Comparing and Ordering Fractions

Objectives To review equivalent fractions; and to provide experience with comparing and ordering fractions.

1 Teaching the Lesson

Key Concepts and Skills
- Find equivalent fractions using a length model. [Number and Numeration Goal 5]
- Compare fractions to the benchmarks 0, \( \frac{1}{2} \), and 1. [Number and Numeration Goal 6]
- Order fractions from least to greatest. [Number and Numeration Goal 6]
- Solve fraction number stories using a number-line model. [Operations and Computation Goal 4]
- Use fraction sticks to add fractions. [Operations and Computation Goal 4]

Key Activities
Students use the Fraction-Stick Chart to find equivalent fractions and compare fractions to the benchmarks 0, \( \frac{1}{2} \), 1, and \( 1\frac{1}{2} \). They use the fraction-stick model to compare pairs of fractions, find equivalent fractions, and continue their exploration of fraction addition.

Ongoing Assessment: Recognizing Student Achievement
Use journal page 129. [Number and Numeration Goal 6]

Ongoing Assessment: Informing Instruction
See page 305.

Key Vocabulary
benchmark, fraction stick, equivalent fractions

Materials
Math Journal 1, pp. 129–132
Study Link 5-2
transparency of Math Masters, p. 137, slate
Geometry Template, straightedge (optional)

Advance Preparation
For Part 1, make a transparency of the chart on Math Masters, page 137. For the optional Readiness activity in Part 3, each student will need 6 strips of colored paper, each 2" by \( \frac{1}{8} \). These can be prepared ahead of time or during the activity.


2 Ongoing Learning & Practice

Playing Fraction Top-It
Student Reference Book, p. 316
Fraction Cards (Math Journal 2, Activity Sheets 5–7)
Students practice comparing fractions by playing Fraction Top-It.

Math Boxes 5-3
Math Journal 1, p. 133
Students practice and maintain skills through Math Box problems.

Study Link 5-3
Math Masters, p. 131
Students practice and maintain skills through Study Link activities.

3 Differentiation Options

READINESS
Making Fraction Strips
6 strips of colored paper, each 2" by \( 8\frac{1}{2} \)
Students use a length model to explore comparing and ordering fractions by making fraction strips.

ENRICHMENT
Exploring a Fraction-Stick Chart
Math Masters, p. 130
Students explore relationships between the numerators and denominators of equivalent fractions.

ELL SUPPORT
Building a Math Word Bank
Differentiation Handbook, p. 142
Students add the term equivalent fractions to their Math Word Banks.
Getting Started

Mental Math and Reflexes
Have students use the rulers on their Geometry Templates.
- Find 2\(\frac{1}{2}\) inches on a ruler. How many half-inches is that? 5
  - Find 6 cm on a ruler. How many \(\frac{1}{2}\) cm is that? 12
- Find 2\(\frac{4}{8}\) inches on a ruler. How many quarter-inches is that? 10
  - Find 3\(\frac{1}{2}\) cm on a ruler. How many \(\frac{1}{2}\) cm is that? 7
- \(\frac{1}{2}\) inch is what fraction of 2\(\frac{1}{2}\) inches? \(\frac{1}{4}\)
- \(\frac{1}{3}\) inch is what fraction of 2\(\frac{2}{2}\) inches? \(\frac{5}{10}\)

1 Teaching the Lesson

Math Message Follow-Up
(Math Journal 1, p. 129)
Remind students that a benchmark is a well-known count or measure that can serve as a reference point when estimating. When working with fractions, the benchmarks 0, \(\frac{1}{2}\), and 1 are often used. Discuss how students applied their knowledge of numerators, denominators, and benchmarks to tell if each measurement is closest to 0, \(\frac{1}{2}\), or 1.

Ongoing Assessment: Recognizing Student Achievement
Use journal page 129, Problem 5 to assess students' understanding of the structure of fractions. Students are making adequate progress if their explanations correctly represent the relationship between the numerator and denominator and the use of benchmarks such as 0, \(\frac{1}{2}\), and 1.

Ordering Fractions
(Math Journal 1, p. 129)
On the board or a transparency, draw 4 horizontal lines in a row to order the fractions from Problems 1–4 of the journal page. Volunteers explain which of the Math Message fractions is least and which is greatest. \(\frac{1}{2}\) is the least because it is the closest to 0; \(\frac{15}{16}\) is the greatest because it is closest to 1. Write these fractions on the first and last lines, respectively. Ask: Since \(\frac{5}{8}\) and \(\frac{3}{8}\) are equally close to \(\frac{1}{2}\), how do we decide where to write them? Both fractions are eighths, and 5 is more than 3, which means that \(\frac{3}{8}\) is the smaller fraction so it is closer to 0.

Math Journal 1, p. 129

Lesson 5-3
Explain that examining numerators and denominators is the first step when comparing and ordering fractions. Refer students to journal page 129.

**Examples:**

- Ask students to describe the fractions in Problem 6. The denominators are the same. So we know that all the unit fractions are the same size. Only the number of pieces (the numerators) need to be compared.

- Ask students to describe the fractions in Problem 7. The numerators are the same. Now what do we know? There are the same number of pieces for each fraction. So only the size of the pieces (the denominators) needs to be compared. Remind students that the smaller the denominator is, the larger the piece is.

- Ask students to describe the fractions in Problem 8. There are two different denominators; there are two unit fractions. First compare the unit fractions 2 and 3. The smaller denominator is the larger fraction. The remaining fractions are within one piece of 1—that is, 5/8 is 1/8 away from 1, and 2/3 is 1/3 away from 1. Since 1/3 is greater than 1/4, that makes 2/3 farther away from 1.

Ask partners to complete the problems on the journal page. When most students are finished, discuss their strategies for Problems 9–12, including the following:

- Problem 9: The least fraction is 1/25. That leaves the other three to compare. Change each to an equivalent fraction with a denominator of 20.

- Problem 10: One of these fractions is close to 0, one is close to 1, and the other two are close to 1/2.

- Problem 11: One way to compare a fraction to 1/2 is to see if the numerator is more or less than 1/2 of the denominator. Two of the fractions are greater than 1/2. Their order is determined because 3/4 is close to 1/2 and 9/10 is close to 1. Of the two fractions that are less than 1/2, the denominators are close to each other, and one numerator is 2 times the numerator of the other.

- Problem 12: One fraction equals 1/2 (the numerator is 3 of the denominator). The others are close to 1/2, and 3/8 is less than 1/2. The other two are greater than 1/2 but only by 1/4 of a piece each—that is, 4/7 is 1/7 of a seventh greater than 1/2, and 3/5 is 1/5 of a fifth greater than 1/2. Because fifths are greater than sevenths, 3/5 is greater than 4/7.

**Introducing the Fraction-Stick Chart**

(Math Journal 1, p. 130; Math Masters, p. 137)

Use a transparency of the chart from Math Masters, page 137 to demonstrate how to use the Fraction-Stick Chart.
1. Skip-Counting with Fractions

Please refer students to journal page 130. Explain that a fraction stick is a model for the whole, or the ONE, that shows unit fractions for the interval between 0 and 1. Each row of the Fraction-Stick Chart combines 2 fraction sticks to show the interval from 0 to 2, divided into unit fractions for a particular denominator.

Example: The third row shows two sticks, each divided into thirds. There are 6 pieces in this row, each labeled \( \frac{1}{3} \). The pieces can be used to count by thirds.

2. Finding Equivalent Fractions

The Fraction-Stick Chart on Math Masters, page 137 can be used to find equivalent fractions. Survey the class for examples of pairs of fractions that name the same part of a whole. Emphasize that these are equivalent fractions and list the examples on the board. For example, \( \frac{3}{6} \) is equivalent to \( \frac{1}{2} \).

Example: Find equivalent fractions for \( \frac{5}{12} \).

Step 1: The denominator is 3, so use the thirds stick to locate the fraction \( \frac{2}{3} \). Count the pieces from left to right. The right edge of the second piece is \( \frac{2}{3} \).

Step 2: Place one edge of a straightedge at \( \frac{2}{3} \), that is, along the right edge of the second \( \frac{1}{3} \) piece. The straightedge should be parallel to the sides of the Fraction-Stick Chart. Now look for other fraction sticks on the chart along the straightedge.

On the sixths stick, the straightedge touches the right edge of a piece. Count the sixths-stick pieces from left to right. The straightedge is at the end of the fourth piece, which is \( \frac{4}{6} \). So \( \frac{4}{6} \) is equivalent to \( \frac{2}{3} \).

On the ninths stick, the straightedge touches the end of the sixth piece, which is \( \frac{2}{9} \). So \( \frac{6}{9} = \frac{2}{3} \).

On the twelfths stick, the straightedge touches the end of the eighth piece, which is \( \frac{4}{12} \). So \( \frac{8}{12} = \frac{2}{3} \). The fractions \( \frac{2}{3} \), \( \frac{4}{6} \), \( \frac{6}{9} \), and \( \frac{8}{12} \) are equivalent. They name the same distance on the Fraction-Stick Chart.

On the other sticks, the straightedge cuts through some of the pieces, so \( \frac{2}{3} \) cannot be written as an equivalent fraction using the denominator on those sticks.

3. Comparing Fractions

The Fraction-Stick Chart on Math Masters, page 137 can be used to compare fractions, for example, compare \( \frac{3}{5} \) and \( \frac{3}{5} \). (See margin.)

Step 1: The denominator of the first fraction is 9, so use the ninths stick to locate \( \frac{4}{9} \). Count the pieces from left to right. The right edge of the fourth piece is \( \frac{4}{9} \). Place the straightedge along this edge.
**Ongoing Learning & Practice**

### Playing Fraction Top-It

(Student Reference Book, p. 316; Math Journal 2, Activity Sheets 5–7)

Students practice comparing fractions by playing *Fraction Top-It*. Students use the Fraction Cards that were stored in Lesson 5-1.

### Math Boxes 5-3

(Math Journal 1, p. 133)

**Mixed Practice** Math Boxes in this lesson are paired with Math Boxes in Lesson 5-1. The skill in Problem 5 previews Unit 6 content.

**Writing/Reasoning** Have students write a response to the following: Explain how you converted the fractions to mixed numbers in Problem 2. Sample answer: For the whole number part, I found how many groups of the denominator were in the numerator. The fraction part was what was left.
**Study Link 5.3**  
(Math Masters, p. 131)

**Home Connection** Students find equivalent fractions, add fractions, and solve fraction number stories using fraction sticks.

**3 Differentiation Options**

**READINESS**

**Making Fraction Strips**

To explore comparing and ordering fractions using a length model, have students make fraction strips. Students cut 6 strips of paper, each 2" by 8 1/2", and then fold and label them to represent halves, thirds, fourths, fifths, sixths, and eighths. (See margin.)

- To fold into thirds, fold one end in so the doubled parts and the single part are the same size.
- To fold into sixths, fold a strip into thirds and then in half.
- For fifths, fold the two outside edges of the strip in toward the middle but not together. Fold them so the doubled parts and the space between them look like three equal parts. Now fold the doubled parts back the other way at the point where the folded ends first came down.

Have students label the fractions on the folds. As they finish, ask students to fold two strips so only the unit fraction shows and then make a comparison statement. For example, \(\frac{1}{3}\) is less than \(\frac{1}{2}\).

**ENRICHMENT**

**Exploring a Fraction-Stick Chart**  
(Math Masters, p. 130)

To apply students’ understanding of fractions, have them explore the relationships between the numerators and denominators of equivalent fractions. When they finish, have them share one of their discoveries.

**ELL Support**

**Building a Math Word Bank**  
(Differentiation Handbook, p. 142)

To provide language support for fractions, have students use the Word Bank Template found on Differentiation Handbook, page 142. They write the term equivalent fraction, draw pictures related to the term, and write other related words. See the Differentiation Handbook for more information.