

Multiplication and Division of Fractions Lesson Plan

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Content Focus of the Lesson: Multiplication and Division of Fractions

Introduction and Rationale

Throughout this lesson I will be building the students skills and knowledge of multiplying and dividing fractions. During the last practicum, two multiplication questions were given to the students to evaluate where their multiplication and division skills of fractions are at. Based on the results, I have chosen to build on their skills and knowledge by using a bulk of problem solving, a few simple problems, and a board game. My two students have two very different learning styles. One does most problems in his head quickly and the other student is less involved and writes his problems out on paper. I chose to create a board game to get both of my students involved, create communication, and to motivate them. So for this lesson plan I am going to start off with asking what they know about multiplying and dividing fractions and to define “taking the inverse”. Then I will ask the questions/ word problems. The students will have to give me their answers and explain how they got their answers in order to move a space on the game board. After the students have made it to the end of the board game, they will get to chose a prize. I have also planned an extension activity called “Fraction Flip It”. This uses a deck of cards to create fractions for the students to multiply and divide. I hope the combination of word problems and the board game will promote communication among the students and myself and motivate them to solve the problems while giving clear explanations. My main goal to this lesson is to make problem solving of multiplication and division of fractions interesting and fun.

Grade Level: 6th Grade

Lesson Objective(s) and Content Standard(s): At the end of the lesson, students are expected to be able to:

- ❖ The students will be able to compute answers and solve problems by applying appropriate procedures.
- ❖ The students will be able to apply and extend previous understanding of multiplication and division to divide fractions by fractions.
- ❖ The students will be able to divide fractions by using the inverse of operations method.
- ❖ The students will be able to connect multiplication and division of fractions and mixed numbers with real world problems.

NCTM Number and Operation Standards (apply to all objectives)

- ❖ work flexibly with fractions, decimals, and percents to solve problems
- ❖ use factors, multiples, prime factorization, and relatively prime numbers to solve problems
- ❖ understand the meaning and effects of arithmetic operations with fractions, decimals, and integers
- ❖ select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators, or computers, and paper and pencil, depending on the situation, and apply the selected method
- ❖ develop and analyze algorithms for computing with fractions, decimals, and integers and develop fluency in their use.

Process Standards:

- ❖ Reasoning and Proof: The reasoning and proof standard is incorporated into this lesson because after the students believe they have the correct answer they will have to prove their reasoning behind why they think they have found the correct answer in order to move a space on the game board. They will have to explain to me and the other student exactly what they did and how they did it while providing proof from the work they did.
- ❖ Communication: The communication process standard is incorporated into this lesson because the students will need to “communicate their mathematical thinking coherently and clearly to peers, teacher, and others” which is a specific aspect of the standard. They will also need to promote discussion among their classmates during the activity in which they will be explaining the strategy they used to solve the problem.
- ❖ Representation: The representation process standard is incorporated into this lesson because the students can draw pictures to show the different types of fractions and how they solved the problem.

Materials: pencil and paper, game board, mini race cars (movers), fraction flip game sheet, deck of cards

Lesson outline:

1. **Introduction:** I will introduce the topic that the students will be working with which is multiplication and division of fractions, and that we will be playing a board game. Before we start the game I will show the students a Charlie Brown comic (attached) about fractions (attached at the end of the lesson). I will ask them to explain the joke to me. Then I will ask the students what they already know about multiplying and dividing fractions in order to get them engaged right away in the topic
2. **Body of the lesson:** I will go through task problems 1-20. The students will use pencil and paper to show their work. When they have both completed the problem, I will ask the students to share their strategy for solving the problem. Students will take turns

going to first to explain their answers. While the students are explaining how they solve the problems I will ask probing questions to create more discussion and explanation. If the student gets the problem correct and can give their reasoning they get to move once space on the game board. Once one of the students makes it to the finish line the game will be over and each student will get to pick a prize that I will provide.

Multiplication of Fractions Problems

Task 1: A sloth spends about $\frac{4}{5}$ of its life asleep. If a sloth lives to be 28 years old, how many years did it spend asleep? Answer: $22\frac{2}{5}$

Probing questions: Why did you use multiplication?

Task 2: Mason ate $\frac{5}{8}$ of a pizza. If there were 16 slices of pizza, how many slices did Mason eat? Answer: 10 slices

Probing questions: Why did you use multiplication? Can you solve using a picture?

Task 3: Half of Mr. Carson's class plays a sport. Of these, $\frac{2}{3}$ are male. What fraction of the class are male and play soccer? Answer: $\frac{1}{3}$

Probing questions: Why did you use multiplication?

Task 4: There are 150 students in the band and 90 students in the chorus. One half of the band members and $\frac{4}{5}$ of the chorus members participate in a charity concert. How many more chorus members participated in the concert? Answer: 3

Probing questions: Why did you use multiplication?

Task 5: Michigan's area is 96,810 square miles. Water makes up about $\frac{2}{5}$ of the area of the state. About how many square miles of water does Michigan have? Answer: 40,000 square miles

Probing questions: Why did you use multiplication?

Task 6: In a recent year, the weather was partly cloudy $\frac{2}{5}$ of the days. Assuming there are 365 days in a year, how many days were partly cloudy? Answer: 146 days

Probing questions: Why did you use multiplication?

Division of Fractions Problems

Task 7: Jong and his friend Ethan ordered 3 one-foot submarine sandwiches. They estimate that $\frac{1}{2}$ of a sandwich will serve one person. How many $\frac{1}{2}$ sandwich servings are there? Answer: 6

Probing questions: Why did you use division? How did you solve it?

Task 8: A neighborhood garden that is $\frac{2}{3}$ of an acre is to be divided into 4 equal sized areas. What is the size of each area? Answer: $\frac{2}{12}$ or $\frac{1}{6}$

Probing questions: Why did you use division? Can you simplify your answer?

Task 9: Mason had $\frac{3}{4}$ of a pumpkin pie left. He divided this into 6 equal size slices. What fraction of the original pie was each slice? Answer: $\frac{3}{24}$ or $\frac{1}{8}$

Probing questions: Why did you use division? Can you simplify your answer? What is the inverse?

Task 10: Jong has a piece of wood that is $\frac{8}{9}$ yard long. He wants to cut this into 3 equal size pieces to use as small shelves in his bedroom. What will be the length of each of these shelves? Answer: $\frac{8}{27}$ yd

Probing questions: Why did you use division? What is the inverse?

Task 11: Mason uses $\frac{3}{4}$ cup of oats to make cookies. This is $\frac{1}{3}$ the amount called for in the recipe. How many cups of oats are called for in the recipe? Answer: $2\frac{1}{4}$ cup

Probing questions: Why did you use division? Is there another way you could solve this?

Task 12: The average adult horse needs $\frac{2}{5}$ bale of hay each day. A horse farm has 44 bales of hay. How many horses can be fed with 44 bales of hay in one day? Answer: 110 horses

Probing questions: Why did you use division? How did you choose to solve this?

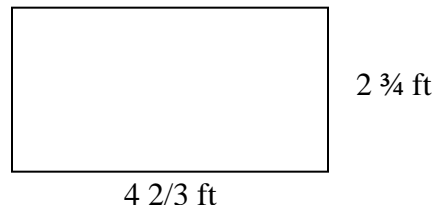
Multiplying Mixed Numbers

Task 13: A waffle recipe calls for $2\frac{1}{4}$ cups of flour. If Jong wants to make $1\frac{1}{2}$ times the Recipe, how much flour does he need? Answer: $3\frac{3}{8}$

Probing questions: How did you solve this? Why did you choose multiplication?

Task 14: Find the area of the box. Answer: $12\frac{5}{6}$ ft squared

Probing questions: What is the area of the box? How do you find area?



Task 15: A three-toed sloth can travel at a speed of $\frac{3}{20}$ mile per hour. At this rate, how far can a three-toed sloth travel in $2\frac{1}{2}$ hours? Answer: $\frac{3}{8}$ miles

Probing questions: What method did you use to solve? Why?

Dividing Mixed Numbers

Task 16: Mason is cutting a roll of biscuit dough into slices that are $\frac{3}{8}$ inch thick. If the roll is $10\frac{1}{2}$ inches long, how many slices can he cut? Answer: 28 slices

Probing questions: What is the inverse? Why did you divide?

Multiplication and Division of Fractions Problems

Task 17: $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$

Probing questions: How did you get that answer?

Task 18: $\frac{2}{3} \times 2\frac{1}{2} = \frac{10}{5}$ or 2

Probing questions: What did you do to the mixed number?

Task 19: $2 \div \frac{1}{5} = 10$

Probing questions: What is the inverse?

Task 20: $3\frac{1}{5} \div \frac{2}{7} = \frac{112}{10}$ or $\frac{56}{5}$ or $11\frac{1}{5}$

Probing questions: What did you do to solve? How did you change $3\frac{1}{5}$ into a improper fraction?

3. **Closure:** To bring closure to the lesson/task I will ask the students about how they did with the fraction problems. I will also ask the students if there was anything new that they learned or anything they will take away from the lesson.

Extension(s): If there is extra time after I have completed task problems 1-20, I will move on to the extension activity “Fraction Flip It”. To play this game I will need a deck of cards with all the face cards removed and each student will have a fraction flip game sheet (attached at the end of the lesson). To begin each student will draw one card at a time until the four spaces on the game sheet are filled. Once they are filled they represent two fractions which the students will multiply together. After a few multiplication problems, I will switch it to division problems. During this game, students will also be discussing with one another the strategies they used to solve the problems creating communication and reasoning and proof.

Anticipated Difficulties: I have two very different students. I noticed during the last practicum that one student isn’t motivated enough when solving the problems and the other seemed bored because the problems were too easy. To avoid this difficulty I created my own game board based on racing and incorporated the fractions into it through the questions. This I hope will give both my students incentive to want to solve the problems and stay engaged in the lesson since they are on two different levels. Another difficulty I see possibly happening is remembering to use the inverse when dividing fractions. If this happens with both students I will “go back to the basics” and define what the inverse is and when we use it creating simpler problems to solve. If only one student has trouble with inverse, I will have my co-teacher worker take the other student and continue with the problems while I work with the struggling student.

Differentiation: Throughout this lesson I need to plan for students who may struggle more than others. If a student is having a difficult time completing some of the problems I will either back track to asking or reminding them what we know about solving multiplication and division of fraction. Then I may have that student do the extension. I chose to go this route because it takes away all of the extra information a word problem gives and focuses on the basics and fundamentals. Then once the student gets the hang of it I will reintroduce the word problems. For student who is not struggling I could have the student create his own

word problems and the solve them. Even though the two students may be working on two completely different problems it will still help to promote discussion and communication between the two as they will have to explain how they solved their problem to their peers and teachers.

Assessment: For the assessment I will use these questions to better understand if the students understand the objectives and have learned something after completing this activity.

- ❖ Why do you need to multiply/divide?
- ❖ How else could you solve this problem besides on paper?
- ❖ What strategy did you use to solve this problem?
- ❖ Why don't you need a common denominator when multiplying and dividing fraction?
- ❖ How would you put the answer into a mixed fraction and then into improper form?
- ❖ How did you find the inverse?
- ❖ What is the inverse?
- ❖ How could you use a picture to solve this problem?
- ❖ How else could you solve this problem?
- ❖ How do you turn a mixed fraction into an improper fraction?
- ❖ How do you put a fraction in simplest form?

Source: Some of my task questions are from a 6th grade math book called, Math Connnects: Concepts, Skills, and Problem Solving, Course 1 by Glencoe McGraw-Hill and the other questions are my own. The extension, "Fraction Flip It" is something I saw done during one of my practicum experiences and then I found the game sheet online at Learn with Math Games.com, <http://www.learn-with-math-games.com/>.



Student Task Sheet

Task 1: A sloth spends about $\frac{4}{5}$ of its life asleep. If a sloth lives to be 28 years old, how many years did it spend asleep?

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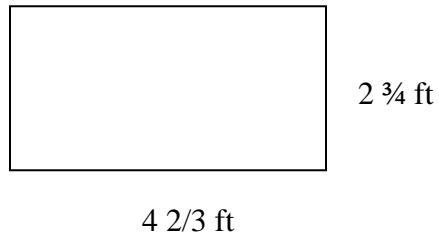
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Task 18: $\frac{2}{3} \times 2 \frac{1}{2} =$

Task 19: $2 \div \frac{1}{5} =$

Task 20: $3 \frac{1}{5} \div \frac{2}{7} =$