

Composing and Decomposing Fractions

- Strand:** Number and Number Sense
- Topic:** Composing and decomposing fractions and mixed numbers
- Primary SOL:** **3.NS.3 The student will use mathematical reasoning and justification to represent and compare fractions (proper and improper) and mixed numbers with denominators of 2, 3, 4, 5, 6, 8, and 10), including those in context.**
- d) Compose and decompose fractions (proper and improper) with denominators of 2, 3, 4, 5, 6, 8, and 10 in multiple ways (e.g., $\frac{7}{4} = \frac{4}{4} + \frac{3}{4}$ or $\frac{4}{6} = \frac{3}{6} + \frac{1}{6} = \frac{2}{6} + \frac{2}{6}$) with models.

Materials

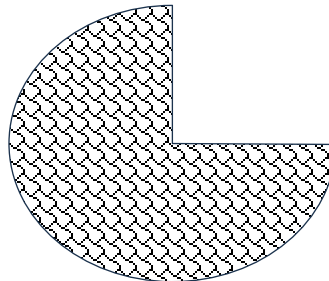
- Sentence strips or other tape model

Vocabulary

Fraction, whole, proper, improper, compose, decompose, numerator, denominator

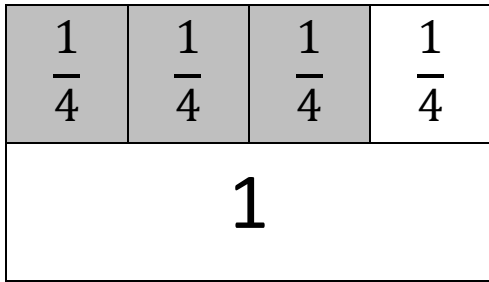
Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Begin class with a count around, starting with $\frac{1}{4}$ and counting by fourths. The first student starts by saying one-fourth, the next student says two-fourths, and so on until the teacher directs the class to stop. Counting fourths should continue beyond four-fourths or one whole.
2. The teacher asks students to notice and wonder about the picture of the eaten pie below.

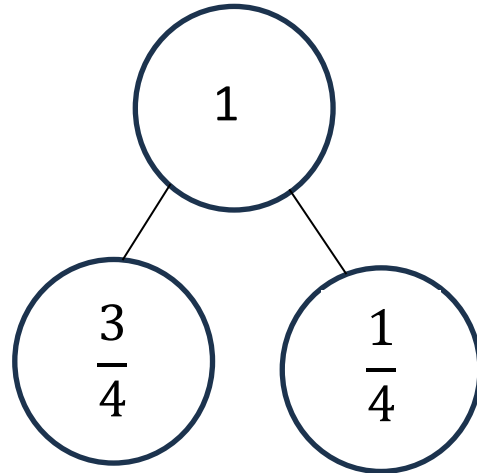


Encourage students to notice and identify the fractional part of the pie that was eaten and the part that was not eaten. Discuss how these two amounts or parts make up or compose the whole pie.

Write on the board both of the following diagrams.



Tape diagram

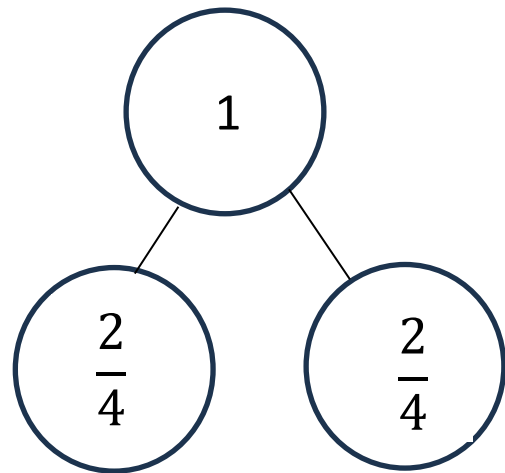
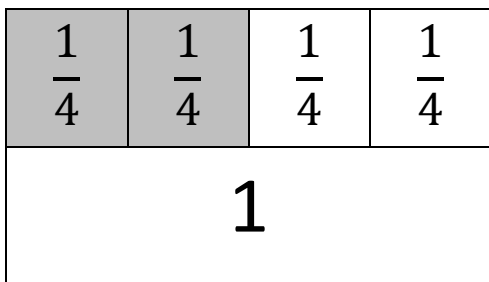


Number Bond

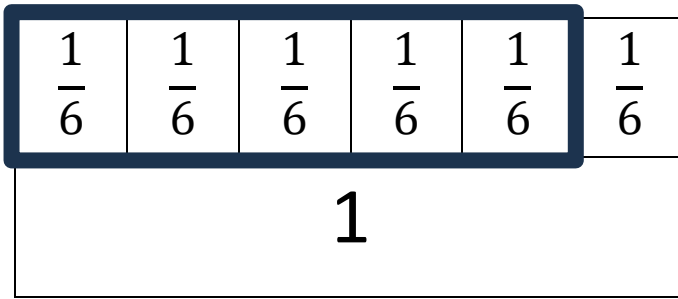
Both models show us that $\frac{3}{4}$ and $\frac{1}{4}$ make a whole.

State the learning goal: Today we will decompose and compose fractions. We may use representations such as tapes models or number bonds to help us reason and communicate our thinking.

3. The teacher will model how to decompose 1 whole a different way. This model would show that $\frac{2}{4}$ and $\frac{2}{4}$ make a whole.



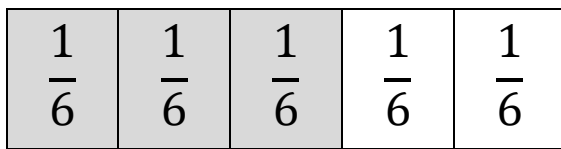
4. The teacher poses a question: I wonder if we can decompose other fractions, other than a whole in more than one way? For example, if a third grader had $\frac{5}{6}$ of a candy bar left, how could he break up or decompose that candy bar to eat it over two days?



This model reminds students six-sixths is equivalent to one whole.

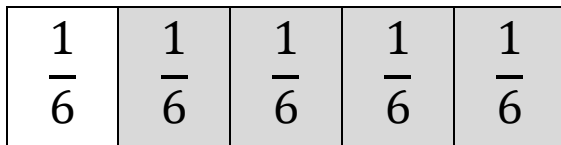
The heavy outline represents five-sixths.

5. Teacher models a few ways to decompose $\frac{5}{6}$ of the candy bar.



$\frac{3}{6}$ and $\frac{2}{6}$

He could eat $\frac{3}{6}$ one day and $\frac{2}{6}$ one day.



$\frac{1}{6}$ and $\frac{4}{6}$

He could eat $\frac{1}{6}$ one day and $\frac{4}{6}$ one day.

Write for students to see: $\frac{5}{6} = \frac{3}{6} + \frac{2}{6} = \frac{1}{6} + \frac{4}{6}$

Ask students what they notice about the equation.

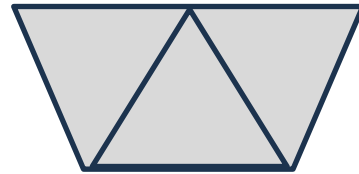
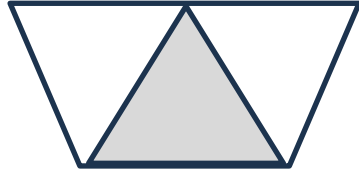
Discuss how $\frac{5}{6}$ is decomposed in the equation and how the fractions shown can be composed to make $\frac{5}{6}$. If needed, use number bonds to also show the relationships.

6. Tell students they will now decompose and compose their own fractions in multiple ways. Hand out a fraction and set of tape models for students to color to show different ways to decompose the fraction.

Assessment

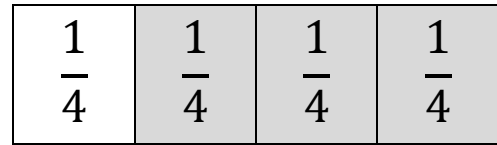
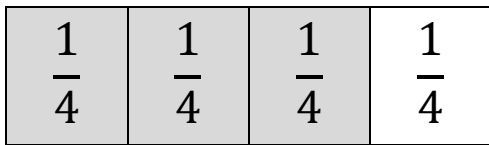
- **Questions**

- Can you decompose $\frac{6}{8}$ in three ways? Use a model to help show your thinking.
- Compose the fraction shown below by the shaded parts of the two models. What fraction do they make when you compose them?



• **Journal/writing prompts**

- How are the two models below the same? How are they different? Explain what they each represent using math symbols and words.



- How can you check to see if you have found all the ways to decompose a fraction?

Other Assessments

- How can you decompose a fraction into unit fractions?

Extensions and Connections (for all students)

- Play a target number rotation with cooperative groups. Display a different fraction on posters around the room. Have teams visit each poster and create a new way to decompose that fraction (e.g., $\frac{8}{8}$, $\frac{6}{10}$, $\frac{9}{4}$, $\frac{4}{6}$, etc.).

Strategies for Differentiation

- Use number bond mats, with concrete manipulatives to model the fractions.
- Scaffold decomposing 1 whole into unit fractions, then progress to other parts.
- Use sentence strips to model fractions.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

How many ways can you create $\frac{7}{8}$?

Use two colors to show how you can decompose $\frac{7}{8}$ in three different ways. Then, write about your model using numbers and symbols.

1 whole

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
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Explain:

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Explain:

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Explain: