WHAT KIND OF NUMBER IS IT?

Natural Numbers {1, 2, 3, 4…..} These are also called *Counting Numbers,* and they're the numbers that can be used for counting the fingers on your hands or the pieces of candy in a bowl. They don't include zero, negatives, or fractions.

Whole Numbers {0, 1, 2, 3, 4…..} These include the natural (counting) numbers, but they also include zero. They don't include negatives or fractions, but they can describe how many cows are in a field as well as how many cows remain after they all leave.

Integers {…-3, -2, -1, 0, 1, 2, 3...} These include the whole numbers (natural numbers and zero), and they also include negative numbers. They don't include fractions.

Rational Numbers These are any numbers that can be expressed as a fraction, which includes all integers and most decimals.

Examples include - $\frac{1}{2}$, 208, $\frac{2}{3}$, 0.66, $\frac{8}{-27}$, $\frac{-4}{1}$, -4, $\frac{19}{8}$, 0. 75

Integers are rational numbers because

$2 = \frac{2}{1}$ $-13 = \frac{-13}{1}$

Fractions are rational numbers so long as their bottom number (the *denominator*) is not zero, because dividing anything by zero is impossible.

Decimals are rational numbers so long as they either

- **terminate,** having a limited number of digits after the decimal point**.** For example, 0.25 and .07 are both terminating decimals. They can also be expressed as fractions:

  $0.25 = \frac{1}{4}$ $0.07 = \frac{7}{100}$

- **repeat,** having an unlimited number of digits after the decimal point that repeat in a regular pattern. For example, the decimals 0.666666… and 0.454545… are usually written as $0.\overline{6}$ and $0.\overline{45}$, although they can go on forever. They can also be expressed as fractions:

  $0.\overline{6} = \frac{2}{3}$ $0.\overline{45} = \frac{5}{11}$

Irrational Numbers

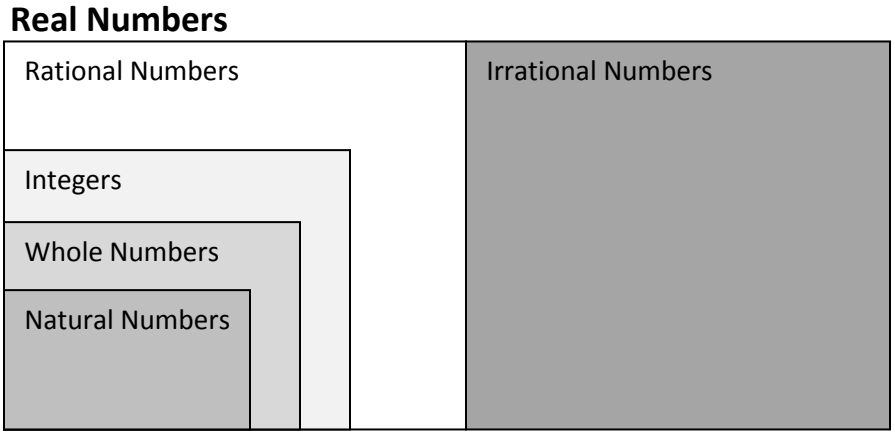
These are any numbers that can't be written as fractions or as decimals that terminate or repeat.

For example, the number *pi* (π) starts as 3.1415926… and continues for an infinite number of digits in no particular pattern. No fraction is equal to exactly that number.

Similarly, the square root of two ($\sqrt{2}$) can be estimated as 1.4, but 1.4 * 1.4 does not equal 2 exactly. There is no fraction equaling any decimal which, multiplied by itself, equals two.

Real Numbers

These are all the rational numbers (including natural numbers, whole numbers, and integers) **and** all the irrational numbers.



Created Fall 2012