

Essential Question: What kinds of characteristics can we look for to be able to classify different sets of numbers? How can we apply the properties of these sets of numbers?

Objective(s): CCSSM

N-RN.3—Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

N-CN.1—Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.

N-CN.2—Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

N-CN.3(+)—Find the conjugate of a complex number; use conjugates to find ~~module and~~ quotients of complex numbers.

Lesson/Activity:

- Topic 1: Review of the Real Number System
 - Students will be given a set of numbers to cut out. They will work in pairs to categorize the numbers by their various characteristics (negative, percents, decimals, fractions, radicals, etc.). The purpose is to allow for multiple entry points into the lesson and to informally assess the knowledge of the sets of numbers (Rational, Irrational, Integer, Whole, or Natural). For each category of numbers (at least three), the students will explain how they grouped them (on a sticky note).
 - Students will be able to walk around the room to look at how to view other's work. The class will discuss the noticeable similarity and differences.
 - The students will complete the graphic organizer for The Real Number System and develop definitions for each set of numbers.
 - After discussing the proper categorization process, students will go back and modify their groupings based on their new knowledge.
 - Students will be given a handout of practice problems to assess their understanding and solidify the concepts.
- Topic 2: Review of the Properties of Numbers
 - A table of the Properties of Numbers will be displayed on the board for students to transfer to their notes. This is strictly for the purpose of review and reference.
- Topic 3: Properties of Rational and Irrational Numbers
 - Students will investigate the properties of rational and irrational numbers through a partner activity. Then, we will discuss how to generalize the patterns that they observed through the use of formal proofs.
- Topic 4: The Complex Number System
 - Students will work through a graphic organizer to learn the properties of complex numbers and then work through problems where they discover how to perform operations using the associative, commutative, and distributive properties.
 - (Extension) Discussion on conjugates of complex numbers. Students will use whiteboards to work through practice problems on dividing complex numbers.
 - As a review activity, students will participate in a game called Complex Number Bingo.

Assessment: 80% proficiency on performance assessment/quiz (students can retake the quiz as many times as necessary in order to pass and/or earn their desired grade). Homework: Rational vs. Irrational; Operations with Complex Numbers