From the Webisode:
Math Meets Culinary Arts

featuring **Carla Hall** *and* **Nicholas Elmi**

HMH

TEACHER

LESSON 4

Protein Proportions

In this lesson, students apply proportional reasoning to analyze the percentage content of specific ingredients in a meal.

CONNECTIONS TO THE CORE

- Find a percent of a quantity as a rate per 100, and solve problems. **6.RP.A.3c**
- Understand ratios and describe ratio relationships between 2 quantities. **6.RP.A.1**
- Recognize and represent proportional relationships between quantities. **7.RP.A.2**

LANGUAGE SUPPORT

MATH TERMS

percent
rate per 100

proportion
equation that shows two equivalent ratios

ACADEMIC LANGUAGE

daily intake
suggested amount of a nutrient to eat each day

protein percentage
percentage of a food item that is protein

SET UP

Introduce Chapter 5 from *Math Meets Culinary Arts*.

Ask questions to review Lesson 3 and connect to Lesson 4.

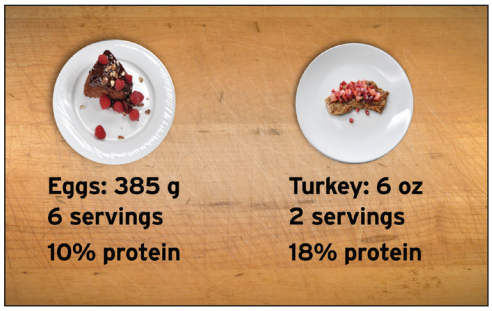
For example: ***How did we find the cost difference in substituting frozen vegetables to serve 500 people?*** (We used proportional reasoning to find the cost difference per 6 servings and multiplied to scale up to 500 servings.)

What do you think makes a meal healthy? (fresh ingredients, smaller portions, balanced food plate)

Review the definition of *percent*.

Today, we'll identify the percentage of daily protein intake in the 3-course meal from the video.

Play Chapter 5: Protein Proportions.



[Pause at 06:27.]

PLAN

Create a plan to solve the problem.

The average high school student needs about 50 g protein every day. The table shows the main sources of protein in this meal and the protein percentage in each ingredient. About what percent of a student's daily protein intake is in this meal?

Item	Quantity	Servings	Protein Percentage
Eggs	385 g	6	10%
Turkey	6 oz	2	18%

Read the problem aloud to students.

Guide students to analyze the problem and make sense of the quantities in the table.

For example: ***What does protein percentage in the table mean?*** (the percentage of protein in each ingredient)

Encourage students to simplify the quantities and find the grams of protein per serving.

How can we find the quantity of protein per serving? (Divide the total by the serving size. Then, multiply by the percentage value to find the quantity.)

Point out that this meal should provide at least 33.3% of daily protein intake.

LESSON 4

Protein Proportions, *continued*

STANDARDS FOR MATHEMATICAL PRACTICE	Reason Abstractly Students make sense of the relationships between quantities to scale down the quantities per serving size.	Use Repeated Reasoning Students repeat their calculations and use patterns to find the precise quantity of protein in each ingredient.

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 can you use a percentage to find a specific quantity?***
- ***What is 10% of 100? How do you know?***
- ***How can you express ounces as grams?***
- ***How can you estimate to check if your answer is reasonable?***

EXTEND

Ask questions to encourage students to extend their thinking.

- ***Should each meal in a day have the same amount of protein? Why or why not?***
- ***Can you express the quantities in the problem as a ratio?***
- ***What would happen if the meal had 6 oz turkey per serving instead?***

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:

Eggs → 385 g: 6 servings: 10% protein

385 ÷ 6 ≈ 64.2 g

10% of 64.2 g → 64.2 × 10%

= 64.2 × 0.1

= 6.42 g

Turkey → 6 oz: 2 servings: 18% protein

6 ÷ 2 = 3 oz

1 oz: 28.35 g → 3 oz: 85.05 g

18% of 85.05 g → 85.05 × 18%

= 85.05 × 0.18

≈ 15.31 g

Total → 6.42 g + 15.31 g = 21.73 g

$\frac{21.73\ g}{50\ g}$ → 43%

This meal has about 43% of a student's daily protein intake.

Play the Chapter 5 Solution from *Math Meets Culinary Arts*.

Have students complete the Practice and Reflect sections on Student Page 2.

HOMEWORK IDEAS

Have students plan a balanced meal!

Students evaluate their protein intake in a single meal.

- ***What percentage of your daily protein intake is in this meal?***
- ***Do you normally get more, less, or the same quantity of protein?***
- ***Which food group do you think you need more or less of?***

Your Name _____

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PLAN

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SOLVE

Use your plan to solve the problem.

LESSON 4

Protein Proportions, *continued*

PRACTICE **Apply your skills to solve another problem.**

Students' daily fiber intake varies with age and gender. Girls 9–18 years need 26 g fiber. Boys 9–13 years need 31 g fiber, while boys 14–18 years need 38 g fiber. The table shows the fiber content in this meal. About what percent of your daily fiber intake is in this meal?

Food	Raspberries	Strawberries	Onions	Peppers	Tomatoes	Baguette
Fiber	2.05 g	1.65 g	0.75 g	0.40 g	0.60 g	1.63 g

REFLECT **Explain how you made sense of the math.**

Why do you think it is helpful to compare quantities using percentages?

It is helpful to compare quantities using percentages because _____

_____

_____

Can you write an expression with a variable to represent this problem?

I can write the expression _____

_____

_____

SCORE 0 1 2 3

Your Name _____

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