Unit 3, Lesson 16

# Reason about Quotients

Let's apply what we know about division to make sure our answers make sense.

Warm-up

## Estimation Exploration: How Many One Fifths?

$$98 \div \frac{1}{5}$$

Record an estimate that is:

| too low | about right | too high |
|---|---|---|
| | | |

Activity 1

## Greater Than or Less Than 1

$25 \div \frac{1}{5}$ $\quad$ $\frac{1}{7} \div 25$ $\quad$ $\frac{1}{8} \div 25$

$25 \div \frac{1}{7}$ $\quad$ $25 \div \frac{1}{8}$ $\quad$ $\frac{1}{5} \div 25$

1. Without calculating the value of the expressions, write each expression under the correct category.

| The value of the expression is less than 1. | The value of the expression is greater than 1. |
|---|---|

2. Explain your strategy for determining whether a quotient is less than 1 or greater than 1.

Activity 2

## Estimate and Divide

$25 \div \frac{1}{5}$ $\quad$ $\frac{1}{7} \div 25$ $\quad$ $\frac{1}{8} \div 25$

$25 \div \frac{1}{7}$ $\quad$ $25 \div \frac{1}{8}$ $\quad$ $\frac{1}{5} \div 25$

1. Without calculating the value of the expressions, put the expressions in order from least to greatest.

2. Choose 2 expressions and find the value of the expressions.

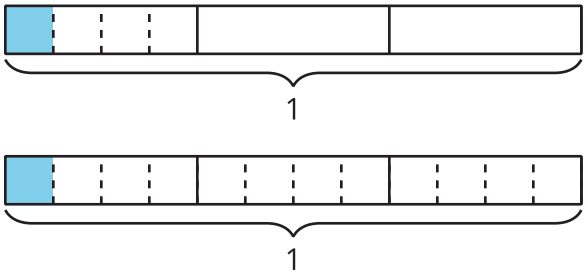
## Section B Summary

We learned to divide with whole numbers and unit fractions. First, we used diagrams to solve problems involving division of a unit fraction by whole numbers.

Example:

Diagram A shows $\frac{1}{3} \div 4$ equals $\frac{1}{12}$. We find the size of one part if $\frac{1}{3}$ is split into 4 equal parts.

**Diagram A**




Then we noticed the relationship between division and multiplication.

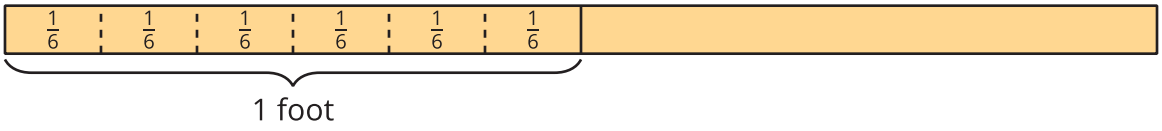
For Diagram A, we know that $\frac{1}{3} \div 4 = \frac{1}{12}$ because $\frac{1}{12} \times 4 = \frac{1}{3}$.

Next, we used diagrams to solve problems involving division of whole numbers by unit fractions. We also wrote equations to represent these problems.

Example:

Diagram B shows that if a strip of paper 2 feet long is cut into $\frac{1}{6}$ foot pieces, there will be 12 pieces. Therefore, $2 \div \frac{1}{6} = 12$ because we are finding how many $\frac{1}{6}$-size pieces are the same length as 2.

**Diagram B**




Finally, we noticed patterns when dividing whole numbers and unit fractions.

- We noticed whole numbers divided by unit fractions were greater than 1.

  Example:

  The value of $12 \div \frac{1}{4}$ is greater than 1. The number of $\frac{1}{4}$-size pieces with length 12 (or any whole number) is greater than 1.

- We also noticed unit fractions divided by whole numbers were less than 1.

  Example:

  The value of $\frac{1}{3} \div 18$ is less than 1. When a whole number less than 1 is divided into many pieces, each piece is less than 1.