Bake It To Scale! Algebra in the Kitchen

Welcome! Today, we're mixing math with something delicious - baking! We'll explore how algebra, specifically ratios and equations, is essential for adjusting recipes.

Materials Needed:

- Pencil or Pen
- Notebook or Paper
- Calculator (optional, for checking work)
- Favorite Cookie Recipe (we'll use a sample one)
- Measuring Cups and Spoons (conceptual use)

The Recipe Challenge

Imagine you have a delicious chocolate chip cookie recipe that makes 24 cookies, but you only want to make 12 cookies for yourself today. Or maybe you need to make 36 cookies for a bake sale! How do you adjust the ingredients?

Original Recipe (Makes 24 cookies):

- 2 cups Flour
- 1 cup Butter
- 3/4 cup Sugar
- 1/2 cup Brown Sugar
- 2 Eggs
- 1 tsp Vanilla Extract
- 1/2 tsp Baking Soda
- 1 cup Chocolate Chips

Using Ratios

To scale a recipe, we use ratios. The ratio represents the relationship between the desired yield (how many cookies you want) and the original yield (how many the recipe makes).

Scenario 1: Making 12 Cookies

Desired Yield: 12 cookies
Original Yield: 24 cookies
Ratio: 12 / 24 = 1/2

This means we need 1/2 of every ingredient. Let's calculate the new amount for Flour:

Original Flour: 2 cups
New Flour = Original Flour * Ratio
New Flour = 2 cups * (1/2) = 1 cup

Your Turn (Scenario 1): Calculate the amount needed for Butter and Sugar using the 1/2 ratio.

*Butter: 1 cup * (1/2) = ?*
*Sugar: 3/4 cup * (1/2) = ?*

Setting up Equations

We can represent this with a linear equation. Let 'O' be the original amount of an ingredient, 'N' be the new amount, and 'S' be the scaling factor (our ratio).

N = O * S

Scenario 2: Making 36 Cookies

Desired Yield: 36 cookies
Original Yield: 24 cookies
Scaling Factor (S) = Desired Yield / Original Yield = 36 / 24

Simplify the fraction: 36/24 = (12 * 3) / (12 * 2) = 3/2

So, we need 3/2 times the original amount of each ingredient.

Let's calculate the new amount for Brown Sugar:

Original Brown Sugar (O): 1/2 cup
Scaling Factor (S): 3/2
New Brown Sugar (N) = O * S
N = (1/2 cup) * (3/2)
N = 3/4 cup

Your Turn (Scenario 2): Calculate the new amount needed for Eggs and Chocolate Chips using the 3/2 scaling factor.

*Eggs: 2 eggs * (3/2) = ?*
*Chocolate Chips: 1 cup * (3/2) = ?*

Dealing with Tricky Units

Sometimes scaling results in awkward measurements. What if you needed 1/8 of a cup? It's helpful to know conversions:

- 1 cup = 16 Tablespoons (Tbsp)
- 1 Tablespoon = 3 Teaspoons (tsp)

Example: If a scaled recipe needs 1/8 cup of an ingredient.
(1/8 cup) * (16 Tbsp / 1 cup) = 16/8 Tbsp = 2 Tbsp.

Practice Problems

1. Your recipe calls for 1 1/2 cups of milk and makes 12 servings. How much milk do you need for 18 servings? (Hint: Find the scaling factor first: 18/12)
2. A brownie recipe making 16 brownies needs 2/3 cup cocoa powder. You want to make only 4 brownies. How much cocoa powder do you need? (Scaling factor: 4/16)
3. You scaled a recipe and need 1.5 eggs. How would you handle this in reality? (Discuss practical baking solutions).

Conclusion

See? Algebra is super useful, even in the kitchen! By understanding ratios and setting up simple equations, you can confidently adjust any recipe. Now, maybe it's time to preheat the oven?