

# Algebra/Geometry Institute Summer 2008

**Faculty Name:** Angela G. Griffin  
**School:** W. A. Higgins Middle School  
**Grade Level:** Pre-Algebra/8  
**Name of Lesson:** Real Number System Graduated Bowl Activity



## 1 Teaching objective(s)

### NUMBER AND OPERATIONS

1. Apply concepts and perform basic operations using real numbers in real-world contexts.
  - a. Define, classify, and order rational and irrational numbers and their subsets.

## 2 Instructional Activities

1. Bellringer—The following question will be written on the dry erase board for the student to complete upon entering the classroom:

Determine whether each statement is *sometimes*, *always*, or *never* true.

- A whole number is an integer. **always**
- An irrational number is a negative integer. **never**
- A repeating decimal is a real number. **always**
- An integer is a whole number. **sometimes**

The teacher will review the answers upon completion by each student.

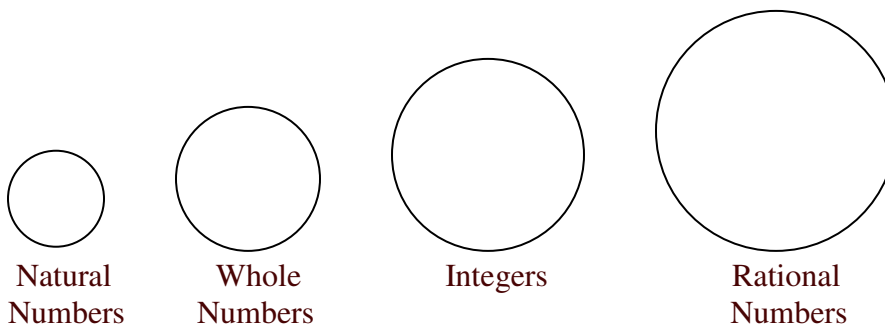
2. The teacher will review notes on the Real Number System that were presented on the previous day.
3. The teacher will explain that in today's activity, each group of students work with the subsets of rational numbers. The teacher will explain the activity as so:
  - a. The teacher will instruct students to work in small groups of four including a team captain. The teacher will inform students that these groups and the captains are pre-selected by the teacher, and the groups will consist of students with mixed abilities.
  - b. The teacher will issue each group the following materials:
    - Four (4) Post-it notes
    - Ten (10) index cards
    - Scissors

- Sharpie
  - A set of four graduated bowls
- c. The teacher will open the file using the Smartboard, of the following list of numbers (if you do not have a Smartboard, write them on the whiteboard).

- $\sqrt{36}$
- -9
- 0
- 0.333...
- 2
- $\pi$
- 0.343343334...
- $\frac{20}{5}$
- $\sqrt{14}$
- $-\sqrt{256}$
- $0.\overline{84}$
- 0.000
- 6.43
- 0.28612861...
- $\frac{9}{16}$
- 1.23456789...
- $\sqrt{3}$
- $3\frac{5}{6}$
- $-\frac{6}{2}$
- $1.\overline{9}$

- d. The teacher will instruct groups to use scissors to cut the index cards in half. The 3 ½” x 5” index cards will become 3½” x 2½” index cards. Then write each of these numbers on the index cards using the Sharpie, allowing one number per index card.
- e. The teacher will have groups to write the following words on the Post-it notes:
- Natural Numbers
  - Whole Numbers
  - Integers
  - Rational Numbers

The groups will then place the Post-it notes on the following bowls:



- f. One card at a time, the teacher will instruct groups to work together to determine the correct bowl that each index card should go in. The teacher will encourage the students as they work together to justify each placement. If the numbers can't be included in one of the subsets, the group will have to explain why.
- g. The teacher will instruct groups to work cooperatively to study each bowl and the numbers in the bowl.
- h. Once all of the numbers have been placed in a bowl, nest the bowls as such—place the Natural Numbers bowl in the Whole Numbers bowl, place the two bowls- Natural Numbers and Whole Numbers- in the Integers bowl, and place the three bowls- Natural Numbers, Whole Numbers and Integers- in the Rational Numbers bowl.
- i. The teacher will review the follow-up questions with the whole class:
  1. Which number(s) did you place in the Natural Number bowl?
  2. Which number(s) did you place in the Whole Number bowl?
  3. Which numbers(s) did you place in the Integer bowl?
  4. Which numbers(s) did you place in the Rational Number bowl?
  5. Which numbers(s) are Natural Numbers and Whole Numbers?
  6. Which number(s) are Natural Numbers, Whole Numbers, and Integers?
  7. Which numbers(s) are Natural Numbers, Whole Numbers, Integers, and Rational Numbers?
  8. Were there any numbers that could not be placed in a bowl? What is/are the/those number(s)? Why?
  9. Which number(s) are Real Numbers?
  10. Name your favorite number. Where does it belong in your model?

#### 4. Closure

Which rational number is a whole number, but not a natural number?

- a. 0

- b. 0.125
- c.  $\frac{9}{10}$
- d. 6

### 3 Materials and Resources

#### Bellringer

- Pencil (1 per child)
- Notebook (1 per child)
- Dry erase board
- Dry erase marker(s)

#### Activity

- Smartboard
- Graduated set of bowls (4 per set)
- Post-it notes
- Sharpie
- Scissors
- Index cards (3.5" x 5")
- Student Activity Sheet (Attachment 1)
- Answer key (Attachment 2)

#### Closure

- Pencil (1 per child)
- Notebook (1 per child)
- Dry erase board
- Dry erase marker(s)

### 4 Assessment

- Teacher observation—The teacher will observe the students' participation in this activity to ensure that they stay on task.
- Student participation—The student must participate in this activity, and the activity will be evaluated for participation.
- Peer evaluation—Each student is required to make sure that his/her peers stay on task.

#### References:

Glencoe McGraw-Hill, *Mississippi Pre-Algebra*; 2008. pp. 470-474.

Meyers, Paul, ed. *Buckle Down Mississippi MCT2—8 Pre-Algebra*. Iowa City: Buckle Down Publishing, 2008. pp. 4-7.

## Attachment 1

### The Real Number System Graduated Bowl Activity

#### Materials:

- Four (4) Post-it notes
- Ten (10) index cards (3 ½" x 5")
- Scissors
- Sharpie
- A set of four graduated bowls

#### Procedure:

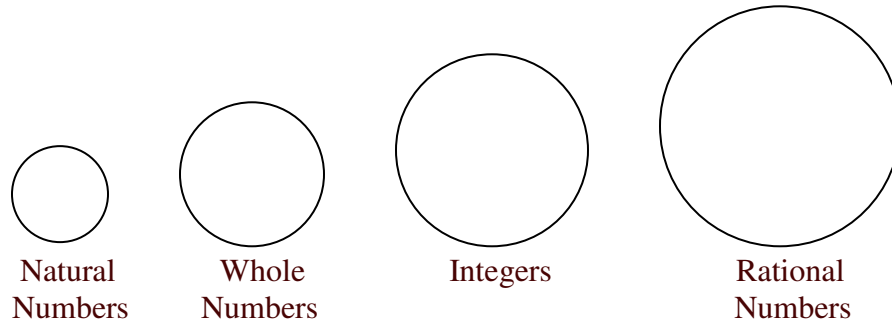
1. Cut all 10 index cards in half. The 3 ½" x 5" index cards will become 3½" x 2½" index cards. Write the following numbers on the index cards using the Sharpie. Write only one number for each index card:

- $\sqrt{36}$
- -9
- 0
- 0.333...
- 2
- $\pi$
- 0.343343334...
- $\frac{20}{5}$
- $\sqrt{14}$
- $-\sqrt{256}$
- 0.84
- 0.000
- 6.43
- 0.28612861...
- $\frac{9}{16}$
- 1.23456789...
- $\sqrt{3}$
- $3\frac{5}{6}$
- $-\frac{6}{2}$
- $1.\bar{9}$

2. Write the following words on the post-it notes:

- Natural Numbers
- Whole Numbers
- Integers
- Rational Numbers

3. Place the Post-it notes on the following bowls:



4. One card at a time, work together to determine the correct bowl that each index card should go. Work together to justify each placement. If the numbers can't be included in one of the subsets, explain why.

#### Follow-Up Questions

1. Which number(s) did you place in the Natural Number bowl?
2. Which number(s) did you place in the Whole Number bowl?
3. Which numbers(s) did you place in the Integer bowl?
4. Which numbers(s) did you place in the Rational Number bowl?
5. Which numbers(s) are Natural Numbers and Whole Numbers?
6. Which number(s) are Natural Numbers, Whole Numbers, and Integers?
7. Which numbers(s) are Natural Numbers, Whole Numbers, Integers, and Rational Numbers?
8. Were there any numbers that could not be placed in a bowl? What is/are the/those number(s)? Why?
9. Which number(s) are Real Numbers?
10. Name your favorite number. Where does it belong in your model?

Attachment 2

Answer Key

1. Which number(s) did you place in the Natural Number bowl?
  - $\sqrt{36}$
  - $\frac{20}{5}$
  - $1.\overline{9}$
  - 2
  
2. Which number(s) did you place in the Whole Number bowl?
  - 0
  - 0.000
  
3. Which numbers(s) did you place in the Integer bowl?
  - 9
  - $-\frac{6}{2}$
  - $-\sqrt{256}$
  
4. Which numbers(s) did you place in the Rational Number bowl?
  - $0.\overline{84}$
  - $3\frac{5}{6}$
  - $\frac{9}{16}$
  - 6.43
  - 0.28612861...
  - 0.333...
  
5. Which numbers(s) are Natural Numbers and Whole Numbers?
  - $\sqrt{36}$
  - $\frac{20}{5}$
  - $\frac{5}{5}$
  - $1.\overline{9}$
  - 2
  - 0
  - 0.000
  
6. Which number(s) are Natural Numbers, Whole Numbers, and Integers?
  - $\sqrt{36}$

- $\frac{20}{5}$
- $1.\overline{9}$
- 2
- 0
- 0.000
- 9
- $-\frac{6}{2}$
- $-\sqrt{256}$

7. Which number(s) are Natural Numbers, Whole Numbers, Integers, and Rational Numbers?

- $\sqrt{36}$
- $\frac{20}{5}$
- $1.\overline{9}$
- 2
- 0
- 0.000
- 9
- $-\frac{6}{2}$
- $-\sqrt{256}$
- $0.\overline{84}$
- $3\frac{5}{6}$
- $\frac{9}{16}$
- 6.43
- 0.28612861...
- 0.333...

8. Were there any numbers that could not be placed in a bowl? What is/are the/those number(s)? Why?

Yes

- ✓  $\pi$
- ✓ 0.343343334...
- ✓  $\sqrt{14}$
- ✓ 1.23456789...
- ✓  $\sqrt{3}$



These numbers are irrational

9. Which number(s) are Real Numbers?

- $\sqrt{36}$
- $\frac{20}{5}$
- $1.\bar{9}$
- 2
- 0
- 0.000
- 9
- $-\frac{6}{2}$
- $-\sqrt{256}$
- $0.\overline{84}$
- $3\frac{5}{6}$
- $\frac{9}{16}$
- 6.43
- 0.28612861...
- 0.333...
- $\pi$
- 0.343343334...
- $\sqrt{14}$
- 1.23456789...
- $\sqrt{3}$

10. Name your favorite number. Where does it belong in your model?

Answers may vary.