

# Unicode Characters in ProofPower through LuaLatex

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## Abstract

This document serves to establish what characters render like in utf8 ProofPower documents prepared using luaLatex.

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<http://www.rbjones.com/rbjpub/pp/doc/t055.pdf>

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# Contents

1	Prelude	2
2	Changes	2
2.1	Recent Changes	2
2.2	Changes Under Consideration	2
2.3	Issues	2
3	Introduction	3
4	Mathematical operators and symbols in Unicode	3
5	Dedicated blocks	3
5.1	Mathematical Operators block	3
5.2	Supplemental Mathematical Operators block	4
5.3	Mathematical Alphanumeric Symbols block	4
5.4	Letterlike Symbols block	6
5.5	Miscellaneous Mathematical Symbols-A block	7
5.6	Miscellaneous Mathematical Symbols-B block	7
5.7	Miscellaneous Technical block	7
5.8	Geometric Shapes block	8
5.9	Miscellaneous Symbols and Arrows block	9
5.10	Arrows block	9
5.11	Supplemental Arrows-A block	10
5.12	Supplemental Arrows-B block	10
5.13	Combining Diacritical Marks for Symbols block	11
5.14	Arabic Mathematical Alphabetic Symbols block	11
5.15	Characters in other blocks	12
6	Postscript	14
	Index	15

## 1 Prelude

## 2 Changes

### 2.1 Recent Changes

### 2.2 Changes Under Consideration

### 2.3 Issues

See also Section 6.

### 3 Introduction

### 4 Mathematical operators and symbols in Unicode

From Wikipedia, the free encyclopedia, transcribed into lualatex to determine which characters work.

Blackboard at the Laurent Schwartz Center for Mathematics, École Polytechnique. This article contains special characters. Without proper rendering support, you may see question marks, boxes, or other symbols.

The Unicode Standard encodes almost all standard characters used in mathematics.

Unicode Technical Report #25 provides comprehensive information about the character repertoire, their properties, and guidelines for implementation.

Mathematical operators and symbols are in multiple Unicode blocks. Some of these blocks are dedicated to, or primarily contain, mathematical characters while others are a mix of mathematical and non-mathematical characters. This article covers all Unicode characters with a derived property of "Math".

### 5 Dedicated blocks

#### 5.1 Mathematical Operators block

Main article: [Mathematical Operators \(Unicode block\)](#)

The Mathematical Operators block (U+2200–U+22FF) contains characters for mathematical, logical, and set notation.

Mathematical Operators[1]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+220x	∇	∮	∂	∃	∄	∅	Δ	∇	∈	∉	∈	∋	∌	∍	■	∏
U+221x	∏	∑	−	∓	±	/	\	*	○	•	√	∛	∜	∞	∞	ℓ
U+222x	∠	∠	∠		†		‡	^	∨	∩	∪	∫	∫∫	∫∫∫	§	ℙ
U+223x	ℱ	f	ℱ	ℱ	∴	∵	:	∴	†	‡	∴	≈	≈	≈	≈	≈
U+224x	∿	≈	≈	≈	≠	≅	≇	≈	≈	≉	≊	≋	≌	≍	≎	≏
U+225x	≐	≑	≒	≓	≔	≕	≆	≇	≈	≉	≊	≋	≌	≍	≎	≏
U+226x	≐	≑	≒	≓	≤	≥	≡	≢	≣	≤	≥	≦	≧	∅	*	*
U+227x	≧	≨	≩	≪	≭	≮	≯	≰	≱	≲	≳	≴	≵	≶	≷	≸
U+228x	*	*	∩	∪	∩	∪	∩	∪	∩	∪	∩	∪	∩	∪	∩	∪
U+229x	∩	∩	∩	∩	∩	⊕	⊖	⊗	⊘	⊙	⊚	⊛	⊜	⊝	⊞	⊟
U+22Ax	⊠	⊡	⊢	⊣	⊤	⊥	⊦	⊧	⊨	⊩	⊪	⊫	⊬	⊭	⊮	⊯
U+22Bx	↖	↗	∇	∇	∇	∇	⊙	⊙	⊙	†	†	∇	∇	∇	∇	∇
U+22Cx	∧	∨	∩	∪	◇	•	*	*	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
U+22Dx	∩	∩	∩	∩	∩	#	∠	∠	∩	∩	∩	∩	∩	∩	∩	∩
U+22Ex	*	*	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩
U+22Fx	∴	∴	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩

Notes

1. As of Unicode version 12.0

## 5.2 Supplemental Mathematical Operators block

Main article: Supplemental Mathematical Operators (Unicode block)

The Supplemental Mathematical Operators block (U+2A00–U+2AFF) contains various mathematical symbols, including N-ary operators, summations and integrals, intersections and unions, logical and relational operators, and subset/superset relations.

Supplemental Mathematical Operators[1]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+2A0x	⊙	⊕	⊗	∪	⊔	∏	∏	⋈	∨	×	∑	ℱ	ℳ	f	f	f
U+2A1x	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ	ƒ	⊗	△	∴
U+2A2x	⋈	†	†	†	†	†	†	†	†	†	†	†	†	⊕	⊕	×
U+2A3x	×	×	×	×	×	×	⊗	⊗	⊕	△	△	△	PG	PF	∴	∏
U+2A4x	∩	∪	∪	∩	∩	∪	∩	∩	∩	∩	∪	∩	∩	∩	∩	∩
U+2A5x	⋈	∧	∨	∧	∨	∧	∨	∨	∧	×	∧	∨	∧	∨	∧	△
U+2A6x	△	∨	∨	∨	∨	∨	∨	∨	∨	∨	∨	∨	∨	∨	∨	∨
U+2A7x	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩
U+2A8x	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩
U+2A9x	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩
U+2AAx	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩
U+2ABx	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩
U+2ACx	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩
U+2ADx	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩
U+2AEx	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩
U+2AFx	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩	∩

Notes

1. As of Unicode version 12.0

## 5.3 Mathematical Alphanumeric Symbols block

Main article: Mathematical Alphanumeric Symbols (Unicode block)

The Mathematical Alphanumeric Symbols block (U+1D400–U+1D7FF) contains Latin and Greek letters and decimal digits that enable mathematicians to denote different notions with different letter styles. The "holes" in the alphabetic ranges are filled by previously defined characters in the Letter like Symbols block shown below.

Mathematical Alphanumeric Symbols[1][2]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+1D40x	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
U+1D41x	Q	R	S	T	U	V	W	X	Y	Z	a	b	c	d	e	f
U+1D42x	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v
U+1D43x	w	x	y	z	A	B	C	D	E	F	G	H	I	J	K	L
U+1D44x	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	a	b
U+1D45x	c	d	e	f	g		i	j	k	l	m	n	o	p	q	r
U+1D46x	s	t	u	v	w	x	y	z	A	B	C	D	E	F	G	H
U+1D47x	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
U+1D48x	Y	Z	a	b	c	d	e	f	g	h	i	j	k	l	m	n
U+1D49x	o	p	q	r	s	t	u	v	w	x	y	z	A		C	D
U+1D4Ax			G			J	K			N	O	P	Q		S	T
U+1D4Bx	U	V	W	X	Y	Z	a	b	c	d		f		h	i	j
U+1D4Cx	k	l	m	n		p	q	r	s	t	u	v	w	x	y	z
U+1D4Dx	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
U+1D4Ex	Q	R	S	T	U	V	W	X	Y	Z	a	b	c	d	e	f
U+1D4Fx	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v
U+1D50x	w	x	y	z	A	B		D	E	F	G		I	J	K	L
U+1D51x	M	N	O	P	Q		R	S	T	U	V	W	X	Y	Z	a
U+1D52x	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
U+1D53x	s	t	u	v	w	x	y	z	A	B		D	E	F	G	
U+1D54x	I	J	K	L	M		O				S	T	U	V	W	X
U+1D55x	Y		a	b	c	d	e	f	g	h	i	j	k	l	m	n
U+1D56x	o	p	q	r	s	t	u	v	w	x	y	z	A	B	C	D
U+1D57x	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
U+1D58x	U	V	W	X	Y	Z	a	b	c	d	e	f	g	h	i	j
U+1D59x	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
U+1D5Ax	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
U+1D5Bx	Q	R	S	T	U	V	W	X	Y	Z	a	b	c	d	e	f
U+1D5Cx	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v
U+1D5Dx	w	x	y	z	A	B	C	D	E	F	G	H	I	J	K	L
U+1D5Ex	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	a	b
U+1D5Fx	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
U+1D60x	s	t	u	v	w	x	y	z	A	B	C	D	E	F	G	H
U+1D61x	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
U+1D62x	Y	Z	a	b	c	d	e	f	g	h	i	j	k	l	m	n
U+1D63x	o	p	q	r	s	t	u	v	w	x	y	z	A	B	C	D
U+1D64x	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
U+1D65x	U	V	W	X	Y	Z	a	b	c	d	e	f	g	h	i	j
U+1D66x	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
U+1D67x	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
U+1D68x	Q	R	S	T	U	V	W	X	Y	Z	a	b	c	d	e	f
U+1D69x	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v
U+1D6Ax	w	x	y	z	ι	ϰ			A	B	Γ	Δ	E	Z	H	Θ
U+1D6Bx	I	K	Λ	M	N	Ξ	O	Π	P	Θ	Σ	T	Υ	Φ	X	Ψ

U+1D6Cx	Ω	∇	α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ
U+1D6Dx	ο	π	ρ	ς	σ	τ	υ	φ	χ	ψ	ω	∂	ε	ϑ	κ	φ
U+1D6Ex	ϱ	ϖ	A	B	Γ	Δ	E	Z	H	Θ	I	K	Λ	M	N	Ξ
U+1D6Fx	O	Π	P	Θ	Σ	T	Υ	Φ	X	Ψ	Ω	∇	α	β	γ	δ
U+1D70x	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο	π	ϱ	ς	σ	τ
U+1D71x	υ	φ	χ	ψ	ω	∂	ε	ϑ	κ	φ	ρ	σ	A	B	Γ	Δ
U+1D72x	E	Z	H	Θ	I	K	Λ	M	N	Ξ	O	Π	P	Θ	Σ	T
U+1D73x	Υ	Φ	X	Ψ	Ω	∇	α	β	γ	δ	ε	ζ	η	θ	ι	κ
U+1D74x	λ	μ	ν	ξ	ο	π	ϱ	ς	σ	τ	υ	φ	χ	ψ	ω	∂
U+1D75x	ε	ϑ	κ	φ	ρ	σ	A	B	Γ	Δ	E	Z	H	Θ	I	K
U+1D76x	Λ	M	N	Ξ	O	Π	P	Θ	Σ	T	Υ	Φ	X	Ψ	Ω	∇
U+1D77x	α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο	π
U+1D78x	ρ	ς	σ	τ	υ	φ	χ	ψ	ω	∂	ε	ϑ	κ	φ	ρ	σ
U+1D79x	A	B	Γ	Δ	E	Z	H	Θ	I	K	Λ	M	N	Ξ	O	Π
U+1D7Ax	P	Θ	Σ	T	Υ	Φ	X	Ψ	Ω	∇	α	β	γ	δ	ε	ζ
U+1D7Bx	η	θ	ι	κ	λ	μ	ν	ξ	ο	π	ρ	ς	σ	τ	υ	φ
U+1D7Cx	χ	ψ	ω	∂	ε	ϑ	κ	φ	ρ	σ	τ	υ	φ	χ	ψ	ω
U+1D7Dx	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7
U+1D7Ex	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3
U+1D7Fx	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9

#### Notes

1. As of Unicode version 12.0
2. Grey areas indicate non-assigned code points

## 5.4 Letterlike Symbols block

Main article: Letterlike Symbols (Unicode block)

The Letterlike Symbols block (U+2100–U+214F) includes variables. Most alphabetic math symbols are in the Mathematical Alphanumeric Symbols block shown above.

The math subset of this block is U+2102, U+2107, U+210A–U+2113, U+2115, U+2118–U+2119, U+2124, U+2128–U+2129, U+212C, U+212F, U+2133, U+2135, U+213C–U+2149, and U+214B.

Letterlike Symbols[1]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+210x	℅	‰	©	°C	¢	%	‰	€	∂	°F	g	ℋ	§	ℍ	h	ℏ
U+211x	ℐ	ℑ	ℒ	ℓ	℔	N	№	®	∅	ℙ	ℚ	ℛ	ℜ	ℝ	℞	℟
U+212x	SM	TEL	TM	Ψ	Z	Ξ	Ω	U	3	ι	K	Å	Β	℄	Ε	e
U+213x	ℰ	ℱ	ℱ	ℳ	ℵ	ℶ	ℷ	ℸ	ℹ	℺	℻	FAX	π	γ	Γ	Π
U+214x	Σ	∅	ℓ	ℓ	ℓ	ℓ	ℓ	e	i	j	ℓ	℘	ℙ	ℚ	ℓ	ℓ

#### Notes

1. As of Unicode version 12.0

## 5.5 Miscellaneous Mathematical Symbols-A block

Main article: [Miscellaneous Mathematical Symbols-A \(Unicode block\)](#) The Miscellaneous Mathematical Symbols-A block (U+27C0–U+27EF) contains characters for mathematical, logical, and database notation.

Miscellaneous Mathematical Symbols-A[1]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+27Cx	⋈	⋈	⊥	⊖	⊗	⊘	⊙	⊚	⊛	⊜	⊝	⊞	⊟	⊠	⊡	⊢
U+27Dx	⋄	⋆	⋇	⋈	⋉	⋊	⋋	⋌	⋍	⋎	⋏	⋐	⋑	⋒	⋓	⋔
U+27Ex	⋕	⋖	⋗	⋘	⋙	⋚	⋛	⋜	⋝	⋞	⋟	⋠	⋡	⋢	⋣	⋤

Notes

1. As of Unicode version 12.0

## 5.6 Miscellaneous Mathematical Symbols-B block

Main article: [Miscellaneous Mathematical Symbols-B \(Unicode block\)](#)

The Miscellaneous Mathematical Symbols-B block (U+2980–U+29FF) contains miscellaneous mathematical symbols, including brackets, angles, and circle symbols.

Miscellaneous Mathematical Symbols-B[1]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+298x	⋈	⋉	⋊	⋋	⋌	⋍	⋎	⋏	⋐	⋑	⋒	⋓	⋔	⋕	⋖	⋗
U+299x	⋘	⋙	⋚	⋛	⋜	⋝	⋞	⋟	⋠	⋡	⋢	⋣	⋤	⋥	⋦	⋧
U+29Ax	⋨	⋩	⋪	⋫	⋬	⋭	⋮	⋯	⋰	⋱	⋲	⋳	⋴	⋵	⋶	⋷
U+29Bx	⋸	⋹	⋺	⋻	⋼	⋽	⋾	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿
U+29Cx	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿
U+29Dx	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿
U+29Ex	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿
U+29Fx	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿	⋿

Notes

1. As of Unicode version 12.0

## 5.7 Miscellaneous Technical block

Main article: [Miscellaneous Technical \(Unicode block\)](#) The Miscellaneous Technical block (U+2300–U+23FF) includes braces and operators.

The math subset of this block is U+2308–U+230B, U+2320–U+2321, U+237C, U+239B–U+23B5, 23B7, U+23D0, and U+23DC–U+23E2.

Miscellaneous Technical[1][2]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+230x	∅	˘	◊	ˆ	˘	˘	˘	˘	∏	∏	L	J	∏	∏	∏	∏
U+231x	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+232x	∏	J	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+233x	//	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+234x	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+235x	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+236x	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+237x	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+238x	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+239x	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+23Ax	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+23Bx	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+23Cx	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+23Dx	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+23Ex	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏
U+23Fx	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏	∏

Notes

1. As of Unicode version 12.0
2. Unicode code points U+2329 and U+232A are deprecated as of Unicode version 5.2

### 5.8 Geometric Shapes block

Main article: Geometric Shapes (Unicode block)

The Geometric Shapes block (U+25A0–U+25FF) contains geometric shape symbols.

The math subset of this block is U+25A0–25A1, U+25AE–25B7, U+25BC–25C1, U+25C6–25C7, U+25CA–25CB, U+25CF–25D3, U+25E2, U+25E4, U+25E7–25EC, and U+25F8–25FF.

Geometric Shapes[1]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+25Ax	■	□	◻	◼	▧	▨	▩	▪	▫	▬	◻	◻	◼	◻	◼	◻
U+25Bx	▮	▯	▴	▵	▶	▷	▸	▹	►	▻	▹	▹	▾	▿	▾	▾
U+25Cx	◀	◁	◂	◃	◄	◅	◈	◉	◊	◈	◈	◯	◉	◉	◉	●
U+25Dx	◐	◑	◒	◓	◔	◕	◖	◗	◘	◙	◚	◛	◜	◝	◞	◟
U+25Ex	◠	◡	◢	◣	◤	◥	◦	◧	◨	◩	◪	◫	◬	◭	◮	◯
U+25Fx	◰	◱	◲	◳	◴	◵	◶	◷	◸	◹	◺	◻	◼	◽	◾	◿

Notes

1. As of Unicode version 12.0



## 5.9 Miscellaneous Symbols and Arrows block

Main article: [Miscellaneous Symbols and Arrows \(Unicode block\)](#)

The Miscellaneous Symbols and Arrows block (U+2B00–U+2BFF Arrows) contains arrows and geometric shapes with various fills.

The math subset of this block is U+2B30–2B44 and U+2B47–2B4C.

Miscellaneous Symbols and Arrows[1][2]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+2B0x																
U+2B1x																
U+2B2x																
U+2B3x																
U+2B4x																
U+2B5x																
U+2B6x																
U+2B7x																
U+2B8x																
U+2B9x																
U+2BAx																
U+2BBx																
U+2BCx																
U+2BDx																
U+2BEx																
U+2BFx																

Notes

1. As of Unicode version 12.0
2. Grey areas indicate non-assigned code points

## 5.10 Arrows block

Main article: [Arrows \(Unicode block\)](#)

The Arrows block (U+2190–U+21FF) contains line, curve, and semicircle arrows and arrow-like operators.

Arrows[1]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+219x	←	↑	→	↓	↔	OK	↗	OH	OI	↘	↵	→	↷	↶	←	↑
U+21Ax	→	↓	↶	↷	↵	↑	↴	↵	↶	↷	↵	↴	↵	↶	↷	↵
U+21Bx	↶	↷	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴
U+21Cx	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴
U+21Dx	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴
U+21Ex	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴
U+21Fx	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴	↵	↴

Notes

- As of Unicode version 12.0

### 5.11 Supplemental Arrows-A block

Main article: Supplemental Arrows-A (Unicode block) The Supplemental Arrows-A block (U+27F0–U+27FF) contains arrows and arrow-like operators.

Supplemental Arrows-A[1]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+27Fx	↕	↘	↻	↻	↻	←	→	↔	⇐	⇒	⇔	↵	↶	↷	↵	↻

Notes

- As of Unicode version 12.0

### 5.12 Supplemental Arrows-B block

Main article: Supplemental Arrows-B (Unicode block)

The Supplemental Arrows-B block (U+2900–U+297F) contains arrows and arrow-like operators (arrow tails, crossing arrows, curved arrows, and harpoons).

Supplemental Arrows-B[1]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+290x	↗	↘	↵	↶	↷	↵	↶	↷	↵	↶	↷	↵	↶	↷	↵	↶
U+291x	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘
U+292x	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘
U+293x	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘
U+294x	↻	↻	↵	↶	↷	↵	↶	↷	↵	↶	↷	↵	↶	↷	↵	↶
U+295x	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘
U+296x	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘
U+297x	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	↘

Notes

- As of Unicode version 12.0

### 5.13 Combining Diacritical Marks for Symbols block

Main article: Combining Diacritical Marks for Symbols (Unicode block)

The Combining Diacritical Marks for Symbols block contains arrows, dots, enclosures, and overlays for modifying symbol characters.

The math subset of this block is U+20D0–U+20DC, U+20E1, U+20E5–U+20E6, and U+20EB–U+20EF.

Combining Diacritical Marks for Symbols[1][2]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+20Dx																
U+20Ex																
U+20Fx																

Notes

1. As of Unicode version 12.0
2. Grey areas indicate non-assigned code points

### 5.14 Arabic Mathematical Alphanumeric Symbols block

Main article: Arabic Mathematical Alphanumeric Symbols block

The Arabic Mathematical Alphanumeric Symbols block (U+1EE00–U+1EEFF) contains characters used in Arabic mathematical expressions.

Arabic Mathematical Alphanumeric Symbols[1][2]

Official Unicode Consortium code chart (PDF)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+1EE0x																
U+1EE1x																
U+1EE2x																
U+1EE3x																
U+1EE4x																
U+1EE5x																
U+1EE6x																
U+1EE7x																
U+1EE8x																
U+1EE9x																
U+1EEAx																
U+1EEBx																
U+1EECx																
U+1EEDx																
U+1EEEx																
U+1EEFx																

## Notes

1. As of Unicode version 12.0
2. Grey areas indicate non-assigned code points

### 5.15 Characters in other blocks

Mathematical characters also appear in other blocks. Below is a list of these characters as of Unicode version 12.0:

#### Basic Latin block

U+002B	+	PLUS SIGN
U+002D	–	HYPHEN–MINUS
U+003C	<	LESS–THAN SIGN
U+003D	=	EQUALS SIGN
U+003E	>	GREATER–THAN SIGN
U+005E	^	CIRCUMFLEX ACCENT
U+007C		VERTICAL LINE
U+007E	~	TILDE

#### Latin-1 Supplement block

U+00AC	¬	NOT SIGN
U+00B1	±	PLUS–MINUS SIGN
U+00D7	×	MULTIPLICATION SIGN
U+00F7	÷	DIVISION SIGN

#### Greek and Coptic block

U+03D0	β	GREEK BETA SYMBOL
U+03D1	θ	GREEK THETA SYMBOL
U+03D2	ϣ	GREEK UPSILON WITH HOOK SYMBOL
U+03D5	φ	GREEK PHI SYMBOL
U+03F0	κ	GREEK KAPPA SYMBOL
U+03F1	ρ	GREEK RHO SYMBOL
U+03F4	Θ	GREEK CAPITAL THETA SYMBOL
U+03F5	ε	GREEK LUNATE EPSILON SYMBOL
U+03F6	ε	GREEK REVERSED LUNATE EPSILON SYMBOL

#### Arabic block

U+0606	√	ARABIC–INDIC CUBE ROOT
U+0607	√	ARABIC–INDIC FOURTH ROOT
U+0608	☞	ARABIC RAY

#### General Punctuation block

U+2016		DOUBLE VERTICAL LINE
U+2032	'	PRIME
U+2033	''	DOUBLE PRIME
U+2034	'''	TRIPLE PRIME
U+2040	^	CHARACTER TIE
U+2044	/	FRACTION SLASH
U+2052	∕	COMMERCIAL MINUS SIGN
U+2061	note	FUNCTION APPLICATION
U+2062	note	INVISIBLE TIMES
U+2063	note	INVISIBLE SEPARATOR
U+2064	note	INVISIBLE PLUS

Note: non-marking character

#### Superscripts and Subscripts block

U+207A	+	SUPERSCRIPPT PLUS SIGN
U+207B	-	SUPERSCRIPPT MINUS
U+207C	=	SUPERSCRIPPT EQUALS SIGN
U+207D	(	SUPERSCRIPPT LEFT PARENTHESIS
U+207E	)	SUPERSCRIPPT RIGHT PARENTHESIS
U+208A	+	SUBSCRIPPT PLUS SIGN
U+208B	-	SUBSCRIPPT MINUS
U+208C	=	SUBSCRIPPT EQUALS SIGN
U+208D	(	SUBSCRIPPT LEFT PARENTHESIS
U+208E	)	SUBSCRIPPT RIGHT PARENTHESIS

#### Miscellaneous Symbols block

U+2605	★	BLACK STAR
U+2606	☆	WHITE STAR
U+2640	♀	FEMALE SIGN
U+2642	♂	MALE SIGN
U+2660	♠	BLACK SPADE SUIT
U+2661	♥	WHITE HEART SUIT
U+2662	♦	WHITE DIAMOND SUIT
U+2663	♣	BLACK CLUB SUIT
U+266D	♭	MUSIC FLAT SIGN
U+266E	♮	MUSIC NATURAL SIGN
U+266F	♯	MUSIC SHARP SIGN

#### Alphabetic Presentation Forms block

U+FB29	+	HEBREW LETTER ALTERNATIVE PLUS SIGN
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#### Small Form Variants block

U+FE61	SMALL ASTERISK
U+FE62	SMALL PLUS SIGN
U+FE63	- SMALL HYPHEN–MINUS
U+FE64	SMALL LESS–THAN SIGN
U+FE65	SMALL GREATER–THAN SIGN
U+FE66	SMALL EQUALS SIGN
U+FE68	SMALL REVERSE SOLIDUS

#### Halfwidth and Fullwidth Forms block

U+FF0B	FULLWIDTH PLUS SIGN
U+FF1C	FULLWIDTH LESS–THAN SIGN
U+FF1D	FULLWIDTH EQUALS SIGN
U+FF1E	FULLWIDTH GREATER–THAN SIGN
U+FF3C	FULLWIDTH REVERSE SOLIDUS
U+FF3E	FULLWIDTH CIRCUMFLEX ACCENT
U+FF5C	FULLWIDTH VERTICAL LINE
U+FF5E	FULLWIDTH TILDE
U+FFE2	FULLWIDTH NOT SIGN
U+FFE9	HALFWIDTH LEFTWARDS ARROW
U+FFEA	HALFWIDTH UPWARDS ARROW
U+FFEB	HALFWIDTH RIGHTWARDS ARROW
U+FFEC	HALFWIDTH DOWNWARDS ARROW

#### See also

List of mathematical symbols

List of logic symbols

Greek letters used in mathematics, science, and engineering

List of letters used in mathematics and science

Latin letters used in mathematics

Unicode subscripts and superscripts

Unicode symbols

CJK Compatibility Unicode symbols includes symbols for SI units

Units for order of magnitude shows position of SI units

#### References

"Unicode Technical Report \#25: Unicode Support for Mathematics" (PDF). The Unicode Consortium. 2 April 2014.

"Unicode Character Database: Derived Core Properties". The Unicode Consortium. 19 February 2014. Retrieved 19 February 2014.

"Unicode Technical Annex #44: Unicode Character Database" (PDF). The Unicode Consortium. 25 September 2014.

#### External links

Mathematical Markup Language (MathML) W3C Recommendation. 3.0 (2nd ed.). W3C. 10 April 2014.

Images of glyphs in section 6.3.3 of the Mathematical Markup Language (MathML) W3C Recommendation. 2.0 (2nd ed.). W3C. 10 April 2014.

## 6 Postscript

## Index