



**THE 2021 YOUNG MATHEMATICAL STORY AUTHOR (YMSA) COMPETITION**

**THE STUART J. MURPHY AWARD  
(THE 8-11 YEARS OLD CATEGORY)**

**SHORTLISTED**

‘The Cooking Competition’ by Ryan Kim (10 years old)  
at Jack L Weaver Elementary (California, USA)

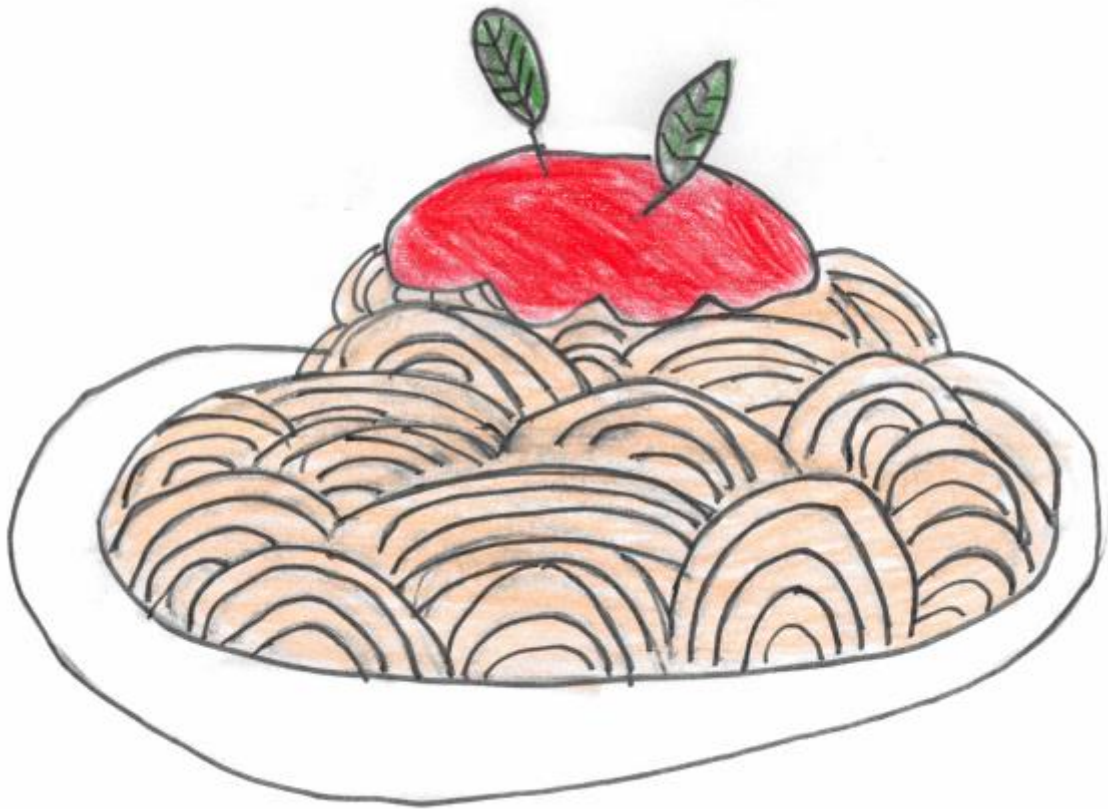
You can read the author’s inspiration for the story and the judges' comments  
on:

[www.mathsthroughstories.org/ymsa2021](http://www.mathsthroughstories.org/ymsa2021)

**#YMSAMaths**

# The Cooking Competition

A Story About Multiplying Fractions



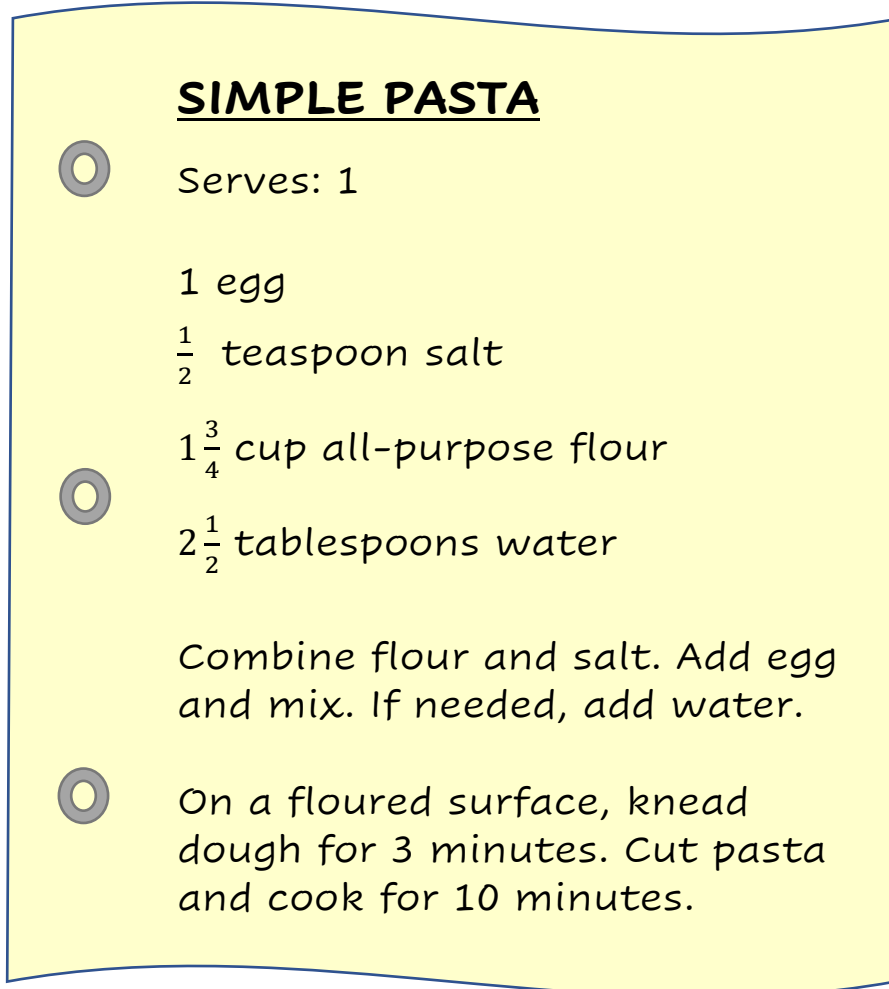
*Ryan K. Kim*

Jack L. Weaver Elementary School



The Sunrise International School holds an annual cooking competition. For several years, four friends came together to participate each spring break. Their names were Jose, Rosa, Riku, and Amber. Jose was from Mexico, Rosa from Italy, Riku from Japan, and Amber from South Africa. They had won second place the last few years, but this time, they were ready to win! As they were thinking about what to make, Rosa said, "I have a family recipe for pasta!" They decided to use her recipe for the competition against 5 other teams. They needed to make food to submit within the next hour. They chose the team name of The All Stars.

Rosa left the room and when she came back, a piece of paper was clutched in her hand. This is what it looked like:



**SIMPLE PASTA**

- Serves: 1
- - 1 egg
  - $\frac{1}{2}$  teaspoon salt
  - $1\frac{3}{4}$  cup all-purpose flour
  - $2\frac{1}{2}$  tablespoons water
- Combine flour and salt. Add egg and mix. If needed, add water.
- On a floured surface, knead dough for 3 minutes. Cut pasta and cook for 10 minutes.

“What should we do?” asked Riku. “It only serves 1 person, but there are 4 judges.”

“We better think of something quick!” Amber said. “Otherwise, we’ll lose the competition!”

“I think we should multiply all of the ingredients by 4 to make enough for everyone,” Jose said. Everyone agreed and they set to work.

“The recipe says we need 1 egg so if we multiply that by 4, we’ll need 4 eggs,” said Amber.

“I don’t understand!” Riku exclaimed.

“Well, multiplication is repeated addition. In other words, multiplying something by four means to add it together 4 times.  $4 \times 1$  is four 1’s or  $1 + 1 + 1 + 1$ ,” Amber responded.

$$\text{🥚} + \text{🥚} + \text{🥚} + \text{🥚} = 4 \text{ eggs}$$

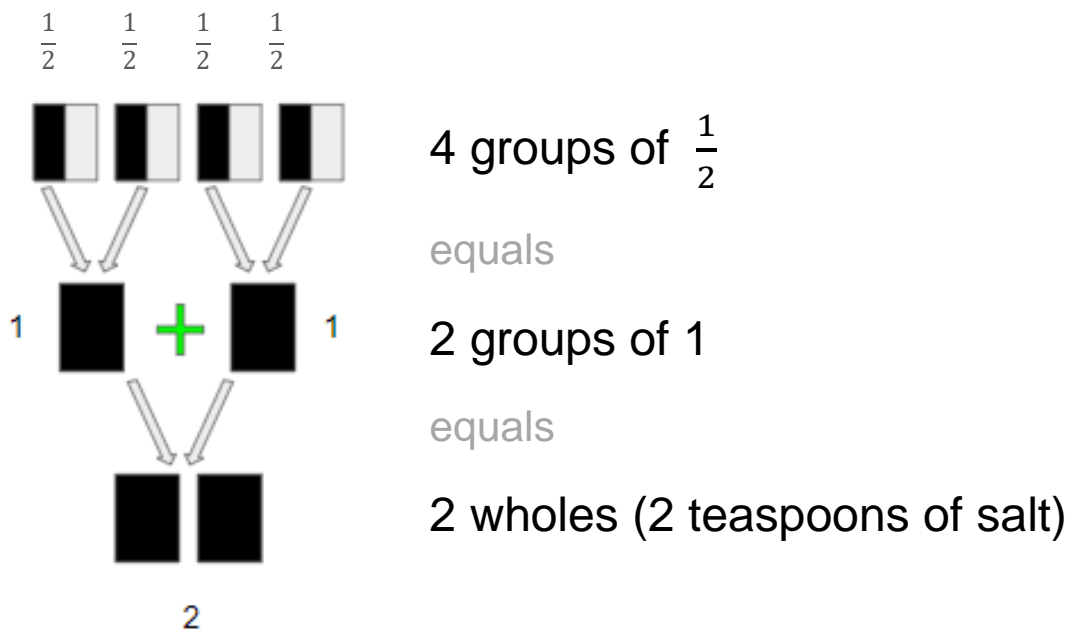
Amber left to get four eggs and Rosa started to calculate the salt needed. Rosa said, “The recipe says we need  $\frac{1}{2}$  a teaspoon for one person, so we need four times that for four people.  $4 \times \frac{1}{2} = 2$  so we’ll need 2 teaspoons salt.”

“How did you get that?” Jose asked.



“Well, as Amber said, multiplication is repeated addition. I started with four groups of  $\frac{1}{2}$ . Then, I grouped the first two  $\frac{1}{2}$  teaspoons into 1 whole teaspoon and made another whole teaspoon with the remaining two  $\frac{1}{2}$  teaspoons. 1 teaspoon plus one teaspoon is two teaspoons...so we need 2 teaspoons of salt!”

This is how Rosa drew it out:



Amber came in with 4 eggs and Rosa went out to find salt.

“Now for the flour!” said Jose. “The recipe says we need  $1\frac{3}{4}$  cups of flour so we need 4 times that for four people. I can split  $1\frac{3}{4}$  into 1 and  $\frac{3}{4}$ . Jose drew it on a page:

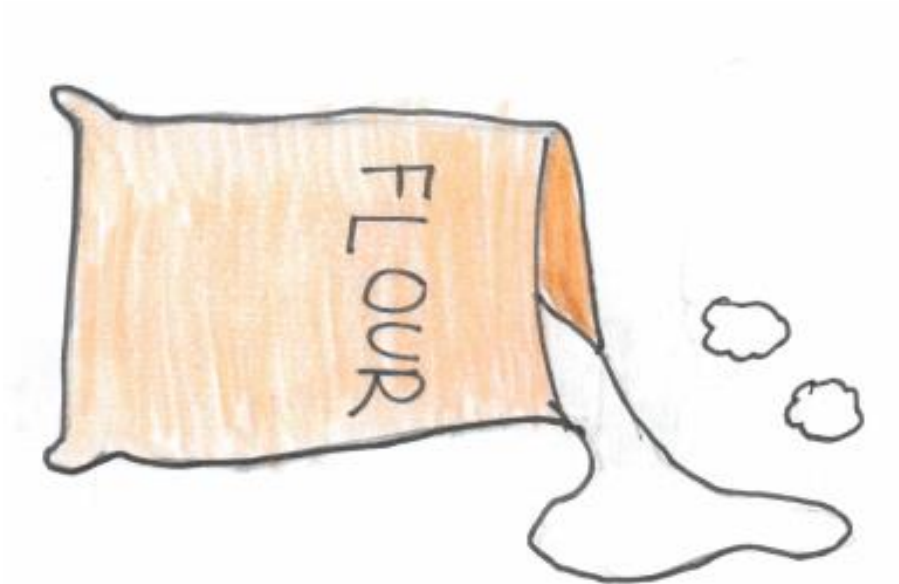
$$1 \frac{3}{4} = 1 + \frac{3}{4}$$

Jose said, "Multiplying 4 by  $1 \frac{3}{4}$  is the same thing as  $4 \times (1 + \frac{3}{4})$ . Using the distributive property, we can change it to  $(4 \times 1) + (4 \times \frac{3}{4})$ . We all know  $4 \times 1 = 4$  because we did the eggs earlier and  $4 \times \frac{3}{4} = 3$ .  $4 + 3 = 7$  cups of flour."

This is what Jose wrote:

$4 \times 1$		$4 \times \frac{3}{4} = \frac{4 \times 3}{1 \times 4} = \frac{12}{4}$		
<b>= 4 cups</b>	<b>+</b>	<b>= 3 cups</b>	<b>=</b>	<b>7 cups</b>

He went off in search of 7 cups of flour. After several minutes, both Rosa and Jose were back with the ingredients.



Now they were ready to make the dough! They mixed all the flour, salt, and eggs in a large bowl and stirred. “It’s too dry!” Riku said. “The recipe calls for  $2\frac{1}{2}$  tablespoons of water so we need 4 times as much for 4 people. I’ll have to multiply  $2\frac{1}{2}$  by 4 to get the amount of water needed, but I don’t quite get it.”

“You can make the numbers into improper fractions so that you can multiply them.  $2\frac{1}{2}$  becomes  $\frac{5}{2}$  and 4 becomes  $\frac{4}{1}$ . Then you can multiply the top number, or numerator by the other numerator. You would do the same for both the top and bottom so that the algorithm is  $\frac{n \times n}{d \times d}$ ,” Rosa answered.

“I get it now!  $5 \times 4 = 20$  and  $2 \times 1 = 2$ ,” Riku said. “ $20/2 = 10/1$  which equals to 10 tablespoons of water. Riku gathered the water and they prepared to cook the pasta.

$$\begin{array}{l} \underline{5 \times 4} = \underline{20} = \underline{10} \\ \underline{2 \times 1} = \underline{2} = \underline{1} \\ \\ = 10 \text{ teaspoon water} \end{array}$$




Just as they were about to boil the pasta, Rosa realized that they had forgotten to make the sauce. “Wait, we need to make a sauce to go with the



homemade pasta!” Rosa said, “My family also has a sauce recipe to go with the pasta. Here it is.”

**PASTA SAUCE**  
 Serves: 1  
 $1\frac{1}{2}$  fresh tomatoes  
 $\frac{1}{4}$  onion  
 $1\frac{1}{3}$  tablespoons of butter  
 Add ingredients into the pot and simmer for 30 minutes.

Together, the four friends calculated the amounts of each ingredient for the sauce on a piece of paper:

Ingredient	1 Serving →	4 Servings	Unit
	$1\frac{1}{2} = \frac{3}{2}$	$4 \times \frac{3}{2} = \frac{12}{2} = 6$	Tomatoes
	$1\frac{1}{3} = \frac{4}{3}$	$4 \times \frac{4}{3} = \frac{16}{3} = 5\frac{1}{3}$	teaspoons of butter
	$\frac{1}{4}$	$4 \times \frac{1}{4} = \frac{4}{4} = 1$	Onion

Amber, Jose, Riku, and Rosa mashed the tomatoes and mixed in the onions and butter. They gathered the pasta and cut it into thin strips. Then they tossed them into a pot of boiling water. After cooking it for a few minutes, the four friends added the ruby red sauce. Soon, the aroma of scrumptious sauce was wafting through the air. When it was done cooking, they added a light dusting of cheese and submitted their creation.

When the judges tasted it, they immediately knew the winner. Steve, the head judge announced, “The winner for this year’s annual cooking competition is...The All Stars!”



**The End**

# The Cooking Competition

Four friends decide to compete in the annual cooking competition. They must use their knowledge of math to complete the recipe and make the right amount of pasta. Are they up to the challenge?



## About the Author



My name is Ryan Kim, and I am 10 years old. I attend Weaver Elementary School in the United States. The inspiration for this story was a trip to Italy where I learned to make pasta from scratch from a local family. In addition, I was inspired by my teachers at Weaver. Mrs. French taught me about multiplying fractions and how we use them in the real world while Mrs. Freedman-Finch taught me to challenge myself and love math.