## **B Language Keywords and Operators** version 1.8.9

ASCII	Math.	Pri.	As.	Description
!	A	250		For any
п				String or definition file delimiter
#	3	250		There exists
\$0				Value of data before substitution
8	λ	250		Lambda expression
&	٨	40	L	Conjunction (logical AND)
1		250	L	Access to a record field
(				Open bracket
)				Close bracket
*	×	190	L	Multiplication or Cartesian product
x ** y	x y	200	R	Power of
+		180	L	Addition
+->	$\rightarrow$	125	L	Partial function
+->>	<del>+&gt;&gt;</del>	125	L	Partial surjection
,		115	L	Comma
-		180	L	Subtraction
-		210		Unary minus
>	$\rightarrow$	125	L	Total function
>>		125	L	Surjection
->	$\rightarrow$	160	L	Insert at the start of a sequence
•		220	R	Renaming or data separator used in the operators $\forall$ , $\exists$ , $\cup$ , $\cap$ , $\Sigma$ , $\Pi$ , $\lambda$
• •		170	L	Interval
/		190	L	Integer division
/:	∉	160	L	Non-belonging
/<:	⊄	110	L	Non-inclusion
/<<:	⊄	110	L	Strict non-inclusion
/=	<b>≠</b>	160	L	Not equal
/\	$\cap$	160	L	Intersection
/ \	1	160	L	Restriction of a sequence to the head
:	€	60	L	Belonging
:		120	L	Record field
::	:∈		L	Becomes part of (belonging)
:=			L	Becomes equal to
;		20	L	Sequencing for substitution or composition of relations

ASCII	Math.	Pri.	As.	Description
<		160	L	Strictly lesser than, or definition file delimiter
<+	4	160	L	Overload a relation
<->	$\leftrightarrow$	125	L	Set of relations
<-	<b>←</b>	160	L	Insert at end of sequence
<	←		L	Operation output parameters
<:	⊆	110	L	Inclusion
<<:	<b>C</b>	110	L	Strict inclusion
<<	⋖	160	L	Subtraction to the domain
<=	<b>S</b>	160	L	Lesser than or equal to
<=>	$\Leftrightarrow$	60	L	Equivalence
<	⊲	160	L	Restriction to the domain
=		60	L	Equals
==				Definition
=>	⇒	30	L	Implies
>		160	L	Strictly greater than, or definition file delimiter
>+>	>+>	125	L	Partial injection
>->	$\rightarrow$	125	L	Total injection
>->>	<b>&gt;&gt;&gt;</b>	125	L	Total bijection
><	8	160	L	Direct product of relations
>=	≥	160	L	Greater than or equal to
ABSTRACT_CONSTANTS				ABSTRACT_CONSTANTS clause
ABSTRACT_VARIABLES				ABSTRACT_VARIABLES clause
ANY				ANY substitution
ASSERT				ASSERT substitution
ASSERTIONS				ASSERTIONS clause
BE				LET substitution
BEGIN				BEGIN substitution
BOOL				Set of the Boolean values
CASE				CASE substitution
CHOICE				CHOICE substitution
CONCRETE_CONSTANTS				CONCRETE_CONSTANTS clause
CONCRETE_VARIABLES				CONCRETE_VARIABLES clause
CONSTANTS				CONSTANTS clause
	i e	1	1	CONSTRAINTS clause

ASCII	Math.	Pri.	As.	Description
DEFINITIONS				DEFINITIONS clause
DO				WHILE substitution
EITHER				CASE substitution
ELSE				IF or CASE substitution
ELSIF				IF substitution
END				Terminator of clauses or of substitutions BEGIN, PRE, ASSERT, CHOICE, IF, SELECT, ANY, LET, VAR, CASE and WHILE
EXTENDS				clause EXTENDS
FALSE				Literal Boolean constant "false"
FIN	F			Set of finite sub-sets
FIN1	$\mathbb{F}_1$			Set of finite non empty sub-sets
IF				Substitution IF
IMPLEMENTATION				IMPLEMENTATION clause
IMPORTS				IMPORTS clause
IN				BE or VAR substitution
INCLUDES				INCLUDES clause
INITIALISATION				INITIALISATION clause
INT				Set of implementable relative integers
INTEGER	$\mathbb{Z}$			Set of relative integers
INTER	Π			Quantified intersection
INVARIANT				INVARIANT clause or WHILE substitution
LET				LET substitution
LOCAL_OPERATIONS				LOCAL_OPERATIONS clause
MACHINE				MACHINE clause
MAXINT				Largest implementable integer
MININT				Smallest implementable integer
NAT				Set of implementable natural integers
NAT1	NAT <sub>1</sub>			Set of non-empty implementable natural integers
NATURAL	N			Set of natural integers
NATURAL1	$N_1$			Set of non-empty natural integers
OF				CASE substitution
OPERATIONS				OPERATIONS clause

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OR         CHOICE or CASE substitution           PI         Π         Quantified integer product           POW         P         Set of sub-sets           POW1         P1         Set of non-empty sub-sets           PRE         Precondition substitution           PROMOTES         PROMOTES clause           PROPERTIES         PROPERTIES clause           REFINES         REFINES clause           REFINEMENT clause         REFINEMENT clause           SEES         SEES clause           SEES         SEES clause           SELECT         Substitution SELECT           SETS         SETS clause           SIGMA         Σ         Quantified product           SETS         Set of character strings           THEN         Precondition substitution, ASSERT, IF or CASE           TRUE         Literal Boolean constant "true"           UNION         U         Quantified product           USES         USES clause           VALUES         VALUES clause           VAR         VAR substitution           VARIABLES clause         VARIABLES clause           WHEN         SELECT substitution           WHERE         ANY substitution           WHILE substi	ASCII	Math.	Pri.	As.	Description
POW         P         Set of sub-sets           POW1         P1         Set of non-empty sub-sets           PRE         Precondition substitution           PROMOTES         PROMOTES clause           PROPERTIES         PROPERTIES clause           REFINES         REFINES clause           REFINEMENT clause         SEES clause           SEES         SEES clause           SELECT         Substitution SELECT           SETS         SETS clause           SIGMA         Σ         Quantified product           STRING         Set of character strings           THEN         Precondition substitution, ASSERT, If or CASE           TRUE         Literal Boolean constant "true"           UNION         U         Quantified union           USES         USES clause           VALUES clause         VALUES clause           VAR         VAR substitution           VARIABLES         VARIABLES clause           WHEN         SELECT substitution           WHERE         ANY substitution           WHILE substitution         Image, or start of sequence           I         Empty sequence           V/         U floo         L           Image, or end of seque	OR				CHOICE or CASE substitution
POW1         P1         Set of non-empty sub-sets           PRE         Precondition substitution           PROMOTES         PROMOTES clause           PROPERTIES         PROPERTIES clause           REFINES         REFINES clause           REFINEMENT         REFINEMENT clause           SEES         SEES clause           SELECT         Substitution SELECT           SETS         SETS clause           SIGMA         Σ           STRING         Set of character strings           THEN         Precondition substitution, ASSERT, IF or CASE           TRUE         Literal Boolean constant "true"           UNION         U           USES clause           VALUES         USES clause           VALUES clause         VALUES clause           VAR         VAR substitution           WHALE substitution         WHILE substitution           WHERE         ANY substitution           WHERE         ANY substitution           WHILE         Empty sequence           I         Empty sequence           I         Image, or start of sequence           I         Image, or end of sequence           A         Image, or end of sequence	PI	П			Quantified integer product
PRE         Precondition substitution           PROMOTES         PROMOTES clause           PROPERTIES         PROPERTIES clause           REFINES         REFINES clause           REFINEMENT         REFINEMENT clause           SEES         SEES clause           SELECT         Substitution SELECT           SETS clause         SETS clause           SIGMA         Σ         Quantified product           STRING         Set of character strings           THEN         Precondition substitution, ASSERT, IF or CASE           TRUE         Literal Boolean constant "true"           UNION         U         Quantified union           USES         USES clause           VALUES         VALUES clause           VAR         VAR substitution           VARIABLES         VARIABLES clause           WHEN         SELECT substitution           WHERE         ANY substitution           WHILE         WHILE substitution           I         Image, or start of sequence           I         Empty sequence           I         Image, or end of sequence           A         Image, or end of sequence           A         Image, or end of sequence           <	POW	₽			Set of sub-sets
PROMOTES         PROMOTES clause           PROPERTIES         PROPERTIES clause           REFINES         REFINES clause           REFINEMENT clause         REFINEMENT clause           SEES         SEES clause           SELECT         Substitution SELECT           SETS         SETS clause           SIGMA         Σ           Quantified product         SETS clause           STRING         Set of character strings           THEN         Precondition substitution, ASSERT, IF or CASE           TRUE         Literal Boolean constant "true"           UNION         U         Quantified union           USES         USES clause           VALUES         VALUES clause           VAR         VAR substitution           VARIABLES         VARIABLES clause           WHEN         SELECT substitution           WHERE         ANY substitution           WHILE substitution         Umage, or start of sequence           []         Empty sequence           V/         U 160         L           Image, or end of sequence         Image, or end of sequence           C         160         L           Concatenate sequences         Tree node arity	POW1	$\mathbb{P}_1$			Set of non-empty sub-sets
PROPERTIES         PROPERTIES clause           REFINES         REFINES clause           REFINEMENT         REFINEMENT clause           SEES         SEES clause           SELECT         Substitution SELECT           SETS         SETS clause           SIGMA         Σ           STRING         Set of character strings           THEN         Precondition substitution, ASSERT, IF or CASE           TRUE         Literal Boolean constant "true"           UNION         U           USES clause         VALUES clause           VALUES         VAR Substitution           VAR         VAR Substitution           VARIABLES         VARIABLES clause           WHEN         SELECT substitution           WHILE         WHILE substitution           WHILE         WHILE substitution           WHILE         Union           V/         U         160         L         Restrict a sequence to the end           I         Image, or end of sequence           C         160         L         Concatenate sequences           arity         Tree node arity         Binary tree in extension           Predicate boolean cast         Predicate boolean cast	PRE				Precondition substitution
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REFINEMENT         REFINEMENT clause           SEES         SEES clause           SELECT         Substitution SELECT           SETS         SETS clause           SIGMA         Σ         Quantified product           STRING         Set of character strings           THEN         Precondition substitution, ASSERT, IF or CASE           TRUE         Literal Boolean constant "true"           UNION         U         Quantified union           USES         VALUES clause           VALUES         VALUES clause           VAR         VAR substitution           VARIABLES         VARIABLES clause           WHEN         SELECT substitution           WHERE         ANY substitution           WHILE         WHILE substitution           Image, or start of sequence         Image, or start of sequence           Image, or end of sequence         Image, or end of sequence           Arity         Image, or end of sequence           Tree node arity         Tree node arity           Binary tree in extension         Predicate boolean cast	PROPERTIES				PROPERTIES clause
SEES         SEES clause           SELECT         Substitution SELECT           SETS         SETS clause           SIGMA         Σ         Quantified product           STRING         Set of character strings           THEN         Precondition substitution, ASSERT, IF or CASE           TRUE         Literal Boolean constant "true"           UNION         U         Quantified union           USES         VALUES clause           VALUES         VALUES clause           VAR         VAR substitution           VARIABLES         VARIABLES clause           WHEN         SELECT substitution           WHERE         ANY substitution           WHILE         WHILE substitution           I         Image, or start of sequence           I         Empty sequence           V         U         160         L         Union           I         Image, or end of sequence           I         Image, or end of sequence           C         160         L         Concatenate sequences           arity         Tree node arity           Binary tree in extension           Predicate boolean cast	REFINES				REFINES clause
SELECT         Substitution SELECT           SETS         SETS clause           SIGMA         Σ         Quantified product           STRING         Set of character strings           THEN         Precondition substitution, ASSERT, IF or CASE           TRUE         Literal Boolean constant "true"           UNION         U         Quantified union           USES         USES clause           VALUES clause         VALUES clause           VAR         VAR substitution           VARIABLES         VARIABLES clause           WHEN         SELECT substitution           WHERE         ANY substitution           WHILE         WHILE substitution           Image, or start of sequence           Image, or start of sequence           Image, or end of sequence	REFINEMENT				REFINEMENT clause
SETS  SETS  SETS  SETS  SETS Clause  Quantified product  STRING  Set of character strings  Precondition substitution, ASSERT, IF or CASE  TRUE  Literal Boolean constant "true"  UNION  USES  VALUES  VALUES  VALUES  VAR  VAR substitution  VARIABLES  WHEN  VARIABLES  WHEN  WHILE SELECT substitution  WHILE  WHILE  WHILE  WHILE  WHILE  WHILE  WHILE  WHILE  WHILE  Literal Boolean constant "true"  VARIABLES clause  VAR  VAR substitution  WHILE substitution  WHILE substitution  WHILE  WHILE  WHILE  WHILE  WHILE  Literal Boolean constant "true"  VARIABLES clause  VAR  VAR substitution  WHILE substitution  WHILE  WHILE SELECT substitution  WHILE  WHILE substitution  Limage, or start of sequence  Image, or start of sequence  Limage, or end of sequence  Concatenate sequences  Tree node arity  Binary tree in extension  Predicate boolean cast	SEES				SEES clause
SIGMA  STRING  Set of character strings  THEN  Precondition substitution, ASSERT, IF or CASE  Literal Boolean constant "true"  UNION  USES  VALUES  VAR  VAR substitution  VARIABLES  WHEN  WHILE substitution  WHERE  WHILE  WHILE  WHILE  WHILE  WHILE  UNION  WHILE substitution  WHILE  WHILE  WHILE  WHILE  WHILE  UNION  WHILE  WHILE  WHILE  WHILE  WHILE  UNION  WHILE  WHILE  WHILE  WHILE  UNION  WHILE  WHILE  WHILE  UNION  WHILE  WHILE  UNION  WHILE  WHILE  UNION  WHILE  WHIL	SELECT				Substitution SELECT
STRING  Set of character strings  Precondition substitution, ASSERT, IF or CASE  Literal Boolean constant "true"  UNION  USES  VALUES  VALUES  VAR  VAR substitution  VARIANT  VARIABLES  WHEN  WHERE  WHILE  Concatenate sequence  Tree node arity  Binary tree in extension  Predicate boolean cast	SETS				SETS clause
THEN  Precondition substitution, ASSERT, IF or CASE  Literal Boolean constant "true"  UNION  USES  VALUES  VAR  VAR Substitution  VARIABLES  WHEN  WHILE SCAUSE  WHEN  WHERE  WHILE  Concatenate sequence  Tree node arity  Binary tree in extension  Predicate boolean cast	SIGMA	Σ			Quantified product
ASSERT, IF or CASE Literal Boolean constant "true"  UNION  USES  VALUES  VAR  VAR Substitution  VARIABLES  WHEN  WHILE  CI  CONCATENTE  WHORE  WHORE	STRING				Set of character strings
UNION  USES  USES clause  VALUES clause  VAR WHILE substitution  VARIANT  VARIABLES  WHEN  WHERE  WHILE  Union  I mage, or start of sequence  I mage, or end of sequence  I mage, or end of sequence  Tree node arity  bin  Binary tree in extension  Predicate boolean cast	THEN				
USES  VALUES  VALUES  VAR  VAR Substitution  VARIABLES  WHEN  WHERE  WHILE  C  Image, or start of sequence  Image, or start of sequence  Image, or end of sequence  Image, or end of sequence  C  Tree node arity  bin  Binary tree in extension  Predicate boolean cast	TRUE				Literal Boolean constant "true"
VALUES  VAR  VAR Substitution  VARIANT  VARIABLES  WHEN  WHERE  WHILE  WHILE  WHILE  WHILE  WHILE  WHILE  WHILE  Union  VARIABLES  VARIABLES  WHEN  WHILE  WHILE  WHILE  WHILE  Concatenate sequence  1 Image, or end of sequence  2 Image, or end of sequence  3 Image, or end of sequence  4 Image, or end of sequence  5 Image, or end of sequence  6 Image, or end of sequence  7 Inguity  8 Image, or end of sequences  1 Image, or end of sequences  2 Image, or end of sequences  3 Image, or end of sequences  4 Image, or end of sequences  4 Image, or end of sequences  5 Image, or end of sequences  6 Image, or end of sequences  7 Inguity  8 Image, or end of sequences  9 Image, or end of sequences  1 Image, or end of sequences  2 Image, or end of sequences  3 Image, or end of sequences  4 Image, or end of sequences  5 Image, or end of sequences  6 Image, or end of sequences  7 Inguity  8 Image, or end of sequences  9 Image, or end of sequences  1 Image, or end of sequences  2 Image, or end of sequences  3 Image, or end of sequences  4 Image, or end of sequences  5 Image, or end of sequences  6 Image, or end of sequences  7 Image, or end of sequences  8 Image, or end of sequences  9 Image, or end of sequences  1 Image, or end of sequences  2 Image, or end of sequences  3 Image, or end of sequences  4 Image, or end of sequences  5 Image, or end of sequences  6 Image, or end of sequences  7 Image, or end of sequences  9	UNION	U			Quantified union
VAR  VAR Substitution  WHILE substitution  VARIABLES  WHEN  WHERE  WHILE  WHILE  WHILE  WHILE  WHILE  Union  I Restrict a sequence to the end  I Image, or end of sequence  I Image, or end of sequence  C Concatenate sequences  arity  bin  Binary tree in extension  Predicate boolean cast	USES				USES clause
VARIANT  VARIABLES  WHEN  WHERE  WHILE  WHILE  WHILE  WHILE  WHILE  WHILE  WHILE  WHILE  WHILE  WHOW  Image, or start of sequence  Union  Image, or end of sequence  Image, or end of sequence  Concatenate sequences  Tree node arity  bin  Binary tree in extension  Predicate boolean cast	VALUES				VALUES clause
VARIABLES  VARIABLES  WHEN  SELECT substitution  WHERE  WHILE  WHILE  WHILE substitution  Image, or start of sequence  Empty sequence  V  160  L  Restrict a sequence to the end  Image, or end of sequence  1  Image, or end of sequence  Concatenate sequences  arity  bin  Binary tree in extension  Predicate boolean cast	VAR				VAR substitution
WHEN  WHERE  ANY substitution  WHILE  WHILE  WHILE  Image, or start of sequence  Empty sequence  Union  Image, or end of sequence  Image, or end of sequence  Concatenate sequences  Tree node arity  bin  Binary tree in extension  Predicate boolean cast	VARIANT				WHILE substitution
WHERE  WHILE  WHILE  WHILE  WHILE  WHILE substitution  Image, or start of sequence  Empty sequence  V  Inion  Image, or end of sequence  Image, or end of sequence  Concatenate sequences  Tree node arity  Binary tree in extension  Predicate boolean cast	VARIABLES				VARIABLES clause
WHILE  WHILE  WHILE  WHILE  WHILE substitution  Image, or start of sequence  Empty sequence  Union  I Union  L Restrict a sequence to the end  Image, or end of sequence  Concatenate sequences  Tree node arity  bin  Binary tree in extension  Predicate boolean cast	WHEN				SELECT substitution
Image, or start of sequence  Image, or end of sequence of the end  Image, or end of sequence  Image, or start of sequence	WHERE				ANY substitution
Empty sequence  V/ Union  L Union  L Restrict a sequence to the end  Image, or end of sequence  L Concatenate sequences  Tree node arity  Binary tree in extension  Predicate boolean cast	WHILE				WHILE substitution
\( \text{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	[				Image, or start of sequence
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	[]				Empty sequence
l Image, or end of sequence  160	\/	U	160	L	Union
^ 160 L Concatenate sequences  arity	\1/	1	160	L	Restrict a sequence to the end
arity  bin  bool  Concatenate sequences  Tree node arity  Binary tree in extension  Predicate boolean cast	]				Image, or end of sequence
bin Binary tree in extension  bool Predicate boolean cast	^	^	160	L	Concatenate sequences
bool Predicate boolean cast	arity				Tree node arity
Rinary troop	bin				Binary tree in extension
btree Binary trees	bool				Predicate boolean cast
	btree				Binary trees

ASCII	Math.	Pri.	As.	Description
card				Cardinal
ceiling				Ceiling function
closure(R)	R *			Reflexive closure of a relation
closure1(R)	R +			Closure of a relation
conc				Concatenation of a succession
const				Tree constructor
dom				Domain of a function
father				Father of a tree node
first				First element in a sequence
floor				Floor function
fnc				Transformed into a function
front				Front of a sequence
id				Function identity
infix				Infix formulae of a tree
inter				General intersection
iseq				Set of injective sequences
iseq1	iseq <sub>1</sub>			Set of injective non-empty sequences
iterate(R, n)	R n			Iteration of a relation
last				Last element in a sequence
left				Left tree
max				Maximum in a set of integers
min				Minimum in a set of integers
mirror				Mirror of a tree
mod		190	L	Modulo
not	7			Logical not
or	~	40	L	Disjunction (logical OR)
perm				Set of permutations (bijective sequences)
postfix				Postfix formulae of a tree
pred				Predecessor of an integer
prefix				Prefix formulae of a tree
prj1	prj₁			First projection of a relation
prj2	prj <sub>2</sub>			Second projection of a relation
ran				Range of a relation
rank				Rank of a tree node

ASCII	Math.	Pri.	As.	Description
real				Conversion from integer to real
rec				Record in extension
rel				Relation transform
rev				Reverse of a sequence
right				Right tree
seq				Set of sequences
seq1				Set of non-empty sequences
size				Size of a sequence
sizet				Size of a tree
skip				Null substitution
son				i <sup>th</sup> son of a tree
sons				Sons of a tree node
struct				Set of records
subtree				Subtree of a tree
succ				Successor
tail				Tail of a sequence
top				Top of a tree
tree				Trees
union				Generalized union
{				Start of set
{}	Ø			Empty set
1		10	L	Vertical bar used in $\forall$ , $\exists$ , $\cup$ , $\cap$ , $\Sigma$ , $\Pi$ , $\lambda$ , $\{\mid\}$
->	$\mapsto$	160	L	Maplet
>	<b>&gt;</b>	160	L	Restriction to the range
>>	⊳	160	L	Subtraction to the range
11		20	L	Simultaneous substitutions, or parallel product of relations
}				End of set
r~	r -1	230	L	Reverse relation