Determine which point shows the location of the fraction.

1. Choose the letter that shows the location of \(\frac{3}{8}\)
   - [ ] A
   - [ ] B
   - [ ] C
   - [ ] D
   - [ ] E

   Explain why you chose this location:

2. Choose the letter that shows the location of \(\frac{3}{10}\)
   - [ ] A
   - [ ] B
   - [ ] C
   - [ ] D
   - [ ] E

   Explain why you chose this location:

3. Choose the letter that shows the location of \(\frac{3}{4}\)
   - [ ] A
   - [ ] B
   - [ ] C
   - [ ] D
   - [ ] E

   Explain why you chose this location:
Resource for Analysis of Probe #5: Locating Fractions on a Number Line

**Understandings and Successful Approaches**

**Correct Answers:**

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<tbody>
<tr>
<td>1.</td>
<td>Choose the letter that shows the location of ( \frac{3}{8} )</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
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<td>2.</td>
<td>Choose the letter that shows the location of ( \frac{3}{10} )</td>
<td>A</td>
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<td>E</td>
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<td>3.</td>
<td>Choose the letter that shows the location of ( \frac{3}{4} )</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
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Students who choose each of these correct answers and have explanations that support their choices may be applying the following:

- understanding that the points represents numbers and that each has one discrete location on a number line;
- ability to determine the whole based on the labels provided (i.e. the interval from 0 to 1 or 2 to 3 or \( \frac{1}{4} \) to \( \frac{1}{2} \)) ; and
- ability to reason about the size of the intervals of the whole, recognizing that these intervals must be of equal size.

**Potential Common Misunderstandings/Misconceptions to Look For**

A mixture of correct and incorrect choices may reveal a variety of misunderstandings related to locating fractions on a number line.

"Incorrect Counting” Misconception

*Incorrect Counting Answer Pattern: 1)C or E, 2)B or C, 3)A*

- **Counting On:** Students with this misconception often apply whole number reasoning by simply using the value of the numerator to count on from the starting point without considering which fractions the hash marks represent or the size of the intervals between them. Student may or may not count the points, instead focusing only on the hash marks.

  a. Counting On: Points and Hash Marks

  b. Counting On: Only Hash Marks

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"Incorrect Counting" Misconception, continued.

- Other Incorrect Counting: Student may also apply other incorrect counting strategies resulting in a different answer pattern.
  - Counting All: including the starting hash mark in their count
  - Counting Back: starting with 1 and counting backwards

"Incorrect Use of Benchmarks" Misconception

Answer Pattern: Answers will vary

- Students may apply a variety of incorrect reasoning approaches including:
  - Incorrectly positioning the fraction in relation to a benchmark, such as 0, ½ or 1
    * For example, a student correctly locates the benchmark ½ and writes that 3/8 is close to ½. However, he incorrectly chooses a point that is too close to ½.
  - Incorrectly locating a benchmark which leads to incorrect positioning of the fraction
    * For example, a student correctly writes that 3/8 is close to the benchmark ½. However, she makes an incorrect assumption that ½ is the middle of a 0-2 number line. This error leads to the student placing 3/8 in the incorrect position.
  - Determining the size of a fraction incorrectly based on a benchmark
    * For example, a student knows that 3/8 is close to the benchmark ½ but incorrectly thinks that 3/8 is larger than ½.

For each problem, review the answers and the example approach to solving the problem. Consider how the approaches are similar and/or different from the approach you took.

1. Choose the letter that shows the location of \( \frac{3}{8} \)
   - A
   - B
   - C
   - D
   - E

Example: Counting Approach to Finding the Answer to Problem 1

Determine the whole and size of the intervals: The original number line goes from 0-1. It is partitioned into **four equal parts** so each interval between hashmarks is a **fourth**.

Locate the target fraction: Since the target fraction (3/8) is in **eighths**, split each of the fourths in half to create **eighths**. Count and label the hashmarks.

2. Choose the letter that shows the location of \( \frac{3}{10} \)

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<td>&lt; ( \frac{1}{10} )</td>
<td>( \frac{3}{10} )</td>
<td>( \frac{4}{5} )</td>
<td>( \frac{9}{10} )</td>
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Example: *Benchmarking/Reasoning* Approach to Finding the Answer to Problem 2

Determine the whole and size of the intervals: One whole unit on the number line is the distance from 0-1. A whole unit is partitioned into **five equal parts** so each interval between hashmarks is a **fifth**.

Locate helpful
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**benchmarks:** Since \( \frac{3}{10} \) is less than \( \frac{1}{2} \), start by finding on the number line. Two points (A and B) are less than \( \frac{1}{2} \). Since \( \frac{3}{10} \) is closer to \( \frac{1}{2} \) than to 0, B is the answer.

**Example:** *Counting Approach to Finding the Answer to Problem 3*

**Locate the target fraction:** Since the target fraction \( \frac{3}{4} \) is in *fourths* and the number line is partitioned into *eighths*, express the *eighths* as *fourths* by combining two *eighths* to make a *fourth*. Label the hashmarks and see that D is \( \frac{3}{4} \).