PBS Lesson Series

Math: Grade 4, Lesson 9, Fractions

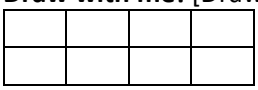
Lesson Focus: Decompose Fractions
Practice Focus: Students will focus on drawing models in order to decompose fractions.
Objective: Students will use various strategies to decompose fractions with a focus on drawing models.
Key Vocabulary: numerator, denominator, fraction, decompose
TN Standards: 4.NF.B.3
Teacher Materials:

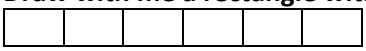
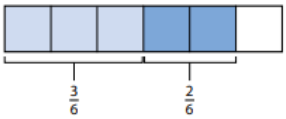
- Whiteboard and markers
- Student Practice Packet

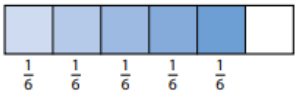
Student Materials:

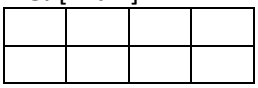
- Paper and a pencil, and a surface to write on

Teacher Do	Student Do
Opening (1 min) **Hello! Welcome to Tennessee's At Home Learning Series for math! Today's lesson is for all our 4th graders out there, though all children are welcome to tune in. This lesson is the ninth in our series.** **My name is ____ and I'm a ____ grade teacher in Tennessee schools! I'm so excited to be your teacher for this lesson! Welcome to my virtual classroom!** **If you didn't see our previous lesson, you can find it on the TN Department of Education's website at www.tn.gov/education. You can still tune in to today's lesson if you haven't see any of our others. But, it might be more fun if you first go back and watch our other lessons since we'll be talking about things we learned previously.** **Today we will be learning about decomposing fractions in mathematics! Before we get started, to participate fully in our lesson today, you will need:** • **Paper and a pencil, and a surface to write on** **Ok, let's begin!**	Students get materials ready for the lesson.
Intro (5 mins) **Today we are going to think about decomposing fractions. A fraction is a number that names equal parts of a whole. We will also think about how to model our thinking about fractions by drawing a model. Before we start decomposing fractions, let's review how to add fractions with like denominators.** **Let's start by thinking about this question:** **1/8 + 1/8**	This warm-up will support students' understanding of adding fractions, foreshadowing the work in in the Teacher Model section. Students will listen to the teacher think aloud modeling the thought

A model might help us thing about this. I'm going to draw a rectangle and split it into eight equal parts, because the denominator tells the number of equal parts in a whole. **Draw with me!** [Draw the model below]  **Now we can shade one of the eight parts to represent 1/8, because the number tells the number of equal parts.** [Shade one of the 8 parts] **We are adding 1/8 plus 1/8 so what should I shade now?** [Pause] **Right! Shade one of the eight parts again!** [Shade one of the 8 parts] **How many parts did I shade?** [Pause] **Great! 2 parts. This means 2 out of 8 equal parts, which tells us that 1/8 + 1/8 = 2/8. Notice that the denominator stays the same because the size of the pieces didn't change. The numerator changes because it represents the total number of equal parts.** **Let's try another one! Draw a new model to shade and add 1/8 + 3/8.** [Pause, give students a moment to think, then draw and shade model] **We'll shade one of the eight parts, then 3 more, for a total of 4 parts shaded. This model shows us that 1/8 + 3/8 = 4/8.** **Last fraction addition problem to get our brains warmed up. Try this one: 1/8 + 5/8** [Pause, give students a moment to think, then draw and shade model] **We'll shade one of the eight parts, then 5 more, for a total of 6 parts shaded. This model shows us that 1/8 + 5/8 = 6/8.** **Great job! Knowing how to add fractions is going to help us understand how to decompose fractions today.**	process for a problem from the start of the problem through finding the solution. Students will follow along by writing on their own paper and responding to teacher questioning.
<u>Teacher Model (10 mins)</u> Objective #1: Teacher will explicitly instruct how to draw a model in order to decompose fractions. **Dan has 5/6 of his reading left to complete for the week. He plans to complete his reading on two or more days of the week from Monday to Friday. What are two different ways he could plan to complete his reading? Use a fraction to describe the part of his reading he does each day.** **Let's think through what the question is asking.** **What fraction describes the amount of reading Dan has left to complete?** [Pause] **He has 5/6 of his reading left to complete.**	Objective #1: Students will listen to the teacher do a think aloud working a contextual problem modeling the thought process for a problem from the start of the problem through finding the solution. Through following along with the think aloud, students will solve a problem that requires them to

What are the days of the week on which Dan could complete his reading? [Pause] **Dan will complete his reading on Monday to Friday.** **On how many of those days does he plan to complete his reading?** [Pause] **He plans to complete his reading on two or more days.** **Dan has 5/6 of his reading left to complete. How many equal parts did he divide his reading assignment into?** [Pause] **Right, 6 equal parts because the denominator tells the number of equal parts in a whole.** **We can draw a model to help understand the problem.** **Let's draw a rectangle with 6 equal size parts.** [Pause] **Draw with me a rectangle with 6 equal size parts.**  **Where does the drawing show the total number of equal parts?** [Pause, then point to one section of the drawing and say] **Each part of the model represents 1/6. There are 6 total equal parts.** **How much reading does Dan need to complete?** [Pause] **Yes, 5/6 of his reading.** **Where does our model show the part of his reading that Dan needs to complete for the week?** [Pause, then draw a bracket under 5 out of the 6 parts and label it 5/6] **Dan needs to complete 5/6 of his reading, so 5 out of the 6 equal parts of our model represent the total amount of reading that Dan needs to complete.** **Dan is going to complete his reading on two or more days. This means we need to take the fraction of reading he has to complete, 5/6, and break it into two or more parts. This is called decomposing. When you decompose a fraction, you break it into parts.** **Look at your model and think about how to break 5/6 into two parts.** [Pause] **One possible way to do this is to break 5/6 into 3/6 and 2/6.** [Draw and label the image below]  **We can write an addition equation to show that this is correct.** [Write and say] **5/6 = 3/6 + 3/6**	decompose a fraction into a sum of fractions in more than one way. Students will model the fractions either on paper to show different ways to break apart a fraction. The purpose of this problem is to have students develop strategies for decomposing fractions.

What if we wanted to decompose 5/6 into 5 parts? [Pause] **Look at your model and think about how to break 5/6 into five parts.** [Pause] **To decomposed 5/6 into 5 parts would look like this:** [Draw and label the image below]  **We can write an addition equation to show that this is correct.** [Write and say] **5/6 = 1/6 + 1/6 + 1/6 + 1/6 + 1/6** [Point to the models while recapping the problem] **How are the two models alike?** [Pause] **Both models have 6 equal parts.** **How is 5/6 shown in each model?** [Pause] **5 of the 6 equal parts are shaded in each model.** **How are they different?** [Pause] **They show 5/6 decomposed in different ways.**	
Objective #2: Teacher will explicitly instruct how write equations to decompose fractions. **Nice job! We have already written two equations to show how to decompose the fraction 5/6.** **One of the equations we just wrote is:** [Write and say] **5/6 = 1/6 + 1/6 + 1/6 + 1/6 + 1/6** **Some other possible equations are:** [Write and say] **5/6 = 1/6 + 1/6 + 1/6 + 2/6** **5/6 = 1/6 + 2/6 + 2/6** **5/6 = 3/6 + 1/6 + 1/6** **5/6 = 3/6 + 2/6** **5/6 = 4/6 + 1/6** **What is the same about each of the equations?** [Pause] **All of the equations have a sum of 5/6.** **What is different about each of the equations?** [Pause] **They show 5/6 decomposed in different ways.** **How is the first equation different from the other equations?** [Pause] **It has the most addends, and all the addends are 1/6. 1/6 is called a unit fraction, a fraction with a numerator of one.** **What do you notice about the numerators of the fractions?** [Pause]	Objective #2: Students will listen to the teacher do a think aloud working a contextual problem modeling the thought process for a problem from the start of the problem through finding the solution. Through following along with the think aloud, students will solve a problem that requires them to decompose a fraction into a sum of fractions in more than one way. Students will model the fractions either on paper to show different ways to break apart a fraction. The purpose of this problem is to have students develop strategies for decomposing fractions.

The numerators vary, but always add to 5, the total number of equal parts. **What do you notice about the denominators of the fractions?** [Pause] **The denominators do not change. They are always 6. We are not changing the size of the parts.** **If you want to add fractions to make 4/6 instead of 5/6, how could the first equation help you?** [Pause] **4/6 could be written as a sum of four of these unit fractions.** **For any fraction with a numerator greater than 1, what is one way you can always decompose the fraction?** [Pause] **A fraction with a numerator greater than 1 can always be decomposed into a sum of unit fractions with the same denominator.** Tying the learning together: **Let's review!** **How can you tell if two or more fractions add to make 5/6?** [Pause] **All the fractions are sixths. If the numerators of the fractions have a sum of 5, then the fractions add to make 5/6.** **How does finding all the ways to make the numerator of a fraction help you find all the ways to decompose a fraction?** [Pause] **When the denominators are all the same, the number of ways to make the numerator is the same as the number of ways to make the fraction.**	Tying the learning together: Students will compare and connect the different representations and identify how they are related. Students will respond to questions to display an understanding that when the denominators are all the same, the number of ways to make the numerator is the same as the number of ways to make the fraction.
<u>Guided Practice (10 mins)</u> [I do] **Let's practice a few more decomposing fractions problems today.** **Find three ways to decompose 7/8 into a sum of other fractions. Draw a model for each way to show how you know the way is correct.** [Pause] **I'm going to draw a model like this to help me. Draw with me!** [Draw]  **Remember, the denominator 8 tells us that there are 8 equal size parts.** **Use your model and shade three different ways to decompose 7/8 into a sum of other fractions.** [Pause]	Students work alongside the teacher as the teacher thinks aloud.

There are lots of possible options! Here are three that I thought of: [Shade models and write equations]  **Model #1: 7/8 = 6/8 + 1/8** **Model #2: 7/8 = 4/8 + 2/8 + 1/8** **Model #3: 7/8 = 3/8 + 3/8 + 1/8** **Did you think of different ways to decompose 7/8? Awesome! Check your work by seeing if the numerators of your fractions have a sum of 7.**	
[We do] **Complete the equations to show a way to decompose each fraction.** a. _____ **+ 1/4 + 3/4 = 5/4** [Pause] **We are trying to make a total of 5/4. 1/4 + 3/4 is 4/4 so we need one more fourth to make 5/4.** [Fill in 1/4 in the blank] **b. 3/4 = 1/4 +** _____ [Pause] **We need two more fourths to make 3/4.** [Fill in 2/4 in the blank] **c. 9/12 = 3/12 + 3/12 +** _____**[** Pause] **3/12 + 3/12 is 6/12 so we need three more twelfths to make 9/12.** [Fill in 3/12 in the blank] **Draw a model to justify your answer to 3/4 = 1/4 + 2/4.** [Pause, then draw]  **Great! Does your model look something like this?**	Students will respond to teacher questions with less scaffolding than the previous example. Students will have more time to think and respond on their own prior to the teacher providing solutions.
[You do] **Now you are going to try decomposing fractions on your own. Remember to draw a model if it helps you! Listen as I read aloud:** **a. 3/4 = 1/4 + 1/4 +** _____ **b. 3/4 = 2/4 +** _____ **c. 3/4 = 1/4 +** _____	Students are working almost exclusively independently with the teacher providing answers at the end.

[Pause to allow students time to think and work.] **Great job, students! Here are the solutions:** **a. 3/4 = 1/4 + 1/4 + __1/4__** **b. 3/4 = 2/4 + __1/4__** **c. 3/4 = 1/4 + __2/4__** <u>Additional Problems (if Needed):</u> Find three ways to decompose each fraction into a sum of other fractions with the same denominator. 1) 7/8 = 6/8 + _____ 7/8 = 5/8 + _____ 7/8 = 4/8 + _____ 2) 6/5 = _____ + 2/5 6/5 = 2/5 + _____ + _____ 6/5 = 2/5 + 2/5 + _____ + _____ 3) 5/6 = _____ + 3/6 5/6 = 1/6 + _____ + _____ 5/6 = 1/6 + 1/6 + _____ + _____ + _____ Answer Key: 4) 7/8 = 6/8 + _1/8_ 7/8 = 5/8 + _2/8_ 7/8 = 4/8 + _3/8_ 5) 6/5 = _4/5_ + 2/5 6/5 = 2/5 + _2/5_ + _2/5_ 6/5 = 2/5 + 2/5 + _1/5_ + _1/5_ 6) 5/6 = _2/6__ + 3/6 5/6 = 1/6 + __2/6__ + __2/6__ 5/6 = 1/6 + 1/6 + _1/6 __ + _1/6 __ + __1/6 __	
<u>Independent Practice (1 min)</u> **Great work, everyone! Today, we practiced decomposing fractions. I hope you're seeing that fractions can be decomposed into a sum of fractions in more than one way! You sure did a great job! I will show you the independent practice problems now, or you can find them in the student practice for this lesson posted on our website, www.tn.gov/education.** [Teacher shows student practice page under document camera or camera zooms in on student practice page.]	

Good luck and do your best!	
Closing (1 min) **I enjoyed learning about decomposing fractions with you! Thank you for inviting me into your home. I look forward to seeing you in our next lesson in Tennessee's At Home Learning Series! Bye!**	