

Practice Task: Equivalent Fractions

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

MCC4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $1/2$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

STANDARDS FOR MATHEMATICAL PRACTICE

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.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Constructing the idea that fractions are relations and that the size or amount is relative to the whole is a critical step in understanding fractions. Fair sharing contexts also provide learners with opportunities to explore how fractional parts can be equivalent without necessarily being congruent. They may look different but still be the same amount. Students have worked with the concept of fair share or partitioning since 2nd grade, with standards which refer to same-sized shares or equal shares. Students should have knowledge of vocabulary terms such as: *numerator* and *denominator*.

Some common misconceptions, found in *Math Misconceptions*, that children have include:

- Dividing nontraditional shapes into thirds, such as triangles, is the same as dividing a rectangle into thirds. If they are only used to dividing traditional shapes – circles, squares, and rectangles – they begin to think that all shapes are divided similarly.
- Children often do not recognize groups of objects as a whole unit. Instead they will incorrectly identify the objects. For example, there may be 2 cars and 4 trucks in a set of 6 vehicles. The student may mistakenly confuse the set of cars as $2/4$ of the unit instead of $2/6$ or $1/3$ (Bamberger, Oberdorf, & Schultz-Ferrell, 2010).

Therefore, it is important that students are exposed to multiple units of measure, various shapes, and denominators other than halves, thirds, and fourths. Additionally, the denominator used as an expression of the whole is a key concept to express for mastery.

ESSENTIAL QUESTIONS

- What happens to the value of a fraction when the numerator and denominator are multiplied or divided by the same number?
- How are equivalent fractions related?

MATERIALS

- “Equivalent Fractions, $\frac{2}{3}$,” student recording sheet
- “Equivalent Fractions, $\frac{3}{4}$,” student recording sheet

GROUPING

individual or partner

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comments: This task allows students to explore the relationship between equivalent fractions and write equations for equivalent fractions using the product and quotient of a fraction equivalent to one.

This task is adapted from Van De Walle, J. (2007). *Elementary and middle school mathematics: Teaching developmentally* (6th ed.) Boston: Pearson Education, Inc. See the section on “Equivalent-Fraction Concepts.” (This task is adapted from an activity titled “Slicing Squares” on p. 311.)

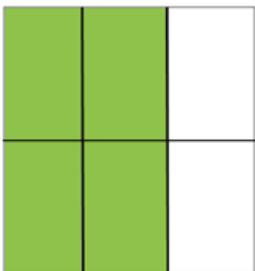
Give students the opportunity to explore equivalent fractions with this task. Encourage students to look for patterns, both in the models as well as in the numerical representations. Equivalent fractions can be thought of as different names for a fraction.

Once students have written equivalent fractions and are able to show that the fraction was multiplied by a fraction equivalent to 1, then begin the discussion about using the inverse operation. Ask students how they can simplify a fraction by dividing it by a fraction equivalent to 1. See the examples below.

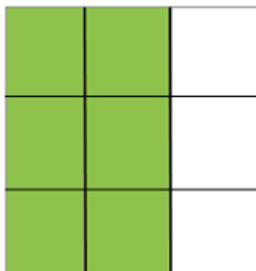
$$\frac{2}{3} = \frac{2}{3} \times \frac{4}{4} = \frac{8}{12}; \frac{8}{12} = \frac{8}{12} \div \frac{4}{4} = \frac{2}{3}$$

$$\frac{3}{4} = \frac{3}{4} \times \frac{2}{2} = \frac{6}{8}; \frac{6}{8} = \frac{6}{8} \div \frac{2}{2} = \frac{3}{4}$$

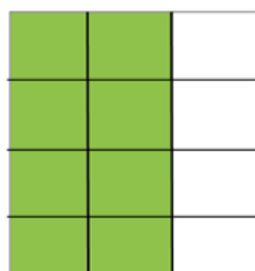
Possible solutions to the “Equivalent Fractions $\frac{2}{3}$ ” student recording sheet are shown below:



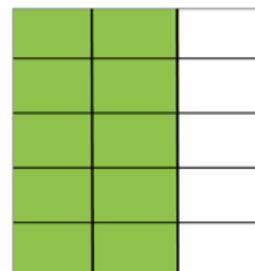
$$\frac{2}{3} \times \frac{2}{2} = \frac{4}{6}$$



$$\frac{2}{3} \times \frac{3}{3} = \frac{6}{9}$$

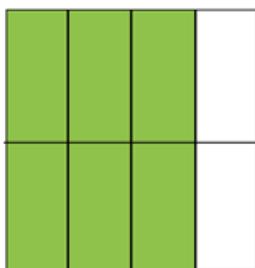


$$\frac{2}{3} \times \frac{4}{4} = \frac{8}{12}$$

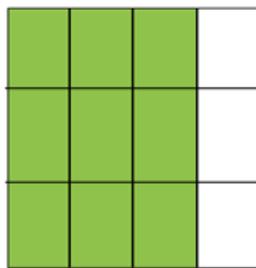


$$\frac{2}{3} \times \frac{5}{5} = \frac{10}{15}$$

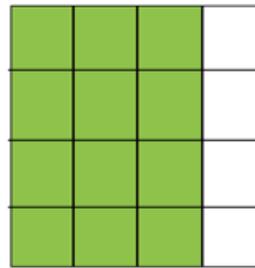
Possible solutions to the “Equivalent Fractions $\frac{3}{4}$ ” student recording sheet are shown below.



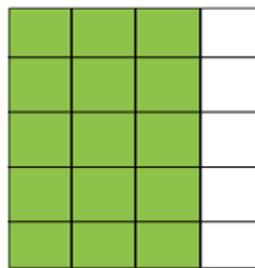
$$\frac{3}{4} \times \frac{2}{2} = \frac{6}{8}$$



$$\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$$



$$\frac{3}{4} \times \frac{4}{4} = \frac{12}{16}$$

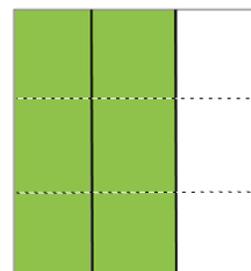


$$\frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$$

Task Directions

Students will follow the directions below from the “Equivalent Fractions $\frac{2}{3}$ ” student recording sheet.

Find fractions that are equivalent to the fraction shown in each square below. Slice the squares by drawing horizontal line segments in each square to create a different but equivalent fraction. Then write an equation for each model. See the example below.



I cut each piece into equal 3 parts, making 9 pieces.

$$\frac{2}{3} = \frac{2}{3} \times \frac{3}{3} = \frac{6}{9}$$

Students will follow the directions below from the “Equivalent Fractions $\frac{3}{4}$ ” student recording sheet.

Find fractions that are equivalent to the fraction shown in each square below. Slice the squares by drawing horizontal line segments in each square to create a different but equivalent fraction. Then write an equation for each square.

FORMATIVE ASSESSMENT QUESTIONS

- Into how many parts did you slice each piece?
- What is a fraction that is equivalent to one? (If the student sliced each piece into three parts, they need to multiply the fraction by $\frac{3}{3}$.)
- How could you use equivalent fractions to simplify this fraction (i.e. $\frac{6}{9}$)?

DIFFERENTIATION

Extension

- Invite students to play the Fraction Game.
<http://illuminations.nctm.org/ActivityDetail.aspx?ID=18>
 This game requires students to recognize equivalent fractions. Students should think about scenarios from the game that could be presented to the class so that students can discuss strategies and choices available to them.

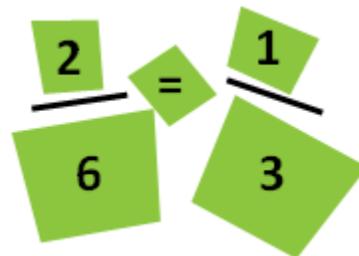
Intervention

- Some students may benefit from having a table of equivalent fractions. Ask students to complete the table by multiplying the numerator and denominator by the same number. Allow students to refer to this table when working with adding and subtracting fractions with unlike denominators.

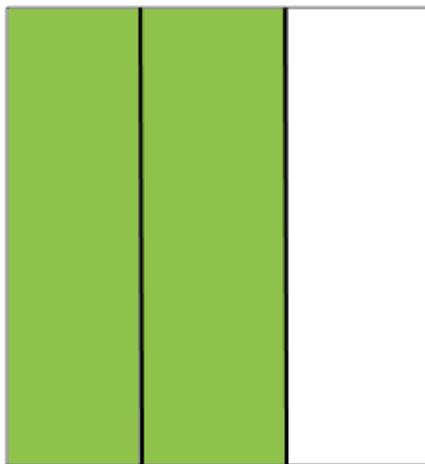
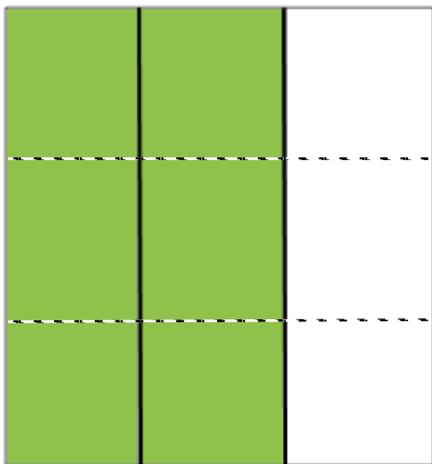
The image shows a digital interface for a fraction game. At the top, there is a number line from 0 to 1 with several points marked. Below it, a worksheet titled "Equivalent Fractions" is displayed. The worksheet includes a name and date line, a diagram showing $\frac{2}{6} = \frac{1}{3}$ with green cards, and a grid for finding equivalent fractions. The grid has 6 rows and 6 columns. The first row is labeled "1/12" in the second column. The second row is labeled "2/12" in the second column. The third row is labeled "3/12" in the second column. The fourth row is labeled "4/12" in the second column. The fifth row is labeled "5/12" in the second column. The sixth row is labeled "6/12" in the second column. The grid is partially shaded with a grey pattern.

Name _____ Date _____

Equivalent Fractions – $\frac{2}{3}$

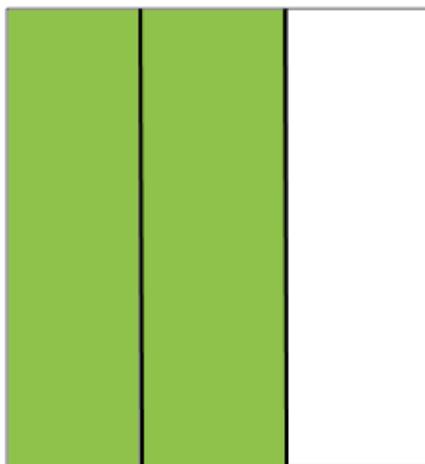
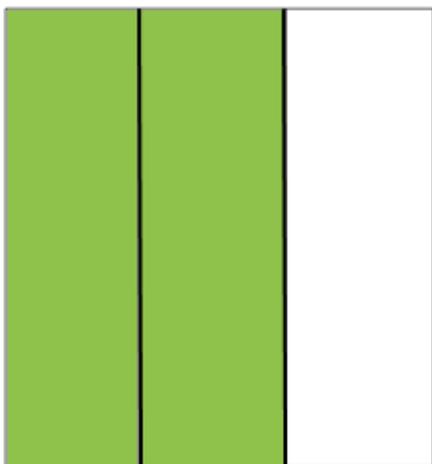


Find fractions that are equivalent to the fraction shown in each square below. Slice the squares by drawing horizontal line segments in each square to create a different but equivalent fraction. Then write an equation for each square. See the example below.



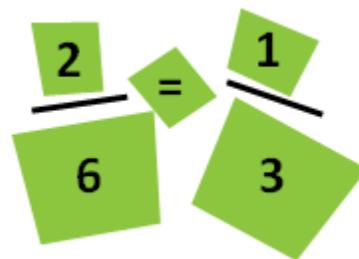
I cut each piece into equal 3 parts,
making 9 pieces.

$$\frac{2}{3} = \frac{2}{3} \times \frac{3}{3} = \frac{6}{9}$$



Name _____ Date _____

Equivalent Fractions – $\frac{3}{4}$



Find fractions that are equivalent to the fraction shown in each square below. Slice the squares by drawing horizontal line segments in each square to create a different but equivalent fraction. Then write an equation for each square.

