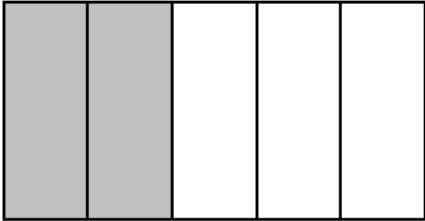
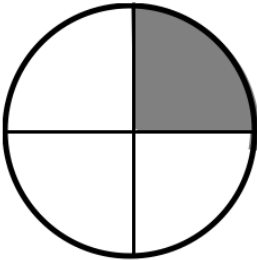
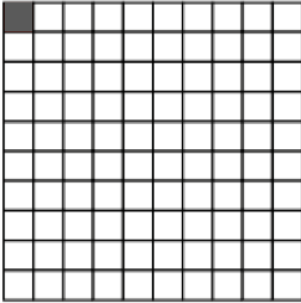


Name: _____

Probe #10: HOW MUCH IS SHADED?

Directions: Decide if the shaded part of the whole represents the given decimal.

Circle yes or no:	Explain your thinking.
<p>A) Is 0.4 shaded?</p>  <p>Yes No</p>	
<p>B) Is 0.25 Shaded?</p>  <p>Yes No</p>	
<p>C) Is 0.1 Shaded?</p>  <p>Yes No</p>	

Resource for Analysis of Probe #10: How Much is Shaded?

I. Understandings and Successful Approaches

Correct Answers:

- A. Yes, $\frac{2}{5}$ is equivalent to 0.4
- B. Yes, $\frac{1}{4}$ is equivalent to 0.25
- ~~C.~~ No, $\frac{1}{100}$ is not equivalent to 0.1

Students who choose these correct answers and have explanations that support their choices are applying one or more successful understandings and strategies including:

- Interpreting different areas models (rectangle, circle, and 10 x 10 grid) to determine what part of the whole is represented
- Making the connection between decimals and a part-whole representation.
- Ability to translate visual models (A & B) that do not have denominators of 10 or 100 into decimal fractions
- Ability to determine whether or not the representations are equivalent
- Ability to justify the equivalence by using multiple ways, including use of visual models and reasoning about the size of a decimal fraction.

II. Potential Common Misunderstandings/Misconceptions to Look For

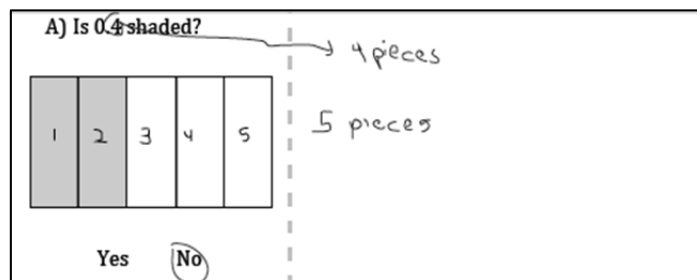
A mixture of correct and incorrect choices may reveal a variety of misunderstandings related to determining whether decimals and area model representations are equivalent. It is important to note that students with these difficulties may have one or more correct responses as sometimes the correct answer can result from incorrect reasoning.

1. "Incorrect Part-Whole Application" Misconception

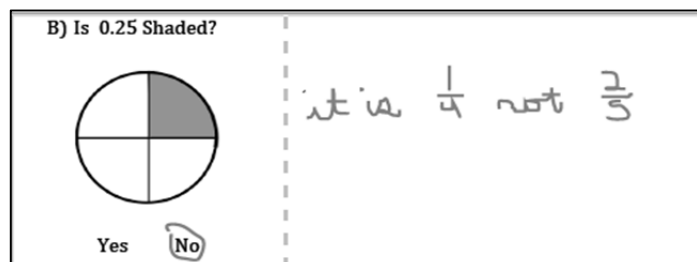
Answer Pattern: A. NO, B. NO, C. YES

Students with this misconception overgeneralize from experiences with representing fractions as area models. They use incorrect approaches to translate decimals into part-whole representations. For example, students may incorrectly assume that 0.25 should be represented as $\frac{2}{5}$ with 2 out of 5 parts shaded on an area model.

Example 1: The student associates 0.4 with the total number of parts. No reference is made to the shaded parts.




Example 2: The student thinks of 0.25 as the fraction $\frac{2}{5}$ by associating the 1st number as the numerator and the 2nd numbers as the denominator.



“Incorrect Part-Whole Application” Misconception, continued

Example 3: The student associates the decimal point with the fraction bar to turn 0.4 into $0/4$.

A) Is 0.4 shaded?

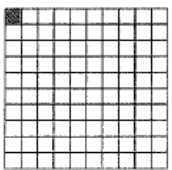


because 0 is the numerator and 4 is the denominator.

Yes No

Example 4: The student associates the number (0.1) with the numerator – the part shaded. No reference is made to the total number of parts.

C) Is 0.1 Shaded?



there is one shaded

Yes No

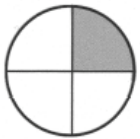
2. Difficulty with Recognizing Equivalent Fractions

Answer Pattern: A. NO B. No

Students are able to translate a decimal into a base-ten fraction, such as representing 0.4 as $4/10$ and 0.25 as $25/100$. However, they have difficulty connecting the decimal to a visual representation of a fraction, such as $1/4$ that is not in 10ths or 100ths. They do not recognize the non base-10 fraction equivalent shown in the visual representations.

Example 5: The student does not recognize that $1/4$ is equivalent to $25/100$.

B) Is 0.25 Shaded?



decimal = $25/100$
Picture shows $1/4$

Yes No