**Task: Treat Bag Task** **4th grade**

Ashley is making treat bags for her birthday party. She is going to put 2/3 cups of peanut M&Ms in each bag. She has invited 9 friends to her party.

1. How many cups of peanut M&Ms does she need for her friends' treat bags? Write an equation and use a visual model to explain your reasoning.

2. Ashley decided to also include ½ of a cup of plain M&Ms in each bag. How many cups of plain M&Ms does she need? Write an equation and use a visual model to explain your reasoning.

3. Each treat bag will hold one cup of treats. Will Ashley be able to fit all of the M&Ms in each treat bag? Justify your answer.

**Teacher Notes:**

Students may use a reasoning strategy to decide if the M&Ms will fit in each treat bag. They are not required to add the two fractions with unlike denominators to show that the sum is greater than one.

| Common Core State Standards for Mathematical Content | Common Core State Standards for Mathematical Practice |
|---|---|
| 4.NF. B.4.c Solve word problems involving multiplication of a fraction by a whole number, e.g. by using visual fraction models and equations to represent the problem.<br>4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g. by creating common denominators or numerators, or by comparing to a benchmark fraction such as ½.Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of the comparisons with symbols >,=, or <, and justify conclusions, e.g., by using a visual fraction model. | 1. Make sense of problems and persevere in solving them.<br>2. Reason abstractly and quantitatively.<br>3. Construct viable arguments and critique the reasoning of others.<br>4. Model with mathematics.<br>5. Use appropriate tools strategically.<br>6. Attend to precision.<br>7. Look for and make use of structure.<br>8. Look for and express regularity in repeated reasoning. |

**Essential Understandings**

- Comparison to known benchmark quantities can help determine the relative size of a fractional piece because the benchmark quantity can be seen as greater than, less than, or the same as the piece.
- A rational number is an operator when it changes or transforms another number or quantity to magnify or shrink it.
- The interpretations of the operations on rational numbers are essentially the same as those on whole numbers, but some interpretations require adaptation, and the algorithms are different.
- A scalar definition of multiplication is useful in representing and solving problems beyond whole number multiplication and division.

<table>
<tr><th colspan="2">Explore Phase</th></tr>
<tr><th>Possible Solution Paths</th><th>Assessing and Advancing Questions</th></tr>
<tr><td>Part 1 and Part 2<ul><li>Students may model the solution with labeled fraction bars, boxes, or circles by partitioning them into thirds and halves. They may color in the correct portion of each picture or accumulate the fractional pieces.</li><li>Students may use the multiplication equation 9 X 2/3 = 18/3 or 6 cups of peanut M&Ms. 9 X ½ = 9/2 or 4 ½ cups of plain M&Ms.</li><li>Students may use the repeated addition equation 2/3 + 2/3 + 2/3 + 2/3 + 2/3 + 2/3 + 2/3 + 2/3 + 2/3 = 18/3 or 6 cups of peanut M&Ms. ½ + ½ + ½ + ½ + ½ + ½ + ½ + ½ + ½ =9/2 or 4 ½ cups of plain M&Ms.</li><li>Students may use a number line to show repeated addition or multiplication of the fractional part by 9.</li></ul></td><td>Assessing Questions<ul><li>Explain how you got the total amount.</li><li>Explain your model.</li><li>Explain how accumulating the fractional parts lead to your answer.</li><li>Explain how you multiplied your whole number by the fraction.</li><li>Explain how your number line works? How many jumps did you show? Why?</li><li>How did you get the mixed umber?</li><li>She has 6 what? She has 6 cups of what?</li></ul>Advancing Questions<ul><li>How can you write your repeated addition equation differently?</li><li>Can you use a different operation to express the equation?</li><li>How can you write the improper fraction differently?</li><li>How can you model your equation?</li><li>How can you change the improper fraction into a whole or mixed number?</li></ul></td></tr>
<tr><td>Part 3<ul><li>Students may justify their answer by drawing a model that shows that 2/3 + ½ > 1.</li><li>Students may state that 2/3 is more than ½. If ½ + ½ = 1, then 2/3 + ½ > 1.</li><li>Students may convert fractions to common denominators and add to find the total is 7/6 or 1 1/6 cups of M&Ms.</li></ul></td><td>Assessing Questions<ul><li>Explain your model.</li><li>How do you know that 2/3 is greater than ½?</li><li>Explain how you know the total will be greater than 1 cup.</li></ul>Advancing Questions<ul><li>How can you write an inequality to explain your answer?</li><li>How can you find equivalent fractions? What property allows you to do this?</li><li>How can you use equivalent fractions to write an equation?</li></ul></td></tr>
<tr><th colspan="2">Possible Student Misconceptions</th></tr>
<tr><td>Part 1 and 2<ul><li>Students may misinterpret the units and labels. They may say 6 peanut M&Ms instead of 6 cups of peanut M&Ms.</li><li>Students may include themselves in the number of bags. Sharing the M&Ms in 10 treat bags instead of 9 bags.</li></ul></td><td>Assessing Questions<ul><li>Show me what 6 M&Ms looks like. Does that seem possible?</li><li>How do you know how many treat bags she needs to make?</li><li>How many friends does Ashley have? So, how many treat bags does she need to make?</li></ul></td></tr>
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| Part 1 and 2 continued | **Advancing Questions**<br>• How can you use a model to show the total amount of treat bags Ashley wants to make?<br>• How can you use a model to show what portion of M&Ms Ashley wants in each bag? |
| Part 3<br>• Students may add the total cups of peanut M&Ms to the total cups of plain M&Ms and compare this to the 1 cup that each bag will hold.<br>• Students may come up with the answer 1 1/6 cups of M&Ms but not state that it is greater then 1 cup or that the M&Ms will not fit in the treat bags. | **Assessing Questions**<br>• What is the question being asked?<br>• Why are you adding 6 + 4 ½? Where did those numbers come from? Is that how much is going into each bag?<br>• What portion of M&Ms will go in each bag?<br>• How can you find the total that she wants to put in each bag?<br>• How did you find the total in each bag?<br>• Did you finish answering the question?<br>**Advancing Questions**<br>• What is the total portion of M&Ms that Ashley wants to put in each bag? |
| **Entry/Extensions** | **Assessing and Advancing Questions** |
| If students can't get started…. | **Assessing Questions**<br>• What is the question being asked?<br>• What do you already know?<br>• How many treat bags does Ashley need to make?<br>• What part of a cup of M&Ms will go in each bag?<br>• How can you find the total?<br>**Advancing Questions**<br>• What is your next step? |
| If students finish early…. | • What portion of the M&Ms does Ashley want to put in each bag? How do you know?<br>• How can you write an inequality to explain your answer in Part 3?<br>• What amount of each type of M&Ms can Ashley use that will fit in the treat bag? |

**Discuss/Analyze**

**Whole Group Questions**

1. **Modeling the combining of fractions.**
- How did you model the combining of each portion of M&Ms in the treat bags?
- Did anyone show it a different way?

2. **Multiplication of a whole number by a fraction.**
- How did you turn the whole number into a fraction?
- How did you multiply the whole number by the fraction?
- How could you model 9/1 ?
- How is this similar to multiplying two whole numbers?

3. **Addition of fractions with like denominators.**
- If you chose to use repeated addition, explain why the denominator stays the same and the numerator increases?
- How can you write the repeated addition equation as a multiplication equation?

4. **Changing the improper fraction into a whole or mixed number.**
- How can you decompose the improper fraction and recombine the unit fractions to make a whole or mixed number?
- Did anyone use a different strategy?

5. **Comparing the combining of two fractions to the benchmark 1.**
- Did you have to add ½ + 2/3 ? Or is there another way to know if they are greater than 1?
- How did you know that the portion of M&Ms was too much to fit into the treat bag?
- Which is bigger 2/3 or 1/2?
- What is ½ + ½?