

ISO 31-11

ISO 31-11 is the part of international standard ISO 31 that defines mathematical signs and symbols for use in physical sciences and technology.

Mathematical logic

Sign	Example	Name	Meaning and verbal equivalent	Remarks
\wedge	$p \wedge q$	conjunction sign	p and q	
\vee	$p \vee q$	disjunction sign	p or q (or both)	
\neg	$\neg p$	negation sign	negation of p ; not p ; non p	
\Rightarrow	$p \Rightarrow q$	implication sign	if p then q ; p implies q	Can also be written as $q \Leftarrow p$. Sometimes \rightarrow is used.
\forall	$\forall x \in A p(x)$ $(\forall x \in A) p(x)$	universal quantifier	for every x belonging to A , the proposition $p(x)$ is true	The " $\in A$ " can be dropped where A is clear from context.
\exists	$\exists x \in A p(x)$ $(\exists x \in A) p(x)$	existential quantifier	there exists an x belonging to A for which the proposition $p(x)$ is true	The " $\in A$ " can be dropped where A is clear from context. $\exists!$ is used where only exactly one x exists for which $p(x)$ is true.

Sets

Sign	Example	Meaning and verbal equivalent	Remarks
\in	$x \in A$	x belongs to A ; x is an element of the set A	
\notin	$x \notin A$	x does not belong to A ; x is not an element of the set A	The negation stroke can also be vertical.
\ni	$A \ni x$	the set A contains x (as an element)	same meaning as $x \in A$
$\not\ni$	$A \not\ni x$	the set A does not contain x (as an element)	same meaning as $x \notin A$
$\{ \}$	$\{x_1, x_2, \dots, x_n\}$	set with elements x_1, x_2, \dots, x_n	also $\{x_i : i \in I\}$, where I denotes a set of indices
$\{ \}$	$\{x \in A p(x)\}$	Set of those elements of A for which the proposition $p(x)$ is true	Example: $\{x \in \mathbb{R} x > 5\}$. The $\in A$ can be dropped where this set is clear from the context.
card	card(A)	number of elements in A ; cardinal of A	
\emptyset		the empty set	
\mathbb{N}		the set of natural numbers; the set of positive integers and zero	$\mathbb{N} = \{0, 1, 2, 3, \dots\}$. Exclusion of zero is denoted by an asterisk: $\mathbb{N}^* = \{1, 2, 3, \dots\}$; $\mathbb{N}_k = \{0, 1, 2, 3, \dots, k-1\}$.
\mathbb{Z}		the set of integers	$\mathbb{Z} = \{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$; $\mathbb{Z}^* = \mathbb{Z} \setminus \{0\} = \{\dots, -3, -2, -1, 1, 2, 3, \dots\}$.
\mathbb{Q}		the set of rational	$\mathbb{Q}^* = \mathbb{Q} \setminus \{0\}$.

		numbers	
\mathbb{R}		the set of real numbers	$\mathbb{R}^* = \mathbb{R} \setminus \{0\}$.
\mathbb{C}		the set of complex numbers	$\mathbb{C}^* = \mathbb{C} \setminus \{0\}$.
[,]	$[a, b]$	closed interval in \mathbb{R} from a (included) to b (included)	$[a, b] = \{x \in \mathbb{R} \mid a \leq x \leq b\}$.
],] (,]	$]a, b]$ $(a, b]$	left half-open interval in \mathbb{R} from a (excluded) to b (included)	$]a, b] = \{x \in \mathbb{R} \mid a < x \leq b\}$.
[, [(,)	$[a, b[$ (a, b)	right half-open interval in \mathbb{R} from a (included) to b (excluded)	$[a, b[= \{x \in \mathbb{R} \mid a \leq x < b\}$.
], [(,)	$]a, b[$ (a, b)	open interval in \mathbb{R} from a (excluded) to b (excluded)	$]a, b[= \{x \in \mathbb{R} \mid a < x < b\}$.
\subseteq	$B \subseteq A$	B is included in A ; B is a subset of A	Every element of B belongs to A . \subset is also used.
\subset	$B \subset A$	B is properly included in A ; B is a proper subset of A	Every element of B belongs to A , but B is not equal to A . If \subset is used for "included", then \subsetneq should be used for "properly included".
$\not\subseteq$	$C \not\subseteq A$	C is not included in A ; C is not a subset of A	$\not\subseteq$ is also used.
\supseteq	$A \supseteq B$	A includes B (as subset)	A contains every element of B . \supset is also used. $B \subseteq A$ means the same as $A \supseteq B$.
\supset	$A \supset B$	A includes B properly.	A contains every element of B , but A is not equal to B . If \supset is used for "includes", then \supsetneq should be used for "includes properly".
$\not\supseteq$	$A \not\supseteq C$	A does not include C (as subset)	$\not\supseteq$ is also used. $A \not\supseteq C$ means the same as $C \not\subseteq A$.
\cup	$A \cup B$	union of A and B	The set of elements which belong to A or to B or to both A and B . $A \cup B = \{x \mid x \in A \vee x \in B\}$.
\cup	$\bigcup_{i=1}^n A_i$	union of a collection of sets	$\bigcup_{i=1}^n A_i = A_1 \cup A_2 \cup \dots \cup A_n$ the set of elements belonging to at least one of the sets A_1, \dots, A_n . $\bigcup_{i=1}^n A_i$ and $\bigcup_{i \in I} A_i$ are also used, where I denotes a set of indices.
\cap	$A \cap B$	intersection of A and B	The set of elements which belong to both A and B . $A \cap B = \{x \mid x \in A \wedge x \in B\}$.
\cap	$\bigcap_{i=1}^n A_i$	intersection of a collection of sets	$\bigcap_{i=1}^n A_i = A_1 \cap A_2 \cap \dots \cap A_n$ the set of elements belonging to all sets A_1, \dots, A_n . $\bigcap_{i=1}^n A_i$ and $\bigcap_{i \in I} A_i$ are also used, where I denotes a set of indices.
\setminus	$A \setminus B$	difference between A and B ; A minus B	The set of elements which belong to A but not to B . $A \setminus B = \{x \mid x \in A \wedge x \notin B\}$; $A - B$ should not be used.
\complement	$C_A B$	complement of subset	The set of those elements of A which do not

		B of A	belong to the subset B . The symbol A is often omitted if the set A is clear from context. Also $C_A B = A \setminus B$.
$(,)$	(a, b)	ordered pair a, b ; couple a, b	$(a, b) = (c, d)$ if and only if $a = c$ and $b = d$. $\langle a, b \rangle$ is also used.
$(, \dots,)$	(a_1, a_2, \dots, a_n)	ordered n -tuple	$\langle a_1, a_2, \dots, a_n \rangle$ is also used.
\times	$A \times B$	cartesian product of A and B	The set of ordered pairs (a, b) such that $a \in A$ and $b \in B$. $A \times B = \{(a, b) \mid a \in A \wedge b \in B\}$. $A \times A \times \dots \times A$ is denoted by A^n , where n is the number of factors in the product.
Δ	Δ_A	set of pairs $(a, a) \in A \times A$ where $a \in A$; diagonal of the set $A \times A$	$\Delta_A = \{(a, a) \mid a \in A\}$; id_A is also used.

Operations

Sign	Example	Meaning and verbal equivalent	Remarks
$+$	$a + b$	a plus b	
$-$	$a - b$	a minus b	
\pm	$a \pm b$	a plus or minus b	
\mp	$a \mp b$	a minus or plus b	$-(a \pm b) = -a \mp b$