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LESSON
29 Comparing Decimals

CCSS: 4.NF.7

1 Introduction

Compare decimals the same way you compare whole numbers, by looking at the digits in the same places. Compare tenths to tenths and hundredths to hundredths.

Compare 0.72 and 0.68.

Line up the numbers on the decimal points. Then look at the tenths.

0.72
0.68

The 7 in the tenths place is greater than the 6 in the tenths place, so 0.72 is greater than 0.68. You can write this using the symbol $>$.

$0.72 > 0.68$

$>$ means "is greater than."
 $<$ means "is less than."
 The symbol always points to the smaller number.

You can use models such as grids or a number line to show your conclusion is correct.

Shade one grid to show 0.72. Shade a second grid to show 0.68.

0.72 0.68

Decimals you compare must name parts of the same size whole. You cannot compare 0.6 mile and 0.2 kilometer because the units are different wholes.

More parts are shaded in the model for 0.72 than in the model for 0.68, so $0.72 > 0.68$ is true.

To check your answer on a number line, plot each number. The number that is on the right is greater than the number on the left.

0.68 < 0.72

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Think About It

If the decimals you are comparing have different numbers of places, how can you compare them? For example, how can you compare 0.1 and 0.15?

2 Focused Instruction

Compare decimals using place values.

➤ Compare 0.41 and 0.38.

What is the first place to the right of the decimal point? tenths

What is the second place to the right of the decimal point? hundredths

Write the numbers at the right, one above the other. Line them up on the decimal points.

Which place should you compare first? tenths. Circle the digits above.

What are the digits in this place in each number? 4 and 3

Which digit is greater? 4

Do you need to compare the digits in the next place to the right? no

Which number is greater? 0.41

Write a comparison of the numbers using $>$, $=$, or $<$. $0.41 > 0.38$

Ones	Decimal point	Tenths	Hundredths
0	.	4	1

Models can help you compare decimals.

➤ Fred buys a bag of nuts that weighs 0.18 pound. Franny buys a bag of nuts that weighs 0.2 pound. Did Fred buy a greater or a lesser amount than Franny?

What place is Fred's amount written in? hundredths

What place is Franny's amount written in? tenths

How many hundredths are equal to 1 tenth? 10

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Objective

To compare decimals by using place value

1 Introduction

Briefly review comparing whole numbers; students should recall that digits in the same places should be compared. Extend the discussion to decimal numbers, stressing that they are compared in the same way as whole numbers. Then work through the examples on the page. Discuss the use of models, such as number lines or grids, to visually compare the decimals.

Think About It

Students should recognize that they can add a placeholder zero to give the decimals being compared the same number of places. For example, 0.1 becomes 0.10 and then is easier to compare to 0.15. Since 5 is greater than 0, 0.15 is greater than 0.1.

Common Core State Standard

4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual model.

2 Focused Instruction

First, students compare two decimals with the same number of places. They align the numbers on the decimal points, identify the places, and compare the digits in those places to determine which number is greater. They then write a comparison using the symbol $<$.

Next, students compare two decimals with different numbers of places. They model each number on a grid, converting the number in tenths to hundredths, and compare the models.

Finally, students locate three decimals on a number line to order them from least to greatest.

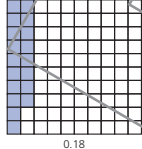
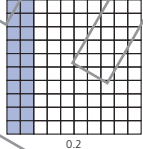
Conclude the Focused Instruction section by having students answer two questions involving comparing and ordering decimals.

2 Focused Instruction

Lesson 29

How many hundredths are equal to 0.2? 20

Shade the left grid to model the number of hundredths in 0.18. Shade the right grid to model the number of hundredths in 0.2.


Which grid has a greater amount shaded? 0.2

Write a comparison using a $<$, $>$, or $=$ symbol. $0.18 < 0.2$

Use a number line to compare and order decimals.

► List the decimals 0.82, 0.53, and 0.69 in order from least to greatest.

Mark each decimal with a point on the number line below. Label the points.



Are numbers on the left larger or smaller than numbers on the right? smaller

Write the numbers in order from least to greatest. 0.53, 0.69, 0.82

Use what you know about comparing decimals to answer these questions.

1 Complete each comparison with the correct symbol, $>$, $<$, or $=$.

0.37 $>$ 0.29 0.48 $<$ 0.5 0.6 $=$ 0.60

2 Write the decimals 0.29, 0.3, and 0.18 in order from greatest to least.

0.3, 0.29, 0.18

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3 Guided Practice

Students should complete the Guided Practice section on their own. Offer assistance as needed, pointing out the reminder and hint boxes along the right side of the page.

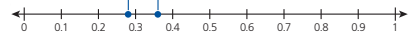
3 Guided Practice

Lesson 29

Solve the following problems.

1 Sachiko lives 0.36 mile from Olga and 0.28 mile from Livia.

Part A Draw and label a point on the number line for each decimal.



Part B Write a comparison statement to compare the decimals.

Answer $0.36 > 0.28$ or $0.28 < 0.36$

Part C Which friend lives farthest from Sachiko?

Answer Olga

2 The chart shows the weights of three packages, in kilograms.

Package	Weight (kilograms)
A	0.78
B	0.09
C	0.8

Part A Write the weights in order from least to greatest.

Answer 0.09, 0.78, 0.8

Part B Explain how you found your answer.

I rewrote 0.8 as 0.80. Then I compared the digits in the tenths place. 8 is greater than 7 and 0, so 0.8 is the greatest number. Then 7 is greater than 0, so 0.78 is the next greatest number and 0.09 is the smallest number.

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Connections to Standards for Mathematical Practice

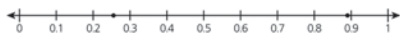
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Model with mathematics.
- Look for and make use of structure.

4 Independent Practice

Lesson 29

Solve the following problems.

- 1 Astrid marked two decimals on this number line. Then she wrote a true comparison using the decimals she marked.



Which comparison could be the one Astrid wrote?

- A $0.2 > 0.8$
 B $0.35 > 0.91$
 C $0.36 < 0.88$
 D $0.26 < 0.89$

DOK 2
4.NF.7

- 2 Mark True or False for each comparison.

	True	False
$0.29 > 0.31$	<input type="checkbox"/>	<input checked="" type="checkbox"/>
$0.09 < 0.10$	<input checked="" type="checkbox"/>	<input type="checkbox"/>
$0.82 > 0.90$	<input type="checkbox"/>	<input checked="" type="checkbox"/>
$0.2 = 0.02$	<input type="checkbox"/>	<input checked="" type="checkbox"/>
$0.30 < 0.33$	<input checked="" type="checkbox"/>	<input type="checkbox"/>
$0.7 = 0.70$	<input checked="" type="checkbox"/>	<input type="checkbox"/>

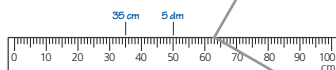
DOK 2
4.NF.7

4 Independent Practice

Lesson 29

- 3 A centimeter (cm) is 0.01 meter. A decimeter (dm) is 0.10 meter.

Part A Mark and label 5 dm and 35 cm on the meter stick below.

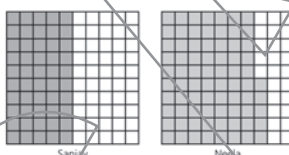


Part B Which measurement is greater?

Answer 5 dm

- 4 Sanjay and Neela each had a bag of candy holding 100 pieces. Sanjay's bag weighed 4 pounds and held 100 chocolate bars. Neela's bag weighed 1 pound and held 100 jellybeans. Sanjay ate 0.50 of the candy in his bag. Neela ate 0.75 of the candy in her bag.

Neela made the grids to show that she ate a greater amount of candy.



Explain the mistake that Neela made.

Neela did not compare the decimals to the same whole.
Sanjay's whole is 4 pounds and her whole is only 1 pound.

DOK 3
4.NF.7

4 Independent Practice Answer Rationales

- 1 Estimate the values of the points by their approximate distances from the tenths marks. The point on the left is about halfway between 0.2 and 0.3; the point on the right is between 0.8 and 0.9, but closer to 0.9. Choice A is incorrect because the points are not directly on either 0.2 or 0.8. Choice B is incorrect; 0.35 is too great to be the leftmost point and the comparison also uses the incorrect symbol. Choice C is incorrect; the statement uses the correct symbol and 0.88 could be the rightmost point, but 0.36 is too far to the right for the indicated point. Choice D is correct; the comparison names plausible values for the points and uses the correct symbol, $<$, to compare them.

- 2 The first comparison is false; 2 tenths is less than, not greater than, 3 tenths. The second comparison is true; comparing the tenths, 0 is less than 1. The third comparison is false; 8 tenths is less than, not greater than, 9 tenths. The fourth comparison is false; the 2s occupy different places, and 2 tenths is greater than, not equal to, 2 hundredths. The fifth comparison is true; the digits in the tenths places are the same, but in the hundredths places, the 3 is greater than the 0. The sixth comparison is true; the 7 occupies the tenths place in both numbers, and the 0 in the hundredths does not change the value because 7 tenths is equivalent to 70 hundredths.

- 3 **PARTS A AND B** A centimeter is 0.01 meter, or 1 hundredth of a meter. So 35 centimeters equal 0.35 meter. A decimeter is 0.1 meter, or 1 tenth of a meter. So 5 decimeters equal 0.50 meter. The meter stick is marked with centimeters and every tenth mark is labeled and is equal to 1 decimeter. So 35 centimeters goes between 30 and 40 and 5 decimeters goes on the 50 centimeter mark. Since 50 centimeters is greater than 35 centimeters, 5 decimeters is the greater measurement.

- 4 Like fractions, decimals can only be compared if they refer to the same whole. Although each person has a whole with 100 equal parts, Sanjay's bag is 4 pounds, and Neela's bag is 1 pound. So a hundredth of Sanjay's bag will be greater than a hundredth of Neela's bag.

5 PART A Each grid shows hundredths, and the weights are given in hundredths of a ton. On the first grid, show 0.57 ton by shading 57 squares. On the second grid, represent 0.65 ton by shading 65 squares. On the third grid, show 0.09 ton by shading 9 squares. The decimals can be compared because they are all parts of a whole made up of 100 parts.

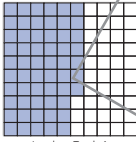
PARTS B AND C The tenths place determines the size of these decimals and 0 tenths is less than 5 tenths is less than 6 tenths. Chuck's mistake was reading 0.09 as 9 tenths, rather than 9 hundredths. In order, the numbers are $0.09 < 0.57 < 0.65$.

6 Change the decimal 0.4 to the equivalent decimal in hundredths, 0.40. A decimal between 0.40 and 0.46 must have a 4 for the tenths digit and a hundredths digit between 0 and 6, that is 1, 2, 3, 4, or 5.

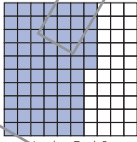
Lesson 29

4 Independent Practice

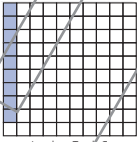
5 Three trucks haul rocks from a quarry. Truck A carries 0.57 ton. Truck B carries 0.65 ton. Truck C carries 0.09 ton. **DOK 2**
4.NF.7



Load on Truck A



Load on Truck B



Load on Truck C

Part A Shade the grids to show the weights on the trucks. Explain why you can compare these decimals.

The decimals can be compared because they are different parts of the same whole.

Part B Chuck ordered the load weights on each truck from least to greatest as follows: 0.57 ton, 0.65 ton, and 0.09 ton. What mistake did Chuck make? Explain.

Chuck thought the 9 in the hundredths place was in the tenths place.

Part C Write the weights in the correct order using the symbols $>$, $<$, or $=$.

Answer $0.09 < 0.57 < 0.65$

6 One pitcher holds 0.4 liter of lemonade. A second pitcher holds 0.46 liter of lemonade. A third pitcher holds an amount of lemonade that is between the amounts in the first and second pitchers. Write a decimal that could name the amount, in liters, of lemonade in the third pitcher. **DOK 2**
4.NF.7

Answers will vary; accept any amount from 0.41 to 0.45.

Answer _____ liter

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Extension Activity

Prepare a set of cards with decimals in tenths from 0.1 to 0.9 and decimals in hundredths from 0.01 to 0.99. Prepare a spinner with three sections labeled $>$, $<$, and $=$. Mix the cards and deal five to each student in a small group. Place the rest facedown and turn over the first. The first student spins the spinner, reads the symbol, and places a card that meets the conditions on top of the face-up card. For example, if the card is 0.35 and the symbol is $>$, the student places a card that is greater than 0.35 and then takes another card from the deck. Students take turns spinning a symbol and placing a card. If a student does not have a card to complete the comparison, he or she returns a card to the bottom of the deck and takes another as play passes to the left. Play continues until the entire deck has been used or no further comparisons can be made.