

# Equivalent Kitchen Conversions: Scaling Recipes

## Materials Needed

- Pencil and Notebook/Paper
- Whiteboard, large sheet of paper, or digital screen for modeling
- Set of standard measuring cups and spoons (physical kitchen tools)
- "The Simple Fudge Recipe" handout (provided in the lesson steps)
- Optional: Fraction tiles or circular diagrams (for visual learners)

## I. Introduction: The Kitchen Calculation Catastrophe (10 Minutes)

### A. The Hook: Recipe Rescue

**Educator Prompt:** Imagine you are baking cookies for a huge family reunion. The recipe you found only makes 12 cookies, but you need 48! If the recipe calls for  $\frac{3}{4}$  cup of flour, how can you quickly figure out exactly how much flour you actually need without ruining the batch?

Sometimes, we need to rename fractions to make them easier to work with, especially when measuring. That's where equivalent fractions save the day!

### B. Learning Objectives (Tell Them What You'll Teach)

By the end of this lesson, you will be able to:

1. Define equivalent fractions and explain their use in recipe scaling.
2. Mathematically generate equivalent fractions by multiplying or dividing the numerator and denominator by the same factor (the 'Magic One').
3. Successfully adjust a simple recipe (doubling or halving) using equivalent fractions.

### C. Success Criteria

You know you've mastered this when you can correctly fill out the Ingredient Conversion Chart for the final recipe challenge.

## II. Body: Mastering the Math of Measurement

### A. I Do: Modeling Equivalent Fractions (15 Minutes)

#### 1. Definition and Visualizing

**Educator Modeling:** An **equivalent fraction** is a fraction that looks different but represents the exact same amount or value. Think of a measuring cup. Is a half-cup the same amount as two quarter-cups?

- **Visual Example:** Draw a circle divided in half ( $\frac{1}{2}$ ). Next to it, draw the same circle divided into

four pieces, with two pieces shaded ( $\frac{2}{4}$ ). Show that they cover the exact same area.

- **Kinesthetic Connection:** Have the learner use the actual measuring cups to prove that two  $\frac{1}{4}$  cups of water fit exactly into one  $\frac{1}{2}$  cup measure.

## 2. The "Magic One" Rule (The Content Rule)

**Educator Modeling:** To find an equivalent fraction, you must multiply or divide the numerator (top number) and the denominator (bottom number) by the exact same number. Why? Because when you multiply a number by something like  $\frac{2}{2}$ , you are actually multiplying it by 1! And multiplying by 1 never changes the value.

### Example 1 (Multiplication/Scaling Up):

$\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}$  (One-third is the same as four-twelfths.)

### Example 2 (Division/Scaling Down/Simplifying):

$\frac{10}{20} \div \frac{10}{10} = \frac{1}{2}$  (Ten-twentieths is the same as one-half.)

## B. We Do: Guided Practice - Doubling a Recipe (15 Minutes)

### 1. Recipe Scenario: The Hot Chocolate Mix

We need to double this recipe (multiply everything by 2). This means our 'Magic One' is going to be  $\frac{2}{2}$ .

#### Original Ingredient List:

- Sugar:  $\frac{1}{4}$  cup
- Cocoa Powder:  $\frac{1}{2}$  cup
- Milk Powder:  $\frac{3}{4}$  cup

### 2. Calculation Walkthrough

**Educator Lead:** Let's start with sugar:  $\frac{1}{4}$  cup. We need to double it. We multiply the numerator by 2 and the denominator by 1 (since we are doubling the amount, not the parts, we are doing  $\frac{1}{4} \times 2$  which is  $\frac{2}{4}$ ).

- **Sugar:**  $\frac{1}{4} \times 2 = \frac{2}{4}$  cup. (Wait! Can we simplify  $\frac{2}{4}$ ? Yes, divide top and bottom by 2. This equals  $\frac{1}{2}$  cup.)
- **Cocoa Powder:**  $\frac{1}{2} \times 2 = \frac{2}{2}$  cup. (This simplifies to 1 full cup.)
- **Milk Powder:**  $\frac{3}{4} \times 2 = \frac{6}{4}$  cup. (This is an improper fraction. How many times does 4 go into 6? Once, with 2 left over. So 1 and  $\frac{2}{4}$  cup, which simplifies to 1 and  $\frac{1}{2}$  cup.)

### 3. Formative Assessment Check-In

**Think-Pair-Share:** Ask the learner(s) (or the homeschool student to explain to the educator/parent): "When we doubled the  $\frac{3}{4}$  cup to get 1 and  $\frac{1}{2}$  cups, did we find an equivalent fraction or did we scale the amount? How are these two ideas connected?" (Answer: We scaled the amount, and then used equivalent fractions to simplify the result, making it easier to measure.)

## C. You Do: Independent Application - The Chef's Challenge (25 Minutes)

### 1. Scenario: The Simple Fudge Recipe

Gage has decided he only wants a small batch of fudge. He needs to **HALVE** the following recipe. (This means multiplying every ingredient by  $\frac{1}{2}$ , or dividing the ingredient fraction by 2.)

#### Original Simple Fudge Recipe:

- Sweetened Condensed Milk: 1 can (assume 1 cup)
- Chocolate Chips: 2  $\frac{1}{4}$  cups
- Butter:  $\frac{1}{2}$  tablespoon
- Vanilla Extract:  $\frac{3}{4}$  teaspoon

### 2. The Ingredient Conversion Chart (Summative Practice)

Learners must complete the chart below, showing their calculations for the new halved amount and simplifying the fraction if necessary.

| Ingredient      | Original Amount      | Required Calculation (Divide by 2)   | New Halved Amount (Simplified)        |
|-----------------|----------------------|--|---------------------------------------|
| Condensed Milk  | 1 cup                | $1 \div 2$   | $\frac{1}{2}$ cup                     |
| Chocolate Chips | 2 $\frac{1}{4}$ cups | Convert 2 $\frac{1}{4}$ to $\frac{9}{4}$ , then divide by 2 ( $\frac{9}{4} \div 2$ ) | $\frac{9}{8}$ or 1 $\frac{1}{8}$ cups |
| Butter          | $\frac{1}{2}$ Tbsp   | $\frac{1}{2} \div 2$   | $\frac{1}{4}$ Tbsp                    |
| Vanilla Extract | $\frac{3}{4}$ tsp    | $\frac{3}{4} \div 2$   | $\frac{3}{8}$ tsp                     |

### 3. Success Review and Practical Check

Once calculations are complete, have the learner visually check the answers using the real measuring cups. For example, if they calculated  $\frac{1}{4}$  Tbsp of butter, show them that  $\frac{1}{4}$  is half of  $\frac{1}{2}$  Tbsp.

## III. Conclusion: Wrap Up and Reflection (10 Minutes)

### A. Recap and Review (Tell Them What You Taught)

#### Q&A Session:

1. What is the golden rule for creating an equivalent fraction? (Answer: Multiply or divide the numerator and denominator by the same number, or the 'Magic One.')
2. Why are equivalent fractions important when you are scaling a recipe? (Answer: They help us rename awkward fractions (like  $\frac{2}{8}$  cup) into measurable amounts (like  $\frac{1}{4}$  cup) so we don't mess up the recipe.)

### B. Final Reflection

**Learner Prompt:** Write down one new thing you learned about fractions today and one way you will use this skill the next time you help cook in the kitchen.

## C. Summative Assessment

The completed and corrected Ingredient Conversion Chart serves as the final summative assessment. (Success is achieved if 3 out of 4 calculations, including the improper fraction conversion for chocolate chips, are correct.)

## IV. Differentiation and Extension

### Scaffolding for Struggling Learners (Adaptability)

- **Focus on Visuals:** Provide pre-cut fraction circles or tiles to physically manipulate the measurements (e.g., demonstrate that two  $\frac{1}{8}$  pieces equal one  $\frac{1}{4}$  piece).
- **Simplify Numbers:** Use only whole number multiplication/division problems before moving to fractional division (e.g., practice converting  $\frac{1}{2}$  to  $\frac{5}{10}$  before attempting to divide  $\frac{3}{4}$  by 2).
- **Provide Conversion Chart:** For the 'You Do' section, provide a reference showing how to convert mixed numbers to improper fractions (e.g.,  $2\frac{1}{4} = \frac{9}{4}$ ).

### Extension for Advanced Learners (Application & Creativity)

- **Scaling to Odd Amounts:** Challenge the learner to scale the Simple Fudge Recipe to 1.5 times the original amount. (Requires multiplying by  $\frac{3}{2}$ , introducing more complex multiplication.)
- **Recipe Rewrite:** Ask the learner to find a favorite family recipe that uses awkward fractions (like  $\frac{5}{8}$  cup) and rewrite the entire recipe using only measurable equivalent fractions ( $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{3}$ , etc.).
- **Cost Analysis:** Have them calculate how much money they save or spend by making the halved recipe versus the full recipe, integrating decimals and fractions.