

Mathematical Operators

Range: 2200–22FF

This file contains an excerpt from the character code tables and list of character names for *The Unicode Standard, Version 6.1*

This file may be changed at any time without notice to reflect errata or other updates to the Unicode Standard. See <http://www.unicode.org/errata/> for an up-to-date list of errata.

See <http://www.unicode.org/charts/> for access to a complete list of the latest character code charts.
See <http://www.unicode.org/charts/PDF/Unicode-6.1/> for charts showing only the characters added in Unicode 6.1.
See <http://www.unicode.org/Public/6.1.0/charts/> for a complete archived file of character code charts for Unicode 6.1.

Disclaimer

These charts are provided as the online reference to the character contents of the Unicode Standard, Version 6.1 but do not provide all the information needed to fully support individual scripts using the Unicode Standard. For a complete understanding of the use of the characters contained in this file, please consult the appropriate sections of The Unicode Standard, Version 6.1, online at <http://www.unicode.org/versions/Unicode6.1.0/>, as well as Unicode Standard Annexes #9, #11, #14, #15, #24, #29, #31, #34, #38, #41, #42, and #44, the other Unicode Technical Reports and Standards, and the Unicode Character Database, which are available online.

See <http://www.unicode.org/ucd/> and <http://www.unicode.org/reports/>

A thorough understanding of the information contained in these additional sources is required for a successful implementation.

Fonts

The shapes of the reference glyphs used in these code charts are not prescriptive. Considerable variation is to be expected in actual fonts. The particular fonts used in these charts were provided to the Unicode Consortium by a number of different font designers, who own the rights to the fonts.

See <http://www.unicode.org/charts/fonts.html> for a list.

Terms of Use

































































































































































































































































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F	 220F	 221F	 222F	 223F	 224F	 225F	 226F	 227F	 228F	 229F	 22AF	 22BF	 22CF	 22DF	 22EF	 22FF

Miscellaneous mathematical symbols

- 2200 \forall **FOR ALL**
= universal quantifier
- 2201 \complement **COMPLEMENT**
→ 0297 \complement latin letter stretched c
- 2202 ∂ **PARTIAL DIFFERENTIAL**
- 2203 \exists **THERE EXISTS**
= existential quantifier
- 2204 \nexists **THERE DOES NOT EXIST**
≡ 2203 \exists 0338 $\not\exists$
- 2205 \emptyset **EMPTY SET**
= null set
• used in linguistics to indicate a null morpheme or phonological “zero”
→ 00D8 \emptyset latin capital letter o with stroke
→ 2300 \emptyset diameter sign
- 2206 Δ **INCREMENT**
= Laplace operator
= forward difference
= symmetric difference (in set theory)
• other symbols may also be used for symmetric difference
→ 0394 Δ greek capital letter delta
→ 25B3 Δ white up-pointing triangle
- 2207 ∇ **NABLA**
= backward difference
= gradient, del
• used for Laplacian operator (written with superscript 2)
→ 25BD ∇ white down-pointing triangle

Set membership

- 2208 \in **ELEMENT OF**
- 2209 \notin **NOT AN ELEMENT OF**
≡ 2208 \in 0338 $\not\in$
- 220A ϵ **SMALL ELEMENT OF**
• originates in math pi fonts; not the straight epsilon
→ 03F5 ϵ greek lunate epsilon symbol
- 220B \ni **CONTAINS AS MEMBER**
= such that
- 220C $\not\ni$ **DOES NOT CONTAIN AS MEMBER**
≡ 220B \ni 0338 $\not\ni$
- 220D \Re **SMALL CONTAINS AS MEMBER**
→ 03F6 \Re greek reversed lunate epsilon symbol

Miscellaneous mathematical symbol

- 220E \blacksquare **END OF PROOF**
= q.e.d.
→ 2023 \blacktriangleright triangular bullet
→ 25AE \blacksquare black vertical rectangle

N-ary operators

- 220F \prod **N-ARY PRODUCT**
= product sign
→ 03A0 \prod greek capital letter pi
- 2210 \coprod **N-ARY COPRODUCT**
= coproduct sign
- 2211 \sum **N-ARY SUMMATION**
= summation sign
→ 03A3 Σ greek capital letter sigma
→ 2140 \sum double-struck n-ary summation

Operators

- 2212 $-$ **MINUS SIGN**
→ 002D $-$ hyphen-minus
→ 2796 — heavy minus sign
- 2213 \mp **MINUS-OR-PLUS SIGN**
→ 00B1 \pm plus-minus sign
- 2214 $+$ **DOT PLUS**
- 2215 $/$ **DIVISION SLASH**
• generic division operator
→ 002F $/$ solidus
→ 2044 $/$ fraction slash
→ 27CB $/$ mathematical rising diagonal
- 2216 \searrow **SET MINUS**
→ 005C \searrow reverse solidus
→ 27CD \searrow mathematical falling diagonal
→ 29F5 \searrow reverse solidus operator
- 2217 $*$ **ASTERISK OPERATOR**
→ 002A $*$ asterisk
- 2218 \circ **RING OPERATOR**
= composite function
= APL jot
→ 00B0 $^\circ$ degree sign
→ 0970 $^\circ$ devanagari abbreviation sign
→ 25E6 \bullet white bullet
→ 10B39 $^\circ$ avestan abbreviation mark
- 2219 \cdot **BULLET OPERATOR**
→ 00B7 \cdot middle dot
→ 2022 \bullet bullet
→ 2024 \cdot one dot leader
- 221A $\sqrt{}$ **SQUARE ROOT**
= radical sign
→ 2713 \checkmark check mark
- 221B $\sqrt[3]{}$ **CUBE ROOT**
→ 0606 $\sqrt[3]{}$ arabic-indic cube root
- 221C $\sqrt[4]{}$ **FOURTH ROOT**
→ 0607 $\sqrt[4]{}$ arabic-indic fourth root
- 221D \propto **PROPORTIONAL TO**
→ 03B1 \propto greek small letter alpha

Miscellaneous mathematical symbols

- 221E ∞ **INFINITY**
- 221F \angle **RIGHT ANGLE**
- 2220 \sphericalangle **ANGLE**
- 2221 \sphericalangle **MEASURED ANGLE**
- 2222 \sphericalangle **SPHERICAL ANGLE**
= angle arc

Relations

- 2223 \mid **DIVIDES**
= such that
= APL stile
→ 007C \mid vertical line
→ 01C0 \mid latin letter dental click
- 2224 \nmid **DOES NOT DIVIDE**
≡ 2223 \mid 0338 $\not\mid$
- 2225 \parallel **PARALLEL TO**
→ 01C1 \parallel latin letter lateral click
→ 2016 \parallel double vertical line
- 2226 \nparallel **NOT PARALLEL TO**
≡ 2225 \parallel 0338 $\not\parallel$

Logical and set operators

- 2227 \wedge LOGICAL AND
= wedge, conjunction
→ 22C0 \wedge n-ary logical and
→ 2303 \frown up arrowhead
- 2228 \vee LOGICAL OR
= vee, disjunction
→ 22C1 \vee n-ary logical or
→ 2304 \vee down arrowhead
- 2229 \cap INTERSECTION
= cap, hat
→ 22C2 \cap n-ary intersection
- 222A \cup UNION
= cup
→ 22C3 \cup n-ary union

Integrals

- 222B \int INTEGRAL
→ 0283 \int latin small letter esh
- 222C \iint DOUBLE INTEGRAL
≈ 222B \int 222B \int
- 222D \iiint TRIPLE INTEGRAL
→ 2A0C \iiint quadruple integral operator
≈ 222B \int 222B \int 222B \int
- 222E \oint CONTOUR INTEGRAL
→ 2A15 \oint integral around a point operator
- 222F \oiint SURFACE INTEGRAL
≈ 222E \oint 222E \oint
- 2230 \iiint VOLUME INTEGRAL
≈ 222E \oint 222E \oint 222E \oint
- 2231 $\int\limits_{\circlearrowright}$ CLOCKWISE INTEGRAL
- 2232 $\int\limits_{\circlearrowleft}$ CLOCKWISE CONTOUR INTEGRAL
- 2233 $\int\limits_{\circlearrowleft}$ ANTICLOCKWISE CONTOUR INTEGRAL
• clockwise or anticlockwise arrows do not reverse during layout mirroring

Miscellaneous mathematical symbols

- 2234 \therefore THEREFORE
→ 26EC \therefore historic site
- 2235 \because BECAUSE

Relations

- 2236 $:$ RATIO
→ 003A $:$ colon
- 2237 $::$ PROPORTION

Operator

- 2238 $\dot{-}$ DOT MINUS
= saturating subtraction
• sometimes claimed as notation for symmetric set difference, but 2206 Δ is preferred

Relation

- 2239 $\ddot{-}$ EXCESS

Operator

- 223A \doteq GEOMETRIC PROPORTION

Relations

- 223B \doteq HOMOTHETIC
→ 2A6B \doteq tilde operator with rising dots

- 223C \sim TILDE OPERATOR
= varies with (proportional to)
= difference between
= similar to
= not
= cycle
= APL tilde
→ 007E \sim tilde
→ 00AC \nrightarrow not sign
→ 02DC \smallsmile small tilde
- 223D \smile REVERSED TILDE
= lazy S
• reversed tilde and lazy S are glyph variants
- 223E \smile INVERTED LAZY S
= most positive

Miscellaneous mathematical symbol

- 223F \sim SINE WAVE
= alternating current

Operator

- 2240 \wr WREATH PRODUCT

Relations

- 2241 \napprox NOT TILDE
≈ 223C \sim 0338 $\not\sim$
- 2242 \napprox MINUS TILDE
- 2243 \approx ASYMPTOTICALLY EQUAL TO
- 2244 \napprox NOT ASYMPTOTICALLY EQUAL TO
≈ 2243 \approx 0338 $\not\approx$
- 2245 \approx APPROXIMATELY EQUAL TO
- 2246 \napprox APPROXIMATELY BUT NOT ACTUALLY EQUAL TO
- 2247 \napprox NEITHER APPROXIMATELY NOR ACTUALLY EQUAL TO
≈ 2245 \approx 0338 $\not\approx$
- 2248 \approx ALMOST EQUAL TO
= asymptotic to
- 2249 \napprox NOT ALMOST EQUAL TO
≈ 2248 \approx 0338 $\not\approx$
- 224A \approx ALMOST EQUAL OR EQUAL TO
- 224B \approx TRIPLE TILDE
- 224C \approx ALL EQUAL TO
• reversed tilde and lazy S are glyph variants
- 224D \approx EQUIVALENT TO
- 224E \approx GEOMETRICALLY EQUIVALENT TO
- 224F \approx DIFFERENCE BETWEEN
- 2250 \approx APPROACHES THE LIMIT
- 2251 \approx GEOMETRICALLY EQUAL TO
- 2252 \approx APPROXIMATELY EQUAL TO OR THE IMAGE OF
= nearly equals
- 2253 \approx IMAGE OF OR APPROXIMATELY EQUAL TO
- 2254 \approx COLON EQUALS
- 2255 \approx EQUALS COLON
- 2256 \approx RING IN EQUAL TO
- 2257 \approx RING EQUAL TO
= approximately equal to
- 2258 \approx CORRESPONDS TO
- 2259 \approx ESTIMATES
= corresponds to
- 225A \approx EQUIANGULAR TO
- 225B \approx STAR EQUALS
- 225C \approx DELTA EQUAL TO
= equiangular
= equal to by definition

225D	\equiv	EQUAL TO BY DEFINITION
225E	\equiv	MEASURED BY
225F	$\stackrel{?}{=}$	QUESTIONED EQUAL TO
2260	\neq	NOT EQUAL TO → 003D = equals sign → 01C2 ‡ latin letter alveolar click ≡ 003D = 0338 \neq
2261	\equiv	IDENTICAL TO
2262	\neq	NOT IDENTICAL TO ≡ 2261 ≡ 0338 \neq
2263	\equiv	STRICTLY EQUIVALENT TO
2264	\leq	LESS-THAN OR EQUAL TO
2265	\geq	GREATER-THAN OR EQUAL TO
2266	\leq	LESS-THAN OVER EQUAL TO
2267	\geq	GREATER-THAN OVER EQUAL TO
2268	\nless	LESS-THAN BUT NOT EQUAL TO
2269	\nless	GREATER-THAN BUT NOT EQUAL TO
226A	\ll	MUCH LESS-THAN → 00AB \ll left-pointing double angle quotation mark
226B	\gg	MUCH GREATER-THAN → 00BB \gg right-pointing double angle quotation mark
226C	\diamond	BETWEEN = plaintiff, quantic
226D	\nless	NOT EQUIVALENT TO ≡ 224D \nless 0338 \nless
226E	\nless	NOT LESS-THAN ≡ 003C < 0338 \nless
226F	\nless	NOT GREATER-THAN ≡ 003E > 0338 \nless
2270	\nless	NEITHER LESS-THAN NOR EQUAL TO ≡ 2264 \leq 0338 \nless
2271	\nless	NEITHER GREATER-THAN NOR EQUAL TO ≡ 2265 \geq 0338 \nless
2272	\leq	LESS-THAN OR EQUIVALENT TO
2273	\geq	GREATER-THAN OR EQUIVALENT TO
2274	\nless	NEITHER LESS-THAN NOR EQUIVALENT TO ≡ 2272 \leq 0338 \nless
2275	\nless	NEITHER GREATER-THAN NOR EQUIVALENT TO ≡ 2273 \geq 0338 \nless
2276	\leq	LESS-THAN OR GREATER-THAN
2277	\geq	GREATER-THAN OR LESS-THAN
2278	\nless	NEITHER LESS-THAN NOR GREATER-THAN ≡ 2276 \leq 0338 \nless
2279	\nless	NEITHER GREATER-THAN NOR LESS-THAN ≡ 2277 \geq 0338 \nless
227A	$<$	PRECEDES = lower rank than → 22B0 \prec precedes under relation
227B	$>$	SUCCEEDS = higher rank than → 22B1 \succ succeeds under relation
227C	\leq	PRECEDES OR EQUAL TO
227D	\geq	SUCCEEDS OR EQUAL TO
227E	\leq	PRECEDES OR EQUIVALENT TO
227F	\geq	SUCCEEDS OR EQUIVALENT TO
2280	\nless	DOES NOT PRECEDE ≡ 227A < 0338 \nless
2281	\nless	DOES NOT SUCCEED ≡ 227B > 0338 \nless

2282	\subset	SUBSET OF = included in set → 2E26 \subset left sideways u bracket
2283	\supset	SUPERSET OF = includes in set → 2E27 \supset right sideways u bracket
2284	$\not\subset$	NOT A SUBSET OF ≡ 2282 \subset 0338 $\not\subset$
2285	$\not\supset$	NOT A SUPERSET OF ≡ 2283 \supset 0338 $\not\supset$
2286	\subseteq	SUBSET OF OR EQUAL TO
2287	\supseteq	SUPERSET OF OR EQUAL TO
2288	$\not\subseteq$	NEITHER A SUBSET OF NOR EQUAL TO ≡ 2286 \subseteq 0338 $\not\subseteq$
2289	$\not\supseteq$	NEITHER A SUPERSET OF NOR EQUAL TO ≡ 2287 \supseteq 0338 $\not\supseteq$
228A	\subsetneq	SUBSET OF WITH NOT EQUAL TO
228B	\supsetneq	SUPERSET OF WITH NOT EQUAL TO

Operators

228C	\cup	MULTISET
228D	\cup	MULTISET MULTIPLICATION → 2A03 \cup n-ary union operator with dot → 2A40 \cap intersection with dot
228E	\cup	MULTISET UNION = z notation bag addition → 2A04 \cup n-ary union operator with plus

Relations

228F	\sqsubset	SQUARE IMAGE OF
2290	\sqsubset	SQUARE ORIGINAL OF
2291	\sqsubseteq	SQUARE IMAGE OF OR EQUAL TO
2292	\sqsupseteq	SQUARE ORIGINAL OF OR EQUAL TO

Operators

2293	\sqcap	SQUARE CAP → 2A05 \sqcap n-ary square intersection operator
2294	\sqcup	SQUARE CUP
2295	\oplus	CIRCLED PLUS = direct sum = vector pointing into page → 2A01 \oplus n-ary circled plus operator → 1F728 \oplus alchemical symbol for verdigris
2296	\ominus	CIRCLED MINUS = symmetric difference → 29B5 \ominus circle with horizontal bar → 1F714 \ominus alchemical symbol for salt
2297	\otimes	CIRCLED TIMES = tensor product = vector pointing into page → 26D2 \otimes circled crossing lanes → 2A02 \otimes n-ary circled times operator
2298	\oslash	CIRCLED DIVISION SLASH
2299	\odot	CIRCLED DOT OPERATOR = direct product = vector pointing out of page → 0298 \odot latin letter bilabial click → 2609 \odot sun → 2A00 \odot n-ary circled dot operator
229A	\odot	CIRCLED RING OPERATOR → 233E \odot apl functional symbol circle jot → 25CE \odot bullseye
229B	\otimes	CIRCLED ASTERISK OPERATOR → 235F \otimes apl functional symbol circle star
229C	\ominus	CIRCLED EQUALS

- 229D \ominus CIRCLED DASH
 229E \boxplus SQUARED PLUS
 229F \boxminus SQUARED MINUS
 22A0 \boxtimes SQUARED TIMES
 → 2612 \boxtimes ballot box with x
 → 26DD \boxtimes squared saltire
 → 1F771 \boxtimes alchemical symbol for month
 22A1 \boxdot SQUARED DOT OPERATOR
 → 1F755 \boxdot alchemical symbol for urine
 22A2 \vdash RIGHT TACK
 = turnstile
 = proves, implies, yields
 = reducible
 22A3 \dashv LEFT TACK
 = reverse turnstile
 = non-theorem, does not yield

Miscellaneous mathematical symbols

- 22A4 \top DOWN TACK
 = top
 → 2E06 \top raised interpolation marker
 → 1F768 \top alchemical symbol for crucible-4
 22A5 \perp UP TACK
 = base, bottom
 → 27C2 \perp perpendicular

Relations

- 22A6 \vdash ASSERTION
 = reduces to
 22A7 \models MODELS
 22A8 \vDash TRUE
 = statement is true, valid
 = is a tautology
 = satisfies
 = results in
 22A9 \Vdash FORCES
 22AA \Vdash TRIPLE VERTICAL BAR RIGHT TURNSTILE
 22AB \Vdash DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE
 22AC \nVdash DOES NOT PROVE
 ≡ 22A2 \vdash 0338 $\not\vdash$
 22AD \nVdash NOT TRUE
 ≡ 22A8 \vDash 0338 $\not\vDash$
 22AE \nVdash DOES NOT FORCE
 ≡ 22A9 \Vdash 0338 $\not\Vdash$
 22AF \nVdash NEGATED DOUBLE VERTICAL BAR DOUBLE RIGHT TURNSTILE
 ≡ 22AB \Vdash 0338 $\not\Vdash$
 22B0 \preceq PRECEDES UNDER RELATION
 → 227A $<$ precedes
 22B1 \succeq SUCCEEDS UNDER RELATION
 → 227B $>$ succeeds
 22B2 \triangleleft NORMAL SUBGROUP OF
 → 25C5 \triangleleft white left-pointing pointer
 22B3 \triangleright CONTAINS AS NORMAL SUBGROUP
 → 25BB \triangleright white right-pointing pointer
 22B4 \trianglelefteq NORMAL SUBGROUP OF OR EQUAL TO
 22B5 \trianglerighteq CONTAINS AS NORMAL SUBGROUP OR EQUAL TO
 22B6 \rightarrowtail ORIGINAL OF
 22B7 \twoheadrightarrow IMAGE OF
 22B8 \multimap MULTIMAP
 22B9 \dashv HERMITIAN CONJUGATE MATRIX

Operators

- 22BA \intercal INTERCALATE
 22BB \curlyvee XOR
 → 26BA \curlyvee semisextile
 22BC \curlywedge NAND
 → 2305 \curlywedge projective
 → 26BB \curlywedge quincunx
 22BD \curlyveebar NOR

Miscellaneous mathematical symbols

- 22BE \angle RIGHT ANGLE WITH ARC
 22BF \triangle RIGHT TRIANGLE

N-ary operators

- 22C0 \bigwedge N-ARY LOGICAL AND
 • also used to denote the universal quantifier
 → 2227 \bigwedge logical and
 22C1 \bigvee N-ARY LOGICAL OR
 • also used to denote the existential quantifier
 → 2228 \bigvee logical or
 22C2 \bigcap N-ARY INTERSECTION
 = z notation generalised intersection
 → 2229 \bigcap intersection
 22C3 \bigcup N-ARY UNION
 = z notation generalised union
 → 222A \bigcup union

Operators

- 22C4 \blacklozenge DIAMOND OPERATOR
 → 25C7 \blacklozenge white diamond
 → 2B29 \blacklozenge black small diamond
 22C5 \cdot DOT OPERATOR
 → 00B7 \cdot middle dot
 22C6 \star STAR OPERATOR
 • APL
 → 066D \star arabic five pointed star
 → 2605 \star black star
 → 2B50 \star white medium star
 22C7 \div DIVISION TIMES

Relation

- 22C8 \bowtie BOWTIE
 → 2445 \bowtie ocr bow tie

Operators

- 22C9 \ltimes LEFT NORMAL FACTOR SEMIDIRECT PRODUCT
 22CA \rtimes RIGHT NORMAL FACTOR SEMIDIRECT PRODUCT
 22CB \lhd LEFT SEMIDIRECT PRODUCT
 22CC \rhd RIGHT SEMIDIRECT PRODUCT
 → 2041 \rhd caret insertion point

Relation

- 22CD \Re REVERSED TILDE EQUALS

Logical operators

- 22CE \curlyvee CURLY LOGICAL OR
 22CF \curlywedge CURLY LOGICAL AND

Relations

- 22D0 \subseteq DOUBLE SUBSET
 22D1 \supseteq DOUBLE SUPERSET

Operators

- 22D2 \cap DOUBLE INTERSECTION
 22D3 \cup DOUBLE UNION

Relations

22D4	⋈	PITCHFORK = proper intersection	22FC	⊃	SMALL CONTAINS WITH VERTICAL BAR AT END OF HORIZONTAL STROKE
22D5	≡	EQUAL AND PARALLEL TO → 2317 ≡ viewdata square	22FD	⊃̄	CONTAINS WITH OVERBAR
22D6	⋈	LESS-THAN WITH DOT	22FE	⊃̄	SMALL CONTAINS WITH OVERBAR
22D7	⋈	GREATER-THAN WITH DOT	22FF	⊃̄	Z NOTATION BAG MEMBERSHIP
22D8	⋈	VERY MUCH LESS-THAN			
22D9	⋈	VERY MUCH GREATER-THAN			
22DA	⋈	LESS-THAN EQUAL TO OR GREATER-THAN			
22DB	⋈	GREATER-THAN EQUAL TO OR LESS-THAN			
22DC	⋈	EQUAL TO OR LESS-THAN			
22DD	⋈	EQUAL TO OR GREATER-THAN			
22DE	⋈	EQUAL TO OR PRECEDES			
22DF	⋈	EQUAL TO OR SUCCEEDS			
22E0	⋈	DOES NOT PRECEDE OR EQUAL ≡ 227C ≡ 0338 ⋈			
22E1	⋈	DOES NOT SUCCEED OR EQUAL ≡ 227D ≡ 0338 ⋈			
22E2	⋈	NOT SQUARE IMAGE OF OR EQUAL TO ≡ 2291 ≡ 0338 ⋈			
22E3	⋈	NOT SQUARE ORIGINAL OF OR EQUAL TO ≡ 2292 ≡ 0338 ⋈			
22E4	⋈	SQUARE IMAGE OF OR NOT EQUAL TO			
22E5	⋈	SQUARE ORIGINAL OF OR NOT EQUAL TO			
22E6	⋈	LESS-THAN BUT NOT EQUIVALENT TO			
22E7	⋈	GREATER-THAN BUT NOT EQUIVALENT TO			
22E8	⋈	PRECEDES BUT NOT EQUIVALENT TO			
22E9	⋈	SUCCEEDS BUT NOT EQUIVALENT TO			
22EA	⋈	NOT NORMAL SUBGROUP OF ≡ 22B2 ≡ 0338 ⋈			
22EB	⋈	DOES NOT CONTAIN AS NORMAL SUBGROUP ≡ 22B3 ≡ 0338 ⋈			
22EC	⋈	NOT NORMAL SUBGROUP OF OR EQUAL TO ≡ 22B4 ≡ 0338 ⋈			
22ED	⋈	DOES NOT CONTAIN AS NORMAL SUBGROUP OR EQUAL ≡ 22B5 ≡ 0338 ⋈			
22EE	⋈	VERTICAL ELLIPSIS • these four ellipses are used for matrix row/column elision → 205D ⋈ tricolon → 2026 ... horizontal ellipsis → FE19 ⋈ presentation form for vertical horizontal ellipsis			
22EF	⋈	MIDLINE HORIZONTAL ELLIPSIS			
22F0	⋈	UP RIGHT DIAGONAL ELLIPSIS			
22F1	⋈	DOWN RIGHT DIAGONAL ELLIPSIS			
22F2	⋈	ELEMENT OF WITH LONG HORIZONTAL STROKE			
22F3	⋈	ELEMENT OF WITH VERTICAL BAR AT END OF HORIZONTAL STROKE			
22F4	⋈	SMALL ELEMENT OF WITH VERTICAL BAR AT END OF HORIZONTAL STROKE			
22F5	⋈	ELEMENT OF WITH DOT ABOVE			
22F6	⋈	ELEMENT OF WITH OVERBAR			
22F7	⋈	SMALL ELEMENT OF WITH OVERBAR			
22F8	⋈	ELEMENT OF WITH UNDERBAR			
22F9	⋈	ELEMENT OF WITH TWO HORIZONTAL STROKES			
22FA	⋈	CONTAINS WITH LONG HORIZONTAL STROKE			
22FB	⋈	CONTAINS WITH VERTICAL BAR AT END OF HORIZONTAL STROKE			