Mathematics: The Language of STEM
Comparing with Visual Fraction Models

CONTENT AND TASK DECISIONS

Grade Level(s): 4th

Description of the Task: Students will compare the fractions 3/8 and 4/10 and justify their thinking using a visual fraction model.

Indiana Mathematics Content Standards: 4.NS.5: Compare two fractions with different numerators and different denominators (e.g., by creating common denominators or numerators, or by comparing to a benchmark, such as 0, 1/2, and 1). Recognize 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).

Indiana Mathematics Process Standards: PS.3: Construct viable arguments and critique the reasoning of others.

Mathematics Content Goals: Students will understand how to compare fractions using a visual model.

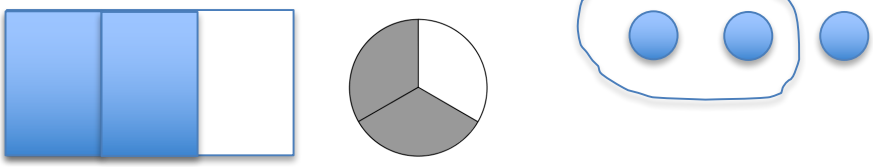
Language Objectives: Explain which fraction is greater and which fraction is less using a visual model.

Materials: paper, colored pencils or crayons

THE LESSON

Before:

- **Activate prior knowledge**
  - Ask: How might I represent the fraction 2/3?
  - Give students a couple minutes to draw various representations and then share a few. A few possible representations:



  - Based on the conversion, help reinforce or clarify vocabulary that students are using or need (examples: numerator, denominator, whole)
- **Be sure the problem is understood,**
  - Say we were going to have a snowball fight. I have two buckets of snow for you to choose from. One bucket is 3/8 full. The other bucket is 4/10 full. Which bucket do you want to choose in order to win?
    - You are more likely to win if you can make more snowballs.
    - Assume you make the snowballs from each bucket the same size.

- **Establish clear expectations**
    - Which bucket do you want to choose?
    - Use a visual model or picture to compare the buckets.
    - Make sure both partners are thinking and sharing.
        - If students don't have preassigned partners, give them those at this point.

During:

- **Let go**
    - Monitor the room as students work. Make sure they are the ones getting the cognitive workout. Resist the urge to intervene too soon when they are engaged in the productive struggle.
    - Students should be drawing pictures to represent their thinking.
- **Listen actively,**
    - As you listen to students be aware of the strategies partners are using. Take this time to make note of the strategies and decide the order you would like students to share in.
    - Be listening and looking for students to be modeling and discussing. Here are a few possible things to look and listen for (students might have strategies that don't look completely like these, but they will reflect similar ideas):
        - Representing both buckets as being the same size and explaining why they have to be the same size (Some students might draw actual buckets while others might choose a shape to represent the bucket. They might draw rectangles, squares, circles, or a bar model to represent the whole. The important idea is that both are the same size).
        - Breaking up the "buckets" into tenths and eighths and explaining that they knew to do this because of the denominator
        - Shading 3/8 and 4/10 of the buckets with an understanding that the numerator is how helping them know this
- **Provide appropriate support**
    - What does 1 whole bucket look like?
    - What does 3/8 of the whole bucket look like?
    - What does 4/10 of the whole bucket look like?
    - How might you use what each looks like to compare the two fractions?
    - What does greater than mean? What does less than mean?
    - How do you know that ____ is larger than ____? How can I see that in your model?
- **Provide worthwhile extensions**.
    - Could you find another way to prove that that bucket is the one to chose?

After:

- **Promote a mathematical community of learners**
    - Students will share their solution and justify their thinking. They will put their visual fraction model under the document camera and explain how they used it to find out which fraction is greater.

- **Listen actively without evaluation** As you are listening, try to take note of misconceptions. Provide time for other students to reflect and critique the thinking of partner groups that shared.
    - Do you agree with their thinking? Why or why not?
    - What language are you hearing classmates use?

- **Make connections**
    - How are _____'s model and _____'s model similar?

    - How are they different?
    - Could we use this strategy to compare other fractions? Explain why or why not.
    - What words did you hear repeated as people shared their strategies?
    - How might we write what people are saying? (This might be an opportunity to introduce or review the symbols for greater than and less than).
    - If we didn't have the models we created, how do we know that one bucket has more than the other?

- **Summarize main ideas** (How will you formalize the main ideas of the lesson? How will you reinforce appropriate terminology, definitions, or symbols?)
    - Hold up your picture you used today. What did we call this? (visual model)
    - We were able to use these models to help us explain how we knew which fraction was greater.
    - How can we write out the answer to the original problem?

ASSESSMENT

Students will complete an exit ticket. That exit ticket will ask them to consider two different fractions (3/4 and 9/10). Which of these is greater? Explain how you know.