1. Letters.

Use a keyboard for regular Latin letters. For drawn one, you can use *doubleN* to create ℕ, *frakturN* to create 𝔑, *scriptN* to create $\mathcal{N}$. Use *double* for 𝔸, 𝔹, ℂ, 𝔻, 𝔼, 𝔽, 𝔾, ℍ, 𝕀, 𝕁, 𝕂, 𝕃, 𝕄, ℕ, 𝕆, ℙ, ℚ, ℝ, 𝕊, 𝕋, 𝕌, 𝕍, 𝕎, 𝕏, 𝕐, ℤ, 𝕒, 𝕓, 𝕔, 𝕕, 𝕖, 𝕗, 𝕘, 𝕙, 𝕚, 𝕛, 𝕜, 𝕝, 𝕞, 𝕟, 𝕠, 𝕡, 𝕢, 𝕣, 𝕤, 𝕥, 𝕦, 𝕧, 𝕨, 𝕩, 𝕪, 𝕫, *fraktur* for 𝔄, 𝔅, ℭ, 𝔇, 𝔈, 𝔉, 𝔊, ℌ, ℑ, 𝔍, 𝔎, 𝔏, 𝔐, 𝔑, 𝔒, 𝔓, 𝔔, ℜ, 𝔖, 𝔗, 𝔘, 𝔙, 𝔚, 𝔛, 𝔜, ℨ, 𝔞, 𝔟, 𝔠, 𝔡, 𝔢, 𝔣, 𝔤, 𝔥, 𝔦, 𝔧, 𝔨, 𝔩, 𝔪, 𝔫, 𝔬, 𝔭, 𝔮, 𝔯, 𝔰, 𝔱, 𝔲, 𝔳, 𝔴, 𝔵, 𝔶, 𝔷, *script* 4 $\mathcal{A},\mathcal{B},\mathcal{C},\mathcal{D},\mathcal{E},\mathcal{F},\mathcal{G},\mathcal{H},\mathcal{I},\mathcal{J},\mathcal{K},\mathcal{L},\mathcal{M},\mathcal{N},\mathcal{O},\mathcal{P},\mathcal{Q},\mathcal{R},\mathcal{S},\mathcal{T},\mathcal{U},\mathcal{V},\mathcal{W},\mathcal{X},\mathcal{Y},\mathcal{Z},\mathcal{a},\mathcal{b},\mathcal{c},\mathcal{d},\mathcal{e},\mathcal{f},\mathcal{g},\mathcal{h},\mathcal{i},\mathcal{j},\mathcal{k},\mathcal{l},\mathcal{m},\mathcal{n},\mathcal{o},\mathcal{p},\mathcal{q},\mathcal{r},\mathcal{s},\mathcal{t},\mathcal{u},\mathcal{v},\mathcal{w},\mathcal{x},\mathcal{y},\mathcal{z}$. Enclose in quotes regular text. E.g. “a”=“b” produces a = b instead of $a = b$. For the Greek alphabet, spell the name of the letter, preceded by the backslash. If the name begins with a high case letter, a high case Greek letter is inserted. The equation editor’s collection of Hebrew characters is limited to the first four. Keywords are case-sensitive (e.g., *rightarrow* is different from *Rightarrow*).

For	Type	For	Type	For	Type	For	Type	For	Type	For	Type	For	Type
d	\dd	i	\ii	$\jmath$	\jmath	ζ	\zeta	Z	\Zeta	ϖ	\varpi		
D	\Dd	$\Im$	\Im	∂	\partial	η	\eta	H	\Eta	ρ	\rho	P	\Rho
e	\ee	$\imath$	\imath	$\Re$	\Re	θ	\theta	Θ	\Theta	ϱ	\varrho		
ℓ	\ell	Jay	\j	$\wp$	\wp	ϑ	\vartheta			σ	\sigma	Σ	\Sigma
$\hbar$	\hbar	j	\jj			ι	\iota	I	\Iota	ς	\varsigma		
For	**Type**	**For**	**Type**	**For**	**Type**	κ	\kappa	K	\Kappa	τ	\tau	T	\Tau
ℵ	\aleph	α	\alpha	A	\Alpha	λ	\lambda	Λ	\Lambda	υ	\upsilon	Υ	\Upsilon
ב	\bet	β	\beta	B	\Beta	μ	\mu	M	\Mu	ϕ	\phi	Φ	\Phi
ב	\beth	γ	\gamma	Γ	\Gamma, \G	ν	\nu	N	\Nu	φ	\varphi		
ג	\gimel	δ	\delta	Δ	\Delta	ξ	\xi	Ξ	\Xi	χ	\chi	X	\Chi
ד	\dalet	ϵ	\epsilon	E	\Epsilon	o	\o	O	\O	ψ	\psi	Ψ	\Psi
ד	\daleth	ε	\varepsilon			π	\pi	Π	\Pi	ω	\omega	Ω	\Omega

2. Symbols.

	Type		Type		Type		Type		Type		Type		Type		Type		Type
!!	!!	≍	\asymp	∪	\cup	≡	\equiv	∋	\ni, \contain	⎱	\rmoust	≽	\succeq	→	->, \to, \rightarrow	⇒	\Rightarrow
...	...	∵	\because	⊣	\dashv	∃	\exists	⊙	\odot	\	\setminus	⊇	\superset	←	\gets, \leftarrow	⇐	\Leftarrow
∷	::	⊥	\bot	⋱	\ddots	∀	\forall	⊖	\ominus	∼	\sim	⊒	\superseteq	↑	\uparrow	⇑	\Uparrow
≔	:=	⋈	\bowtie	≝	\defeq	▫	\frown	⊕	\oplus	≃	\simeq	∴	\therefore	↓	\downarrow	⇓	\Downarrow
≅	~=	⊡	\boxdot	°C	\degc	♡	\heartsuit	⊗	\otimes	⌣	\smile	×	\times	↔	\leftrightarrow	⇔	\Leftrightarrow
±	+-	⊟	\boxminus	°F	\degf	∈	\in	⏞	\overbracket	♠	\spadesuit	⊤	\top	↕	\updownarrow	⇕	\Updownarrow
∓	-+	⊞	\boxplus	°	\degree	Δ	\inc	∥	\parallel	⊓	\sqcap	⏟	\underbracket	↖	\nwarrow	⟹	\Longrightarrow
≤	<=, \le	·	\bullet	≜	\Deltaeq	∞	\infty	⊥	\perp	⊔	\sqcup	▱	\underline	↗	\nearrow	⟸	\Longleftarrow
≥	>=, \ge	∩	\cap	⋄	\diamond	...	\ldots	≺	\prec	⊑	\sqsubseteq	⊎	\uplus	↙	\swarrow	⟺	\Longleftrightarrow
≪	<<	·	\cdot	♢	\diamondsuit	⊢	\left	≼	\preceq	⊒	\sqsupseteq	⊢	\vdash	↘	\searrow	↪	\hookrightarrow
≫	>>	⋯	\cdots	÷	\div	∫	\lmoust	∝	\propto	⋆	\star	⋮	\vdots	⇀	\rightharpoonup	↩	\hookleftarrow
∠	\angle	∘	\circ	≐	\doteq	⊨	\models	:	\ratio	⊂	\subset	∨	\vee	⇁	\rightharpoondown	↵	\break
≈	\approx	♣	\clubsuit	...	\dots	∇	\nabla	⋰	\rddots	⊆	\subseteq	∧	\wedge	↼	\leftharpoonup	⇋	\lrhar
∗	\ast	≅	\cong	∅	\emptyset	¬	\neg	⊣	\right	≻	\succ	≀	\wr	↽	\leftharpoondown	↦	\mapsto

Bug: The *clubsuit* symbol can be problematic.

3. Accent.

For	Type	For	Type	For	Type	For	Type	For	Type	For	Type
$\bar{x}$	x\bar	$\acute{x}$	x\acute	$\breve{x}$	x\breve	$\check{x}$	x\check	$\dot{x}$	x\dot	x'	x\prime
$\bar{\bar{x}}$	x\Bar	$\grave{x}$	x\grave	$\hat{x}$	x\hat	$\tilde{x}$	x\tilde	$\ddot{x}$	x\ddot	x''	x\pprime
$\underline{x}$	x\ubar	$\vec{x}$	x\vec	$\overrightarrow{x}$	x\tvec	$\underleftarrow{x}$	x\lvec	$\dddot{x}$	x\dddot	x'''	x\ppprime
$\underline{\underline{x}}$	x\Ubar	$\vec{x}$	x\hvec	$\vec{x}$	x\rhvec	$\underleftarrow{x}$	x\lhvec	$\ddddot{x}$	x\ddddot	x''''	x\pppprime

4. Spaces.

Because spaces have special meaning in the equation editor, and because the equation editor usually handles spacing appropriately, the spacebar cannot usually be used to add spaces within equations. However, spaces can be inserted using keywords. The *zwsp* means "zero width space". The *itimes* used for math multiplication. The *medsp* is "medium mathematical space". The *zwnj* means "zero width non-joiner".

For	$a\quad b$	$a\ b$	$a\ b$	$a\ b$	$a\ b$	$a\ b$	$a\ b$	ab	ab	ab	$a\ b$	ab
Type	\emsp	\ensp	\vthicksp	\nbsp	\thicksp	\thinsp	\hairsp	\zwsp	\itimes	\medsp	\zwnj	

Add blank space before colon to make it binary operator: **var** $x : \mathbb{N}$ vs $x < 3 : x \coloneqq 5$.

5. Superscripts, Subscripts, and Formatting.

The ^ and _ keys are used to insert superscripts and subscripts. Grouping is important because it distinguishes between F_{n^2} and F_n^2. Terms can be grouped by enclosing them in parentheses, where the parentheses themselves do not print.

For	Type	For	Type	For	Type	Comments
$x_i \times y^n$	x_i\times y^n	$\boxed{y = x + 4}$	\rect(y=x+4)	$y = x + 4$	\box(y=x+4)	Invisible box for formatting purposes.
x^{i+1}	x^(i+1)	$\underbrace{F}_{\text{force}}$	\underbrace F_"force"	$\overbrace{F}^{\text{force}}$	\overbrace F^"force"	
F_n^{k+1}	F_n^(k+1)	$\underparen{a+b}$	\underparen(a+b)	$\overparen{a+b}$	\overparen(a+b)	
$F_{n^{k+1}}$	F_(n^(k+1))	$\underline{a+b}$	\underbar(a+b)	$\overline{a+b}$	\overbar(a+b)	Also possible \overline(a+b).
${}_0^9H$	(_0^9)H			$\overshell{a+b}$	\overshell(a+b)	

6. Brackets.

The brackets are grouped to easier work. Be sure to make space following each closed bracket. The *begin* and *end* brackets are used for "invisible" grouping, as in last parameter in the nary operators (sum, product, etc.). Sometimes you need unbalanced brackets, use *open* and *close* to balance them. The last column vertical bars can be used as middle separators inside the brackets and balanced with them. Use */middle* before some symbol if you want to make it separator.

For	(	[	{	|	‖	⟨	⟨	⟦	⌈	⌊	⟦	⊢	For	∣
Type	(	[	{	|, \vert	\norm, \Vert	\bra, \langle	\bra, \langle	\lbbrack	\lceil	\lfloor	\begin	\open	Type	\mid
For	)	]	}	|	‖	⟩	⟫	⟧	⌉	⌋	⟧	⊣	For	∣
Type	)	]	}	|, \vert	\norm, \Vert	\ket, \rangle	\Rangle	\Rbrack	\rceil	\rfloor	\end	\close	Type	\vbar

The equation editor causes brackets (such as [], {} and ( )) to grow to the size of the expression within them. However, parentheses are the grouping character and will not display when used as such. To force parentheses to display, you must double them. To prevent brackets from being reformatted, precede them by the "\" character. Bug: Never try to select with a mouse the ⟨⟩ brackets.

For	Type	Comments
$\left[\frac{a}{b}\right]$ *or* $\left\{\frac{a}{b}\right\}$ *or* $\left(\frac{a}{b}\right)$	[a/b] or {a/b} or (a/b)	Parentheses display.
$\frac{a}{b+1}$	a/(b+1)	Parentheses used for grouping do not display.
$\binom{a}{b} y$	{a\atop b y\close	
$\left\|\frac{a\|b\|f}{c+d}\right\|$	|(a|b|f)/(c+d)|	The parentheses are, again, used for grouping.
$\|a\|b\left\|\frac{f}{c+d}\right\|$	|a|b|f/(c+d)|	
$y = [\frac{a}{b}]$	y=\[a/b \]	Backslashes prevent [and] from growing.
∣[	|[\zwsp\close\close	
$\{x \in \mathbb{N} \mid x < 100\}$	{x\in\doubleN\mid x<100}	
$\{x \in \mathbb{N} * x < 100\}$	{x\in\doubleN\middle*x<100}	The * will be the separator.
He said: ″Hello″.	"He said: "\zwnj\pprime "Hello"\zwnj\pprime.	Make quotes visible.

The keywords phantom and smash can be used to force brackets or parentheses to have a specific size. The symbols below are invisible.

For	⬆	⬇	↔	↕	⇔	✧	⇳
Type	\asmash	\dsmash	\hsmash	\smash	\hphantom	\phantom	\vphantom

For example:

For	Type	Comments
[ ]	[\phantom (a\atop b)]<sp>	The \phantom command creates an object as large as the expression in parentheses, but does not print it, so you can create, for example, large empty brackets.
[ ]	[\hphantom((a+b)/c)]	The \hphantom command creates an object with the width of the expression in parentheses, but zero height.
[]	[\vphantom((a+b)/c)]	The \vphantom command creates an object with the height of the expression in parentheses, but zero width.
$[\sum_{l=0}^{5} l * 2$	[\smash(\sum_(l=0)^5\of\begin l*2\end)\close	The \smash creates the object, but makes its size zero so that the enclosing bracket does not grow. Bug: Looks different on printing.

Used and fixed in this paper: http://www.iun.edu/~mathiho/useful/Equation%20Editor%20Shortcut%20Commands.pdf.

7. Division and Matrices.

For	Type	Comments
a/b	a\/b	
$\frac{a}{b}$	a/b	
a/b	a\sdiv b	
$\frac{a+b}{c+d}$	(a+b)/(c+d)	
$\frac{(a+b)}{c+d}$	((a+b))/(c+d)	The double parentheses force the single parentheses to print in the numerator.
$\frac{\frac{a+b}{c+d}+n}{f(x)+e^{1/2}}$	((a+b)/(c+d) + n)/(f(x)+e^(1\/2))	The "/" is preceded by "\" in the exponential to provide a horizontal fraction (1/2 instead of $\frac{1}{2}$).
$\frac{a}{b}$	a\atop b	
$\frac{a+b}{c+d}$	(a+b)\atop(c+d)	
$\begin{matrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \\ x_{31} & x_{32} & x_{33} \end{matrix}$	\matrix(x_11&x_12&x_13@ x_21&x_22&x23@x_31&x_32&x_33)	The matrix must be enclosed in ()'s. The & character separates columns of the matrix. The @ separates rows.
$\begin{pmatrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \\ x_{31} & x_{32} & x_{33} \end{pmatrix}$	\pmatrix(x_11&x_12&x_13@ x_21&x_22&x23@x_31&x_32&x_33)	
$\left\Vert \begin{matrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \\ x_{31} & x_{32} & x_{33} \end{matrix} \right\Vert$	\Vmatrix(x_11&x_12&x_13@ x_21&x_22&x23@x_31&x_32&x_33)	
$\begin{bmatrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \\ x_{31} & x_{32} & x_{33} \end{bmatrix}$	[\matrix(x_11&x_12&x_13@ x_21&x_22&x23@x_31&x_32&x_33)]	
$\begin{matrix} x_{11} x_{12} x_{13} \\ x_{21} x_{22} x_{23} \\ x_{31} x_{32} x_{33} \end{matrix}$	\eqarray(x_11&x_12&x_13@ x_21&x_22&x23@x_31&x_32&x_33)	
$\begin{cases} x \coloneqq 5, x < 3 \\ x \coloneqq 8, x \geq 3 \end{cases}$	\cases(x:=5,x<3@x:=8,x>=3)	
$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	\identitymatrix	

8. Roots.

For	Type	Comments
$\sqrt{x}$	\sqrt x	
$\sqrt{x+1}$	\sqrt(x+1)	
$\sqrt[3]{x+1}$	\cbrt(x+1)	
$\sqrt[4]{x+1}$	\qdrt(x+1)	
$\sqrt[n]{x}$	\sqrt(n&x)	The & separates the root order from the argument
$\sqrt[n+1]{a+b}$	\root n+1\of(a+b)	
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	\quadratic	

9. Negation.

Some math symbols can be negated. To create one, use / before it. Bug: But there is an annoying bug in the Word. Be careful with the cursor position after the negation. You are even recommended to have an extra empty page at the document end (using Ctrl-Enter) to avoid problems.

Negate	For	Type	Not	Negate	For	Type	Negate	For	Type	Not	Negate	For	Type
$=$	$\neq$	/=		$\subset$	$\not\subset$	/\subset	$\exists$	$\nexists$	/\exists		$\equiv$	$\not\equiv$	/\equiv
$<$	$\not<$	/<		$\supset$	$\not\supset$	/\superset	$\in$	$\notin$	/\in		$\prec$	$\not\prec$	/\prec
$>$	$\not>$	/>		$\subseteq$	$\not\subseteq$	/\subseteq	$\ni$	$\not\ni$	/\notcontain	/\ni	$\preccurlyeq$	$\not\preccurlyeq$	/\preceq
$\leq$	$\not\leq$	/\le	/<=	$\supseteq$	$\not\supseteq$	/\superseteq	$\cong$	$\not\cong$	/~=		$\succ$	$\not\succ$	/\succ
$\geq$	$\not\geq$	/\ge	/>=	$\sqsubseteq$	$\not\sqsubseteq$	/\sqsubseteq	$\simeq$	$\not\simeq$	/\simeq		$\succcurlyeq$	$\not\succcurlyeq$	/\succeq
$\approx$	$\not\approx$	/\approx		$\sqsupseteq$	$\not\sqsupseteq$	/\sqsupseteq	$\sim$	$\not\sim$	/\sim	/~	$\asymp$	$\not\asymp$	/\asymp

10. Products, Sums and Integrals.

There are a variety of aggregation symbols in the editor. Use subscripts and superscripts to insert the limits. Use the *\of* (or *\naryand)* for the content. Add spaces to finish the form after all the changes, if needed, and if you see the blue area for some argument, try move right to exit it.

For	Type	For	Type	For	Type	For	Type	For	Type
∑	\sum	⋃	\bigcup	⨀	\bigodot	∫	\int	∮	\oint
∏	\prod	⋂	\bigcap	⨁	\bigoplus	∬	\iint	∯	\oiint
∐	\amalg, \coprod	⨆	\bigsqcup	⨂	\bigotimes	∭	\iiint	∰	\oiiint
⋀	\bigwedge	⨄	\biguplus			⨌	\iiiint	∲	\coint
⋁	\bigvee							∳	\aouint

For example:

For	Type
$\bigwedge_i x_{1,i} \vee x_{2,i}$	\bigwedge_i\of\begin x_(1,i)\vee x_(2,i) \end
$\sum_{n=0}^{N} x^n$	\sum_(n=0)^N x^n
$\int_{-\infty}^{\infty} f(t)e^{-i\omega t}dt$	\int_-\infty^\infty f(t)e^-i\omega t dt
$\iiint f(x)dx$	\iiint f(x) dx
$\oint f(x,y)dl$	\oint f(x,y) dl
$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}$	\binomial
$\frac{1}{2\pi}\int_0^{2\pi} \frac{d\theta}{a+b\,sin\,\theta} = \frac{1}{\sqrt{a^2-b^2}}$	\integral

11. Functions.

The equation editor switches between "variable style" or "function style", depending on whether it interprets part of an equation as a variable or a function (compare the two styles in the equation $y = \sin(x)$, which would not look right if it were displayed as $y = sin(x)$). You must type a space after the function name to allow the editor to interpret it as a function. If a function is not recognized, you can force the editor to treat it as a function if you follow it with the *\funcapply* keyword. For example, sinc is not recognized as a function, but the sequence *sinc\funcapply* and double space will produce $\mathrm{sinc}\,x$ (as opposed to the less attractive $sinc\ x$). Be sure to move right to exit argument blue area.

For	Type	Comments
$\lim_{x\to 0} f(x)$	lim_(x->0) f(x)	
$\lim\limits_{x\to 0} f(x)$	lim^(x->0) f(x)	
$\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n = e$	\limit	Choose from the start to the equal sign, not including, pick professional mode, put a cursor between "l" and "i", move one left, add a space.
$\mathrm{mylim}_x\, x^2$	mylim\funcapply _x x^2	
$\underset{x}{\mathrm{mylim}}\, x^2$	mylim\funcapply \below x x^2	
$\overset{x}{\mathrm{mylim}}\, x^2$	mylim\funcapply \above x x^2	

The recognized functions are:

sin	sec	asin	asec	arcsin	arcsec	sinh	sech	asinh	asech	arcsinh	arcsech	arg	det	exp	inf	lim	min
cos	csc	acos	acsc	arccos	arccsc	cosh	csch	acosh	acsch	arccosh	arccsch	def	dim	gcd	ker	log	Pr
tan	cot	atan	acot	arctan	arccot	tanh	coth	atanh	acoth	arctanh	arccoth	deg	erf	hom	lg, ln	max	sup