BSA
BE SMART ACADEMY

M@th€m@ti¢§ 9

Real numbers

Part 1 (Set of numbers)

Numbers are used to count, represent a quantity, making calculation,…

The numbers are classified in many different sets depending on their properties.

The main sets are:

- ❖ Set of natural numbers.
- ❖ Set of integers.
- ❖ Set of decimal numbers.
- ❖ Set of rational numbers.
- ❖ Set of real numbers.

1. Set of natural numbers

- Numbers used for counting
- They are **positive**.
- There **is no point** between the digits that compose the number.

Example: 0 ; 1 ; 2 ; …; 25 ; … ; 100 ; …

$\mathbb{N}$

Remark:

The digits are: 0 ; 1 ; 2 ; 3 ; 4 ; 5 ; 6 ; 7 ; 8 ; 9

2. Set of integers

- They can be **positive** or **negative**.
- There **is no point** between the digits that compose the number.

Example:

… ; -100 ; … ; -25; … -2 ; -1 ; 0 ; 1 ; 2 ; … ; 25 ; … ; 100 ; …

Remark:

The natural numbers are part of the integers.

3. Set of Decimal numbers

- The decimal part is limited.
- They can be **positive** or **negative**.

Example:

1.5 ; 2.899 ; 0.2365 ; -0.1 ; -2.5 ; …

Remark:

- The integers are decimal numbers of 0 as a decimal part:

2 = 2.0 ; -3 = -3.0

4. Set of rational numbers

- They can be written **in form of fraction**.
- They can be **positive** or **negative**.

IMPORTANT

The fraction is in the form of $\frac{a}{b}$ where a and b are two integers ($b \neq 0$).

Example:

- $\frac{2}{3}$; $\frac{-2}{3}$; $\frac{-2}{-3}$; $\frac{2}{-3}$ are rational numbers since there are in form of a fraction.

4. Set of rational numbers

- Decimal numbers are rational since they can be written in form of fraction of denominator power of 10:

$$1.5 = \frac{15}{10} \; ; \; -3.11 = -\frac{311}{10^2} \; ; 0.00025 = \frac{25}{10^5} \; ; \ldots$$

- Periodic numbers: $1.333\ldots = 1.\overline{3} = 1\frac{3}{9} = 1\frac{1}{3} = \frac{4}{3}$ which is fraction.
- Integers are rational numbers since they van be written in f[illegible] fraction of denominator 1: $2 = \frac{2}{1}$; $-3 = -\frac{3}{1}$; ...

5. Set of real numbers

- Any number found in the real world is called real.
- They can be **positive** or **negative**.
- They can be naturals, integers, rationals or irrationals.

Remark:

Irrational numbers: cannot be written in form of fraction.

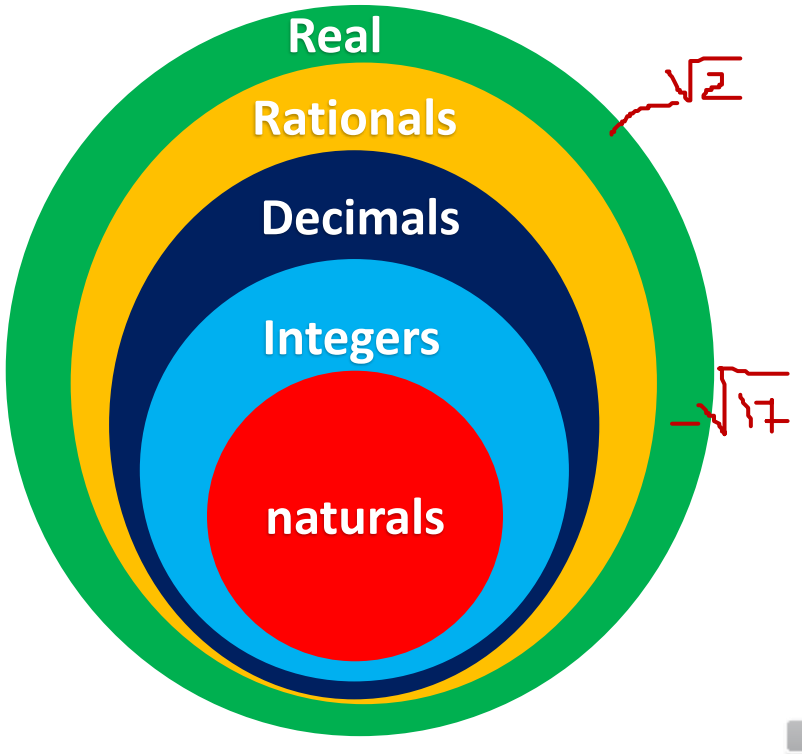
Example: $\sqrt{2}$; π ; ...

IMPORTANT

Within the 5 main sets, there are many subsets of numbers according to their properties.
For example:
Set of prime numbers, set of even numbers , set of odd number …

Conclusion

The main sets of numbers are:



Answer with true or false

Statement	True	False
-17 is a natural number.		X
3π is rational number.		X
5.236 is a decimal number.	X	
$\frac{5}{3}$ is an irrational number.		X
$\sqrt{4}-3$ is an irrational number.		X
$-\frac{64}{-2}$ is an integer.	X	
-99999999 is a decimal number.	X	