![Math Explorations logo]

**Small Things**

> ✓ A sequence is a list of numbers.
> ✓ Adjacent means right next to.
> ✓ One of the questions you can ask yourself about a sequence is "How far apart is each number from the next one?"
> ✓ Sometimes the distance between every two adjacent numbers is the same as in this sequence: 2, 4, 6, 8, 10
> ✓ Sometimes the distance between numbers changes as in this sequence: 1, 4, 9, 16, 25

Consider this sequence of fractions: $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}$

1. Is the distance between each two adjacent fractions the same or different?
2. If the distance is not the same, is it getting larger or smaller?
3. After examining the list of fractions above, can you write a sentence with words or symbols which generalizes the distance between adjacent fractions?
4. Can you predict the distance between $\frac{1}{100}$ and $\frac{1}{101}$?
5. What are some questions this problem prompts you to ask about other sequences?

# Teacher Notes on Questioning

Here are examples of four types of questions, which may be asked about this problem. A good questioner asks a variety of questions of all students and gives them time to think, respond, and follows up with more questions when possible. By example, students will learn what questions to ask themselves and others.

## Factual
- What kind of fractions are these?
- What is the distance between each two, adjacent fractions?

## Conceptual
- What is a unit fraction? Are $\frac{1}{1}$ are $\frac{1}{0}$ unit fractions?
- Are these fractions increasing or decreasing? How do you know?
- What do you notice about the distance between these five unit fractions?
- Is the distance between fractions increasing or decreasing? How do you know?
- What patterns do you notice about the distance between these five unit fractions?
- What would these fractions look like on a number line?
- What are some other fraction sequences, which might be interesting?

## Generalizing
- What can you say about an infinite sequence of unit fractions?
- How do the distances between fractions in other sequences behave?
- What if the numerator in the sequence changed instead of the denominator?
- What if the numerator was a constant other than 1?

## Emotive
- Are these sequences pleasing?
- How did you feel when you found the pattern?
- What does this sequence remind you of?
- How small is small enough when thinking about a sequence of unit fractions?