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Tennessee Department of Education: Instructional Task Guide

Fourth Grade Task: Star Bar

John has $\frac{1}{2}$ of a Star Bar. Sue has $\frac{3}{4}$ of a Star Bar. You have $\frac{4}{6}$ of a Star Bar. Who has the biggest share of a Star Bar? Be prepared to explain how you figured out the share or the part of the candy bar that each person receives and how you know who has received the most candy. Show your solution with a visual model and explain how you know who has the most candy.

Extension: If all of the students want the same amount of candy then how much more will each student need in order to have the same amount of candy as Sue?

Common Core State Standards for Mathematical Content

Extend understanding of fraction equivalence and ordering.

4.NF.1 Explain why a fraction *a/b* is equivalent to a fraction *(n x a)/(n x b)* by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

4.NF.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 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

Common Core State Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Essential Understandings

- A fraction describes the division of a whole (region, set, segment) into equal parts.
- The larger the name of the denominator the smaller the size of the piece.
- When adding fractions the amounts can be changed into fractions with like denominators in order to find a common name.
- Comparison to known benchmark quantities can help students determine the relative size of a fractional piece because the benchmark quantity can clearly be seen as smaller or larger than the piece. One significant benchmark quantity is one-half.
- A fraction can be named in more than one way and the fractions will be equivalent as long as the same portion of the set or area of the figure is represented.
- When the denominator is multiplied or divided then the numerator is automatically divided into the same number of pieces because it is a subcomponent of the denominator.
- A mixed number or an improper fraction consists of a whole number and a fraction or a total number of pieces that exceeds the size of the pieces.

Explore Phase

Possible Solution Paths	Assessing and Advancing Questions
Makes a Claim But Does Not Support with Reasoning Claims that $\frac{3}{4}$ is the biggest piece of the Star Bar but has not said why or proven that the other pieces are smaller.	**Assessing Questions** • Tell me about $\frac{3}{4}$ in comparison to the other's pieces of the Star Bar. How do you know it is the largest piece? **Advancing Questions** • You have shown $\frac{3}{4}$. How can you prove that $\frac{1}{2}$ and $\frac{4}{6}$ are not bigger than the $\frac{3}{4}$?
Decomposes $\frac{4}{6}$ into $\frac{3}{6}$ and $\frac{1}{6}$ The student talks about $\frac{4}{6}$ as $\frac{3}{6}$ and $\frac{1}{6}$ and claims that $\frac{4}{6}$ is one more piece than a half and the sixth is smaller than a fourth in $\frac{3}{4}$.	**Assessing Questions** • Tell me about $\frac{4}{6}$. Why did you write $\frac{3}{6}$ and $\frac{1}{6}$? **Advancing Questions** • $\frac{3}{6}$ + $\frac{1}{6}$ is $\frac{4}{6}$. I also agree that $\frac{1}{6}$ is a smaller piece than $\frac{1}{4}$. Can you explain more? How can you make a stronger argument about why $\frac{3}{4}$ is greater than $\frac{4}{6}$? Use what you said about $\frac{1}{6}$ being smaller than $\frac{1}{4}$ to make your argument.
Uses a Benchmark to Compare $\frac{4}{6}$ and $\frac{3}{4}$ Claims that $\frac{4}{6}$ is two away from one and $\frac{3}{4}$ is only one away from one; therefore, $\frac{3}{4}$ is greater than $\frac{4}{6}$.	**Assessing Questions** • Tell me how $\frac{4}{6}$ compares to $\frac{3}{4}$. **Advancing Questions** • $\frac{4}{6}$ is $\frac{2}{6}$ away from one and $\frac{3}{4}$ is one piece that is a fourth away from one but this isn't a good enough reason to say that $\frac{3}{4}$ is greater than $\frac{4}{6}$. Can you elaborate more on how you know for sure that $\frac{3}{4}$ is greater than $\frac{4}{6}$? Is there another name for $\frac{2}{6}$ that will make it easier for you to compare it to the $\frac{1}{4}$ needed to make $\frac{3}{4}$ into a whole?
Possible Student Misconceptions	**Assessing and Advancing Questions**
Assumes that Sixths are Greater Than Fourths. Incorrectly claims that sixths are larger than fourths because the number six is larger than four.	**Assessing Questions** • Show me on your paper strip how many parts each person's candy bar is divided into. **Advancing Questions** • What if I told you that fourths are bigger than sixths? Now think about your answer. Can you show me each amount and then make a comparison?
Entry/Extensions	**Assessing and Advancing Questions**
If student can't get started…	**Assessing Questions** • What are you trying to figure out? • Who do you think has the most? **Advancing Questions** • Can you show each of the students' amounts of a Star Bar?
If students finish early…	**Assessing Questions** • Tell me how you know for sure that $\frac{3}{4}$ is greater than $\frac{4}{6}$. **Advancing Questions** • Can you make a drawing and write a written explanation that describes how $\frac{3}{4}$ is more than $\frac{4}{6}$ and

	why?

Discuss/Analyze

Whole Group Questions

Using Benchmarks Amounts of 1 and $\frac{1}{2}$ to Comparison $\frac{4}{6}$ to $\frac{3}{4}$

- Who has the largest part of a Star Bar? How do you know?
- Someone claimed that $\frac{3}{4}$ is one piece away from a whole candy bar. Can someone say more?
- Someone said that $\frac{4}{6}$ is two pieces away from 1. Can someone be more specific and talk about the size of pieces we are working with? Why is it important to talk about the size of the piece before we compare the sixths to the fourths?
- Tell me about how thinking about the size of the denominator and using benchmark amounts can help you compare the amounts.

Renaming a Fraction in Order to Make Comparisons ($\frac{4}{6} = \frac{2}{3}$ and then making comparisons between $\frac{2}{3}$and $\frac{3}{4}$)

- Someone claimed that $\frac{4}{6}$ can be renamed. Turn and talk. Think about what this group is thinking. Prepare to explain and show what you mean with a diagram when they say they can rename the sixths.
- Someone show us with a diagram how to change the sixths into thirds.
- What operation can be done to reduce or change $\frac{4}{6}$ to $\frac{2}{3}$? Why do the sixths change to thirds? What happens to the 4 pieces named in the numerator?
- How does $\frac{2}{3}$ compare with $\frac{3}{4}$? Someone said that $\frac{2}{3}$ and $\frac{3}{4}$ are both 1 piece away from the whole. Tell me about the piece that is needed to make each one a whole.
- Can I write $\frac{2}{3} + \frac{1}{3} = \frac{3}{3}$ and $\frac{3}{4} + \frac{1}{4} = \frac{4}{4}$? What does this tell you?

Extension: Making Equivalent Amounts

- This doesn't seem fair. Sue has more than John and you. What would we have to give to John so he has the same amount of candy as Sue? How much more would you need in order to have the same amount as Sue? Turn and Talk.
- What equation would we write to show that John got the same amount as Sue? What equation would we write to show that you got the same amount as Sue?
- Both a missing addend equation and a subtraction equation can be used when determining the additional amount of Star Bar that John needs. Can you explain why either equation can be written?