

## Lesson 14: Compare and Order Fractions, Using a Number Line

### Lesson Objectives

- Students will compare and order fractions, using a number line and equivalent fractions.

### Instructional Materials

Material	Quantity	Description
How Am I Doing? graph	1 per student	
Colored pencils	1 per student	
Display Masters	1 each	<ul style="list-style-type: none"><li>• Preview: Key Ideas: Compare and Order</li><li>• Demonstrate: Fractions Less Than 1 A–G</li><li>• Demonstrate: Fractions A–E</li></ul>
Handouts	1 per student	<ul style="list-style-type: none"><li>• Cumulative Review</li><li>• Practice 1</li><li>• Practice 2</li><li>• Independent Practice</li></ul>
Answer Keys	1 each	<ul style="list-style-type: none"><li>• Cumulative Review</li><li>• Practice 1</li><li>• Practice 2</li><li>• Independent Practice</li></ul>

## Cumulative Review

Have students answer the questions on the Cumulative Review handout. Go over the answers. Correct misconceptions. Have students use a colored pencil to make corrections as needed. Collect student papers to determine who needs additional instruction.

## Preview

This lesson will build on students' conceptual knowledge of using a number line and computing equivalent fractions.

Display and introduce through a brief explanation the key ideas for this lesson:

- Fractions can be compared, using equivalent forms of fractions.
- Fractions can be ordered, using equivalent forms of fractions and a number line.

Use the Key Ideas: Compare and Order  display master as needed.


## Engage Prior/Informal Knowledge

To open the lesson, present tasks to activate students' background knowledge and preskills, such as the following:

- Name a common denominator for the following sets of denominators:
  - ◇ 4, 6, 12
  - ◇ 3, 10, 15
- Generate a fraction equivalent to  $\frac{3}{6}$  with a denominator of 24 and generate a fraction equivalent to  $\frac{6}{8}$  with a denominator of 24.

**Demonstrate**

1. Compare and order fractions less than 1.

**Say:** *In the previous lesson, we generated equivalent fractions, using multiplication and division. Today, we will compare fractions with different denominators, using what we know about equivalent fractions. We will then order the fractions, using a number line.* 

**Say:** *We will compare and order the fractions  $\frac{4}{6}$ ,  $\frac{3}{8}$ , and  $\frac{2}{12}$ . To compare the fractions, we must create an equivalent fraction for each that has the same denominator. Let's look at the denominators. We need to find a common denominator of 6, 8, and 12. What is a common denominator of 6, 8, and 12? (answers will vary: 24, 48, etc.)*

Use the Fractions Less Than 1 A  display master as needed.

**Say:** *In this case, I am going to use 24, which just happens to be the least common denominator of 6, 8, and 12. I could use another common denominator, such as 48, but I chose 24 because it is sometimes easier to work with smaller numbers.*

**Say:** *We will create new fractions equivalent to each of the original fractions but with a denominator of 24. Because 24 is greater than each of the original denominators, we know we will need to multiply to find the equivalent fractions.*

Use the Fractions Less Than 1 B  display master as needed.

**TEACHER NOTE**



This lesson assumes that students are familiar with finding a common denominator. Although most examples demonstrate the use of the least common denominator, doing so is not a necessity.



**TEACHER NOTE**

If time allows, repeat this process with another common denominator, such as 72. Show students that using another common denominator is acceptable but that computations with smaller common denominators are less complex.

**Say:** Let's begin with  $\frac{4}{6}$ . What do we multiply 6 by to get 24?  
(4) If we multiply 6 by 4 to get 24, then we need to multiply the numerator, 4, by 4 to get the new numerator. What is 4 times 4? (16). Therefore, the fraction equivalent to  $\frac{4}{6}$  with a denominator of 24 is  $\frac{16}{24}$ . Find the fractions equivalent to  $\frac{3}{8}$  and  $\frac{2}{12}$  with denominators of 24 the same way.

Allow students to find the other equivalent fractions independently before discussing the solutions as a group. Use the Fractions Less Than 1 C  display master as needed. 

**Say:** Now that we have generated fractions with the same denominator that are equivalent to the given fractions, we can compare the fractions. The equivalent fractions that we generated are  $\frac{16}{24}$ ,  $\frac{9}{24}$ , and  $\frac{4}{24}$ . Which fraction is the greatest? ( $\frac{16}{24}$ ) How do you know? (more parts of the whole) Which fraction is the least? ( $\frac{4}{24}$ ) How do you know? (fewer parts of the whole)

**Say:** Next, let's order the fractions on a number line.

**Say:** Before finding the exact places of the fractions, let's estimate where they will go. Because all of the given fractions are less than 1, we know that they will be between 0 and 1 on the number line.

Use the Fractions Less Than 1 D  display master as needed.

**Say:** Start at the halfway point. What fraction with 24 in the denominator is exactly halfway between 0 and 1? ( $\frac{12}{24}$ )

Use the Fractions Less Than 1 E  display master as needed.

**Say:** Where should  $\frac{16}{24}$  go? (to the right of  $\frac{12}{24}$ ) Where should  $\frac{9}{24}$  go? (to the left of  $\frac{12}{24}$ ) Does  $\frac{4}{24}$  go closer to 0 or  $\frac{12}{24}$ ?

(closer to 0)

Have students write below the number line where they think the fractions belong.

**Say:** Now, let's use marks to place the fractions more accurately. To place the fractions on the number line, we will create 24 parts between 0 and 1.

Use the Fractions Less Than 1 F  display master as needed.

**Say:** The first fraction is  $\frac{16}{24}$ . With our pencil, we begin at 0, and then count 16 marks, make a point, and label the point  $\frac{16}{24}$ .

**Say:** The next fraction is  $\frac{9}{24}$ . With our pencil, we begin at 0, count 9 marks, make a point, and label the point  $\frac{9}{24}$ .

**Say:** The last point is  $\frac{4}{24}$ . With our pencil, we begin at 0, count 4 marks, make a point, and label the point  $\frac{4}{24}$ .

**Say:** How close are these fractions to the ones we estimated?

Answer student questions.

**Say:** Now that we have compared and ordered the equivalent fractions we generated, we write our original fractions above the equivalent fraction on the number line.

Use the Fractions Less Than 1 G  display master as needed.

**Say:** Which is greater:  $\frac{3}{8}$  or  $\frac{2}{12}$ ? ( $\frac{3}{8}$ ) How do you know? (more parts in the equivalent fraction; position on the number line) Which is less:  $\frac{2}{12}$  or  $\frac{4}{6}$ ? ( $\frac{2}{12}$ ) How do you know? (more parts in the equivalent fraction; position on the number line)

**Say:** That means  $\frac{4}{6}$  is greatest.

2. Compare and order fractions less and greater than 1.

**Say:** Compare and order the fractions  $\frac{11}{10}$ ,  $\frac{2}{5}$ , and  $\frac{5}{4}$ .

Use the Fractions A  display master as needed.

**Say:** What do we do first? (create equivalent fractions of each that all have the same denominator) Let's look at the denominators. We need to find a common denominator of 10, 5, and 4. What is a common denominator of 10, 5, and 4? (20)

Use the Fractions B  display master as needed.

**Say:** Because we know that a common denominator of 10, 5, and 4 is 20, we need to create a fraction equivalent to each of the given fractions that has a denominator of 20.

Allow students to find the equivalent fractions independently before confirming the solutions as a group. Use the Fractions C  display master as needed.

**Say:** Now that we have generated equivalent fractions with a like denominator, we can compare the fractions. The equivalent fractions that we generated are  $\frac{22}{20}$ ,  $\frac{8}{20}$ , and  $\frac{25}{20}$ . Which fraction is the greatest? ( $\frac{25}{20}$ ) How do you know? (more parts of the whole) Which fraction is the least? ( $\frac{8}{20}$ ) How do you know? (fewer parts of the whole)

**Say:** Next, let's order the fractions on a number line. Not all of the fractions are less than 1. To accurately place the fractions on the number line, we need to create 20 parts between 0 and 1 and between 1 and 2.

Use the Fractions D  display master as needed.

**Say:** The first fraction is  $\frac{22}{20}$ . With our pencil, begin at 0, count 22 marks, make a point, and label the point  $\frac{22}{20}$ . The next fraction is  $\frac{8}{20}$ . With our pencil, begin at 0, count 8 marks, make a point, and label the point  $\frac{8}{20}$ . The last point is  $\frac{25}{20}$ . With our pencil, begin at 0, count 25 marks, make a point, and label the point  $\frac{25}{20}$ .

**Say:** *Now that we have compared and ordered the equivalent fractions we generated, we write our original fractions above the equivalent fraction on the number line.*

Use the Fractions E  display master as needed.

**Say:** *We can now compare the original fractions on the number line.*

*Which is greater:  $\frac{11}{10}$  or  $\frac{5}{4}$ ? ( $\frac{5}{4}$ ) How do you know? (more parts in the equivalent fraction; position on the number line) Which is less:  $\frac{2}{5}$  or  $\frac{11}{10}$ ? ( $\frac{2}{5}$ ) How do you know? (fewer parts in the equivalent fraction; position on the number line)*

## Practice

For each practice activity, provide detailed feedback to students, highlighting what was done correctly and what needs improvement. Provide opportunities for students to correct their errors. Collect student work to review and monitor student progress.

**Activity 1:** Help students complete the activity on the Practice 1 handout.

**Activity 2:** Have students work in pairs to complete the activity on the Practice 2 handout.

## Independent Practice

1. Have students work independently to complete the activity on the Independent Practice handout.
2. Go over the answers (students self-check and correct, using a colored pencil).
3. Have students record the number correct in the box and complete their How Am I Doing? graph.
4. Collect the papers to review and monitor student progress.

## Closure

Review the key ideas. Have students provide examples from the lesson.

Have students discuss their answer to the following questions:

- What is the first step when ordering a series of fractions?
- Why is it easier to compare fractions when they all have the same denominator?

Clear up any misconceptions. Students who do not understand why fractions need to have a common denominator to compare the numerators need additional instruction.