REAL NUMBERS

STRAND: Number and Number Sense

STRAND CONCEPT: Number Sets and Characteristics

SOL 8.2

Remediation Plan Summary

Students describe the relationships between the subsets of the real number system.

Common Errors and Misconceptions

- Students do not simplify improper fractions or radicals (perfect squares) prior to classifying the number.
- Students classify all negative numbers as integers instead of realizing that negative decimals and fractions are rational numbers.
- Students incorrectly classify decimals numbers as irrational numbers instead of classifying repeating and terminating decimals as rational numbers.

Materials

- Number lines for students and teacher
- Copies of *Real Numbers, Subsets of the Real Number System* and *Venn Diagram of the Subsets of the Real Number System* handouts
- Scissors

Introductory Activity

Display the following numbers and ask students to place them on a number line.

$\sqrt{51}$ $\qquad\qquad$ $\sqrt{95}$ $\qquad\qquad$ $\sqrt{14}$ $\qquad\qquad$ $\sqrt{34}$

How did you decide where to put each number on the number line? Between which two whole numbers does each square root lie?

Plan for Instruction

1. Arrange the students in pairs, and give each pair a copy of the "Real Numbers" template. Have the students cut apart the number cards.
2. Have the student pairs sort the number cards into any groupings that make sense to them. Circulate among the groups, and ask them to explain the reasoning behind their sorting.
3. Hold a class discussion on the attributes of the sets of numbers. *What patterns did you notice? How did you decide where to place each card?*
4. Hand out a copy of "Subsets of the Real Number System" to each group. Have the students cut out the five subsets and arrange them in any order.

5. Have the students sort the number cards onto the different subset cards. Discuss numbers that could belong to more than one subset. If students have forgotten the definitions of some of the subsets, this is a good time to reinforce them. Discuss the properties of each subset.

6. Pi (π), square root of 2 ($\sqrt{2}$), square root 5 ($\sqrt{5}$) and 1.232332333… should not have been used in step 5.
    What is unusual about these numbers? Why don't they fit into any of these subsets?
    Explain that any number that is nonrepeating and nonterminating is considered **irrational**. Define **nonrepeating** and **nonterminating**, and explain why irrational numbers cannot be written in fraction form ($\frac{a}{b}$).

7. Give a copy of the "Venn Diagram of the Subsets of the Real Number System" to each pair, and have the students write the names of the subsets in the appropriate places in the diagram. Then have them write the numbers they used in the sort (step 2) in the appropriate subsets.

8. Next have the students add one or two numbers to each subset on their diagram and share why they put the number in that subset.
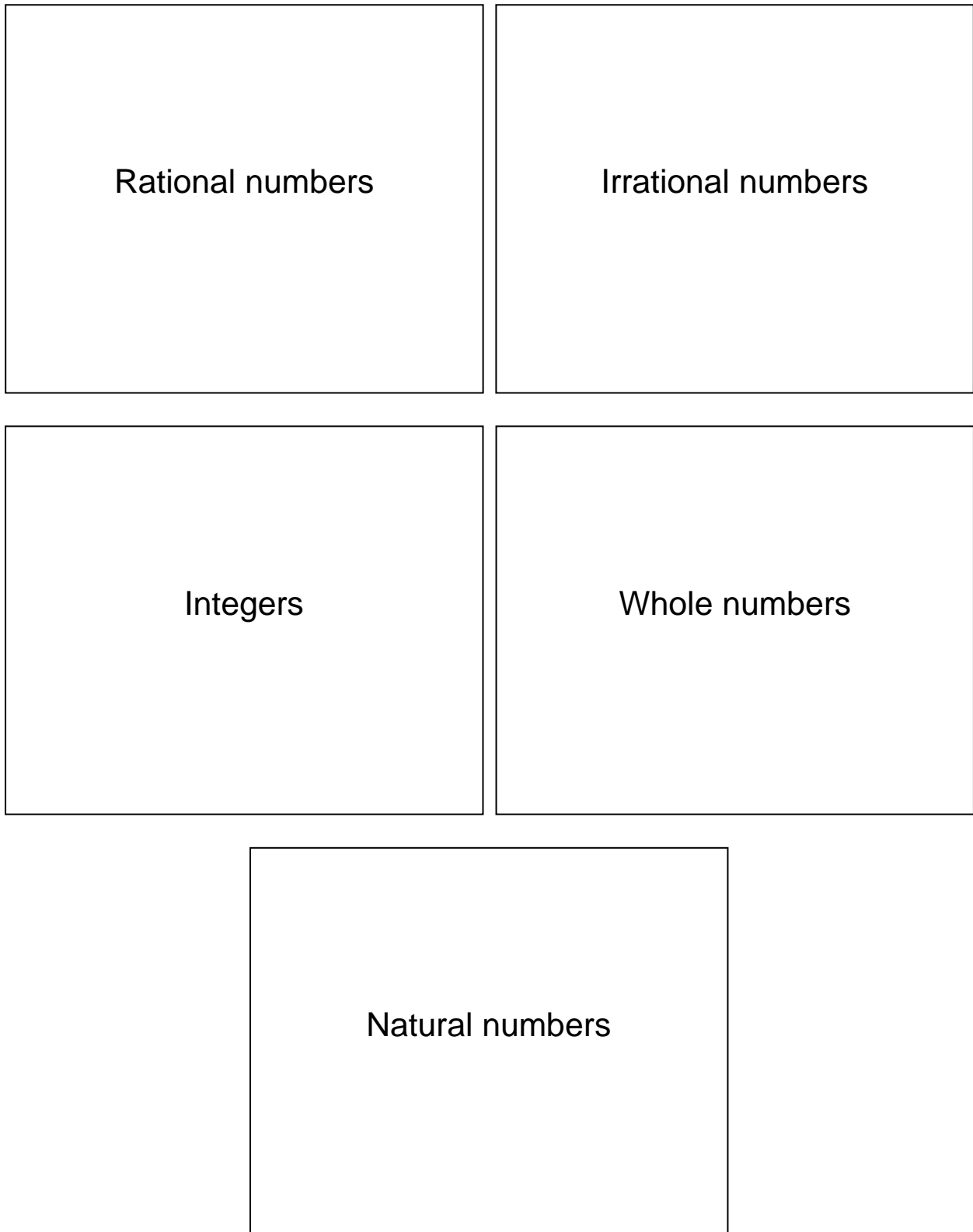
Pulling It All Together (Reflection)

Have each student create five number cards and trade them with a partner. Then have each student place the numbers on the Venn diagram in the correct place.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Real Numbers

0	$\dfrac{1}{2}$	0.7	1
-3	$\sqrt{2}$	-0.9	π
-4.267	$-\dfrac{5}{17}$	14.8	-8
$\sqrt{36}$	$2.\overline{45}$	$\sqrt{5}$	$1.232332333\ldots$

Subsets of the Real Number System

Rational numbers	Irrational numbers
Integers	Whole numbers

Natural numbers

Name:

Venn Diagram of the Subsets of the Real Number System