Multiplying and Dividing Fractions and Mixed Numbers Using Multiple Models

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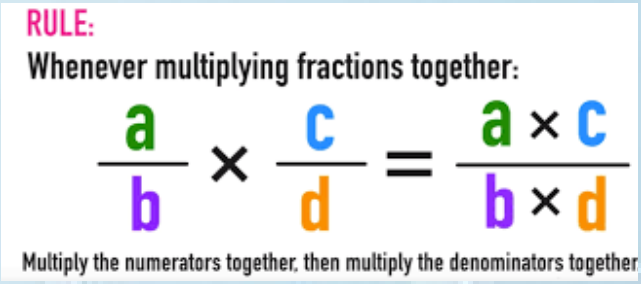
# Multiplying and Dividing Fractions and Mixed Numbers Using Multiple Models

***Why Learn Fraction Multiplication?***

*Fluency with fraction operations provides a foundation for more complex math like algebra. Fractions also enable solving practical problems - calculating ingredient amounts in recipes, finding areas and probabilities, and more. Building a conceptual grasp early on facilitates future learning.*



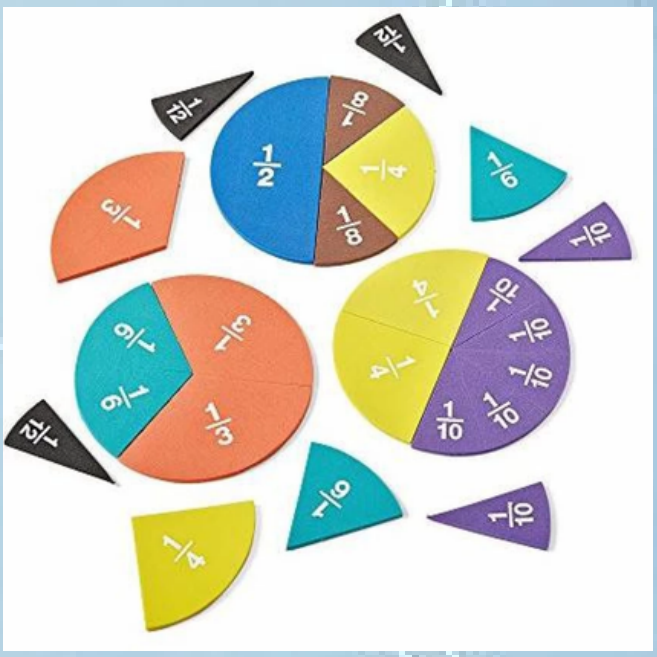

**Abstract**

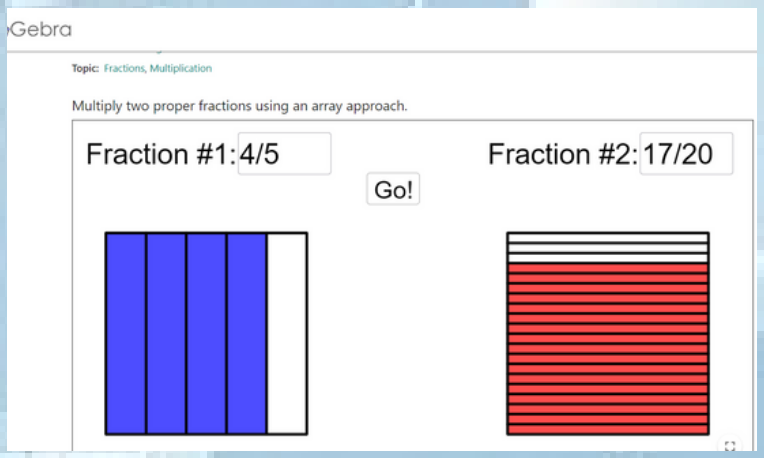
This lesson is based on the study of Multiplying and Dividing Fractions using multiple representations, and the subsequent application of these concepts to real-life situations. In this lesson, we demonstrate/model multiplication and division of fractions (proper or improper) and mixed numbers using multiple models. We solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division with and without models. The sum, difference, product, and quotient of fraction and mixed number problems are determined. We also determine the sum and difference of fraction, mixed number, and fraction, division, and product of mixed numbers.

This lesson focuses on the use of models to solve practical problems that involve addition and subtraction with fractions, with and with regrouping, that include like and unlike denominators of 12 or less. Technology is used to create, adapt, and personalize learning experiences that foster independent learning and accommodate learner differences and needs, which promote critical and/or creative thinking. The student uses assessment in a sophisticated manner to monitor the progress of individual students and provide high-quality continuous and specific formative and summative feedback aligned with the instructional outcomes in both content and process.

## Introduction

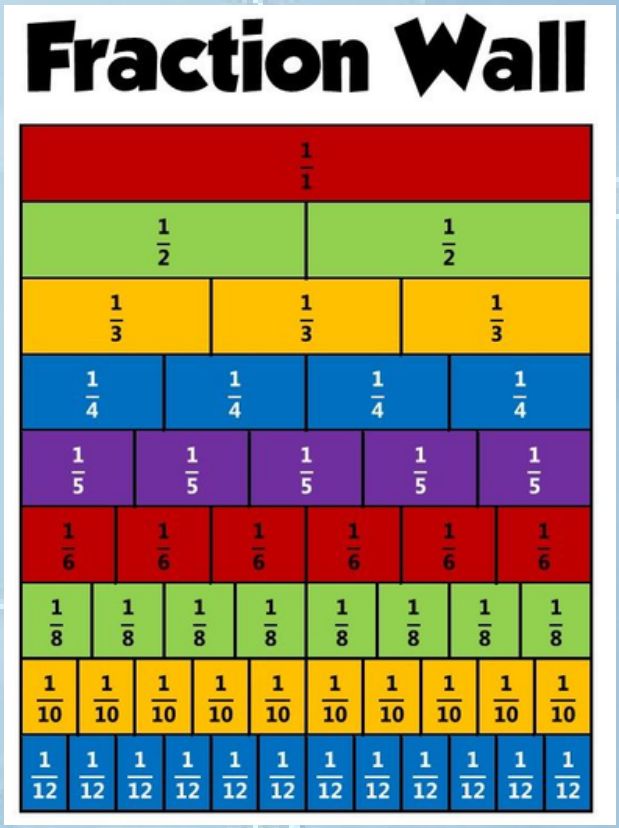
The lesson today is all about Multiplying and Dividing Fractions, which can be understood better through modeling. My school district came up with this lesson plan to make learning more interesting and get students excited about it. We'll be focusing on Multiplying and Dividing Fractions using models and then applying these concepts to real-life situations. Our main goals for this lesson are to help students grasp the concepts of multiplying and dividing fractions and to give them a visual understanding of these operations. Understanding fractions is crucial as it will greatly impact their ability to learn algebra in high school or college. By showing them how fractions are used in real-life situations, we hope to increase their focus and engagement in the classroom. Working with fractions also introduces them to important concepts in number theory, such as the lowest common denominator, greatest common factor, and prime factorization, which will be helpful in simplifying fractions.






To make the lesson more interactive, I used a website (Multiplying Fractions – GeoGebra) that demonstrates how to multiply fractions and highlights the difference between rows and columns. This approach worked particularly well for our visual learners. The unit was taught over a period of three weeks, with two full weeks dedicated to this specific topic. In a 90-minute block each day, I provided detailed instruction, and on the remaining days, I created various activities and gave students ample time to practice and master this skill. It's worth noting that in Virginia, students are not allowed to use calculators for this particular skill.

I connected my lesson plan on multiplying fractions to an annotated bibliography source in a journal reflection. The article I read emphasized the importance of quality teacher training and professional development in STEM education. This made me realize that I needed to improve my own math instruction skills and understanding of fractions. To do this, I watched online PD videos and read math education blogs to learn the key concepts I needed to teach. The article confirmed that researching best practices would help me design better activities and explanations. The study also highlighted the significance of providing appropriate materials and resources for hands-on STEM activities. In my fraction lesson, I made sure to include various models and manipulatives for students to use and interact with. From pattern blocks to digital tools, I incorporated hands-on options that aligned with the article's recommendations for active STEM learning. Reflecting on my experience, I was able to make these connections to the literature.

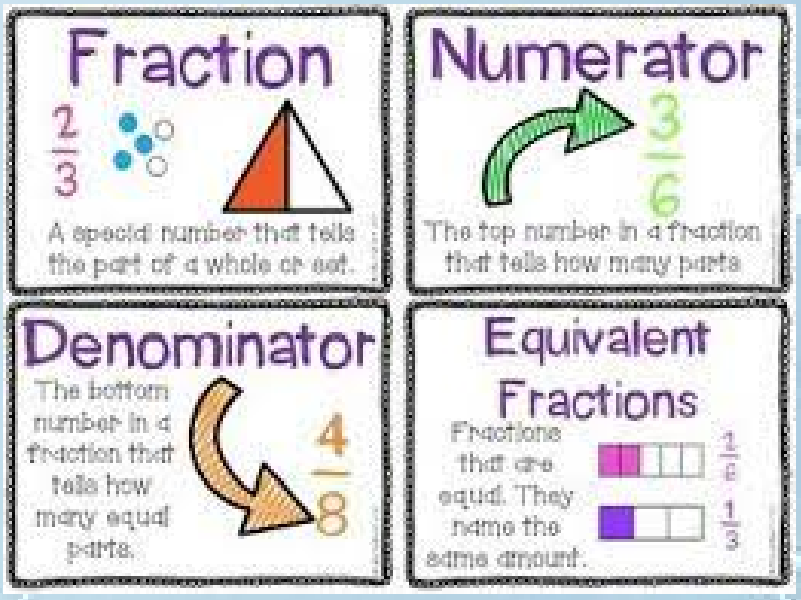



## Engage

During the lesson introduction, students remained attentive while we discussed multiplication representations and vocabulary. Their hands went up to offer examples and answers to my questions. Watching the instructional videos also held their focus, especially with the visual models and real-world scenarios portrayed. When it came time to create their own fraction models, students actively cut out paper strips, colored grids, and explained their work to partners. The hands-on activities kept them involved and interested in the content. I noticed lively discussions, smiles, and peer teaching taking place. Student engagement dropped slightly during the independent practice as their attention spans waned. In the future, I will aim to include a closing hands-on activity or game to reinvigorate their participation before the exit ticket.

# EXPLORE

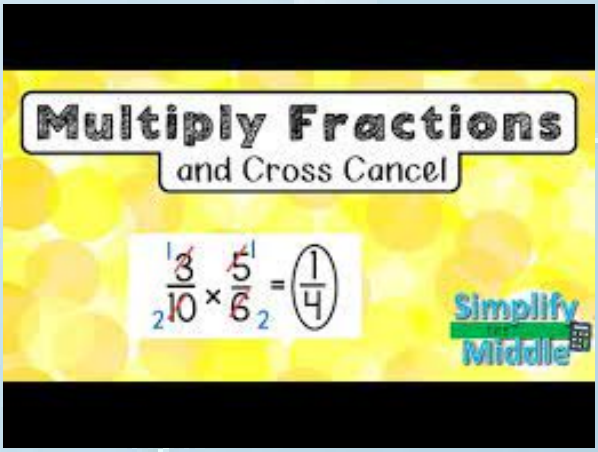
To set the foundation for learning to multiply fractions, I started with a discussion focused on the various symbols used to represent multiplication. Going beyond just the (x) symbol, I pointed out other notations like the dot "." and parentheses around a number such as 3(3) to denote three times three. Reviewing the different ways multiplication can be written helped activate students' prior knowledge before introducing new concepts.



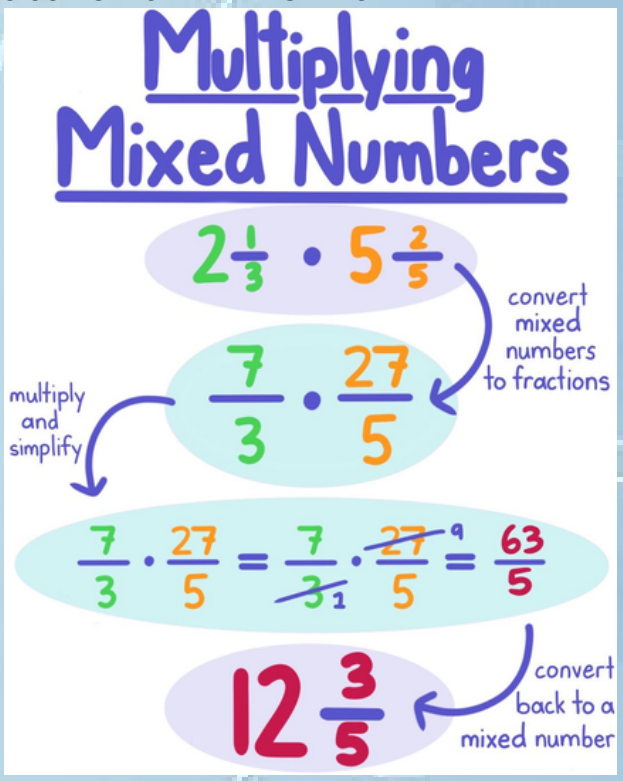

As a Teacher, I made sure to preview key vocabulary such as "product," "numerator," and "denominator" since these terms are essential to understand when multiplying fractions. After our discussion, I showed two short YouTube videos - one on multiplying basic fractions and one focused specifically on multiplying fractions and whole numbers. The visual models and step-by-step narration brought the concepts to life. Allowing students to see and hear the processes in multiple ways really cemented understanding. To process the videos, students completed guided notes, filling in key ideas and examples. Having them actively take notes kept students engaged versus passively watching. They were able to document the essential learning in their own words and access it for future review.

## Explain

To begin teaching the concept of multiplying fractions, I started by going through sample problems with the class on the board. I presented examples such as 1/4 x 1/2, 2/3 x 1/8, and 3/4 x 2/3 for students to follow along. As we worked through the problems step-by-step, I was able to model how to simplify fractions before multiplying them.For instance, with 2/3 x 1/8, I demonstrated how to divide both the numerator and denominator by the common factor of 2 first.




This resulted in the simplified fraction 1/3 x 1/4 which made the multiplication process easier.I also made sure to provide examples with whole numbers and fractions to illustrate how to convert the whole number into a fraction with a denominator of 1. For example, with the problem 3 x 1/2, I showed students how 3 can be rewritten as 3/1. Once we are done with examples i played the following video (Multiplying Fractions and Mixed Numbers)so that the students could visualize the concept.

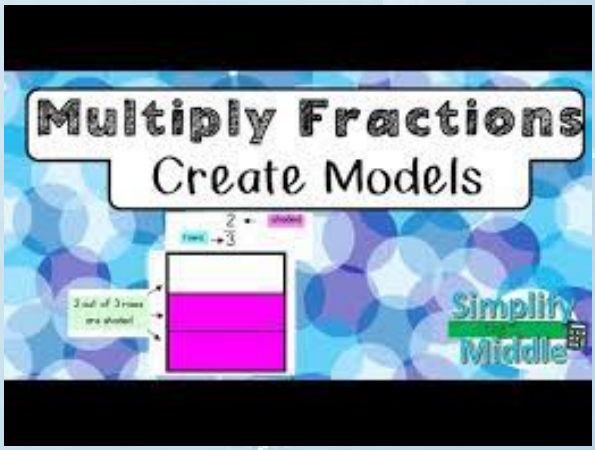



This allowed them to understand that the same process of multiplying numerators and denominators applies regardless of whether one factor is a whole number or fraction. Taking the time to methodically go through a diverse range of examples really allowed me to unpack the step-by-step process and address any misconceptions before having students practice independently.

The hands-on, collaborative nature of working through problems as a class helped lay a solid conceptual foundation before moving into application. I was able to gauge students' understanding and provide just-in-time feedback as we solved examples together. Starting with thorough teacher modeling sets students up for success when they apply their new knowledge during the lesson activities. Reflecting on the sequence and pacing of the introduction is helpful for improving my instructional skills and maximizing student learning.

## Elaborate

During the explanation phase of my lesson, I leveraged technology by having students engage with the Multiplying Fractions - GeoGebra website. This interactive website allowed students to visually manipulate fraction models to see how the area changes when fractions are multiplied. I think this dynamic visual aid really supported students in grasping the underlying concepts. However, I wanted to take the learning even further by having students create their own hands-on models.




After watching a short video tutorial (Multiply Fractions: Create Models ), students worked in pairs to draw area models on paper and color them in with colored pencils. They were able to see first-hand how the rows and columns form a rectangle representing the product. To drive home the meaning of "row" and "column," I used my own hand as a sample model. I pointed out how my fingers represent the columns and my palm the rows when multiplying. Students were able to easily relate this real-world example to the math concepts. Based on their engagement during the activities and models shown on the exit tickets, I believe incorporating multiple modalities deepened understanding for many learners.

**Evaluation or Assessment Strategies**

After modeling several examples together, I gave students about 10 minutes to practice multiplying fractions independently or with a partner. As they worked, I circulated the room to observe their progress, offer support, and assess understanding. Having students apply the concepts allowed me to see if my instruction took hold. Some students dove right in and successfully created models and found products. However, others struggled with the steps or made computational errors.

In the future, I need to build in more informal checks for understanding as we go before releasing students to work independently. Strategies like having them hold up 1-4 fingers to self-assess or doing think-pair-share with a neighbor could help me detect gaps sooner.I ended the lesson by hitting key vocabulary and concepts again. Students seemed to grasp the content during this wrap-up, but I realized there was a disconnect when I looked at the exit ticket results.

Several students who actively participated during the lesson had incorrect responses, revealing they did not truly absorb the material. Moving forward, I will incorporate more continuous short assessments rather than relying solely on an exit ticket. For example, having students summarize key points or complete a quick 3-question quiz at multiple points would provide better ongoing data.

## Concluding Thoughts

My lesson plan had videos and notes to help students understand better. I used the Multiplying Fractions – GeoGebra website to show them visually how to multiply fractions. I also gave them a Fraction bar chart to make the concept clearer. During the lesson, I used visual aids and math aids for students with different abilities, and I used different colors on the Promethean board to get their attention. Plus, I gave fidget toys to students who had trouble focusing, so they could concentrate better. Once they finished their work, I gave them an exit ticket or Quizizz to check if they understood the concept.

To make their learning even better, I assigned homework in Prodigy with fun activities. The pace of the lesson felt a bit rushed, especially when I explained things. Next time, I'll make sure to spend more time on the initial instruction and go through examples at a slower speed. I might even split the lesson into two days to give them more time to practice and reflect. For students who are still confused, I'll provide extra help in small groups. And for those who already mastered the material, I'll create some extra activities for them to work on independently. In the future, I want to include more chances for self-assessment and reflection, so that students can take more ownership of their learning.

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