

The Real Number System

Natural Numbers: $\{1, 2, 3, 4, 5, \dots\}$

Whole Numbers: $\{0, 1, 2, 3, 4, 5, \dots\}$

Integers: $\{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$

Rational Numbers:

Formal Definition: Any number that can be written in the form p/q where p and q are integers with q not equal to zero.

Informal Definition: All decimals that terminate (end) or repeat.

Examples:

Irrational Numbers: All numbers that are not rational.

Informal Definition: All decimals that do not terminate AND do not repeat.

Examples:

Real Numbers: All rational and irrational numbers.

Limitations of Real Numbers: You can't take the square root of a negative number (or the even root of any negative number).

In the Complex Number System, the imaginary number i is defined to allow negatives under the square root.

So the Complex Number System includes more numbers than the Real Number System because it includes complex numbers of the form $a + bi$ where a and b are real numbers.

Examples of Complex Numbers that are not real numbers: