**Grade level: 4th and 5th**

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| 1. **Title of the Lesson: Adding Fractions using Fraction Bars** |

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| 1. **Research Theme and Initial Question** |
| **What are you trying to find out by studying this lesson? What important mathematical topic is a problem that you are trying to address by teaching and studying this lesson?**  We want students to find that they have to change the size the parts to equivalent parts to add fractions. They will use fraction strips (tag board or construction paper). Students are learning the algorithm and not understanding the value of equivalent fractions. |

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| 1. **Goals of this lesson (See sample lessons for examples.)** |
| **What student behaviors is the lesson trying to foster?**  Students will use the fraction strips strategically and accurately to solve fraction problems. Students will explain or demonstrate what they did. |
| **What math concepts underlie this topic?**  A fraction is a relationship between a part or whole. Parts must be equal in size or number. |
| **What mathematical misunderstandings do students have that cause them to have difficulty with this topic?**  They have a weak understanding of the meaning of the numerator and denominator. They have weak understanding of scale and value. |
| **What do you want students to come out of this lesson being able to know or do?**  We want students to be able to find equivalent fractions to add fractions with unlike denominators. They will use a model to represent equivalent fractions. |
| **What Mathematical Practice will your lesson show?**  Reason abstractly and quantitatively. |

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| 1. **Relationship of the Lesson to the Unit and Mathematics Content Standards across grade levels.** |
| **Where does this lesson fit in the unit?**  This lesson fits in after students have had some experience with equivalent fractions but before they have learned to find common denominators to add and subtract fractions with unlike denominators**.** This is a lesson to be used to introduce adding fractions with unlike denominators. This lesson takes multiple days.   * Pre-lesson- Students take the pre-test. Label fraction rulers. Compare and discuss equivalent fractions. Then cut fraction rulers. Discuss with students the meaning of ½ . The key question “ ½ of what?” “These are special rulers. You can’t use them for just anything. ……….” * Lesson Part 1- Use fraction rulers to measure and draw models. Complete the drawing portion of the worksheet. (On the worksheet, make sure the rulers extend to the ends of the paper.) * Lesson Part 2- Explicitly discuss equivalent fractions using the tic marks. Rewrite the problem in the right-hand box using fractions with like denominators. At the end of the lesson, take students from noticing the pattern to understanding the algorithm to add fractions with unlike denominators. |
| **What prior knowledge is necessary?**  They have had practice with equivalent fractions using fraction strips. |
| **What new knowledge can be developed from the concepts that students will learn in this unit**?  Students will have a better conceptual understanding of adding fractions with unlike denominators. |
| **What have students done related to this topic in previous years?**  Students have drawn models to represent fractions. They have found equivalent and simplified fractions. Students have also added and subtracted fractions with like denominators. |
| **Which CA standards for this grade level does the lesson address?**  **Standard : NS 2.3 Solve Simple problems, including ones arising in concrete situations, involving the addition and subtraction of fractions and mixed numbers(like and unlike denominators of 20 or less), and express answers in the simplest forms.** |
| **What will students do related to these standards in future years?**  They will work with more complex fractions problems with all operations. |

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| 1. **About the students (Do this after you have decided whose class will be observed.)** |
| **What would be helpful for observers to know about the students in the class in order to better understand your instructional decisions?**  Math ability: 6 students are advanced; most are basic or lower as evidenced from Successmaker and classroom interaction. Students are struggling with processing. Maturity is developing. Students have done the lesson’s pre-test. |

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| 1. **Learning Process: (See the handout “Developing deep content knowledge is a fundamental goal of lesson study.”)**   What kind of instructional strategies are needed to develop the behaviors and students’ understanding of the concepts in the lesson goals? Include materials needed. (***TPS, use of manipulatives, worksheets, etc.)*** |

1. **Before students cut bars, ask students to discuss what they notice about the rulers. Students will label and cut out fraction rulers. Students will find equivalent fractions using rulers. Teacher prompts discussion by asking questions about fraction equivalency. Students have an overall familiarity with fraction rulers.**
2. **Give Pre-Assessment- 1) 1/3 + 1/3= 2) ½ + ¼= 3) 2/5 + ½=**

**Solve and draw a model to show your answer. Show what this would look like.**

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| **Instructional strategies:**  **Materials needed:** | | |
| **Sequence of Instructional Tasks** | **Teacher’s Support**  **and things to remember** | **Points of Evaluation during the lesson**  **Or progress checks**  **(What students should be doing)** |
| **Anticipatory Set**  America and Leo share a piece of rope for a class project. America uses ½ of the rope for her project and Leo uses 1/3 of the rope for his project. How much of the rope do they use together?  How do you say how much this is? Think, Pair, Share. Have a classroom discussion. | If students need the prompting, remind them to use their fraction rulers.  Use the discussion to move into the main activity. Have student volunteers give correct explanation and model to show under a document camera. If no student finds the answer, the teacher can prompt the answer and discussion. | Students should be trying to use their rulers to solve the problem. |
| **Main Activity**  **Lesson Part 1:**  Pass out the worksheet with practice problems.  The teacher will explicitly demonstrate the example problem using the fraction rulers.  Review what we did yesterday. Today we are going to start with a simple problem and add 2/5 and 2/5.  Then complete Example B that is connected to the word problem. (1/2 + 1/3)  Have students complete Check your Understanding and Review solutions with the class.  Review directions/hints on chart paper with  students.  If students need more guidance, ask group questions to help clarify the process.  Have students work with partners to do problems  1-4. Let students explore and try to find the  answers with their partners.  Give students enough time for many students to complete several problems.(Roughly 15 minutes)  Discuss answers and have students share answers. Students need to correct mistakes. This is a great opportunity to discuss different answers that are both correct.  Closure: Explain how you used fraction rulers to add two fractions with unlike denominators.  **Lesson Part 2:**  Teacher will go back to example problem to  rename fractions to show addition of fractions  with unlike denominators. Renaming is to  reinforce equivalent fractions.  We can see now that ½ is equal to 3/6 and 1/3 is  equal to 2/6 . Now they are easy to add because  they have like denominators.  Students will complete Check your  understanding and then review answers  together.  Then students will complete 1-4 on their own  and with partners.  Use student answers and models to discuss  finding common parts to add fractions with  unlike parts. | Teachers can walk around and help by prompting answers.   1. Did you read the directions? 2. How can the fraction rulers help you with the problem? 3. Show me how you would line up the fractions to add them. 4. Do any of the other strips fit that length? | - What should observers look for to tell if students are doing, saying, or thinking about what was intended during each part of the lesson?  - What evidence can observers look for during the lesson to see if students are making sense of the math and are doing original thinking?  Students are discussing ways to add the unlike fractions using the rulers. They are helping each other.  They are trying different rulers to find a solution.  Students are listening to their peers share their reasoning. They are creating valid arguments that prove their solutions. They are also questioning wrong answers |
| **Closure**  We use equivalent fractions to make a difficult addition problem easier by\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | Discuss the question with students. Then have them write their own response on the worksheet. (Optional)  Collect their work to assess their learning. We will be collecting their work to show evidence of the mathematical practice. | Students are using the sentence frames to write their reasoning. |

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| 1. **Evaluation** |
| **How will we determine if the lesson met each of its goals and supported our research theme? In other words how will we determine if students understood the concepts taught in this lesson and exhibited the intended behaviors in this lesson?** |
| **What evidence of learning do we want to collect during the lesson to answer our research question? What will we be able to tell about the student from the evidence collected?** |
| **What evidence of the mathematical practice will be collected?** |

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| **Answer the following questions after the first observation.** |
| 1. What we changed and why:   (First Revision)  We realized that students were mostly able to find the sum using the fraction rulers but were not making the connection to equivalent fractions.  So we added the component of tick-marking the answer ruler to identify the equivalence. We also added a space where students had to write the equivalent fractions with like denominators. We also noticed students were spending a lot of time drawing the rulers so we added to help them focus on the concept. We also changed the reflection question to be less open ended and more focused on equivalent fractions.  (Second Revision)  We realized the lesson was too much to do in one day so we broke it up into two days. We also changed the first example to be like denominators and a check for understanding. Students will also do less independent problems. We also changed the anticipatory set to emphasize length to reinforce that they were measuring. We also added a step of adding brackets on the second day to more explicitly illustrate the renaming of like denominators. |
| 2)What we learned about how students learn this concept:  (First Revision)  We learned that students will be able to come up with the sum but do not understand why. They need more explicit instruction and modeling. The fraction rulers did help student have a better understanding of relative fraction sizes.  (Second Revision)  We learned that there are many layers to learning this concept. The concept requires a series of lessons, not just one or two. |

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Add Fractions**

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| **Directions: Solve and draw a model to show your answer. Show what this would like.** |
| **1) +=** |
| **2)+=** |
| **3) +=** |