Fraction Talks

Topics: Mental math, numerical fluency; argument & critique
Materials: White board or projector
Common Core: Variable, and especially MP3 and NF

This mental math routine creates powerful positive habits for students to understand and think productively about fractions.

Why We Love Fraction Talks

Fraction Talks are a powerful way to extend the Number Talk format to the domain of fractions. They get all students involved, help them strengthen fluency, intuition, and mental math strategies, improve students' ability to explain and critique solutions, and allow teachers a valuable window into their students' thinking, as well as giving a framework for students to develop a more visual, conceptual framework

The Launch

Refer to the write up of Number Talks for more on the mechanics of Number Talks, as a basis for Fraction Talks: http://mathforlove.com/lesson/number-talks/

Display a picture that represents a fractional relationship or relationships. Students consider the fraction being represented, then, after a brief "think time," argue why they think the fraction is what they believe it to be. The teacher can facilitate the student discussion, underline powerful ideas, and encourage students to share multiple ways to solve problems.

Example Fraction Talk
Teacher: I'm going to put up an picture, and you can tell me what fraction of the space is occupied by each color. Take some time to think about it, and about how you can defend your answer. [Teacher shows the image below. Students think about the image.]
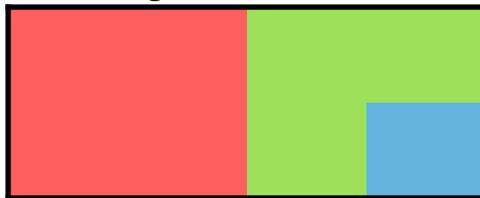
Teacher: If you think you can tell me the fraction of the rectangle that is occupied by one —and just one—of those colors, raise your hand.
Student 1: Red is half. [Teacher adds this to the image.]
Student 2: Blue is one eighth. [Teacher adds this to the image.]
Student 3: Green is three quarters. [Teacher adds this to the image.]
Student 4: I have another answer: green is three eighths. [Teacher adds this to the image.]

Teacher: It sounds like we'll really need especially strong defenses for that green area to convince each other. Let's start with the other sections. Who can explain why they think the red section is half?

Student 5: Well, there are two halves. Like if the other side was all green, it's the same as the red, and that means there are two halves, since two halves make a whole.
Teacher: So you're imaging two equal pieces making the whole, meaning the red part is half.
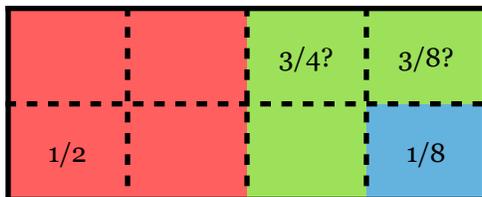Student 5: Right!
Teacher: Great. Can anyone defend why the blue section is 1/8 of the whole?
Student 6: I imagined cutting the whole thing into eighths.
Teacher: I'm not sure I understand what you mean. Can you draw it for us?
Student 6: Sure. [Draws lines in on the drawing.] See? That makes eight pieces, and so blue is 1/8.

 Teacher: Very nice! By imaging those lines, we can see eight equal pieces—and you made sure the pieces were equal with how you chose to draw in the lines—and one of eight equal pieces is one eighth of the whole. Did anyone do this another way?
Student 2: I saw that it was one quarter of one half, but I like that way.
Teacher: I do too. I can really see clearly when we have eight equal pieces like that. Does anyone have a defense of either of the conjectures for the green area?
Student 3: I thought it was 3/4 since there are three green pieces, so it's 3/4 of a whole.
Student 7: I disagree, because if you had all four pieces, you wouldn't have a whole, you would have a half. So it is 3/4 of a <u>half</u>.
Student 3: Oh, I guess you're right. So I guess it's 3/8.
Teacher: That's not clear to me. I guess I see that it is 3/4 of a half, but why is that 3/8?
Student 3: I guess I don't see why either.
Teacher: Yeah. And you're modeling exactly how to tackle these, because you're staking a claim, and then you're willing to change your answer when someone shows that it's wrong. But I still want to know if this is really 3/8, and why.
Student 8: Here's how I saw it. We said blue was 1/8. And so each of those boxes is one eighth. So that's one eighth, two eighths, three eighths.
Teacher: Ah, I think I see. You're saying the green is made of up three of these boxes. How big is one box? One eighth. So that's [pointing at each green rectangle] one eighth, two eighths, three eighths. [Writes this on the image.] So that idea of dividing the entire

shape into equal pieces made this much easier to solve. So here's my question: if we follow the same logic, shouldn't the red section be four eighths? Because we could count, 1, 2, 3, 4 eighths. So why is one half, and not four eighths? Think about that, and then turn and talk to a neighbor. [Students discuss.] Yes?

Student 9: One half and four eighths are the same thing!

Teacher: Aha! [Writes 1/2 = 4/8.] So our logic was right in both cases, because cutting it up into more pieces doesn't change what it is, even if it changes what we call it. Can anyone else give me another name for 1/2?

Student 10: Eight sixteenths?

Teacher: What would the picture look like for that? Can you draw it? [Student draws.]
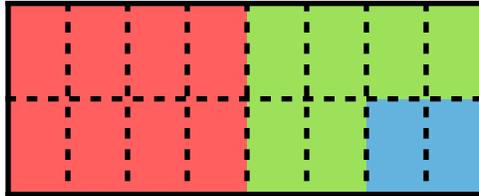
Student 10: That makes 16 equal pieces, and 8 of them are red, so that's 8/16.

Teacher: Great! I can imagine we could have made a lot of different versions of the same thing.

Student 11: 16/32!

Teacher: Okay - let's move on to another talk...

Prompts and Questions

- Who would like to defend this answer?
- I don't quite follow. Could you draw what you are seeing?
- How did you do that/know that?
- Does anyone else think they can explain what Shawn is saying?
- Turn to the person next to you and explain how you figure out the fraction.

Tips for the Classroom

1. Start with questions that are accessible to everyone.
2. Students will be looking to see if you indicate what the right answer is. Don't favor right answers over wrong ones. Make sure that the explanations are what matters.
3. Give students constructive language to use in the discussion, like, "I respectfully disagree, because..." and "I agree with _____, because..."
4. Always keep the environment safe and positive.
5. Don't worry if you don't reach total consensus on every problem. Sometimes a student will need more time to process. You can move on when it feels like it is time.
6. Fraction Talks can sprawl if you're not careful. Doing short (5 - 10 minute) talks regularly is more powerful than long ones infrequently.

Resources
Find more at fractiontalks.com.