

Notes for the Teacher

Students construct area models of fractions equivalent to $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{2}{3}$. These equivalent fractions will include relatively small numerators and denominators, such as $\frac{2}{4}$, as well as those with relatively large numerators and denominators, like $\frac{50}{100}$.

Students learn that equivalent fractions name the same quantity using different-sized fractional parts. Students then discuss their different strategies for building equivalent fractions.

Objectives:

- Students will use an area model of fractions to explore part-whole relationships.
- Students will understand the relationship between visual representations of fractions and their symbolic forms.
- Students will make fractions equivalent to $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{2}{3}$ using a given selection of numerator and denominator values.
- Students will describe strategies for finding equivalent fractions.

Common Core Mathematical Practices: (1) Make sense of problems and persevere in solving them; (2) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (5) Use appropriate tools strategically; (7) Look for and make use of structure.

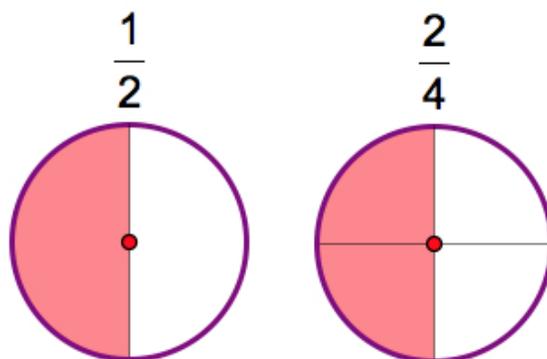
Common Core State Content Standards: 3.NF3; 4.NF1

Grade Range: Grades 3–4

Introduce:

Use a projector to show sketch page “Practice” and distribute the worksheet. Follow the steps in worksheet step 1 to demonstrate how to make $\frac{1}{2}$. Notice that the fraction does not appear until after you’ve clicked the number 1, clicked the number 2, and then moved your mouse. Pick a few volunteers to make their own fractions so that the class is comfortable with the **Make Fraction** tool. Show students how to use the **Arrow** tool to drag a fraction and how to resize all the fractions on the page by shortening or lengthening the segment in the lower-left corner of the sketch.

Now go to page “1/2.” Use the **Make Fraction** tool to represent $\frac{1}{2}$ and $\frac{2}{4}$. Ask students to compare the two fractions. Students may say, “The fractions are the same because each circle has the same amount shaded.” Explain that when fractions show the same amount shaded on the same-size whole, they are equal, or equivalent. Use the **Arrow** tool to drag $\frac{2}{4}$ onto $\frac{1}{2}$ to demonstrate this.



Ask volunteers to come to the computer and make several other fractions equal to $\frac{1}{2}$ using the numbers shown. Students can use the **Arrow** tool to drag their fractions onto the $\frac{1}{2}$ fraction to check. If students make a fraction that they do not want, they can choose **Edit | Undo Make Fraction** to delete it.

As students are making fractions, ask questions like the following to guide their thinking: “Can you make a fraction equivalent to $\frac{1}{2}$ using 5 as a denominator? Can you make a fraction equivalent to $\frac{1}{2}$ using 40 as a numerator? What is the relationship between the numerator and denominator in fractions that are equivalent to $\frac{1}{2}$?”

Students will undoubtedly gravitate towards the larger numbers in the list as they make their fractions.

When all equivalent fractions for $\frac{1}{2}$ have been found, have students write them down on their worksheet. Alternatively, you may have volunteers find a few fractions equivalent to $\frac{1}{2}$ and then have partners find the remaining ones on their own in the Explore section.

Explore:

Assign students to partners and send them in pairs to the computers. If students are new to the area model of fractions, ask them to explore making fractions on page “Practice.” If students have used this model before, send them straight to the sketch page “ $\frac{1}{3}$.”

Have students use the **Make Fraction** tool to make as many fractions equivalent to $\frac{1}{3}$ as possible using the numbers given. Students should write each fraction on their worksheet. Some students may be very systematic in their approach to finding the equivalent fractions. They may notice that not all fractions equivalent to $\frac{1}{3}$ can be made using all the numbers given. For example, $\frac{7}{21}$ cannot be made because 21 is not listed.

Next, have students go to pages “ $\frac{1}{4}$ ” and “ $\frac{2}{3}$ ” and use the new lists of numbers to make equivalent fractions for $\frac{1}{4}$ and $\frac{2}{3}$. As you circulate, ask students what strategies they are using to find the equivalent fractions. Some students may have trouble finding fractions equivalent to $\frac{2}{3}$. Encourage these students to think about the relationship between $\frac{1}{3}$ and $\frac{2}{3}$ (twice as much) and use the fractions they made equivalent to $\frac{1}{3}$ to make fractions equivalent to $\frac{2}{3}$. (Students can double the numerators of each of the fractions equivalent to $\frac{1}{3}$.)

As you circulate, make sure students record the fractions and their explanations on the worksheet.

Discuss:

Call students together to talk about their different strategies for finding equivalent fractions. Strategies will vary depending on the math background of your students:

- *We found patterns. For fractions equal to $\frac{1}{2}$, when we increased the numerator by 1, the denominator increased by 2.*

- *To find fractions equal to $\frac{1}{2}$, we multiplied each numerator by 2 to find the denominator because the denominator must be twice as much as the numerator.*
- *We multiplied the numerator and denominator of $\frac{1}{4}$ by the same amount. For example, 1 times 10 is 10 and 4 times 10 is 40, so $\frac{10}{40}$ is equal to $\frac{1}{4}$.*
- *For $\frac{1}{3}$, we knew the numerator was one third the denominator. So we looked for denominators that could be divided by 3.*

Encourage students to share their strategies using mathematical language. It is helpful for all students to gain insight from other students' methods for solving the same problem.

Go to page “Choose a Fraction.” Have volunteers pick their own fraction and then, as a class, make fractions equivalent to it. If students would like to change one of the numbers in the list provided, they can double-click it with the **Arrow** tool and enter a new number in the dialog box that appears.

Ask students to explain their thinking as they are making the equivalent fractions.

Related Activities:

- *Make Your Own Fractions—Comparing Fractions to One*
- *Make Your Own Fractions—Ordering Fractions*
- *Make Your Own Fractions—Getting Close to One*
- *Make Your Own Fractions—Comparisons to One Half*
- *Make Your Own Fractions—An Early Algebra Approach to Equivalent Fractions*
- *Make Your Own Fractions—Fractions Greater Than One*

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