

Mathematics Assessment Task

I. Analyzing Student Work

A. *Analysis of Whole Class:*

a. Grade Level: 5th

Standard: 5.NF.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. ~~Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result $2/5 + 1/2 = 3/7$, by observing that $3/7 < 1/2$.~~

Objective: Students will be able to solve a word problem with unlike denominators, referring to the same whole by using visual fraction models and equations to explain their reasoning.

b. Evaluation Criteria:

	3	2	1
MATHEMATICAL CONCEPTS	Student has a clear understanding that a fraction is part of a whole and is able to successfully add fractions with unlike denominators.	Student has trouble understanding one out of the two mathematical concepts: adding fractions with unlike denominators or understanding that a fraction is part of a whole.	Student has very limited understanding of both underlying concepts needed to solve the problem.
VISUAL MODELS	Visual models are clear and greatly add to the students' understanding of the procedure.	Visual models are somewhat difficult understand.	Visual models are difficult to understand or are not included.
EXPLANATION	Detailed explanation included by the student shows clear understanding of the procedure.	Explanation included by the student somewhat shows that the student understands the procedure.	Explication shows that the student does not yet understand the procedure or is not included.
CORRECT ANSWER	Student correctly identifies/ concludes the answer to the given word problem.	Student does not state a clear conclusion/solution to the given word problem.	Student incorrectly identifies/concludes the answer to the given word problem.

c. Analysis:

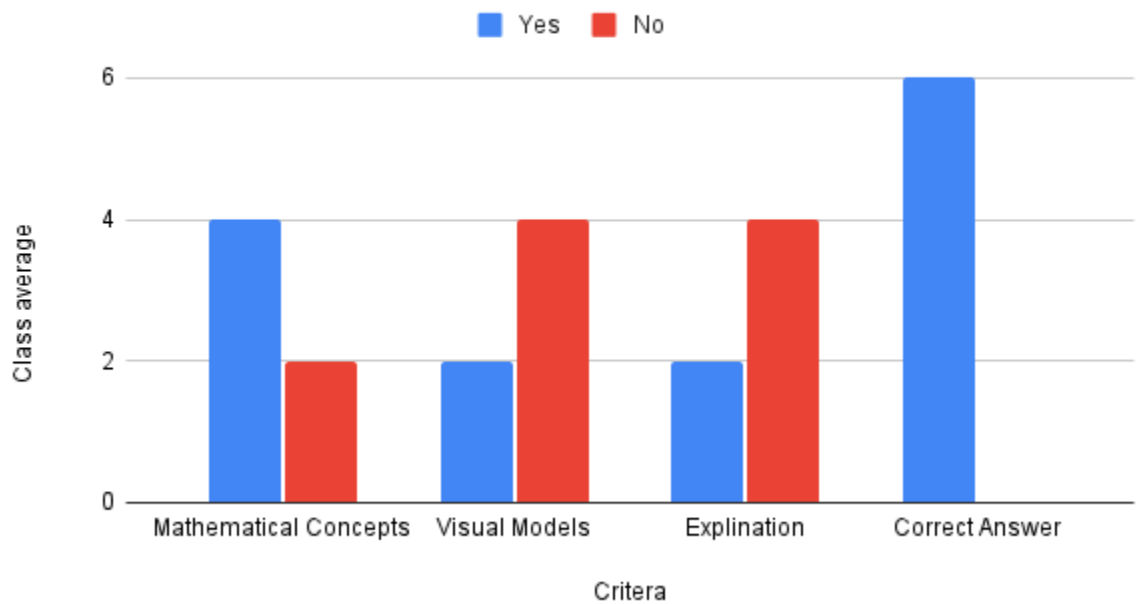
	Mathematical Concepts	Visual Models	Explanation	Correct Answer
Carla	1	1	1	2
Frank	1	1	1	2
Abby	2	3	2	2
Emma	2	1	2	2
Devon	2	1	2	2
Brad	3	3	3	3
	Mathematical Concepts	Visual Models	Explanation	Correct Answer
Yes	4	2	2	6
No	2	4	4	0

- ❖ Abby: Based on Abby's response, I can see that she has a basic understanding that the denominators determine the partitions of the whole. Abby also knows how to correctly simplify a fraction as she takes $\frac{2}{4}$ and makes a visual model that equals to $\frac{1}{2}$. Overall, she is able to successfully recognize an incorrect result by observing that if $\frac{1}{3}$ is less than $\frac{1}{2}$ it would not be able to make a whole. Her scores are as follows: 2 for mathematical concepts because she did not show she could add them, explanation, and correct answers. 3 for visual models.
- ❖ Brad: Based on Brad's response, he has a strong understanding of equivalent fractions. He is able to successfully add the two fractions with unlike denominators by finding the common denominator for the whole. His scores are as follows: 3's for mathematical concepts, visual models, explanation, and correct answer because he was able to add them, include a visual model of his work and an explanation.
- ❖ Emma: Based on Emma's response, I can tell she has a good part/whole understanding and knowledge about equivalent fractions. She is able to successfully simplify $\frac{2}{4}$ into $\frac{1}{2}$ and states that if she were to add $\frac{1}{2} + \frac{1}{3}$ it would not be equal to one because $\frac{1}{3}$ is less than $\frac{1}{2}$. Overall, she would also score a 2 on mathematical concepts because she was not able to demonstrate that she can add the two fractions. Visual models is a 1 because she did not include a sketch and a two for explanation as well as correct answer since she came to a conclusion.
- ❖ Carla: Based on Carla's response, she has a difficult time understanding that you can not add fractions with unlike denominators until you have found the common denominator. She has difficulty understanding that a fraction is part of a whole number. In this case, she knows the meaning of a fraction. She knows that the denominator determines the partitions of the whole and the numerator the shaded portions. This would mean Emma would score a 1 for mathematical concepts and a 1 for visual models, because she did provide one but it is incorrect or difficult to understand.

- ❖ Devon: Devon provides a visual model where he sketches the whole as 24 circles. He then partitions Kates oranges into three sections and Pauls oranges into 2 sections to represent $\frac{1}{2}$ of 24. This shows me that he understands equivalent fractions because he simplified $\frac{2}{4}$ into $\frac{1}{2}$. Devon has a difficult time understanding the meaning of fractions because although he split the oranges into partitions, they are not of equal amounts for Kate meaning he also has difficulty understanding part/whole. I would give Devon a 2 for both mathematical concepts, explanation and correct answer. His visual model is difficult to understand due to the small writing and it does not show that he has a good grasp of both mathematical concepts earning him a 1.
- ❖ Frank: Frank provides an explanation where he successfully points out the whole is equal to 24. In his explanation he states that $3+8=11$ but he needs 24 meaning he has difficulty understanding part whole, meaning of fractions and partitioning. He points out that $\frac{1}{3}$ is equal to 3 oranges, $\frac{1}{4}$ is equal to 4 oranges and $\frac{2}{4}$ is equal to 8 oranges. Instead of determining the part/whole of the fraction, he is multiplying the numerator and the denominator to come to his conclusion. This would prompt me to give Frank a 1 for both mathematical concepts, explanation, and visual models and a 2 for correct answer because he did come to a conclusion.

d. Analysis Results:

Class Average on Orange Carton Problem



Based on the results, I have found that three groups have formed after analyzing their work. Group 1 is made up of two students: Carla and Frank. Carla and Frank scored a majority of 1's under every category in the rubric. These two students do not have a strong conceptual understanding that a fraction is part of a whole, which is shown in their work as they did not know how the denominators were used to add the two fractions with unlike denominators.

The next group of students is made up of Abby, Emma, and Devon. These students have a good conceptual understanding of fractions being a part of a whole, but they lack procedural fluency. The students were able to provide explanations that the carton would indeed not be full, but they failed to do the addition of the two fractions with unlike denominators. The students need more help understanding the next steps into adding the fractions. These students may have used mathematical reasoning to come to their conclusion, by finding that the $\frac{1}{2}$ and $\frac{1}{3}$ do not make a whole, but it is important to add them together to find out how full it is or how much more they will need to fill the carton.

Finally, the third group is made up of one student: Brad. Brad scored 3's across the whole rubric. Brad has a good conceptual understanding of fractions and adding two fractions with unlike denominators. In addition, he has good procedural fluency because first he changed the denominators by finding the lowest common multiple, and then continued to add. He could work to show his mathematical reasoning skills by further explaining how he got the denominator.

Overall, as the teacher I can tell that most students did not comprehend the procedure of adding the fractions together. The second group is close to being able to solve the problem by using their procedural fluency, they just need to be retaught on the steps.

B. Analysis of Three Focus Students:

a. Area of Struggle:

The three students I have chosen are Carla, Devon and Frank. Carla, Devon and Frank were chosen for further analysis because they were the three students who needed a refresher and an extra hand to reach a 3 on the rubric. The 1 common area of struggle would be conceptual understanding. They need to be engaged in learning about parts and wholes.

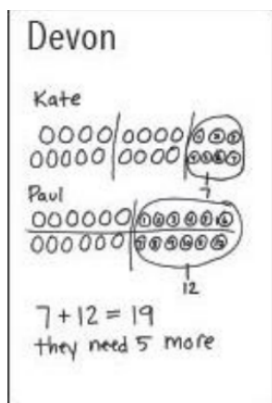
b. Student Work Samples:

Devon

Kate
○○○○○|○○○○○|○○○○○
○○○○○|○○○○○|○○○○○

Paul
○○○○○○○|○○○○○○○|○○○○○○○
○○○○○○○|○○○○○○○|○○○○○○○

7 + 12 = 19
they need 5 more



Frank

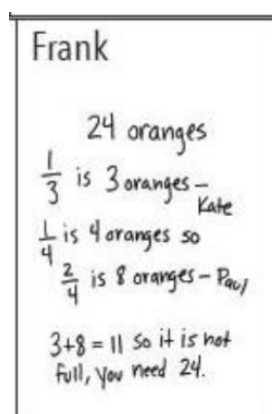
24 oranges

$\frac{1}{3}$ is 3 oranges - Kate

$\frac{1}{4}$ is 4 oranges so

$\frac{2}{4}$ is 8 oranges - Paul

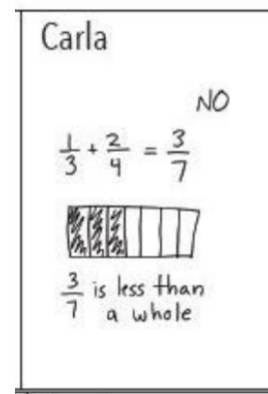
3 + 8 = 11 so it is not full, you need 24.



Carla

NO

$\frac{1}{3} + \frac{2}{4} = \frac{3}{7}$



c. Analysis Results:

A common area of struggle comes from part and whole understanding. These students have not yet developed a conceptual understanding about partitioning fractions to add them with an unlike denominator when referring to the same whole. In addition these students need more time to understand procedural fluency when adding fractions. They are not yet finding a common denominator before adding. Lastly, these students all need to work on the mathematical reasoning or inductive reasoning for this type of word problem. The type of word problem given to the students asks for them to have prior knowledge about how to add and subtract fractions referring to the same whole, which is learned as early as first grade. As the teacher my engagement plan would be to start with the basic understanding of vocabulary. These students will learn about numerators and denominators, and the meaning of a part and a whole. We would then move on to procedural fluency, in this case it would be how to find the greatest common factor or how to find equal fractions/simplify. Lastly, we would focus on inductive reasoning. This part could be taught to the students with manipulatives and we would work in small groups in order to boost participation amongst these students.

II. Re-Engaging Students in Learning Mathematics

A. *Targeted Learning Objective and Goal of Re-Teach:*

- ❖ Targeted Learning Objective: Students will be able to understand that a fraction is part of a whole by categorizing fractions with unlike denominators into groups in order to be able to find the lowest common multiples.
- ❖ Re-Teach Goal: The goal for this small group re-teach is that students form a stronger conceptual understanding of fractions. By focusing on the denominator of a fraction, students will be able to understand that the bottom number in a fraction shows the number of equal parts an item is divided into. In this group, there is an English Language Learner who will need more help understanding what the vocabulary words mean such as: denominator, fraction, and lowest common multiple. To accommodate this learner's needs, I will make an anchor chart with the definition in English and Spanish to spark cognizance between the English and Spanish vocabulary words.

One specific activity we will do is sort out fractions to match other fractions with unlike denominators. For example, students will work as a team to categorize $\frac{2}{4}$ and $\frac{3}{6}$ together with $\frac{1}{2}$ and so on. After working with the students to help them categorize fractions with unlike denominators, we will work together once again on different strategies that can be used to convert fractions with unlike denominators into fractions with common denominators to be able to add them.

One strategy we will discuss is how to find the lowest common multiple. I will re-tech students how to do this by teaching them the listing method. With the listing method, the students will write the denominators on the left and next to the denominators they will list the first few multiples of both denominators. By doing

this they will be able to find the common multiple of both denominators, making it the new denominator.

B. *Re-engagement plan:*

B1). Specific strategies and representations and purposeful question posed:

In order to show that the students know that they have a stronger conceptual understanding than before, they will need to complete four practice problems where they will be given two fractions with unlike denominators in each problem. Students will have to work in partners, using the given strategy to find the least common multiple in both fractions. While students are working, I will be talking to one student at a time to ask purposeful questions such as:

- ❖ Why did you add this number to your list?
- ❖ How do you know that is a multiple of the denominator?
- ❖ How did you find the least common multiple in both of the fractions?
- ❖ Can you explain this to me?
- ❖ Can you find an easier way to do this?

Once I have spoken to all three students and assisted them with their questions and seen that they are using the strategy, I will have one student at a time go up to the board and solve a different problem than the one on their papers. This student will be prompted to walk us through their solving strategy and students who are watching will be prompted to ask at least one question for the student that is solving the problem.

B2). Assessment Plan including rubric:

As the student is solving the problem and walking us through their steps, I will have a checklist with me as a formative assessment. The next step for these students is to teach them to add the fractions now that they understand how to find the LCM.

Student Name	Clearly shows their step by step process to finding the LCM using appropriate vocabulary?	Uses the strategy taught to them to find the LCM or demonstrates one that they found on their own?	Students is able to answer questions, showing that they have a good conceptual understanding that fractions are parts of a whole?
Devon			
Frank			
Carla			