

Seven Brownies, Four People

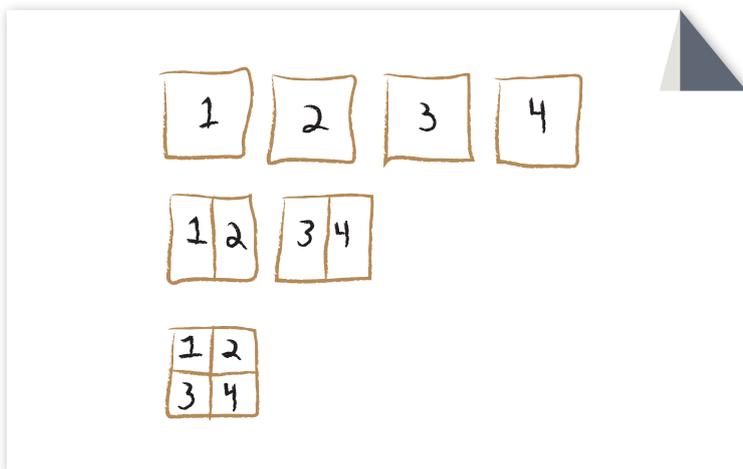
The teacher observes students as they divide seven brownies equally among four people in Session 1.7. As students work to find equal shares, the teacher helps them write each solution by using fractions.

Becky: First, each person would get one.

Jung: But because there were only three left, we can't give another whole one out.

Becky: We can give a half to each person.

Jung: And we still have one left over. And we can't just divide it in half because there are four people.



[Jung's work]

Becky: So we divide it into quarters and add a quarter to each half. That is one and a third.

Teacher: This is what one third looks like [draws a rectangle and splits it into thirds], and one and one third would look like one and one of those pieces.

Becky: So it's not one and a third. Each person gets 1 and a half and a quarter.

Teacher: How could you write that?

Becky: I don't know.

Teacher: Can you write what you just said using addition? You said one and a half and a quarter.

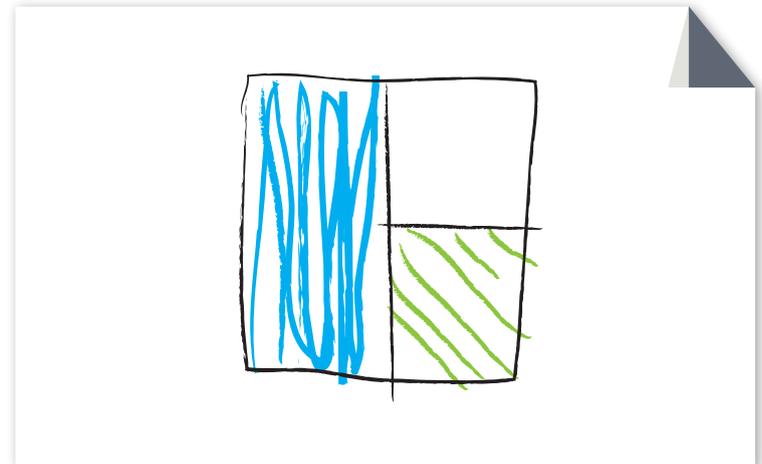
Becky: Oh!

Becky writes $1 + \frac{1}{2} + \frac{1}{4}$.

Jung: So what would a half plus a fourth be?

Teacher: That is a good question! Let's draw what each person would get. Draw one half plus one fourth.

Becky: [draws a new picture in which she shades in one half and one fourth in the same whole] It's $\frac{3}{4}$.



[Becky's work]

Jung: I get it. There are two fourths in one half, so it's three fourths altogether.

Teacher: So what would you call the whole amount of brownie that one person gets?

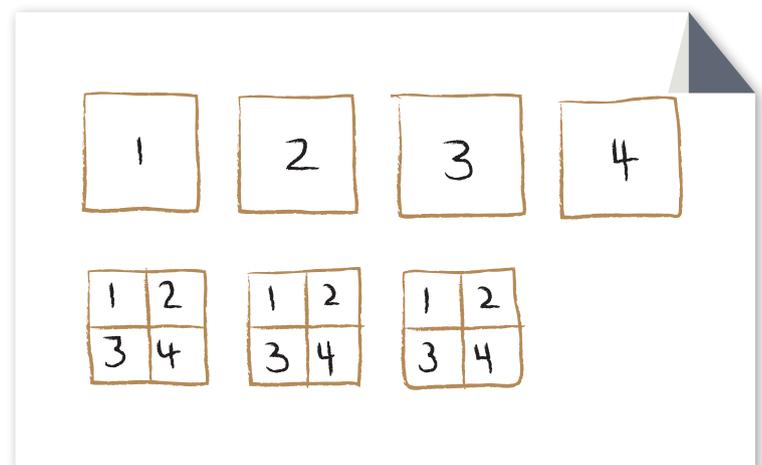
Becky: You could say one plus $\frac{3}{4}$.

The teacher moves to another pair and asks them how they shared the seven brownies.

Ines: We gave one whole to each person and then split the three brownies into four parts, one for each person.

Teacher: Show me how you actually cut the brownies.

Ines: We split the three brownies with a line this way [makes a vertical motion] and this way [makes a horizontal motion]. Now each person gets a piece from each brownie.



[Ines' work]

Teacher: What size pieces are these?

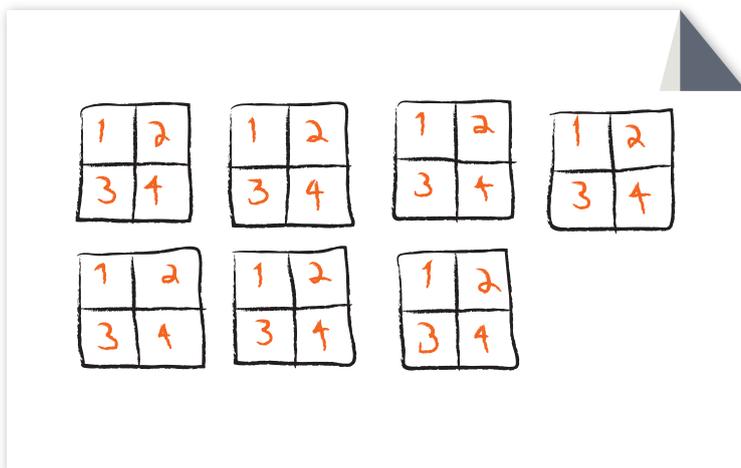
Kim: Quarters. Fourths.

Teacher: How much brownie does each person get?

Kim: One whole brownie and three of the fourths pieces.

Teacher: So how could you write that?

The teacher moves on to another group that has cut all of their brownies into fourths.



[Kathryn's work]

Teacher: Why did you cut up all of your brownies?

Kathryn: There are four people sharing so we knew that we needed fourths.

Oscar: So each person gets seven of the fourths.

Oscar points to his paper which shows:

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{7}{4}$$

Teacher: [pointing to $\frac{7}{4}$] What does this fraction mean?

Oscar: It's like what we did on the number line. You just keep counting up the fourths, so it's 7 of the $\frac{1}{4}$ pieces.

As students work, the teacher listens to see whether they understand that fractions are equal pieces of a whole and whether they can distinguish between halves, fourths, and thirds. She checks in to see how different students use notation to model the equal shares, noting especially whether students are using fractions greater than 1, as Oscar does, and how they are combining fractional parts. She notices that none of her students are comfortable using the mixed number, $1\frac{3}{4}$, but she knows that will come up in the discussion in the next session.