Lesson 10

Objective: Use area models and the number line to compare decimal numbers, and record comparisons using <, >, and =.

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)

▪ Decompose Larger Units **4.NF.5**   (3 minutes)
▪ Decimal Fraction Equivalence **4.NF.5**   (5 minutes)
▪ Rename the Decimal **4.NF.5**   (2 minutes)

Decompose Larger Units (3 minutes)

Materials: (S) Personal white board, place value chart (Lesson 7 Template)

Note: This fluency activity reviews Lesson 8.

T: (Write 2.) Say the number in unit form.
S: 2 ones.
T: Draw 2 ones on your place value chart.
S: (Draw 2 ones disks.)
T: (Write 2 ones = __ tenths.) Regroup 2 ones for tenths.
S: (Cross out the ones disks, and draw 20 tenths disks. Write 2 ones = 20 tenths.)

Continue with the following possible sequence:

▪   Regroup 2 ones 5 tenths for tenths.
▪   Regroup 2 tenths for hundredths.
▪   Regroup 2 tenths 4 hundredths for hundredths.

2 ones = 20 tenths

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157

Decimal Fraction Equivalence (5 minutes)

Materials: (S) Personal white board, place value chart (Lesson 7 Template)

Note: This fluency activity reviews Lesson 8.

T: (Write 5 ones 7 tenths.) Write the number in digits on your place value chart.

S: (Write the digit 5 in the ones place and the digit 7 in the tenths place.)

T: (Write 5.7 = __ —.) Write the number as a mixed number.

S: (Write 5.7 = $5\frac{7}{10}$.)

T: (Write 5.7 = $5\frac{7}{10} = \frac{}{10}$.) Write the number as a fraction greater than 1.

S: (Write 5.7 = $5\frac{7}{10} = \frac{57}{10}$.)

T: Read this number as written on the chart.

S: 5 and 7 tenths.

T: Express the answer as ones and hundredths.

S: 5 and 70 hundredths.

ones	.	tenths	hundredths
5	.	7	

$$5.7 = 5\frac{7}{10} = \frac{57}{10}$$

Continue with the following possible sequence: 3 ones 8 tenths, 1 ten 9 tenths, and 2 tens 3 ones 3 tenths.

Rename the Decimal (2 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 8.

T: (Write 5.2.) Write the decimal as a mixed number.

S: (Write $5\frac{2}{10}$.)

T: (Write 5.2 = $5\frac{2}{10} = \frac{}{10}$.) Complete the number sentence.

S: (Write 5.2 = $5\frac{2}{10} = \frac{52}{10}$.)

T: (Write 5.2 = $5\frac{2}{10} = \frac{52}{10} = \frac{}{100}$.) Complete the number sentence.

S: (Write 5.2 = $5\frac{2}{10} = \frac{52}{10} = \frac{520}{100}$.)

Continue with the following possible sequence: 9.6, 10.6, and 78.9.

Application Problem (5 minutes)

In science class, Emily's 1-liter beaker contains 0.3 liter of water. Ali's beaker contains 0.8 liter of water, and Katie's beaker contains 0.63 liter of water. Who can pour all of her water into Emily's beaker without going over 1 liter, Ali or Katie?

E $\boxed{0.3 L}$

A $\boxed{0.8 L}$

K $\boxed{0.63 L}$

$0.3 \xrightarrow{\overparen{+0.7}} 1$

$0.8 > 0.7$

$0.63 < 0.7$

Emily's beaker can only fit 0.7L water more. 0.8L is greater than 0.7L so it would spill. Katie's water will fit because 0.63 < 0.7.

Note: This Application Problem reviews comparison of metric measurements from Lesson 9. Students contextualize and compare volumes of water with measurements of tenths and hundredths. Students may try to use addition and subtraction, but encourage them to use what they know about completing the whole and benchmark numbers.

Concept Development (35 minutes)

Materials: (T/S) Personal white board, comparing with area models (Template), number line
(Lesson 6 Template 2)

Problem 1: Compare pairs of decimal numbers using an area model. Record the comparison using <, >, and =.

T: (Write 0.15 on the board. Distribute the comparing with area models template.) Shade the first area model to represent this decimal.

T: (Write 0.51 on the board.) In the second area model, represent this decimal number.

T: What statements using the phrases *greater than* and *less than* can we make to compare these decimals?

S: 0.51 is greater than 0.15. → 0.15 is less than 0.51.

T: How does the area model help you compare 0.15 and 0.51?

MP.6

S: The shaded part of 0.51 covers a lot more area than the shaded part for 0.15. → I only shaded 1 full column and 1 half of a column to represent 0.15, but I shaded 5 full columns plus another small part of the next column for 0.51, so 0.51 is greater than 0.15. → I have 15 hundredths shaded on the first area model, but I have
51 hundredths shaded on the second area model.

T: (Write <, >, and = on the board.) Use the appropriate comparison symbol to write both statements on comparing with area models.

S: (Write 0.51 > 0.15. 0.15 < 0.51.)

$0.15 < 0.51$

$0.51 > 0.15$

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159
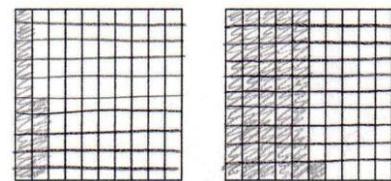
Repeat the process using the following sequence:

- 0.37 and 0.3
- 0.27 and 0.7
- 0.7 and 0.70
- 0.06 and 0.6

Problem 2: Compare decimal numbers on a number line. Record the comparison using <, >, and =.

T: (Distribute the number line template.) Look at the first number line. Label the endpoints as 4 and 3 tenths and 4 and 6 tenths.

T: Label the other tenths that can be labeled on this number line.

S: (Label 4.4 and 4.5.)

T: (Write 4.50 and 4.38 on the board.) Plot and label these two points on the number line.

T: How did you locate the points?

S: I went to 4.5. Since there are no hundredths, you just stop there. → 4.5 is the same as 4.50. → To locate 4.38, I started at 4.3. Then, I went 8 hundredths more to get to 4.38. → I knew 4.38 was 2 hundredths less than 4.4, so I went to 4.4 and counted back 2 hundredths.

T: What statements can we make to compare these decimals?

S: 4.5 is greater than 4.38. → 4.38 is less than 4.5.

T: (Write <, >, and = on the board.) Use the appropriate comparison symbol to write both statements.

S: (Write 4.5 > 4.38. 4.38 < 4.5.)

T: 4.38 has three digits. 4.5 only has two digits. At a quick glance, it appears that 4.38 would have a greater value. Talk with your partner. Why does 4.5 have a greater value even though it has fewer digits?

S: 4.5 has more tenths than 4.38. Tenths are larger than hundredths. → Make the tenths into hundredths. 4 and 5 tenths renamed is 4 and 50 hundredths. Now, it's obvious that it is greater. → Four point five is four point five zero. Now, it has three digits, too. → 4.5 is halfway between 4 and 5, and 4.38 is part of the way between 4 and 4.5, so 4.38 is less than 4.5.
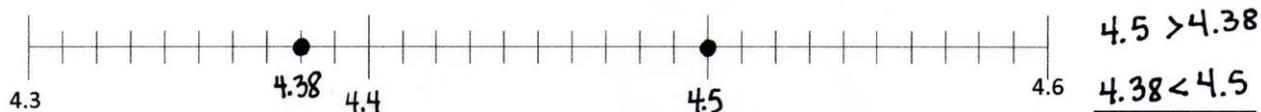
Repeat the process with the number line using the sequence below. Have students label the blank number line to best match each number pair. Ask students to consider what the endpoints should be in order to represent both numbers on the same number line.

- 6.37 _____ 6.3
- 2.68 _____ 2.8
- 10.1 _____ 10.10
- 10.2 _____ 10.02

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Problem 3: Compare decimal numbers using <, >, and =.

Project the sequence below, and ask students to compare using <, >, and =. With each pair of numbers, ask students to share their reasoning with a partner. They may use the area model, a number line, a place value chart, or other reasonable strategies.

- 6.24 _____ 5.24
- 13.24 _____ 13.42
- 0.48 _____ 2.1
- 2.17 _____ 2.7
- 3.3 _____ 3.30
- 7.9 _____ 7.09
- 8.02 _____ $8\frac{2}{10}$
- 5.3 _____ 5 ones and 3 hundredths
- 5.2 _____ 52 tenths
- 4 ones and 6 tenths _____ 4 ones and 60 hundredths
- 0.25 _____ $\frac{25}{10}$
- $\frac{237}{100}$ _____ 2.73
- 4 tenths _____ 45 hundredths
- 2.31 _____ 23 tenths and 5 hundredths

The sequence above engages students with practice that addresses common misconceptions and becomes increasingly more complex. For instance, the sequence opens with two examples that have the same number of digits and simply requires students to attend to the value of each place. In the next four examples, the pairs being compared have differing numbers of digits. Students come to understand that the value of the number is not dependent on the number of digits. The sequence of the examples then goes on to numbers written in different forms. Students may choose to model the numbers, convert into common units, or rewrite in the same form.

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.

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161

Student Debrief (10 minutes)

Lesson Objective: Use area models and the number line to compare decimal numbers, and record comparisons using <, >, and =.

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.

- Compare your area model for Problem 1(d) with your partner's area model. Explain why it was possible to shade both models without decomposing one to hundredths.

- Find an example on your Problem Set where a decimal number with only three digits has a greater value than a decimal number with four digits. Explain why this is so.

- During our lesson, we saw that 0.27 is less than 0.7. Explain why this is so. How can looking at the numbers quickly instead of considering the size of the unit lead to mistakes when comparing? How can we rename 0.7 to compare it easily to 0.27? Which model helped you compare numbers most easily? Was it easier to represent particular problems with certain types of models?

- How did the Application Problem connect to today's lesson?

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.

Lesson 10: Use area models and the number line to compare decimal numbers, and record comparisons using <, >, and =.

162

Name _____   Date _____

1. Shade the area models below, decomposing tenths as needed, to represent the pairs of decimal numbers. Fill in the blank with <, >, or = to compare the decimal numbers.
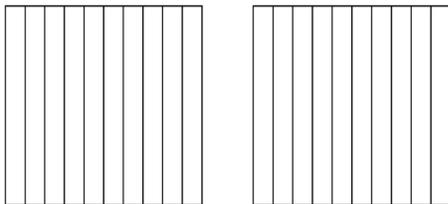
   a. 0.23 _____ 0.4
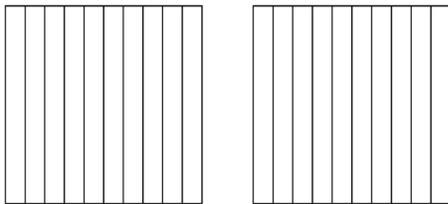
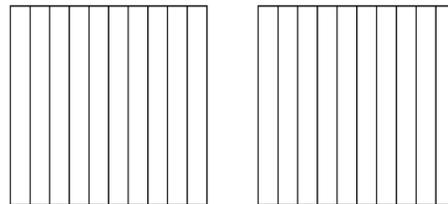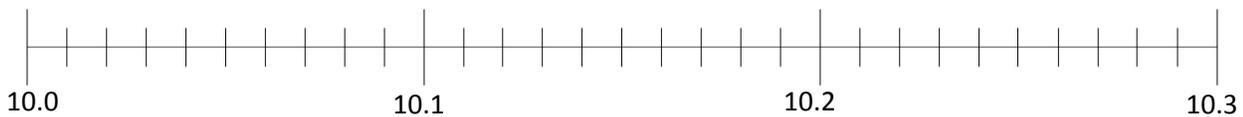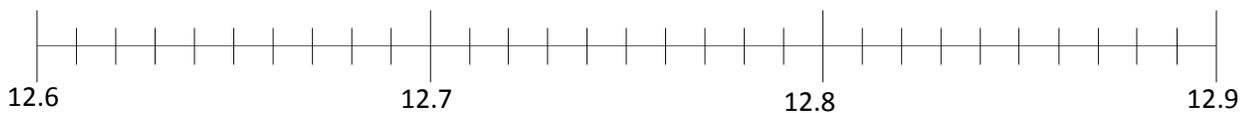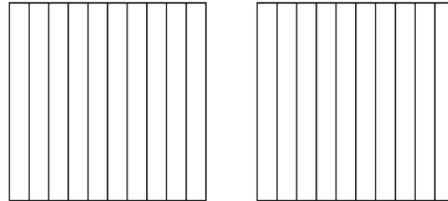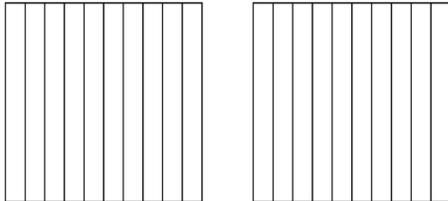   b. 0.6 _____ 0.38
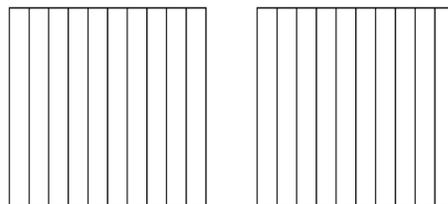
   c. 0.09 _____ 0.9
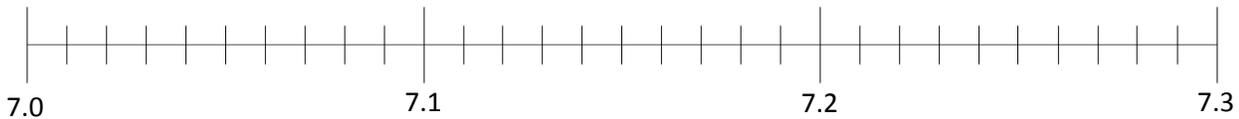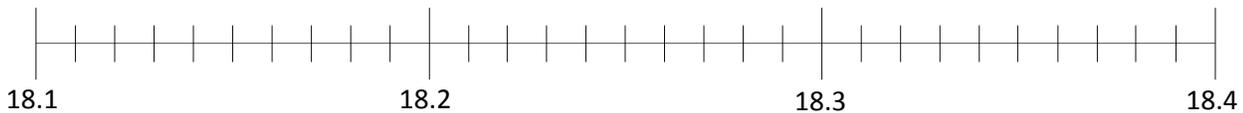
   d. 0.70 _____ 0.7

2. Locate and label the points for each of the decimal numbers on the number line. Fill in the blank with <, >, or = to compare the decimal numbers.

   a. 10.03 _____ 10.3

   10.0   10.1   10.2   10.3

   b. 12.68 _____ 12.8

   12.6   12.7   12.8   12.9

3. Use the symbols <, >, or = to compare.

    a.   3.42 _____ 3.75

    b.   4.21 _____ 4.12

    c.   2.15 _____ 3.15

    d.   4.04 _____ 6.02

    e.   12.7 _____ 12.70

    f.   1.9 _____ 1.21

4. Use the symbols <, >, or = to compare. Use pictures as needed to solve.

    a.   23 tenths _____ 2.3

    b.   1.04 _____ 1 one and 4 tenths

    c.   6.07 _____ $6\frac{7}{10}$

    d.   0.45 _____ $\frac{45}{10}$

    e. $\frac{127}{100}$ _____ 1.72

    f.   6 tenths _____ 66 hundredths

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1. Ryan says that 0.6 is less than 0.60 because it has fewer digits. Jessie says that 0.6 is greater than 0.60.
   Who is right? Why? Use the area models below to help explain your answer.

0.6 _____ 0.60
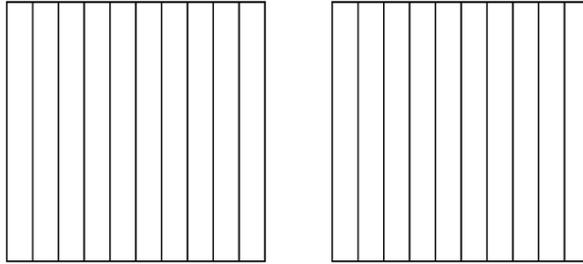
2. Use the symbols <, >, or = to compare.

   a. 3.9 _____ 3.09

   b. 2.4 _____ 2 ones and 4 hundredths

   c. 7.84 _____ 78 tenths and 4 hundredths

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engage^ny   165

Name _____ Date _____

1. Shade the parts of the area models below, decomposing tenths as needed, to represent the pairs of decimal numbers. Fill in the blank with <, >, or = to compare the decimal numbers.

   a. 0.19 _____ 0.3
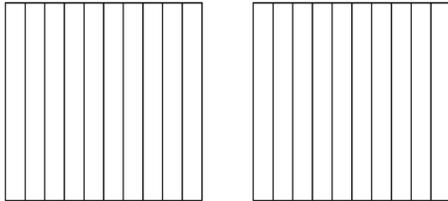
   b. 0.6 _____ 0.06

   c. 1.8 _____ 1.53

   d. 0.38 _____ 0.7
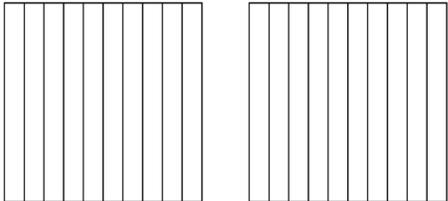
2. Locate and label the points for each of the decimal numbers on the number line.
   Fill in the blank with <, >, or = to compare the decimal numbers.

   a. 7.2 _____ 7.02

   7.0   7.1   7.2   7.3

   b. 18.19 _____ 18.3

   18.1   18.2   18.3   18.4

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3. Use the symbols <, >, or = to compare.

   a. 2.68 _____ 2.54

   b. 6.37 _____ 6.73

   c. 9.28 _____ 7.28

   d. 3.02 _____ 3.2

   e. 13.1 _____ 13.10

   f. 5.8 _____ 5.92

4. Use the symbols <, >, or = to compare. Use pictures as needed to solve.

   a. 57 tenths _____ 5.7

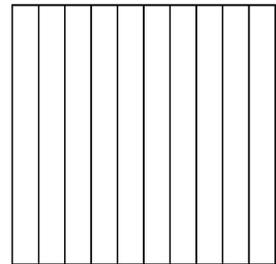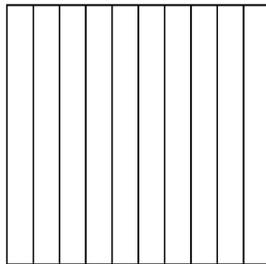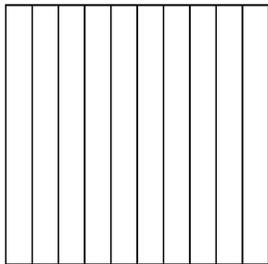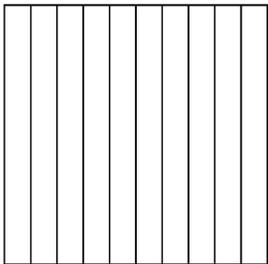   b. 6.2 _____ 6 ones and 2 hundredths

   c. 33 tenths _____ 33 hundredths

   d. 8.39 _____ $8\frac{39}{10}$

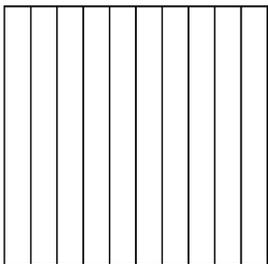   e. $\frac{236}{100}$ _____ 2.36

   f. 3 tenths _____ 22 hundredths

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comparing with area models