Table 1: Mathematical Symbols and Their Usage

Symbol	**Name**	**Description**	**Example**
{ }	set	used to define a set	$S = \{1, 2, 3, 4, \ldots\}$
$\in$	in, element of	used to denote that an element is part of a set	$1 \in \{1, 2, 3\}$
$\notin$	not in, not an element of	used to denote than an element is not part of a set	$4 \notin \{1, 2, 3\}$
$\lvert S \rvert$	cardinality	used to describe the size of a set	$S = \{1, 2, 2, 2, 3, 4, 5, 5\}$, $\lvert S \rvert = 5$
:, |	such that	used to denote a condition	$\{x^2 : x + 3 \text{ is prime}\}$
$\subseteq$	subset	set A is a subset of set B when each element in A is also in B	$A = \{1, 2\}$, $B = \{2, 1, 4, 3, 5\}$, $A \subseteq B$
$\subset$	proper subset	set A is a proper subset of set B when each element in A is in B and $A \neq B$	$A = \{1, 2, 3, 4, 5\}$, $B = \{2, 1, 4, 3, 5\}$
$\supseteq$	superset	set A is a superset of set B when B is a subset of A	$A = \{2, 4, 6, 7, 8\}$, $B = \{2, 4, 8\}$, $A \supseteq B$
$\cup$	union	a set with elements in set A or in set B	$A = \{1, 2\}$, $B = \{2, 3, 5\}$, $A \cup B = \{1, 2, 3, 5\}$
$\cap$	intersection	a set with elements in set A and in set B	$A = \{1, 2\}$, $B = \{2, 3, 5\}$, $A \cap B = \{2\}$
$\emptyset$	empty set	the set with no elements	$\{1, 2, 3\} \cap \{4, 5, 6\} = \emptyset$
$\setminus$	set difference	elements in set A that are not in B	$A = \{1, 2, 3, 4\}$, $B = \{2, 3, 5, 8\}$, $A \setminus B = \{1, 4\}$
$\times$	Cartesian product	all possible combinations of elements from A and B	$A = \{1, 2\}$, $B = \{3, 4\}$, $A \times B = \{(1, 3), (2, 3), (1, 4), (2, 4)\}$
A^c	complement	elements of universe U not in set A	$U = \{1, 2, 3, 4, 5\}$, $A = \{2, 4\}$, $A^c = \{1, 3, 5\}$
$\mathrm{f} : \mathrm{A} \to B$	function	maps elements of set A to set B	$f(x) = x^2 + 5$ is $f : \mathbb{R} \to \mathbb{R}$
$\mathrm{f} : \mathrm{x} \mapsto x^3$	mapping	maps any x to x^3	$f : x \mapsto x^2 + 5$
N	natural numbers	set of natural numbers starting at 1	$\mathbb{N} = \{1, 2, 3, \ldots\}$
N_0	whole numbers	set of whole numbers starting at 0	$\mathbb{N}_0 = \{0, 1, 2, 3, \ldots\}$
Z	integers	whole numbers with their negatives	$\mathbb{Z} = \{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$
Q	rational numbers	all $\frac{p}{q}$ where $p, q \in \mathbb{Z}, q \neq 0$	$\{\frac{1}{2}, \frac{5}{14}, \frac{-17}{3}\} \subset \mathbb{Q}$
$\wedge$	conjunction	$P \wedge Q$ true if both P, Q true	$P = (2 \text{ is prime}), Q = (8 \text{ is cube})$
$\vee$	disjunction	$P \vee Q$ true if either P, Q true	$P = (2 \text{ is prime}), Q = (4 \text{ is square})$
$\neg$	negation	$\neg P$ true if P false	if $P = (35 \text{ is prime})$ then $\neg P$ is true
$\implies$	implication	if P then Q	if $P = (x \text{ div by } 4)$, $Q = (x \text{ even})$
$\iff$	if and only if	$P \implies Q$ and $Q \implies P$	$P = (\text{new year}), Q = (\text{January } 1)$
$\forall$	for all	refers to all elements in a set	if $A = \{2, 4, 10\}$ then $x \in \mathbb{N}\ \forall x \in A$
$\exists$	there exists	at least one exists	$\exists x \in \mathbb{N}_0 : x = -x$
$\oplus$	XOR	either P or Q true but not both	$P \oplus Q$ true for one Democrat