



One indicator of how well a student understands comparing fractions mentally is to compare a student's work and explanation for a problem with how other students have responded to the same problem. Students, parents, or teachers can use the following problem and sample responses to evaluate understanding.

Directions for the Student:

- 1) Solve the following problem and explain your work and answer.
- 2) Compare your work to the sample responses in order to determine if your work indicates deep, partial, or beginning understanding.

Problem:

Four girls each got a box of chocolates for Valentine's Day. Jill had $\frac{5}{12}$ of her box left. Jami had $\frac{5}{8}$ of her box left. Janelle had $\frac{15}{16}$ of her box left. Joni had $\frac{7}{8}$ of her box left. Using mental math, determine which girl had the smallest fraction of her box of chocolates left?

Level of Understanding	Sample Student Response	Comments
Deep Understanding	<p>Student 1: "Five eighths is less than $\frac{7}{8}$. Fifteen sixteenths is almost the whole box, so it's too much. Five twelfths and $\frac{5}{8}$ have the same number of pieces, but twelfths are smaller pieces than eighths, so $\frac{5}{12}$ is the smallest fraction."</p>	<p>This student compared $\frac{5}{8}$ and $\frac{7}{8}$ using a common denominator. The student used number sense to determine that $\frac{15}{16}$ is almost one. Then the student used common numerators to compare $\frac{5}{12}$ and $\frac{5}{8}$. Since both fractions have the same number of pieces, but twelfths are smaller pieces, $\frac{5}{12}$ must be smaller.</p>
	<p>Student 2: "Five-twelfths is the only fraction that is less than $\frac{1}{2}$, so it is the smallest."</p>	<p>This student knows that fractions can be compared to a familiar fraction like one half. Four eighths is equal to $\frac{1}{2}$, so $\frac{5}{8}$ and $\frac{7}{8}$ are greater than $\frac{1}{2}$. Eight sixteenths is equal to $\frac{1}{2}$, so $\frac{15}{16}$ is greater than $\frac{1}{2}$. Six twelfths is equal to $\frac{1}{2}$, so $\frac{5}{12}$ is less than $\frac{1}{2}$.</p>



Level of Understanding	Sample Student Response	Comments
Partial Understanding	<p>Student 3: “I changed them to forty-eighths. $\frac{5}{12} = \frac{20}{48}$, $\frac{5}{8} = \frac{30}{48}$, $\frac{15}{16} = \frac{45}{48}$, and $\frac{7}{8} = \frac{42}{48}$, so $\frac{5}{12}$ is the smallest.”</p>	This student knows how to compare fractions using a common denominator. In general, that is not an efficient way to compare fractions mentally.
	<p>Student 4: “My diagram shows $\frac{5}{12}$ is the smallest amount left.”</p>	This student’s representation shows an understanding of fractions, but in general, drawing diagrams is an inefficient way to compare fractions. It is often difficult to draw precise enough diagrams of many fractions to compare them accurately.

Level of Understanding	Sample Student Response	Comments
Beginning Understanding	<p>Student 5: “Sixteenths are really small pieces, so $\frac{15}{16}$ must be the smallest.”</p>	This student realizes that sixteenths are smaller pieces than eighths or twelfths, but the student does not consider that 15 of the 16 pieces is almost the entire box. One very small piece is missing from the whole box.
	<p>Student 6: “I think Jami had less because 5 and 8 are both small numbers.”</p>	This student believes that when the numerator and denominator are small, the fraction must be small. The student is not thinking about the number of equal pieces in the whole and the number of pieces being considered.