|  |
| --- |
| **TEAM Lesson Plan Template** |
| Teacher: |
| Subject/Grade: 5th grade Math |
| Lesson Title: “Dividing a Unit Fraction by a Whole Number” |
| **STANDARDS:** |
| Needed explanation: We have discovered that students better understand why they don’t count the whole model to determine the answer if we teach this using word problems **first**. It is easier for them to understand that they are receiving one piece of the brownie, or each cat is receiving one portion of the cat food when put in the context of a word problem.  Standard: 5.NF.B.7c: Solve real-world problems that divide a unit fraction by a whole number.  5.NF.B.7a: Divide a unit fraction by a whole number using visual models.  This lesson emphasizes:   * Dividing a unit fraction by a whole number using visual models to understand. * understanding that the quotient of a unit fraction and a whole number will be smaller than the unit fraction. |
| **OBJECTIVES:** |
| I can statements:   * I can divide a unit fraction by a whole number in a real-world problem. (level 3) * I can provide a visual model to show the quotient of a unit fraction and a whole number. (level 3) |
| **MATERIALS AND RESOURCES:** |
| Materials:   * Each student is given a blank piece of paper. * Each student will need colored pencils, crayons, markers, or highlighters. * Each student will need a pair of scissors (or be able to fold and tear paper) * Each student will need one small square or rectangle of colored paper   What if technology is not working?   * Ideally, this is shown under document cameras and observations are recorded on a whiteboard; however, circulating around the room and writing observations on butcher paper works as well.   Routine for distributing materials:   * Distribute these supplies based on your class expectations and outline expectations of use. I prefer to pass out all materials at the beginning of the lesson to streamline the lesson time; however, some students cannot handle this and materials can be passed out as they appear in the lesson. |
| **ACCOMMODATIONS/ADAPTATIONS:** |
| Accommodations:   * Preferential seating   + Close to teacher for behavior or attention needs   + Close to a peer for students with math difficulties   + Ask specific students or entire class to pick a specific color or ask everyone to use the same color, as needed, to help with attention needs.   + This lesson could be modified to be more hands on if you wanted by giving the students precut squares of paper for any of the problems and following the same routine as seen in the hook.   + Another way of making it more hands on is by using play dough, or even real brownies, instead of paper.   Enrichment option:   * Students will be given visual models and asked to determine the division problem using the models to justify their answer. (These should be created before hand). * Example below shows a model the student may receive.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  |   OR | |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | | Sample response: I know that this model represents 1/2 ÷ 4 because I see the whole has been divided into two equal parts, or 1/2. The ½ was then divided into 4 equal pieces. The quotient is one piece of this, or 1/8 because the whole has now been divided into 8 equal pieces. \*\*Remember that unlike multiplication, division is **not** commutative; therefore, students should not give 4 ÷ 1/2 as a response. | |  * Student will be asked to create their own models to represent problems and switch with other students in need of enrichment to solve each other’s work. * Students will be able to explain why the saying “Keep. Change. Flip” works. * Students will write word problems and switch with partners to solve each other’s work. |
| **MOTIVATING STUDENTS/ANTICIPATORY SET:** |
| Put the following question on the board:   * Marlow has 1/8 of a bag of chips. If he and his friend, Tod, share the chips equally, what fraction of the bag will each boy get? * Students will write their answer on a post stick note and place at the front of the room. Make sure to explain that they will have the opportunity to revise their answer later on, so have them write neatly and put their name or student # on it for easy identification. |
| **INSTRUCTIONAL PROCEDUCRES:** |
| **Lesson Layout**  Introduction:   * Instruct students to get out their scissors as you pass out a piece of the brightly colored paper to each student. Say, “Class, today I have brought brownies for you, so you each are getting a whole brownie, but you dropped half of it on the floor.” Instruct them to cut their paper in half and put that half at the top of their desk to ignore for the remainder of the intro. “Alright, alright… so I gave each of you half of a brownie, but your best buddy wants to share it with you. Being pretty awesome, you decide to give them half of your half.” Have the students cut their piece of paper in half to demonstrate. Take a moment to discuss what they are noticing about the piece that they are getting. Reiterate the phrase “Half of a half,” some students will make the connection to multiplication, while others may need this repeated throughout the lesson. * After an appropriate amount of time, allow the students to share their answers and justifications. Use assessing and advancing questions to get them to tell you that the quotient I smaller than the original piece. This is a key concept that you will translate into the rest of the lesson. Ask to see if anyone possibly sees a different way to determine the answer. (Multiply the starting fraction by the reciprocal of the whole number commonly referred to as keep-change-flip, or ½ x ½ = ¼) This is a BIG discussion and may take some time. Initially, they may want to rely on the model, so be prepared to really stretch their thinking with questioning. It may take seeing a few more models to understand and be able to explain it to others. Revisit this throughout the lesson because this is a huge part of what they need to learn and understand. * Allow time here for the class discussion to deepen understanding. Use assessing and advancing questions and accountable talk practices; encourage the students to lead. You may want to add good observations to a class created anchor chart.   Middle:   * Now give each student a blank piece of paper. Lead them through folding it to create 4 squares on the front and back for 8 working spaces. * In the first box, teach and explain as you draw a model of ½ ÷ ½ = 1/4. Start by drawing one whole (square or rectangle) to represent the whole, then cut the whole in to two equal parts, or half. Shade one half and remind them that they divided, or shared, the half of the brownie that is shaded. Now they may cut the half into half, this represents sharing the half of the brownie with their best friend. To show how much they ate, and the quotient, they can circle one section (refer back to the enrichment diagram) and determine that this section is one-fourth of the whole, or one-half of one-half. Reiterate that they are only eating one portion of the brownie and so they will only count one piece of the brownie as their answer. Add any other key observations the students made during the discussion earlier. If students are struggling with this, you can quickly refer back to the pieces of paper that the students cut. Walk through the process and refer to the drawings at the same time. Again, help guide students to or reiterate the connection between division and multiplying by the reciprocal through questioning. * \*\*HINT\*\* For some children drawing division models is simple but determining the answer can be difficult. I always refer back to the fact that they are finding out what one portion or piece is and have them circle one piece of the model as seen in the enrichment diagram. * Read aloud, or write the following word problem on the board. “Chad has half of a bag of Doritos and shares it equally with two other people. What fraction of the bag of Doritos does Chad eat?” Repeat the process with from above with 1/2 ÷ 3. Allow appropriate time to draw and shade the models. This may be as guided or as modeled as you think your students can handle. The goal is that by the end of the lesson they are able to draw the whole, partition it correctly to show the fraction they started with, or in this case ½, then correctly partition it again to show the division, in this case, divide it into 3 equal pieces creating sixths. Once they have drawn the model ask, “Where is the answer found?” (by circling one piece of the shaded part), “Why?” (dividing one half in to thirds, creates sixths; we count one piece as the answer), “Turn to your partner and determine the answer.” (1/6 a bag of Doritos) Then bring the class back together to discuss the answer. Follow this with, “How could we determine the answer without drawing a model?” Again, allow time for students to discuss in partners or groups than bring the class back together. Allow time for students to explain how they think they could multiply the fraction by the reciprocal of the whole number. Help them deepen their reasoning and encourage class discussion so that all students understand that the answer is smaller, or less, than the original whole number because it was divided into pieces that were less than one whole each. * Repeat this discussion with the following problems all the while circulating to make sure all students are able to accurately model and explain their models. During this exercise, you can do a combination of word problems and numerical problems. If students are having difficulty with understanding why they only count one piece of the model as the answer, word problems will help remind them and make more sense. Sample word problems are found below each set of numerical problems.   + 1/3 ÷ 4 and 1/4 ÷ 2 (drawing models, then writing the problem)     - Elijah had 1/3 of a bag of Skittles. He split it evenly between himself and three friends. How much of the bag of Skittles did Elijah get?     - Ava had ¼ of a pack of beads and needed one half of it for a necklace. What fraction of the pack of beads did Ava use for her necklace?   + 1/6 ÷ 3 and 1/8 ÷ 2 (encourage students to try it without the model first, then they may draw the model to prove their answer)     - Jose had 1/6 of his birthday cake left over. He shared it evenly with his two brothers. How much of the whole cake did Jose get?     - Myla has 1/8 of her library book left to read. She has two more days before she has to turn it in. If she reads the same fraction of the book each day, what fraction of the book will she have to read to finish the book?   + 1/12 ÷ 4 and 1/10 ÷ 7 (without models – explain that these create very small pieces in the models and are much quicker by just using the algorithm)     - Zander has 1/12 of his science project left to complete and 4 days to complete it. If he works an equal amount each day, what fraction of the project will he have to complete each day?     - Maeve, the pirate, has 1/10 of her treasure left. If she shares it equally with 6 other pirates, what fraction of the total treasure will each pirate receive?   End/Closure:   * Put the original hook question about Marlow back on the board. Instruct students to get their post stick notes and rethink their first answer. They can NOT erase the original answer, but they can write that they’ve changed it and why, or they can add to their original explanation to make it clearer and more math focused. Have them turn in their post stick note. This is now used by the teacher to see each child’s understanding of the concept.   **Motivating Students**   * Verbal praise; make sure to praise the *process* and not the end result. This helps encourage those struggling learners and keeps them engaged in putting forth the effort.   **Presenting Instructional Content**   * Hands-on/Drawing models * Class discussion with teacher assessing and advancing questioning and accountable talk   **Instructional Strategies**  Input:   * Hook   Exploration and Discussion:   * Hands on work/Drawing models * Teacher guides exploration through assessing and advancing questions   Check for Understanding:   * Check for understanding through questioning and observing student models   + Struggling Students: Give more 1 on 1 attention during partner/group work; question individually to see where the misunderstanding lies and help aid in understanding.   + Challenging Students: Extend thinking using higher level of questioning and include more advanced fractions; challenge to complete division without the fraction models or challenge them to use much larger fractions. |
| **QUESTIONING/THINKING/PROBLEM SOLVING:** |
| Questioning - These questions will occur throughout the activity as prompts based on groups’ or individual students’ progress and needs. These are also meant to be springboards to other questions.  Knowledge:   * What happens if you divide a whole number greater than one by a whole number greater than one, for example 10 ÷ 2? (the answer, or quotient, is smaller) * What happens if you divide a whole number one or greater by a fraction less than one? (the answer, or quotient, is larger because the whole is being cut into many pieces) * What is division? a dividend? a divisor? a quotient?   Comprehension:   * As you divide a fraction less than one by a whole number, what are you noticing about the size of the quotient? (The answer is less than the original fraction) * Is the quotient smaller or larger than the unit fraction? (smaller) * Is the quotient smaller or larger than the whole number? (smaller)   Application:   * Why is the quotient less than the original unit fraction? (The unit fraction is being divided by a number larger than one, or into pieces; the result is pieces are smaller, or less, than the original piece)   **Thinking**  Practical:   * What fraction of the bag of chips will Marlow get?   Analytical:   * Application questions – discovering why the quotient is less than the original unit fraction   What am I going to do to give students an opportunity to:   * Generate a variety of ideas?   + Use assessing and advancing questions during the class discussion.   + Allow students to explore the concept of dividing unit fractions by whole numbers through drawing models (or cutting paper/dividing playdough). * Analyze problems from multiple viewpoints?   + Facilitate class discussions and encourage a variety of thoughts/ideas from different levels of students.   **Problem Solving**  Experimenting:   * Allow plenty of time for students to explore the concept through drawing and interpreting the models. * Student discovery of the best way to prove the answer for various problems (Is the model or the algorithm more effective and efficient?).   Predicting outcomes:   * Students will predict outcomes as they experiment with determining what amount of the bag of chips Marlow receives.   Improving solutions:   * Teacher-led discussion using assessing and advancing questions based on student ideas * Exit ticket |
| **ASSESSMENT** |
| * Hook and Exit Ticket |
| **CLOSURE** |
| Students go and get their “hook” post stick note. They must leave their original work, but can change their answer or add to their original explanation to reflect their learning. ALL students will write and explanation to justify their answer. |

**NOTES:**

This work is licensed under the Creative Commons Attribution-ShareAlike 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-sa/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.