Abstract: This thesis gives an explanation of the basic concepts of set theory, focusing primarily on high school students interested in mathematics. The text of the thesis is divided into six chapters. The first chapter provides a historical context, mainly explaining the development of the term "infinity" and the reasons for the establishment of axiomatic set theory. The second chapter reminds the reader of propositional logic and gives a simplified explanation of predicate calculus. Main focus of this chapter is on the explanation of working with logical quantifiers. The third chapter deals with the Zermelo-Fraenkel set theory axioms and some basic properties about sets they imply. Chapter Four separately introduces relations and related terminology, especially mappings and their properties. The penultimate chapter shows how to establish natural numbers using sets. In its introductory part, it is concisely presented a method of such establishment by means of Peano axioms. Further on, the knowledge concerning relations are extended along with the definition of ordering and ordered sets, and some basic properties of natural numbers in context of the described establishment are proved. The last chapter is devoted to the problem of comparing infinite sets. The idea of Hilbert hotel, comparison of sets using mappings, and especially the use of Cantor's diagonal argument are explained. Finally, the terms countable and uncountable sets are introduced and Cantor's theorem is formulated together with its proof. The text is accompanied by examples and also graphical illustrations for easier understanding. Additional information and more complex concepts in the topics covered are developed in the appendices of the thesis.