Help:Displaying a formula

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"WP:MATH" and "WP:MATHS" redirect here. For the WikiProject on mathematics, see Wikipedia:WikiProject Mathematics. For Wikipedia's mathematics style manual, see Wikipedia:Manual of Style/Mathematics. For the mathematics reference desk, see Wikipedia:Reference desk/Mathematics.

This page is a how-to guide, detailing processes or procedures of some aspect or aspects of Wikipedia's norms and practices. It is not one of Wikipedia's policies or guidelines.

MediaWiki renders mathematical equations using a combination of html markup and a variant of LaTeX.

The version of LaTeX used is a subset of AMS-LaTeX markup, a superset of LaTeX markup which is in turn a superset of TeX markup, for mathematical formulae. Only a limited part of the full TeX language is supported; see below for details.[a]

By default SVG images with non-visible MathML are generated. The older PNG images can be set via user preferences.[b] On some browsers like Firefox, it is possible to use MathML for display via extensions (https://addons.mozilla.org/en-US/firefox/addon/native-mathml); see the main extension page at mw:Extension:Math for details. Client side MathJax is no longer supported.

Contents

Basics

Math markup goes inside `<math>...</math>`. Chemistry markup goes inside `<math chem>...</math>` or `<chem>...</chem>`. All these tags use TeX.

The TeX code has to be put literally: MediaWiki templates, predefined templates, and parameters cannot be used within math tags: pairs of double braces are ignored and "#" gives an error message. However, math

tags work in the then and else part of #if, etc. See m:Template:Demo of attempt to use parameters within TeX (backlinks edit (https://meta.wikimedia.org/wiki/Template:Demo_of_attempt_to_use_parameters_within_TeX?action=edit)) for more information.

The now deprecated tag `<ce>` was considered too ambiguous, and it has been replaced by `<chem>`.[1] A script will be used to replace all `<ce>` with `<chem>` [2]

LaTeX commands

LaTeX commands are case-sensitive, and take one of the following two formats:

- They start with a backslash \ and then have a name consisting of letters only. Command names are terminated by a space, a number or any other "non-letter".
- They consist of a backslash \ and exactly one non-letter.

Some commands need an argument, which has to be given between curly braces { } after the command name. Some commands support optional parameters, which are added after the command name in square brackets []. The general syntax is:

```
\commandname[option1,option2,...]{argument1}{argument2}...
```

Special characters

The following symbols are reserved characters that either have a special meaning under LaTeX or are unavailable in all the fonts. If you enter them directly in your text, they will normally not render, but rather do things you did not intend.

```
# $ % ^ & _ { } ~ \
```

These characters can be entered by adding a prefix backslash or using special sequences:

```
\# \$ \% ^\wedge \& \_ \{ \} \sim \backslash
```

yielding

$$\#\$\%\text{^}\&\_\{\}\sim\backslash.$$

The backslash character \ can *not* be entered by adding another backslash in front of it (\\); this sequence is used for line breaking. For introducing a backslash in math mode, you can use `\backslash` instead which gives $\backslash$.

The command `\tilde` produces a tilde which is placed over the next letter. For example, `\tilde{a}` gives $\tilde{a}$. To produce just a tilde character ~, use `\tilde{}` which gives $\tilde{}$, placing a ~ over an empty box. Alternatively \sim produces $\sim$, a large centred ~ which may be more appropriate in some situations.

The command `\hat` produces a hat over the next character, for example `\hat{o}` produces $\hat{o}$. For a stretchable version use `\widehat{abc}` giving $\widehat{abc}$. The wedge `\wedge` is normally used as a mathematical operator $\wedge$ the sequence `^\wedge` produces ^ the best equivalent to the ascii caret ^ character.

Spaces

"Whitespace" characters, such as blank or tab, are treated uniformly as "space" by LaTeX. Several consecutive whitespace characters are treated as one "space". See below for commands that produces spaces of different size.

LaTeX environments

Environments in LaTeX have a role that is quite similar to commands, but they usually have effect on a wider part of formula. Their syntax is:

```
\begin{environmentname}
  text to be influenced
\end{environmentname}
```

Environments supported by Wikipedia include *matrix*, *align*, etc. See below.

Rendering

By default, the PNG images are rendered black on white, with a transparent background. On darker backgrounds, the characters may show white edges. To remove these, match the PNG background color with the background color of the page using `\pagecolor`. However, black text on a dark background is hard to read and should be avoided altogether where possible.

$e^{i\pi}+1=0$	$e^{i\pi}+1=0$	$e^{i\pi}+1=0$

The colors, as well as font sizes and types, are independent of browser settings or CSS. Font sizes and types will often deviate from what HTML renders. Vertical alignment with the surrounding text can also be a problem; a work-around is described in the "Alignment with normal text flow" section below. The css selector of the images is `img.tex`.

The alt text of the PNG images, which is displayed to visually impaired and other readers who cannot see the images, and is also used when the text is selected and copied, defaults to the wikitext that produced the image, excluding the `<math>` and `</math>`. You can override this by explicitly specifying an `alt` attribute for the `math` element. For example, `<math alt="Square root of pi">\sqrt{\pi}</math>` generates an image $\sqrt{\pi}$ whose alt text is "Square root of pi". This should not be confused with the *title* attribute that produces popup text when the hovering over the PNG image, for example `<math title="pi">\pi</math>` generates an image π whose popup text is "pi".

Apart from function and operator names, as is customary in mathematics, variables and letters are in italics; digits are not. For other text, (like variable labels) to avoid being rendered in italics like variables, use `\text`, `\mbox`, or `\mathrm`. You can also define new function names using `\operatorname{...}`. For example, `\text{abc}` gives abc. `\operatorname{...}` provides spacing before and after the operator name when appropriate, as when `a\operatorname{sn}b` is rendered as $a\operatorname{sn}b$ (with space to the left and right of "sn") and `a\operatorname{sn}(b+c)` as $a\operatorname{sn}(b+c)$ (with space to the left and not to the right). LaTeX's starred version, `\operatorname*` is not supported, but a workaround is to add `\limits` instead. For example, `\operatorname{sn}_{b>c}(b+c) \qquad \operatorname{sn}\limits_{b>c}(b+c)` renders as

$$\operatorname{sn}_{b>c}(b+c) \qquad \operatorname{sn}\limits_{b>c}(b+c).$$

Latex does not have full support for Unicode characters and not all characters render. Most Latin characters with accents render correctly. However some do not, in particular those that include multiple diacritics (e.g. with Latin letters used in Vietnamese) or that cannot be precomposed into a single character (such as the uppercase Latin letter W with ring), or that use other diacritics (like the ogonek or the double grave accent, used in Central European languages like Polish, or the horn attached above some vowels in Vietnamese), or other modified letter forms (used in IPA notations, or African languages, or in medieval texts), some digram ligatures (like IJ in Dutch), or Latin letters borrowed from Greek, or small capitals, as well as superscripts and subscript letters. For example, `\text{ð}` or `\mbox{ð}`, and `\text{þ}` or `\mbox{þ}` (used in Icelandic) will give errors.

Force-rerendering of formulas

MediaWiki stores rendered formulas in a cache so that the images of those formulas do not need to be created each time the page is opened by a user. To force the rerendering of all formulas of a page, you must open it with the getter variables `action=purge&mathpurge=true`. Imagine for example there is a wrong rendered formula in the article Integral. To force the re-rendering of this formula you need to open the URL https://en.wikipedia.org/w/index.php?title=Integral&action=purge&mathpurge=true . Afterwards you need to bypass your browser cache so that the new created images of the formulas are actually downloaded. See also mw:Extension:Math#Purging pages that contain equations for more details.

TeX vs HTML

See also: Wikipedia:Rendering math

TeX markup is not the only way to produce special characters. As this comparison table shows, sometimes similar results can be achieved in HTML using Template:Math. See also Help:Special characters.

TeX syntax	TeX rendering	HTML syntax	HTML rendering
`\alpha`	α	{{math|''α''}}	α
f(x) = x^2	$f(x) = x^2$	{{math|''f''(''x'') {{=}} ''x''²}}	$f(x) = x^2$
`\sqrt{2}`	$\sqrt{2}$	{{math|{{radical|2}}}}	$\sqrt{2}$
`\sqrt{1-e^2}`	$\sqrt{1-e^2}$	{{math|{{radical|1 − ''e''²}}}}	$\sqrt{1-e^2}$

The codes on the left produce the symbols on the right, but the latter can also be put directly in the wikitext, except for '='.

HTML syntax	Rendering
α β γ δ ε ζ η θ ι κ λ μ ν ξ ο π ρ σ ς τ υ φ χ ψ ω	α β γ δ ε ζ η θ ι κ λ μ ν ξ ο π ρ σ ς τ υ φ χ ψ ω
Γ Δ Θ Λ Ξ Π Σ Φ Ψ Ω	Γ Δ Θ Λ Ξ Π Σ Φ Ψ Ω
∫ ∑ ∏ √ − ± ∞ ≈ ∝ = ≡ ≠ ≤ ≥ × · ⋅ ÷ ∂ ′ ″ ∇ ‰ ° ∴ ∅	∫ ∑ ∏ √ − ± ∞ ≈ ∝ = ≡ ≠ ≤ ≥ × · ⋅ ÷ ∂ ′ ″ ∇ ‰ ° ∴ ∅
∈ ∉ ∩ ∪ ⊂ ⊃ ⊆ ⊇ ¬ ∧ ∨ ∃ ∀ ⇒ ⇔ → ↔ ↑ ↓ ℵ - – —	∈ ∉ ∩ ∪ ⊂ ⊃ ⊆ ⊇ ¬ ∧ ∨ ∃ ∀ ⇒ ⇔ → ↔ ↑ ↓ ℵ - – —

The project has not reached a consensus on HTML and TeX because each has advantages in some situations.

Native MathML

The default MathML/SVG renderer option, selectable through My Preferences - Appearance - Math, generates hidden MathML code. This code can be used by screen readers and other assistive technology. To actually display the MathML in Firefox you can install the Native MathML (https://addons.mozilla.org/en-US/firefox/addon/native-mathml/) extension, or simply copy its CSS rules (https://github.com/fred-wang/webextension-native-mathml/blob/master/content-scripts/mediawiki.css) to your Wikipedia user stylesheet. In either case, you must have fonts that support MathML (https://developer.mozilla.org/en-US/docs/Mozilla/MathML_Project/Fonts) installed on your system. For copy-paste support also install MathML Copy (https://addons.mozilla.org/en-US/firefox/addon/mathml-copy/). Details on using MathML in other systems can be found at mw:Extension:Math.

Formatting using TeX

Functions, symbols, special characters

Accents & diacritics	
`\dot{a}, \ddot{a}, \acute{a}, \grave{a}`	$\dot{a}, \ddot{a}, \acute{a}, \grave{a}$
`\check{a}, \breve{a}, \tilde{a}, \bar{a}`	$\check{a}, \breve{a}, \tilde{a}, \bar{a}$
`\hat{a}, \widehat{a}, \vec{a}`	$\hat{a}, \widehat{a}, \vec{a}$
Standard numerical functions	
`\exp_a b = a^b, \exp b = e^b, 10^m`	$\exp_a b = a^b, \exp b = e^b, 10^m$
`\ln c, \lg d = \log e, \log_{10} f`	$\ln c, \lg d = \log e, \log_{10} f$
`\sin a, \cos b, \tan c, \cot d, \sec e, \csc f`	$\sin a, \cos b, \tan c, \cot d, \sec e, \csc f$
`\arcsin h, \arccos i, \arctan j`	$\arcsin h, \arccos i, \arctan j$
`\sinh k, \cosh l, \tanh m, \coth n`	$\sinh k, \cosh l, \tanh m, \coth n$
`\operatorname{sh}\,k, \operatorname{ch}\,l, \operatorname{th}\,m, \operatorname{coth}\,n`	$\operatorname{sh}\,k, \operatorname{ch}\,l, \operatorname{th}\,m, \operatorname{coth}\,n$
`\operatorname{argsh}\,o, \operatorname{argch}\,p, \operatorname{argth}\,q`	$\operatorname{argsh}\,o, \operatorname{argch}\,p, \operatorname{argth}\,q$
`\sgn r, \left\vert s \right\vert`	$\sgn r, \left\vert s \right\vert$
`\min(x,y), \max(x,y)`	$\min(x,y), \max(x,y)$
Bounds	
`\min x, \max y, \inf s, \sup t`	$\min x, \max y, \inf s, \sup t$
`\lim u, \liminf v, \limsup w`	$\lim u, \liminf v, \limsup w$
`\dim p, \deg q, \det m, \ker\phi`	$\dim p, \deg q, \det m, \ker\phi$
Projections	
`\Pr j, \hom l, \lVert z \rVert, \arg z`	$\Pr j, \hom l, \lVert z \rVert, \arg z$
Differentials and derivatives	
`dt, \operatorname{d}\!t, \partial t, \nabla\psi`	$dt, \operatorname{d}\!t, \partial t, \nabla\psi$
`dy/dx, \operatorname{d}\!y/\operatorname{d}\!x, {dy \over dx}, {\operatorname{d}\!y\over\operatorname{d}\!x}, {\partial^2\over\partial x_1\partial x_2}y`	$dy/dx, \operatorname{d}\!y/\operatorname{d}\!x, \frac{dy}{dx}, \frac{\operatorname{d}\!y}{\operatorname{d}\!x}, \frac{\partial^2}{\partial x_1\partial x_2}y$
`\prime, \backprime, f^\prime, f', f'', f^{(3)}, \dot y, \ddot y`	$\prime, \backprime, f^\prime, f', f'', f^{(3)}, \dot y, \ddot y$
Letter-like symbols or constants	
`\infty, \aleph, \complement, \backepsilon, \eth, \Finv, \hbar`	$\infty, \aleph, \complement, \backepsilon, \eth, \Finv, \hbar$
`\Im, \imath, \jmath, \Bbbk, \ell, \mho, \wp, \Re, \circledS`	$\Im, \imath, \jmath, \Bbbk, \ell, \mho, \wp, \Re, \circledS$
Modular arithmetic	
`s_k \equiv 0 \pmod{m}`	$s_k \equiv 0 \pmod{m}$
`a\,\bmod\,b`	$a\,\bmod\,b$
`\gcd(m, n), \operatorname{lcm}(m, n)`	$\gcd(m, n), \operatorname{lcm}(m, n)$
`\mid, \nmid, \shortmid, \nshortmid`	$\mid, \nmid, \shortmid, \nshortmid$

Radicals

`\surd, \sqrt{2}, \sqrt[n]{}, \sqrt[3]{x^3+y^3 \over 2}`	$\surd, \sqrt{2}, \sqrt[n]{}, \sqrt[3]{x^3+y^3 \over 2}$

Operators

`+, -, \pm, \mp, \dotplus`	$+, -, \pm, \mp, \dotplus$
`\times, \div, \divideontimes, /, \backslash`	$\times, \div, \divideontimes, /, \backslash$
`\cdot, * \ast, \star, \circ, \bullet`	$\cdot, * \ast, \star, \circ, \bullet$
`\boxplus, \boxminus, \boxtimes, \boxdot`	$\boxplus, \boxminus, \boxtimes, \boxdot$
`\oplus, \ominus, \otimes, \oslash, \odot`	$\oplus, \ominus, \otimes, \oslash, \odot$
`\circleddash, \circledcirc, \circledast`	$\circleddash, \circledcirc, \circledast$
`\bigoplus, \bigotimes, \bigodot`	$\bigoplus, \bigotimes, \bigodot$

Sets

`\{ \}, \O \empty \emptyset, \varnothing`	$\{ \}, \O \empty \emptyset, \varnothing$
`\in, \notin \not\in, \ni, \not\ni`	$\in, \notin \not\in, \ni, \not\ni$
`\cap, \Cap, \sqcap, \bigcap`	$\cap, \Cap, \sqcap, \bigcap$
`\cup, \Cup, \sqcup, \bigcup, \bigsqcup, \uplus, \biguplus`	$\cup, \Cup, \sqcup, \bigcup, \bigsqcup, \uplus, \biguplus$
`\setminus, \smallsetminus, \times`	$\setminus, \smallsetminus, \times$
`\subset, \Subset, \sqsubset`	$\subset, \Subset, \sqsubset$
`\supset, \Supset, \sqsupset`	$\supset, \Supset, \sqsupset$
`\subseteq, \nsubseteq, \subsetneq, \varsubsetneq, \sqsubseteq`	$\subseteq, \nsubseteq, \subsetneq, \varsubsetneq, \sqsubseteq$
`\supseteq, \nsupseteq, \supsetneq, \varsupsetneq, \sqsupseteq`	$\supseteq, \nsupseteq, \supsetneq, \varsupsetneq, \sqsupseteq$
`\subseteqq, \nsubseteqq, \subsetneqq, \varsubsetneqq`	$\subseteqq, \nsubseteqq, \subsetneqq, \varsubsetneqq$
`\supseteqq, \nsupseteqq, \supsetneqq, \varsupsetneqq`	$\supseteqq, \nsupseteqq, \supsetneqq, \varsupsetneqq$

Relations

`=, \ne, \neq, \equiv, \not\equiv`	$=, \ne, \neq, \equiv, \not\equiv$
`\doteq, \doteqdot, \overset{\underset{\mathrm{def}}{}}{=}, :=`	$\doteq, \doteqdot, \overset{\underset{\mathrm{def}}{}}{=}, :=$
`\sim, \nsim, \backsim, \thicksim, \simeq, \backsimeq, \eqsim, \cong, \ncong`	$\sim, \nsim, \backsim, \thicksim, \simeq, \backsimeq, \eqsim, \cong, \ncong$
`\approx, \thickapprox, \approxeq, \asymp, \propto, \varpropto`	$\approx, \thickapprox, \approxeq, \asymp, \propto, \varpropto$
`<, \nless, \ll, \not\ll, \lll, \not\lll, \lessdot`	$<, \nless, \ll, \not\ll, \lll, \not\lll, \lessdot$
`>, \ngtr, \gg, \not\gg, \ggg, \not\ggg, \gtrdot`	$>, \ngtr, \gg, \not\gg, \ggg, \not\ggg, \gtrdot$
`\le, \leq, \lneq, \leqq, \nleq, \nleqq, \lneqq, \lvertneqq`	$\le, \leq, \lneq, \leqq, \nleq, \nleqq, \lneqq, \lvertneqq$
`\ge, \geq, \gneq, \geqq, \ngeq, \ngeqq, \gneqq, \gvertneqq`	$\ge, \geq, \gneq, \geqq, \ngeq, \ngeqq, \gneqq, \gvertneqq$
`\lessgtr, \lesseqgtr, \lesseqqgtr, \gtrless, \gtreqless, \gtreqqless`	$\lessgtr, \lesseqgtr, \lesseqqgtr, \gtrless, \gtreqless, \gtreqqless$
`\leqslant, \nleqslant, \eqslantless`	$\leqslant, \nleqslant, \eqslantless$

\geqslant, \ngeqslant, \eqslantgtr	$\geqslant, \ngeqslant, \eqslantgtr$
\lesssim, \lnsim, \lessapprox, \lnapprox	$\lesssim, \lnsim, \lessapprox, \lnapprox$
\gtrsim, \gnsim, \gtrapprox, \gnapprox	$\gtrsim, \gnsim, \gtrapprox, \gnapprox$
\prec, \nprec, \preceq, \npreceq, \precneqq	$\prec, \nprec, \preceq, \npreceq, \precneqq$
\succ, \nsucc, \succeq, \nsucceq, \succneqq	$\succ, \nsucc, \succeq, \nsucceq, \succneqq$
\preccurlyeq, \curlyeqprec	$\preccurlyeq, \curlyeqprec$
\succcurlyeq, \curlyeqsucc	$\succcurlyeq, \curlyeqsucc$
\precsim, \precnsim, \precapprox, \precnapprox	$\precsim, \precnsim, \precapprox, \precnapprox$
\succsim, \succnsim, \succapprox, \succnapprox	$\succsim, \succnsim, \succapprox, \succnapprox$

Geometric

\parallel, \nparallel, \shortparallel, \nshortparallel	$\parallel, \nparallel, \shortparallel, \nshortparallel$
\perp, \angle, \sphericalangle, \measuredangle, 45^\circ	$\perp, \angle, \sphericalangle, \measuredangle, 45^\circ$
\Box, \blacksquare, \diamond, \Diamond \lozenge, \blacklozenge, \bigstar	$\Box, \blacksquare, \diamond, \Diamond \lozenge, \blacklozenge, \bigstar$
\bigcirc, \triangle, \bigtriangleup, \bigtriangledown	$\bigcirc, \triangle, \bigtriangleup, \bigtriangledown$
\vartriangle, \triangledown	$\vartriangle, \triangledown$
\blacktriangle, \blacktriangledown, \blacktriangleleft, \blacktriangleright	$\blacktriangle, \blacktriangledown, \blacktriangleleft, \blacktriangleright$

Logic

\forall, \exists, \nexists	$\forall, \exists, \nexists$
\therefore, \because, \And	$\therefore, \because, \And$
\or \lor \vee, \curlyvee, \bigvee	$\or \lor \vee, \curlyvee, \bigvee$
\and \land \wedge, \curlywedge, \bigwedge	$\and \land \wedge, \curlywedge, \bigwedge$
\bar{q}, \bar{abc}, \overline{q}, \overline{abc},	$\bar{q}, \bar{abc}, \overline{q}, \overline{abc},$
\lnot \neg, \not\operatorname{R}, \bot, \top	$\lnot \neg, \not\operatorname{R}, \bot, \top$
\vdash \dashv, \vDash, \Vdash, \models	$\vdash \dashv, \vDash, \Vdash, \models$
\Vvdash \nvdash \nVdash \nvDash \nVDash	$\Vvdash \nvdash \nVdash \nvDash \nVDash$
\ulcorner \urcorner \llcorner \lrcorner	$\ulcorner \urcorner \llcorner \lrcorner$

Arrows

\Rrightarrow, \Lleftarrow	$\Rrightarrow, \Lleftarrow$
\Rightarrow, \nRightarrow, \Longrightarrow \implies	$\Rightarrow, \nRightarrow, \Longrightarrow \implies$
\Leftarrow, \nLeftarrow, \Longleftarrow	$\Leftarrow, \nLeftarrow, \Longleftarrow$
\Leftrightarrow, \nLeftrightarrow, \Longleftrightarrow \iff	$\Leftrightarrow, \nLeftrightarrow, \Longleftrightarrow \iff$
\Uparrow, \Downarrow, \Updownarrow	$\Uparrow, \Downarrow, \Updownarrow$
\rightarrow \to, \nrightarrow, \longrightarrow	$\rightarrow \to, \nrightarrow, \longrightarrow$
\leftarrow \gets, \nleftarrow, \longleftarrow	$\leftarrow \gets, \nleftarrow, \longleftarrow$
\leftrightarrow, \nleftrightarrow, \longleftrightarrow	$\leftrightarrow, \nleftrightarrow, \longleftrightarrow$
\uparrow, \downarrow, \updownarrow	$\uparrow, \downarrow, \updownarrow$
\nearrow, \swarrow, \nwarrow, \searrow	$\nearrow, \swarrow, \nwarrow, \searrow$

`\mapsto, \longmapsto`	$\mapsto, \longmapsto$
`\rightharpoonup \rightharpoondown \leftharpoonup \leftharpoondown \upharpoonleft \upharpoonright \downharpoonleft \downharpoonright \rightleftharpoons \leftrightharpoons`	$\rightharpoonup \rightharpoondown \leftharpoonup \leftharpoondown \upharpoonleft \upharpoonright \downharpoonleft \downharpoonright \rightleftharpoons \leftrightharpoons$
`\curvearrowleft \circlearrowleft \Lsh \upuparrows \rightrightarrows \rightleftarrows \rightarrowtail \looparrowright`	$\curvearrowleft \circlearrowleft \Lsh \upuparrows \rightrightarrows \rightleftarrows \rightarrowtail \looparrowright$
`\curvearrowright \circlearrowright \Rsh \downdownarrows \leftleftarrows \leftrightarrows \leftarrowtail \looparrowleft`	$\curvearrowright \circlearrowright \Rsh \downdownarrows \leftleftarrows \leftrightarrows \leftarrowtail \looparrowleft$
`\hookrightarrow \hookleftarrow \multimap \leftrightsquigarrow \rightsquigarrow \twoheadrightarrow \twoheadleftarrow`	$\hookrightarrow \hookleftarrow \multimap \leftrightsquigarrow \rightsquigarrow \twoheadrightarrow \twoheadleftarrow$
Special	
`\amalg \P \S \% \dagger \ddagger \ldots \cdots`	$\amalg \P \S \% \dagger \ddagger \ldots \cdots$
`\smile \frown \wr \triangleleft \triangleright`	$\smile \frown \wr \triangleleft \triangleright$
`\diamondsuit, \heartsuit, \clubsuit, \spadesuit, \Game, \flat, \natural, \sharp`	$\diamondsuit, \heartsuit, \clubsuit, \spadesuit, \Game, \flat, \natural, \sharp$
Unsorted (new stuff)	
`\diagup \diagdown \centerdot \ltimes \rtimes \leftthreetimes \rightthreetimes`	$\diagup \diagdown \centerdot \ltimes \rtimes \leftthreetimes \rightthreetimes$
`\eqcirc \circeq \triangleq \bumpeq \Bumpeq \doteqdot \risingdotseq \fallingdotseq`	$\eqcirc \circeq \triangleq \bumpeq \Bumpeq \doteqdot \risingdotseq \fallingdotseq$
`\intercal \barwedge \veebar \doublebarwedge \between \pitchfork`	$\intercal \barwedge \veebar \doublebarwedge \between \pitchfork$
`\vartriangleleft \ntriangleleft \vartriangleright \ntriangleright`	$\vartriangleleft \ntriangleleft \vartriangleright \ntriangleright$
`\trianglelefteq \ntrianglelefteq \trianglerighteq \ntrianglerighteq`	$\trianglelefteq \ntrianglelefteq \trianglerighteq \ntrianglerighteq$

For a little more semantics on these symbols, see the brief TeX Cookbook (https://web.archive.org/web/20160305074303/https://www.math.upenn.edu/tex-stuff/cookbook.pdf).

Larger expressions

Subscripts, superscripts, integrals

Feature	Syntax	How it looks rendered
Superscript	`a^2`	a^2
Subscript	`a_2`	a_2
Grouping	`10^{30} a^{2+2}`	$10^{30}a^{2+2}$
	`a_{i,j} b_{f'}`	$a_{i,j}b_{f'}$
Combining sub & super without and with horizontal separation	`x_2^3`	x_2^3
	`{x_2}^3`	${x_2}^3$
Super super	`10^{10^{8}}`	10^{10^8}
Preceding and/or additional sub & super	`\sideset{_1^2}{_3^4}\prod_a^b`	$\sideset{_1^2}{_3^4}\prod_a^b$
	`{}_1^2\!\Omega_3^4`	${}_1^2\!\Omega_3^4$
Stacking	`\overset{\alpha}{\omega}`	$\overset{\alpha}{\omega}$
	`\underset{\alpha}{\omega}`	$\underset{\alpha}{\omega}$
	`\overset{\alpha}{\underset{\gamma}{\omega}}`	$\overset{\alpha}{\underset{\gamma}{\omega}}$
	`\stackrel{\alpha}{\omega}`	$\stackrel{\alpha}{\omega}$
Derivatives	`x', y'', f', f''`	x', y'', f', f''
	`x^\prime, y^{\prime\prime}`	$x^\prime, y^{\prime\prime}$
Derivative dots	`\dot{x}, \ddot{x}`	$\dot{x}, \ddot{x}$
Underlines, overlines, vectors	`\hat a \ \bar b \ \vec c`	$\hat a \ \bar b \ \vec c$
	`\overrightarrow{a b} \ \overleftarrow{c d} \ \widehat{d e f}`	$\overrightarrow{ab} \ \overleftarrow{cd} \ \widehat{def}$
	`\overline{g h i} \ \underline{j k l}`	$\overline{ghi} \ \underline{jkl}$
Arc (workaround)	`\overset{\frown} {AB}`	$\overset{\frown}{AB}$
Arrows	`A \xleftarrow{n+\mu-1} B \xrightarrow[T]{n\pm i-1} C`	$A \xleftarrow{n+\mu-1} B \xrightarrow[T]{n\pm i-1} C$
Overbraces	`\overbrace{ 1+2+\cdots+100 }^{5050}`	$\overbrace{1+2+\cdots+100}^{5050}$
Underbraces	`\underbrace{ a+b+\cdots+z }_{26}`	$\underbrace{a+b+\cdots+z}_{26}$
Sum	`\sum_{k=1}^N k^2`	$\sum_{k=1}^N k^2$
Sum (force `\textstyle`)	`\textstyle \sum_{k=1}^N k^2`	$\textstyle \sum_{k=1}^N k^2$
Sum in a fraction (default `\textstyle`)	`\frac{\sum_{k=1}^N k^2}{a}`	$\frac{\sum_{k=1}^N k^2}{a}$
Sum in a fraction (force `\displaystyle`)	`\frac{\displaystyle \sum_{k=1}^N k^2}{a}`	$\frac{\displaystyle \sum_{k=1}^N k^2}{a}$
Sum in a fraction (alternative limits style)	`\frac{\sum\limits^{^N}_{k=1} k^2}{a}`	$\frac{\sum\limits^{^N}_{k=1} k^2}{a}$

Product	`\prod_{i=1}^N x_i`	$\prod_{i=1}^N x_i$
Product (force `\textstyle`)	`\textstyle \prod_{i=1}^N x_i`	$\textstyle \prod_{i=1}^N x_i$
Coproduct	`\coprod_{i=1}^N x_i`	$\coprod_{i=1}^N x_i$
Coproduct (force `\textstyle`)	`\textstyle \coprod_{i=1}^N x_i`	$\textstyle \coprod_{i=1}^N x_i$
Limit	`\lim_{n \to \infty}x_n`	$\lim_{n \to \infty} x_n$
Limit (force `\textstyle`)	`\textstyle \lim_{n \to \infty}x_n`	$\textstyle \lim_{n \to \infty} x_n$
Integral	`\int\limits_{1}^{3}\frac{e^3/x}{x^2}\, dx`	$\int\limits_{1}^{3}\frac{e^3/x}{x^2}\, dx$
Integral (alternative limits style)	`\int_{1}^{3}\frac{e^3/x}{x^2}\, dx`	$\int_{1}^{3}\frac{e^3/x}{x^2}\, dx$
Integral (force `\textstyle`)	`\textstyle \int\limits_{-N}^{N} e^x\, dx`	$\textstyle \int\limits_{-N}^{N} e^x\, dx$
Integral (force `\textstyle`, alternative limits style)	`\textstyle \int_{-N}^{N} e^x\, dx`	$\textstyle \int_{-N}^{N} e^x\, dx$
Double integral	`\iint\limits_D \, dx\,dy`	$\iint\limits_D \, dx\,dy$
Triple integral	`\iiint\limits_E \, dx\,dy\,dz`	$\iiint\limits_E \, dx\,dy\,dz$
Quadruple integral	`\iiiint\limits_F \, dx\,dy\,dz\,dt`	$\iiiint\limits_F \, dx\,dy\,dz\,dt$
Line or path integral	`\int_{(x,y)\in C} x^3\, dx + 4y^2\, dy`	$\int_{(x,y)\in C} x^3\, dx + 4y^2\, dy$
Closed line or path integral	`\oint_{(x,y)\in C} x^3\, dx + 4y^2\, dy`	$\oint_{(x,y)\in C} x^3\, dx + 4y^2\, dy$
Intersections	`\bigcap_{i=1}^n E_i`	$\bigcap_{i=1}^n E_i$
Unions	`\bigcup_{i=1}^n E_i`	$\bigcup_{i=1}^n E_i$

Display attribute

The `<math>` tag can take a `display` attribute with possible values of `inline` and `block`.

Inline

If the value of the display attribute is inline, the contents will be rendered in inline mode; i.e., there will be no new paragraph for the equation and the operators will be rendered to consume only a small amount of vertical space.

Example

The sum $\sum_{i=0}^{\infty} 2^{-i}$ converges to 2.

The next line-width is not disturbed by large operators.

The code for the math example reads:

```
<math display="inline">\sum_{i=0}^\infty 2^{-i}</math>
```

Technical implementation

Technically the command *\textstyle* will be added to the user input before the tex command is passed to the renderer. The result will be displayed without further formatting by outputting the image or MathMLelement to the page.

Block

In block-style the equation is rendered in its own paragraph and the operators are rendered consuming less horizontal space.

This screenshot shows the formula $E = mc^2$ being edited using VisualEditor. The visual editor shows a button that allows to choose one of three offered modes to display a formula.

Example

The equation

$$\textbf{geometric series:}\quad \sum_{i=0}^{\infty} 2^{-i} = 2$$

It was entered as

```
<math display="block">\text{geometric series:}\quad \sum_{i=0}^\infty 2^{-i}=2 </math>
```

Technical implementation

Technically it will add the command *\displaystyle* will be added to the user input, if the user input does not contain the string *\displaystyle* or *\align* before the tex command is passed to the renderer. The result will be displayed in a new paragraph. Therefore, the style of the MathImage is altered i.e. the style attribute "display:block;margin:auto" is added. For MathML it is ensured that display=inline is replaced by display block which produces a new paragraph

Not specified

If nothing is specified the current behavior is preserved. That means all equations are rendered in display style but not using a new paragraph.

Example

The sum $\displaystyle\sum_{i=0}^{\infty} 2^{-i}$ converges to 2.

The next line-width is disturbed by large operators.

The code for the math example reads:

```
<math>\sum_{i=0}^\infty 2^{-i}</math>
```

The equation

$$\textbf{geometric series:}\quad \displaystyle\sum_{i=0}^{\infty} 2^{-i} = 2$$

It was entered as

```
<math>\text{geometric series:}\quad \sum_{i=0}^\infty 2^{-i}=2 </math>
```

Fractions, matrices, multilines

Feature	Syntax	How it looks rendered
Fractions	`\frac{2}{4}=0.5` or `{2 \over 4}=0.5`	$\frac{2}{4}=0.5$
Small fractions (force `\textstyle`)	`\tfrac{2}{4} = 0.5`	$\tfrac{2}{4}=0.5$
Large (normal) fractions (force `\displaystyle`)	`\dfrac{2}{4} = 0.5 \qquad \dfrac{2}{c + \dfrac{2}{d + \dfrac{2}{4}}} = a`	$\dfrac{2}{4}=0.5 \qquad \dfrac{2}{c+\dfrac{2}{d+\dfrac{2}{4}}}=a$
Large (nested) fractions	`\cfrac{2}{c + \cfrac{2}{d + \cfrac{2}{4}}} = a`	$\cfrac{2}{c+\cfrac{2}{d+\cfrac{2}{4}}}=a$
Cancellations in fractions	`\cfrac{x}{1 + \cfrac{\cancel{y}}{\cancel{y}}} = \cfrac{x}{2}`	$\cfrac{x}{1+\cfrac{\cancel{y}}{\cancel{y}}}=\cfrac{x}{2}$
Binomial coefficients	`\binom{n}{k}`	$\binom{n}{k}$
Small binomial coefficients (force `\textstyle`)	`\tbinom{n}{k}`	$\tbinom{n}{k}$
Large (normal) binomial coefficients (force `\displaystyle`)	`\dbinom{n}{k}`	$\dbinom{n}{k}$
Matrices	`\begin{matrix} x & y \\ z & v \end{matrix}`	$\begin{matrix} x & y \\ z & v \end{matrix}$
	`\begin{vmatrix} x & y \\ z & v \end{vmatrix}`	$\begin{vmatrix} x & y \\ z & v \end{vmatrix}$
	`\begin{Vmatrix} x & y \\ z & v \end{Vmatrix}`	$\begin{Vmatrix} x & y \\ z & v \end{Vmatrix}$
	`\begin{bmatrix} 0 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & 0 \end{bmatrix}`	$\begin{bmatrix} 0 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & 0 \end{bmatrix}$
	`\begin{Bmatrix} x & y \\ z & v \end{Bmatrix}`	$\begin{Bmatrix} x & y \\ z & v \end{Bmatrix}$
	`\begin{pmatrix} x & y \\ z & v \end{pmatrix}`	$\begin{pmatrix} x & y \\ z & v \end{pmatrix}$

	`\bigl( \begin{smallmatrix} a&b\\ c&d \end{smallmatrix} \bigr)`	$\bigl(\begin{smallmatrix} a&b\\ c&d \end{smallmatrix} \bigr)$
Case distinctions	`f(n) = \begin{cases} n/2, & \text{if }n\text{ is even} \\ 3n+1, & \text{if }n\text{ is odd} \end{cases}`	$f(n) = \begin{cases} n/2, & \text{if } n \text{ is even} \\ 3n+1, & \text{if } n \text{ is odd} \end{cases}$
Multiline equations	`\begin{align} f(x) & = (a+b)^2 \\ & = a^2+2ab+b^2 \\ \end{align}`	$\begin{aligned} f(x) &= (a+b)^2 \\ &= a^2+2ab+b^2 \end{aligned}$
	`\begin{alignat}{2} f(x) & = (a-b)^2 \\ & = a^2-2ab+b^2 \\ \end{alignat}`	$\begin{aligned} f(x) &= (a-b)^2 \\ &= a^2-2ab+b^2 \end{aligned}$
Multiline equations (must define number of columns used ({lcl})) (should not be used unless needed)	`\begin{array}{lcl} z & = & a \\ f(x,y,z) & = & x + y + z \end{array}`	$\begin{array}{lcl} z & = & a \\ f(x,y,z) & = & x + y + z \end{array}$
Multiline equations (more)	`\begin{array}{lcr} z & = & a \\ f(x,y,z) & = & x + y + z \end{array}`	$\begin{array}{lcr} z & = & a \\ f(x,y,z) & = & x + y + z \end{array}$
Breaking up a long expression so that it wraps when necessary, at the expense of destroying correct spacing	`f(x) = \sum_{n=0}^{\infty} a_n x^n = a_0+a_1x+a_2x^2+\cdots`	$f(x) = \sum_{n=0}^{\infty} a_n x^n = a_0+a_1x+a_2x^2+\cdots$
Simultaneous equations	`\begin{cases} 3x + 5y + z \\ 7x - 2y + 4z \\ -6x + 3y + 2z \end{cases}`	$\begin{cases} 3x + 5y + z \\ 7x - 2y + 4z \\ -6x + 3y + 2z \end{cases}$
Arrays	`\begin{array}{|c|c|c|} a & b & S \\ \hline 0&0&1\\ 0&1&1\\ 1&0&1\\ 1&1&0\\ \end{array}`	$\begin{array}{\|c\|c\|c\|} a & b & S \\ \hline 0&0&1\\ 0&1&1\\ 1&0&1\\ 1&1&0\\ \end{array}$

Parenthesizing big expressions, brackets, bars

Feature	Syntax	How it looks rendered
✗Bad	`( \frac{1}{2} )^n`	$(\frac{1}{2})^n$
Good✓	`\left ( \frac{1}{2} \right )^n`	$\left (\frac{1}{2} \right)^n$

You can use various delimiters with \left and \right:

Feature	Syntax	How it looks rendered
Parentheses	`\left ( \frac{a}{b} \right )`	$\left(\frac{a}{b}\right)$
Brackets	`\left [ \frac{a}{b} \right ] \quad` `\left \lbrack \frac{a}{b} \right \rbrack`	$\left[\frac{a}{b}\right] \quad \left[\frac{a}{b}\right]$
Braces	`\left \{ \frac{a}{b} \right \} \quad` `\left \lbrace \frac{a}{b} \right \rbrace`	$\left\{\frac{a}{b}\right\} \quad \left\{\frac{a}{b}\right\}$
Angle brackets	`\left \langle \frac{a}{b} \right \rangle`	$\left\langle\frac{a}{b}\right\rangle$
Bars and double bars	`\left | \frac{a}{b} \right \vert \quad` `\left \Vert \frac{c}{d} \right \\|`	$\left\|\frac{a}{b}\right| \quad \left\|\frac{c}{d}\right\|$
Floor and ceiling functions:	`\left \lfloor \frac{a}{b} \right \rfloor \quad` `\left \lceil \frac{c}{d} \right \rceil`	$\left\lfloor\frac{a}{b}\right\rfloor \quad \left\lceil\frac{c}{d}\right\rceil$
Slashes and backslashes	`\left / \frac{a}{b} \right \backslash`	$\left/\frac{a}{b}\right\backslash$

Up, down, and up-down arrows	`\left \uparrow \frac{a}{b} \right \downarrow \quad`
	`\left \Uparrow \frac{a}{b} \right \Downarrow \quad`
	`\left \updownarrow \frac{a}{b} \right \Updownarrow`
		$\left\uparrow\frac{a}{b}\right\downarrow \quad \left\Uparrow\frac{a}{b}\right\Downarrow \quad \left\updownarrow\frac{a}{b}\right\Updownarrow$

Delimiters can be mixed, as long as \left and \right match	`\left [ 0,1 \right )` `\left \langle \psi \right |`	$\left[0,1\right)$ $\left\langle\psi\right\|$
Use \left. and \right. if you do not want a delimiter to appear	`\left . \frac{A}{B} \right \} \to X`	$\left.\frac{A}{B}\right\} \to X$
Size of the delimiters (add "l" or "r" to indicate the side for proper spacing)	`( \bigl( \Bigl( \biggl( \Biggl( \dots \Biggr] \biggr] \Bigr] \bigr] ]`	$(\bigl(\Bigl(\biggl(\Biggl(\dots\Biggr]\biggr]\Bigr]\bigr]]$
	`\{ \bigl\{ \Bigl\{ \biggl\{ \Biggl\{ \dots \Biggr\rangle \biggr\rangle \Bigr\rangle \bigr\rangle \rangle`	$\{\bigl\{\Bigl\{\biggl\{\Biggl\{\dots\Biggr\rangle\biggr\rangle\Bigr\rangle\bigr\rangle\rangle$
	`| \big| \Big| \bigg| \Bigg| \dots \Bigg| \bigg| \Big| \big| |`	$\|\big\|\Big\|\bigg\|\Bigg\|\dots\Bigg\|\bigg\|\Big\|\big\|\|$
	`\lfloor \bigl\lfloor \Bigl\lfloor \biggl\lfloor \Biggl\lfloor \dots \Biggr\rceil \biggr\rceil \Bigr\rceil \bigr\rceil \rceil`	$\lfloor\bigl\lfloor\Bigl\lfloor\biggl\lfloor\Biggl\lfloor\dots\Biggr\rceil\biggr\rceil\Bigr\rceil\bigr\rceil\rceil$
	`\uparrow \big\uparrow \Big\uparrow \bigg\uparrow \Bigg\uparrow \dots \Bigg\Downarrow \bigg\Downarrow \Big\Downarrow \big\Downarrow \Downarrow`	$\uparrow\big\uparrow\Big\uparrow\bigg\uparrow\Bigg\uparrow\dots\Bigg\Downarrow\bigg\Downarrow\Big\Downarrow\big\Downarrow\Downarrow$
	`\updownarrow \big\updownarrow \Big\updownarrow \bigg\updownarrow \Bigg\updownarrow \dots \Bigg\Updownarrow \bigg\Updownarrow \Big\Updownarrow \big\Updownarrow \Updownarrow`	$\updownarrow\big\updownarrow\Big\updownarrow\bigg\updownarrow\Bigg\updownarrow\dots\Bigg\Updownarrow\bigg\Updownarrow\Big\Updownarrow\big\Updownarrow\Updownarrow$
	`/ \big/ \Big/ \bigg/ \Bigg/ \dots \Bigg\backslash \bigg\backslash \Big\backslash \big\backslash \backslash`	$/\big/\Big/\bigg/\Bigg/\dots\Bigg\backslash\bigg\backslash\Big\backslash\big\backslash\backslash$

Equation numbering

The templates {{NumBlk}} and {{EquationRef}} can be used to number equations. The template {{EquationNote}} can be used to refer to a numbered equation from surrounding text. For example, the following syntax:

```
{{NumBlk|:|<math>x^2 + y^2 + z^2 = 1</math>|{{EquationRef|1}}}}
```

produces the following result (note the equation number in the right margin):

$$x^2 + y^2 + z^2 = 1 \qquad (1)$$

Later on, the text can refer to this equation by its number using syntax like this:

```
As seen in equation ({{EquationNote|1}}), blah blah blah...
```

The result looks like this:

> As seen in equation (**1**), blah blah blah...

The equation number produced by {{EquationNote}} is a link that the user can click to go immediately to the cited equation.

Alphabets and typefaces

See also: Wikipedia:LaTeX symbols § Fonts

Texvc cannot render arbitrary Unicode characters. Those it can handle can be entered by the expressions below. For others, such as Cyrillic, they can be entered as Unicode or HTML entities in running text, but cannot be used in displayed formulas.

Greek alphabet	
`\Alpha \Beta \Gamma \Delta \Epsilon \Zeta \Eta \Theta`	$\Alpha \Beta \Gamma \Delta \Epsilon \Zeta \Eta \Theta$
`\Iota \Kappa \Lambda \Mu \Nu \Xi \Pi \Rho`	$\Iota \Kappa \Lambda \Mu \Nu \Xi \Pi \Rho$
`\Sigma \Tau \Upsilon \Phi \Chi \Psi \Omega`	$\Sigma \Tau \Upsilon \Phi \Chi \Psi \Omega$
`\alpha \beta \gamma \delta \epsilon \zeta \eta \theta`	$\alpha \beta \gamma \delta \epsilon \zeta \eta \theta$
`\iota \kappa \lambda \mu \nu \xi \pi \rho`	$\iota \kappa \lambda \mu \nu \xi \pi \rho$
`\sigma \tau \upsilon \phi \chi \psi \omega`	$\sigma \tau \upsilon \phi \chi \psi \omega$
`\varepsilon \digamma \varkappa \varpi`	$\varepsilon \digamma \varkappa \varpi$
`\varrho \varsigma \vartheta \varphi`	$\varrho \varsigma \vartheta \varphi$
Hebrew symbols	
`\aleph \beth \gimel \daleth`	$\aleph \beth \gimel \daleth$
Blackboard bold/scripts	
`\mathbb{ABCDEFGHI}`	$\mathbb{ABCDEFGHI}$
`\mathbb{JKLMNOPQR}`	$\mathbb{JKLMNOPQR}$
`\mathbb{STUVWXYZ}`	$\mathbb{STUVWXYZ}$
Boldface	
`\mathbf{ABCDEFGHI}`	$\mathbf{ABCDEFGHI}$
`\mathbf{JKLMNOPQR}`	$\mathbf{JKLMNOPQR}$
`\mathbf{STUVWXYZ}`	$\mathbf{STUVWXYZ}$
`\mathbf{abcdefghijklm}`	$\mathbf{abcdefghijklm}$
`\mathbf{nopqrstuvwxyz}`	$\mathbf{nopqrstuvwxyz}$
`\mathbf{0123456789}`	$\mathbf{0123456789}$
Boldface (Greek)	
`\boldsymbol{\Alpha\Beta\Gamma\Delta\Epsilon\Zeta\Eta\Theta}`	$\boldsymbol{\Alpha\Beta\Gamma\Delta\Epsilon\Zeta\Eta\Theta}$
`\boldsymbol{\Iota\Kappa\Lambda\Mu\Nu\Xi\Pi\Rho}`	$\boldsymbol{\Iota\Kappa\Lambda\Mu\Nu\Xi\Pi\Rho}$
`\boldsymbol{\Sigma\Tau\Upsilon\Phi\Chi\Psi\Omega}`	$\boldsymbol{\Sigma\Tau\Upsilon\Phi\Chi\Psi\Omega}$
`\boldsymbol{\alpha\beta\gamma\delta\epsilon\zeta\eta\theta}`	$\boldsymbol{\alpha\beta\gamma\delta\epsilon\zeta\eta\theta}$
`\boldsymbol{\iota\kappa\lambda\mu\nu\xi\pi\rho}`	$\boldsymbol{\iota\kappa\lambda\mu\nu\xi\pi\rho}$
`\boldsymbol{\sigma\tau\upsilon\phi\chi\psi\omega}`	$\boldsymbol{\sigma\tau\upsilon\phi\chi\psi\omega}$
`\boldsymbol{\varepsilon\digamma\varkappa\varpi}`	$\boldsymbol{\varepsilon\digamma\varkappa\varpi}$
`\boldsymbol{\varrho\varsigma\vartheta\varphi}`	$\boldsymbol{\varrho\varsigma\vartheta\varphi}$
Italics (default for Latin alphabet)	
`\mathit{0123456789}`	$\mathit{0123456789}$
Greek italics (default for lowercase Greek)	
`\mathit{\Alpha\Beta\Gamma\Delta\Epsilon\Zeta\Eta\Theta}`	$\mathit{\Alpha\Beta\Gamma\Delta\Epsilon\Zeta\Eta\Theta}$
`\mathit{\Iota\Kappa\Lambda\Mu\Nu\Xi\Pi\Rho}`	$\mathit{\Iota\Kappa\Lambda\Mu\Nu\Xi\Pi\Rho}$
`\mathit{\Sigma\Tau\Upsilon\Phi\Chi\Psi\Omega}`	$\mathit{\Sigma\Tau\Upsilon\Phi\Chi\Psi\Omega}$
Roman typeface	
`\mathrm{ABCDEFGHI}`	$\mathrm{ABCDEFGHI}$
`\mathrm{JKLMNOPQR}`	$\mathrm{JKLMNOPQR}$
`\mathrm{STUVWXYZ}`	$\mathrm{STUVWXYZ}$
`\mathrm{abcdefghijklm}`	$\mathrm{abcdefghijklm}$
`\mathrm{nopqrstuvwxyz}`	$\mathrm{nopqrstuvwxyz}$
`\mathrm{0123456789}`	$\mathrm{0123456789}$
Sans serif	
`\mathsf{ABCDEFGHI}`	$\mathsf{ABCDEFGHI}$

`\mathsf{JKLMNOPQR}`	JKLMNOPQR
`\mathsf{STUVWXYZ}`	STUVWXYZ
`\mathsf{abcdefghijklm}`	abcdefghijklm
`\mathsf{nopqrstuvwxyz}`	nopqrstuvwxyz
`\mathsf{0123456789}`	0123456789
Sans serif Greek (capital only)	
`\mathsf{\Alpha \Beta \Gamma \Delta \Epsilon \Zeta \Eta \Theta}`	ΑΒΓΔΕΖΗΘ
`\mathsf{\Iota \Kappa \Lambda \Mu \Nu \Xi \Pi \Rho}`	ΙΚΛΜΝΞΠΡ
`\mathsf{\Sigma \Tau \Upsilon \Phi \Chi \Psi \Omega}`	ΣΤΥΦΧΨΩ
Calligraphy/script	
`\mathcal{ABCDEFGHI}`	$\mathcal{ABCDEFGHI}$
`\mathcal{JKLMNOPQR}`	$\mathcal{JKLMNOPQR}$
`\mathcal{STUVWXYZ}`	$\mathcal{STUVWXYZ}$
Fraktur typeface	
`\mathfrak{ABCDEFGHI}`	$\mathfrak{ABCDEFGHI}$
`\mathfrak{JKLMNOPQR}`	$\mathfrak{JKLMNOPQR}$
`\mathfrak{STUVWXYZ}`	$\mathfrak{STUVWXYZ}$
`\mathfrak{abcdefghijklm}`	$\mathfrak{abcdefghijklm}$
`\mathfrak{nopqrstuvwxyz}`	$\mathfrak{nopqrstuvwxyz}$
`\mathfrak{0123456789}`	$\mathfrak{0123456789}$
Small scriptstyle text	
`{\scriptstyle\text{abcdefghijklm}}`	abcdefghijklm

Mixed text faces

Feature	Syntax	How it looks rendered
Italicised characters (spaces are ignored)	`x y z`	xyz
Non-italicised characters	`\text{x y z}`	x y z
Mixed italics (bad)	`\text{if} n \text{is even}`	$\text{if}n\text{is even}$
Mixed italics (good)	`\text{if }n\text{ is even}`	$\text{if }n\text{ is even}$
Mixed italics (alternative: ~ or "\ " forces a space)	`\text{if}~n\ \text{is even}`	$\text{if}~n\ \text{is even}$

Color

Equations can use color with the `\color` command. For example,

- `{\color{Blue}x^2}+{\color{Orange}2x}-{\color{LimeGreen}1}`
  $${\color{Blue}x^2}+{\color{Orange}2x}-{\color{LimeGreen}1}$$
- `x_{1,2}=\frac{{\color{Blue}-b}\pm\sqrt{\color{Red}b^2-4ac}}{\color{Green}2a }`
  $$x_{1,2}=\frac{{\color{Blue}-b}\pm\sqrt{\color{Red}b^2-4ac}}{\color{Green}2a }$$

There are several alternate notations styles

- `{\color{Blue}x^2}+{\color{Orange}2x}-{\color{LimeGreen}1}` works with both texvc and MathJax
  $${\color{Blue}x^2}+{\color{Orange}2x}-{\color{LimeGreen}1}$$
- `\color{Blue}x^2\color{Black}+\color{Orange}2x\color{Black}-\color{LimeGreen}1` works with both texvc and MathJax
  $$\color{Blue}x^2\color{Black}+\color{Orange}2x\color{Black}-\color{LimeGreen}1$$
- `\color{Blue}{x^2}+\color{Orange}{2x}-\color{LimeGreen}{1}` only works with MathJax
  $$\color{Blue}{x^2}+\color{Orange}{2x}-\color{LimeGreen}{1}$$

Some color names are predeclared according to the following table, you can use them directly for the rendering of formulas (or for declaring the intended color of the page background).

Colors supported

Apricot	Aquamarine	Bittersweet	Black
Blue	BlueGreen	BlueViolet	BrickRed
Brown	BurntOrange	CadetBlue	CarnationPink
Cerulean	CornflowerBlue	Cyan	Dandelion
DarkOrchid	Emerald	ForestGreen	Fuchsia
Goldenrod	Gray	Green	GreenYellow
JungleGreen	Lavender	LimeGreen	Magenta
Mahogany	Maroon	Melon	MidnightBlue
Mulberry	NavyBlue	OliveGreen	Orange
OrangeRed	Orchid	Peach	Periwinkle
PineGreen	Plum	ProcessBlue	Purple
RawSienna	Red	RedOrange	RedViolet
Rhodamine	RoyalBlue	RoyalPurple	RubineRed
Salmon	SeaGreen	Sepia	SkyBlue
SpringGreen	Tan	TealBlue	Thistle
Turquoise	Violet	VioletRed	White
WildStrawberry	Yellow	YellowGreen	YellowOrange

Color should not be used as the *only* way to identify something, because it will become meaningless on black-and-white media or for color-blind people. See WP:Manual of Style (accessibility)#Color.

Latex does not have a command for setting the background color. The most effective of setting a background color is by setting a CSS styling rules for a table cell

```
{| class="wikitable" align="center"
| style="background: gray;"      | <math>\pagecolor{Gray}x^2</math>
| style="background: Goldenrod;" | <math>\pagecolor{Goldenrod}y^3</math>
|}
```

Rendered as

x^2	y^3

The `\pagecolor{Goldenrod}` command is necessary for the Texvc renderer to use the correct anti-aliasing around the edges of the semi-transparent images. Without the command a default (white) background color is used — below are shown the results displayed on non-white background.

```
{| class="wikitable"  align="center"
| style="background: gray;"      | <math>x^2</math>
| style="background: Goldenrod;" | <math>y^3</math>
|}
```

x^2	y^3

Custom colours can be defined using

```
\definecolor{myorange}{rgb}{1,0.65,0.4}\color{myorange}e^{i \pi}\color{Black} + 1 = 0
```

$$e^{i\pi} + 1 = 0$$

Formatting issues

Spacing

TeX handles most spacing automatically, but you may sometimes want manual control.

Feature	Syntax	How it looks rendered
double quad space	`a \qquad b`	$a \qquad b$
quad space	`a \quad b`	$a \quad b$
text space	`a\ b`	$a\ b$
text space without PNG conversion	`a \mbox{ } b`	$a\ b$
large space	`a\;b`	$a\;b$
medium space	`a\<b`	[not supported]
small space	`a\,b`	$a\,b$
tiny space (use for multiplication of factors)	`ab`	ab
tiny space (syntax space ignored)	`a b`	ab
no space (use for multi-letter variables)	`\mathit{ab}`	ab
small negative space	`a\!b`	$a\!b$

Automatic spacing may be broken in very long expressions (because they produce an overfull hbox in TeX):

```
0+1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16+17+18+19+20+\cdots
```

$$0+1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16+17+18+19+20+\cdots$$

This can be remedied by putting a pair of braces { } around the whole expression:

```
{0+1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16+17+18+19+20+\cdots}
```

$$0+1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16+17+18+19+20+\cdots$$

Alignment with normal text flow

Because of the default CSS

```
img.tex { vertical-align: middle; }
```

an inline expression like $\int_{-N}^{N} e^x\,dx$ should look good.

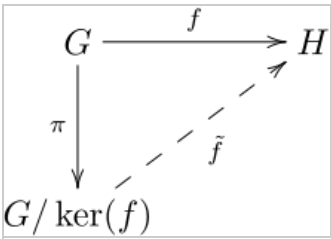
If you need to align it otherwise, use `<math style="vertical-align:-100%;">...</math>` and play with the `vertical-align` argument until you get it right; however, how it looks may depend on the browser and the browser settings.

If you rely on this workaround, if and when the rendering on the server gets fixed in a future release, this extra manual offset will suddenly make every affected formula align *incorrectly*. So use it sparingly, if at all.

Commutative diagrams

To make a commutative diagram, there are three steps:

1. write the diagram in TeX
2. convert to SVG
3. upload the file to Wikimedia Commons



A sample commutative diagram, created in the manner described

Diagrams in TeX

Xy-pic (http://www.tug.org/applications/Xy-pic/) (online manual (http://tex.loria.fr/graph-pack/doc-xypic/xyguide-html/xyguide-html.html)) is the most powerful and general-purpose diagram package in TeX. Diagrams created using it can be found at Commons: Category:Xy-pic diagrams.

Simpler packages include:

- AMS's amscd (http://www.dante.de/CTAN//help/Catalogue/entries/amscd.html)
- Paul Taylor's diagrams (http://www.ctan.org/tex-archive/macros/generic/diagrams/taylor/)
- François Borceux Diagrams (http://www.ctan.org/tex-archive/help/Catalogue/entries/borceux.html)

The following is a template for Xy-pic, together with a hack to increase the margins in dvips, so that the diagram is not truncated by over-eager cropping (suggested in TUGboat: TUGboat, Volume 17 1996, No. 3 (http://www.tug.org/TUGboat/Articles/tb17-3/tb52rahtz.pdf)):

```
\documentclass{amsart}
\usepackage[all, ps, dvips]{xy}  % Loading the XY-Pic package
                                 % Using postscript driver for smoother curves
\usepackage{color}  % For invisible frame
\begin{document}
\thispagestyle{empty}  % No page numbers
\SelectTips{eu}{}  % Euler arrowheads (tips)
\setlength{\fboxsep}{0pt}  % Frame box margin
{\color{white}\framebox{{\color{black}$$  % Frame for margin

\xymatrix{
%%% Diagram goes here %%%
}

$$}}} % end math, end frame
\end{document}
```

Convert to SVG

Once you have produced your diagram in LaTeX (or TeX), you can convert it to an SVG file using the following sequence of commands:

```
pdflatex file.tex
pdfcrop --clip file.pdf tmp.pdf
pdf2svg tmp.pdf file.svg
rm tmp.pdf
```

The pdfcrop (http://pdfcrop.sourceforge.net) and pdf2svg (http://www.cityinthesky.co.uk/opensource/pdf2svg) utilities are needed for this procedure. You can alternatively use pdf2svg (http://www.pdftron.com/pdf2svg/) from PDFTron for the last step.

If you do not have pdfTeX (which is unlikely) you can use the following commands to replace the first step (TeX → PDF):

```
latex file.tex
dvipdfm file.dvi
```

In general, you will not be able to get anywhere with diagrams without TeX and Ghostscript, and the `inkscape` program is a useful tool for creating or modifying your diagrams by hand. There is also a utility `pstoedit` which supports direct conversion from Postscript files to many vector graphics formats, but it requires a non-free plugin to convert to SVG, and regardless of the format, this editor has not been successful in using it to convert diagrams with diagonal arrows from TeX-created files.

These programs are:

- a working TeX distribution, such as TeX Live
- Ghostscript
- pstoedit
- Inkscape

Upload the file

See also: commons:Commons:First steps/Upload form
See also: Help:Contents/Images and media

As the diagram is your own work, upload it to Wikimedia Commons, so that all projects (notably, all languages) can use it without having to copy it to their language's Wiki. (If you've previously uploaded a file to somewhere other than Commons, to Commons.)

Check size

Before uploading, check that the default size of the image is neither too large nor too small by opening in an SVG application and viewing at default size (100% scaling), otherwise adjust the `-y` option to `dvips`.

Name
Make sure the file has a meaningful name.
Upload
Login to Wikimedia Commons, then upload the file (http://commons.wikimedia.org/w/index.php?title=Special:Upload&uselang=ownwork); for the **Summary**, give a brief description.

Now go to the image page and add a description, including the **source code**, using this template:

```
{{Information
|description =
{{en|1= Description [[:en:Link to WP page|topic]]
}}
|source = {{own}}, created as per:
 [[:en:Help:Displaying a formula#Commutative diagrams]];
 source code below.
|date = The Creation Date, like 1999-12-31
|author = [[User:YourUserName|Your Real Name]]
|permission = {{self|PD-self (or other license)
    |author = [[User:YourUserName|Your Real Name]]}}
}}
```

TeX source

```
<source lang=latex>
% TeX source here
</source>
```

```
[[Category:Commutative diagrams]]
[[Category:Xy-pic diagrams]]
[[Category:Images with LaTeX source code]]
```

Source code

- Include the source code in the image page, in the `Source` section of the `{{Information}}` template, so that the diagram can be edited in future.
- Include the complete `.tex` file, not just the fragment, so future editors do not need to reconstruct a compilable file.
- You may optionally make the source code section collapsible, using the `{{cot}}`/`{{cob}}` templates.
- (Don't include it in the Summary section, which is just supposed to be a summary.)

License
The most common license for commutative diagrams is `PD-self`; some use `PD-ineligible`, especially for simple diagrams, or other licenses. Please *do not* use the GFDL (http://www.gnu.org/copyleft/fdl.html), as it requires the entire text of the GFDL to be attached to any document that uses the diagram.
Description
If possible, link to a Wikipedia page relevant to the diagram. (The `1=` is necessary if you use nest templates within the description, and harmless otherwise.)
Category
Include `[[Category:Commutative diagrams]]`, so that it appears in commons:Category:Commutative diagrams. There are also subcategories, which you may choose to use.
Include image
Now include the image on the original page via `[[File:Diagram.svg]]`

Examples

A sample conforming diagram is commons:File:PSU-PU.svg.

Unimplemented elements and workarounds

`\oiint` and `\oiiint`

Elements which are not yet implemented are `\oiint`, namely a two-fold integral `\iint` ($\iint$) with a circular curve through the centre of the two integrals, and similarly `\oiiint`, a circular curve through three integrals. In contrast, `\oint` ($\oint$) exists for the single dimension (integration over a curved line within a plane or any

space with higher dimension).

These elements appear in many contexts: `\oiint` denotes a surface integral over the closed 2d boundary of a 3d region (which occurs in much of 3d vector calculus and physical applications – like Maxwell's equations), likewise `\oiiint` denotes integration over the closed 3d boundary (surface volume) of a 4d region, and they would be strong candidates for the next TeX version. As such there are a lot of workarounds in the present version.

`\oiint` and `\oiiint` using currently implemented symbols

`\oiint` looks like:

- $\oiint_S \mathbf{D} \cdot \mathrm{d}\mathbf{A}$, which uses `\iint` along with `\subset` and `\supset` (overdrawn after backspacing):
  ```
  \iint\limits_{S}\!\!\!\!\!\!\!\!\!\!\!\subset\!\supset \mathbf D \cdot \mathrm{d}
  \mathbf A
  ```
- $\oiint_{\partial V} \mathbf{D} \cdot \mathrm{d}\mathbf{A}$, which uses `\int` twice (with some backward kerning) along with `\bigcirc` (also overdrawn after backpacing) to produce a more consistent circle:
  ```
  \int\!\!\!\!\int_{\partial V}\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\;\;\;\bigcirc
  \,\,\mathbf D\cdot\mathrm{d}\mathbf A
  ```

`\oiiint` (should also be preferably more tightly kerned) looks more or less like:

- $\iiint_{\partial V} \mathbf{D} \cdot \mathrm{d}\mathbf{A}$ which uses three \int symbols (with more backward kerning) with \subset and \supset (overdrawn after backspacing):
  ```
  \int\!\!\!\!\!\int\!\!\!\!\!\!\int_{\partial V}\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\;
  \;\;\subset\!\supset \mathbf D\;\cdot\mathrm{d}\mathbf A
  ```
- $\oiiint_{\partial V} \mathbf{D} \cdot \mathrm{d}\mathbf{A}$, which uses three `\int` symbols (with more backward kerning) along with `\bigcirc` (also overdrawn after backspacing):
  ```
  \int\!\!\!\!\!\int\!\!\!\!\!\!\int_{\partial V}\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\;\;\;
  \bigcirc\,\,\mathbf D\;\cdot\mathrm{d}\mathbf A
  ```

However, since no standardisation exists as yet, any workaround like this (which uses many `\!` symbols for backspacing) should be avoided, if possible. See below for a possibility using PNG image enforcement.

Note that `\iint` (the double integral) and `\iiint` (the triple integral) are still not kerned as they should preferably be, and are currently rendered as if they were successive `\int` symbols; this is not a major problem for reading the formulas, even if the integral symbols before the last one do not have bounds, so it's best to avoid backspacing "hacks" as they may be inconsistent with a possible future better implementation of integrals symbols (with more precisely computed kerning positions).

`\oiint` and `\oiiint` as PNG images

These symbols are available as PNG images which are also integrated into two templates, {{oiint}} and {{oiiint}}, which take care of the formatting around the symbols.

The templates have three parameters:

preintegral
: the text or formula immediately before the integral

intsubscpt
: the subscript below the integral

integrand
: the text or formula immediately after the integral

Examples

- Stokes' theorem: `<math>\oiint_{\scriptstyle S}( \nabla \times \bold{F} ) \cdot {\rm d}\bold{S} = \oint_{\partial S} \bold{F} \cdot {\rm d}\boldsymbol{\ell} </math>`

$$\oiint_S (\nabla \times \mathbf{F}) \cdot \mathrm{d}\mathbf{S} = \oint_{\partial S} \mathbf{F} \cdot \mathrm{d}\boldsymbol{\ell}$$

- Ampère's law + correction: `{{oiint | preintegral=<math>\oint_C \bold{B} \cdot {\rm d} \boldsymbol{\ell} = \mu_0 </math> | intsubscpt = <math>{\scriptstyle S}</math> | integrand = <math>\left ( \bold{J} + \epsilon_0\frac{\partial \bold{E}}{\partial t} \right ) \cdot {\rm d}\bold{S}</math> }}`

$$\oint_{\partial S} \mathbf{B} \cdot \mathrm{d}\boldsymbol{\ell} = \mu_0 \oiint_S \left(\mathbf{J} + \epsilon_0 \frac{\partial \mathbf{E}}{\partial t} \right) \cdot \mathrm{d}\mathbf{S}$$

- Continuity of 4-momentum flux (in general relativity):[3]`<math display=block> \bold{P} = \oiiint_{\scriptstyle \partial \Omega} \bold{T} \cdot {\rm d}^3\boldsymbol{\Sigma} = 0 </math>`

$$\mathbf{P} = \oiiint_{\partial \Omega} \mathbf{T} \cdot \mathrm{d}^3\boldsymbol{\Sigma} = 0$$

Oriented `\oiint` and `\oiiint` as PNG images

Some variants of `\oiint` and `\oiiint` have arrows on them to indicate the sense of integration, such as a line integral around a closed curve in the clockwise sense, and higher dimensional analogues. These are not implemented in TeX on Wikipedia either, although the template {{intorient}} is available - see link for details.

`\overarc`

`\overarc` is not yet implemented to display the arc notation. However, there exists a workaround: use `\overset{\frown}{AB}`, which gives $\overset{\frown}{AB}$

`\dddot`

`\dddot` is not implemented in the TexVC renderer but does work in MathJax. For a workaround use `\overset{...}{x}`, which gives $\overset{...}{x}$.

Syntax to avoid

The texvc processor accepts some non-standard syntax. These should be avoided as the MathJax based renderers do not support these syntax.

Percentages

Texvc accepts `%` for representing percentages. This causes an error with MathJax and should be replaced with `\%` in all renderers.

\textrm

In texvc spaces need to be represented inside the \textrm environment using `\, \` and normal spaces are ignored i.e. `\textrm{A\,B C}` would render as A BC. In mathjax \textrm is an alias for \text which is renders its argument as normal text, hence `\textrm{A\,B C}` renders as A\,B C. To ensure compatibility between versions alway use the \text environment: `\text{A B C}`.

Unicode characters

Non-ASCII Unicode characters like π work in MathML, and MathJax but not in texvc so should be avoided.

Chemistry

There are three ways to render chemical sum formulae as used in chemical equations:

- `<math chem>...</math>`
- `<chem>...</chem>`
- {{chem}}

`<chem>X</chem>` is short for `<math chem>\ce{X}</math>`

(where `X` is a chemical sum formula)

Technically, `<math chem>...</math>` is a `math` tag with the extension `mhchem` enabled, according to the MathJax documentation (http://mathjax.readthedocs.org/en/latest/tex.html#mhchem).

Note, that the commands `\cee` and `\cf` are disabled, because they are marked as deprecated in the mhchem LaTeX package documentation (http://www.ctan.org/pkg/mhchem).

Please note that there are still major issues (https://phabricator.wikimedia.org/T140217) with mhchem support in MediaWiki.

Molecular and Condensed formula

mhchem		{{chem}}	Equivalent HTML
Markup	**Renders as**		
`<chem>H2O</chem>`	$\mathrm{H_2O}$		
`<chem>Sb2O3</chem>`	$\mathrm{Sb_2O_3}$		
`<chem>(NH4)2S</chem>`	$\mathrm{(NH_4)_2S}$		

Bonds

mhchem		Equivalent {{chem}} and HTML
Markup	**Renders as**	
`<chem>C6H5-CHO</chem>`	$\mathrm{C_6H_5-CHO}$	
`<chem>A-B=C{\equiv}D</chem>`	$\mathrm{A-B=C\equiv D}$	

Charges

mhchem		{{chem}}	Equivalent HTML
Markup	**Renders as**		
<chem>H+</chem>	$\mathrm{H^+}$		
<chem>NO3-</chem>	$\mathrm{NO_3^-}$		
<chem>CrO4^2-</chem>	$\mathrm{CrO_4^{2-}}$		
<chem>AgCl2-</chem>	$\mathrm{AgCl_2^-}$		
<chem>[AgCl2]-</chem>	$\mathrm{[AgCl_2]^-}$		
<chem>Y^{99}+</chem> <chem>Y^{99+}</chem>	$\mathrm{Y^{99}+}$ $\mathrm{Y^{99+}}$		

Addition Compounds and Stoichiometric Numbers

mhchem		{{chem}}
Markup	**Renders as**	
<chem>MgSO4.7H2O</chem>	$\mathrm{MgSO_4 \cdot 7H_2O}$	
<chem>KCr(SO4)2*12H2O</chem>	$\mathrm{KCr(SO_4)_2 \cdot 12H_2O}$	
<chem>{CaSO4.1/2H2O} + 1\!1/2H2O -> CaSO4.2H2O</chem>	$\mathrm{CaSO_4 \cdot \frac{1}{2}H_2O + 1\frac{1}{2}H_2O \longrightarrow CaSO_4 \cdot 2H_2O}$	
<chem>{25/2O2} + C8H18 -> {8CO2} + 9H2O</chem>	$\mathrm{\frac{25}{2}O_2 + C_8H_{18} \longrightarrow 8\,CO_2 + 9\,H_2O}$	

(Italic) Math

mhchem	Markup	<chem>{C_\mathit{x}H_\mathit{y}} + \mathit{z}O2 -> {\mathit{x}CO2} + \frac{\mathit{y}}{2}H2O</chem>
	Renders as	$\mathrm{C_{\mathit{x}}H_{\mathit{y}} + \mathit{z}O_2 \longrightarrow \mathit{x}CO_2 + \frac{\mathit{y}}{2}H_2O}$
{{chem}}	Markup	{{chem|C|''x''|H|''y''}} + ''z''{{chem|O|2}} → ''x''{{chem|C|O|2}} + {{frac|''y''|2}}{{chem|H|2|O}}
	Renders as	$\mathrm{C_xH_y + \mathit{z}O_2 \rightarrow xCO_2 + {}^{\mathit{y}}\!/_2H_2O}$

Oxidation States

mhchem	Markup	`<chem>Fe^{II}Fe^{III}2O4</chem>`
	Renders as	$\mathrm{Fe^{II}Fe^{III}_2O_4}$
{{chem}} with ^{...}	Markup	`{{chem|Fe|<sup>II</sup>|Fe|<sup>III</sup>|2|0|4}}`
	Renders as	$\mathrm{Fe^{II}Fe^{III}{}_2O_4}$

Greek characters

mhchem		Equivalent {{chem}} and HTML
Markup	**Renders as**	
`<chem>\mu-Cl</chem>`	$\mu-\mathrm{Cl}$	
`<chem>[Fe(\eta^5-C5H5)2]</chem>`	$[\mathrm{Fe}(\eta^5-\mathrm{C_5H_5})_2]$	

Isotopes

mhchem		Equivalent {{chem}} and HTML
Markup	**Renders as**	
`<chem>^{227}_{90}Th+</chem>`	$\mathrm{^{227}_{90}Th^+}$	
`<chem>^0_{-1}n-</chem>`	$\mathrm{^0_{-1}n^-}$	

States

States Subscripting is not IUPAC recommendation.

mhchem		{{chem}}
Markup	**Renders as**	
`<chem>H2_{(aq)}</chem>`	$\mathrm{H_{2(aq)}}$	
`<chem>CO3^{2-}{(aq)}</chem>`	$\mathrm{CO_3^{2-}(aq)}$	

Precipitate

mhchem	Markup	`<chem>{Ba^2+} + SO4^{2-} -> BaSO4 v</chem>`
	Renders as	$\mathbf{Ba^{2+} + SO_4^{2-} \longrightarrow BaSO_4\downarrow}$
{{chem}}	Markup	`{{chem|Ba|2+}} + {{chem|S|O|4|2-}} &rarr; {{chem|Ba|S|O|4}}&darr;`
	Renders as	$\mathrm{Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4\downarrow}$
Equivalent HTML	Markup	`Ba<sup>2+</sup> + SO<sub>4</sub><sup>2-</sup> &rarr; BaSO<sub>4</sub>&darr;`
	Renders as	$\mathrm{Ba^{2+} + SO_4{}^{2-} \rightarrow BaSO_4\downarrow}$

Reaction Arrows

Markup	Renders as
`<chem>A ->[x] B</chem>`	$\mathbf{A \xrightarrow{x} B}$
`<chem>A ->[\text{text above}][\text{text below}] B</chem>`	$\mathbf{A \xrightarrow[\text{text below}]{\text{text above}} B}$
`<chem>A ->[\ce{+H2O}] B</chem>`	$\mathbf{A \xrightarrow{+H_2O} B}$

Comparison of arrow symbols

Markup	Renders as
`<math>\rightarrow</math>`	$\rightarrow$
`<math>\rightleftarrows</math>`	$\rightleftarrows$
`<math>\rightleftharpoons</math>`	$\rightleftharpoons$
`<math>\leftrightarrow</math>`	$\leftrightarrow$
`<math>\longrightarrow</math> <chem>-></chem>`	$\longrightarrow$ $\longrightarrow$
`<chem><=></chem>`	$\rightleftharpoons$
`<math>\longleftrightarrow</math> <chem><-></chem>`	$\longleftrightarrow$ $\longleftrightarrow$

Further Examples Using Ordinary LaTeX tags

```
<math chem>\begin{align}
```

```
\ce{\overbrace{2Fe304}^{magnetite} + {1/202} ->}\ &{\color{Brown}\ce{\overbrace{3(\lambda-Fe203)}^{maghemite}}}\\
\ce{\underbrace{2Fe304}_{magnetite} + {1/202} ->}\ &{\color{Red}\ce{\underbrace{3(\alpha-Fe203)}_{hematite}}}
\end{align}</math>
```

$$\ce{\overbrace{2Fe304}^{magnetite} + {1/202} ->}\ &{\color{Brown}\ce{\overbrace{3(\lambda-Fe203)}^{maghemite}}}\\
\ce{\underbrace{2Fe304}_{magnetite} + {1/202} ->}\ &{\color{Red}\ce{\underbrace{3(\alpha-Fe203)}_{hematite}}}$$

To align the equations or color them, use `<math chem>` and `\ce`.

Examples of implemented TeX formulas

Quadratic polynomial

Markup	`<math>ax^2 + bx + c = 0</math>`
Renders as	$ax^2 + bx + c = 0$

Quadratic formula

Markup	`<math>x={-b\pm\sqrt{b^2-4ac} \over 2a}</math>`
Renders as	$x = {-b \pm \sqrt{b^2 - 4ac} \over 2a}$

Tall parentheses and fractions

Markup	`<math>2 = \left( \frac{\left(3-x\right) \times 2}{3-x} \right)</math>`
Renders as	$2 = \left(\frac{\left(3-x\right) \times 2}{3-x} \right)$
Markup	`<math>S_{\text{new}} = S_{\text{old}} - \frac{ \left( 5-T \right) ^2} {2}</math>`
Renders as	$S_{\text{new}} = S_{\text{old}} - \frac{ \left(5-T \right) ^2} {2}$

Integrals

Markup	`<math>\int_a^x \!\!\!\int_a^s f(y)\,dy\,ds = \int_a^x f(y)(x-y)\,dy</math>`
Renders as	$\int_a^x \!\!\!\int_a^s f(y)\,dy\,ds = \int_a^x f(y)(x-y)\,dy$
Markup	`<math>\int_e^{\infty}\frac 1{t(\ln t)^2}dt={\frac{-1}{\ln t}\,\Bigg\vert\,}_e^\infty=1</math>`
Renders as	$\int_e^{\infty} \frac{1}{t(\ln t)^2}dt = \frac{-1}{\ln t}\,\Bigg\vert_e^{\infty} = 1$

Matrices and determinants

Markup	`<math>\det(\mathsf{A}-\lambda\mathsf{I}) = 0</math>`
Renders as	$\det(\mathsf{A}-\lambda\mathsf{I}) = 0$

Summation

Markup	`<math>\sum_{i=0}^{n-1} i</math>`
Renders as	$\sum_{i=0}^{n-1} i$

Markup	`<math>\sum_{m=1}^\infty\sum_{n=1}^\infty\frac{m^2\,n} {3^m\left(m\,3^n+n\,3^m\right)}</math>`
Renders as	$\sum_{m=1}^{\infty}\sum_{n=1}^{\infty}\frac{m^2\,n}{3^m\left(m\,3^n+n\,3^m\right)}$

Differential equation

Markup	`<math>u'' + p(x)u' + q(x)u=f(x),\quad x>a</math>`
Renders as	$u'' + p(x)u' + q(x)u = f(x), \quad x > a$

Complex numbers

Markup	`<math>|\bar{z}| = |z|,`
	`|(\bar{z})^n| = |z|^n,`
	`\arg(z^n) = n \arg(z)</math>`

Renders as	$\|\bar{z}\| = \|z\|, \|(\bar{z})^n\| = \|z\|^n, \arg(z^n) = n\arg(z)$

Limits

Markup	`<math>\lim_{z\to z_0} f(z)=f(z_0)</math>`
Renders as	$\lim_{z\to z_0} f(z) = f(z_0)$

Integral equation

Markup	`<math>\phi_n(\kappa) =`
	`\frac{1}{4\pi^2\kappa^2} \int_0^\infty`
	`\frac{\sin(\kappa R)}{\kappa R}`
	`\frac{\partial}{\partial R}`
	`\left [ R^2\frac{\partial D_n(R)}{\partial R} \right ] \,dR</math>`

Renders as	$\phi_n(\kappa) = \frac{1}{4\pi^2\kappa^2} \int_0^\infty \frac{\sin(\kappa R)}{\kappa R} \frac{\partial}{\partial R} \left [R^2 \frac{\partial D_n(R)}{\partial R} \right] dR$

Example

Markup	`<math>\phi_n(\kappa) =`
	`0.033C_n^2\kappa^{-11/3},\quad`
	`\frac{1}{L_0}\ll\kappa\ll\frac{1}{l_0}</math>`

Renders as	$\phi_n(\kappa) = 0.033C_n^2\kappa^{-11/3}, \quad \frac{1}{L_0} \ll \kappa \ll \frac{1}{l_0}$

Continuation and cases

Markup	<math> f(x) = \begin{cases} 1 & -1 \le x < 0 \\ \frac{1}{2} & x = 0 \\ 1 - x^2 & \text{otherwise} \end{cases} </math>
Renders as	$f(x) = \begin{cases} 1 & -1 \le x < 0 \\ \frac{1}{2} & x = 0 \\ 1 - x^2 & \text{otherwise} \end{cases}$

Prefixed subscript

Markup	<math>{}_pF_q(a_1,\dots,a_p;c_1,\dots,c_q;z) = \sum_{n=0}^\infty \frac{(a_1)_n\cdots(a_p)_n}{(c_1)_n\cdots(c_q)_n} \frac{z^n}{n!}</math>
Renders as	$${}_pF_q(a_1,\dots,a_p;c_1,\dots,c_q;z) = \sum_{n=0}^\infty \frac{(a_1)_n\cdots(a_p)_n}{(c_1)_n\cdots(c_q)_n}\frac{z^n}{n!}$$

Fraction and small fraction

Markup	$\frac{a}{b}\ \tfrac{a}{b}$
Renders as	$\frac{a}{b}\ \tfrac{a}{b}$

Area of a quadrilateral

Markup	$S=dD\,\sin\alpha\!$
Renders as	$S = dD\,\sin\alpha$

Volume of a sphere-stand

Markup	$V = \frac 16 \pi h \left [3 \left (r_1^2 + r_2^2 \right) + h^2 \right]$
Renders as	$V = \frac{1}{6}\pi h \left [3 \left (r_1^2 + r_2^2 \right) + h^2 \right]$

Multiple equations

Markup	<math>\begin{align} u & = \tfrac{1}{\sqrt{2}}(x+y) \qquad & x &= \tfrac{1}{\sqrt{2}}(u+v) \\ v & = \tfrac{1}{\sqrt{2}}(x-y) \qquad & y &= \tfrac{1}{\sqrt{2}}(u-v) \end{align}</math>
Renders as	$$\begin{aligned} u &= \tfrac{1}{\sqrt{2}}(x+y) \qquad & x &= \tfrac{1}{\sqrt{2}}(u+v) \\ v &= \tfrac{1}{\sqrt{2}}(x-y) \qquad & y &= \tfrac{1}{\sqrt{2}}(u-v) \end{aligned}$$

See also

- Typesetting of mathematical formulae
- Help:Score (a tag for tablatures, "sheet music") and Help:Musical symbols
- Table of mathematical symbols
- WP:Rendering math
- mw:Extension:Blahtex, or blahtex: a LaTeX to MathML converter for Wikipedia
- commons:Category:Images which should use TeX

References

Footnotes

a. Although, in all cases mentioned, TeX is generated by compilation, and not by an interpreter program, there is one essential difference between, e.g., Knuth's TeX or Lamport's LaTeX and the present implementation: whereas in the first two cases the compiler typically generates an *all-in-one* printable output, which has the quality of a whole book with all chapters, sections and subsections, and where no line is "special", in the present case one has, typically, a mixture of TeX images (more precisely: PNG images) for the equations, embedded into usual text, and with short TeX elements usually replaced by HTML parts. As a consequence, in many cases TeX-elements, e.g. vector symbols, "stick out" below (or above) the text line. This "sticking out" is *not* the case in the above-mentioned original products, and the HTML-substitutes for small TeX additions to the text are often insufficient in quality for many readers. In spite of these shortcomings, the present product characterized by "many embedded PNG-images" should be preferred for small texts, where the equations do not dominate.
b. This can cause difficulty with setting the baseline as vertical alignment with the surrounding text can also be a problem (see bug 32694)

Citations

1. Ed Sanders (December 18, 2016). "Consider a longer, less ambiguous name for <ce>". WikiMedia. Retrieved April 24, 2017.
2. Ed Sanders (January 11, 2017). "Replace all usages of <ce> with <chem> on wiki". WikiMedia. Retrieved April 24, 2017.
3. J. A. Wheeler; C. Misner; K. S. Thorne (1973). *Gravitation* (2nd ed.). W. H. Freeman & Co. ISBN 0-7167-0344-0.

External links

- A LaTeX tutorial (http://www.maths.tcd.ie/~dwilkins/LaTeXPrimer/)
- LaTex online editor (http://www.codecogs.com/latex/eqneditor.php)
- Doob, Michael, *A Gentle Introduction to TeX: A Manual for Self-study* (PDF). A paper introducing TeX — see page 39 onwards for a good introduction to the maths side of things.
- Oetiker, Tobias; Partl, Hubert; Hyna, Irene; Schlegl, Elisabeth (December 13, 2009), *The Not So Short Introduction to LaTeX 2$_\varepsilon$* (PDF) (4.27 ed.). A paper introducing LaTeX — skip to page 49 for the math section. See page 63 for a complete reference list of symbols included in LaTeX and AMS-LaTeX.
- The Comprehensive LaTeX Symbol List (http://tug.ctan.org/tex-archive/info/symbols/comprehensive/symbols-letter.pdf)—symbols not found here may be documented there.
- Long list of many symbols (http://www.tex.ac.uk/tex-archive/info/symbols/comprehensive/symbols-a4.pdf)
- short list of common symbols (http://amath.colorado.edu/documentation/LaTeX/Symbols.pdf)
- The esint package for closed double integrals (http://milde.users.sourceforge.net/LUCR/Math/mathpackages/esint-symbols.pdf)
- The esint package for closed double integrals (http://mirror.ox.ac.uk/sites/ctan.org/macros/latex/contrib/esint/esint.pdf)
- cancel package homepage (http://www.ctan.org/pkg/cancel) and PDF documentation (http://mirrors.ctan.org/macros/latex/contrib/cancel/cancel.pdf)
- AMS-LaTeX guide (http://www.ams.org/tex/amslatex.html).
- A set of public domain fixed-size math symbol bitmaps (http://us.metamath.org/symbols/symbols.html).
- List of mathematical symbols with their Unicode characters and their LaTeX commands (http://milde.users.sourceforge.net/LUCR/Math/unimathsymbols.xhtml)
- MathML: A product of the W3C Math working group (http://www.w3.org/Math/), is a low-level specification for describing mathematics as a basis for machine-to-machine communication

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