

Cup of Rice

Sample task from achievethecore.org

Task by Illustrative Mathematics, annotation by Student Achievement Partners

GRADE LEVEL Sixth

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 fifth grade (see 5.NF.B.7)
- Engages students in constructing viable arguments and critiquing the arguments of others (MP.3)

In the classroom:

- Uses visual models to support understanding
- Allows for individual or group work
- Encourages students to share their developing thinking

MAKING THE SHIFTS¹

	Focus	Belongs to the major work ² of sixth grade
	Coherence	Addresses the culminating standard in the progression of fraction operations; prepares for rational arithmetic in grade 7
	Rigor ³	Conceptual Understanding: primary in this task Procedural Skill and Fluency: secondary in this task Application: primary in this task

¹For more information read [Shifts for Mathematics](#).

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

³Tasks will often target only one aspect of rigor.

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.

Illustrative Mathematics

6.NS Cup of Rice

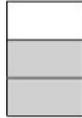
Alignment 1: 6.NS.A

Not yet tagged

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?"

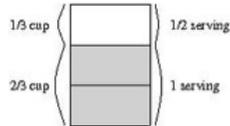
Is the answer $1 \frac{1}{3}$ or $1 \frac{1}{2}$? Explain your reasoning using the diagram.

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.

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 $\frac{1}{2}$ of a 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.



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