Equivalent Fractions
Lesson Plan

Objectives:
- Recognize equivalent fractions
- Create equivalent fractions
- Discover and communicate the generalization that if you multiply the numerator and denominator of a fraction by the same number (not zero) you get an equivalent fraction

Grade Band: 3rd – 5th
Estimated Time: 45 minutes (You may choose to show and discuss the video the following day.)
Pre-requisite Knowledge:
An understanding of fractions, specifically the following four key ideas:
- Identify the unit or one
- Knowledge that fractions must have equal parts
- Knowledge that the denominator tells how many equal parts are in the unit
- Knowledge that the numerator tells how many equal parts are considered

Materials Needed:
Audio-visual: Problem Solved video: *Equivalent Fractions* (Time: 4:41 minutes)
Photograph or diagram of brownies (see page 4)
Other: Several unlined papers for each student, pencils or markers

MAIN LESSON DEVELOPMENT
Launch:
- Present Problem 1 from *Equivalent Fractions Video Problems* to the class. You may present the problem to the class verbally and use the photograph or diagram from page 4.
- Allow individual students to decide which pan contains more and explain the reasoning for their answers.
- Use this time of discussion to review the following four key ideas:
  - The pan is the unit or one. Since both pans are the same size, we can compare the fractions that describe what is left in each pan.
  - Each pan of brownies is cut into equal-sized parts, so we can easily represent the brownies in each pan with a fraction.
  - The pan on the left shows four sixths because the whole pan is cut into six equal parts and four of the six brownies remain.
  - The pan on the right shows two thirds because the whole pan is cut into three equal parts and two of the three brownies remain.

Explore:
Show the students an unlined piece of paper. Fold the paper in half and shade one half. Show the paper and ask the students the following questions:
- How many total parts do you see? (2)
- How many shaded parts do you see? (1)
- What fraction of the paper is shaded? (One half)

Refold the paper in half and then fold the paper in thirds. Ask the students to:
- Predict the number of total parts you will have when you unfold the paper. (6)
- Predict the number of shaded parts you will have when you unfold the paper. (3)
- Predict what new fraction will be represented when you unfold the paper. (Three sixths)

Confirm students' predictions by unfolding the paper and ask the following questions:

- What happened to the number of total parts? (Tripled)
- What happened to the number of shaded parts? (Tripled)
- How do you know one half and three sixths are equal? (They both represent the same amount.)

Challenge each pair or small group of students to use paper folding to find two different fractions equivalent to one third. Use the questions listed above to help individual groups.

Summarize:

Have several students write fractions equivalent to one third on the board and show their paper models of the fraction. In each case ask the class the following two questions:

- What happened to the number of total parts?
- What happened to the number of shaded parts?

You may want to record the answers to these questions as shown below.

$$\overset{\times 4}{\underset{\times 4}{\frac{1}{3} = \frac{4}{12}}}$$

Challenge students to find a fraction equivalent to one third that is not on the board without using paper folding. Have students share their fractions and strategies. Ask students how many different fractions are equivalent to one third.

Show the *Equivalent Fractions* video and discuss students' comments and questions. Then discuss the following questions:

- How you can find an equivalent fraction without using paper folding?
- Why does this method always work? (Multiplying both the numerator and denominator by the same number is the same as multiplying by one.) If students do not offer this explanation, ask questions to help students see that when you multiply by two halves, three thirds, four fourths, etc., you are multiplying by one. When you multiply a whole number by one, you get the same number. When you multiply a fraction by a fraction equivalent to one, you get the same number, but in a different form. You may want to record the process as shown below.

$$\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}$$

- How can this knowledge help you simplify fractions? For example, how can this help you find that nine twelfths equals three fourths?
- Sometimes you hear a statement similar to, "I can reduce four eighths to one half." Does this statement make sense? Why not? (Because four eighths and one half are equal, one half is not smaller than four eighths.)
- What are some correct ways to say this statement without using the word reduce? (I can rename four eighths to one half. If I put four eighths in lowest terms, I get one half. If I simplify four eighths, I get one half.)

Modifications/Extensions:

- Rather than having all groups find fractions equivalent to one third, give each small group of students a different fraction.
- After finding fractions equivalent to one third, find fractions equivalent to a non-unit fraction like two thirds.
- Challenge students to find *at least* two fractions equivalent to one third. Only require them to show two or three of their fractions with paper folding.

Checking for Understanding (Formative Assessment)

- Have the students individually write down a fraction equivalent to three eighths and explain how they know their answers are correct. Note that students may choose to justify their answer using a model like paper folding or they may justify their answer by summarizing the generalization.