LESSON 1

Baker's Percentage

In this lesson, students use ratio reasoning in the baker's percentage to identify the precise quantities for a recipe.

CONNECTIONS TO THE CORE

- Find a percent of a quantity as a rate per 100, and solve problems. **6.RP.A.3c**
- Use ratio and rate reasoning to solve real-world and mathematical problems. **6.RP.A.3**
- Recognize and represent proportional relationships between quantities. **7.RP.A.2**

LANGUAGE SUPPORT

MATH TERMS

percent
part per 100

ratio
relationship between two or more numbers

ACADEMIC LANGUAGE

baker's percentage
ratio of ingredients needed to create a balanced structure for different types of cakes

SET UP

Introduce Chapter 2 from *Math Meets Culinary Arts*.

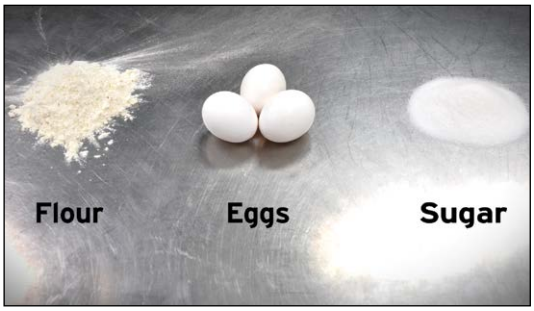
Ask questions to review the video with students.

For example: ***What types of careers do you think there are in culinary arts?*** (chef, nutritional consultant, restaurant manager) ***How does math relate to culinary arts?*** (Chefs and managers use unit prices and ratios to manage costs, measure ingredients, and scale quantities.)

Review the definition of *baker's percentage*.

Today, we'll use the baker's percentage to find the quantity of egg whites and sugar against the benchmark quantity of flour in an angel food cake.

Play Chapter 2: Baker's Percentage.



[Pause at 02:24.]

PLAN

Create a plan to solve the problem.

Diamond wants to change her recipe from a chocolate-raspberry mousse cake to an angel food cake. Her current recipe calls for 110 g flour. Using the baker's percentage ratio, how many grams of egg whites and sugar should Diamond use?

Cake	Flour	Eggs	Sugar
Angel Food Cake	100%	350%	260%

Read the problem aloud to students.

Guide students to analyze the quantities and look for entry points to solve the problem.

For example: ***What is the problem asking us to find?*** (the quantity of egg whites and sugar in an angel food cake)

What information do we have? (quantity of flour and the baker's percentage)

Point out to students that they can analyze the percents in the table as a ratio.

How can we find the unknown quantities? (Work backwards using the benchmark quantity of flour and then multiply to find the ratio of eggs and sugar.)

LESSON 1

Baker's Percentage, *continued*

STANDARDS FOR MATHEMATICAL PRACTICE	**Make Use of Structure** Students use the structure of the ratio in the baker's percentage to find the unknown quantities.	**Model With Mathematics** Students represent quantities as a ratio and apply proportional reasoning to create a solution.

SOLVE

Have student pairs solve the problem as you circulate.

Encourage students to come up with multiple strategies and represent the problem situation in different ways. Guide students to work backwards to check their work.

SUPPORT

Ask questions based on common errors to support student understanding.

- ***How many times more egg whites do you need than flour? How do you know?***
- ***Can you draw a model to represent the quantities of flour, eggs, and sugar?***
- ***Which ingredient is there the most of? The least? How do you know?***

EXTEND

Ask questions to encourage students to extend their thinking.

- ***Quantities based on the baker's percentage can vary up to 20%. What is the minimum quantity of sugar in this recipe?***
- ***How many grams of egg whites and sugar would you need to bake an angel food cake with 55 g flour?***

SHARE

Have students present their solutions.

Ask students from each pair to explain their solutions to the class. Show at least two different approaches to solving the problem and one incorrect solution. To extend classroom discussion, call on students to explain the reasoning of the student who is presenting.

Possible student work:

Flour → 100%: 110 g

100 + 10 = 110
100(1) + 100(0.1) = 110
100 x 1.1 = 110 g
So, the scale factor is 1.1.

Eggs → 350%: ?

350 x 1.1 = 350(1) + 350(0.1)
= 350 + 35
= 385 g

Sugar → 260%: ?

260 x 1.1 = 260(1) + 260(0.1)
= 260 + 26
= 286 g

Therefore, 100%: 350%: 260% = 110 g: 385 g: 286 g.

Play the Chapter 2 Solution from *Math Meets Culinary Arts*.
Have students complete the Practice and Reflect sections on Student Page 2.

HOMEWORK IDEAS

Have students apply the baker's percentage!

Students choose a cake recipe and determine if it matches the baker's percentage.

- ***What is the baker's percentage for this type of cake?***
- ***How many grams of eggs and sugar should you use?***
- ***Is your answer reasonable?***

MATH@WORK™
CONNECTING MATH TO 21ST CENTURY CAREERS

Your Name _____

STUDENT

LESSON 1

Baker's Percentage

MATH TERMS

percent
part per 100

ratio
relationship between two or more numbers

Diamond wants to change her recipe from a chocolate-raspberry mousse cake to an angel food cake. Her current recipe calls for 110 g flour. Using the baker's percentage ratio, how many grams of egg whites and sugar should Diamond use?

Cake	Flour	Eggs	Sugar
Angel Food Cake	100%	350%	260%

PLAN

Create a plan to solve the problem with your partner.

SOLVE

Use your plan to solve the problem.

Your Name _____

LESSON 1

Baker's Percentage, *continued*

PRACTICE

Apply your skills to solve another problem.

Diamond bakes a sponge cake with 50 g flour, 112.5 g egg whites, and 77.5 g sugar. Based on the ratio in this recipe, what is the baker's percentage for a sponge cake?

REFLECT

Explain how you made sense of the math.

How did you find the unknown quantities?

I found the unknown quantities by _____

_____

_____

_____

Why are percents a type of ratio?

Percents are a type of ratio because _____

_____

_____

_____

SCORE 0 1 2 3

LESSON 1

Baker's Percentage

POSSIBLE STUDENT WORK

MATH TERMS

percent
part per 100

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relationship between two or more numbers

Diamond wants to change her recipe from a chocolate-raspberry mousse cake to an angel food cake. Her current recipe calls for 110 g flour. Using the baker's percentage ratio, how many grams of egg whites and sugar should Diamond use?

Cake	Flour	Eggs	Sugar
Angel Food Cake	100%	350%	260%

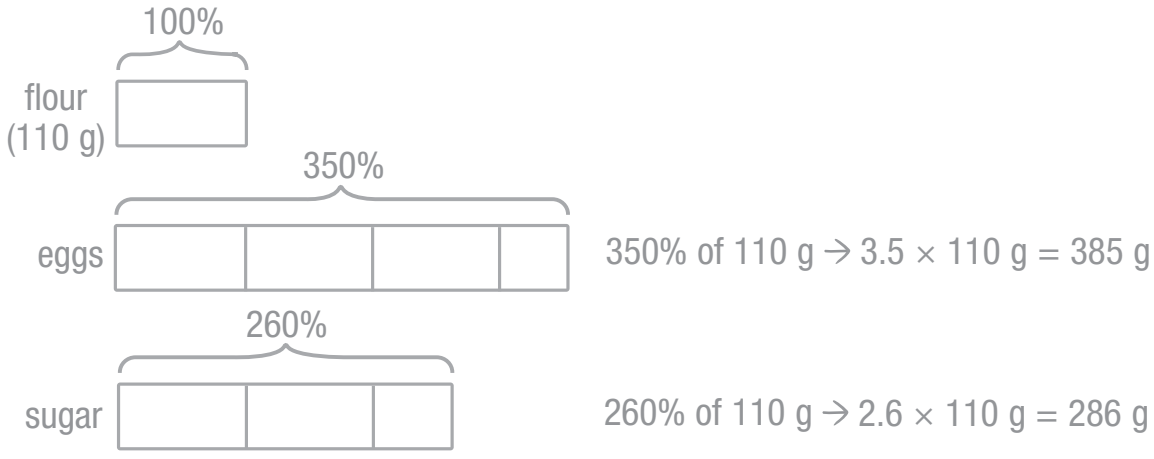
PLAN

Create a plan to solve the problem with your partner.

The baker's percentage ratio is 100% flour: 350% eggs: 260% sugar.
First, I will draw models to represent the three quantities.
Then, I will rewrite the percents as decimals and multiply to find the unknown quantities.

SOLVE

Use your plan to solve the problem.



350% of 110 g → 3.5 × 110 g = 385 g

260% of 110 g → 2.6 × 110 g = 286 g

The ratio is 110 g flour: 385 g eggs: 286 g sugar.
Diamond should use 385 g egg whites and 286 g sugar.

LESSON 1

Baker's Percentage, *continued*

POSSIBLE STUDENT WORK

PRACTICE

Apply your skills to solve another problem.

Diamond bakes a sponge cake with 50 g flour, 112.5 g egg whites, and 77.5 g sugar. Based on the ratio in this recipe, what is the baker's percentage for a sponge cake?

The ratio in this recipe is 50 g flour: 112.5 g eggs: 77.5 g sugar.
To find the baker's percentage, I need to measure the quantities of eggs and sugar against the benchmark of 100% flour.
Then, I can find the scale factor and multiply to find the unknown baker's percentage.

To represent 50 g flour as a benchmark of 100%, I will double the quantity to get 100 g. I will use 2 as the scale factor.

Flour → $50 \times 2 = 100\%$
Eggs → $112.5 \times 2 = 225\%$
Sugar → $77.5 \times 2 = 155\%$

Sponge Cake	Flour	Eggs	Sugar
Recipe	50 g	112.5 g	77.5 g
Baker's Percentage	100%	225%	155%

The baker's percentage for a sponge cake is 100% flour: 225% eggs: 155% sugar.

REFLECT

Explain how you made sense of the math.

How did you find the unknown quantities?

I found the unknown quantities by representing the quantities as a ratio against the benchmark of 100% flour.

Why are percents a type of ratio?

Percents are a type of ratio because a percent compares two or more quantities by representing them as parts per 100.

SCORE 0 1 2 3