Guide for Probe: Ordering Fractions

I. *Understandings and Successful Approaches*

Correct Answers:

1. **NO** $\frac{5}{7}, \frac{4}{7}, \frac{2}{7}$
2. **YES** $\frac{3}{8}, \frac{3}{5}, \frac{3}{4}$
3. **NO** $\frac{5}{8}, \frac{3}{5}, \frac{1}{2}$

Students' **explanations** should show evidence of one or more successful strategies including:

- reasoning about the size of the fractions (i.e., use of benchmarks, unit fractions, equivalent fractions, etc.);
- drawing and reasoning about models/visual representations;
- reasoning about the distance or amount missing for the whole;
- use of common denominators; or
- conversions to decimals or percents

Students with a deep and flexible understanding of fractions will pay attention to the fractions within an item and apply a strategy based on those numbers rather than applying one strategy across all items. For example, for item 2 the use of reasoning about the size of the fractions by comparing to a benchmark of $\frac{1}{2}$ is much more efficient than using common denominators.

II. *Common Misunderstandings/Misconceptions to Look For*

A mixture of correct and incorrect choices/explanations may reveal a variety of misunderstandings related to comparing fractions. It is important to note that each of the set of answer choices below includes one or more correct responses as sometimes the correct answer can result from incorrect reasoning.

1.1 "**Whole Number Thinking**" Misconception

Students who apply this misconception across all 3 items will answer: **1) NO, 2) NO, 3) NO** Students with this misconception apply whole number reasoning and make their decision based on whether the numbers in the denominators are ordered from least to greatest

1.2 "**Smaller is always bigger"** Misconception

*Students who apply this misconception across all 3 items will answer***: 1) NO, 2) YES, 3) YES** These students have overgeneralized the concept that "the larger the value of the denominator the smaller the piece" to all cases without consideration of the numerator (the number of pieces). They make their decision based on whether the numbers in the denominators are ordered from greatest to least. With denominators of same value, they often revert to the numerator.

1.3 Incorrect "Gap" Reasoning Misconception

Students who apply this misconception across all 3 items will answer:

- **1) NO, 2) YES, 3) YES** if they compare the number of pieces needed to make a whole and determine smallest distance from whole is greatest answer
- **1) YES, 2) NO, 3) NO** if they compare the number of pieces needed to make a whole and determine greater distance from whole is greatest answer.

Other difficulties: Students may use a number of other incorrect approaches, including drawing models or visuals incorrectly, make calculation errors, and answering for "greatest to least".