Lesson 11

Objective: Compare and order mixed numbers in various forms.

Suggested Lesson Structure

■ Fluency Practice (10 minutes)
■ Application Problem (5 minutes)
■ Concept Development (35 minutes)
■ Student Debrief (10 minutes)

Total Time **(60 minutes)**
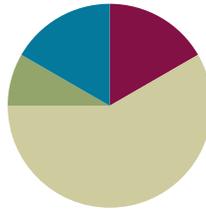
Fluency Practice (10 minutes)

- Expanded Form **4.NBT.2** (3 minutes)
- Rename the Decimal **4.NF.5** (4 minutes)
- Compare Decimal Numbers **4.NF.7** (3 minutes)

Expanded Form (3 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 7.

- T: (Write $6\frac{13}{100}$.) Write 6 and 13 hundredths in expanded fraction form without multiplication.
- S: (Write $6\frac{13}{100} = 6 + \frac{1}{10} + \frac{3}{100}$.)
- T: Write 6 and 13 hundredths in expanded decimal form.
- S: (Write $6.13 = 6 + 0.1 + 0.03$.)

Repeat the process for $54\frac{73}{100}$.

- T: (Write 8.53.) Write 8 and 53 hundredths in expanded decimal form.
- S: (Write $8.53 = 8 + 0.5 + 0.03$.)
- T: Write 8 and 53 hundredths in expanded fraction form.
- S: (Write $8\frac{53}{100} = 8 + \frac{5}{10} + \frac{3}{100}$.)

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Rename the Decimal (4 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 8.

    T: (Write 9.4.) Write the decimal as a mixed number.

    S: (Write $9\frac{4}{10}$.)

    T: (Write $9.4 = 9\frac{4}{10} = \frac{}{10}$.) Complete the number sentence.

    S: (Write $9.4 = 9\frac{4}{10} = \frac{94}{10}$.)

    T: (Write $9.4 = 9\frac{4}{10} = \frac{94}{10} = \frac{}{100}$.) Complete the number sentence.

    S: (Write $9.4 = 9\frac{4}{10} = \frac{94}{10} = \frac{940}{100}$.)

Continue with the following possible sequence: 12.3, 4.27, and 53.8.

> **NOTES ON MULTIPLE MEANS OF REPRESENTATION:**
>
> The Compare Decimal Numbers fluency activity gives students working below grade level and others useful practice using the less than (<) and greater than (>) symbols, which are easily confused. Mnemonic devices such as imagining the < symbol to be an alligator mouth that eats the larger amount can be effective. To enhance the practice, ask students to read the comparison statements aloud.

Compare Decimal Numbers (3 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 10.

    T: (Write 2.5 ＿＿ 2.50.) Complete the number sentence, filling in a greater than, less than, or equal sign.

    S: (Write 2.5 = 2.50.)

Continue with the following possible sequence: 6.74 ＿＿ 6.7, 4.16 ＿＿ 4.61, 3.89 ＿＿ 3.9, 8.64 ＿＿ 8.46, 10.04 ＿＿ 10.4, and 13.28 ＿＿ 13.8.

Application Problem (5 minutes)

While sewing, Kikanza cut 3 strips of colored fabric: a yellow 2.8-foot strip, an orange 2.08-foot strip, and a red 2.25-foot strip.

She put the shortest strip away in a drawer and placed the other 2 strips side by side on a table. Draw a tape diagram comparing the lengths of the strips on the table. Which measurement is longer?
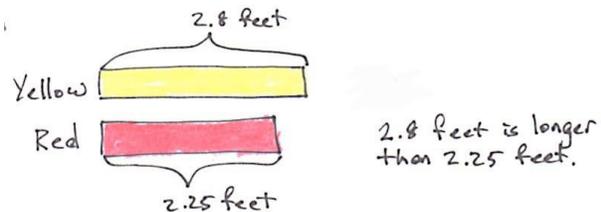
Note: Students apply their comparison skills from Lesson 10 by not including the orange strip in the drawing, recognizing it is the shortest. This also introduces students to a part–whole tape diagram with decimals without calculations.

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Concept Development (35 minutes)

Materials: (T) Number line (Lesson 6 Template 2) (S) Number line (Lesson 6 Template 2), decimal number flash cards (Template) (1 set per group), personal white board

Note: The onset of Problem 1 asks students to work in small groups. Each group needs one set of flash cards. The recommended group size is three students.

Problem 1: Arrange mixed numbers, fractions, and decimals on a number line.

T: (Distribute 1 set of decimal number flash cards to each group.) In your small groups, work together to arrange your decimal number flash cards in order from least to greatest.

Allow three to five minutes for students to work. Students may renumber the cards if they wish. Do not correct their ordering yet, but do ask students to provide reasoning for their ordering choices.
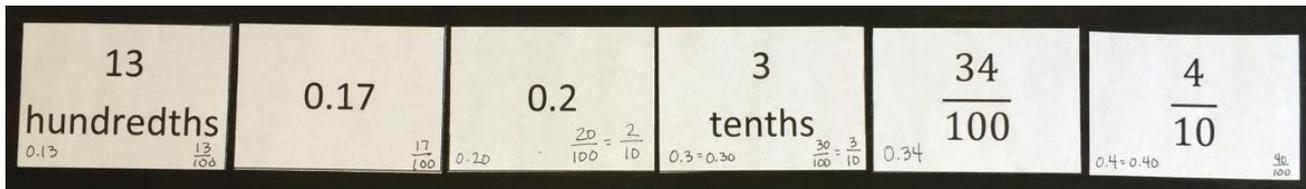

T: We want to plot all of these numbers on the number line. (Distribute the number line template. Project the first number line on the number line template.)

T: What is the smallest number in this set?

S: 13 hundredths.

T: What is the greatest number in this set?

S: 4 tenths.

T: Talk with your group to determine what the most appropriate endpoints are.

S: (Determine the endpoints.)

T: Turn to another group, and compare your endpoints. Discuss how you chose your endpoints.

S: Our endpoints are 1 tenth and 4 tenths since the smallest number in this set is 13 hundredths. We started at the tenth that comes before 13 hundredths.

T: Work with your group to plot and label each number from the set on the number line.

S: (Work with the group to complete the task.)

T: Did your group discover an ordering mistake when it came time to plot the numbers? Explain how you found the mistake.

T: (Project three number lines, completed by students, similar to the ones shown on the following page.) Did these groups represent the numbers using the same form that you did?

S: No, we changed some of the numbers into decimal form so they are all in the same form. → We wrote all the numbers in fraction form. → We left some of them the way they were given to us.

T: Does the form change the order of the numbers?

S: No. No matter which form we used, the numbers are in the same position on the number line.

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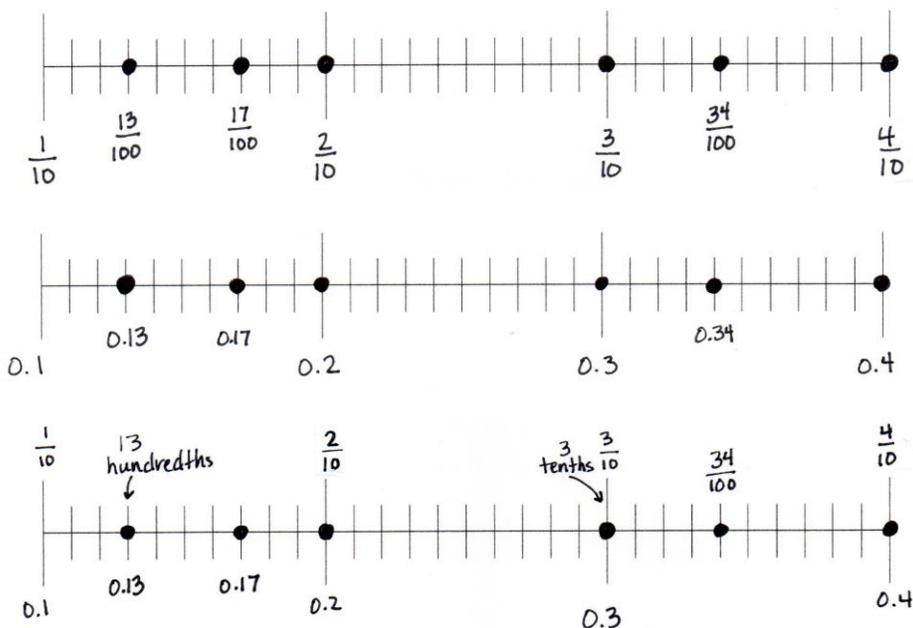
Repeat the process by writing the following sets of numbers:

- 7.92, 8.1, $7\frac{86}{100}$, $\frac{79}{10}$, $\frac{802}{100}$

- $9\frac{5}{10}$, 9.41, $\frac{968}{100}$, $\frac{96}{10}$, 9.7, 9.63

T: Look at your number line. How are your numbers arranged? In what order are they?

S: The numbers go from least to greatest. → The smallest numbers come first. Whenever you read numbers on a number line, they always go in order, with the smallest numbers on the left and larger numbers on the right.

Problem 2: Arrange mixed numbers, fractions, and decimals in order from greatest to least.

T: (Write $\frac{18}{10}$, 1.08, $\frac{18}{100}$, $1\frac{81}{100}$, $\frac{190}{100}$, 1.82.)

T: Instead of using the number line to order the numbers from least to greatest, work with your group to arrange the numbers in order from *greatest to least* using decimal form. Use the > symbol between the numbers as you list them from greatest to least on your personal white board.

S: (Work with the group to complete the task.)

T: List the numbers in order from greatest to least. (Accept numbers in any correct form.)

S: 1.9 > 1.82 > 1.81 > 1.8 > 1.08 > 0.18.

T: How did you decide on the order of the numbers?

S: We changed all of the numbers to decimal form or fraction form because it's easier for us to compare in the same form. → We renamed every number to hundredths. → We left the numbers in tenths and hundredths and used place value to compare: first the ones, then the tenths, and then the hundredths. → We compared the decimals or fractions first. Then, we found where the mixed numbers would go.

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Repeat the process with the following sets of numbers:

- $14\frac{5}{10}$, 15.5, $\frac{154}{100}$, 15.05, $14\frac{40}{100}$

- $8\frac{61}{100}$, $8\frac{6}{10}$, $8\frac{1}{10}$, $\frac{816}{100}$, 86, 8.01

Problem 3: Compare and order mixed numbers in the context of a word problem.

T: (Project the following word problem.) During a triple jump contest, Hae Jung jumped 8.76 meters. Marianne jumped $8\frac{7}{10}$ meters. Beth jumped $\frac{880}{100}$ meters. Lily jumped 8.07 meters. In what place did each student rank?

T: Use what you know to answer this question on your personal white board and demonstrate your reasoning. (Allow students time to work.)

MP.4

T: In what place did each student rank?

S: Beth came in first. Hae Jung came in second. Marianne placed third. Lily placed fourth.

T: How did you solve this problem?

S: I changed all of the numbers to decimal form. → I changed all the numbers to fractions. I used hundredths so that they were all the same unit. → I changed everything to a mixed number so I could compare the ones first. I realized I had one fraction with tenths, so I made that 70 hundredths so it would be easier to compare.

Extension: Give six blank flash cards or index cards to each group. Ask the groups to record decimal numbers using various forms for another group to order. Pair up groups, trade cards, and then have the groups check the work of their partnered group.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

Lesson Objective: Compare and order mixed numbers in various forms.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- In Problem 1(a), which numbers were the easiest for you to plot? Why?
- How did the number line help you to order—or to check the order of—the numbers from least to greatest? Do you think it could be useful to use the number line to order numbers from greatest to least like in Problem 2? Why or why not?
- How could a place value chart help you solve Problem 2(a)? Create an example to share with the class. What other models or tools have we used this year that might help you with Problem 2?

- In Problem 2(b), which numbers did you start ordering first? How did ordering some numbers help you with the remaining numbers? Use specific numbers to explain your process.
- In Problems 3 and 4, how did you make it easier to compare the various numbers? Explain your reasoning.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

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Name _____ Date _____

1. Plot the following points on the number line.

    a. 0.2, $\frac{1}{10}$, 0.33, $\frac{12}{100}$, 0.21, $\frac{32}{100}$

    0.1   0.2   0.3   0.4
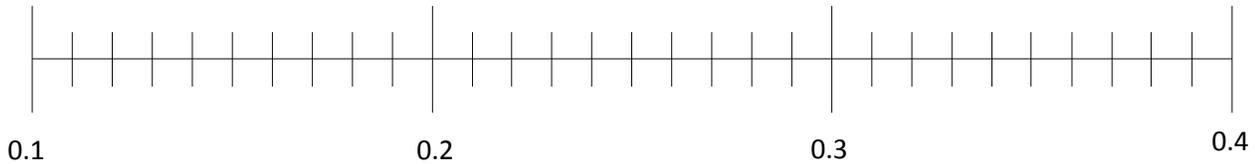
    b. 3.62, 3.7, $3\frac{85}{100}$, $\frac{38}{10}$, $\frac{364}{100}$

    3.6   3.7   3.8   3.9
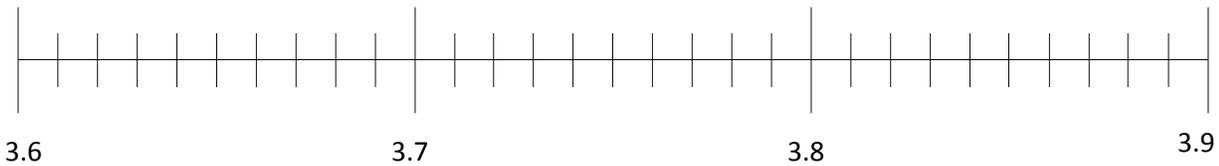
    c. $6\frac{3}{10}$, 6.31, $\frac{628}{100}$, $\frac{62}{10}$, 6.43, 6.40
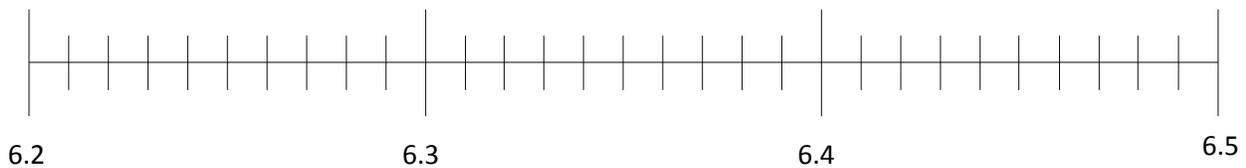
    6.2   6.3   6.4   6.5

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2. Arrange the following numbers in order from greatest to least using decimal form. Use the > symbol between each number.

a. $\frac{27}{10}$, 2.07, $\frac{27}{100}$, $2\frac{71}{100}$, $\frac{227}{100}$, 2.72

_____

b. $12\frac{3}{10}$, 13.2, $\frac{134}{100}$, 13.02, $12\frac{20}{100}$

_____

c. $7\frac{34}{100}$, $7\frac{4}{10}$, $7\frac{3}{10}$, $\frac{750}{100}$, 75, 7.2

_____

3. In the long jump event, Rhonda jumped 1.64 meters. Mary jumped $1\frac{6}{10}$ meters. Kerri jumped $\frac{94}{100}$ meter. Michelle jumped 1.06 meters. Who jumped the farthest?

4. In December, $2\frac{3}{10}$ feet of snow fell. In January, 2.14 feet of snow fell. In February, $2\frac{19}{100}$ feet of snow fell, and in March, $1\frac{1}{10}$ feet of snow fell. During which month did it snow the most? During which month did it snow the least?

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Name _____   Date _____

1. Plot the following points on the number line using decimal form.

   1 one and 1 tenth, $\frac{13}{10}$, 1 one and 20 hundredths, $\frac{129}{100}$, 1.11, $\frac{102}{100}$
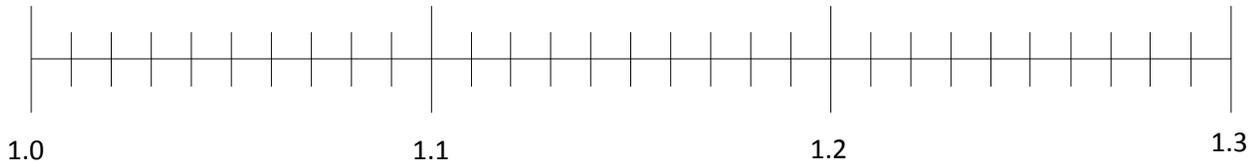
   ```
   |—+—+—+—+—+—+—+—+—|—+—+—+—+—+—+—+—+—|—+—+—+—+—+—+—+—+—|
   1.0                1.1                1.2                1.3
   ```

2. Arrange the following numbers in order from greatest to least using decimal form. Use the > symbol between each number.

   5.6, $\frac{605}{100}$, 6.15, $6\frac{56}{100}$, $\frac{516}{100}$, 6 ones and 5 tenths

   _____

Name _____   Date _____

1. Plot the following points on the number line using decimal form.

   a. $0.6, \frac{5}{10}, 0.76, \frac{79}{100}, 0.53, \frac{67}{100}$

   0.5   0.6   0.7   0.8
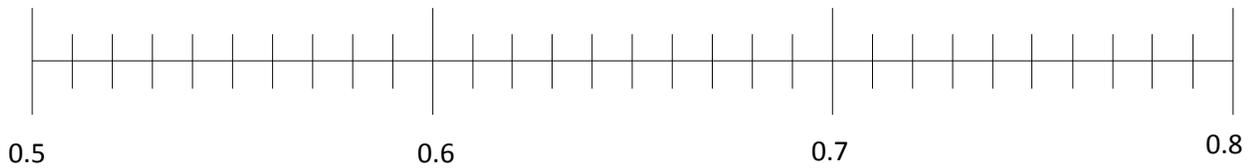
   b. 8 ones and 15 hundredths, $\frac{832}{100}, 8\frac{27}{100}, \frac{82}{10}, 8.1$

   8.1   8.2   8.3   8.4
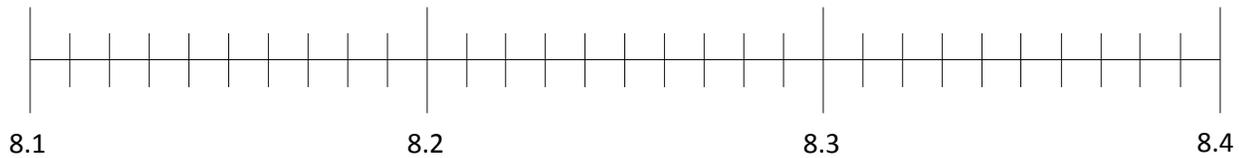
   c. $13\frac{12}{100}, \frac{130}{10}$, 13 ones and 3 tenths, $13.21, 13\frac{3}{100}$
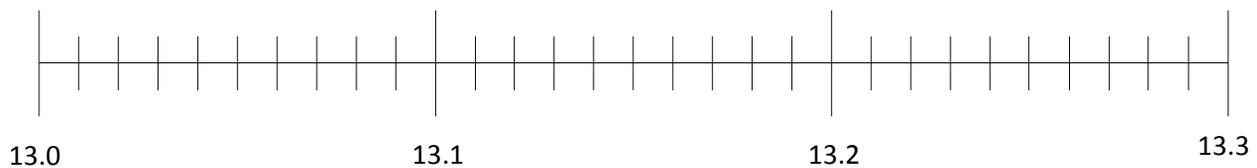
   13.0   13.1   13.2   13.3

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2. Arrange the following numbers in order from greatest to least using decimal form. Use the > symbol between each number.

a.   4.03, 4 ones and 33 hundredths, $\frac{34}{100}$, $4\frac{43}{100}$, $\frac{430}{100}$, 4.31

_____

b. $17\frac{5}{10}$, 17.55, $\frac{157}{10}$, 17 ones and 5 hundredths, 15.71, $15\frac{75}{100}$

_____

c.   8 ones and 19 hundredths, $9\frac{8}{10}$, 81, $\frac{809}{100}$, 8.9, $8\frac{1}{10}$

_____

3. In a paper airplane contest, Matt's airplane flew 9.14 meters. Jenna's airplane flew $9\frac{4}{10}$ meters. Ben's airplane flew $\frac{904}{100}$ meters. Leah's airplane flew 9.1 meters. Whose airplane flew the farthest?

4. Becky drank $1\frac{41}{100}$ liters of water on Monday, 1.14 liters on Tuesday, 1.04 liters on Wednesday, $\frac{11}{10}$ liters on Thursday, and $1\frac{40}{100}$ liters on Friday. Which day did Becky drink the most? Which day did Becky drink the least?

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3 tenths	0.2
0.17	$\dfrac{34}{100}$
13 hundredths	$\dfrac{4}{10}$

decimal number flash cards

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