

# Help:Displaying a formula

*"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 help page is a how-to guide.

It details processes or procedures of some aspect(s) of Wikipedia's norms and practices. It is not one of Wikipedia's policies or guidelines, as it has not been thoroughly vetted by the community.

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.<sup>[a]</sup>

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

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## Basics

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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](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` was considered too ambiguous, and it has been replaced by `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>`.<sup>[1]</sup>

### 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 prefixing the escape character backslash `\` or using special sequences:

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

yielding

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

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  $\sim$ , use `\tilde{ }` which gives  $\sim$ , placing a  $\sim$  over an empty box. Alternatively `\sim` produces  $\sim$ , a large centred  $\sim$  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  $\wedge$  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

The 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`.



This help page needs to be **updated**. Please update this help page to reflect recent events or newly available information. Relevant discussion may be found on

the talk page.

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  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  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` 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 sn b** (with space to the left and right of "sn") and `a\operatorname{sn}(b+c)` as **a 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)` `\quad` `\operatorname{sn}_{b>c}(b+c)` renders as

**sn<sub>b>c</sub>(b + c)**      **sn<sub>b>c</sub>(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{ø}` and `\text{þ}` (used in Icelandic) will give errors.

The normal way of entering quotation marks in text mode (two back ticks for the left and two apostrophes for the right), such as `\text{a ``quoted'' word}` will not work correctly. As a workaround, you can use the Unicode left and right quotation mark characters, which are available from the "Symbols" dropdown panel beneath the editor: `\text{a “quoted” word}`.

### 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
<code>\alpha</code>	$\alpha$	<code>{{math '&amp;alpha;'}}{{}}</code>	$\alpha$
<code>f(x) = x^2</code>	$f(x) = x^2$	<code>{{math 'f'('x') {{=}} 'x'&lt;sup&gt;2&lt;/sup&gt;}}}}</code>	$f(x) = x^2$
<code>\sqrt{2}</code>	$\sqrt{2}$	<code>{{math {{radical} 2}}}}</code>	$\sqrt{2}$
<code>\sqrt{1-e^2}</code>	$\sqrt{1-e^2}$	<code>{{math {{radical} 1 &amp;minus; 'e'&lt;sup&gt;2&lt;/sup&gt;}}}}</code>	$\sqrt{1-e^2}$
<code>\{1,e,\pi\}</code>	$\{1,e,\pi\}$	<code>{{math {{mset} 1, 'e', '&amp;pi;'}}}}</code>	$\{1,e,\pi\}$
<code> z + 1  \leq 2</code>	$ z + 1  \leq 2$	<code>{{math {{abs 'z' + 1}} &amp;le; 2}}}}</code>	$ z + 1  \leq 2$

Care should be taken when writing sets within `{{math}}`, as braces can conflict with template syntax. The `{{mset}}` template is available to help with this as shown in the example above. Likewise, `{{abs}}` encloses its parameter inside vertical bars to help with the pipe character conflicting with template syntax.

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
<div><code>&amp;alpha; &amp;beta; &amp;gamma; &amp;delta; &amp;epsilon; &amp;zeta; &amp;eta; &amp;theta; &amp;iota; &amp;kappa; &amp;lambda; &amp;mu; &amp;nu; &amp;xi; &amp;omicron; &amp;pi; &amp;rho; &amp;sigma; &amp;sigmaf; &amp;tau; &amp;upsilon; &amp;phi; &amp;chi; &amp;psi; &amp;omega;</code></div>	$\alpha \beta \gamma \delta \epsilon \zeta$ $\eta \theta \iota \kappa \lambda \mu \nu$ $\xi \omicron \pi \rho \sigma \varsigma$ $\tau \upsilon \phi \chi \psi \omega$
<div><code>&amp;Gamma; &amp;Delta; &amp;Theta; &amp;Lambda; &amp;Xi; &amp;Pi; &amp;Sigma; &amp;Phi; &amp;Psi; &amp;Omega;</code></div>	$\Gamma \Delta \Theta \Lambda \Xi \Pi$ $\Sigma \Phi \Psi \Omega$
<div><code>&amp;int; &amp;sum; &amp;prod; &amp;radic; &amp;minus; &amp;plusmn; &amp;infin; &amp;asymp; &amp;prop; = &amp;equiv; &amp;ne; &amp;le; &amp;ge; &amp;times; &amp;middot; &amp;sdot; &amp;divide; &amp;part; &amp;prime; &amp;Prime; &amp;nabla; &amp;permil; &amp;deg; &amp;there4; &amp;empty;</code></div>	$\int \sum \prod \sqrt{-\pm\infty}$ $\approx \propto = \equiv \neq \leq \geq$ $\times \cdots \div \partial \prime \prime$ $\nabla \text{‰}^\circ \therefore \emptyset$
<div><code>&amp;isin; &amp;notin; &amp;cap; &amp;cup; &amp;sub; &amp;sup; &amp;sube; &amp;supe; &amp;not; &amp;and; &amp;or; &amp;exist; &amp;forall; &amp;rArr; &amp;hArr; &amp;rarr; &amp;harr; &amp;uarr; &amp;darr; &amp;alefsym; - &amp;ndash; &amp;mdash;</code></div>	$\in \notin \cap \cup \subset \supseteq \supset$ $\neg \wedge \vee \exists \forall$ $\Rightarrow \Leftrightarrow \rightarrow \leftrightarrow \uparrow \downarrow$ $\propto - - -$

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



<code>\gcd(m, n)</code> , <code>\operatorname{lcm}(m, n)</code>	$\gcd(m, n), \operatorname{lcm}(m, n)$
<code>\mid</code> , <code>\nmid</code> , <code>\shortmid</code> , <code>\nshortmid</code>	$\mid, \nmid, \shortmid, \nshortmid$
<b>Radicals</b>	
<code>\surd</code> , <code>\sqrt{2}</code> , <code>\sqrt[n]{}</code> , <code>\sqrt[3]{\frac{x^3+y^3}{2}}</code>	$\surd, \sqrt{2}, \sqrt[n]{}, \sqrt[3]{\frac{x^3+y^3}{2}}$
<b>Operators</b>	
<code>+</code> , <code>-</code> , <code>\pm</code> , <code>\mp</code> , <code>\dotplus</code>	$+, -, \pm, \mp, \dotplus$
<code>\times</code> , <code>\div</code> , <code>\divideontimes</code> , <code>/</code> , <code>\backslash</code>	$\times, \div, \divideontimes, /, \backslash$
<code>\cdot</code> , <code>*</code> , <code>\ast</code> , <code>\star</code> , <code>\circ</code> , <code>\bullet</code>	$\cdot, **, *, \star, \circ, \bullet$
<code>\boxplus</code> , <code>\boxminus</code> , <code>\boxtimes</code> , <code>\boxdot</code>	$\boxplus, \boxminus, \boxtimes, \boxdot$
<code>\oplus</code> , <code>\ominus</code> , <code>\otimes</code> , <code>\oslash</code> , <code>\odot</code>	$\oplus, \ominus, \otimes, \oslash, \odot$
<code>\circleddash</code> , <code>\circledcirc</code> , <code>\circledast</code>	$\circleddash, \circledcirc, \circledast$
<code>\bigoplus</code> , <code>\bigotimes</code> , <code>\bigodot</code>	$\bigoplus, \bigotimes, \bigodot$
<b>Sets</b>	
<code>\{ \}</code> , <code>\O \empty \emptysetset</code> , <code>\varnothing</code>	$\{ \}, \emptyset, \emptysetset, \varnothing$
<code>\in</code> , <code>\notin</code> , <code>\not\in</code> , <code>\ni</code> , <code>\not\ni</code>	$\in, \notin, \not\in, \ni, \not\ni$
<code>\cap</code> , <code>\Cap</code> , <code>\sqcap</code> , <code>\bigcap</code>	$\cap, \Cap, \sqcap, \bigcap$
<code>\cup</code> , <code>\Cup</code> , <code>\sqcup</code> , <code>\bigcup</code> , <code>\bigsqcup</code> , <code>\uplus</code> , <code>\biguplus</code>	$\cup, \Cup, \sqcup, \bigcup, \bigsqcup, \uplus, \biguplus$
<code>\setminus</code> , <code>\smallsetminus</code> , <code>\times</code>	$\setminus, \smallsetminus, \times$
<code>\subset</code> , <code>\Subset</code> , <code>\sqsubset</code>	$\subset, \Subset, \sqsubset$
<code>\supset</code> , <code>\Supset</code> , <code>\sqsupset</code>	$\supset, \Supset, \sqsupset$
<code>\subseteq</code> , <code>\nsubseteq</code> , <code>\subsetneq</code> , <code>\varsubsetneq</code> , <code>\sqsubseteq</code>	$\subseteq, \nsubseteq, \subsetneq, \varsubsetneq, \sqsubseteq$
<code>\supseteq</code> , <code>\nsupseteq</code> , <code>\supsetneq</code> , <code>\varsupsetneq</code> , <code>\sqsupseteq</code>	$\supseteq, \nsupseteq, \supsetneq, \varsupsetneq, \sqsupseteq$
<code>\subseteqq</code> , <code>\nsubseteqq</code> , <code>\subsetneqq</code> , <code>\varsubsetneqq</code>	$\subseteqq, \nsubseteqq, \subsetneqq, \varsubsetneqq$
<code>\supseteqq</code> , <code>\nsupseteqq</code> , <code>\supsetneqq</code> , <code>\varsupsetneqq</code>	$\supseteqq, \nsupseteqq, \supsetneqq, \varsupsetneqq$
<b>Relations</b>	
<code>=</code> , <code>\ne</code> , <code>\neq</code> , <code>\equiv</code> , <code>\not\equiv</code>	$=, \neq, \neq, \equiv, \not\equiv$
<code>\doteq</code> , <code>\doteqdot</code> , <code>\overset{\underset{\mathrm{def}}{}}{=}</code> , <code>:=</code>	$\doteq, \doteqdot, \overset{\underset{\mathrm{def}}{}}{=}, :=$
<code>\sim</code> , <code>\nsim</code> , <code>\backsim</code> , <code>\thicksim</code> , <code>\simeq</code> , <code>\backsimeq</code> , <code>\eqsim</code> , <code>\cong</code> , <code>\ncong</code>	$\sim, \nsim, \backsim, \thicksim, \simeq, \backsimeq, \eqsim, \cong, \ncong$
<code>\approx</code> , <code>\thickapprox</code> , <code>\approxeq</code> , <code>\asymp</code> , <code>\propto</code> , <code>\varpropto</code>	$\approx, \thickapprox, \approxeq, \asymp, \propto, \varpropto$
<code>&lt;</code> , <code>\less</code> , <code>\ll</code> , <code>\not\ll</code> , <code>\lll</code> , <code>\not\lll</code> , <code>\lessdot</code>	$<, \less, \ll, \not\ll, \lll, \not\lll, \lessdot$
<code>&gt;</code> , <code>\ngtr</code> , <code>\gg</code> , <code>\not\gg</code> , <code>\ggg</code> , <code>\not\ggg</code> , <code>\gtrdot</code>	$>, \ngtr, \gg, \not\gg, \ggg, \not\ggg, \gtrdot$
<code>\le</code> , <code>\leq</code> , <code>\lneq</code> , <code>\leqq</code> , <code>\nleq</code> , <code>\nleqq</code> , <code>\lvertneqq</code>	$\leq, \leq, \lneq, \leqq, \nleq, \nleqq, \lvertneqq$

<code>\ge</code> , <code>\geq</code> , <code>\gneq</code> , <code>\geqq</code> , <code>\ngeq</code> , <code>\ngeqq</code> , <code>\gneqq</code> , <code>\gvertneqq</code>	$\geq, \geq, \gtrsim, \gtrsim, \nless, \nless, \nless, \nless$
<code>\lessgtr</code> , <code>\lesseqgtr</code> , <code>\lesseqqgtr</code> , <code>\gtrless</code> , <code>\gtreqless</code> , <code>\gtreqqless</code>	$\lessgtr, \lessgtr, \lessgtr, \lessgtr, \lessgtr, \lessgtr$
<code>\leqslant</code> , <code>\nleqslant</code> , <code>\eqslantless</code>	$\leq, \nless, \leq$
<code>\geqslant</code> , <code>\ngeqslant</code> , <code>\eqslantgtr</code>	$\gtr, \nless, \gtr$
<code>\lesssim</code> , <code>\lnsim</code> , <code>\lessapprox</code> , <code>\lnapprox</code>	$\lesssim, \lesssim, \lessapprox, \lessapprox$
<code>\gtrsim</code> , <code>\gnsim</code> , <code>\gtrapprox</code> , <code>\gnapprox</code>	$\gtrsim, \gtrsim, \gtrapprox, \gtrapprox$
<code>\prec</code> , <code>\nprec</code> , <code>\preceq</code> , <code>\npreceq</code> , <code>\precneqq</code>	$\prec, \nless, \prec, \nless, \prec$
<code>\succ</code> , <code>\nsucc</code> , <code>\succeq</code> , <code>\nsucceq</code> , <code>\succneqq</code>	$\succ, \nless, \succ, \nless, \succ$
<code>\preccurlyeq</code> , <code>\curlyeqprec</code>	$\preccurlyeq, \preccurlyeq$
<code>\succcurlyeq</code> , <code>\curlyeqsucc</code>	$\succcurlyeq, \succcurlyeq$
<code>\precsim</code> , <code>\precnsim</code> , <code>\precapprox</code> , <code>\precnapprox</code>	$\precsim, \precsim, \precsim, \precsim$
<code>\succsim</code> , <code>\succnsim</code> , <code>\succapprox</code> , <code>\succnapprox</code>	$\succsim, \succsim, \succsim, \succsim$
<b>Geometric</b>	
<code>\parallel</code> , <code>\nparallel</code> , <code>\shortparallel</code> , <code>\nshortparallel</code>	$\parallel, \nparallel, \parallel, \nparallel$
<code>\perp</code> , <code>\angle</code> , <code>\sphericalangle</code> , <code>\measuredangle</code> , <code>45^\circ</code>	$\perp, \angle, \sphericalangle, \measuredangle, 45^\circ$
<code>\Box</code> , <code>\blacksquare</code> , <code>\diamond</code> , <code>\Diamond</code> , <code>\lozenge</code> , <code>\blacklozenge</code> , <code>\bigstar</code>	$\Box, \blacksquare, \diamond, \Diamond, \lozenge, \blacklozenge, \bigstar$
<code>\bigcirc</code> , <code>\triangle</code> , <code>\bigtriangleup</code> , <code>\bigtriangledown</code>	$\bigcirc, \triangle, \bigtriangleup, \bigtriangledown$
<code>\vartriangle</code> , <code>\triangledown</code>	$\triangle, \triangledown$
<code>\blacktriangle</code> , <code>\blacktriangledown</code> , <code>\blacktriangleleft</code> , <code>\blacktriangleright</code>	$\blacktriangle, \blacktriangledown, \blacktriangleleft, \blacktriangleright$
<b>Logic</b>	
<code>\forall</code> , <code>\exists</code> , <code>\nexists</code>	$\forall, \exists, \nexists$
<code>\therefore</code> , <code>\because</code> , <code>\And</code>	$\therefore, \because, \&$
<code>\lor</code> , <code>\vee</code> , <code>\curlyvee</code> , <code>\bigvee</code> don't use <code>\or</code> which is now deprecated	$\vee, \vee, \vee, \bigvee$
<code>\land</code> , <code>\wedge</code> , <code>\curlywedge</code> , <code>\bigwedge</code> don't use <code>\and</code> which is now deprecated	$\wedge, \wedge, \wedge, \bigwedge$
<code>\bar{q}</code> , <code>\bar{abc}</code> , <code>\overline{q}</code> , <code>\overline{abc}</code> , <code>\lnot</code> , <code>\neg</code> , <code>\not\operatorname{R}</code> , <code>\bot</code> , <code>\top</code>	$\bar{q}, \bar{abc}, \bar{q}, \bar{abc}, \neg, \neg, \neg, \bot, \top$
<code>\vdash</code> , <code>\dashv</code> , <code>\vDash</code> , <code>\Vdash</code> , <code>\models</code>	$\vdash, \vdash, \vdash, \vdash, \models$
<code>\Vdash</code> , <code>\nvDash</code> , <code>\nVdash</code> , <code>\nvDash</code> , <code>\nVdash</code>	$\Vdash, \Vdash, \Vdash, \Vdash, \Vdash$
<code>\ulcorner</code> , <code>\urcorner</code> , <code>\llcorner</code> , <code>\lrcorner</code>	$\ulcorner, \urcorner$
<b>Arrows</b>	
<code>\rightarrow</code> , <code>\leftarrow</code>	$\Rightarrow, \Leftarrow$

<code>\Rightarrow</code> , <code>\nrightarrow</code> , <code>\Longrightarrow</code> <code>\implies</code>	$\Rightarrow$ , $\Rrightarrow$ , $\Longrightarrow$ , $\Rightarrow$
<code>\Leftarrow</code> , <code>\nleftarrow</code> , <code>\Longleftarrow</code>	$\Leftarrow$ , $\nleftarrow$ , $\Longleftarrow$
<code>\Leftrightarrow</code> , <code>\nLeftrightarrow</code> , <code>\Longleftrightarrow</code> <code>\iff</code>	$\Leftrightarrow$ , $\nLeftrightarrow$ , $\Longleftrightarrow$ , $\iff$
<code>\Uparrow</code> , <code>\Downarrow</code> , <code>\Updownarrow</code>	$\Uparrow$ , $\Downarrow$ , $\Updownarrow$
<code>\rightarrowtail</code> , <code>\nrightarrowtail</code> , <code>\longrightarrowtail</code>	$\rightarrowtail$ , $\nrightarrowtail$ , $\rightarrowtail$
<code>\leftarrowtail</code> , <code>\nleftarrowtail</code> , <code>\longleftarrowtail</code>	$\leftarrowtail$ , $\nleftarrowtail$ , $\leftarrowtail$
<code>\leftrightharpoonup</code> , <code>\nleftrightharpoonup</code> , <code>\longleftrightharpoonup</code>	$\leftrightharpoonup$ , $\nleftrightharpoonup$ , $\leftrightharpoonup$
<code>\uparpoonup</code> , <code>\downarpoonup</code> , <code>\updownarpoonup</code>	$\uparpoonup$ , $\downarpoonup$ , $\updownarpoonup$
<code>\nearrow</code> , <code>\swarrow</code> , <code>\nwarrow</code> , <code>\searrow</code>	$\nearrow$ , $\swarrow$ , $\nwarrow$ , $\searrow$
<code>\mapsto</code> , <code>\longmapsto</code>	$\mapsto$ , $\longmapsto$
<code>\rightharpoonup</code> , <code>\rightharpoonleft</code> , <code>\leftharpoonup</code> , <code>\leftharpoonleft</code> , <code>\upharpoonleft</code> , <code>\upharpoonright</code> , <code>\downharpoonleft</code> , <code>\downharpoonright</code> , <code>\rightleftharpoons</code> , <code>\leftrightharpoons</code>	$\rightharpoonup$ , $\rightharpoonleft$ , $\leftharpoonup$ , $\leftharpoonleft$ , $\upharpoonleft$ , $\upharpoonright$ , $\downharpoonleft$ , $\downharpoonright$ , $\rightleftharpoons$ , $\leftrightharpoons$
<code>\curvearrowleft</code> , <code>\circlearrowleft</code> , <code>\Lsh</code> , <code>\upuparrows</code> , <code>\rightrightarrows</code> , <code>\rightleftarrows</code> , <code>\rightarrowtail</code> , <code>\looparrowright</code>	$\curvearrowleft$ , $\circlearrowleft$ , $\Lsh$ , $\upuparrows$ , $\rightrightarrows$ , $\rightleftarrows$ , $\rightarrowtail$ , $\looparrowright$
<code>\curvearrowright</code> , <code>\circlearrowright</code> , <code>\Rsh</code> , <code>\downdownarrows</code> , <code>\leftleftarrows</code> , <code>\leftrightharpoons</code> , <code>\leftarrowtail</code> , <code>\looparrowleft</code>	$\curvearrowright$ , $\circlearrowright$ , $\Rsh$ , $\downdownarrows$ , $\leftleftarrows$ , $\leftrightharpoons$ , $\leftarrowtail$ , $\looparrowleft$
<code>\hookrightarrow</code> , <code>\hookleftarrow</code> , <code>\multimap</code> , <code>\leftrightsquigarrow</code> , <code>\rightsquigarrow</code> , <code>\twoheadrightarrow</code> , <code>\twoheadleftarrow</code>	$\hookrightarrow$ , $\hookleftarrow$ , $\multimap$ , $\leftrightsquigarrow$ , $\rightsquigarrow$ , $\twoheadrightarrow$ , $\twoheadleftarrow$
<b>Special</b>	
<code>\amalg</code> , <code>\P</code> , <code>\S</code> , <code>\%</code> , <code>\dagger</code> , <code>\ddagger</code> , <code>\ldots</code> , <code>\cdots</code>	$\amalg$ , $\P$ , $\S$ , $\%$ , $\dagger$ , $\ddagger$ , $\ldots$ , $\cdots$
<code>\smile</code> , <code>\frown</code> , <code>\wr</code> , <code>\triangleleft</code> , <code>\triangleright</code>	$\smile$ , $\frown$ , $\wr$ , $\triangleleft$ , $\triangleright$
<code>\diamondsuit</code> , <code>\heartsuit</code> , <code>\clubsuit</code> , <code>\spadesuit</code> , <code>\Game</code> , <code>\flat</code> , <code>\natural</code> , <code>\sharp</code>	$\diamondsuit$ , $\heartsuit$ , $\clubsuit$ , $\spadesuit$ , $\Game$ , $\flat$ , $\natural$ , $\sharp$
<b>Unsorted (new stuff)</b>	
<code>\diagup</code> , <code>\diagdown</code> , <code>\centerdot</code> , <code>\ltimes</code> , <code>\rtimes</code> , <code>\leftthreetimes</code> , <code>\rightthreetimes</code>	$\diagup$ , $\diagdown$ , $\cdot$ , $\ltimes$ , $\rtimes$ , $\leftthreetimes$ , $\rightthreetimes$
<code>\eqcirc</code> , <code>\circeq</code> , <code>\triangleq</code> , <code>\bumpeq</code> , <code>\Bumpeq</code> , <code>\doteqdot</code> , <code>\risingdotseq</code> , <code>\fallingdotseq</code>	$\eqcirc$ , $\circeq$ , $\triangleq$ , $\bumpeq$ , $\Bumpeq$ , $\doteqdot$ , $\risingdotseq$ , $\fallingdotseq$
<code>\intercal</code> , <code>\barwedge</code> , <code>\veebar</code> , <code>\doublebarwedge</code> , <code>\between</code> , <code>\pitchfork</code>	$\intercal$ , $\bar{\wedge}$ , $\vee$ , $\bar{\wedge}$ , $\boxtimes$ , $\pitchfork$
<code>\vartriangleleft</code> , <code>\ntriangleleft</code> , <code>\vartriangleright</code> , <code>\ntriangleright</code>	$\vartriangleleft$ , $\ntriangleleft$ , $\vartriangleright$ , $\ntriangleright$
<code>\trianglelefteq</code> , <code>\ntrianglelefteq</code> , <code>\trianglerighteq</code> , <code>\ntrianglerighteq</code>	$\trianglelefteq$ , $\ntrianglelefteq$ , $\trianglerighteq$ , $\ntrianglerighteq$

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

Product	<code>\prod_{i=1}^N x_i</code>	$\prod_{i=1}^N x_i$
Product (force <code>\textstyle</code> )	<code>\textstyle \prod_{i=1}^N x_i</code>	$\prod_{i=1}^N x_i$
Coproduct	<code>\coprod_{i=1}^N x_i</code>	$\prod_{i=1}^N x_i$
Coproduct (force <code>\textstyle</code> )	<code>\textstyle \coprod_{i=1}^N x_i</code>	$\prod_{i=1}^N x_i$
Limit	<code>\lim_{n \to \infty} x_n</code>	$\lim_{n \rightarrow \infty} x_n$
Limit (force <code>\textstyle</code> )	<code>\textstyle \lim_{n \to \infty} x_n</code>	$\lim_{n \rightarrow \infty} x_n$
Integral	<code>\int\limits_1^3 \frac{e^3/x}{x^2} \, dx</code>	$\int_1^3 \frac{e^3/x}{x^2} dx$
Integral (alternative limits style)	<code>\int_1^3 \frac{e^3/x}{x^2} \, dx</code>	$\int_1^3 \frac{e^3/x}{x^2} dx$
Integral (force <code>\textstyle</code> )	<code>\textstyle \int_{-N}^N e^x \, dx</code>	$\int_{-N}^N e^x dx$
Integral (force <code>\textstyle</code> , alternative limits style)	<code>\textstyle \int_{-N}^N e^x \, dx</code>	$\int_{-N}^N e^x dx$
Double integral	<code>\iint\limits_D dx \, dy</code>	$\iint_D dx \, dy$
Triple integral	<code>\iiint\limits_E dx \, dy \, dz</code>	$\iiint_E dx \, dy \, dz$
Quadruple integral	<code>\iiint\limits_F dx \, dy \, dz \, dt</code>	$\iiint_F dx \, dy \, dz \, dt$
Line or path integral	<code>\int_{(x,y) \in C} x^3 \, dx + 4y^2 \, dy</code>	$\int_{(x,y) \in C} x^3 dx + 4y^2 dy$
Closed line or path integral	<code>\oint_{(x,y) \in C} x^3 \, dx + 4y^2 \, dy</code>	$\oint_{(x,y) \in C} x^3 dx + 4y^2 dy$
Intersections	<code>\bigcap_{i=1}^n E_i</code>	$\bigcap_{i=1}^n E_i$
Unions	<code>\bigcup_{i=1}^n E_i</code>	$\bigcup_{i=1}^n E_i$

## 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.

### Example

The equation

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

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

The next line-width is disturbed by large operators.

The code for the math example reads:

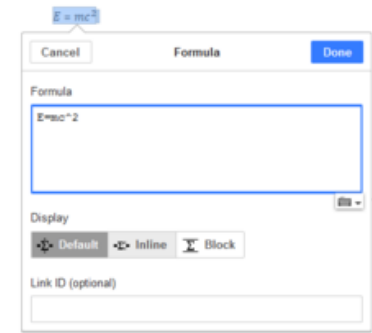
```
<math>\sum_{i=0}^{\infty} 2^{-i}</math>
```

The equation

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

It was entered as

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



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.

## Fractions, matrices, multilines

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



Parenthesizing big expressions, brackets, bars

Feature	Syntax	How it looks rendered
<div>✖</div> Bad	<code>( \frac{1}{2} )^n</code>	$(\frac{1}{2})^n$
<div>✔</div> Good	<code>\left ( \frac{1}{2} \right )^n</code>	$\left(\frac{1}{2}\right)^n$

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

Feature	Syntax	How it looks rendered
Parentheses	<code>\left ( \frac{a}{b} \right )</code>	$\left(\frac{a}{b}\right)$
Brackets	<code>\left [ \frac{a}{b} \right ] \quad \left \lbrack \frac{a}{b} \right \rbrack</code>	$\left[\frac{a}{b}\right] \quad \left[\frac{a}{b}\right]$
Braces	<code>\left \{ \frac{a}{b} \right \} \quad \left \lbrack \frac{a}{b} \right \rbrack</code>	$\left\{\frac{a}{b}\right\} \quad \left\{\frac{a}{b}\right\}$
Angle brackets	<code>\left \langle \frac{a}{b} \right \rangle</code>	$\left\langle\frac{a}{b}\right\rangle$
Bars and double bars	<code>\left   \frac{a}{b} \right   \quad \left \lvert \frac{c}{d} \right \rvert</code>	$\left \frac{a}{b}\right  \quad \left\ \frac{c}{d}\right\ $
Floor and ceiling functions:	<code>\left \lfloor \frac{a}{b} \right \rfloor \quad \left \lceil \frac{c}{d} \right \rceil</code>	$\left\lfloor\frac{a}{b}\right\rfloor \quad \left\lceil\frac{c}{d}\right\rceil$
Slashes and backslashes	<code>\left / \frac{a}{b} \right \backslash</code>	$\left/\frac{a}{b}\right\backslash$
Up, down, and up-down arrows	<code>\left \uparrow \frac{a}{b} \right \downarrow \quad \left \Uparrow \frac{a}{b} \right \Downarrow \quad \left \updownarrow \frac{a}{b} \right \Updownarrow</code>	$\uparrow\frac{a}{b}\downarrow \quad \Uparrow\frac{a}{b}\Downarrow \quad \updownarrow\frac{a}{b}\Updownarrow$
Delimiters can be mixed, as long as <code>\left</code> and <code>\right</code> match	<code>\left [ 0,1 \right ) \quad \left \langle \psi \right  </code>	$[0,1) \quad \langle\psi $
Use <code>\left.</code> and <code>\right.</code> if you do not want a delimiter to appear	<code>\left . \frac{A}{B} \right \} \rightarrow X</code>	$\frac{A}{B}\} \rightarrow X$
Size of the delimiters (add "l" or "r" to indicate the side for proper spacing)	<code>( \bigl( \Bigl( \biggl( \Biggl( \dots \Biggr) \biggr) \Bigr) \bigr) ]</code>	$(((((\dots])))])$
	<code>\{ \bigl\{ \Bigl\{ \biggl\{ \Biggl\{ \dots \Bigr\} \biggr\} \Bigr\} \bigr\} \rangle \rangle \rangle \rangle</code>	$\{\{\{\{\{\dots\}\}\}\}\}\rangle\rangle\rangle\rangle$
	<code>\  \big  \Big  \bigg  \Bigg  \dots \Bigg  \bigg  \Big  \big  \ </code>	$\  \big  \Big  \bigg  \Bigg  \dots \Bigg  \bigg  \Big  \big  \ $
	<code>\lfloor \bigl\lfloor \Bigl\lfloor \biggl\lfloor \Biggl\lfloor \dots \Biggr\rceil \biggr\rceil \Bigr\rceil \bigr\rceil \rceil</code>	$\lfloor \bigl\lfloor \Bigl\lfloor \biggl\lfloor \Biggl\lfloor \dots \Biggr\rceil \biggr\rceil \Bigr\rceil \bigr\rceil \rceil$
	<code>\uparrow \big\uparrow \Big\uparrow \bigg\uparrow \Bigg\uparrow \dots \Downarrow \big\Downarrow \Big\Downarrow \bigg\Downarrow \Bigg\Downarrow</code>	$\uparrow \big\uparrow \Big\uparrow \bigg\uparrow \Bigg\uparrow \dots \Downarrow \big\Downarrow \Big\Downarrow \bigg\Downarrow \Bigg\Downarrow$
	<code>\updownarrow \big\updownarrow \Big\updownarrow \bigg\updownarrow \Bigg\updownarrow \dots \Updownarrow \big\Updownarrow \Big\Updownarrow \bigg\Updownarrow \Bigg\Updownarrow</code>	$\updownarrow \big\updownarrow \Big\updownarrow \bigg\updownarrow \Bigg\updownarrow \dots \Updownarrow \big\Updownarrow \Big\Updownarrow \bigg\Updownarrow \Bigg\Updownarrow$
	<code>/ \big/ \Big/ \bigg/ \Bigg/ \dots \Bigg\backslash \bigg\backslash \Big\backslash \big\backslash \backslash</code>	$///\bigg/\Bigg/\dots\Bigg\backslash\bigg\backslash\Big\backslash\big\backslash\backslash$

## 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:

$$x^2 + y^2 + z^2 = 1$$

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

$$x^2 + y^2 + z^2 = 1 \tag{1}$$

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	
<code>\Alpha \Beta \Gamma \Delta \Epsilon \Zeta \Eta \Theta</code>	ΑΒΓΔΕΖΗΘ
<code>\Iota \Kappa \Lambda \Mu \Nu \Xi \Omicron \Pi</code>	ΙΚΑΜΝΕΟΠ
<code>\Rho \Sigma \Tau \Upsilon \Phi \Psi \Omega</code>	ΡΣΤΥΦΧΨΩ
<code>\alpha \beta \gamma \delta \epsilon \zeta \eta \theta</code>	αβγδεζηθ
<code>\iota \kappa \lambda \mu \nu \xi \omicron \pi</code>	ικλμνξοπ
<code>\rho \sigma \tau \upsilon \phi \chi \psi \omega</code>	ρστυφχψω
<code>\varGamma \varDelta \varTheta \varLambda \varXi \varPi \varSigma \varPhi \varPsi \varOmega</code>	ΓΔΘΛΞΠΣΦΥΩ
<code>\varepsilon \digamma \varkappa \varpi \varrho \varsigma \vartheta \varphi</code>	εFκωρςθφ
Hebrew symbols	
<code>\aleph \beth \gimel \daleth</code>	אבגד
Blackboard bold/scripts	
<code>\mathbb{A}\mathbb{B}\mathbb{C}\mathbb{D}\mathbb{E}\mathbb{F}\mathbb{G}\mathbb{H}\mathbb{I}</code>	A B C D E F G H I
<code>\mathbb{J}\mathbb{K}\mathbb{L}\mathbb{M}\mathbb{N}\mathbb{O}\mathbb{P}\mathbb{Q}\mathbb{R}</code>	J K L M N O P Q R
<code>\mathbb{S}\mathbb{T}\mathbb{U}\mathbb{V}\mathbb{W}\mathbb{X}\mathbb{Y}\mathbb{Z}</code>	S T U V W X Y Z
Boldface	
<code>\mathbf{A}\mathbf{B}\mathbf{C}\mathbf{D}\mathbf{E}\mathbf{F}\mathbf{G}\mathbf{H}\mathbf{I}</code>	A B C D E F G H I
<code>\mathbf{J}\mathbf{K}\mathbf{L}\mathbf{M}\mathbf{N}\mathbf{O}\mathbf{P}\mathbf{Q}\mathbf{R}</code>	J K L M N O P Q R
<code>\mathbf{S}\mathbf{T}\mathbf{U}\mathbf{V}\mathbf{W}\mathbf{X}\mathbf{Y}\mathbf{Z}</code>	S T U V W X Y Z
<code>\mathbf{a}\mathbf{b}\mathbf{c}\mathbf{d}\mathbf{e}\mathbf{f}\mathbf{g}\mathbf{h}\mathbf{i}\mathbf{j}\mathbf{k}\mathbf{l}\mathbf{m}</code>	a b c d e f g h i j k l m
<code>\mathbf{n}\mathbf{o}\mathbf{p}\mathbf{q}\mathbf{r}\mathbf{s}\mathbf{t}\mathbf{u}\mathbf{v}\mathbf{w}\mathbf{x}\mathbf{y}\mathbf{z}</code>	n o p q r s t u v w x y z
<code>\mathbf{0}\mathbf{1}\mathbf{2}\mathbf{3}\mathbf{4}\mathbf{5}\mathbf{6}\mathbf{7}\mathbf{8}\mathbf{9}</code>	0 1 2 3 4 5 6 7 8 9
Boldface (Greek)	
<code>\boldsymbol{\Alpha} \boldsymbol{\Beta} \boldsymbol{\Gamma} \boldsymbol{\Delta} \boldsymbol{\Epsilon} \boldsymbol{\Zeta} \boldsymbol{\Eta} \boldsymbol{\Theta}</code>	ΑΒΓΔΕΖΗΘ
<code>\boldsymbol{\Iota} \boldsymbol{\Kappa} \boldsymbol{\Lambda} \boldsymbol{\Mu} \boldsymbol{\Nu} \boldsymbol{\Xi} \boldsymbol{\Omicron} \boldsymbol{\Pi}</code>	ΙΚΑΜΝΕΟΠ
<code>\boldsymbol{\Rho} \boldsymbol{\Sigma} \boldsymbol{\Tau} \boldsymbol{\Upsilon} \boldsymbol{\Phi} \boldsymbol{\Psi} \boldsymbol{\Omega}</code>	ΡΣΤΥΦΧΨΩ
<code>\boldsymbol{\alpha} \boldsymbol{\beta} \boldsymbol{\gamma} \boldsymbol{\delta} \boldsymbol{\epsilon} \boldsymbol{\zeta} \boldsymbol{\eta} \boldsymbol{\theta}</code>	αβγδεζηθ
<code>\boldsymbol{\iota} \boldsymbol{\kappa} \boldsymbol{\lambda} \boldsymbol{\mu} \boldsymbol{\nu} \boldsymbol{\xi} \boldsymbol{\omicron} \boldsymbol{\pi}</code>	ικλμνξοπ
<code>\boldsymbol{\rho} \boldsymbol{\sigma} \boldsymbol{\tau} \boldsymbol{\upsilon} \boldsymbol{\phi} \boldsymbol{\chi} \boldsymbol{\psi} \boldsymbol{\omega}</code>	ρστυφχψω
<code>\boldsymbol{\varepsilon} \boldsymbol{\digamma} \boldsymbol{\varkappa} \boldsymbol{\varpi}</code>	εFκω
<code>\boldsymbol{\varrho} \boldsymbol{\varsigma} \boldsymbol{\vartheta} \boldsymbol{\varphi}</code>	ρςθφ
Italics (default for Latin alphabet)	
<code>\mathit{0}\mathit{1}\mathit{2}\mathit{3}\mathit{4}\mathit{5}\mathit{6}\mathit{7}\mathit{8}\mathit{9}</code>	0123456789
Greek italics (default for lowercase Greek)	
<code>\mathit{\Alpha} \mathit{\Beta} \mathit{\Gamma} \mathit{\Delta} \mathit{\Epsilon} \mathit{\Zeta} \mathit{\Eta} \mathit{\Theta}</code>	ΑΒΓΔΕΖΗΘ
<code>\mathit{\Iota} \mathit{\Kappa} \mathit{\Lambda} \mathit{\Mu} \mathit{\Nu} \mathit{\Xi} \mathit{\Omicron} \mathit{\Pi}</code>	ΙΚΑΜΝΕΟΠ
<code>\mathit{\Rho} \mathit{\Sigma} \mathit{\Tau} \mathit{\Upsilon} \mathit{\Phi} \mathit{\Psi} \mathit{\Omega}</code>	ΡΣΤΥΦΧΨΩ
Greek uppercase boldface italics	
<code>\boldsymbol{\varGamma} \boldsymbol{\varDelta} \boldsymbol{\varTheta} \boldsymbol{\varLambda}</code>	ΓΔΘΛ
<code>\boldsymbol{\varXi} \boldsymbol{\varPi} \boldsymbol{\varSigma} \boldsymbol{\Upsilon} \boldsymbol{\varOmega}</code>	ΞΠΣΥΩ

Roman typeface	
<code>\mathrm{ABCDEFGHI}</code>	ABCDEFGHI
<code>\mathrm{JKLMNOPQR}</code>	JKLMNOPQR
<code>\mathrm{STUVWXYZ}</code>	STUVWXYZ
<code>\mathrm{abcdefghijklm}</code>	abcdefghijklm
<code>\mathrm{nopqrstuvwxyz}</code>	nopqrstuvwxyz
<code>\mathrm{0123456789}</code>	0123456789
Sans serif	
<code>\mathsf{ABCDEFGHI}</code>	ABCDEFGHI
<code>\mathsf{JKLMNOPQR}</code>	JKLMNOPQR
<code>\mathsf{STUVWXYZ}</code>	STUVWXYZ
<code>\mathsf{abcdefghijklm}</code>	abcdefghijklm
<code>\mathsf{nopqrstuvwxyz}</code>	nopqrstuvwxyz
<code>\mathsf{0123456789}</code>	0123456789
Sans serif Greek (capital only)	
<code>\mathsf{\backslash Alpha \backslash Beta \backslash Gamma \backslash Delta \backslash Epsilon \backslash Zeta \backslash Eta \backslash Theta}</code>	ΑΒΓΔΕΖΗΘ
<code>\mathsf{\backslash Iota \backslash Kappa \backslash Lambda \backslash Mu \backslash Nu \backslash Xi \backslash Omicron \backslash Pi}</code>	ΙΚΑΜΝΞΟΠ
<code>\mathsf{\backslash Rho \backslash Sigma \backslash Tau \backslash Upsilon \backslash Phi \backslash Chi \backslash Psi \backslash Omega}</code>	ΣΤΥΦΧΨΩ
Calligraphy/script	
<code>\mathcal{ABCDEFGHI}</code>	<i>ABCDEF<sup>G</sup>HI</i>
<code>\mathcal{JKLMNOPQR}</code>	<i>JKLMN<sup>O</sup>PQR</i>
<code>\mathcal{STUVWXYZ}</code>	<i>STUVW<sup>X</sup>YZ</i>
Fraktur typeface	
<code>\mathfrak{ABCDEFGHI}</code>	𝔸𝔹𝔼𝔻𝔼𝔢𝔢𝔢𝔢
<code>\mathfrak{JKLMNOPQR}</code>	𝔙𝔸𝔩𝔞𝔞𝔞𝔞𝔞𝔞
<code>\mathfrak{STUVWXYZ}</code>	𝔢𝔗𝔞𝔞𝔞𝔞𝔞𝔞
<code>\mathfrak{abcdefghijklm}</code>	𝔞𝔱𝔱𝔱𝔱𝔱𝔱𝔱𝔱
<code>\mathfrak{nopqrstuvwxyz}</code>	𝔞𝔭𝔭𝔱𝔱𝔱𝔱𝔱𝔱𝔱
<code>\mathfrak{0123456789}</code>	𝔬𝔱𝔱𝔱𝔱𝔱𝔱𝔱
Small scriptstyle text	
<code>{\scriptstyle\text{abcdefghijklm}}</code>	abcdefghijklm

## Mixed text faces

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

## Color

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

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

There are several alternate notations styles

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

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).

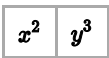
Colors supported			
Apricot	Aquamarine	Bittersweet	Black
Blue	BlueGreen	BlueViolet	BrickRed
Brown	BurntOrange	CadetBlue	CarnationPink
Cerulean	CornflowerBlue	Cyan	Dandelion
DarkOrchid	Emerald	ForestGreen	Fuchsia
Goldenrod	Gray	Green	GreenYellow
JungleGreen	Lavender	LimeGreen	Magenta
Mahogany	Maroon	Melon	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	
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 way of setting a background color is by setting a CSS styling rule for a table cell:

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

Rendered as:



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 \quad b	<i>a</i> <i>b</i>
quad space	a \quad b	<i>a</i> <i>b</i>
text space	a\ b	<i>a</i> <i>b</i>
text space in text mode	a \text{ } b	<i>a</i> <i>b</i>
large space	a\;b	<i>a</i> <i>b</i>
medium space	a\<b	[not supported]
small space	a\,b	<i>a</i> <i>b</i>
tiny space (use for multiplication of factors)	ab	<i>a</i> <i>b</i>
tiny space (syntax space ignored)	a b	<i>a</i> <i>b</i>
no space (use for multi-letter variables)	\mathit{ab}	<i>ab</i>
small negative space	a\!b	<i>a</i> <i>b</i>

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 + ...**

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 + ...**

#### 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 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.

## \ooint and \oiint

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 `\oiintt` 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.

`\joint` looks like:

$$\lim_{\substack{\longrightarrow \\ \mathrm{d}}} \mathbf{A} = \mathbf{D}$$
$$\int_{\partial D} \frac{1}{|z - w|} dz = 0$$
$$\int \partial V = \frac{1}{2} \int \left( \nabla^2 V + (\nabla V)^2 \right) dV$$
$$\int_{\partial D} \frac{1}{|z|} dz = \int_0^{2\pi} \frac{1}{1} i e^{it} dt = i \int_0^{2\pi} e^{it} dt = i [e^{it}]_0^{2\pi} = i(e^{2\pi i} - e^0) = i(1 - 1) = 0$$

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 `\oiint` as PNG images

These symbols are available as PNG images which are also integrated into two templates, `{{oiint}}` and `{{oiint}}`, 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: 
$$\oiint_{\scriptstyle S} (\nabla \times \mathbf{F}) \cdot \mathrm{d}\mathbf{S} = \oint_{\partial S} \mathbf{F} \cdot \mathrm{d}\mathbf{\ell}$$

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

- Ampère's law + correction: 
$$\oiint_C \mathbf{B} \cdot \mathrm{d}\mathbf{\ell} = \mu_0 \oint_S \left( \mathbf{J} + \epsilon_0 \frac{\partial \mathbf{E}}{\partial t} \right) \cdot \mathrm{d}\mathbf{S}$$

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

- Continuity of 4-momentum flux (in general relativity):<sup>[2]</sup> 
$$\oiint_{\scriptstyle \partial V} \mathbf{P} = \oiint_{\scriptstyle \partial V} \mathbf{T} \cdot \mathrm{d}\mathbf{S} = 0$$

---

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

Some variants of `\oiint` and `\oiint` 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.

#### Arc notation `\overarc`

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

#### Triple dot `\dddot`

`\dddot` is not implemented. For a workaround use `\overset{\cdot}{\cdot}{\cdot}{x}`, which gives  $\overset{\cdot}{\cdot}{\cdot}{x}$ .

## Starred operatorname `\operatorname*`

The starred version of `\operatorname` is not currently supported. A workaround for

```
\operatorname*{median}_{j\,\neq\,i} X_{i,j}
```

is

```
\operatorname{\underset{\mathit{j\,\neq\,i}}{median}} X_{i,j}
```

## Strikethrough

Strikethrough like `\sout` or `\st` is not implemented, nor is overlapping like `\rlap`. This means struck characters like  $\lambda$  are difficult to type, except the hardcoded `\hbar`. A workaround suffix for a normal strikethrough is `\!\!\!\!` `\frac{}{\ }`, and for elevated strikethrough is `\lambda \!\!\!\!^{ }\underline{\ \ \ }` , which give

$\bar{q}$ ,  $\bar{\lambda}$

## 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.

## Unicode characters

Non-ASCII Unicode characters like  $\pi$  work in MathML, and MathJax but not in texvc so should currently be avoided. In the long term it may be possible to use these characters.

## Deprecatcd syntax

The following texvc commands are now deprecated and should be avoided. This is part of a effort to update the math engine see mw:Extension:Math/Roadmap for details. A bot User:Texvc2LaTeXBot will replace this syntax on the English Wikipedia.

Current syntax	Suggested replacement	Comment
<code>\$</code>	<code>\\$</code>	redefinition would involve changing the character code
<code>%</code>	<code>\%</code>	redefinition would involve changing the character code
<code>\or</code>	<code>\lor</code>	see [1] ( <a href="https://tex.stackexchange.com/questions/418490">https://tex.stackexchange.com/questions/418490</a> ); causes teubner to fail
<code>\and</code>	<code>\land</code>	causes normal align environment to fail
<code>\pagecolor</code>	remove	not needed and not working anymore, done manually
<code>\part</code>	<code>\partial</code>	acceptable if the document doesn't use sectioning with <code>\part</code> .
<code>\ang</code>	<code>\angle</code>	this only conflicts with siunitx package.
<code>\C</code>	<code>\Complex</code>	conflicts with puenc.def e.g. from hyperref package
<code>\H</code>	<code>\mathbb{H}</code>	conflicts with text command <code>\H{0}</code> which is $\delta$ .
<code>\bold</code>	<code>\mathbf</code>	
<code>\Bbb</code>	<code>\mathbb</code>	

## Chemistry

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

- `<chem>...</chem>` (`<ce>...</ce>` is a deprecated alias for it)

- `<math chem>...</math>`
- `{{chem}}` **and** `{{chem2}}`

`<chem>X</chem>` is short for `<math chem>\ce{X}</math>` (where X is a chemical sum formula)

Technically, `<math chem>` 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>).

If the formula reaches a certain "complexity", spaces might be ignored (`<chem>A + B</chem>` might be rendered as if it were `<chem>A+B</chem>` with a positive charge). In that case, write `<chem>A{ } + B</chem>` (and *not* `<chem>{A} + {B}</chem>` as was previously suggested). This will allow auto-cleaning of formulae once the bug will be fixed and/or a newer `mhchem` version will be used.

Please note that there are still major issues (<https://phabricator.wikimedia.org/T140217>) with `mhchem` support in MediaWiki. Some issue can be solved by enabling the extension using `<math chem>` and formatting individual items with `\ce`. For example,

- `<math chem>\ce{pIC_{50}} = -\log_{10} \ce{(IC_{50})}</math>`

$$\text{pIC}_{50} = -\log_{10} (\text{IC}_{50})$$

## Molecular and condensed formula

mhchem		{{chem}}		{{chem2}}		Equivalent HTML	
Markup	Renders as	Markup	Renders as	Markup	Renders as	Markup	Renders as
<code>&lt;chem&gt;H2O&lt;/chem&gt;</code>	H <sub>2</sub> O	<code>{{chem H 2 O}}</code>	H <sub>2</sub> O	<code>{{chem2 H2O}}</code>	H <sub>2</sub> O	<code>H&lt;sub&gt;2&lt;/sub&gt;O</code>	H <sub>2</sub> O
<code>&lt;chem&gt;Sb2O3&lt;/chem&gt;</code>	Sb <sub>2</sub> O <sub>3</sub>	<code>{{chem Sb 2 O 3}}</code>	Sb <sub>2</sub> O <sub>3</sub>	<code>{{chem2 Sb2O3}}</code>	Sb <sub>2</sub> O <sub>3</sub>	<code>Sb&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;3&lt;/sub&gt;</code>	Sb <sub>2</sub> O <sub>3</sub>
<code>&lt;chem&gt;(NH4)2S&lt;/chem&gt;</code>	(NH <sub>4</sub> ) <sub>2</sub> S	<code>{{chem {{chem N H 4}} 2 S}}</code>	(NH <sub>4</sub> ) <sub>2</sub> S	<code>{{chem2 (NH4)2S}}</code>	(NH <sub>4</sub> ) <sub>2</sub> S	<code>(NH&lt;sub&gt;4&lt;/sub&gt;&lt;sub&gt;2&lt;/sub&gt;S</code>	(NH <sub>4</sub> ) <sub>2</sub> S

## Bonds

mhchem		Equivalent { {chem} } and HTML		{ {chem2} }	
		Markup	Renders as	Markup	Renders as
Markup	Renders as	<div><pre>{{chem C 6 H 5}}-CHO &lt;br/&gt; C&lt;sub&gt;6&lt;/sub&gt;&lt;/sub&gt;H&lt;sub&gt;5&lt;/sub&gt;-CHO</pre></div>	<div>C<sub>6</sub>H<sub>5</sub>-CHO</div> <div>C<sub>6</sub>H<sub>5</sub>-CHO</div>	<div><pre>{{chem2 C6H5\sCHO}} </pre></div>	<div>C<sub>6</sub>H<sub>5</sub>-CHO</div>
<div><pre>&lt;chem&gt;A- B=C#D&lt;/chem&gt;</pre></div>	<div>A-B=C≡D</div>	<div>A-B=C≡D</div>	<div>N/A</div>	<div><pre>{{chem2 1=A\sB=C#D}} </pre></div>	<div>A-B=C≡D</div>

## Charges

mhchem		{ {chem} }		Equivalent HTML	
Markup	Renders as	Markup	Renders as	Markup	Renders as
<code>&lt;chem&gt;H+&lt;/chem&gt;</code>	$\text{H}^+$	<code>{{chem H +}}</code>	$\text{H}^+$	<code>H&lt;sup&gt;+&lt;/sup&gt;</code>	$\text{H}^+$
<code>&lt;chem&gt;NO3-&lt;/chem&gt;</code>	$\text{NO}_3^-$	<code>{{chem N O 3 -}}</code>	$\text{NO}_3^-$	<code>NO&lt;sub&gt;3&lt;/sub&gt;&lt;sup&gt;-&lt;/sup&gt;</code>	$\text{NO}_3^-$
<code>&lt;chem&gt;CrO4^2-&lt;/chem&gt;</code>	$\text{CrO}_4^{2-}$	<code>{{chem Cr O 4 2-}}</code>	$\text{CrO}_4^{2-}$	<code>CrO&lt;sub&gt;4&lt;/sub&gt;&lt;sup&gt;2-&lt;/sup&gt;</code>	$\text{CrO}_4^{2-}$
<code>&lt;chem&gt;AgCl2-&lt;/chem&gt;</code>	$\text{AgCl}_2^-$	<code>{{chem Ag Cl 2 -}}</code>	$\text{AgCl}_2^-$	<code>AgCl&lt;sub&gt;2&lt;/sub&gt;&lt;sup&gt;-&lt;/sup&gt;</code>	$\text{AgCl}_2^-$
<code>&lt;chem&gt;[AgCl2]-&lt;/chem&gt;</code>	$[\text{AgCl}_2]^-$	<code>{{chem [[{{chem Ag Cl 2}}] -}}</code>	$[\text{AgCl}_2]^-$	<code>[AgCl&lt;sub&gt;2&lt;/sub&gt;&lt;sup&gt;-&lt;/sup&gt;]</code>	$[\text{AgCl}_2]^-$
<code>&lt;chem&gt;Y^99+&lt;/chem&gt;</code> <code>&lt;chem&gt;Y^{99+}&lt;/chem&gt;</code>	$\text{Y}^{99+}$ $\text{Y}^{99+}$	<code>{{chem Y 99+}}</code>	$\text{Y}^{99+}$	<code>Y&lt;sup&gt;99+&lt;/sup&gt;</code>	$\text{Y}^{99+}$

## Addition compounds and stoichiometric numbers

mhchem		{ {chem} }		{ {chem2} }	
Markup	Renders as	Markup	Renders as	Markup	Renders as
<code>&lt;chem&gt;MgSO4.7H2O&lt;/chem&gt;</code>	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	<code>{{chem Mg S O 4}}&amp;\text{middot};7\{\text{chem H 2 O }\}</code>	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	<code>{{chem2 MgSO4*7H2O }}</code>	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
<code>&lt;chem&gt;KCr(SO4)2*12H2O&lt;/chem&gt;</code>	$\text{KCr}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	<code>{{chem K Cr {{chem S O 4}} 2}}&amp;\text{middot};12\{\text{chem H 2 O }\}</code>	$\text{KCr}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	<code>{{chem2 KCr(SO4)2*12H2O }}</code>	$\text{KCr}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$
<code>&lt;chem&gt;CaSO4.1/2H2O + 1/2H2O -&gt; CaSO4.2H2O&lt;/chem&gt;</code>	$\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O} + \frac{1}{2}\text{H}_2\text{O} \rightarrow \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	<code>{{chem Ca S O 4}}&amp;\text{middot};\frac{1}{2}\{\text{chem H 2 O }\} + \frac{1}{2}\{\text{chem H 2 O }\} \rightarrow \{\text{chem Ca S O 4}}&amp;\text{middot};2\{\text{chem H 2 O }\}</code>	$\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O} + \frac{1}{2}\text{H}_2\text{O} \rightarrow \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	<code>{{chem2 2CaSO4*H2O + 3H2O -&gt; 2CaSO4*2H2O }}</code>	$2\text{CaSO}_4 \cdot \text{H}_2\text{O} + 3\text{H}_2\text{O} \rightarrow 2\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
<code>&lt;chem&gt;25/2 O2 + C8H18 -&gt; 8 CO2 + 9 H2O&lt;/chem&gt;</code>	$\frac{25}{2}\text{O}_2 + \text{C}_8\text{H}_{18} \rightarrow 8\text{CO}_2 + 9\text{H}_2\text{O}$	<code>8\{\frac{1}{2}\{\text{chem O 2}\} + \{\text{chem C 8 H 18}\} \rightarrow 8\{\text{chem C O 2}\} + 9\{\text{chem H 2 O }\}</code>	$\frac{25}{2}\text{O}_2 + \text{C}_8\text{H}_{18} \rightarrow 8\text{CO}_2 + 9\text{H}_2\text{O}$	<code>{{chem2 25 O2 + 2 C8H18 -&gt; 16 CO2 + 18 H2O }}</code>	$25\text{O}_2 + 2\text{C}_8\text{H}_{18} \rightarrow 16\text{CO}_2 + 18\text{H}_2\text{O}$

## Wiki linking

**(Italic) Math**

## Oxidation states

## Greek characters

## Isotopes

mhchem		Equivalent <code>{{chem}}</code> and HTML	
Markup	Renders as	Markup	Renders as
<code>&lt;chem&gt;^{227} {90}Th&lt;/chem&gt;</code>	$^{227}_{90}\text{Th}^+$	<code>{{chem 227 90 Th +}}</code>	$^{227}_{90}\text{Th}^+$
<code>&lt;chem&gt;^0 {-1}n&lt;/chem&gt;</code>	$^0_{-1}\text{n}^-$	<code>{{chem 0 -1}}n&lt;sup&gt;-&lt;/sup&gt;</code>	$^0_{-1}\text{n}^-$

## States

States subscripting is not IUPAC recommendation.

mhchem		<code>{{chem}}</code>	
Markup	Renders as	Markup	Renders as
<code>&lt;chem&gt;H2_{(aq)}&lt;/chem&gt;</code>	$\text{H}_{2(\text{aq})}$	<code>{{chem H 2(aq)}}</code>	$\text{H}_{2(\text{aq})}$
<code>&lt;chem&gt;CO3^{2-}(aq)&lt;/chem&gt;</code>	$\text{CO}_3^{2-}(\text{aq})$	<code>{{chem C O 3 2-}}(aq)</code>	$\text{CO}_3^{2-}(\text{aq})$

## Precipitate

mhchem	Markup	<code>&lt;chem&gt;Ba^2+ + SO4^{2-} -&gt; BaSO4(v)&lt;/chem&gt;</code>
	Renders as	$\text{Ba}^{2+} + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4\downarrow$
<code>{{chem}}</code>	Markup	<code>{{chem Ba 2+}} + {{chem S O 4 2-}} \rightarrow {{chem Ba S O 4}}\downarrow</code>
	Renders as	$\text{Ba}^{2+} + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4\downarrow$
<code>{{chem2}}</code>	Markup	<code>{{chem2 Ba(2+) + SO4(2-) -&gt; BaSO4\downarrow}}</code>
	Renders as	$\text{Ba}^{2+} + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4\downarrow$
Equivalent HTML	Markup	<code>Ba&lt;sup&gt;2+&lt;/sup&gt; + SO&lt;sub&gt;4&lt;/sub&gt;&lt;sup&gt;2&amp;minus;&lt;/sup&gt; &amp;rarr; BaSO&lt;sub&gt;4&lt;/sub&gt;&amp;darr;</code>
	Renders as	$\text{Ba}^{2+} + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4\downarrow$

## Reaction arrows

Markup	Renders as
<code>&lt;chem&gt;A -&gt;B&lt;/chem&gt;</code>	$\text{A} \rightarrow \text{B}$
<code>&lt;chem&gt;A &lt;- B&lt;/chem&gt;</code>	$\text{A} \leftarrow \text{B}$

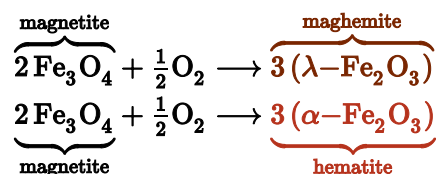
<code>&lt;chem&gt;A &lt;=&gt; B&lt;/chem&gt;</code>	$A \rightleftharpoons B$
<code>&lt;chem&gt;A &lt;=&gt;&gt; B&lt;/chem&gt;</code>	$A \rightleftharpoons B$
<code>&lt;chem&gt;A &lt;&lt;=&gt; B&lt;/chem&gt;</code>	$A \leftrightharpoons B$
<code>&lt;chem&gt;A -&gt;[{} \textcolor{green}{\atop x}] B&lt;/chem&gt;</code>	$A \xrightarrow{x} B$
<code>&lt;chem&gt;A -&gt;[\textcolor{green}{text above}][\textcolor{green}{text below}] B&lt;/chem&gt;</code>	$\begin{array}{ccc} \textcolor{green}{\text{text above}} & & \\ A & \longrightarrow & B \\ \textcolor{green}{\text{text below}} & & \end{array}$
<code>&lt;chem&gt;A -&gt;[{} \textcolor{green}{\atop \textcolor{blue}{ce{+H2O}}}] B&lt;/chem&gt;</code>	$A \xrightarrow{+\textcolor{blue}{\text{H}_2\text{O}}} B$

Comparison of arrow symbols

Markup	Renders as
<code>&lt;math&gt;\rightarrow&lt;/math&gt;</code>	$\rightarrow$
<code>&lt;math&gt;\rightleftarrows&lt;/math&gt;</code>	$\rightleftarrows$
<code>&lt;math&gt;\rightleftharpoons&lt;/math&gt;</code>	$\rightleftharpoons$
<code>&lt;math&gt;\leftrightharpoonrightarrow&lt;/math&gt;</code>	$\leftrightharpoonrightarrow$
<code>&lt;math&gt;\longrightarrow&lt;/math&gt; <code>&lt;chem&gt;-&gt;&lt;/chem&gt;</code></code>	$\longrightarrow$ $\longrightarrow$
<code>&lt;math&gt;\rightleftharpoons&lt;/math&gt; <code>&lt;chem&gt;&lt;=&gt;&lt;/chem&gt;</code></code>	$\rightleftharpoons$ $\rightleftharpoons$
<code>&lt;math&gt;\longleftrightarrow&lt;/math&gt; <code>&lt;chem&gt;&lt;-&gt;&lt;/chem&gt;</code></code>	$\longleftrightarrow$ $\longleftrightarrow$

Further examples using ordinary LaTeX tags

```
<math chem>\begin{align}
\overbrace{\textcolor{blue}{ce{2Fe3O4}}^{\textcolor{green}{\text{magnetite}}}} + \textcolor{blue}{ce{1/2 O2}} ->\textcolor{brown}{\text{ }} & \textcolor{brown}{\text{ }} \\
\overbrace{\textcolor{blue}{ce{3 (\lambda Fe2O3)}}^{\textcolor{green}{\text{maghemite}}}} \textcolor{blue}{\text{ }} & \textcolor{blue}{\text{ }} \\
\underbrace{\textcolor{blue}{ce{2Fe3O4}}_{\textcolor{green}{\text{magnetite}}}} + \textcolor{blue}{ce{1/2 O2}} ->\textcolor{red}{\text{ }} & \textcolor{red}{\text{ }} \\
\underbrace{\textcolor{blue}{ce{3 (\alpha Fe2O3)}}_{\textcolor{green}{\text{hematite}}}} & \textcolor{green}{\text{ }} \\
\end{align}</math>
```



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

## 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

### Diagrams in TeX

Xy-pic (<http://www.tug.org/applications/Xy-pic/>) (online manual (<http://tex.loria.fr/graph-pack/doc-xy-pic/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:

```

\documentclass[border=10pt]{standalone} % Crop to size, remove page numbers, leave margin
\usepackage[all]{xy} % Loading the XY-Pic package
\begin{document}
\SelectTips{eu}{} % Euler (shorter) arrowheads (tips)
$$
\xymatrix{
%% Diagram goes here %%
}
$
\end{document}

```

Using postscript drivers may in some cases give smoother curves and will handle fonts differently:

```

\usepackage[all, ps, dvips]{xy}

```

### 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:

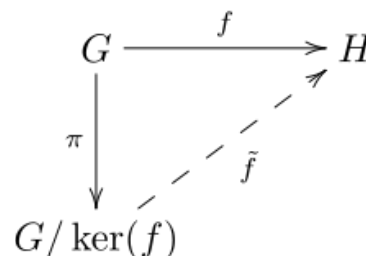
```

pdflatex file.tex
pdf2svg file.pdf file.svg

```

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):



A sample commutative diagram, created in the manner described



```
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 (<https://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 [[commons:Licensing#Well-known licenses|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`.

Examples of implemented TeX formulas

Quadratic polynomial

Markup	<code>&lt;math&gt;ax^2 + bx + c = 0&lt;/math&gt;</code>
Renders as	$ax^2 + bx + c = 0$

Quadratic formula

Markup	<code>&lt;math&gt;x={\frac {-b{\pm }\sqrt {b^{2}-4ac}}{2a}}&lt;/math&gt;</code>
Renders as	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Tall parentheses and fractions

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

Integrals

Markup	<code>&lt;math&gt;\int_a^x \int_a^s f(y) \, dy \, ds = \int_a^x f(y)(x-y) \, dy&lt;/math&gt;</code>
Renders as	$\int_a^x \int_a^s f(y) \, dy \, ds = \int_a^x f(y)(x-y) \, dy$

Markup	<code>&lt;math&gt;\int e^{\infty}\frac{1}{t(\ln t)^2}dt = \left. \frac{-1}{\ln t} \right _e^{\infty} = 1&lt;/math&gt;</code>
Renders as	$\int_e^{\infty} \frac{1}{t(\ln t)^2} dt = \left. \frac{-1}{\ln t} \right _e^{\infty} = 1$

### Matrices and determinants

Markup	<code>&lt;math&gt;\det(\mathbf{A}-\lambda \mathbf{I}) = 0&lt;/math&gt;</code>
Renders as	$\det(\mathbf{A} - \lambda \mathbf{I}) = 0$

### Summation

Markup	<code>&lt;math&gt;\sum_{i=0}^{n-1} i&lt;/math&gt;</code>
Renders as	$\sum_{i=0}^{n-1} i$
Markup	<code>&lt;math&gt;\sum_{m=1}^{\infty}\sum_{n=1}^{\infty}\frac{m^2n}{3^m\left(m3^n+n3^m\right)}&lt;/math&gt;</code>
Renders as	$\sum_{m=1}^{\infty}\sum_{n=1}^{\infty}\frac{m^2n}{3^m\left(m3^n+n3^m\right)}$

### Differential equation

Markup	<code>&lt;math&gt;u'' + p(x)u' + q(x)u=f(x), \quad x&gt;a&lt;/math&gt;</code>
Renders as	$u'' + p(x)u' + q(x)u = f(x), \quad x > a$

### Complex numbers

Markup	<div><code>&lt;math&gt; \bar{z}  =  z ,\\  (\bar{z})^n  =  z ^n,\\ \arg(z^n) = n \arg(z)&lt;/math&gt;</code></div>
Renders as	$ \bar{z}  =  z ,  (\bar{z})^n  =  z ^n, \arg(z^n) = n \arg(z)$

### Limits

Markup	<code>&lt;math&gt;\lim_{z\rightarrow z_0} f(z)=f(z_0)&lt;/math&gt;</code>
Renders as	$\lim_{z\rightarrow z_0} f(z) = f(z_0)$

### Integral equation

Markup	<div><code>&lt;math&gt;\phi_n(\kappa) = \frac{1}{4\pi^2\kappa^2} \int_0^{\infty} \frac{\sin(\kappa R)}{\kappa R}&lt;/math&gt;</code></div>
--------	--

	<div><math display="block">\frac{\partial}{\partial R} \left[ R^2 \frac{\partial}{\partial R} \left( \frac{\partial D_n(R)}{\partial R} \right) \right] dR</math></div>
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	<div><math display="block">\phi_n(\kappa) = 0.033 C_n^2 \kappa^{-11/3}, \quad \frac{1}{L_0} \ll \kappa \ll \frac{1}{l_0}</math></div>
Renders as	$\phi_n(\kappa) = 0.033 C_n^2 \kappa^{-11/3}, \quad \frac{1}{L_0} \ll \kappa \ll \frac{1}{l_0}$

Continuation and cases

Markup	<div><math display="block">f(x) = \begin{cases} 1 &amp; -1 \leq x &lt; 0 \\ \frac{1}{2} &amp; x = 0 \\ 1 - x^2 &amp; \text{otherwise} \end{cases}</math></div>
Renders as	$f(x) = \begin{cases} 1 & -1 \leq x < 0 \\ \frac{1}{2} & x = 0 \\ 1 - x^2 & \text{otherwise} \end{cases}$

Prefixed subscript

Markup	<div><math display="block">{}_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></div>
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	<div><math display="block">\frac{a}{b} \quad \frac{a}{b}</math></div>
Renders as	$\frac{a}{b} \quad \frac{a}{b}$

Area of a quadrilateral

Markup	<div><math display="block">S = dD \sin \alpha</math></div>
Renders as	$S = dD \sin \alpha$

Volume of a sphere-stand

Markup	<code>&lt;math&gt;V = \frac{1}{6} \pi h \left[ 3 \left( r_1^2 + r_2^2 \right) + h^2 \right]&lt;/math&gt;</code>
Renders as	$V = \frac{1}{6} \pi h \left[ 3 \left( r_1^2 + r_2^2 \right) + h^2 \right]$

Multiple equations

Markup	<div><code>&lt;math&gt;\begin{align}u &amp;= \tfrac{1}{\sqrt{2}}(x+y) &amp; \qquad x &amp;= \tfrac{1}{\sqrt{2}}(u+v) \\v &amp;= \tfrac{1}{\sqrt{2}}(x-y) &amp; \qquad y &amp;= \tfrac{1}{\sqrt{2}}(u-v) \\ \end{align}&lt;/math&gt;</code></div>
Renders as	<div><math display="block">\begin{array}{ll} u = \frac{1}{\sqrt{2}}(x+y) &amp; x = \frac{1}{\sqrt{2}}(u+v) \\ v = \frac{1}{\sqrt{2}}(x-y) &amp; y = \frac{1}{\sqrt{2}}(u-v) \end{array}</math></div>

See also

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

References

Footnotes

- 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.
- This can cause difficulty with setting the baseline as vertical alignment with the surrounding text can also be a problem (see bug 32694)

Citations

- Ed Sanders (December 18, 2016). "Consider a longer, less ambiguous name for <ce>" (<https://phabricator.wikimedia.org/T153606>). Wikimedia Foundation. Retrieved April 24, 2017.
- 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* (<http://www.ctan.org/tex-archive/info/gentle/gentle.pdf>) (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<sub>ε</sub>* (<http://www.ctan.org/tex-archive/info/lshort/english/lshort.pdf>) (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

### Wikipedia help pages

Visit the *Teahouse* if you are a new editor looking for interactive help, or the *Help desk* for an interactive **Q & A** forum.

**FAQs** (?) · **Reference desks** (?) · **Noticeboards** (?) · **Missing Manual** (?) · **Cheatsheet** (?) · **Directories** (?)

#### About Wikipedia

Administration (Purpose · Principles · Wikipedia in brief) · Policies and guidelines · What Wikipedia is not · Disclaimer (parental advice) · Making requests (w here to ask questions · contact Wikipedia directly) · Who writes Wikipedia? · Why create an account?

#### Help for readers

FAQ · Books · Copyright · Glossary · Mobile access · Navigation · Other languages · Searching · Students · Viewing media

#### Contributing to Wikipedia

A plain and simple overview · A primer for new comers · Advice for young editors · Avoiding common mistakes · Etiquette (community expectations) · Learning the ropes · Instructional material · Simplified Manual of Style · Simplified rule-set ("Ignore all rules" · "The rules are principles") · Style-tips · Tip of the day · Task Center · Your first article (article wizard) · Vandalism

#### Getting started

Wikipedia intro · Wikipedia tutorial · The Wikipedia Adventure · Manual of Style intro · Graphics tutorials · Picture tutorial (Uploading intro) · IRC (live chat) tutorial · Navigating intro · Policies intro · Referencing intro · Tables intro · Talk pages intro · VisualEditor user guide

#### Dos and don'ts

Accessibility · Bio's · Categorization · Disambiguation · Images · Links · Lists · References · Tables · Talks

#### How-to pages and information pages

Appealing blocks · Article deletion · Categories · Citations/references (Referencing for beginners · Citation Style 1 · Cite errors · References and page numbers) · Convert · Diff · Editing (Minor edit · toolbar · edit conflict) · Email confirmation · Find sources · Files · Footnotes · Image deletion · Infoboxes · Linking (link color) · Logging in · Merging · Namespaces · Page name · Redirect · Renaming pages · Passwords · Reverting · Talk pages (archiving) · URL · User contributions · User page design center

#### Coding wiki markup

Wiki markup · Barcharts · Calculations · Characters · Citation templates · Columns · Hidden text · HTML · Lists · Magic words (introduction) · Music symbols · Sections · Sounds · Tables (introduction) · Templates (documentation · messages (cleanup messages)) · Transclusion · Visual files · Wiki tools

**Directories**

Abbreviations · Departments · Editor's index · Essays · FAQs · Glossary · Guidelines · Help menu · Manual of Style · Policies · Shortcuts · Tasks · Tips

**Wikipedia technical help**

**Get personal technical help at the Teahouse, Help desk, Village pump (technical), talk pages or IRC.**

**General technical help**

Editing (Edit toolbar · CharInsert · Edit conflict · Reverting) · VisualEditor (User guide) · Create a page · Page history · Page information · Page name (Introduction) · Browser notes (Keyboard shortcuts · Troubleshooting · Bypass cache) · Mobile access · Multilingual support · Special Characters (Entering) · Printing · User access levels · Software notices (Editnotice) · IRC (Tutorial)

**Special page related**

Special page help · Searching (Linksearch) · Logging in (Reset passwords) · Notifications/Echo (FAQ) · Moving a page (Fixing cut-and-paste moves) · Watching pages · User contributions · Emailing users · Random pages · Logs · What links here · Related changes · Recent changes · Pending changes · Page Curation · Page import · Edit filter · Tags

**Wikitext**

Wikitext main page (Cheatsheet) · Colours use · Columns · Line-break handling · Lists · Magic words (For beginners · Conditional expressions · Switch parser function · Time function) · Redirects · Sections and TOCs · Tables (Introduction · Basics · Conditional tables · Sorting · Collapsing · Advanced table formatting)

**Links and diffs**

URLs · Links · Permanent link · Interwikimedia links · Interlanguage links · Link color · Pipe trick · Colon trick · Magic links · Diffs (Simplest diff guide · Simple diff and link guide · Complete diff and link guide)

**Media files: images, videos and sounds**

Media help · Options to hide an image · Uploading images (Introduction) · Files (Creation and usage · Moving files to Commons) · Visual file markup · Images (Preparing images for upload · Picture tutorial · Extended image syntax) · Gallery tag · Graphics tutorials (Basic bitmap image editing · How to improve image quality) · Graphics Lab resources · Sound file markup · SVG help

**Other graphics**

Family trees · Graphs and charts (How to create · To scale charts · Barcharts) · Math formula (Math symbols · Rendering math · LaTeX symbols) · Musical scores (Musical symbols) · Timeline (EasyTimeline syntax) · WikiHiero syntax

**Templates and Lua modules**

Templates · Template messages · Citation templates · Transclusion (Labeled section) · Substitution · Advanced template coding · Template limits · Template sandbox and test cases · Template documentation · Purge (Job queue) · Lua help · Lua project (To do · Resources) · Guide to Scribbling

**Data structure**

Namespaces · Main/Article · Talk namespaces (Archiving) · User (User page design) · Project/Wikipedia · File (File description page) · MediaWiki (Bug reports and feature requests · System message) · Template · Help · Category · Portal · Book · Draft · TimedText · Module/Lua · Special

**HTML and CSS**

HTML in wikitext · Markup validation · Span tags · Cascading Style Sheets · Catalogue of CSS classes · Useful styles · Classes used in microformats · Ambox classes · Common.js and common.css · User CSS for monospaced coding font

**Customisation and tools**

Preferences · Skins · Customizing watchlists (Hide pages) · Gadgets · Beta Features · User scripts (Guide · Techniques) · IRC Scripts · User styles · Tools (Navigation shortcuts · Browser tools · Alternative browsing · Editing tools · Optimum tool set) · Cleaning up vandalism tools · Citation tools · Wikimedia Cloud Services

**Automating editing**

Bots (Creating) · Twinkle · HotCat · WPCleaner · igloo · AutoWikiBrowser · Navigation popups · STiki · AfC helper script · Huggle

**See also:** **Category:Wikipedia information pages** · **Category:Wikipedia how-to**

Further navigation at: Help pages (Administrators) · Templates · Referencing (Citation metadata) · Accessibility · Bots · User scripts · Accounts

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