



Sample Mathematics Item: Grade 4

“Fraction Comparison”

November 2013

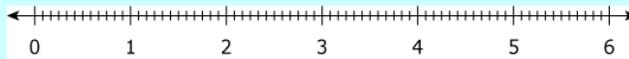
Ava and Mia are comparing the fractions $\frac{3}{2}$ and $\frac{5}{6}$.

Part A

Ava created this number line to graph $\frac{3}{2}$. Select the correct point on the number line to represent $\frac{3}{2}$.



Mia created this number line to graph $\frac{5}{6}$. Select the correct point on the number line to represent $\frac{5}{6}$.



Part B

Is $\frac{3}{2}$ greater than or less than $\frac{5}{6}$? Explain how you know.

Cut Paste Undo Redo

Part C

Write a fraction that is between $\frac{3}{2}$ and $\frac{5}{6}$.

Explain how you know your fraction is between $\frac{3}{2}$ and $\frac{5}{6}$.

Cut Paste Undo Redo

Grade 4	Fraction Comparison
Type	Type II - 4 points
Evidence Statement	<p>4.C.4-1: Base arithmetic explanations/reasoning on concrete referents such as diagrams (whether provided in the prompt or constructed by the student in her response), connecting the diagrams to a written (symbolic) method. Content Scope: Knowledge and skills articulated in 4.NF.A</p> <p>Clarifications: i) Tasks have “thin context” or no context. ii) Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100 (CCSS footnote, p. 30).</p>
Most Relevant Standards for Mathematical Content	<p>4.NF.A: Extend understanding of fraction equivalence and ordering.</p> <ol style="list-style-type: none"> 1. Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. 2. Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $1/2$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model. <p>This standard is major content in the grade based on the PARCC Model Content Frameworks.</p>
Most Relevant Standards for Mathematical Practice	<p>PARCC highlights MP.3 and MP.6 through Subclaim C. These items require students to construct viable arguments through precisely written mathematical statements. This task requires an explanation that accurately compares the two fractions by reasoning with grade-appropriate fraction concepts. In addition, students may choose to use the number line models given in the stem to find the structure needed for the explanation (MP.7). Or, students may be able to construct an argument from previously-learned, securely-held material. Students may find it easy to identify a fraction between $\frac{5}{6}$ and $\frac{3}{2}$, then need to engage in MP.3 and MP.6 again to explain how they know that fraction is between $\frac{5}{6}$ and $\frac{3}{2}$.</p>
Item Description and Assessment Qualities	<p>This conceptual understanding task assesses understanding of fraction equivalence and fraction notation. Students use number lines already divided into twelfths to create two fractions, one greater than 1 and one less than 1. Students then compare the size of those fractions using precise language. The models provided in the stem encourage students to consider the size of 1 whole and then construct an argument that may or may not relate to those linear models. Regardless of how the student proves that $\frac{3}{2}$ is greater than $\frac{5}{6}$, students must use grade-appropriate, precise language to describe the mathematical thinking behind their actions.</p>

Students will autonomously choose any fraction between $\frac{5}{6}$ and $\frac{3}{2}$ and then defend how they know that their fraction is greater than $\frac{5}{6}$ and less than $\frac{3}{2}$.

Students may again use their model in their explanation or may choose to reason numerically.

The response boxes are technology-enhanced so they can be electronically scored. Unlike traditional multiple choice, it is difficult to guess the correct answer or use a choice elimination strategy.

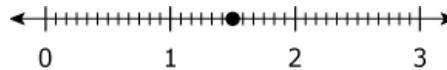
Scoring Rubric

Task is worth 4 points. Task can be scored as 0, 1, 2, 3, or 4.

Scoring consists of 2 points for calculation and 2 points for reasoning.

Part A

- 1 calculation point is earned for a number line that correctly shows $\frac{3}{2}$.



- 1 calculation point is earned for a number line that correctly shows $\frac{5}{6}$.



Note: The number lines do not align on the 0; however, students should understand that $\frac{3}{2}$ is further to the right from 0 than $\frac{5}{6}$.

Part B

- 1 reasoning point is earned for explaining that $\frac{3}{2}$ is greater than $\frac{5}{6}$. Possible examples include but are not limited to the following:
 - I can see that $\frac{3}{2}$ is to the right of 1, but $\frac{5}{6}$ is to the left of 1, so $\frac{5}{6}$ is less than $\frac{3}{2}$.
 - $\frac{3}{2} = \frac{9}{6}$, so $\frac{3}{2}$ is nine $\frac{1}{6}$ units long and $\frac{5}{6}$ is five $\frac{1}{6}$ units long. So, $\frac{9}{6}$ has more $\frac{1}{6}$ units, and $\frac{3}{2}$ is greater than $\frac{5}{6}$.
 - I know that $\frac{3}{2}$ is equivalent to $\frac{9}{6}$. Because the denominator of $\frac{9}{6}$ is the same as $\frac{5}{6}$ and 9 is greater than 5, $\frac{3}{2} > \frac{5}{6}$.

Part C

Scoring Information

- 1 reasoning point is earned for identifying a fraction between $\frac{5}{6}$ and $\frac{3}{2}$ and explaining why that fraction is between $\frac{5}{6}$ and $\frac{3}{2}$. Possible examples include but are not limited to the following:

- $\frac{2}{2}$

My number lines show that $\frac{3}{2}$ is to the right of 1, and $\frac{5}{6}$ is to the left of 1, and I know that $\frac{2}{2}$ is equal to 1 because two halves is one whole.

- $\frac{7}{6}$

$\frac{3}{2}$ is nine $\frac{1}{6}$ units long and $\frac{5}{6}$ is five $\frac{1}{6}$ units long, I know that $\frac{7}{6}$ is seven $\frac{1}{6}$ units long. So, $\frac{7}{6}$ has more $\frac{1}{6}$ unit lengths than $\frac{5}{6}$. And, $\frac{9}{6}$ has more $\frac{1}{6}$ unit lengths, than $\frac{7}{6}$.

- $\frac{11}{12}$

On my number line, I saw that $\frac{5}{6}$ was the equal to $\frac{10}{12}$, and $\frac{11}{12}$ is to the right of $\frac{5}{6}$. I know that $\frac{11}{12}$ is less than $\frac{3}{2}$ because I can see $\frac{11}{12}$ is less than 1 and $\frac{3}{2}$ is greater than 1.