Exploratory Learning

**Materials Needed:** Play coins and one set of fraction pieces per group.

Explain to the groups that you will be asking them create amounts with the manipulatives. They are then to draw a representation and write the amount out to the side. Inform students that you will also be asking a series of questions.

<table>
<thead>
<tr>
<th>1st Amount’s Drawing</th>
<th>1st Written Value</th>
<th>2nd Amount’s Drawing</th>
<th>2nd Written Value</th>
<th>Which is greater? Why?</th>
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</thead>
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</table>

Decimal Exploration – instruct students to use the money to complete this portion.

- Show me $0.48 and $0.75. (Allow students time to create the amounts). Which is larger? Why? Can you prove it? Can you show the money amounts another way? Now, which is larger? Why?

- Show me $0.52 and $0.31. (Allow students time to create the amounts). Which is larger? Why? Can you prove it? Can you show the money amounts another way? Now, which is larger? Why?
Fraction Exploration – instruct students to use the fraction pieces to complete this portion

- Show me $\frac{1}{8}$ and $\frac{1}{9}$. (Allow students time to identify the amounts). Which is larger? Why? Can you prove it? Can you show the fractional amounts another way? Now, which is larger? Why?

- Show me $\frac{1}{2}$ and $\frac{3}{5}$. (Allow students time to identify the amounts). Which is larger? Why? Can you prove it? Can you show the fractional amounts another way? Now, which is larger? Why?

Comparing Fractions and Decimals – students should use both types of manipulatives.

- Show me $0.61$ and $\frac{3}{4}$. (Allow students time to identify the amounts). Which is larger? Why? Can you prove it?
- Show me $0.13$ and $\frac{1}{7}$. (Allow students time to identify the amounts). Which is larger? Why? Can you prove it?

Have students put up all manipulatives and pose the following questions:

1) What was easier, comparing decimals or comparing fractions?
2) What made the last portion more difficult?
3) What could you do when faced with a problem that involves two types of rational numbers? How do we go about setting the problem up in a better way?

OR

Students can complete the introductory activity located in the 6th grade math textbook on page 330.

Notes
As a class, we will develop notes to summarize what the students learned in today’s activity. The below notes should be used as a guide.

Converting Fractions to:
Decimals
Example: $\frac{3}{5}$

Step 1: Divide the numerator by the denominator.

\[
\begin{array}{r}
0.6 \\
5 \overline{3.0} \\
-3.0 \\
0
\end{array}
\]

= 0.6
Percents

Example: \( \frac{1}{4} \)

Step 1: Set up the fraction in a proportion equal to \( \frac{x}{100} \).

\[ \frac{1}{4} = \frac{x}{100} \]

Step 2: Solve the proportion by cross multiplying and dividing.

\[ \frac{1}{4} = \frac{x}{100} \quad 1(100) = 100 \quad 100 \div 4 = 25 \quad = 25\% \]

Converting Decimals to:

Fractions

Example: 2.125

Step 1: Write the whole number, (all digits to the left of the decimal point), as the whole part of a mixed number.

\[ 2.125 \quad 2 - \]

Step 2: Place all digits to the right of the decimal point in the numerator.

\[ 2.125 \quad 2 \frac{125}{1000} \]

Step 3: Name the last digit’s place value and place this in the denominator.

\[ 2.125 \quad 2 \frac{125}{1000} \]

Thousandths place

Step 4: Simplify if needed.

\[ 2 \frac{125}{1000} \div \frac{125}{125} = 2 \frac{1}{8} \]

Percents

Example: 0.08

Step 1: Move the decimal point two places to the right.

\[ 0.08 = 8\% \]
Converting Percents to:  

Decimals  
Example: 15%  

Step 1: Move the decimal point two places to the left.  
  \[
  \frac{1.5}{100}
  \]

Fractions  
Example: 110%  

Step 1: Write the percentage in the numerator of a fraction.  
  \[
  \frac{110}{100}
  \]

Step 2: Place 100 in the denominator.  

Step 3: Simplify the fraction or convert to a mixed number if needed.  
  \[
  \frac{110}{100} \div \frac{10}{10} = \frac{11}{10}
  \]

Engaged Practice  
Students are to complete the M & M Activity in class.

Journal Writing  
Fractions and decimals are related because...

Kagan Structure  
Students should play Mix-Freeze-Group to reinforce comparing and ordering rational numbers. Teacher should place five various rational numbers on the board notated by the number 1, 2, 3, 4, and 5. Questions should reflect, “When placed in order from least to greatest, the number 0.124 would be written directly after which rational number?”
Thinking Map
A flow map can be used by the teacher or by students to show the step-by-step order to solving problems dealing with converting rational numbers.

A bridge map can be used by the teacher or assigned to the class to show the relationships between various forms of rational numbers.
Operations with Rational Numbers

Exploratory Learning
*Materials Needed:* Algebra tiles or you can use yellow and red cups and chips.
This activity is to review how to solve one-step equations incorporating integers with the students.
(See Holt Pre-algebra textbook pages 72-73)

Engaged Practice
Students are to work in partners to complete the problems on the handout. In working these problems each student should have their own answer sheet. (See attachment) Partners will take turns answering and teaching each question to their partners. Partners will need a set of manipulatives to represent a scale. They can use either method of choice, modeling with the scale or the arrow method.

Journal Writing
Think about inverse operations as operations that “undo” each other. Write about everyday things that “undo” each other, such as accelerator and brake pedals or locking and unlocking a door.

Kagan Structure
Students should work in pairs to solve various problems utilizing the rally coach method. This is where students A solves a problem discussing each step taken while students B listens, reviews, and checks. Then roles reverse.

Thinking Maps
A flow map can be used by the teacher or by students to show the step-by-step order to solving problems dealing with one-step equations including rational numbers.

A bridge map can be used by the teacher or assigned to the students to show relationships between the two sides of an equation and how they relate.
The Real Number System

Exploratory Learning
Pass out a piece of register tape to each student. Have students mark 0 on one side and 1 on the other. Complete the “magnified inch” activity by challenging students to find a number in between 0 and 1, then between those numbers, and so on. This should help make the connection to discuss the denseness of rational numbers.

Notes
As a class, we will develop notes to summarize what the students learned in today’s activity. The below notes should be used as a guide.

The Real Number System
Real Numbers

<table>
<thead>
<tr>
<th>Rational Numbers</th>
<th>Irrational Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integers</td>
<td></td>
</tr>
<tr>
<td>Whole</td>
<td></td>
</tr>
<tr>
<td>Natural</td>
<td></td>
</tr>
</tbody>
</table>

Natural Numbers: 1, 2, 3, 4, 5...
Whole Numbers: 0, 1, 2, 3, 4, 5...

Integers: The set of whole numbers and their opposites.
Rational Numbers: Includes whole numbers, integers, terminating decimals, and fractions.
Irrational Numbers: A repeating decimal or unsolvable problem.

Strategy: Never Walk In Rain (Natural, Whole, Integer, Rational)

Key: Inside to Outside or IO is true
Outside to Inside or OI is false
Engaged Practice
Students will work in groups to create a drawing of the real numbers system. Pass out a bag of various types of numbers to each group of students. They are to work together to place the numbers in the correct areas of their posters. Have students explain how they came up with the answers they did to the class.

Calculator Activity
See Holt Pre-algebra textbook page 135 for activity.

Journal Writing
What do you think it means when a number is called real? What kinds of numbers do you think may not be real?

Kagan Structure
Students should play Mix-pair-share activity. This is where students mix about the room until the teacher calls “pair”. They then find a partner, face each other, and respond to a question that the teacher calls out. Each partner takes his or her own turn to respond. A question from the teacher could be “What steps would you have to take to find a number in between two fractional values?”

Thinking Map
A flow map can be used by the teacher or by students to show the step-by-step order to solving problems dealing with classifying or showing the density or numbers in the real number system.

A tree map can be used by the teacher or assigned to the students to classify numbers in the real number system.

A bubble map can be used by the teacher or assigned to the students to showcase density. Two values can be given in the main bubble and all describing bubbles could be values that can be found in between the two givens.
Density of Real Numbers

Exploratory Learning
Use the “Which Domain?” activity to review classifying numbers in the real number system.

Engaged Practice
Pass out a piece of register tape to each student. Have students mark 0 on one side and 1 on the other. Complete the “magnified inch” activity by challenging students to find a number in between 0 and 1, then between those numbers, and so on. This should help make the connection to discuss the denseness of rational numbers.

Journal Writing
What do you think it means when a number is called real? What kinds of numbers do you think may not be real?

Kagan Structure
Students should play Mix-pair-share activity. This is where students mix about the room until the teacher calls “pair”. They then find a partner, face each other, and respond to a question that the teacher calls out. Each partner takes his or her own turn to respond. A question from the teacher could be “What steps would you have to take to find a number in between two fractional values?”

Thinking Maps
A flow map can be used by the teacher or by students to show the step-by-step order to solving problems dealing with classifying or showing the density of numbers in the real number system.