

ScholaX

Michael Sharpe

January 31, 2022

In short

ScholaX has a text part and a math support part that is called with an option to `newtxmath`. The text component has many of the options and macros that are part of the `newtxtext` package, but with Times fonts replaced by TeXGyreScholaX fonts, the latter being an extension of the TeXGyreSchola fonts which in turn extended the URW rendering of *New Century Schoolbook* that was donated as open source to the Ghostscript project. The font is based on early nineteenth century “Scotch” type, whose dominant features are low contrast as compared to, say, Times and Baskerville, and a relatively tall x-height. Its revivals gained popularity because of studies indicating its readability by children leading to its adoption in many texts for that market. Now that I am approaching the age where second childhood is not uncommon, the font is looking more interesting.

Slanted and Bold Slanted styles are provided in addition to the basic Regular, Bold, Italic and Bold Italic.

Options and Macros

`scaled`, `scale`:

Rescales every font in the package. E.g.,

```
\usepackage[scaled=1.15]{scholax}
```

scales everything up by 15%.

`proportional` (`p`), `tabular`, `lining`, `osf`:

These affect the figure style used in text. The default is `tabular`, `lining`, which is appropriate for math usage, and will be used in math mode no matter how you set the text figure option. E.g., `p,osf` sets the text figure style to `proportional`, `oldstyle`, like `12345`, but in math mode, figures will always be `tabular`, `lining`.

The option `osf` has the same effect as the macro `\useosf`, which must occur in the preamble, but after loading `scholax`. A similar macro `\useproportional` makes `proportional` figures the default outside math mode.

`scosf`:

This option makes `osf` the default figure style in small cap text.

`theoremfont`:

This option makes use of a new text font family, `thfamily`, amounting to Italic with upright punctuation glyphs. (This differs from the behavior in earlier packages, which involved re-defining the meaning of `\slshape` and substituting it for `\itshape` in the definition of the plain theorem style.)

This is how the `\thfamily` looks: it is Italic but has upright punctuation symbols ;!/? etc. The figures are not changed, but should in many cases be tabular lining figures, accessed using, e.g., `\texttlf`.

There are two ways to make use of `\thfamily` for body text in theorem-like text.

- **(for `amsthm` and theorem `only`)**—add the option `theoremfont` to `scholax`, which will patch the `\th@plain` command which stores the definition of the plain theorem format, replacing `\itshape` by `\thfamily`. Then, in your document preamble, make the usual theorem specifications, like

```
\theoremstyle{plain}
\newtheorem{thm}{Theorem}[section]
etc
```

- **(for `ntheorem` `only`)** The `theoremfont` option has no effect but will cause no harm. Simply replace the theorem specifications described above for the plain theorem style with

```
\theoremstyle{plain}
\theorembodyfont{\thfamily}
\newtheorem{thm}{Theorem}[section]
etc
```

After doing this, you should get output like this:

Theorem 0.1. *This is Theorem Italic: text numbers are upright—12345; punctuation is in many cases upright (also, parens (), braces {} and brackets []). What about question marks and exclamations? Also upright! [These fit better with math mode punctuation and figures, like: for all $x \in [0, 1]$, let $f(x) := \exp(ax)$.]*

Compare this to traditional plain theorem style of the same text:

Theorem 0.1. *This is NOT Theorem Italic: text numbers are NOT upright—12345; punctuation is in many cases NOT upright (also, parens (), braces {} and brackets []). What about question marks and exclamations? Also NOT upright! [These DON'T fit better with math mode punctuation and figures, like: for all $x \in [0, 1]$, let $f(x) := \exp(ax)$.]*

`sup`s:

This makes superior figures to be used in footnote markers except in minipages. This option is prevented when using the KOMA classes, with which it may conflict. The option has no effect if you define a non-default handling of footnote markers in your preamble before loading `scholax`.

`\textosf`, `\texttosf`, `\textlfl`, `\texttlf`, `\texttsu`, `\textin`:

These macros provide ways to use other figures styles, no matter what defaults may have been set. They denote respectively proportional oldstyle, tabular oldstyle, lining, tabular lining, superiors, inferiors which render as follows.

```
\textosf{0123456789} 0123456789
\texttosf{0123456789} 0123456789
```

```

\textlf{0123456789} 0123456789
\texttlf{0123456789} 0123456789
\textsu{0123456789abc+--()} 0123456789abc+--()
\textin{0123456789} 0123456789
\textsu{1}X\textin{1} renders as  $^1X_1$ 
\textfrac[2]{19}{32} renders as  $2^{19}_{32}$  with default settings. Note also  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{3}{4}$ ,  $\frac{7}{8}$ ,  $\frac{3}{16}$ . (The optional argument to \textfrac is the integer part.)

```

The `\textfrac` constructs fractions using `\textsu` and `\textin`, raising the result to align with the text baseline. The behavior is quite configurable, there being three parameters available to control the kerns before and after the fraction solidus, and the amount to raise the resulting box. The three parameters are passed as options to `scholax`, named

```

foresolidus % default value .04em
aftsolidus  % default value -.11em
raisefrac   % default value .111em

```

(The values should always be in `em` units in order to behave correctly with respect to scaling.) If you were to change the default behavior with the option

```
raisefrac=0em
```

you would get a fraction with the denominator's baseline at the baseline of the `\textin` figures, namely `-.111em`. Those who wish the fractional part to be vertically centered with respect to lining figures should specify

```
raisefrac=.052em
```

Spacing issues

The inter-word spacing in `scholax` may be controlled by the three parameters `spacing`, `stretch`, `shrink` which reset `fontdimens` 2, 3 and 4 of the text font. The default values are `.278em`, `.139em`, `.093em`. Option `looser` increases them somewhat, and option `loosest` increases them even more.

If you want full control, the options `spacing`, `stretch`, `shrink` allow you to modify one or more of the above `fontdimens`. For example,

```
\usepackage[stretch=.18em,shrink=.11em]{scholax}
```

Using `newtxmath` as accompanying math font

The options `nc` and `ncf` to `newtxmath` both entail using math italic letters drawn from `scholax`. Option `nc` gets Greek letters from `newtxmath`, and option `ncf` gets them from (an adaptation of) `fourier` Greek. The latter are I think a better match to the `scholax` style, having lower contrast than those from `newtxmath`. Note that `scholax` and `newtxmath` are not at the same scale. You have to either scale down `scholax` by `0.93` or scale up `newtxmath` by `1.075`, or some intermediate combination. See the example preamble below.

Example preamble with math

Caution: If you have an up-to-date distribution (TeXLive or MiKTeX), then there is an important change to note in the AMS classes, making the option `noamsfonts` viable. If you plan to use the `newtxmath` package with an AMS class, be sure to enable this option, as it will save you two of your precious sixteen math families. (The equivalent symbols are already available in `newtxmath` at a weight appropriate to fonts heavier than Computer Modern.)

EXAMPLE PREAMBLE:

```
\usepackage[11pt,noamsfonts]{amsart}
\usepackage[p,osf]{scholax}
% T1 and textcomp are loaded by package. Change that here, if you want
% load sans and typewriter packages here, if needed
\usepackage{amsmath,amsthm}% must be loaded before newtxmath
% amssymb should not be loaded
\usepackage[scaled=1.075,ncf,vvarbb]{newtxmath}% need to scale up math package
% vvarbb selects the STIX version of blackboard bold. See below.
```

Usage with babel

You should normally load `babel` before loading `scholax` in order for `babel` to function as expected. For example:

```
\usepackage[greek.polutonico,english]{babel}
% the next line makes text figures proportional, oldstyle, while math uses lining figures
\usepackage[scale=.93,theoremfont,p,osf]{scholax}
\usepackage[T1]{fontenc}
\usepackage{textcomp}
\usepackage[varqu,varl]{inconsolata}
\usepackage{amsmath,amsthm}
\usepackage[ncf,vvarbb]{newtxmath}
% option ncf loads math italics from scholax, Greek from fourier
% option vvarbb gives you stix blackboard bold
%\linespread{1.05} %needed only if scholax loaded at full scale
```

Choices for blackboard bold

Unless you specify in the options a choice (one of `varbb`, `vvarbb` for your blackboard bold alphabet, `\mathbb` will use the default blackboard bold alphabet: $\mathbb{A} \dots \mathbb{Z}$, \mathbb{k} (the only lowercase letter available is \mathbb{k}), which I find unappealing because the uneven separations between boundaries makes the gray level likewise uneven. There are two macros which provide access to other alphabets:

- `\vmathbb` gives you $\mathbb{A} \dots \mathbb{Z} \mathbb{x} \mathbb{1} \mathbb{j}$ (full lowercase, \imath , \jmath , $\mathbb{1}$ borrowed from `\vvarmathbb`);
- `\vvarmathbb` gives you $\mathbb{A} \dots \mathbb{z} \mathbb{1} \mathbb{2} \mathbb{j}$ (full lowercase, digits, \imath , \jmath).

For further details, consult the `newtx` documentation.

Textcomp glyphs

	0	1	2	3	4	5	6	7	
00x	˘ 0	˘ 1	ˆ 2	˜ 3	¨ 4	˝ 5	˚ 6	ˇ 7	"0x
01x	˘ 8	˘ 9	˙ 10	˚ 11	˚ 12	, 13	14	15	
02x	16	17	„ 18	19	20	— 21	— 22	23	"1x
03x	← 24	→ 25	ˆ 26	ˆ 27	ˆ 28	ˆ 29	30	31	
04x	ƒ 32	33	34	35	\$ 36	37	38	' 39	"2x
05x	40	41	* 42	43	, 44	= 45	. 46	/ 47	
06x	o 48	1 49	2 50	3 51	4 52	5 53	6 54	7 55	"3x
07x	8 56	9 57	58	59	< 60	— 61	> 62	63	
10x	64	65	66	67	68	69	70	71	"4x
11x	72	73	74	75	76	∪ 77	78	○ 79	
12x	80	81	82	83	84	85	86	Ω 87	"5x
13x	88	89	90	∥ 91	92	∥ 93	↑ 94	↓ 95	
14x	˘ 96	97	★ 98	o 99	† 100	101	102	103	"6x
15x	104	105	106	107	∞ 108	∞ 109	♪ 110	111	
16x	112	113	114	115	116	117	118	119	"7x
17x	120	121	122	123	124	125	~ 126	= 127	
20x	˘ 128	˘ 129	˝ 130	˝ 131	† 132	‡ 133	∥ 134	‰ 135	"8x
21x	• 136	°C 137	\$ 138	¢ 139	f 140	© 141	W 142	ℱ 143	
22x	G 144	P 145	£ 146	R 147	‡ 148	‡ 149	đ 150	™ 151	"9x
23x	‰ 152	¶ 153	B 154	№ 155	‰ 156	e 157	◦ 158	SM 159	
24x	{ 160	} 161	¢ 162	£ 163	□ 164	¥ 165	¡ 166	§ 167	"Ax
25x	¨ 168	© 169	ª 170	© 171	¬ 172	© 173	® 174	˘ 175	
26x	◦ 176	± 177	² 178	³ 179	´ 180	µ 181	¶ 182	• 183	"Bx
27x	* 184	¹ 185	º 186	√ 187	¼ 188	½ 189	¾ 190	€ 191	
32x	208	209	210	211	212	213	× 214	215	"Dx
33x	216	217	218	219	220	221	222	223	
36x	240	241	242	243	244	245	÷ 246	247	"Fx
37x	ffl 248	ffi 249	ff 250	fl 251	l 252	fi 253	i 254	f 255	
	"8	"9	"A	"B	"C	"D	"E	"F	

PDF/A Compliance

This remains a work in progress—currently, this package does not generate pdfs that comply with the PDF/A-1b standard even when using the standard incantation in the preamble:

```

\pdfcompresslevel=0
\pdfgentounicode=1
\input glyphtounicode.tex
\usepackage[a-1b]{pdfx}
\InputIfFileExists{glyphtounicode-cmr.tex}{}{}
\InputIfFileExists{glyphtounicode-ntx.tex}{}{}

```

Some math samples

The following snippets mostly originated with the `TEXBook` and were adapted for `LATEX` from Karl Berry's torture test for plain tex math fonts.

$$x + y - z, \quad x + y * z, \quad z * y / z, \quad (x + y)(x - y) = x^2 - y^2,$$

$$x \times y \cdot z = [xyz], \quad x \circ y \bullet z, \quad x \cup y \cap z, \quad x \sqcup y \sqcap z,$$

$$x \vee y \wedge z, \quad x \pm y \mp z, \quad x = y / z, \quad x := y, \quad x \leq y \neq z, \quad x \sim y \simeq z \quad x \equiv y \neq z, \quad x \subset y \subseteq z$$

$$\sin 2\theta = 2 \sin \theta \cos \theta, \quad O(n \log n \log n), \quad \Pr(X > x) = \exp(-x/\mu),$$

$$(x \in A(n) \mid x \in B(n)), \quad \bigcup_n X_n \parallel \bigcap_n Y_n$$

In text matrices $\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$ and $\begin{pmatrix} a & b & c \\ 1 & m & n \end{pmatrix}$

$$a_0 + \frac{1}{a_1 + \frac{1}{a_2 + \frac{1}{a_3 + \frac{1}{a_4}}}}$$

$$\binom{p}{2} x^2 y^{p-2} - \frac{1}{1-x} \frac{1}{1-x^2} = \frac{a+1}{b} \Big/ \frac{c+1}{d}.$$

$$\sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + x}}}}}$$

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |\varphi(x + iy)|^2 = 0$$

$$\pi(n) = \sum_{m=2}^n \left[\left(\sum_{k=1}^{m-1} \lfloor (m/k) / \lceil m/k \rceil \rfloor \right)^{-1} \right].$$

$$\int_0^\infty \frac{t - ib}{t^2 + b^2} e^{iat} dt = e^{ab} E_1(ab), \quad a, b > 0.$$

$$\mathbf{A} := \begin{pmatrix} x - \lambda & 1 & 0 \\ 0 & x - \lambda & 1 \\ 0 & 0 & x - \lambda \end{pmatrix}.$$

$$\begin{pmatrix} a & b & c \\ d & e & f \end{pmatrix} \begin{pmatrix} u & x \\ v & y \\ w & z \end{pmatrix}$$

$$\mathbf{A} = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{pmatrix}$$

$$\mathbf{M} = \begin{matrix} & C & I & C' \\ C & \begin{pmatrix} 1 & 0 & 0 \\ b & 1-b & 0 \\ 0 & a & 1-a \end{pmatrix} \end{matrix}$$

$$\sum_{n=0}^{\infty} a_n z^n \quad \text{converges if} \quad |z| < \left(\limsup_{n \rightarrow \infty} \sqrt[n]{|a_n|} \right)^{-1}.$$

$$\frac{f(x + \Delta x) - f(x)}{\Delta x} \rightarrow f'(x) \quad \text{as } \Delta x \rightarrow 0.$$

$$\|u_i\| = 1, \quad u_i \cdot u_j = 0 \quad \text{if } i \neq j.$$

The confluent image of $\left\{ \begin{array}{l} \text{an arc} \\ \text{a circle} \\ \text{a fan} \end{array} \right\}$ is $\left\{ \begin{array}{l} \text{an arc} \\ \text{an arc or a circle} \\ \text{a fan or an arc} \end{array} \right\}.$

$$\begin{aligned} T(n) &\leq T(2^{\lceil \lg n \rceil}) \leq c(3^{\lceil \lg n \rceil} - 2^{\lceil \lg n \rceil}) \\ &< 3c \cdot 3^{\lg n} \\ &= 3cn^{\lg 3}. \end{aligned}$$

$$\begin{aligned} (x+y)(x-y) &= x^2 - xy + yx - y^2 \\ &= x^2 - y^2 \\ (x+y)^2 &= x^2 + 2xy + y^2. \end{aligned}$$

$$\begin{aligned} \left(\int_{-\infty}^{\infty} e^{-x^2} dx \right)^2 &= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-(x^2+y^2)} dx dy \\ &= \int_0^{2\pi} \int_0^{\infty} e^{-r^2} dr d\theta \\ &= \int_0^{2\pi} \left(e^{-\frac{r^2}{2}} \Big|_{r=0}^{r=\infty} \right) d\theta \\ &= \pi. \end{aligned}$$

$$\prod_{k \geq 0} \frac{1}{(1 - q^k z)} = \sum_{n \geq 0} z^n / \prod_{1 \leq k \leq n} (1 - q^k).$$

$$\sum_{\substack{0 < i \leq m \\ 0 < j \leq n}} p(i, j) \neq \sum_{i=1}^p \sum_{j=1}^q \sum_{k=1}^r a_{ij} b_{jk} c_{ki} \neq \sum_{\substack{1 \leq i \leq p \\ 1 \leq j \leq q \\ 1 \leq k \leq r}} a_{ij} b_{jk} c_{ki}$$

$$\max_{1 \leq n \leq m} \log_2 P_n \quad \text{and} \quad \lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$p_1(n) = \lim_{m \rightarrow \infty} \sum_{v=0}^{\infty} (1 - \cos^{2m}(v!^n \pi/n))$$

Font Tables

MATH LETTERS (OPTION nc)

	0	1	2	3	4	5	6	7	
00x	Γ_0	Δ_1	Θ_2	Λ_3	Ξ_4	Π_5	Σ_6	Υ_7	"0x
01x	Φ_8	Ψ_9	Ω_{10}	α_{11}	β_{12}	γ_{13}	δ_{14}	ϵ_{15}	
02x	ζ_{16}	η_{17}	θ_{18}	ι_{19}	κ_{20}	λ_{21}	μ_{22}	ν_{23}	"1x
03x	ξ_{24}	π_{25}	ρ_{26}	σ_{27}	τ_{28}	υ_{29}	ϕ_{30}	χ_{31}	
04x	ψ_{32}	ω_{33}	ϵ_{34}	ϑ_{35}	ϖ_{36}	ϱ_{37}	ς_{38}	φ_{39}	"2x
05x	\leftarrow_{40}	\nrightarrow_{41}	\rightarrow_{42}	\dashrightarrow_{43}	\curvearrowleft_{44}	\curvearrowright_{45}	\triangleright_{46}	\triangleleft_{47}	
06x	0 ₄₈	1 ₄₉	2 ₅₀	3 ₅₁	4 ₅₂	5 ₅₃	6 ₅₄	7 ₅₅	"3x
07x	8 ₅₆	9 ₅₇	. ₅₈	, ₅₉	< ₆₀	/ ₆₁	> ₆₂	★ ₆₃	
10x	d ₆₄	A ₆₅	B ₆₆	C ₆₇	D ₆₈	E ₆₉	F ₇₀	G ₇₁	"4x
11x	H ₇₂	I ₇₃	J ₇₄	K ₇₅	L ₇₆	M ₇₇	N ₇₈	O ₇₉	
12x	P ₈₀	Q ₈₁	R ₈₂	S ₈₃	T ₈₄	U ₈₅	V ₈₆	W ₈₇	"5x
13x	X ₈₈	Y ₈₉	Z ₉₀	b ₉₁	h ₉₂	# ₉₃	~ ₉₄	^ ₉₅	
14x	l ₉₆	a ₉₇	b ₉₈	c ₉₉	d ₁₀₀	e ₁₀₁	f ₁₀₂	g ₁₀₃	"6x
15x	h ₁₀₄	i ₁₀₅	j ₁₀₆	k ₁₀₇	l ₁₀₈	m ₁₀₉	n ₁₁₀	o ₁₁₁	
16x	p ₁₁₂	q ₁₁₃	r ₁₁₄	s ₁₁₅	t ₁₁₆	u ₁₁₇	v ₁₁₈	w ₁₁₉	"7x
17x	x ₁₂₀	y ₁₂₁	z ₁₂₂	ı ₁₂₃	j ₁₂₄	ø ₁₂₅	ˆ ₁₂₆	ˆ ₁₂₇	
20x	1 ₁₂₈	ı ₁₂₉	1 ₁₃₀	1 ₁₃₁	0 ₁₃₂	1 ₁₃₃	2 ₁₃₄	3 ₁₃₅	"8x
21x	4 ₁₃₆	5 ₁₃₇	6 ₁₃₈	7 ₁₃₉	8 ₁₄₀	9 ₁₄₁	A ₁₄₂	B ₁₄₃	
22x	C ₁₄₄	D ₁₄₅	E ₁₄₆	F ₁₄₇	G ₁₄₈	H ₁₄₉	I ₁₅₀	J ₁₅₁	"9x
23x	K ₁₅₂	L ₁₅₃	M ₁₅₄	N ₁₅₅	O ₁₅₆	P ₁₅₇	Q ₁₅₈	R ₁₅₉	
24x	S ₁₆₀	T ₁₆₁	U ₁₆₂	V ₁₆₃	W ₁₆₄	X ₁₆₅	Y ₁₆₆	Z ₁₆₇	"Ax
25x	a ₁₆₈	b ₁₆₉	c ₁₇₀	d ₁₇₁	e ₁₇₂	f ₁₇₃	g ₁₇₄	h ₁₇₅	
26x	i ₁₇₆	j ₁₇₇	k ₁₇₈	l ₁₇₉	m ₁₈₀	n ₁₈₁	o ₁₈₂	p ₁₈₃	"Bx
27x	q ₁₈₄	r ₁₈₅	s ₁₈₆	t ₁₈₇	u ₁₈₈	v ₁₈₉	w ₁₉₀	x ₁₉₁	
30x	y ₁₉₂	z ₁₉₃	ı ₁₉₄	ı ₁₉₅	A ₁₉₆	B ₁₉₇	C ₁₉₈	D ₁₉₉	"Cx
31x	E ₂₀₀	F ₂₀₁	G ₂₀₂	H ₂₀₃	I ₂₀₄	J ₂₀₅	K ₂₀₆	L ₂₀₇	
32x	M ₂₀₈	N ₂₀₉	O ₂₁₀	P ₂₁₁	Q ₂₁₂	R ₂₁₃	S ₂₁₄	T ₂₁₅	"Dx
33x	U ₂₁₆	V ₂₁₇	W ₂₁₈	X ₂₁₉	Y ₂₂₀	Z ₂₂₁	a ₂₂₂	b ₂₂₃	
34x	c ₂₂₄	d ₂₂₅	e ₂₂₆	f ₂₂₇	g ₂₂₈	h ₂₂₉	i ₂₃₀	j ₂₃₁	"Ex
35x	k ₂₃₂	l ₂₃₃	m ₂₃₄	n ₂₃₅	o ₂₃₆	p ₂₃₇	q ₂₃₈	r ₂₃₉	
36x	s ₂₄₀	t ₂₄₁	u ₂₄₂	v ₂₄₃	w ₂₄₄	x ₂₄₅	y ₂₄₆	z ₂₄₇	"Fx
37x	ı ₂₄₈	j ₂₄₉	2 ₂₅₀	2 ₂₅₁	2 ₂₅₂	2 ₂₅₃	2 ₂₅₄	2 ₂₅₅	
	"8	"9	"A	"B	"C	"D	"E	"F	

MATH LETTERSA (OPTION nc)

	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	
<i>00x</i>	Γ_0	Δ_1	Θ_2	Λ_3	Ξ_4	Π_5	Σ_6	Υ_7	"0x
<i>01x</i>	Φ_8	Ψ_9	Ω_{10}	α_{11}	β_{12}	γ_{13}	δ_{14}	ϵ_{15}	
<i>02x</i>	ζ_{16}	η_{17}	θ_{18}	ι_{19}	κ_{20}	λ_{21}	μ_{22}	ν_{23}	"1x
<i>03x</i>	ξ_{24}	π_{25}	ρ_{26}	σ_{27}	τ_{28}	υ_{29}	ϕ_{30}	χ_{31}	
<i>04x</i>	ψ_{32}	ω_{33}	ϵ_{34}	ϑ_{35}	\wp_{36}	\mathcal{Q}_{37}	ζ_{38}	φ_{39}	"2x
<i>05x</i>	40	41	42	\mathcal{O}_{43}	144	245	346	447	
<i>06x</i>	548	649	750	851	952	53	454	555	"3x
<i>07x</i>	656	757	858	959	1060	1161	{62	}63	
<i>10x</i>	δ_{64}	\mathcal{U}_{65}	\mathcal{B}_{66}	\mathcal{C}_{67}	\mathcal{D}_{68}	\mathcal{E}_{69}	\mathcal{F}_{70}	\mathcal{G}_{71}	"4x
<i>11x</i>	\mathcal{H}_{72}	\mathcal{I}_{73}	\mathcal{J}_{74}	\mathcal{K}_{75}	\mathcal{L}_{76}	\mathcal{M}_{77}	\mathcal{N}_{78}	\mathcal{O}_{79}	
<i>12x</i>	\mathcal{P}_{80}	\mathcal{Q}_{81}	\mathcal{R}_{82}	\mathcal{S}_{83}	\mathcal{T}_{84}	\mathcal{U}_{85}	\mathcal{B}_{86}	\mathcal{W}_{87}	"5x
<i>13x</i>	\mathcal{X}_{88}	\mathcal{Y}_{89}	\mathcal{Z}_{90}	\mathcal{h}_{91}	\mathcal{h}_{92}	\mathcal{l}_{93}	\mathcal{Z}_{94}	\mathcal{A}_{95}	
<i>14x</i>	\mathcal{E}_{96}	\mathcal{a}_{97}	\mathcal{b}_{98}	\mathcal{c}_{99}	\mathcal{d}_{100}	\mathcal{e}_{101}	\mathcal{f}_{102}	\mathcal{g}_{103}	"6x
<i>15x</i>	\mathcal{h}_{104}	\mathcal{i}_{105}	\mathcal{j}_{106}	\mathcal{k}_{107}	\mathcal{l}_{108}	\mathcal{m}_{109}	\mathcal{n}_{110}	\mathcal{o}_{111}	
<i>16x</i>	\mathcal{p}_{112}	\mathcal{q}_{113}	\mathcal{r}_{114}	\mathcal{s}_{115}	\mathcal{t}_{116}	\mathcal{u}_{117}	\mathcal{v}_{118}	\mathcal{w}_{119}	"7x
<i>17x</i>	\mathcal{x}_{120}	\mathcal{y}_{121}	\mathcal{z}_{122}	\mathcal{t}_{123}	\mathcal{j}_{124}	\mathcal{l}_{125}	\mathcal{j}_{126}	$\hat{\mathcal{i}}_{127}$	
<i>20x</i>	128	\mathcal{K}_{129}	130	131	\mathcal{A}_{132}	\mathcal{B}_{133}	\mathcal{C}_{134}	\mathcal{D}_{135}	"8x
<i>21x</i>	\mathcal{E}_{136}	\mathcal{F}_{137}	\mathcal{G}_{138}	\mathcal{H}_{139}	\mathcal{I}_{140}	\mathcal{J}_{141}	\mathcal{K}_{142}	\mathcal{L}_{143}	
<i>22x</i>	\mathcal{M}_{144}	\mathcal{N}_{145}	\mathcal{O}_{146}	\mathcal{P}_{147}	\mathcal{Q}_{148}	\mathcal{R}_{149}	\mathcal{S}_{150}	\mathcal{T}_{151}	"9x
<i>23x</i>	\mathcal{U}_{152}	\mathcal{V}_{153}	\mathcal{W}_{154}	\mathcal{X}_{155}	\mathcal{Y}_{156}	\mathcal{Z}_{157}	\mathcal{a}_{158}	\mathcal{b}_{159}	
<i>24x</i>	\mathcal{c}_{160}	\mathcal{d}_{161}	\mathcal{e}_{162}	\mathcal{f}_{163}	\mathcal{g}_{164}	\mathcal{h}_{165}	\mathcal{i}_{166}	\mathcal{j}_{167}	"Ax
<i>25x</i>	\mathcal{k}_{168}	\mathcal{l}_{169}	\mathcal{m}_{170}	\mathcal{n}_{171}	\mathcal{o}_{172}	\mathcal{p}_{173}	\mathcal{q}_{174}	\mathcal{r}_{175}	
<i>26x</i>	\mathcal{s}_{176}	\mathcal{t}_{177}	\mathcal{u}_{178}	\mathcal{v}_{179}	\mathcal{w}_{180}	\mathcal{x}_{181}	\mathcal{y}_{182}	\mathcal{z}_{183}	"Bx
<i>27x</i>	\mathcal{i}_{184}	\mathcal{j}_{185}	1186	\mathcal{j}_{187}	\mathcal{g}_{188}	\mathcal{y}_{189}	190	191	
<i>30x</i>	192	\mathcal{A}_{193}	\mathcal{B}_{194}	\mathcal{C}_{195}	\mathcal{D}_{196}	\mathcal{E}_{197}	\mathcal{F}_{198}	\mathcal{G}_{199}	"Cx
<i>31x</i>	\mathcal{H}_{200}	\mathcal{l}_{201}	\mathcal{J}_{202}	\mathcal{K}_{203}	\mathcal{L}_{204}	\mathcal{M}_{205}	\mathcal{N}_{206}	\mathcal{O}_{207}	
<i>32x</i>	\mathcal{P}_{208}	\mathcal{Q}_{209}	\mathcal{R}_{210}	\mathcal{S}_{211}	\mathcal{T}_{212}	\mathcal{U}_{213}	\mathcal{V}_{214}	\mathcal{W}_{215}	"Dx
<i>33x</i>	\mathcal{X}_{216}	\mathcal{Y}_{217}	\mathcal{Z}_{218}	\mathcal{T}_{219}	\mathcal{P}_{220}	\mathcal{Y}_{221}	\mathcal{P}_{222}	223	
<i>34x</i>	224	\mathcal{a}_{225}	\mathcal{b}_{226}	\mathcal{c}_{227}	\mathcal{d}_{228}	\mathcal{e}_{229}	\mathcal{f}_{230}	\mathcal{g}_{231}	"Ex
<i>35x</i>	\mathcal{h}_{232}	\mathcal{i}_{233}	\mathcal{j}_{234}	\mathcal{k}_{235}	\mathcal{l}_{236}	\mathcal{m}_{237}	\mathcal{n}_{238}	\mathcal{O}_{239}	
<i>36x</i>	\mathcal{p}_{240}	\mathcal{q}_{241}	\mathcal{r}_{242}	\mathcal{s}_{243}	\mathcal{t}_{244}	\mathcal{u}_{245}	\mathcal{v}_{246}	\mathcal{w}_{247}	"Fx
<i>37x</i>	\mathcal{x}_{248}	\mathcal{y}_{249}	\mathcal{z}_{250}	\mathcal{A}_{251}	252	253	254	255	
	"8	"9	"A	"B	"C	"D	"E	"F	

MATH LETTERS (OPTION ncf)

	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	
<i>00x</i>	Γ_0	Δ_1	Θ_2	Λ_3	Ξ_4	Π_5	Σ_6	Υ_7	"0x
<i>01x</i>	Φ_8	Ψ_9	Ω_{10}	α_{11}	β_{12}	γ_{13}	δ_{14}	ϵ_{15}	
<i>02x</i>	ζ_{16}	η_{17}	θ_{18}	ι_{19}	κ_{20}	λ_{21}	μ_{22}	ν_{23}	"1x
<i>03x</i>	ξ_{24}	π_{25}	ρ_{26}	σ_{27}	τ_{28}	υ_{29}	ϕ_{30}	χ_{31}	
<i>04x</i>	ψ_{32}	ω_{33}	ϵ_{34}	ϑ_{35}	ϖ_{36}	ϱ_{37}	ς_{38}	φ_{39}	"2x
<i>05x</i>	\leftarrow_{40}	\longleftarrow_{41}	\rightarrow_{42}	\longrightarrow_{43}	\curvearrowright_{44}	\curvearrowleft_{45}	\triangleright_{46}	\triangleleft_{47}	
<i>06x</i>	$\mathbf{0}_{48}$	$\mathbf{1}_{49}$	$\mathbf{2}_{50}$	$\mathbf{3}_{51}$	$\mathbf{4}_{52}$	$\mathbf{5}_{53}$	$\mathbf{6}_{54}$	$\mathbf{7}_{55}$	"3x
<i>07x</i>	$\mathbf{8}_{56}$	$\mathbf{9}_{57}$	$\mathbf{.}_{58}$	$\mathbf{,}_{59}$	$\mathbf{<}_{60}$	$\mathbf{/}_{61}$	$\mathbf{>}_{62}$	$\mathbf{\star}_{63}$	
<i>10x</i>	∂_{64}	A_{65}	B_{66}	C_{67}	D_{68}	E_{69}	F_{70}	G_{71}	"4x
<i>11x</i>	H_{72}	I_{73}	J_{74}	K_{75}	L_{76}	M_{77}	N_{78}	O_{79}	
<i>12x</i>	P_{80}	Q_{81}	R_{82}	S_{83}	T_{84}	U_{85}	V_{86}	W_{87}	"5x
<i>13x</i>	X_{88}	Y_{89}	Z_{90}	\flat_{91}	\natural_{92}	\sharp_{93}	\smile_{94}	\frown_{95}	
<i>14x</i>	ℓ_{96}	a_{97}	b_{98}	c_{99}	d_{100}	e_{101}	f_{102}	g_{103}	"6x
<i>15x</i>	h_{104}	i_{105}	j_{106}	k_{107}	l_{108}	m_{109}	n_{110}	o_{111}	
<i>16x</i>	p_{112}	q_{113}	r_{114}	s_{115}	t_{116}	u_{117}	v_{118}	w_{119}	"7x
<i>17x</i>	x_{120}	y_{121}	z_{122}	ι_{123}	j_{124}	\varnothing_{125}	$\vec{}_{126}$	$\hat{}_{127}$	
<i>20x</i>	$\mathbf{1}_{28}$	κ_{129}	$\mathbf{1}_{30}$	$\mathbf{1}_{31}$	$\mathbf{0}_{132}$	$\mathbf{1}_{133}$	$\mathbf{2}_{134}$	$\mathbf{3}_{135}$	"8x
<i>21x</i>	$\mathbf{4}_{136}$	$\mathbf{5}_{137}$	$\mathbf{6}_{138}$	$\mathbf{7}_{139}$	$\mathbf{8}_{140}$	$\mathbf{9}_{141}$	\mathcal{A}_{142}	\mathcal{B}_{143}	
<i>22x</i>	\mathcal{C}_{144}	\mathcal{D}_{145}	\mathcal{E}_{146}	\mathcal{F}_{147}	\mathcal{G}_{148}	\mathcal{H}_{149}	\mathcal{I}_{150}	\mathcal{J}_{151}	"9x
<i>23x</i>	\mathcal{K}_{152}	\mathcal{L}_{153}	\mathcal{M}_{154}	\mathcal{N}_{155}	\mathcal{O}_{156}	\mathcal{P}_{157}	\mathcal{Q}_{158}	\mathcal{R}_{159}	
<i>24x</i>	\mathcal{S}_{160}	\mathcal{T}_{161}	\mathcal{U}_{162}	\mathcal{V}_{163}	\mathcal{W}_{164}	\mathcal{X}_{165}	\mathcal{Y}_{166}	\mathcal{Z}_{167}	"Ax
<i>25x</i>	\mathcal{a}_{168}	\mathcal{b}_{169}	\mathcal{c}_{170}	\mathcal{d}_{171}	\mathcal{e}_{172}	\mathcal{f}_{173}	\mathcal{g}_{174}	\mathcal{h}_{175}	
<i>26x</i>	\mathcal{i}_{176}	\mathcal{j}_{177}	\mathcal{k}_{178}	\mathcal{l}_{179}	\mathcal{m}_{180}	\mathcal{n}_{181}	\mathcal{o}_{182}	\mathcal{p}_{183}	"Bx
<i>27x</i>	\mathcal{q}_{184}	\mathcal{r}_{185}	\mathcal{s}_{186}	\mathcal{t}_{187}	\mathcal{u}_{188}	\mathcal{v}_{189}	\mathcal{w}_{190}	\mathcal{x}_{191}	
<i>30x</i>	\mathcal{y}_{192}	\mathcal{z}_{193}	\mathcal{t}_{194}	\mathcal{I}_{195}	\mathcal{A}_{196}	\mathcal{B}_{197}	\mathcal{C}_{198}	\mathcal{D}_{199}	"Cx
<i>31x</i>	\mathcal{E}_{200}	\mathcal{F}_{201}	\mathcal{G}_{202}	\mathcal{H}_{203}	\mathcal{I}_{204}	\mathcal{J}_{205}	\mathcal{K}_{206}	\mathcal{L}_{207}	
<i>32x</i>	\mathcal{M}_{208}	\mathcal{N}_{209}	\mathcal{O}_{210}	\mathcal{P}_{211}	\mathcal{Q}_{212}	\mathcal{R}_{213}	\mathcal{S}_{214}	\mathcal{T}_{215}	"Dx
<i>33x</i>	\mathcal{U}_{216}	\mathcal{V}_{217}	\mathcal{W}_{218}	\mathcal{X}_{219}	\mathcal{Y}_{220}	\mathcal{Z}_{221}	\mathcal{a}_{222}	\mathcal{b}_{223}	
<i>34x</i>	\mathcal{c}_{224}	\mathcal{d}_{225}	\mathcal{e}_{226}	\mathcal{f}_{227}	\mathcal{g}_{228}	\mathcal{h}_{229}	\mathcal{i}_{230}	\mathcal{j}_{231}	"Ex
<i>35x</i>	\mathcal{k}_{232}	\mathcal{l}_{233}	\mathcal{m}_{234}	\mathcal{n}_{235}	\mathcal{o}_{236}	\mathcal{p}_{237}	\mathcal{q}_{238}	\mathcal{r}_{239}	
<i>36x</i>	\mathcal{s}_{240}	\mathcal{t}_{241}	\mathcal{u}_{242}	\mathcal{v}_{243}	\mathcal{w}_{244}	\mathcal{x}_{245}	\mathcal{y}_{246}	\mathcal{z}_{247}	"Fx
<i>37x</i>	$\mathbf{1}_{248}$	\mathbf{j}_{249}	$\mathbf{2}_{50}$	$\mathbf{2}_{51}$	$\mathbf{2}_{52}$	$\mathbf{2}_{53}$	$\mathbf{2}_{54}$	$\mathbf{2}_{55}$	
	"8	"9	"A	"B	"C	"D	"E	"F	

MATH LETTERSA (OPTION ncf)

	0	1	2	3	4	5	6	7	
00x	Γ_0	Δ_1	Θ_2	Λ_3	Ξ_4	Π_5	Σ_6	Υ_7	"0x
01x	Φ_8	Ψ_9	Ω_{10}	α_{11}	β_{12}	γ_{13}	δ_{14}	ϵ_{15}	
02x	ζ_{16}	η_{17}	θ_{18}	ι_{19}	κ_{20}	λ_{21}	μ_{22}	ν_{23}	"1x
03x	ξ_{24}	π_{25}	ρ_{26}	σ_{27}	τ_{28}	υ_{29}	ϕ_{30}	χ_{31}	
04x	ψ_{32}	ω_{33}	ϵ_{34}	ϑ_{35}	ϖ_{36}	ϱ_{37}	ς_{38}	φ_{39}	"2x
05x	40	41	42	\mathcal{O}_{43}	1 ₄₄	2 ₄₅	3 ₄₆	4 ₄₇	
06x	5 ₄₈	6 ₄₉	7 ₅₀	8 ₅₁	9 ₅₂	53	6 ₅₄	7 ₅₅	"3x
07x	€ ₅₆	ø ₅₇	:= ₅₈	=: ₅₉	≠ ₆₀	= ₆₁	{ ₆₂	} ₆₃	
10x	∂ ₆₄	ℳ ₆₅	ℬ ₆₆	ℭ ₆₇	ℰ ₆₈	ℱ ₆₉	ℊ ₇₀	ℋ ₇₁	"4x
11x	ℌ ₇₂	℩ ₇₃	ℰ ₇₄	ℱ ₇₅	ℊ ₇₆	ℋ ₇₇	ℌ ₇₈	ℭ ₇₉	
12x	ℙ ₈₀	ℚ ₈₁	ℛ ₈₂	ℜ ₈₃	℟ ₈₄	℠ ₈₅	℡ ₈₆	℣ ₈₇	"5x
13x	Å ₈₈	Ⅎ ₈₉	ℷ ₉₀	ℸ ₉₁	ℹ ₉₂	℺ ₉₃	℻ ₉₄	ℼ ₉₅	
14x	℞ ₉₆	℟ ₉₇	℠ ₉₈	℡ ₉₉	™ ₁₀₀	℣ ₁₀₁	ℤ ₁₀₂	℞ ₁₀₃	"6x
15x	ℎ ₁₀₄	℩ ₁₀₅	ℰ ₁₀₆	ℱ ₁₀₇	ℊ ₁₀₈	ℋ ₁₀₉	ℌ ₁₁₀	ℭ ₁₁₁	
16x	ℙ ₁₁₂	ℚ ₁₁₃	ℛ ₁₁₄	ℜ ₁₁₅	℟ ₁₁₆	℠ ₁₁₇	℡ ₁₁₈	℣ ₁₁₉	"7x
17x	Å ₁₂₀	Ⅎ ₁₂₁	ℷ ₁₂₂	ℸ ₁₂₃	ℹ ₁₂₄	℺ ₁₂₅	℻ ₁₂₆	ℼ ₁₂₇	
20x	128	κ ₁₂₉	130	131	A ₁₃₂	B ₁₃₃	C ₁₃₄	D ₁₃₅	"8x
21x	E ₁₃₆	F ₁₃₇	G ₁₃₈	H ₁₃₉	I ₁₄₀	J ₁₄₁	K ₁₄₂	L ₁₄₃	
22x	M ₁₄₄	N ₁₄₅	O ₁₄₆	P ₁₄₇	Q ₁₄₈	R ₁₄₉	S ₁₅₀	T ₁₅₁	"9x
23x	U ₁₅₂	V ₁₅₃	W ₁₅₄	X ₁₅₅	Y ₁₅₆	Z ₁₅₇	a ₁₅₈	b ₁₅₉	
24x	c ₁₆₀	d ₁₆₁	e ₁₆₂	f ₁₆₃	g ₁₆₄	h ₁₆₅	i ₁₆₆	j ₁₆₇	"Ax
25x	k ₁₆₈	l ₁₆₉	m ₁₇₀	n ₁₇₁	o ₁₇₂	p ₁₇₃	q ₁₇₄	r ₁₇₅	
26x	s ₁₇₆	t ₁₇₇	u ₁₇₈	v ₁₇₉	w ₁₈₀	x ₁₈₁	y ₁₈₂	z ₁₈₃	"Bx
27x	1184	J ₁₈₅	1186	J ₁₈₇	g ₁₈₈	y ₁₈₉	190	191	
30x	192	A ₁₉₃	B ₁₉₄	C ₁₉₅	D ₁₉₆	E ₁₉₇	F ₁₉₈	G ₁₉₉	"Cx
31x	H ₂₀₀	I ₂₀₁	J ₂₀₂	K ₂₀₃	L ₂₀₄	M ₂₀₅	N ₂₀₆	O ₂₀₇	
32x	P ₂₀₈	Q ₂₀₉	R ₂₁₀	S ₂₁₁	T ₂₁₂	U ₂₁₃	V ₂₁₄	W ₂₁₅	"Dx
33x	X ₂₁₆	Y ₂₁₇	Z ₂₁₈	Γ ₂₁₉	Π ₂₂₀	Υ ₂₂₁	Π ₂₂₂	223	
34x	224	a ₂₂₅	b ₂₂₆	c ₂₂₇	d ₂₂₈	e ₂₂₉	f ₂₃₀	g ₂₃₁	"Ex
35x	h ₂₃₂	i ₂₃₃	j ₂₃₄	k ₂₃₅	l ₂₃₆	m ₂₃₇	n ₂₃₈	o ₂₃₉	
36x	p ₂₄₀	q ₂₄₁	r ₂₄₂	s ₂₄₃	t ₂₄₄	u ₂₄₅	v ₂₄₆	w ₂₄₇	"Fx
37x	x ₂₄₈	y ₂₄₉	z ₂₅₀	λ ₂₅₁	252	253	254	255	
	"8	"9	"A	"B	"C	"D	"E	"F	