1.2 –A- Rational Numbers

There are different types of numbers:

- Real Numbers:
  - Natural
  - Integers
  - Rational
  - Irrational
- Complex Numbers (aka Imaginary Numbers)

Definitions:

$\mathbb{N}$: Set of **Natural numbers** : {0,1,2,3,...}

$\mathbb{N}^*$: Set of non zero natural numbers : {1,2,3,...}

$\mathbb{Z}$: Set of **Integers** : {...,-3,-2,-1,0,1,2,3,...}

$\mathbb{Z}^*$: Set of non zero Integers : {...,-3,-2,-1, 1,2,3,...}

$\mathbb{Z}_+$: Set of positive Integers: {0,1,2,3,...) same as $\mathbb{N}$

$\mathbb{Z}_-$: Set of negative Integers: {...,-3,-2,-1,0}

$\mathbb{Q}$: Set of **Rational numbers**

(i.e. numbers that can be written as fractions including terminating decimals ($0.5 = \frac{1}{2}$), and repeating decimals ($0.\overline{5} = \frac{5}{9}$)

Definitions:

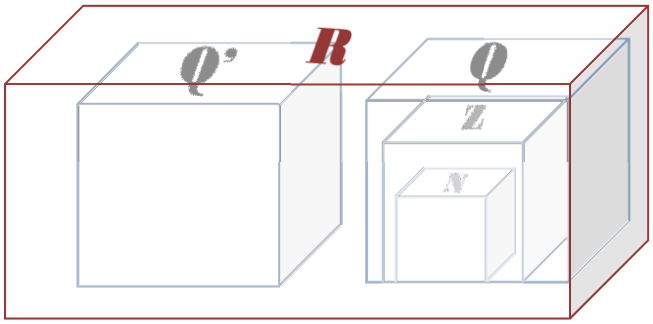
$\mathbb{Q}'$: are Irrational Numbers, these are non-periodic (non-repeating), non-terminating decimals; so we cannot write them as fractions.

(Ex: π , $\sqrt{2}$, $\sqrt{3}$, $\sqrt[3]{4}$ etc.)

$\mathbb{R}$: is the Set of Real Numbers , that is all Rational and Irrational numbers: $\mathbf{Q} \cup \mathbf{Q'}$

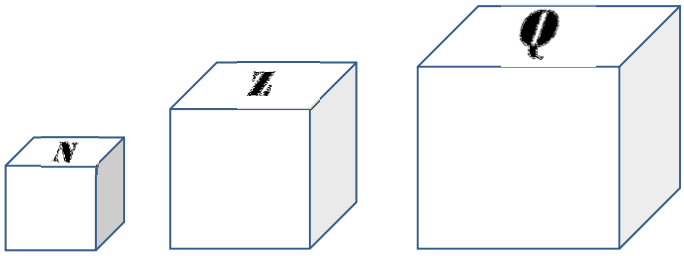
We read this: **Q** Union **Q** prime.

So if we were to put them in nesting boxes (or circles) they would look like this:



Ex 1 : place each number in the correct box.

0 0.3 -3 -7 5 -2/3 100



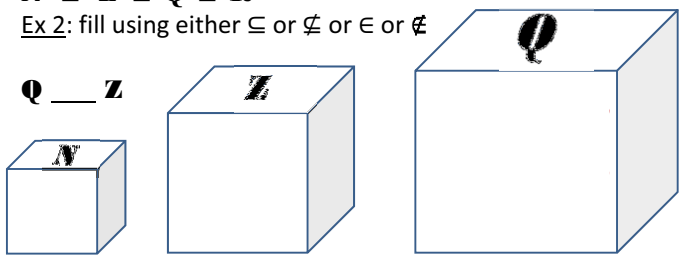
$\subseteq$ means subset; ϵ means element of

$\mathbb{N}$ is a subset of $\mathbb{Z}$ is a subset of $\mathbb{Q}$ is a subset of $\mathbb{R}$

$\mathbb{N} \subseteq \mathbb{Z} \subseteq \mathbb{Q} \subseteq \mathbb{R}$

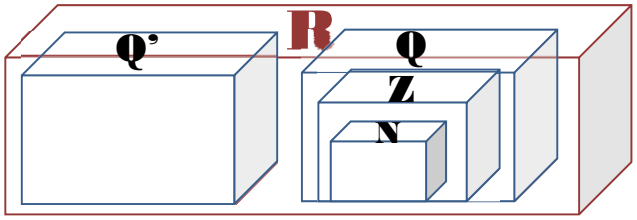
Ex 2: fill using either $\subseteq$ or $\not\subseteq$ or $\in$ or $\notin$

$\mathbb{Q}$ ___ $\mathbb{Z}$

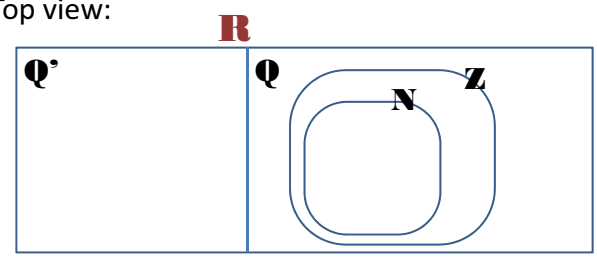


-3 ___ $\mathbb{Z}$

-3 ___ $\mathbb{N}$

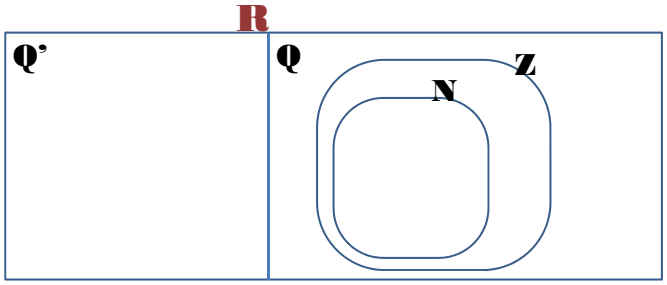


Top view:



Ex 3 : place each number in the correct box.

-1 $-0.\overline{6}$ $-\sqrt{5}$ 11/7 -12 $\sqrt{4}$ 0.5 π 10 $\sqrt{2}$



Practice:
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