Lesson Plan Aligned with Personal Theory of Learning

Unit: Comparing Bits & Pieces: Ratios, rational numbers, and equivalence

Objectives:
Recognize rational numbers as locations on a number line.
Solidify understanding of equivalent fractions.
Talk to your partner to help you solidify your understanding of the math.

Purpose:
After this lesson, students will learn to order rational numbers, calculate absolute value of rational numbers, and calculate the distance between two rational numbers. By folding and comparing fraction strips, this will build background knowledge about rational numbers' locations on the number line.

Later in the unit, students will learn about equivalent ratios. Equivalent ratios and equivalent fractions have a lot of similarity, so one intent of this lesson is to solidify understanding of what equivalent fractions are and how to find them so that students can draw on that prior knowledge when learning about equivalent ratios.

This lesson takes place fairly early in the year. Students are still getting used to the norms and expectations of the classroom, one of which is to work collaboratively to ensure a deeper understanding.

Standards:
CCSS.MATH.CONTENT.6.NS.C.6
Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

CCSS.MATH.CONTENT.4.NF.A.1
Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ 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.

Time allotted: Two class periods

Day 1

Launch:

"In yesterday's lesson, the sixth graders started their fundraiser. Now, it is Day 2 of the fundraiser. This is a diagram of how much progress they have made toward their goal."

Show Diagram 1.

"How much money do you think they have raised?"

Have a few students share estimates with the class. Talk as a class about which estimates are reasonable. Show Diagram 2.

"If I had shown you this part of the diagram right away, how could you have calculated the amount that they raised?"

Invite the class to share strategies.

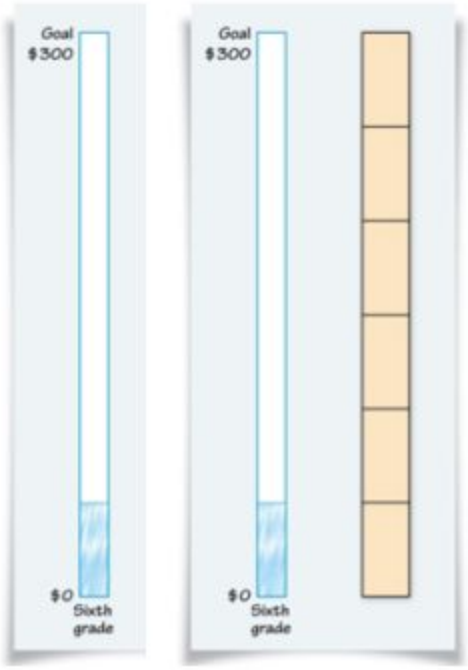


Diagram 1 Diagram 2

Explore:

"Wouldn't it be nice if we had a set of tools like this so that we could always tell what fraction they had raised? Today, you will be folding fraction strips like the one in the diagram so that you can measure each day's progress. As you fold the strips, think about the strategies you are using to decide how to fold them. After you finish folding a strip, mark them like in the picture and label each line so that you can easily figure out which fraction strip it is later. You should talk with your teammates about how you are folding the fraction strips and ask them for help when you need it, but you are not allowed to touch anyone else's fractions strips and nobody else may touch yours."

This collaborative learning will help students that are struggling to see relationships in folding the fraction strips. This will also support the students that see the relationships right away by forcing them to put the relationship into a verbal explanation. Students will be seated in teams of three or four. At each team, there will be one or two students that demonstrated a strong

understanding of fractions on the pre-test. Within the teams, partner pairs will have been created so that one partner demonstrated a strong understanding and one partner demonstrated less understanding on the pre-test. The make-up of these teams and partner pairs will ensure that the students with less understanding always have someone with them who can help them.

As students fold, walk around to observe the fraction sense that they are bringing into the lesson. In sixth grade, there will be a mixture of students who have understood fractions and relationships between fractions for a couple of years and students with very little fraction sense. Use this mixture of understanding to get the students talking to each other and asking each other questions. Some specific questions to ask to get the students talking to each other:

- *How could you get six pieces?*
- *What would happen if you folded fifths and then folded the fifths in half? How many pieces would there be?*
- *How can you use thirds to make ninths?*

If a student is not folding the fraction strips evenly, have them compare their fraction strips with a teammate's to help them see that uneven pieces will not line up correctly. Then help them get ideas from their teammates about how to fold them evenly.

Reinforce positive behaviors throughout the work time. Use Class Dojo to give points to students exhibiting positive behaviors. Students will need to see that positive behaviors lead to rewards (which I will have explained to them a few weeks prior to this) so that they are building good classroom habits.

Summarize:

Draw the class back together for a whole group discussion. This discussion should focus on equivalent fractions.

"I like the way you were completing your work and helping your teammates figure out how to fold their fraction strips. What fraction strips, besides halves, could you refold to make twelfths?"

Discuss this as a whole class, and draw out why these fraction strips could be refolded to make twelfths.

"Turn to your shoulder partner. What fraction strips could you refold to make eighths?"

Give them 30 seconds to discuss with their partners.

"How many partner pairs said halves would work? How many partner pairs said fourths would work? Why do these work?"

Discuss as a class.

"What fractions strips can you make by refolding a halves strip? What fraction strips can't you make?"

In the discussion, draw out the relationship between this and multiples of 2. Students learned about multiples in the previous unit, but this background knowledge needs to be drawn out for the next steps of the discussion.

"Turn to your shoulder partner. What fraction strips can you make by refolding a thirds strip?"

"What are the roles of factors and multiples in finding equivalent fractions?"

This is a great summary question to end with for the day. It pulls together all of the ideas the students have been working with today, and should produce an algorithm for calculating equivalent fractions. It is important that the algorithm for finding equivalent fractions be reintroduced to the students through a sense-making discussion like this, rather than just shown to them. This will lead to a much deeper conceptual understanding.

Exit ticket:
What fraction strips could you make if you started with a fourths strip?

Day 2

During the warm-up, pull students that struggled with the previous day's exit ticket for remediation. Have a student pass back the previous day's exit ticket to students that did understand so that they receive feedback about their understanding of the lesson.

Launch:

"Yesterday you folded a set of fraction strips that we can use to identify what fraction the sixth graders have raised of their total goal. Everybody find your halves strip and your fourths strip. Do any of the folds line up? Which ones? Why?"

Do this as a whole class discussion. Get the students to dig in deep. Because you could start with a halves strip and fold it in half to make fourths, ½ scaled up by a factor of 2 is 2/4.

"Everybody find your twelfths strip. Which of your other fraction strips have at least one fold that lines up with a fold on the twelfths strip? Why?"

Give time for all students to find an example, have them share the example with their shoulder partner, and then discuss a few of the examples as a whole class.

"Today we will start talking about number lines. How is a fraction strip like a number line?"

Have the students talk to their shoulder partner to get their ideas flowing. Draw a number line on the whiteboard (from 0 to 1) the length of a fraction strip.

"This number line is the length of a fraction strip. If I asked you to label 2/3 on this number line, which fraction strip would you use to measure where 2/3 belongs? Which other fraction strips *could* you use?"

Do this as a whole class discussion. Draw out the connection to equivalent fractions.

Explore:

"Today you will be working in your workbooks on pages 11, 12, and 13. You will not need your fraction strips today, but you will be drawing on the ideas we discussed in class yesterday. Your goal for today is to be able to label fractions (and equivalent fractions) on a number line. You will be working with your shoulder partner today."

Having students work with partners will benefit both students. Students that struggle with the concepts will have a partner to help them make the connection between their background knowledge and the new content. Both students will be forced to explain more because they are talking to each other and deciding if they agree with each other, rather than simply writing down an answer.

As students are working, walk around the room, redirecting partners to talk to each other if necessary. Ask students questions to draw out explanations of equivalent fractions on the number lines. Some specific questions to pull out connections:

- *How did you find an equivalent name for 2/3 on the number line?*
- *What other labels could you place at 1/3 using the fraction strips you made?*

Reinforce positive behaviors throughout the work time. Use Class Dojo to give points to students making positive behavior choices. Build good classroom habits among the students.

Summarize:

Do this as a whole group.

"You guys did a nice job working with each other today."

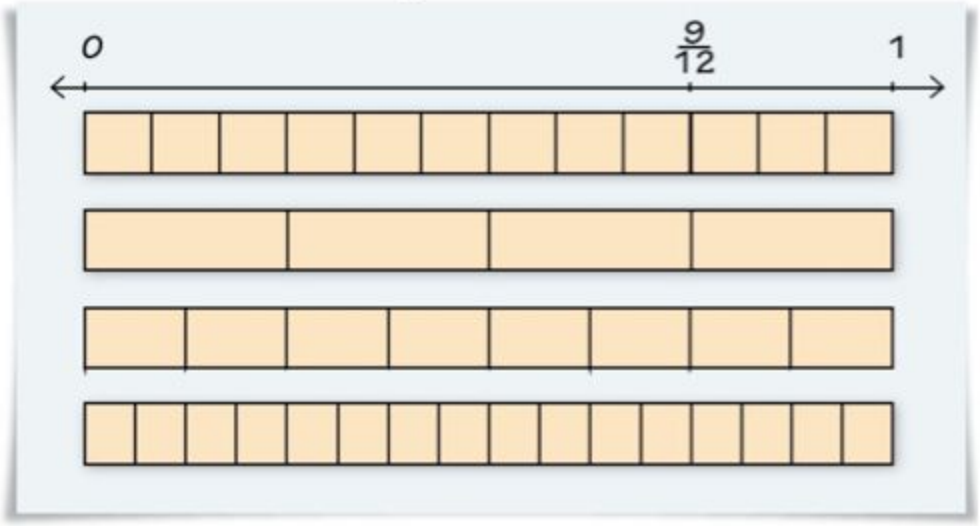
Point out (or have the students point out) any improvements that could be made to behavior during partner work time.

"What marks on the thirds number line have more than one label? What else could they be labeled as?"

In the discussion, pull out the connection to equivalent fractions and how to calculate them. Make the strategies for how to find equivalent fractions very explicit.

Exit Ticket:

Name four fractions that are equivalent to 9/12.



During the next day's warm-up, pull any students for remediation that did not demonstrate understanding of equivalent fractions on this exit ticket. Have a student pass back the previous day's exit ticket to students that did understand so that they receive feedback about their understanding of the lesson.