

Table of Braille Mathematical Signs with Unicode References

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Introduction

The following is a summary of mathematical signs in UEB. Unicode numbers and descriptions are given where available.

Note, a number of UEB symbols in the tables below must be shown in grade 1 mode. Grade 1 indicators are not shown in the following tables, but may be needed in practical use. Simplistically, if a sign also has a grade 2 contracted meaning, then it needs to be in grade 1 mode to have its mathematical meaning. For information on the placement of grade 1 indicators, see Guidelines for Mathematics, available from www.ukaaf.org/braille/ueb. For more information on UEB generally, see Rules of Unified English Braille, and Guidelines for Technical Material, latest edition, available from www.iceb.org/ueb.

The braille signs in the following tables should generally be used to represent the corresponding print signs whatever their meaning.

Braille Indicators

These signs are used as part of the braille code, they have no direct print equivalent.

Braille	Description
⠆	Numeric indicator
⠆⠆	Numeric passage indicator
⠆⠆⠆	Numeric passage terminator
⠆	Simple numeric fraction line
⠆	General fraction open indicator
⠆⠆	General fraction line
⠆	General fraction close indicator
⠆	Superscript indicator
⠆	Subscript indicator
⠆⠆	Directly above
⠆⠆	Directly below

Braille	Description
⠏	Open radical (root)
⠈	Close radical (root)
⠠	Opening braille grouping indicator
⠡	Closing braille grouping indicator
⠠	Line continuation indicator
⠠⠠	Line continuation indicator with space
⠠	Grade 1 symbol indicator
⠠⠠	Grade 1 word indicator
⠠⠠⠠	Grade 1 passage indicator
⠠⠠	Grade 1 terminator
⠠	Capital letter indicator
⠠⠠	Capital word indicator
⠠⠠⠠	Capital passage indicator
⠠⠠	Capital terminator
⠠⠠	Bold word indicator
⠠⠠	Bold symbol indicator
⠠⠠	Bold passage indicator
⠠⠠	Bold terminator
⠠⠠	Script word indicator
⠠⠠	Script symbol indicator
⠠⠠	Script passage indicator
⠠⠠	Script terminator

Comparison Signs

These are normally spaced on both sides.

Print	Braille	Unicode	Description
=	⠠⠨	003D	Equals
≠	⠠⠨⠠⠨	2260	Not equal
<	⠠⠨	003C	Less than
≤	⠠⠨⠠⠨	2264	Less than or equal to
>	⠠⠨	003E	Greater than
≥	⠠⠨⠠⠨	2265	Greater than or equal to
≪	⠠⠨⠠⠨	226A	Much less than
≫	⠠⠨⠠⠨	226B	Much greater than
⩵	⠠⠨⠠⠨	226E	Not less than
⩶	⠠⠨⠠⠨	226F	Not greater than
⩷	⠠⠨⠠⠨⠠⠨	2270	Neither less than nor equal to
⩸	⠠⠨⠠⠨⠠⠨	2271	Neither greater than nor equal to
∝	⠠⠨⠠⠨	221D	Proportional to
≈	⠠⠨	2243	Approximately equal to (tilde over horizontal line)
≐	⠠⠨⠠⠨	2245	Approximately equal to (tilde over equals sign)
≈	⠠⠨	2248	Approximately equal (tilde over tilde)
≐	⠠⠨⠠⠨	224F	Equals with bump in top bar (difference between)
≐	⠠⠨⠠⠨	2251	Geometrically equal to (equals dotted above and below)
≐	⠠⠨	2261	Equivalent to (three horizontal lines)
≐	⠠⠨⠠⠨	2262	Not identical to
∈	⠠⠨	2208	Element of (member of)

Print	Braille	Unicode	Description
\notin	⠠⠠⠠⠠⠠⠠	2209	Not an element of
\ni	⠠⠠⠠⠠	220B	Contains as member
$\not\ni$	⠠⠠⠠⠠⠠⠠	220C	Does not contain as member
\subset	⠠⠠⠠	2282	Subset of (is contained in)
\supset	⠠⠠⠠	2283	Superset (contains)
$\not\subset$	⠠⠠⠠⠠⠠⠠	2284	Not a subset of
$\not\supset$	⠠⠠⠠⠠⠠⠠	2285	Not a superset of
\subseteq	⠠⠠⠠⠠	2286	Subset or equal to
\supseteq	⠠⠠⠠⠠	2287	Superset or equal to
$\not\subseteq$	⠠⠠⠠⠠⠠⠠	2288	Neither subset nor equal to
$\not\supseteq$	⠠⠠⠠⠠⠠⠠	2289	Neither superset nor equal to
\subsetneq	⠠⠠⠠⠠	228A	Subset but not equal to
\supsetneq	⠠⠠⠠⠠	228B	Superset but not equal to
\triangleleft	⠠⠠⠠⠠	22B2	Normal subgroup of
\triangleright	⠠⠠⠠⠠	22B3	Contains as normal subgroup
\trianglelefteq	⠠⠠⠠⠠	22B4	Normal subgroup of or equal to
\trianglerighteq	⠠⠠⠠⠠	22B5	Contains as normal subgroup of or equal to
	⠠⠠⠠⠠	2AF4	Triple vertical bar

Operation Signs

These signs are generally not spaced.

Print	Braille	Unicode	Description
+	⠠⠆	002B	Plus sign
-	⠠⠤	2212	Minus sign
×	⠠⠵	00D7	Multiplication sign (times)
÷	⠠⠶	00F7	Division sign (divided by)
±	⠠⠆⠠⠤	00B1	Plus or minus
∓	⠠⠤⠠⠆	2213	Minus or plus
*	⠠⠠⠠	2217	Asterisk operator
◦	⠠⠠⠠	2218	Ring operator
~	⠠⠠⠠	223C	Tilde operator
·	⠠⠠⠠	22C5	Dot operator
∧	⠠⠠⠠	2227	Logical and
∨	⠠⠠⠠	2228	Logical or
∩	⠠⠠⠠	2229	Intersection
∪	⠠⠠⠠	222A	Union
\	⠠⠠⠠	2216	Set minus

Brackets

Brackets are usually unspaced. The multiline brackets are used when a print bracket spans more than one line of text (e.g. for vectors and matrices) and must be vertically aligned in the braille.

Print	Braille	Unicode	Description
(⠠⠠	0028	Left parenthesis
)	⠠⠠	0029	Right parenthesis
[⠠⠠	005B	Left square bracket
]	⠠⠠	005D	Right square bracket
{	⠠⠠	007B	Left curly bracket
}	⠠⠠	007D	Right curly bracket
<	⠠⠠	2329	Left angle bracket
>	⠠⠠	232A	Right angle bracket
	⠠⠠	007C	Vertical bar
	⠠⠠⠠		Multiline left parenthesis
	⠠⠠⠠		Multiline right parenthesis
	⠠⠠⠠		Multiline left square bracket
	⠠⠠⠠		Multiline right square bracket
	⠠⠠⠠		Multiline left curly bracket
	⠠⠠⠠		Multiline right curly bracket
	⠠⠠⠠		Multiline vertical bar

Greek Letters

Greek letters may be used as needed. Some Greek letters have variant visual forms.

Print	Braille	Unicode	Description
α	⠠⠁	03B1	Greek alpha
β	⠠⠃	03B2	Greek beta
γ	⠠⠄	03B3	Greek gamma
δ	⠠⠅	03B4	Greek delta
ε	⠠⠆	03B5	Greek epsilon
ζ	⠠⠇	03B6	Greek zeta
η	⠠⠈	03B7	Greek eta
θ	⠠⠉	03B8	Greek theta
ι	⠠⠊	03B9	Greek iota
κ	⠠⠋	03BA	Greek kappa
λ	⠠⠌	03BB	Greek lambda
μ	⠠⠍	03BC	Greek mu
ν	⠠⠎	03BD	Greek nu
ξ	⠠⠏	03BE	Greek xi
ο	⠠⠑	03BF	Greek omicron
π	⠠⠒	03C0	Greek pi
ρ	⠠⠓	03C1	Greek rho
σ	⠠⠔	03C3	Greek sigma
τ	⠠⠕	03C4	Greek tau
υ	⠠⠖	03C5	Greek upsilon
φ	⠠⠗	03C6	Greek phi
χ	⠠⠘	03C7	Greek chi
ψ	⠠⠙	03C8	Greek psi
ω	⠠⠚	03C9	Greek omega

Note that several of the uppercase Greek letters look very similar to Latin capital letters.

Print	Braille	Unicode	Description
A	⠁⠠	0391	Capital Greek alpha
B	⠃⠠	0392	Capital Greek beta
Γ	⠄⠠	0393	Capital Greek gamma
Δ	⠅⠠	0394	Capital Greek delta
E	⠇⠠	0395	Capital Greek epsilon
Z	⠈⠠	0396	Capital Greek zeta
H	⠉⠠	0397	Capital Greek eta
Θ	⠊⠠	0398	Capital Greek theta
I	⠋⠠	0399	Capital Greek iota
K	⠌⠠	039A	Capital Greek kappa
Λ	⠍⠠	039B	Capital Greek lambda
M	⠎⠠	039C	Capital Greek mu
N	⠏⠠	039D	Capital Greek nu
Ξ	⠑⠠	039E	Capital Greek xi
O	⠒⠠	039F	Capital Greek omicron
Π	⠓⠠	03A0	Capital Greek pi
P	⠔⠠	03A1	Capital Greek rho
Σ	⠖⠠	03A3	Capital Greek sigma
T	⠗⠠	03A4	Capital Greek tau
Υ	⠘⠠	03A5	Capital Greek upsilon
Φ	⠙⠠	03A6	Capital Greek phi
X	⠚⠠	03A7	Capital Greek chi
Ψ	⠛⠠	03A8	Capital Greek psi
Ω	⠝⠠	03A9	Capital Greek omega

Note also the following:

Print	Braille	Unicode	Description
μ	⠸⠨	00B5	Micro (Greek mu)
Ω	⠠⠨⠠⠨	2126	Ohm sign (capital Greek omega)
Δ	⠠⠨⠠⠨	2206	Increment (capital Greek delta)
Π	⠠⠨⠠⠨	220F	Product (capital Greek pi)
Σ	⠠⠨⠠⠨	2211	Sum (capital Greek sigma)

Miscellaneous

Print	Braille	Unicode	Description
	⠠		Visible space
!	⠠	0021	Exclamation (factorial)
#	⠠⠠	0023	Number sign (hash)
%	⠠⠠	0025	Percent sign
&	⠠⠠	0026	Ampersand
*	⠠⠠	002A	Asterisk
,	⠠	002C	comma
-	⠠	002D	Hyphen
.	⠠	002E	Full stop (decimal point)
/	⠠⠠	002F	Solidus (slash)
:	⠠	003A	Colon
;	⠠	003B	Semicolon
?	⠠	003F	Question mark
@	⠠⠠⠠	0040	Commercial at sign
\	⠠⠠	005C	Backslash
^	⠠⠠	005E	Caret (hat, up arrow)
_	⠠⠠	005F	Low line (underscore)

Print	Braille	Unicode	Description
~	⠠⠨	007E	Tilde (swung dash)
¢	⠠⠨⠠	00A2	Cents sign
€	⠠⠨⠠	20AC	Euro sign
₣	⠠⠨⠠	20A3	French franc sign
£	⠠⠨⠠	00A3	Pound sign
₺	⠠⠨⠠	20A6	Naira sign
\$	⠠⠨⠠	0024	Dollar sign
¥	⠠⠨⠠	00A5	Yen sign
‡	⠠⠨⠠	00A6	Broken bar
¬	⠠⠨⠠	00AC	Not sign
°	⠠⠨⠠	00B0	Degree sign
†	⠠⠨⠠⠠	2020	Dagger
‡	⠠⠨⠠⠠	2021	Double dagger
...	⠠⠨⠠⠠	2026	Ellipsis
'	⠠⠨	2032	Prime sign
"	⠠⠨⠠	2033	Double prime sign
'''	⠠⠨⠠⠠	2034	Triple prime sign
Å	⠠⠨⠠⠠⠠	212B	Angstrom symbol
∀	⠠⠨⠠	2200	For all
∂	⠠⠨⠠	2202	Partial differential
∃	⠠⠨⠠	2203	There exists
∄	⠠⠨⠠⠠⠠	2204	There does not exist
∅	⠠⠨⠠	2205	Empty set
∇	⠠⠨⠠	2207	Nabla (del, inverted capital delta)
■	⠠⠨⠠⠠⠠	220E	End of proof
√	⠠⠨⠠	221A	Square root (radical) without vinculum

Print	Braille	Unicode	Description
∞	⠠⠨⠠	221E	Infinity
\sphericalangle	⠠⠨⠠	2220	Angle
\sphericalangle	⠠⠨⠠⠨⠠	2221	Measured angle
\sphericalangle	⠠⠨⠠⠨⠠	22BE	Right angle with arc
\int	⠠⠨⠠	222B	Integral
\oint	⠠⠨⠠	222E	Contour integral (closed line integral)
\therefore	⠠⠨⠠	2234	Therefore
\because	⠠⠨⠠	2235	Because (since)
$:$	⠠⠨⠠	2236	Ratio
$::$	⠠⠨⠠	2237	Proportion
\mid	⠠⠨⠠	2223	Divides
\nmid	⠠⠨⠠⠨⠠	2224	Does not divide
\parallel	⠠⠨⠠	2225	Parallel
\nparallel	⠠⠨⠠⠨⠠	2226	Not parallel
\perp	⠠⠨⠠	27C2	Perpendicular
\perp	⠠⠨⠠	22A5	Up tack (perpendicular)
\vDash	⠠⠨⠠	22A6	Assertion (is a theorem)
\nvdash	⠠⠨⠠⠨⠠	22A3	Left tack (reverse assertion)
\vDash	⠠⠨⠠	22A8	True (is valid)
\nVdash	⠠⠨⠠⠨⠠	22AC	Does not prove
\nVdash	⠠⠨⠠⠨⠠	22AD	Not true
\vDash	⠠⠨⠠	2AE4	Vertical bar double left turnstile
✓	⠠⠨⠠	2713	Check mark (tick)
⊖	⠠⠨⠠	29B5	Plimsoll sign (standard state)

Embellishments

Embellishments may be applied after a symbol. They apply to the previous "item", as defined in the Rules of Unified English Braille.

Braille	Description
⠨	Bar over previous item
⠨⠨	Line through previous item (cancellation)
⠨⠨⠨	Simple right arrow over previous item
⠨⠨⠨	Tilde over previous item
⠨⠨⠨	Hat over previous item
⠨⠨⠨⠨	Arc over previous item
⠨⠨⠨	Dot over previous item
⠨⠨⠨	Bar under previous item
⠨⠨⠨⠨	Simple right arrow under previous item
⠨⠨⠨⠨	Tilde under previous item
⠨⠨⠨⠨	Hat under previous item
⠨⠨⠨⠨	Dot under previous item

Arrows

Many arrows may be constructed in UEB. A selection is shown below.

Note that most arrows begin with the arrow indicator ⠠, or the bold arrow indicator ⠠⠠.

Print	Braille	Unicode	Description
←	⠠⠠	2190	Leftwards arrow
↑	⠠⠠	2191	Upwards arrow
→	⠠⠠	2192	Rightwards arrow
↓	⠠⠠	2193	Downwards arrow
↔	⠠⠠⠠⠠	2194	Left right arrow
↕	⠠⠠⠠⠠	2195	Up down arrow
↖	⠠⠠	2196	Northwest arrow
↗	⠠⠠	2197	Northeast arrow
↘	⠠⠠	2198	Southeast arrow
↙	⠠⠠	2199	Southwest arrow
⇐	⠠⠠⠠⠠	219A	Leftwards arrow with stroke
⇒	⠠⠠⠠⠠	219B	Rightwards arrow with stroke
↵	⠠⠠⠠⠠	219C	Leftwards wave arrow
↶	⠠⠠⠠⠠	219D	Rightwards wave arrow
⇐⇐	⠠⠠⠠⠠⠠⠠	219E	Leftwards two headed arrow
⇑⇑	⠠⠠⠠⠠⠠⠠	219F	Upwards two headed arrow
⇒⇒	⠠⠠⠠⠠⠠⠠	21A0	Rightwards two headed arrow
⇓⇓	⠠⠠⠠⠠⠠⠠	21A1	Downwards two headed arrow
⇐̄	⠠⠠⠠⠠	21A2	Leftwards arrow with tail
⇒̄	⠠⠠⠠⠠	21A3	Rightwards arrow with tail
⇐̅	⠠⠠⠠⠠	21A4	Leftwards arrow from bar
⇑̅	⠠⠠⠠⠠	21A5	Upwards arrow from bar
⇒̅	⠠⠠⠠⠠	21A6	Rightwards arrow from bar

Print	Braille	Unicode	Description
↓	⠇⠇⠇⠇	21A7	Downwards arrow from bar
↔	⠇⠇⠇⠇⠇⠇	21AD	Left right wave arrow
↔	⠇⠇⠇⠇⠇⠇	21AE	Left right arrow with stroke
↶	⠇⠇⠇⠇	21B0	Upwards arrow with tip left
↷	⠇⠇⠇⠇	21B1	Upwards arrow with tip right
↵	⠇⠇⠇⠇	21B2	Downwards arrow with tip left
↶	⠇⠇⠇⠇	21B3	Downwards arrow with tip right
↶	⠇⠇⠇⠇	21B6	Anticlockwise top semicircle arrow
↷	⠇⠇⠇⠇	21B7	Clockwise top semicircle arrow
↶	⠇⠇⠇⠇	21BC	Leftwards harpoon with barb upwards
↷	⠇⠇⠇⠇	21BD	Leftwards harpoon with barb downwards
↶	⠇⠇⠇⠇	21BE	Upwards harpoon with barb rightwards
↷	⠇⠇⠇⠇	21BF	Upwards harpoon with barb leftwards
→	⠇⠇⠇⠇	21C0	Rightwards harpoon with barb upwards
↶	⠇⠇⠇⠇	21C1	Rightwards harpoon with barb downwards
↶	⠇⠇⠇⠇	21C2	Downwards harpoon with barb rightwards
↷	⠇⠇⠇⠇	21C3	Downwards harpoon with barb leftwards
↔	⠇⠇⠇⠇⠇⠇	21C4	Rightwards arrow over leftwards arrow
↕	⠇⠇⠇⠇⠇⠇	21C5	Upwards arrow left of Downwards arrow

Print	Braille	Unicode	Description
⇒	⠠⠠⠠⠠	21CC	Rightwards harpoon over leftwards harpoon (equilibrium)
⇐	⠠⠠⠠⠠	21D0	Leftwards double arrow
⇑	⠠⠠⠠⠠	21D1	Upwards double arrow
⇒	⠠⠠⠠⠠	21D2	Rightwards double arrow
⇓	⠠⠠⠠⠠	21D3	Downwards double arrow
↔	⠠⠠⠠⠠⠠⠠	21D4	Left right double arrow
↕	⠠⠠⠠⠠⠠⠠	21D5	Up down double arrow
⇐	⠠⠠⠠⠠	21E0	Leftwards dashed arrow
⇑	⠠⠠⠠⠠	21E1	Upwards dashed arrow
⇒	⠠⠠⠠⠠	21E2	Rightwards dashed arrow
⇓	⠠⠠⠠⠠	21E3	Downwards dashed arrow
←	⠠⠠⠠⠠⠠⠠	27F5	Long leftwards arrow
→	⠠⠠⠠⠠⠠⠠	27F6	Long rightwards arrow
↔	⠠⠠⠠⠠	2942	Rightwards arrow above short leftwards arrow (equilibrium, trend to the right)
↔	⠠⠠⠠⠠	2944	Short rightwards arrow above leftwards arrow (equilibrium, trend to the left)

Note: some arrows may be brailled in more than one way so the above list is not definitive.

Shapes

The various shape indicators in UEB are:

Braille	Description
⠠	Shape indicator
⠠⠠	Filled shape indicator
⠠⠡	Shaded shape indicator
⠠⠢	Transcriber-defined shape indicator
⠠⠣⠣	Transcriber-defined solid shape indicator
⠠⠣⠣⠣	Transcriber-defined shaded shape indicator
⠠⠤	Shape terminator
⠠⠥	Superposition indicator
⠠⠦	Horizontal juxtaposition indicator
⠠⠧	Vertical juxtaposition indicator
⠠⠨	Physical enclosure indicator

Some specific shapes include:

Print	Braille	Unicode	Description
△	⠠⠣⠣	25B3	Triangle
□	⠠⠣⠣	25A1	Square
○	⠠⠣⠣	25CB	Circle
▭	⠠⠣⠣⠣	25B1	Parallelogram
▲	⠠⠣⠣⠣	25B2	Filled triangle
■	⠠⠣⠣⠣	25A0	Filled square

Braille	Description
⠠⠠⠠	7th transcriber-defined print symbol
⠠⠠⠠	1st transcriber-defined typeform word indicator
⠠⠠⠠	1st transcriber-defined typeform symbol indicator
⠠⠠⠠	1st transcriber-defined typeform passage indicator
⠠⠠⠠	1st transcriber-defined typeform terminator
⠠⠠⠠	2nd transcriber-defined typeform word indicator
⠠⠠⠠	2nd transcriber-defined typeform symbol indicator
⠠⠠⠠	2nd transcriber-defined typeform passage indicator
⠠⠠⠠	2nd transcriber-defined typeform terminator
⠠⠠⠠	3rd transcriber-defined typeform word indicator
⠠⠠⠠	3rd transcriber-defined typeform symbol indicator
⠠⠠⠠	3rd transcriber-defined typeform passage indicator
⠠⠠⠠	3rd transcriber-defined typeform terminator
⠠⠠⠠	4th transcriber-defined typeform word indicator
⠠⠠⠠	4th transcriber-defined typeform symbol indicator
⠠⠠⠠	4th transcriber-defined typeform passage indicator
⠠⠠⠠	4th transcriber-defined typeform terminator
⠠⠠⠠	5th transcriber-defined typeform word indicator
⠠⠠⠠	5th transcriber-defined typeform symbol indicator
⠠⠠⠠	5th transcriber-defined typeform passage indicator
⠠⠠⠠	5th transcriber-defined typeform terminator

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