

Are Fractions Numbers?

Sample task from achievethecore.org

By Student Achievement Partners

GRADE LEVEL Third

IN THE STANDARDS 3.NF.A

WHAT WE LIKE ABOUT THIS TASK

Mathematically:

- Requires students to construct a viable argument and use examples to justify their reasoning (MP.3)
- Focuses on the cluster-level expectations for grade 3, “Develop understanding of fractions as numbers”
- Asks students to think about fractions as numbers without requiring that they have been taught operations with fractions
- Addresses major misconceptions students often have with fractions

In the classroom:

- Encourages students to talk about each other’s thinking in order to improve their mathematical understanding
- Allows teacher to gather data on student understanding and use it to plan future instruction
- Provides opportunity for students to choose and use concrete objects or pictures to help them conceptualize and solve problems
- Allows students to work independently or collaboratively

MAKING THE SHIFTS¹



Focus

Belongs to the major work² of third grade



Coherence

Extends student’s understanding of the number system; lays foundation for grades 4 and 5 work with fraction operations



Rigor³

Conceptual Understanding: primary in this task

Procedural Skill and Fluency: not targeted in this task

Application: not targeted in this task

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

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

³Tasks will often target only one aspect of rigor.

TASK

TASK: ACTIONS

The teacher should prepare students to engage with this task by asking them what a number is. This dialogue will set the stage for students to begin thinking about fractions and whether or not they are numbers, based on the information they share or hear.

Students work to answer each question in the task. While the students work, the teacher should circulate and ask students about their mathematical thinking. The teacher may take anecdotal notes as a formative assessment of students' understanding of fractions as numbers. Questions the teacher may ask students while working include, but are not limited to:

- How do you know? Tell me more.
- What do you have questions about?
- What in the classroom could you use to help you solve the problem?
- Can you explain how that drawing/model supports your answer?
- Tell me why that is a good model/example for this question.

After students have had time to work the teacher leads a whole-class discussion, focused on highlighting specific reasoning or examples students have used to justify their answers. If possible, the teacher should call on a few students so a variety of solution methods are shared with the class. Some questions the teacher may ask during this discussion could include, but are not limited to:

- Can someone explain that in another way?
- Who can show us a different way to support that same answer?
- Can you show an example of that?
- How do you know that answer makes sense?
- What models convinced you that fractions are or are not numbers?
- Why do you agree/disagree with what your classmate said?

The teacher summarizes the mathematics of the task by highlighting student work and the class discussion with the conclusion that fractions are indeed numbers.

TASK: MATERIALS

Artie said: "Choose a number between 1 and 10."
Kay said: " $\frac{3}{2}$."
Artie: "That's not a number! It's a fraction."
Kay: "But fractions are numbers!"

☞ Are fractions numbers? Take this quiz and decide.

	Yes	No	Don't Know	Give an example (if possible)
1. Is it possible to add two fractions?				
2. Is it possible to add a fraction and a whole number?				
3. Is it possible to place a fraction on the number line?				
4. Is it possible for a fraction to equal a whole number?				
5. Is it possible to add two fractions and have the sum equal a whole number?				

☞ Based on your answers, do you agree with Artie or with Kay? Write 1-2 sentences to explain why.

Are Fractions Numbers? Handout

For a direct link, go to: <http://achievethecore.org/page/929/are-fractions-numbers>

COMMENTARY

There are a number of ways this task could be used in a 3rd or 4th grade classroom. This task could be used in third grade in the beginning of a unit of study on fractions. It gives teachers an idea of their students' number sense as it relates to fractions. While teachers would not expect their students to have a deep understanding of fractions (yet), some students may apply their knowledge of whole numbers or their experience from real life situations, in order to correctly answer some or all of the questions on the task.

This task may also be used as a pre-assessment in fourth grade to determine what level of understanding students have about fractions from third grade. Alternatively, instructors may choose to use this task towards the end of a study of fractions – either in third or fourth grade – as a mini-assessment of the work students have done with fractions. Once teachers are able to pinpoint the strengths and weaknesses in their students' understanding of fractions, they can plan focused lessons for future instruction.

This task may be used as an activity that starts with independent work and then transitions into partners or small groups. This allows students to create their own ideas and generate examples to support their thinking, without being influenced by the ideas of others. Once students have had time to think about and work with the questions on their own, encourage them to work together. Some of the most profound learning comes from discussions around students' developing thinking, sharing various student solution methods, and asking students to justify their reasoning.

ADDITIONAL THOUGHTS

As part of the Major Work of third grade, this task can enhance classroom discussion about the concept of fractions as numbers (3.NF.A). Number line diagrams are important representations for students as they make the connection between fractions and whole numbers. Understanding fractions as numbers means, first and foremost, seeing fractions as useful for describing quantities. This is the focus of fraction work in Grade 3. Then, in Grades 4 through 6, students learn how to compute with fractions and solve problems involving arithmetic with fractional quantities.

The work students do with fractions in third grade is predominantly conceptual, as can be seen at the cluster and standard level. The word “understand” is used in the Standards to set explicit expectations for conceptual understanding. Similarly, when standards call for students to “explain” a concept, there needs to be a deep level of understanding in order to arrive at a meaningful explanation. It is important for teachers to carve out sufficient time for students to be able to develop a deep conceptual understanding of fractions in third grade, so they have a strong foundation on which they can build their skills using fractions.

Understanding a fraction (and whole numbers) as a point on the number line and understanding the properties of operations on fractions (and whole numbers) are two key concepts students develop in K–5 in order to understand the rational numbers as a number system (6–8, NS). For more information on the specific expectations for students working with fractions in grade 3, read pages 3–5 in the progression document, [3–5, Number and Operations–Fractions](#).

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Kay: "But fractions are numbers!"

👉 Are fractions numbers? Take this quiz and decide.

Give an example (if possible)

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2. Is it possible to add a fraction and a whole number?Yes No Don't Know
3. Is it possible to place a fraction on the number line?Yes No Don't Know
4. Is it possible for a fraction to equal a whole number?Yes No Don't Know
5. Is it possible to add two fractions and have the sum equal a whole number?Yes No Don't Know

👉 Based on your answers, do you agree with Artie or with Kay? Write 1-2 sentences to explain why.