

Compare Numbers

How do we compare and order numbers? How can modeling the numbers with blocks help us?

Students use blocks to represent numbers on a place value mat. They compare numbers using the symbols =, >, < and put them in order from least to greatest. Students play a game where they use their knowledge of place value to make the greatest number.

Objectives

- To identify the greater of two decimal numbers
- To use the greater than (>) and less than (<) symbols to indicate relationships between numbers
- To put a list of decimal numbers in order from least to greatest.

Materials

Each group will need:

- blocks of each size (10, 1, 0.1, 0.01)
- blank paper
- 2-4 decimal mats
- transparency of the decimal mat (p. A3) (optional)
- 1 photocopy of *The Greatest* game sheet **per student** (or have students record their answers during the game on blank paper)
- 1 *Compare Numbers* activity sheet **per student**

◆ Class Introduction

30 MIN.

- Model several whole numbers on place value mats:

227 280 309 224

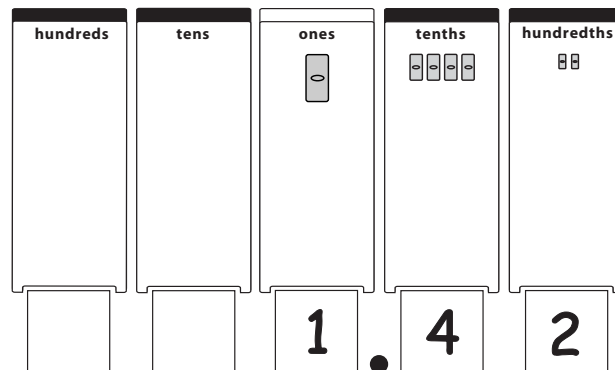
Ask students to tell which number is greatest and to explain how they know. Encourage students to consider the blocks on the mats.

Using one-to-one elimination, students can compare the largest blocks first to see that 409 has the greatest number of hundreds. For the other numbers, they must look at the tens, and finally the ones. List the numbers in order: 309, 280, 227, 224.

Explain that to compare decimal numbers we can continue using one-to-one elimination.

- Divide students into groups of 4. Provide each group with the materials listed except the activity sheet. Write the following three digits on the board: **2, 4, 1**.

Each person in your group is going to make a number using just these three digits. The number has to have one or two decimal places in it. Each person in your group must have a different number. (Possible Numbers: 42.1, 41.2, 24.1, 21.4, 14.2, 12.4, 4.21, 4.12, 2.41, 2.14, 1.42, 1.24)



Now each of you will build your number using blocks on your place value mat. (If necessary, have students share a mat by drawing a horizontal line across the center.)

Ask,

Who in your group has the greatest number? Who has the least number? How do you know? How would you write the numbers in order?

Generate a list of numbers in order by asking questions like the following. Leave spaces as you write so you can put the numbers in order as the students give them to you (see figure).

- Does anyone have a number that is greater than ___?**
- Does anyone have a number that is less than ___?**
- Does anyone have a number that is between ___ and ___?**

Each time a student volunteers a number, have the student explain how he or she decided that the number was (greater than/less than/between) the given number(s). Students can use the models they have created with blocks to help explain their reasoning.

To compare numbers, look at the blocks or digits in the highest place, then if they are the same, compare the next place, and so on.

- Write 0.64 and 0.9 on the board (or transparency).

Before we represent these numbers with blocks, predict which number you think will be greater.

Give students a chance to make their predictions and then have them represent each number on a place value mat.

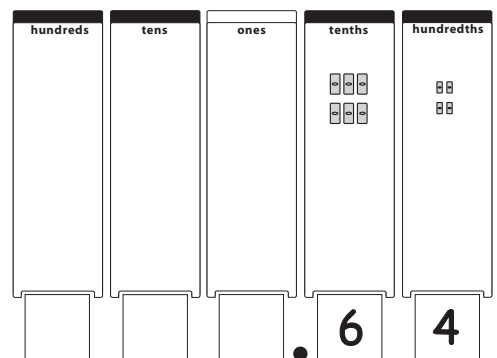
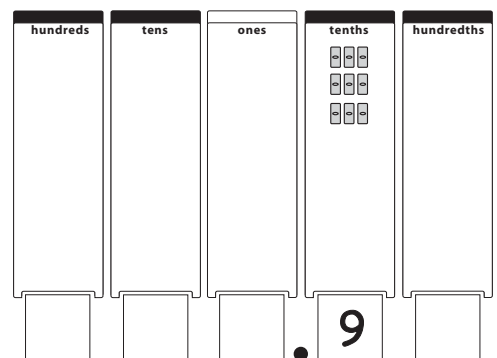
Discuss ways to compare the numbers. Help them see that to compare these numbers we should look first at the tenths place in each of them. 0.9 has more tenths than 0.64. Therefore 0.9 is the greater number (see figure).

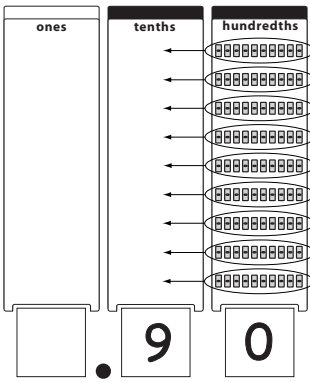
(Note: Many students will be surprised to realize that 0.9 is greater than 0.64 because 64 is greater than 9.)

Another way to see the comparison is to read both numbers from the hundredths place: “ninety hundredths” and “sixty-four hundredths.”

Generate a list of numbers in order:

42.1
41.2
24.1
21.4
14.2
12.4
4.21
4.12
2.41
2.14
1.42
1.24

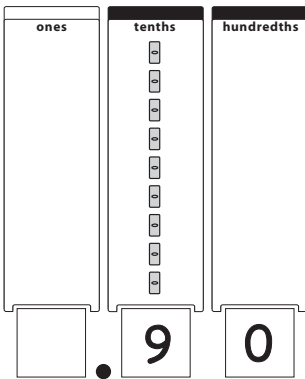




When expressed this way, the comparison is more obvious. Discuss how to rewrite the number 0.9 as 0.90 by adding a trailing zero. Remind students that adding a zero at the end of a number, after the decimal point, does not change the number. (See lesson 1.4.)

If necessary, model the exchange of 90 hundredth blocks for 9 tenth blocks to show how these are equivalent (see figures).

- Write 0.93 and 0.49 on the board.



Can you figure out which number is greater without using the blocks? (0.93)

Through discussion, help students realize that when we compare two decimal numbers, if one number has more tenths, then it is always greater, regardless of the number of hundredths in either number. If the numbers of tenths are the same, then we compare the hundredths, and so on.

How can we use symbols to write that 0.93 is greater than 0.49? ($0.93 > 0.49$) How do we write that 0.49 is less than 0.93? ($0.49 < 0.93$) How do we know which way to direct the greater than/less than symbol? (One way to remember is that it opens toward the larger number.)

- Write 0.4623 and 0.463 on the board. Ask students which of these numbers is greater. Help students see that 0.463 is greater. Since the tenths place and the hundredths place are the same, we must look at the thousandths place. The number 0.463 has more thousandths than 0.4623 so 0.463 is greater. Give students other pairs of decimal numbers to compare if you feel they need more practice.

◆ Group Activity

20 MIN.

- Give each student a copy of *The Greatest* game sheet (or have them copy the sheet on their own paper.) Tell them that they are going to play a game where they try to create the greatest number. For each round,
 - ◆ The teacher says aloud a number from 0-9.
 - ◆ Each student decides in which empty place of their number they will write that digit.
 - ◆ Once all 5 digits have been written, students compare the numbers they created.
 - ◆ The goal is to get the greatest number.
 - ◆ For the final step, the group writes all of their numbers in order.

◆ Closure

10 MIN.

- Talk to students about what strategies they used to get the greatest number. Students should point out that you want the larger digits on the left hand side of the number where the places have a higher value and the smaller digits on the right hand side of the number where the places have a lower value. Illustrate this point by taking a single digit, such as a 2, and showing it in all six places, discussing the value of that digit in each place.

When reading numbers, the non-zero digits inform us of the quantities of blocks.

The zeros as well as the decimal point help us determine the size of block that each digit refers to.

- Write the numbers 4.9999 and 5 on the board. Have students visualize all the blocks on a mat and ask them to say which number is greater. Students may be surprised to find that no matter how many nines are after the decimal point, the number is still less than 5.

Can any of these columns be packed up? (No.) No matter how many 9s there are, none of the columns will ever be packed and moved, so 4.9999 remains less than 5.

For follow-up, have students complete the *Compare Numbers* activity sheet. If a student makes a mistake on the activity sheet, have him or her make a block drawing for the problem so they can self correct.

◆ Assessment

- Given a pair of decimal numbers, do students correctly identify which number is greater or which number is less? Are they able to give an explanation of why?
- How do students decide which number is the greater or the lesser? Do they use blocks and place value mats? Are they able to compare the numbers by looking at the value of the digits in each place?
- Do students use the greater than ($>$) and less than ($<$) symbols correctly?
- Can students put a list of decimal numbers in order from least to greatest and greatest to least?
- Do students have a strategy for the game that shows their understanding of comparing and ordering numbers? Do they place higher digits on the left hand side of the number and lower digits on the right hand side of the number, or do they place digits randomly?

Name

The Greatest

.....

Example

My Number: 7 9 4 2 1

These are the numbers my group wrote in order from least to greatest:

4.7921

4.9712

7.9421

9.7421

Round 1:

My Number: **O** . ____ ____ ____ ____ ____

These are the numbers my group wrote in order from least to greatest:

Round 2:

My Number: ____ ____ . ____ ____ ____

These are the numbers my group wrote in order from least to greatest:

Round 3:

My Number: ____ ____ ____ . ____ ____

These are the numbers my group wrote in order from least to greatest:

Name

Compare Numbers

1. Draw the blocks for each number. Put the correct symbol, $<$ $>$ or $=$, in the circle.

ones	tenths	hundredths	○	ones	tenths
1	5	2		1	9

2. Put the following numbers in order.

1.7 1.07 1.007 170 17

___ < ___ < ___ < ___ < ___

3. Put the following numbers in order.

1.07 2.1 0.0342 1 2.04

___ > ___ > ___ > ___ > ___