Nasco Education

LESSON PLAN

Math

Developed with Kristin Hotter

Comparing and ordering decimals

Volume 22 | Gr. 4-6

Time: 60-75 mins.

** The lesson can easily be broken up into a two-day lesson. Day 1 would focus on creating decimal numbers using Base 10 blocks. Day 2 would focus on comparing and ordering those numbers.

CCSS.Math.Content.4.NBT.A.2
Read and write multi-digit whole numbers using Base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

CCSS.Math.Content.5.NBT.A.3
Read, write, and compare decimals to thousandths.

CCSS.Math.Content.5.NBT.A.3.B
Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Materials list

- Nasco's Super Classroom Base 10 Set (**TB17959 or TB27026**); individual Base 10 components are also available from nascoeducation.com)
- Note cards or sticky notes with a decimal point
- Worksheet and answer key (included with lesson plan download)

Content

Use Base 10 blocks to teach students the basics of comparing and ordering decimals to the thousandths place. This lesson will give them a clear, concrete picture of what a decimal number actually looks like. Students will grasp the concept that a number such as 1.3 is greater than 1.29, even though there are more digits in the second number. The concept can be challenging for students to comprehend without the use of concrete manipulatives, such as Base 10 blocks.

In this lesson, you will use the decimeter cube (thousands cube) to represent one, the hundreds flat to represent tenths, the tens rod to represent hundredths, and the ones unit to represent thousandths.

Objectives

Students will...

- Investigate different values for Base 10 blocks
- Create decimal numbers using Base 10 blocks
- Compare and order decimals using Base 10 blocks
- Justify why given decimals are greater than, less than, or equal to other given decimals

Introduction

1. Students have most likely used Base 10 blocks before, but it's always good to reacquaint them with the blocks. Hold up the decimeter cube (thousands cube) and ask what number this represents *(1,000)*. Hold up the hundred flat and ask what number it represents *(100)*. Do the same with the tens rod *(10)* and the unit cube *(1)*.
2. Put aside two flats, one rod, and four units, then ask what number that represents *(214)*. Put aside a decimeter cube, four flats, three rods, and eight units, then ask what number is represented *(1,438)*. Do the same with eight flats, eight rods, and six units *(886)*.
3. Tell students that you are going to blow their mind. Since they are dealing with the Base 10 system, the value of the blocks can easily be changed. Remind students that they have learned about and worked with different place values like the millions place, the ten thousands place, the ones place, the tenths place, and the thousandths place. Tell students that, for the moment, you are going to make the decimeter cube represent a million rather than one thousand. Ask what place the flat would represent if the decimeter cube represented one million *(the hundred thousand place)*. Explain that this is true because the flat has 1/10 the value of the decimeter cube, so they needed to figure out what place value has 1/10 the value of one million.
4. Continue with the rod. Students should come up with the ten thousand place and understand that this is true because the rod has 1/10 the value of the flat, so they needed to determine the place value that has 1/10 the place value of one hundred thousand.
5. Conclude with the unit cube. Students should determine that the unit would equal the thousand place because the unit has 1/10 the value of the rod, and the thousand place has 1/10 the value of the ten thousand place.

Activity 1

1. Now that students have been introduced to assigning different values to their Base 10 blocks, tell them that they are going to apply this ability to what they know about decimals and decimal place value. Distribute the worksheet, then tell students they will work through problem 1 of Part A together.
2. For this problem, the decimeter cube represents 1. Ask students what the flat represents in this case and how they know? *(The flat represents 0.1 [one tenth] because its value is 1/10 of 1.)*
3. Ask students if the decimeter cube represents 1 and the flat represents 0.1, what does the rod represent, and why? *(The rod represents 0.01 [one hundredth] because its value is 1/10 of 0.1.)*
4. Finally, what does the unit cube represent if the decimeter represents 1, the flat represents 0.1, and the rod represents 0.01? *(It represents 0.001 [one thousandth] because its value is 1/10 of 0.01.)*
5. Have students fill in those values for problem 1, then give them a couple of minutes to complete problems 2 and 3 of Part A. As they are doing so, circulate and distribute Base 10 blocks to each student or small group of students. If possible, each student or group will need one decimeter cube, nine flats, nine rods, and nine units. If you do not have enough decimeter cubes to go around, you can provide each student or group with an image of a decimeter cube block. The lesson will work just as well with the image as with the actual cube. Students will also need the decimal point cards that you created. An image of a decimeter cube is on page 1 of this lesson, or see product number TB20181 at nascoeducation.com. You should also be assessing student understanding of Part A by reviewing problems 2 and 3 as you circulate.
6. Once you resume the lesson, tell students that they will be using the values that were assigned to the Base 10 blocks in problem 1 for the rest of the lesson. Have them put a star next to problem 1 to serve as a visual reminder that they should be using those values for their Base 10 blocks. Point out that they also have some Base 10 blocks and a decimal point in front of them now.
7. Look at problem 1 of Part B of the worksheet. Ask how to say the first decimal *(zero and sixty-eight hundredths)*. Tell students they are going to use their Base 10 blocks to make the decimal, then ask how many decimeter cubes they will need *(0 because there is a 0 in the ones place of the number)*.
8. Students should place the decimal point in front of them, since that comes next in the number. Now ask how many flats they need *(six because there is a 6 in the tenths place of the number)*. Have them put six flats in front of them to the right of the decimal point.
9. Move on to the rods. Students should say they need eight rods because there is an 8 in the hundredths place of the number. Have them put eight rods to the right of the six flats. When it comes to the units, they should tell you they don't need any because there is no digit in the thousandths place of the number. Finally, have students draw the Base 10 blocks that are in front of them that make up the number 0.68 in the box on the worksheet.
10. Have students look at problem 2 of Part B. Ask how to say that number *(one and three hundred three thousandths)*. Then ask how many decimeter cubes they will need for this number *(one because there is a 1 in the ones place of the number)*. Have them put the decimeter cube in front of them.
11. Ask what comes after the decimeter cube *(the decimal point)*, then what comes after that *(the flats)*. When asked, students should tell you that they need three flats because there is a 3 in the tenths place of the number. Students should now have the decimeter cube, the decimal point, and three flats in front of them.
12. Continue with asking what comes next, how many of each item, and why. Rods come next but are not needed because there is a 0 in the hundredths place of the number. Units come last, and students will need three unit cubes because there is a 3 in the thousandths place of the number.
13. In the box, have them draw the Base 10 blocks that they have put in front of them that make the number 1.303.
14. Ask how they say the number in problem 3 *(zero and four hundred seventy-five thousandths)*, then the number in problem 4 *(zero and eighty-nine thousandths)*. Give students time to create the third and fourth decimal numbers and draw them in the appropriate boxes on their worksheet. Circulate through the room as students create those two numbers.
15. Once students have completed creating and drawing the two numbers, check for understanding using the questions below, then have students complete the last two problems of Part B independently. If you are choosing to do this lesson in two days, this would be a great stopping point.

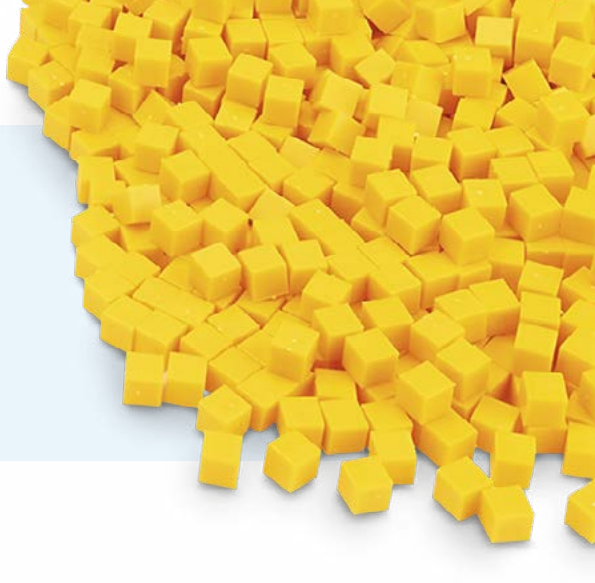
PART A - PROBLEM #1

One decimeter cube represents 1.

ANSWER

What does one flat represent? 0.1

rod? 0.01 unit? 0.001



Check for Understanding

0.475

1. How many decimeter cubes did you use? *(0)*
2. How many flats did you use? *(4)*
3. How many rods did you use? *(7)*
4. How many unit cubes did you use? *(5)*

0.089

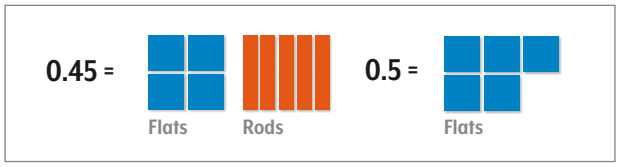
1. How many decimeter cubes did you use? *(0)*
2. How many flats did you use? *(0)*
3. How many rods did you use? *(8)*
4. How many unit cubes did you use? *(9)*

Activity 2

1. Now that students have the hang of creating decimal numbers using Base 10 blocks, let them know that the next step is to compare decimal numbers, but before they do that, they will briefly review comparing whole numbers. Start with the numbers 326 and 315. Using a greater than, less than, or equal to statement, have students compare these two numbers *(326 is greater than 315)*. Have students prove how they know this *(First, one needs to look at the hundreds place. Both numbers have a 3. Next, one moves on to the tens place. 326 has a 2 in the tens place, and 315 has a 1 in the tens place. Since 2 is greater than 1, 326 is therefore greater than 315.)* Ask why they need to look at the hundreds place first *(because it's the greatest place in each number)*.
2. Tell them that the same theory holds true for decimal numbers. Direct them to problem 1 of Part C of the worksheet and ask what two numbers are being compared *(zero and forty-five hundredths and zero and five tenths)*. Ask how to make 45 hundredths *(four flats and five rods)*. Have them make the number with their blocks and draw it on the worksheet. Ask how to make five tenths *(with five flats)*. Have them do so and draw it on their worksheet.
3. Ask how they can figure out which number is greater *(look at the digits in each place value)*. Remind students to always start with the greatest digit, which is the one furthest to the left. Each number has a 0 in the ones place, so they should move on to the tenths place. They should see that 0.45 has a 4 and 0.5 has a 5. Ask how they should complete their number statement using greater than, less than, or equal to *(0.45 is less than [<] 0.5)*.
4. For a moment, take the decimal points out of the two numbers. Without the decimal points, the two numbers would be 45 and 5. Would the statement still be true if this was the case? *(No.)* Explain that this is why it's important to work out these decimal problems until students get a handle on them, as otherwise they may be fooled into answering something that isn't true if they simply look at the numbers.
5. Work problem 2 of Part C together. Ask what two numbers are being compared *(zero and thirteen hundredths and zero and fifteen thousandths)*. Ask how to make 13 hundredths *(with one flat and three rods)*, then have students make the number and draw it on their worksheet. Do the same with 15 thousandths *(one rod and five units)*.
6. Ask how can they figure out which number is greater *(look at the digits in each place value)*. Remind students to start with the greatest digit, which is the one furthest to the left. Since each number has a 0 in the ones place, they should move on to the next place, the tenths place. Students should notice that 0.13 has a 1 and 0.015 has a 0. Ask how they would complete their number statement using greater than, less than, or equal to *(0.13 is greater than [>] 0.015)*.
7. Give students about five minutes to complete the next two problems on their own. Tell them to be sure to use their Base 10 blocks to make the numbers first, then solve the problem. When students have completed the two problems, ask the following questions below to check for understanding. After that, give students a few minutes to complete the last two comparisons on the worksheet.
8. Once students have completed creating and drawing the two numbers, check for understanding using the questions below, then have students complete the last two problems of Part B independently. If you are choosing to do this lesson in two days, this would be a great stopping point.

PART C - PROBLEM #1 **0.45 ? 0.5 = <**

ANSWER

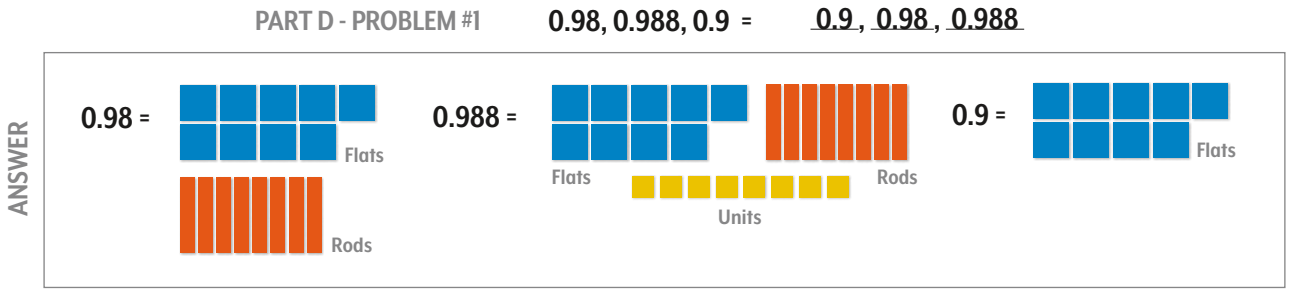


Check for Understanding

1. What Base 10 blocks did you need to create 1.24? *(one decimeter cube, two flats, and four rods)*
2. What Base 10 blocks did you need to create 1.235? *(one decimeter cube, two flats, three rods, and five units)*
3. Which number is greater? *(1.24 is greater than 1.235)*
4. How do you know? *(They have the same number in the ones and tenths place. The hundredths place of 1.24 has a 4 while the other number has a 3. 3 is less than 4.)*
5. What Base 10 blocks did you need to create 0.90? *(nine flats)*
6. What Base 10 blocks did you need to create 0.9? *(nine flats)*
7. Which number is greater? *(0.90 is equal to 0.9)*
8. How do you know? *(They have the same number of Base 10 blocks in each place value. Nothing is different about the numbers.)*

Activity 3

1. The final component of this lesson is to order three decimals. Tell students that you will work one together, then they will complete the last five independently. They will use the same methods and steps that they did in the previous section of the lesson. The only difference is that they are comparing three numbers instead of just two this time.
2. Have students look at problem 1 of Part D of the worksheet. Have them tell you what the three decimal numbers are *(zero and ninety-eight hundredths, zero and nine hundred eighty-eight thousandths, and zero and nine tenths).*
3. For each number, ask what Base 10 blocks are needed to make that number, then have them make each number and draw them in the box on the worksheet *(0.98 needs nine flats and eight rods; 0.988 needs nine flats, eight rods, and eight units; and 0.9 needs nine flats).*
4. Ask what the three numbers have in common *(they all have a 0 in the ones place and a 9 in the tenths place).*
5. This leaves two numbers left to compare. Ask what they need to do now *(look at the next place).* They should see that 0.988 has an 8 in that place, while 0.98 doesn't have anything, making that place a 0. Students should be able to tell you that this difference indicates that 0.98 is less than 0.988.
6. Have students write the three numbers in orders from least to greatest on the lines provided in the first box.
7. Give students a couple of minutes to build the three numbers in the next box, draw them on the worksheet, then order them from least to greatest. When they have completed the problem, ask the following questions below to check for understanding. After that, have students complete the remaining problems independently.



Check for Understanding

1. What Base 10 blocks did you need to create 0.43? *(four flats and three rods)*
2. What Base 10 blocks did you need to create 0.044? *(four rods and four units)*
3. What Base 10 blocks did you need to create 0.435? *(four flats, three rods, and five units)*
4. What place did you look at first to start comparing the numbers? *(The tenths place because that was the first difference I noticed.)*
5. What difference did you see? *(0.435 and 0.43 both had a 4 in that place, but 0.044 had a 0)*
6. What does that mean? *(0.044 is the smallest of the three numbers)*
7. What did you look at next? *(I looked at the thousandths place because that was the next difference. The two remaining numbers both had a 3 in the hundredths place.)*
8. What difference did you see in the thousandths place? *(0.435 had a 5 and 0.43 didn't have a number in that place, which means it's a 0)*
9. What does that mean? *(0.435 is greater than 0.43)*
10. What is the correct order of these three numbers? *(0.044, 0.43, and 0.435)*

Intervention

- Spend the majority of time creating different decimal numbers, like the activity in Part B. The extra practice will help students when they are ready to compare and order decimals.
- When comparing and ordering decimals, have the numbers being compared end in the same place. Compare numbers that go to the thousandths place to other numbers that go to the thousandths place.

Extension

- Students will likely not need the Base 10 blocks for too long, so feel free to remove them from the activity when you think students are prepared.
- Have students change the values of the Base 10 blocks. For instance, the decimeter cube could represent one tenth, the flat could represent one hundredth, the rod could represent one thousandth, and the unit could represent one ten-thousandth. Create problems that give students this added challenge.

Comparing and ordering decimals — **worksheet**

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Name: _____ Date: _____

Part A:

1. One decimeter cube represents 1.

What does one flat represent? _____ rod? _____ unit? _____

2. One decimeter cube represents 10.

What does one flat represent? _____ rod? _____ unit? _____

3. One decimeter cube represents 100.

What does one flat represent? _____ rod? _____ unit? _____

Part B Directions: Draw the following decimals.

1. 0.68

2. 1.303

3. 0.475

4. 0.089

5. 0.507

6. 1.002

cont. next page

Part C Directions: Use your Base 10 blocks to compare the following decimals. Compare each pair of decimals with a >, <, or =.

1. 0.45 _____ 0.5

2. 0.13 _____ 0.015

3. 1.24 _____ 1.235

4. 0.90 _____ 0.9

5. 0.64 _____ 0.643

6. 0.789 _____ 0.877

Part D Directions: Use your Base 10 blocks to put each set of decimals in order from least to greatest.

1. 0.98, 0.988, 0.9

_____, _____, _____

2. 0.43, 0.044, 0.435

_____, _____, _____

3. 0.01, 0.10, 0.001

_____, _____, _____

4. 0.65, 0.56, 0.656

_____, _____, _____

5. 0.32, 0.34, 0.312

_____, _____, _____

6. 0.863, 0.87, 0.8

_____, _____, _____

Comparing and ordering decimals — **answer key**

Part A:

1. One decimeter cube represents 1.

What does one flat represent? 0.1 rod? 0.01 unit? 0.001

2. One decimeter cube represents 10.

What does one flat represent? 1 rod? 0.1 unit? 0.01

3. One decimeter cube represents 100.

What does one flat represent? 10 rod? 1 unit? 0.1

Part B Directions: Draw the following decimals.

1. 0.68

Six flats
Eight rods

2. 1.303

One decimeter cube
Three flats
Three units

3. 0.475

Four flats
Seven rods
Five units

4. 0.089

Eight rods
Nine units

5. 0.507

Five flats
Seven units

6. 1.002

One decimeter cube
Two units

cont. next page

Part C Directions: Use your Base 10 blocks to compare the following decimals. Compare each pair of decimals with a >, <, or =.

1. 0.45 < 0.5

0.45 = four flats, five rods

0.5 = five flats

2. 0.13 > 0.015

0.13 = one flat, three rods

0.015 = one rod, five units

3. 1.24 > 1.235

1.24 = one decimeter cube two flats, four rods

1.235 = one decimeter cube, two flats, three rods, five units

4. 0.90 = 0.9

0.90 = nine flats

0.9 = nine flats

5. 0.64 < 0.643

0.64 = six flats, four rods

0.643 = six flats, four rods, three units

6. 0.789 < 0.877

0.789 = seven flats, eight rods, nine units

0.877 = eight flats, seven rods, seven units

Part D Directions: Use your Base 10 blocks to put each set of decimals in order from least to greatest.

1. 0.98, 0.988, 0.9

0.9 , 0.98 , 0.988

0.9 = nine flats

0.98 = nine flats, eight rods

0.988 = nine flats, eight rods, eight units

2. 0.43, 0.044, 0.435

0.044 , 0.43 , 0.435

0.044 = four rods, four units

0.43 = four flats, three rods

0.435 = four flats, three rods, five units

3. 0.01, 0.10, 0.001

0.001 , 0.01 , 0.10

0.001 = one unit

0.01 = one rod

0.10 = one flat

4. 0.65, 0.56, 0.656

0.56 , 0.65 , 0.656

0.56 = five flats, six rods

0.65 = six flats, five rods

0.656 = six flats, five rods, six units

5. 0.32, 0.34, 0.312

0.312 , 0.32 , 0.34

0.312 = three flats, one rod, two units

0.32 = three flats, two rods

0.34 = three flats, four rods

6. 0.863, 0.87, 0.8

0.8 , 0.863 , 0.87

0.8 = eight flats

0.863 = eight flats, six rods, three units

0.87 = eight flats, seven rods