Lesson in Action

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AT A GLANCE

Launch

- Begin class with a warm-up of fraction addition problems using like denominators.
- Explain the purpose of this lesson.
- Discuss with students how to work on a math problem in a group.

Learning Task

- Lead a class discussion about different ways to write a fraction as a sum of fractions with the same denominator.
- Remind students they can use manipulatives and applets if they want, and that everyone in the group should contribute.
- Organize students into groups.
- Circulate as the groups work, providing prompts and feedback as needed.

Closure

- Ask some groups to explain how they went about finding different combinations.
- Invite feedback

Interacting With Peers: Talking About Fractions

Context

Ms. Moore's Grade 4 class has a mix of visual, tactile, and numerical thinkers. At this point in the unit, her students have discussed equivalent fractions and have started working on the addition of fractions with like denominators. She finds that her students express their thinking about fractions in different ways.

Common Core State Standards

- CCSS.Math.NF.4.3b (http://www.corestandards.org/Math/Content/4/NF/B/3/b) Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions (e.g., by using a visual fraction model. *Examples: $3/8 = 1/8 + 1/8 + 1/8$; $3/8 = 1/8 + 2/8$; $2\ 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$*).
- CCSS.Math.MP3 (http://www.corestandards.org/Math/Practice/MP3) Construct viable arguments and critique the reasoning of others.

Lesson Objective

Students will discuss ways to decompose fractions, taking advantage of each student's different way of thinking to advance the understanding of their peers.

Technology

- Interactive whiteboard to communicate visually with the class and interact with numbers
- Virtual manipulative (http://www.nlvm.usu.edu/en/nav/search.html) for adding fractions with like denominators to create different representations

Assessment

- Assess prior knowledge by using individual whiteboards during the warm-up
- Observe students' discussions and strategies for completing their task
- Select certain groups to present their thinking

Ms. Moore's Class in Action

Launch

Ms. Moore begins class with a warm-up—1/4 + 2/4. Students write their responses on whiteboards and hold them up so she can see who remembered how to add these fractions and who didn't.

She puts up a virtual manipulative for adding fractions on the whiteboard and reviews how to use it, in case students want to use it later in the lesson:
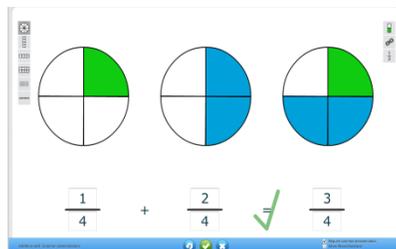
"Today we're going to learn how fractions can be broken into sums of smaller fractions," Ms. Moore tells the class. "I'll give you a fraction, and you're going to find as many ways as you can to write your fraction as a sum of two or more fractions with the same denominator."

"We're also going to learn more about how to work well in groups," she adds. "Let's think a little about how to work in a group on a math problem. How would you want your group members to react after you have shared an idea, even if they disagree with you?"

Students offer their ideas, which Ms. Moore summarizes:

Do	Don't
• Listen carefully	• Say a peer's ideas are stupid
• Acknowledge the other person's ideas	• Ignore others' ideas
• Build off the other person's ideas if you can	• Interrupt
• Be specific about what you want to change	
• Be sure everyone has a chance to speak	

She wraps up the discussion by saying, "We might need to add to these later, after you've worked in groups a few more times. I'm going to leave them on the board while you work."

Learning Task

Ms. Moore writes 3/12 + 4/12 = 7/12 and points at the sum: "If you have 7/12 as your fraction, then one way to write this as a sum of two numbers is right here—3/12 + 4/12. What is another way to write it?"

Jim calls out, "4/12 + 3/12!" Ms. Moore nods and says, "Good. Is there another way?"

Shondra says, "What about 1/12 + 1/12 + 1/12…" She pauses and thinks. "Well, there'd have to be seven of them, can we do that?"

"Yes," Ms. Moore says with a smile, "I said two or more, so you can have lots of addends."

Ms. Moore adds, "Use fraction pieces or any virtual tools we've used to help you explain your thinking. There are a lot of ways to write each of these fractions, so everyone should be able to contribute."

Ms. Moore calls out which students will be in each group and assigns each a starting fraction. She has purposefully included students with different ways of thinking in each group.

As the groups work, Ms. Moore moves among them and listens, taking note of how students are collaborating.

Group 1 is working individually on 6/7. After a minute, Janine says, "I got 3/7 + 3/7. What did you get?" The others give their answers—including Carl's incorrect answer of 2/7 + 5/7. When they start to move on to the next problem, Ms. Moore interrupts them. "You all gave an answer, so good work making sure everyone is contributing, but now you need to find out how the others are thinking about it. Check that their thinking is correct. Janine, why don't you start?" The students begin to discuss their answers. She makes a mental note to return and see if Carl has corrected his mistake.

Group 2 is using the virtual manipulative to visualize 1/9 + 4/9.
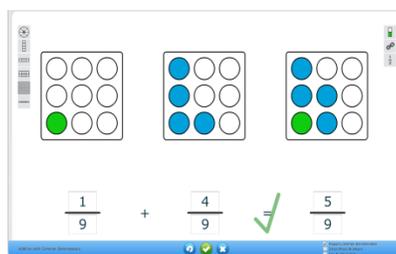
"If you take one of the blues and move it here," Juan says (pointing to the first addend), "then you have two green and only three blue." He changes the numbers to read 2/9 and 3/9 to check that the sum is correct.
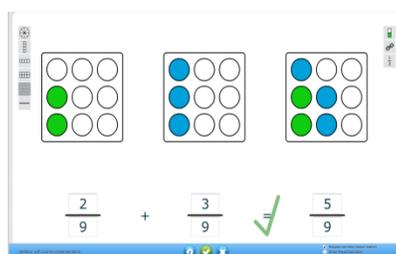
"Oh!" Jim exclaims. "We can also get 1/9 and 4/9, and 2/9 and 3/9, then 3/9 and 2/9, and 4/9 and 1/9?"

"That's not all of them," Hattie says. "We can do what Shondra did and add 1/9 five times. Let's get some counters because we can't make more than two addends on the computer."

Ms. Moore moves on, making a note to tell the class about this organized way of finding several possible combinations.

In Group 3, Eva has fraction pieces arranged in front of her. She suggests 1/2 + 1/8 to get 5/8. Mike shakes his head and says, "That's wrong, Eva. I said 2/8 + 2/8 + 1/8." Eva starts to erase her suggestion, but Ms. Moore stops her.

Ms. Moore says, "Mike, you didn't tell her why you think her answer is wrong." She reads from the rules, "'Build off the other person's ideas if you can,' and 'be specific about what you want to change.'" "Let's try that again," Ms. Moore says. "Mike, what do you think of Eva's suggestion?"

He thinks and then says, "It's not right, the denominators are different."

"Oh," Eva says, "I forgot about that. I was looking at the fraction pieces and saw it was the same as 1/2 and 1/8 more."

"That's better, Mike," Ms. Moore says. "Can you help Eva fix that error?"

Mike looks at Eva's sum, "Well, 1/2 is the same as 4/8, which uses the same denominator."

"Great," Ms. Moore says. "Now you can work together to fix Eva's idea, because she made an excellent observation. Then you can go on to your suggestion, Mike."

Closure

To engage the class in a closing discussion, she begins by asking Group 2 to explain how they worked collaboratively, using the rule "build off the other person's idea if you can":

▶ Juan explained his idea for finding more than one way.

▶ Jim followed through with the next steps.

▶ Hattie helped extend the idea.

Other groups explain what they did to check that they had all the possible answers. She encourages the listening students to ask questions. When one student asks Ms. Moore a question, she says, "I wasn't part of the group, so I can't answer the question. Ask one of the group members."

When the discussion ends, she tells the class they will do more group work in the future, so they can practice talking about math with each other.

Reflection

Ms. Moore opens her Lesson Plan Builder and types in her reflections on the day's lesson. She records the class rules and includes a note to review the rules with her students during the next class. Today the rules covered issues that arose, but she wants to give her students the opportunity to add more rules.

During the lesson, Ms. Moore noticed that although the groups found many ways to rewrite their fractions, most did not find all the ways. She writes herself a reminder to talk with her students about organizing their work as they solve problems. Sharing the organizing strategy was not part of her goals for today's lesson. In a future lesson, she will introduce the strategy, model it, and give students a chance to start practicing it.