Types of numbers

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As mathematics teachers, we need to know about the different types of numbers that we are dealing with. There are numbers like 1, 2, 3, ... etc., ones like 0.33333... , or ones like 5/7.
We introduce students to these gradually, and each new type comes with its own uses, and its own challenges.The main **types of numbers** used in school mathematics are listed below:

- **Natural Numbers** (**N**), (also called positive integers, counting numbers, or natural numbers); They are the numbers {1, 2, 3, 4, 5, …}
- **Whole Numbers** (**W**). This is the set of natural numbers, plus zero, i.e., {0, 1, 2, 3, 4, 5, …}.
- **Integers** (**Z**). This is the set of all whole numbers plus all the negatives (or opposites) of the natural numbers, i.e., {… , ⁻2, ⁻1, 0, 1, 2, …}
- **Rational numbers** (**Q**). This is all the fractions where the top and bottom numbers are integers; e.g., 1/2, 3/4, 7/2, ⁻4/3, 4/1 [Note: The denominator cannot be 0, but the numerator can be].
- **Real numbers** (**R**), (also called measuring numbers or measurement numbers). This includes all numbers that can be written as a decimal. This includes fractions written in decimal form e.g., 0.5, 0.75 2.35, ⁻0.073, 0.3333, or 2.142857. It also includes all the irrational numbers such as π, √2 etc. Every real number corresponds to a point on the number line.

1. Students generally start with the **counting numbers** (**N**).
2. They are then introduced to 0, and this gives them the **whole numbers** (**W**).
3. The integers are avoided initially, even though simple subtraction could lead to negative numbers (e.g., 3 – 4 = ⁻1).
4. **Simple unit fractions** are the next group of numbers that are met i.e., {1/2, 1/3, 1/4, 1/5 ... }, then other fractions (e.g., 3/4, 4/9, 7/2, 3/100, ⁻1/2 etc.) which are known as the **rational numbers** (**Q**).
5. We next move onto **decimal numbers** (such as 0.3, 0.32, ⁻2.7). These can be called **decimal fractions**, because they can be written in a fractional form (e.g., 3/10, 32/100, ⁻27/10).
6. These expand to the **real numbers** (**R**), which include **irrational numbers** such as π, √2. An irrational number cannot be represented as a fraction (i.e., a rational number). π can be represented with numerals, i.e., 3.14159265 ... ; however the digits go on infinitely but there is no pattern to them.

Discrete and continuous numbers
The above types of numbers can be split up into discrete or continuous numbers.
The first four of the above (**N**, **W**, **Z** and **Q**) are referred to as discrete. This means that they are separate and distinct entities. In fact each of these sets is countable.The last set, (**R**), cannot be counted. This is because they are continuous. Between any two real numbers, however close they may be, there are infinitely more real numbers.

For more click on https://en.wikipedia.org/wiki/Continuous_and_discrete_variables or on Types of data: Statistics.At higher levels of secondary and tertiary education discrete mathematics, is often more challenging than the mathematics of continuous functions. With continuous functions, a small change in the **input** variable leads to a small change in the output variable. Smooth, continuous functions lead on to most of the functions students meet at secondary school, including calculus at the senior secondary school level.

Constructing numbers
The numbers we meet at school are generally represented by using combinations of ten number symbols (also called numerals or digits) plus the symbols ".", "+", and "–" (e.g., 5, 27, 35.8, ⁻4)The ten number symbols we use are:
1 2 3 4 5 6 7 8 9 as well as 0.

All of these symbols also represent the numbers one, two, three, ... up to nine; as well as zero.**0** is itself a number, and a very important one. It is called zero, nil, nought etc. It is also a place-holder. It is first used in this sense in the number ten (10). The 0 denotes that there is nothing in the units place, and therefore distinguishes 10 from 1. The concept of place holder is best interpreted as there being zero (0) of the units in the place where the 0 is. For example, in 1025 there are zero hundreds. Students need to meet the number 0 before they meet the number 10.