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| **TEAM Lesson Plan Template** |
| Teacher: |
| Subject/Grade: 5th grade Math |
| Lesson Title: “Multiplying A Fraction by a Fraction” |
| **STANDARDS:** |
| Standard: 5.NF.B.4a: Interpret the product of a fraction (a/b) and a fraction (c/d).  This lesson emphasizes:   * multiplying a fraction by a fraction using visual models to understand. * understanding that the product of a whole number and a fraction will be smaller than the whole number. |
| **OBJECTIVES:** |
| I can statements:   * I can multiply a fraction by a fraction. (level 3) * I can provide a visual model to show the product of a fraction and a fraction. (level 4) |
| **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) * The teacher will need the provided “Fraction Model Multipliers” * Each student will need one small square or rectangle of brightly 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 two contrasting colors or ask everyone to use the same color, as needed, to help with attention needs. Blue and yellow, red and blue, or red and yellow work well for this.   + This lesson could be modified to be more hands on if you ordered additional sets of the Fraction Tile Multipliers found here: <https://www.eaieducation.com/Product/520676/Fraction_Model_Multipliers.aspx>   Or here is a freebie that can be printed on overhead transparency: <http://www.livelaughlovetolearn.com/2016/02/multiply-fractions-using-area-models.html>  Enrichment option:   * Students will be given visual models and asked to determine the multiplication problem using the models to justify their answer. (These should be created before hand). * Example below shows a model the student may receive.  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  |  | | --- | --- | --- | |  |  |  | |  |  |  | |  |  |  | |  |  |  | | | Sample response: I know that this model represents 3/4 x 1/3 (or 1/3 x 3/4) because I see that the whole has been partitioned into 3 equal parts vertically with 1 shaded (1/2) and the whole has been partitioned into 4 equal parts horizontally with 3 shaded (3/4). The product is 3/12 or 1/4. \*\*You’ll want to encourage your students to always give the answer in as many possible variations as they/you can think of. It will help them continue to build an understanding of fractions. |  * 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. |
| **MOTIVATING STUDENTS/ANTICIPATORY SET:** |
| Put the following question on the board:   * Remy’s mother has a flock of chickens. 1/3 of her chickens are roosters. ½ of her roosters are red. What fraction of all her chickens are red roosters? * 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, I brought a cake to share with the class and have just given each of you a delicious piece of this cake. You are so excited because it is your veerryyyy favorite flavor of cake BUT something terrible happens…. Your brother comes by and asks for some of your cake. He isn’t shy either and takes HALF of your piece!” Have the students cut their piece of paper in half to show what their “brother” took. Take a moment to discuss how the “piece of cake” has changed. Continue, “Don’t worry though… your dog comes by and eats HALF of the piece your brother took!” At this point, have the students cut the half that was the brother’s to demonstrate how much the dog ate. “What fraction of your piece did the dog eat?” Allow the students time to discuss with their partners or groups. * 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 dg ate a part of a part (1/2 of ½ - BIG piece to make them realize this is multiplication) and ate ¼ of the original piece that they had. This is a key concept that you will translate into the rest of the lesson. 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. A misconception may include saying the dog ate 1/3, be prepared to allow classmates to have a conversation about what the answer is and why 1/3 isn’t a possibility. * Explain that you have in fact modeled ½ x ½ or ½ of ½. Again, make sure to focus on “of” by taking the time to point out the word and explaining to students that it is indicating that we multiplied. Optional: have students write “½ x ½ = ¼” and/or “ ½ of ½ = 1/4” on the dog’s square. This square could easily be put in a notebook as notes. * 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 x ½. Start by drawing a square to represent the whole, cut it in half vertically and shade in half with blue. Then cut it in half horizontally and shade in half with yellow. Reiterate that you are taking part of a part (The dog ate HALF of a HALF. He didn’t eat the WHOLE HALF – he ate PART of the HALF, so less than the HALF.) and the other key observations the students made during the discussion earlier. The part the dog ate is where the two colors intersect. This is where we see one half of one half. If students are struggling with this, you can quickly hold up a new piece of paper and show ripping it in half to represent what your brother had, then ripping it in half again to show what the dog ate. The piece he had was smaller than what your brother had. The brother had only part of your whole. * \*\*HINT\*\* For some children drawing multiplication models is a tricky skill. First, I stress to my students to ALWAYS partition ***and*** shade vertically before they move on to partitioning and shading horizontally because if they don’t it is easy to get lost in all the lines. Second, I tell students that they can rotate the paper after each step if it makes it easier for them. * Repeat this process with 1/3 x ½ (1/2 of 1/3). 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 appropriately partition and shade the fractions of the whole. Once they have drawn the model as, “Where is the answer found?” (where the two colors intersect), “Why?” (because that represents ½ of 1/3 or half of the third), “Turn to your partner and determine how much of the whole model is shaded.” (1/6) 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 numerators and then multiply the denominators to get their answer. Help them deepen their reasoning and encourage class discussion so that all students understand that the answer is smaller that the original fractions because a part, or fraction, of a fraction was taken. * 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:   + 1/3 x 1/5 and 2/3 x 2/3 (drawing models, then writing the problem)   + 1/4 x 1/3 and 1/2 x 4/5 (encourage students to try it without the model first, then they may draw the model to prove their answer)   + 1/10 x 3/7 and 2/5 x 6/9 (without models – explain that these are large models and are much quicker by just using the algorithm)   End/Closure:   * Put the original hook question about Remy 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 multiplication without the fraction models or challenge them to determine the 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 take a piece of a piece (a part of a part)? * What operation does “of” describe?   Comprehension:   * As you multiply a fraction by a fraction, what are you noticing about the size of the product? * Is the product smaller than both factors?   Application:   * Why does the product get smaller? * ~~Is the product smaller than both factors?~~ Why or why not? \*\*The answer is yes. The product is smaller than both factors because you are taking a fraction (or piece) of a fraction.   **Thinking**  Practical:   * What fraction of the chickens are red roosters?   Analytical:   * Application questions – discovering why the product is smaller than either 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 multiplying fractions by fractions through drawing models (or 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 fraction of the chickens are red roosters.   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:**

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