

# Cup of Rice

Sample task from [achievethecore.org](http://achievethecore.org)

Task adapted from Illustrative Mathematics, annotation by Student Achievement Partners

GRADE LEVEL Six

IN THE STANDARDS 6.NS.A

WHAT WE LIKE ABOUT THIS TASK

Mathematically:

- Involves concepts, procedure, and application of fraction division – all required by standard 6.NS.A.1.
- Devotes attention to a mathematically important case (dividend equal to 1).
- Builds on fraction division work from grade 5 (see 5.NF.B.7).
- Engages students in constructing viable arguments and critiquing the arguments of others (MP3).




In the classroom:

- Uses visual models to support understanding.
- Encourages students to share their developing thinking.

This task was designed to include specific features that support access for all students and align to best practice for English Language Learner (ELL) instruction. [Go here](#) to learn more about the research behind these supports. This lesson aligns to English Language Learner best practice in the following ways:

- Provides opportunities for students to practice and refine their use of mathematical language.
- Allows for whole class, small group, and paired discussion for the purpose of practicing with mathematical concepts and language.
- Elicits evidence of thinking both verbally and in written form.
- Includes a mathematical routine that reflects best practices for supporting English Language Learners in accessing mathematical concepts.
- Provides students with support in negotiating written word problems through multiple reads and/or multi-modal interactions with the problem.

## MAKING THE SHIFTS<sup>1</sup>

	Focus	Belongs to the Major Work <sup>2</sup> of Grade 6
	Coherence	Addresses the culminating standard in the progression of fraction operations; prepares for rational arithmetic in grade 7
	Rigor <sup>3</sup>	Conceptual Understanding: primary in this task Procedural Skill and Fluency: secondary in this task Application: primary in this task

<sup>1</sup>For more information read [Shifts for Mathematics](#).

<sup>2</sup>For more information, see [Focus in Grade Six](#).

<sup>3</sup>Tasks will often target only one aspect of rigor.

## LANGUAGE DEVELOPMENT

Ensure students have ample opportunities in instruction to read, write, speak, listen, and understand the mathematical concepts that are represented by the following terms and concepts:

- Remainder
- Cup
- Quotient

Students should engage with these terms and concepts in the context of mathematical learning, not as a separate vocabulary study. Students should have access to multi-modal representations of these terms and concepts, including: pictures, diagrams, written explanations, gestures, and sharing of non-examples. These representations will encourage precise language, while prioritizing students' articulation of concepts. These terms and concepts should be reinforced in teacher instruction, classroom discussion, and student work.

ELLs may need support with the following vocabulary word during the classroom discussion:

- Serving

## INSTRUCTIONAL ROUTINE – DECIDE AND DEFEND

Engage students in the [Decide and Defend Instructional Routine](#). This routine prompts students to interpret Tonya's work, decide if it is correct, draft a defense of that decision, share the defense with the class, and reflect on the learning.

Ask students to interpret the Cup of Rice task and Tonya's work. Provide individual think time, partner processing time, and public recording of the class's interpretations. Individual think time is an opportunity for teachers to check in with individual students to see if anyone needs support or clarification of the directions. After sharing ideas, have students annotate Tonya's work with color, visuals, and words in order to make sense of it and prepare to convince themselves and partners of their stance. While partners share their defense in the full group, students consider each other's arguments. Choose which ideas to explore with particular attention to the difference between  $1/3$  as a remainder compared to the fractional part of an answer. Facilitate a reflection process that allows students to identify new mathematical understandings and articulate aspects of constructing viable arguments. Create a public record of the reflections generated in the room for future reference.

## ADDITIONAL THOUGHTS

The quotient chosen for this problem,  $1 \div \frac{2}{3} = \frac{3}{2}$ , sheds light on the fact that dividing is multiplying by the reciprocal. Once students understand a quotient like  $1 \div \frac{2}{3} = \frac{3}{2}$ , they can think about a problem like  $\frac{3}{4} \div \frac{2}{3}$  by taking  $\frac{3}{4}$  of the known quotient  $1 \div \frac{2}{3}$ . That is,  $\frac{3}{4} \div \frac{2}{3} = \frac{3}{4} \times 1 \div \frac{2}{3} = \frac{3}{4} \times \frac{3}{2}$ .

For more insight into the expectations for fraction division, read pages 5 and 6 of the progression document, *6–8 The Number System*, available at [www.achievethecore.org/progressions](http://www.achievethecore.org/progressions).

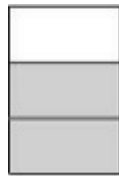
## 6.NS Cup of Rice

### Task

Tonya and Chrissy are trying to understand the following story problem for  $1 \div \frac{2}{3}$ :

*One serving of rice is  $\frac{2}{3}$  of a cup. I ate 1 cup of rice. How many servings of rice did I eat?*

To solve the problem, Tonya and Chrissy draw a diagram divided into three equal pieces, and shade two of those pieces.



Tonya says, "There is one  $\frac{2}{3}$ -cup serving of rice in 1 cup, and there is  $\frac{1}{3}$  cup of rice left over, so the answer should be  $1\frac{1}{3}$ ."

Chrissy says, "I heard someone say that the answer is  $\frac{3}{2} = 1\frac{1}{2}$ . Which answer is right?"

Is the answer  $1\frac{1}{3}$  or  $1\frac{1}{2}$ ? Explain your reasoning using the diagram.



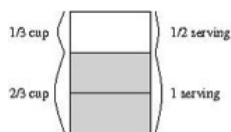
## Commentary

One common mistake students make when dividing fractions using visuals is the confusion between remainder and the fractional part of a mixed number answer. In this problem,  $\frac{1}{3}$  is the remainder with units “cups of rice” and  $\frac{1}{2}$  has units “servings,” which is what the problem is asking for.

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### Solution: Solution

In Tonya’s solution of  $1\frac{1}{3}$ , she correctly notices that there is one  $\frac{2}{3}$  cup serving of rice in 1 cup, and there is  $\frac{1}{3}$  cup of rice left over. But she is mixing up the quantities of servings and cups in her answer. The question becomes how many servings is  $\frac{1}{3}$  cup of rice? The answer is “ $\frac{1}{3}$  cup of rice is of a  $\frac{1}{2}$  serving.”



It would be correct to say, "There is one serving of rice with  $\frac{1}{3}$  cup of rice left over," but to interpret the quotient  $1\frac{1}{2}$ , the units for the 1 and the units for the  $\frac{1}{2}$  must be the same:

*There are  $1\frac{1}{2}$  servings in 1 cup of rice if each serving is  $\frac{2}{3}$  cup.*