

# ZAHLENMENGE / SET

<b>Definition</b>	A <b>set</b> is a collection of different objects, called elements of a set.		<i>e. g.</i> $S = \{1,3,4\}, T = \{3,5\}$
<b>Predefined sets</b>	Leere Menge / Empty set	$\emptyset = \{ \}$	
	Primzahlen / Prim	$\mathbb{P} = \{2, 3, 5, 7, 11, \dots\}$	
	Natürliche Zahlen	$\mathbb{N} = \{0, 1, 2, 3, \dots\}$	
	Ganzen Zahlen / integer	$\mathbb{Z} = \{ \dots, -2, -1, 0, 1, 2, \dots \}$	
	Rationale Zahlen / rational	$\mathbb{Q} = \left\{ \frac{a}{b} \mid a, b \in \mathbb{Z}, b \neq 0 \right\}$	
	Irrationale Zahlen	$\pi = 3.14159 \dots, e = 2.718 \dots$	
	Reellen Zahlen / real	$\mathbb{R} =$ Rationale und Irrationale Zahlen	
	Komplexe Zahlen	$\mathbb{C}$	
<b>operations</b>	<b>  </b> <b>Cardinality</b> is defined to be the number of elements of the set.	$ S  = 3$	
	$\in$ An <b>element</b> of a set: $x \in S$ . Or not an element of a set: $x \notin S$ .	$4 \in S, \quad 4 \notin T$	
	$\cup$ <b>Union</b> of two sets: $S \cup T = \{x: x \in S \text{ or } x \in T\}$	$S \cup T = \{1,3,4,5\}$	
	$\cap$ <b>Intersection</b> of two sets: $S \cap T = \{x: x \in S \text{ and } x \in T\}$	$S \cap T = \{3\}$	
	$-$ <b>Difference</b> of two sets: $S - T = \{x: x \in S \text{ and } x \notin T\}$ . Notice that $S - T \neq T - S$ if $S \neq T$ .	$S - T = \{1,4\}$ $T - S = \{5\}$	
	$\subseteq$ A <b>subset</b> : $S \subseteq T$ . Or not a subset: $S \not\subseteq T: x \in S \text{ with } x \notin T$	$\{1,3\} \subseteq S, \quad \{1,5\} \not\subseteq S$	
	$\subset$ A <b>proper subset</b> : $S \subset T: S \subseteq T \text{ and } S \neq T$	$\{1,3\} \subset S$	
	<b>Disjoint</b> of to sets: $S \cap T = \emptyset$	$\{1,3,4\} \cap \{2,5\} = \emptyset$	
<b>Collection of sets</b> : $\mathcal{S} = \{S_1, S_2, \dots, S_k\}$	$\mathcal{S} = \{\{1,3\}, \{2,4\}\}$		