Is $\{\emptyset\}$ an empty set?

Instituto Politécnico de Bragança, Bragança, Portugal

Set

A collection of objects known as elements is called set. An element can be almost anything, such as numbers, functions, or lines. A set can be finite or infinite as well.

Example

1. $A = \{1, 3, 5, 7, 9\}$ is an example of finite set.
2. $\mathbb{Z}$ is a set of integers which is an example of finite set.
3. The elements of set is not only limited to numbers, the elements of set can be anything,
   $B = \{cow, donkey, rat, horse\}$ is also a valid set.
4. Sets can also be written in set builder notation. Like $A = \{x \in \mathbb{N} \mid x \geq 4 \text{ and } x \leq 10\}$ which is same as $A = \{4, 5, 6, 7, 8, 9, 10\}$

Properties

1. Order of elements in a set doesn't matter.
2. If one or many elements of a set are repeated, the set remains the same.
   For example $\{1, 2, 3, 1, 2, 3, 1, 2, 3\}$ is same as just $\{1, 2, 3\}$.
3. Two sets are considered equal if and only if every element of each set is an element of the other.

Symbol $\in$ is used to to denote a element belongs to a set. For example : $X = \{a, e, i, o, u\}$ Then, $a \in X$ but $b \notin X$ or $\{a\} \notin X$.

Some important sets

- Some important Sets

Symbol	Name
$\mathbb{Z}$	The set of Integers.
$\mathbb{N}$	The set of Natural numbers.
$\mathbb{Q}$	The set of Rational numbers.
$\mathbb{R}$	The set of Real numbers.
$\mathbb{C}$	The set of Complex numbers.

- Empty set is a set without any elements, represented by $\{\}$ or $\emptyset$.

- A set with only one element is called a singleton set. For example $X = \{a\}$.

So, Is $\{\emptyset\}$ an empty set?

NO, $\{\emptyset\}$ is not an empty set and is a singleton set (it has element $\emptyset$ in it). Empty set is indicated by $\{\}$ or $\emptyset$.