



## LESSON 2

### Relish Ratios

In this lesson, students solve a multi-step problem by converting measurement units and scaling down quantities.

#### CONNECTIONS TO THE CORE

- Convert between different standard measurement units. **5.MD.A.1**
- Interpret multiplication as scaling (resizing). **5.NF.B.5**
- Fluently add, subtract, multiply, and divide multi-digit decimals. **6.NS.B.3**
- Use ratio reasoning to convert measurement units. **6.RP.A.3d**

#### LANGUAGE SUPPORT

##### MATH TERMS

**proportion**  
equation that shows two equivalent ratios

**scale factor**  
number that scales or multiplies a quantity

##### ACADEMIC LANGUAGE

**paillard**  
thinly sliced or pounded piece of meat

**relish**  
chopped fruit or vegetable pieces in a sauce

#### SET UP

### Introduce Chapter 3 from *Math Meets Culinary Arts*.

Ask questions to review Lesson 1 and connect to Lesson 2.

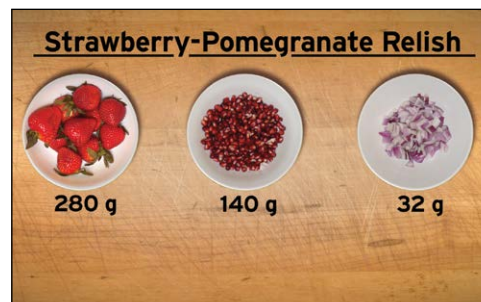
For example: **How did we use math in the last problem to create a recipe?** (We created a recipe using the baker's percentage ratio to identify the precise quantities.)

Ask students to list possible steps from creating a recipe to preparing it for a group. Explain that sometimes recipes need to be scaled up or down depending on their serving size.

Review the definitions of *proportion* and *scale factor*.

**Today, we'll convert from grams to ounces and scale down the ingredients in a recipe.**

Play Chapter 3: Relish Ratios.



[Pause at 01:12.]

#### PLAN

### Create a plan to solve the problem.

Lyanna's relish recipe calls for 280 g strawberries, 140 g pomegranate seeds, and 32 g red onions. It makes 8 servings.

In ounces, what quantity of each ingredient does Lyanna need to make only 2 servings of the relish?

Read the problem aloud to students.

Guide students to think logically and analyze the different steps in the problem.

For example: **How should Lyanna scale down her recipe?** (The recipe serves 8, and she only needs to make 2 servings.)

Point out that chefs often need to convert between different measurement units.

**Which measurement unit do we use for the final quantities?** (ounces) **How many grams are in 1 ounce?** (1 oz ≈ 28.35 g)

Guide students to see that they can estimate and use proportional reasoning to check if their answers are reasonable.



**LESSON**

**2**

## Relish Ratios, *continued*

**STANDARDS FOR  
MATHEMATICAL  
PRACTICE**

**Construct Viable Arguments**

Students construct arguments to support their reasoning and summarize the reasoning of others.

**Attend to Precision**

Students specify units of measure and evaluate their answers to determine the precision of their estimates.

**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.

- **About how many grams is 2 oz? 3 oz? How can you estimate to check if your answer is reasonable?**
- **What is the scale factor?**
- **Is it more efficient to divide the quantities by 4 or multiply by the scale factor  $\frac{1}{4}$ ?**

**EXTEND**

Ask questions to encourage students to extend their thinking.

- **Does it matter which step of the problem you solve first? Why or why not?**
- **What expression can you write to simplify scaling down and converting into one step?**
- **Why do you think proportional reasoning is important in this problem?**

**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:**

$$8 \text{ servings} \div 4 = 2 \text{ servings}$$

Ingredients	Original Quantity (8 servings)	$\div 4$	New Quantity (2 servings)	Conversion $\times \frac{1 \text{ oz}}{28.35 \text{ g}}$
Strawberries	280 g	$\div 4$	70 g	2.5 oz
Pomegranate Seeds	140 g	$\div 4$	35 g	1.2 oz
Red Onions	32 g	$\div 4$	8 g	0.3 oz



**Play the Chapter 3 Solution from Math Meets Culinary Arts.**

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

**HOMEWORK  
IDEAS**

### Have students scale their own recipe!

Students scale a recipe up or down for a specific serving size.

- **What is the scale factor?**
- **How can you check that your quantities are correct?**
- **What if someone asked you to serve the meal to 100 people instead?**

**LESSON**

**2**

## Relish Ratios

**MATH TERMS**

**proportion**

equation that shows two equivalent ratios

**scale factor**

number that scales or multiplies a quantity

Lyanna's relish recipe calls for 280 g strawberries, 140 g pomegranate seeds, and 32 g red onions. It makes 8 servings. In ounces, what quantity of each ingredient does Lyanna need to make only 2 servings of the relish?

**PLAN**

Create a plan to solve the problem with your partner.

**SOLVE**

Use your plan to solve the problem.

LESSON

**2**

## Relish Ratios, *continued*

**PRACTICE**

Apply your skills to solve another problem.

Lyanna needs to make her recipe for a group of 15 people. How many ounces of strawberries, pomegranate seeds, and red onions will she need?

**REFLECT**

Explain how you made sense of the math.

How are scaling and converting quantities similar?

*Scaling and converting quantities are similar because*

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How could you use mental math to solve these problems?

*I could use mental math by* \_\_\_\_\_

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**LESSON**

# 2

## Relish Ratios

## POSSIBLE STUDENT WORK

**MATH TERMS**

**proportion**

equation that shows two equivalent ratios

**scale factor**

number that scales or multiplies a quantity

Lyanna's relish recipe calls for 280 g strawberries, 140 g pomegranate seeds, and 32 g red onions. It makes 8 servings. In ounces, what quantity of each ingredient does Lyanna need to make only 2 servings of the relish?

**PLAN**

Create a plan to solve the problem with your partner.

First, I will divide by 4 to scale down the quantities in the recipe from 8 servings to 2. Then, I will convert the quantities by setting up a proportion and solving for the unknown. Since 1 oz  $\approx$  28.35 g, I can use proportional reasoning to estimate whether my answer is reasonable.

Ounces	Grams
1	28.35
2	56.70
3	85.05

**SOLVE**

Use your plan to solve the problem.

Strawberries  $\rightarrow 280 \text{ g} \div 4 = 70 \text{ g}$

Pomegranate seeds  $\rightarrow 140 \text{ g} \div 4 = 35 \text{ g}$

Red onions  $\rightarrow 32 \text{ g} \div 4 = 8 \text{ g}$

To convert from grams to ounces, I can use the ratio  $\frac{1 \text{ oz}}{28.35 \text{ g}}$ .

Strawberries	Pomegranate Seeds	Red Onions
$\frac{1 \text{ oz}}{28.35 \text{ g}} = \frac{x}{70 \text{ g}}$ $\frac{1 \text{ oz}}{28.35 \text{ g}} (70 \text{ g}) = x$ $x \approx 2.47 \text{ oz}$	$\frac{1 \text{ oz}}{28.35 \text{ g}} = \frac{p}{35 \text{ g}}$ $\frac{1 \text{ oz}}{28.35 \text{ g}} (35 \text{ g}) = p$ $p \approx 1.23 \text{ oz}$	$\frac{1 \text{ oz}}{28.35 \text{ g}} = \frac{r}{8 \text{ g}}$ $\frac{1 \text{ oz}}{28.35 \text{ g}} (8 \text{ g}) = r$ $r \approx 0.28 \text{ oz}$

Therefore, Lyanna needs about 2.5 oz strawberries, 1.2 oz pomegranate seeds, and 0.3 oz red onions to make 2 servings of the relish.

**LESSON**

**2**

**Relish Ratios, continued**

**POSSIBLE STUDENT WORK**

**PRACTICE**

Apply your skills to solve another problem.

Lyanna needs to make her recipe for a group of 15 people. How many ounces of strawberries, pomegranate seeds, and red onions will she need?

From the previous problem, I already know how many ounces of each ingredient Lyanna needs to serve 2 people. Since I already know the quantity for 2 servings, I can multiply using the scale factor of  $\frac{15}{2}$  to get 15 servings. Since 15 is close to 16, and  $2 \times 8 = 16$ , I can estimate by multiplying the quantities by 8 to check if my answer is reasonable.

Estimate (16 servings):

Strawberries  $\rightarrow 2.5 \text{ oz} \times 8 = 20 \text{ oz}$

Pomegranate seeds  $\rightarrow 1.2 \text{ oz} \times 8 = 9.6 \text{ oz}$

Red onions  $\rightarrow 0.3 \text{ oz} \times 8 = 2.4 \text{ oz}$

To get from 2 servings to 15, my exact scale factor is  $\frac{15}{2}$ , or 7.5. I will multiply all the ingredients by 7.5.

Ingredients	Original Quantity (2 servings)	$\times 7.5$	New Quantity (15 servings)
Strawberries	2.5 oz	$\times 7.5$	18.75 oz
Pomegranate Seeds	1.2 oz	$\times 7.5$	9.0 oz
Red Onions	0.3 oz	$\times 7.5$	2.25 oz

Lyanna will need 18.75 oz strawberries, 9 oz pomegranate seeds, and 2.25 oz red onions to make 15 servings of the relish.

**REFLECT**

Explain how you made sense of the math.

How are scaling and converting quantities similar?

Scaling and converting quantities are similar because they can both be done by multiplying one quantity by another.

How could you use mental math to solve these problems?

I could use mental math by using proportions and estimating to check whether my answers were reasonable.