

# Organizing Numbers

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<b>Reporting Category</b>	Number and Number Sense
<b>Topic</b>	Investigating the real number system
<b>Primary SOL</b>	8.2 The student will describe orally and in writing the relationships between the subsets of the real number system.

## Materials

- Real Numbers Cards (attached)
- Scissors
- Real Number System Subset Labels (attached)
- Real Number System Venn Diagram (attached)
- Student whiteboards and markers

## Vocabulary

*natural numbers, whole numbers, integers* (earlier grades)  
*rational numbers, irrational numbers, real numbers* (8.2)

## Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Distribute scissors and copies of the Real Numbers Cards. Discuss various characteristics of the numbers. Then, direct students to cut the cards apart and sort them any way they like. When they are finished sorting, have them discuss with partners how they did their sorts. Lead a class discussion about the different ways they sorted the numbers, asking them to explain the processes they used.
2. Distribute copies of the Real Number System Subset Labels. Have students cut them apart and arrange them in any order. Have students assign each number card to a subset. Point out how some numbers belong in more than one subset, and discuss the characteristics of each subset.
3. Have students work with partners to sort the number cards into rational and irrational numbers. Then, have them sort the rational numbers into integers, whole numbers, and/or natural numbers. When they have finished sorting, discuss the fact that some numbers can appear in more than one subset, e.g., 4 is a rational number, an integer, a whole number, and a natural or counting number. Explain that the attributes of one subset can be contained in whole or in part in another subset. Explain the process of sorting numbers into the *most specific* subset.
4. Distribute copies of the Real Number System Venn Diagram. Have students write the names of the subsets in the appropriate areas on the diagram and then write the numbers from the number cards in the *most specific* subsets. Finally, have students add two more numbers to each subset, explaining why the only number that can be uniquely in the “Whole Numbers” subset area is zero.

## Assessment

- **Questions**
  - To which subset(s) of the real number system does the number  $-0.75$  belong? Why?
  - Is the square root of 15 rational or irrational? How do you know?
- **Journal/Writing Prompts**
  - Identify whether a number can be both whole and irrational, and explain why or why not.
  - Identify which subset of the real number system contains the most rational numbers, and explain why.
  - Explain why rational numbers are “friendly.”
  - Identify whether  $\pi$  ( $\pi$ ) is rational or irrational, and explain why.

## Extensions and Connections (for all students)

- Display examples of Venn diagrams used in other areas of study to model the purpose of a Venn diagram.
- Have students utilize graphic organizer software to create their own organizers to represent the real number system.
- Prepare a large shopping bag labeled “Real Numbers.” Inside the bag, place two smaller equal-size bags, one labeled “Irrational Numbers” and the other labeled “Rational Numbers.” Inside the “Rational Numbers” bag, place a smaller bag labeled “Integers.” In the “Integers” bag, place a yet smaller bag labeled “Whole Numbers,” and in the “Whole Numbers” bag, place the smallest bag labeled “Natural Numbers.” Display the “Real Numbers” bag, and pull the smaller bags out one at a time to show the differences in sizes and how they relate to each other. Discuss the types of numbers that would be in each bag. Hand student number cards to put into the *most specific* bags, and then demonstrate putting the set of bags together again.

## Strategies for Differentiation

- Use different colors of paper to help students distinguish the different subsets of numbers.
- Use the Venn diagram with only the vocabulary terms, and as a class, create examples to include. Then, have students create their own Venn diagrams and use the real number cards provided to glue into place.
- Place location signs around the room labeled “Natural Numbers, Whole Numbers, Integers, Rational Numbers, Irrational Numbers, and Real Numbers.” Give each student a number card, and have him/her match the number to as many locations as possible by going to the location(s) and writing the number on the sign(s). Confirm in class discussion the place or places each number is placed. Repeat this activity throughout the year.

## Real Numbers Cards

Copy cards on cardstock, and cut out.

$-6$	$0.5$	$0.\overline{4}$	$0.349\dots$
$\sqrt{25}$	$2$	$0$	$\frac{3}{5}$
$\pi$	$\sqrt{13}$	$\frac{2}{3}$	$-\frac{10}{2}$
$5$	$2.25$	$-\sqrt{25}$	$\frac{9}{3}$

# Real Number System Subset Labels

Copy labels on cardstock, and cut out.

Real Numbers

Irrational Numbers

Rational Numbers

Integers

Whole Numbers

Natural Numbers

# Real Number System Venn Diagram

Name \_\_\_\_\_ Date \_\_\_\_\_

