**DOMAIN I—NUMBER CONCEPTS Competency 001**

**The teacher understands the structure of number systems, the development of a sense of quantity, and the relationship between quantity and symbolic representations.**

• Analyzes the structure of numeration systems and the roles of place value and zero in the base ten system.

• Understands the relative magnitude of whole numbers, integers, rational numbers, and real numbers.

• Demonstrates an understanding of a variety of models for representing numbers

(e.g., fraction strips, diagrams, patterns, shaded regions, number lines).

• Demonstrates an understanding of equivalency among different representations of rational numbers.

• Selects appropriate representations of real numbers (e.g., fractions, decimals, percents, roots, exponents, scientific notation) for particular situations.

• Understands the characteristics of the set of whole numbers, integers, rational numbers, real numbers, and complex numbers (e.g., commutativity, order, closure, identity elements, inverse elements, density).

**Links**: <http://www.jamesbrennan.org/algebra/numbers/real_number_system.htm> Real Number System

<http://www.purplemath.com/modules/numbprop.htm> Properties

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=11> Models and equivalencies: fraction, decimal, %

<http://www.cliffsnotes.com/math/algebra/algebra-i/preliminaries-and-basic-operations/square-roots-and-cube-roots>

<http://www.mathsisfun.com/numbers/scientific-notation.html> Scientific Notation

**Competency 002**

**The teacher understands number operations and computational algorithms.**

• Works proficiently with real and complex numbers and their operations.

• Analyzes and describes relationships between number properties, operations, and algorithms for the four basic operations involving integers, rational numbers, and real numbers.

• Uses a variety of concrete and visual representations to demonstrate the connections between operations and algorithms.

• Justifies procedures used in algorithms for the four basic operations with integers, rational numbers, and real numbers, and analyzes error patterns that may occur in their application.

• Relates operations and algorithms involving numbers to algebraic procedures (e.g., adding fractions to adding rational expressions, division of integers to division of polynomials).

• Extends and generalizes the operations on rationals and integers to include exponents, their properties, and their applications to the real numbers.

**Links:**

<http://www.purplemath.com/modules/complex.htm> Operations with complex numbers

<http://www.purplemath.com/modules/synthdiv.htm> Synthetic Division (used to divide polynomials)

<http://usablealgebra.landmark.edu/algebra/exponents/rules.php> Rules for exponents

<http://www.purplemath.com/modules/orderops.htm> Order of Operations

**Competency 003**

**The teacher understands ideas of number theory and uses numbers to model and solve problems within and outside of mathematics.**

• Demonstrates an understanding of ideas from number theory (e.g., prime factorization, greatest common divisor) as they apply to whole numbers, integers, and rational numbers, and uses these ideas in problem situations.

• Uses integers, rational numbers, and real numbers to describe and quantify phenomena such as money, length, area, volume, and density.

• Applies knowledge of place value and other number properties to develop techniques of mental mathematics and computational estimation.

• Applies knowledge of counting techniques such as permutations and combinations to quantify situations and solve problems.

• Applies properties of the real numbers to solve theoretical and applied problems.

**Links:**

<http://www.mathsisfun.com/combinatorics/combinations-permutations.html>