TeX Commands Available in MathJax

This is a print version of the free, online resource
by Dr. Carol JVF Burns, located at:
`http://www.onemathematicalcat.org/MathJaxDocumentation/TeXSyntax.htm`

This print version is for the convenience of readers
who like to feel the paper between their fingers, highlight,
write notes in margins, or who must work away from a computer.
An extra bonus—you don't have to wait for the gigantic web page to load!

All ‘collapsing paragraphs’ were opened up, so the document is completely visible.
The web page was stripped of extraneous materials (headers, footers, ads)
and then converted to a pdf file.
Page breaks were added to start most sections on a new page; page numbers were added.
Other than this, the print version is identical to its online version.

This print version (of course) lacks the dynamic benefits of the actual web page.
For full functionality, visit the online web page.

Table of Contents for the Print Version

TEX Commands available in MathJax

MathJax homepage

Jump to the alphabetical list of commands

THIS IS A BIG PAGE.
It may take a while to process.
You can watch the progress in the lower left corner—it loads most reliably if you ***resist the temptation to click on something before it's done***.
I think it's worth the wait (but of course I'm biased).
You can read about why it's so big below.

This document was created in Spring of 2011.
As of May 2017, it is being processed using MathJax 2.7.1 (loaded from my own server).

I (Dr. Carol JVF Burns) prepared this page to thoroughly familiarize myself with the TEX commands that are available in MathJax,
and to provide a resource that may be useful to other MathJax users.
Davide Cervone, the lead developer of MathJax, has most generously provided extensive edits,
and this page is greatly improved due to his efforts; I owe him countless thanks.
All mistakes on this page are my own (and I welcome suggestions and corrections).
Please contact me via the contact form on my homepage.

MathJax allows a syntax modeled on both TEX and LATEX .
Therefore, web authors can use familiar and concise commands when creating mathematics with MathJax.

Click to show/hide: WHY IS THIS SUCH A BIG PAGE?

The TEX commands available in MathJax are listed alphabetically on this page, each with a brief description.
Everything is on this single page, instead of (say) having each letter as its own page.
My decision is that the advantages of this approach outweigh the disadvantage:

ADVANTAGES	DISADVANTAGE
• You can easily scroll through and use 'find' features on everything at once, making it more likely to find what you're looking for, even if you don't know its name. • You can use this page as a 'MathJax torture test'. If it loads in an acceptable time, and displays things acceptably, then you're all set. • It's easier to compare different viewing environments with everything on the same page. • You can do stretching exercises while the page loads, and improve your flexibility while you're learning about MathJax.	This is a *big* page. There is lots of MathJax to process. Load time may not be insignificant.

Click to show/hide: Getting Started Links

The following links may be useful:

- Need to define your own macros?
  MathJax supports both \def and \newcommand .
  You must include your definitions within a math block, e.g., inside '$ $' or '\(\)' or '$$ $$', so that MathJax will process them.
- Syntax for TeX Commands available in MathJax gives information about the syntax used in this documentation to describe commands.
  It also includes a table of length units available in MathJax.
- The MathJax Users Group is a support forum and open discussion for the MathJax Project.
  Please be sure to read the MathJax documentation and search the forum discussions before creating a new post,
  to see if your question has already been answered.

Alphabetical List of TeX Commands available in MathJax

Click to show/hide: Characteristics of the Alphabetical Command Tables

- Some entries are logically grouped, instead of appearing strictly alphabetically.
- Examples are sometimes contrived to exhibit particular behaviors, and hence may not represent typical mathematical usage.
- Unless otherwise indicated, the delimiters for a math block are *not* shown in examples.
  For example, you will see:

`a<b`	yields	$a < b$	instead of (say)	`$a<b$`	yields $a < b$
`\frac{a+1}{b+2}`	yields:			`$$\frac{a+1}{b+2}$$`	yields:
		$\frac{a+1}{b+2}$	instead of (say)		$\frac{a+1}{b+2}$

  If it is important to distinguish between display mode and inline mode, then these differences will be clearly indicated.
- The following information is provided for each table element (as appropriate):
  - command name (e.g., `\alpha`)
  - extension information:
    MathJax includes nearly all the Plain TeX math macros, and many of the LaTeX macros and environments;
    however, not everything is implemented in the core TeX input processor.
    Some less frequently used commands are defined in extensions, like `AMSsymbols` or `AMSmath` .

    To enable an extension, add the appropriate string (e.g., `AMSsymbols.js` or `AMSmath.js`)
    to the extensions array in the TeX block of your configuration.
    A combined configuration file (e.g., `TeX-AMS_HTML`) will include some extensions automatically.
    An extension that appears in brackets (like `[HTML]`) means that the extension is loaded automatically, when needed.
    See the MathJax documentation for further details.
  - MathJax rendering of command
  - TeX class (e.g., `ORD`)
  - HTML entity reference (e.g., `&#x03B1;`)
  - brief description (unless the command name needs no further explanation)
  - syntax for proper usage
  - example(s) illustrating usage
  - cross-references to related commands

Know the *shape* of a character that you want, but not its name? Draw it here!

symbols

#

indicates numbered arguments in definitions

Example:

```
\def\specialFrac#1#2{\frac{x + #1}{y + #2}}
\specialFrac{7}{z+3}
```

yields $\frac{x+7}{y+z+3}$

%

used for a single-line comment;
shows only in the source code;
does not show in the rendered expression

Example (showing the math block delimiters):

```
$$
% Note: (x+1)^2 is NOT x^2 + 1
(x+1)^2      % original expression
= (x+1)(x+1) % definition of exponent
= x^2 + 2x + 1 % FOIL, combine like terms
$$
```

yields $(x+1)^2 = (x+1)(x+1) = x^2 + 2x + 1$

Internet Explorer caution: show/hide more info
Some versions of Internet Explorer convert newlines to spaces
when building the page DOM, so that something like

```
\begin{equation} % some comment
a = b + c
\end{equation}
```

becomes

```
\begin{equation} % some comment a = b + c \end{equation}
```

before MathJax sees it. Thus,

```
 some comment a = b + c \end{equation}
```

is all treated as a comment, causing a '`missing \end{equation}`' error.
It is therefore recommended that you keep comments *outside* of math mode (using HTML comment style).
If you must use comments within mathematics, then it is best to end them with `<br />` (as of version 1.1a):
for example,
`$x + y % a comment<br />$` yields $x + y$

&

used as separators in alignment environments;
used in HTML entity references within math mode;
for a literal ampersand, use \&

Examples:

```
\begin{matrix}
a & b\cr
c & d
\end{matrix}
```

yields $\begin{matrix} a & b \\ c & d \end{matrix}$

`a < b` yields $a < b$

`\text{Carol }\&\text{ Julia}` yields $\text{Carol }\&\text{ Julia}$

^

used to indicate exponents;
used to indicate superscripts;
used for limits on large operators and in some 'vertical' constructions (see examples)

`<optional #1> ^ #2`

argument #1 is optional;
use braces, as needed, to clarify what is the exponent

Examples:

`^i`	yields	^{i}	
`x^i_2`	yields	x^i_2	
`{x^i}_2`	yields	${x^i}_2$	
`x^{i_2}`	yields	x^{i_2}	
`x^{i^2}`	yields	x^{i^2}	
`{x^i}^2`	yields	${x^i}^2$	Note: `x^i^2` yields an error.
`^ax^b`	yields	${}^a x^b$	
`\sum_{n=1}^\infty`	yields	$\sum_{n=1}^\infty$	(inline mode)

		`\overbrace{x+\cdots+x}^{n\text{ times}}` yields $\overbrace{x+\cdots+x}^{n\text{ times}}$
_		used to indicate subscripts; used for limits on large operators and in some 'vertical' constructions (see examples) `<optional #1> _ #2` argument #1 is optional; use braces, as needed, to clarify what is the subscript Examples: `_2` yields $_2$ `x_i^2` yields x_i^2 `{x_i}^2` yields x_i^2 `x_{i^2}` yields x_{i^2} `x_{i_2}` yields x_{i_2} `{x_i}_2` yields x_{i2} Note: `x_i_2` yields an error. `^a_bx^c_d` yields ${}^a_b x^c_d$ `\sum_{n=1}^\infty` yields $\sum_{n=1}^{\infty}$ (inline mode) `\underbrace{x+\cdots+x}_{n\text{ times}}` yields $\underbrace{x+\cdots+x}_{n\text{ times}}$

{ }		braces, used for grouping;
		for literal braces, use \{ and \}
		
		There are two basic grouping constructs that use braces;
		I will refer to them as 'arguments' versus 'braced groups'.
		If you're not aware which construct is in force, then you can get unexpected results.
		The examples below should clarify.
		
		ARGUMENTS:
		In this documentation, arguments are indicated by #1, #2, etc.
		An argument is either a single 'token' (like 'a' or '\alpha'), or is a group enclosed in braces.
		For example, the `\boldsymbol` command takes an argument, notated by:
		`\boldsymbol #1`
		Thus:
		`\boldsymbol aa` yields $\boldsymbol{aa}$ the first token, 'a', becomes bold
		`\boldsymbol \alpha\alpha` yields $\boldsymbol{\alpha\alpha}$ the first token, '\alpha', becomes bold
		`\boldsymbol{a\alpha}a\alpha` yields $\boldsymbol{a\alpha}a\alpha$ braces have been used to make the argument the group 'a\alpha', so both become bold
		
		BRACED GROUPS:
		A 'braced group' is a group, enclosed by braces, inside which some behavior is in force.
		The `\bf` (boldface) command operates inside a braced group, notated by:
		`{\bf ... }`
		Here, `\bf` is a switch, which 'turns on' boldface inside the braced group;
		boldface ends when the braced group ends.
		
		Sometimes, you may not see the opening '{' that signals the start of a braced group.
		In this situation, when does a command (like `\bf`) end?
		It ends at whichever occurs first:
		• it is replaced by a competing command (e.g., `\bf` is replaced by `\rm`)
		• the end of math mode (math delimiters form an implicit local group)
		
		Examples: (explicit braced groups are indicated in red, for your convenience)
		`\bf ab` yields **ab** turn on boldface; stays on to end of math mode
		`{\bf ab}cd` yields **ab***cd* an explicit braced group is entered; the 'cd' falls outside this group
		`\bf{ab}cd` yields **abcd** turn on boldface; stays on to end of math mode; the braces here are extraneous

		{\bf{ab}c}d yields **abc***d* — boldface operates inside a braced group; the 'd' falls outside this group {efg\bf{ab}c}d yields *efg***abc***d* — the 'efg' occur before boldface is turned on ab \bf cd \rm ef yields *ab***cd**ef — the competing \rm replaces boldface ab \bf cd {\rm ef} gh yields *ab***cd**ef**gh** — the 'gh' is still in boldface Make sure you see the difference in the behaviors below: \boldsymbol{ab}cd yields ***ab****cd* — \boldsymbol takes an argument \bf{ab}cd yields **abcd** — \bf does not take an argument; instead, \bf 'turns on' boldface behavior
\!		negative thin space; i.e., it 'back ups' a thin space amount Examples: \rm IR yields IR \rm I\! R yields IR see also: \negthinspace
\, \: \> \;		\, thin space (normally $\frac{1}{6} = \frac{3}{18}$ of a quad) \: medium space (normally $\frac{2}{9} = \frac{4}{18}$ of a quad) \> alternate medium space \; thick space (normally $\frac{5}{18}$ of a quad) Examples: normal spacing between letters: *ababab* using \, between letters: $a\,b\,a\,b\,a\,b$ using \: between letters: $a\:b\:a\:b\:a\:b$ using \> between letters: $a\>b\>a\>b\>a\>b$ using \; between letters: $a\;b\;a\;b\;a\;b$ see also: \thinspace
\ (backslash space)		control space; class ORD TEX often ignores spaces, or collapses multiple spaces to a single space. A control space is used to force TEX to typeset a space. Examples: \rm This is a sentence. yields Thisisasentence. \rm This\ is\ a\ sentence. yields This is a sentence. \rm This~is~a~sentence. yields This is a sentence. \text{This is a sentence.} yields This is a sentence. in MathJax, this is the same as: \nobreakspace, \space, ~ (tilde character) see also: \text
~ (tilde character)		In TEX this is a non-breaking space—i.e., a blank space where TEX is not allowed to break between lines. class ORD MathJax (unlike TEX) doesn't do any automatic breaking of lines, so MathJax will not break at *any* space. The tilde is useful to force a space where MathJax would otherwise collapse or ignore spaces, as illustrated in the examples below. Click here to see examples of what happens with very long math in MathJax. Examples: \rm Dr. Carol J.V. Fisher yields Dr. CarolJ. V. Fisher \rm Dr.~Carol~J.V.~Fisher yields Dr. Carol J. V. Fisher \text{Dr. Carol J.V. Fisher} yields Dr. Carol J.V. Fisher a b c d yields *abcd* a~b~~~~~c~d yields $a\,b\;\;c\,d$ in MathJax, this is the same as: \nobreakspace, \space, \ (backslash space)
\#	#	literal number sign; literal pound sign; # class ORD needed since # is used to indicate arguments in definitions

\$	$	literal dollar sign; needed since `$` may (optionally) be used to delimit math mode Dollar sign outside of math mode: show/hide more info The configuration information below enables dollar signs as inline math delimiters; setting `processEscapes:` to `true` allows use of `\$` *outside* of math mode, as a literal dollar sign: `MathJax.Hub.Config({ tex2jax: { inlineMath: [['$','$'],['\\(','\\)']], processEscapes: true } });`	`&#x0024;` class ORD
\%	%	literal percent sign; needed since `%` is used to begin a single-line comment	`&#x0025;` class ORD
\&	&	literal ampersand; needed since ampersands are used as separators in alignment environments and for HTML entity references inside math mode see also: \And	`&#x0026;` class ORD
\\		line separator in alignment modes and environments Example: `\begin{gather}a\\a+b\\a+b+c\end{gather}` yields $\begin{gathered}a\\a+b\\a+b+c\end{gathered}$ For a literal backslash, see \backslash. in MathJax, these are essentially the same: \cr, \newline	
_	_	literal underscore; needed since underscores are used for subscripts Examples: `a_2` yields a_2 `a\_2` yields a_2	`&#x005F;` class ORD
\{ \}	{ }	literal braces; needed since braces are used for grouping in math mode; non-stretchy when used alone; stretchy when used with `\left` or `\right` Examples: `{1,2,3}` yields $1,2,3$ `\{1,2,3\}` yields $\{1,2,3\}$ `\left\{\frac ab,c\right\}` yields $\left\{\frac{a}{b},c\right\}$ see also: \brace, \lbrace, \rbrace	\{ is class OPEN \} is class CLOSE
|	|	pipe character; vertical bar; absolute value; non-stretchy when used alone; stretchy when used with `\left` or `\right` Examples: `|x|` yields $\|x\|$ `|\frac ab|` yields $\left\|\frac{a}{b}\right\|$ `\left|\frac ab\right|` yields $\left\|\frac{a}{b}\right\|$ `\{x | x\in\Bbb Z\}` yields $\{x \mid x\in\mathbb{Z}\}$ `\{x\,|\,x\in\Bbb Z\}` yields $\{x\,\|\,x\in\mathbb{Z}\}$ see also: \lvert, \rvert, \vert	class ORD
\\|	‖	double pipe character; double vertical bar; norm; non-stretchy when used alone; stretchy when used with `\left` or `\right` Examples: `|x|` yields $\|x\|$ `|\frac ab|` yields $\left\|\frac{a}{b}\right\|$	`&#x2225;` class ORD

		`\left|\frac ab\right|` yields $\left\|\frac{a}{b}\right\|$ see also: \lVert, \rVert, \Vert
( )	( )	parentheses; (is class OPEN; non-stretchy when used alone; stretchy when used with `\left` or `\right`) is class CLOSE Examples: `(\frac ab,c)` yields $(\frac{a}{b},c)$ `\left(\frac ab,c\right)` yields $\left(\frac{a}{b},c\right)$
.	.	period; decimal point class PUNCT In some math environments (but not all): With numbers on either side, there is no surrounding space: `3.14` yields 3.14 With non-numeric characters, there is a slight amount of space on right: `a.b` yields $a.b$ To suppress this space, enclose the '.' in braces: `a{.}b` yields $a{.}b$
/	/	forward slash; class ORD can be used to denote division Example: `a/b` yields a/b
+	+	plus symbol; class BIN e.g., used for addition Example: `a+b` yields $a+b$
-	−	minus symbol; class BIN e.g., used for subtraction Example: `a-b` yields $a-b$ `-b` yields $-b$ in most cases, proper spacing is achieved to denote an opposite `\text{first: } -a\star b` yields first: $-a\star b$ an unusual situation; spacing is not optimal `\text{first: } {-}a\star b` yields first: $-a\star b$ in such cases, you can put the minus sign (or, the group `-a`) inside braces to suppress extra space
[ ]	[ ]	(square) brackets; [is class OPEN; non-stretchy when used alone; stretchy when used with `\left` or `\right`] is class CLOSE Examples: `[\frac ab,c]` yields $[\frac{a}{b},c]$ `\left[\frac ab,c\right]` yields $\left[\frac{a}{b},c\right]$ see also: \brack, \lbrack, \rbrack
=	=	equal; equals class REL see also: \ne, \neq

'	′	prime symbol class ORD
		
		Example:
		
		`f(x) = x^2,\`
		`f'(x) = 2x,\`
		`f''(x) = 2` yields $f(x)=x^2,\ f'(x)=2x,\ f''(x)=2$
		
		see also: \prime

A

\above		general command for making fractions; gives control over thickness of horizontal fraction bar { <subformula1> \above <dimen> <subformula2> } Creates a fraction: numerator: subformula1 denominator: subformula2 fraction bar has thickness: dimen There are separate local groups for subformula1 and subformula2 ; if these local groups are not explicit, then unexpected results may occur, as illustrated in the choose discussion. Examples: a+1 \above 1pt b yields $\frac{a+1}{b}$ a \above 1pt b+2 yields $\frac{a}{b+2}$ {a+1 \above 1.5pt b+2}+c yields $\frac{a+1}{b+2}+c$ see also: \abovewithdelims, \atop, \atopwithdelims, \cfrac, \dfrac, \frac, \genfrac, \over, \overwithdelims
\abovewithdelims		general command for making fractions; gives control over thickness of horizontal fraction bar; specifies left and right enclosing delimiters { <subformula1> \abovewithdelims <delim1> <delim2> <dimen> <subformula2> } Creates a fraction: numerator: subformula1 denominator: subformula2 fraction bar has thickness: dimen delim1 is put before the fraction delim2 is put after the fraction For an empty delimiter, use '.' in place of the delimiter. There are separate local groups for subformula1 and subformula2 ; if these local groups are not explicit, then unexpected results may occur, as illustrated in the choose discussion. Examples: a+1 \abovewithdelims [ ] 1pt b yields $\left[\frac{a+1}{b}\right]$ {a \abovewithdelims . | 1.5pt b+2}_{a=3} yields $\frac{a}{b+2}\Big\vert_{a=3}$ {a+1 \abovewithdelims \{ \} 1pt b+2}+c yields $\left\{\frac{a+1}{b+2}\right\}+c$ see also: \above, \atop, \atopwithdelims, \cfrac, \dfrac, \frac, \genfrac, \over, \overwithdelims
\acute	´	ˊ acute accent \acute #1 Usually, #1 is a single letter; otherwise, accent is centered over argument. Examples: \acute e yields $\acute{e}$ \acute E yields $\acute{E}$ \acute eu yields $\acute{e}u$ \acute{eu} yields $e\acute{u}$
\aleph	ℵ	Hebrew letter aleph; ℵ class ORD commonly used for the cardinality of the real numbers
\alpha	α	lowercase Greek letter alpha α class ORD
\amalg	⨿	this symbol is often used for co-products ⨿ class BIN
\And	&	ampersand & class ORD see also: \&
\angle	∠	∠ class ORD
\approx	≈	≈ class REL
\approxeq AMSsymbols	≊	≊ class REL
\arccos	arccos	

		does not change size; class OP default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples If alternate notation is desired, define: `\def\arccosAlt{\cos^{-1}}` so that `$\arccosAlt(x)$` yields $\cos^{-1}(x)$
\arcsin	arcsin	does not change size; class OP default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples If alternate notation is desired, define: `\def\arcsinAlt{\sin^{-1}}` so that `$\arcsinAlt(x)$` yields $\sin^{-1}(x)$
\arctan	arctan	does not change size; class OP default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples If alternate notation is desired, define: `\def\arctanAlt{\tan^{-1}}` so that `$\arctanAlt(x)$` yields $\tan^{-1}(x)$
\arg	arg	the complex argument function; class OP does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples
\array		a synonym for `\matrix` `\array{ <math> & <math> ... \cr <repeat as needed> }` alignment occurs at the ampersands; a double-backslash can be used in place of the `\cr` ; the final `\\` or `\cr` is optional Example: `\array{ a & b+1 \cr c+1 & d }` yields $\begin{matrix} a & b+1 \\ c+1 & d \end{matrix}$ see also: \matrix
\arrowvert	|	not intended for direct use; `&#x23D0;` class ORD used internally to create stretchy delimiters see also: |, \vert, \lvert, \rvert,
\Arrowvert	‖	not intended for direct use; `&#x2016;` class PUNCT used internally to create stretchy delimiters see also: |, \Vert, \lVert, \rVert
\ast	*	asterisk `&#x2217;` class BIN
\asymp	≍	asymptotic `&#x224D;` class REL
\atop		general command for making a fraction-like structure, but without the horizontal fraction bar `{ <subformula1> \atop <subformula2> }` Creates a fraction-like structure: 'numerator' `subformula1` 'denominator' `subformula2` There are separate local groups for `subformula1` and `subformula2` ; if these local groups are not explicit, then unexpected results may occur, as illustrated in the choose discussion. Examples: `a \atop b` yields $\begin{matrix} a \\ b \end{matrix}$ `a+1 \atop b+2` yields $\begin{matrix} a+1 \\ b+2 \end{matrix}$ `{a+1 \atop b+2}+c` yields $\begin{matrix} a+1 \\ b+2 \end{matrix} + c$ see also: \above, \abovewithdelims, \atopwithdelims, \cfrac, \dfrac, \frac, \genfrac, \over, \overwithdelims
\atopwithdelims		general command for making a fraction-like structure, but without the horizontal fraction bar; specifies left and right enclosing delimiters `{ <subformula1> \atopwithdelims <delim1> <delim2> <subformula2> }`

		Creates a fraction-like structure: 'numerator' `subformula1` 'denominator' `subformula2` `delim1` is put before the structure `delim2` is put after the structure For an empty delimiter, use '.' in place of the delimiter. There are separate local groups for `subformula1` and `subformula2` ; if these local groups are not explicit, then unexpected results may occur, as illustrated in the choose discussion. Examples: `a \atopwithdelims [ ] b` yields $\left[\begin{smallmatrix}a\\b\end{smallmatrix}\right]$ `a+1 \atopwithdelims . | b+2` yields $\left.\begin{smallmatrix}a+1\\b+2\end{smallmatrix}\right\|$ `{a+1 \atopwithdelims \{ \} b+2}+c` yields $\left\{\begin{smallmatrix}a+1\\b+2\end{smallmatrix}\right\}+c$ see also: \above, \abovewithdelims, \atop, \cfrac, \dfrac, \frac, \genfrac, \over, \overwithdelims

B

\backepsilon AMSsymbols	϶		∍ class REL
\backprime AMSsymbols	‵	see also: \prime	‵ class ORD
\backsim AMSsymbols	∽		∽ class REL
\backsimeq AMSsymbols	⋍		⋍ class REL
\backslash	\	see also: \setminus	∖
\bar	¯	bar accent (non-stretchy) \bar #1 Usually, #1 is a single letter; otherwise, bar is centered over argument. Examples: \bar x yields $\bar{x}$ \bar X yields $\bar{X}$ \bar xy yields $\bar{x}y$ \bar{xy} yields $\bar{xy}$	ˉ
\barwedge AMSsymbols	⊼		⊼ class BIN
\Bbb		blackboard-bold for uppercase letters and lowercase 'k'; if lowercase blackboard-bold letters are not available, then they are typeset in a roman font \Bbb #1 Whether lower-case letters are displayed in blackboard-bold, or not, depends on the fonts being used. The MathJax web-based fonts don't have lowercase blackboard-bold, but the STIX fonts do; so users with the STIX fonts installed will be able to display lowercase blackboard-bold letters. Examples: \Bbb R yields $\mathbb{R}$ \Bbb ZR yields $\mathbb{Z}R$ \Bbb{AaBbKk}Cc yields $\mathbb{AaBbKk}Cc$ \Bbb{ABCDEFGHIJKLMNOPQRSTUVWXYZ} yields $\mathbb{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$ see also: \mathbb	class ORD
\Bbbk AMSsymbols	𝕜	blackboard-bold lowercase k	k class ORD
\because AMSsymbols	∵		∵ class REL
\begin		used in \begin{xxx} ... \end{xxx} environments	
\beta	β	lowercase Greek letter beta	β class ORD
\beth AMSsymbols	ב	Hebrew letter beth	ℶ class ORD
\between AMSsymbols	≬		≬ class REL
\bf		turns on boldface; affects uppercase and lowercase letters, and digits {\bf ... } Examples: \bf AaBb\alpha\beta123 yields $\mathbf{AaBb\alpha\beta123}$ {\bf A B} A B yields $\mathbf{A\,B}\,AB$ \bf AB \rm CD yields $\mathbf{AB}\mathrm{CD}$ \bf{AB}CD yields $\mathbf{ABCD}$ see also: \mathbf, \boldsymbol	class ORD
\Bigg \bigg \Big \big		used to obtain various-sized delimiters; may be followed by any of these Variable-Sized Delimiters Examples: \Bigg[2.470 em \bigg[2.047 em \Big[1.623 em \big[1.2 em [	
\Biggl \Biggm \Biggr \biggl \biggm \biggr \Bigl \Bigm \Bigl \bigl \bigm \bigr		Used to obtain various-sized delimiters, with a left/right/middle context; may be followed by any of these Variable-Sized Delimiters. The 'l' (left), 'm' (middle), and 'r' (right) specifications	

		may make reading the source code more meaningful, especially when there are delimiters inside delimiters. Whereas (say) `\Bigg` produces results of class `ORD`, we have: • `\Biggl` produces results of class `OPEN` • `\Biggr` produces results of class `CLOSE` • `\Biggm` produces results of class `REL` The spacing for these differ (but may not always be apparent, as it depends on the class of what is next to it). For example, `$x\big\| y$` ($x\|y$) has less space than `$x\bigm\| y$` ($x \mid y$). Therefore, these commands affect typeset results in a fundamental way; it is best to use the form appropriate for the position of the desired delimiter.
`\bigcap`	$\bigcap$	changes size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples `&#x22C2;` class OP
`\bigcirc`	$\bigcirc$	`&#x25EF;` class BIN
`\bigcup`	$\bigcup$	changes size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples `&#x22C3;` class OP

`\bigodot`
`\bigoplus`
`\bigotimes`
	$\bigodot$
	$\bigoplus$
	$\bigotimes$
		all change size;
		can change limit placement using \limits and \nolimits;
		see the Big Operators Table for examples
		`&#x2A00;` class OP
		`&#x2A01;` class OP
		`&#x2A02;` class OP

`\bigsqcup`	$\bigsqcup$	changes size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples `&#x2A06;` class OP
`\bigstar` AMSsymbols	★	`&#x2605;` class ORD
`\bigtriangledown`	▽	`&#x25BD;` class BIN
`\bigtriangleup`	△	`&#x25B3;` class REL
`\biguplus`	$\biguplus$	changes size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples `&#x2A04;` class OP
`\bigvee`	$\bigvee$	changes size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples `&#x22C1;` class OP
`\bigwedge`	$\bigwedge$	changes size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples `&#x22C0;` class OP
`\binom` AMSmath		notation commonly used for binomial coefficients `\binom #1 #2` Examples: `\binom n k` yields (inline mode) $\binom{n}{k}$ `\binom n k` yields (display mode) $\binom{n}{k}$ `\binom{n-1}k-1` yields $\binom{n-1}{k} - 1$ `\binom{n-1}{k-1}` yields $\binom{n-1}{k-1}$ see also: \binom, \choose, \dbinom, \tbinom
`\blacklozenge` AMSsymbols	⧫	`&#x29EB;` class ORD
`\blacksquare` AMSsymbols	■	`&#x25A0;` class ORD

`\blacktriangle`
`\blacktriangledown`
both AMSsymbols
	▲
	▼
		`&#x25B2;` class ORD
		`&#x25BC;` class ORD

`\blacktriangleleft`
`\blacktriangleright`
both AMSsymbols
	◄
	►
		`&#x25C0;` class BIN
		`&#x25B6;` class BIN

`\bmod`	mod	properly spaced as a binary operator class BIN

\boldsymbol		as opposed to \bf and \mathbf , class ORD \boldsymbol applies to nearly *all* symbols, not just letters and numbers \boldsymbol #1 Examples: \boldsymbol aa yields $\boldsymbol{aa}$ \boldsymbol \alpha\alpha yields $\boldsymbol{\alpha\alpha}$ \boldsymbol{a\alpha}a\alpha yields $\boldsymbol{a\alpha}a\alpha$ \boldsymbol{a+2+\alpha+\frac{x+3}{\beta+4}} yields $\boldsymbol{a+2+\alpha+\frac{x+3}{\beta+4}}$ \mathbf{a+2+\alpha+\frac{x+3}{\beta+4}} yields $\mathbf{a+2+\alpha+\frac{x+3}{\beta+4}}$ see also: \bf, \mathbf
\bot	⊥	⊥ class ORD
\bowtie	⋈	⋈ class REL
\Box AMSsymbols	□	□ class ORD
\boxdot AMSsymbols	⊡	⊡ class BIN
\boxed AMSmath		puts a box around argument; argument is in math mode \boxed #1 Examples: \boxed ab yields $\boxed{a}b$ \boxed{ab} yields $\boxed{ab}$ \boxed{ab\strut} yields $\boxed{ab}$ \boxed{\text{boxed text}} yields $\boxed{\text{boxed text}}$ see also: \fbox
\boxminus AMSsymbols	⊟	⊟ class BIN
\boxplus AMSsymbols	⊞	⊞ class BIN
\boxtimes AMSsymbols	⊠	⊠ class BIN
\brace		creates a braced structure { <subformula1> \brace <subformula2> } Examples: \brace yields $\left\{\right\}$ a\brace b yields $\left\{\begin{smallmatrix}a\\b\end{smallmatrix}\right\}$ a+b+c\brace d+e+f yields $\left\{\begin{smallmatrix}a+b+c\\d+e+f\end{smallmatrix}\right\}$ a+{b+c\brace d+e}+f yields $a+\left\{\begin{smallmatrix}b+c\\d+e\end{smallmatrix}\right\}+f$
\bracevert		not intended for direct use; used internally to create stretchy delimiters ⎪ class ORD
\brack		creates a bracketed structure { <subformula1> \brack <subformula2> } Examples: \brack yields $\left[\right]$ a\brack b yields $\left[\begin{smallmatrix}a\\b\end{smallmatrix}\right]$ a+b+c\brack d+e+f yields $\left[\begin{smallmatrix}a+b+c\\d+e+f\end{smallmatrix}\right]$ a+{b+c\brack d+e}+f yields $a+\left[\begin{smallmatrix}b+c\\d+e\end{smallmatrix}\right]+f$
\breve	˘	breve accent ˘ \breve #1 Usually, #1 is a single letter; otherwise, accent is centered over argument. Examples: \breve e yields $\breve{e}$ \breve E yields $\breve{E}$

		`\breve eu` yields $\breve{e}u$ `\breve{eu}` yields $e\breve{u}$
`\buildrel ... \over ...`		`\buildrel <subformula1> \over #1` The result is of class `REL` (binary relation), so it has the spacing of a relation. Examples: `\buildrel \alpha\beta \over \longrightarrow` yields $\overset{\alpha\beta}{\longrightarrow}$ `\buildrel \rm def \over {:=}` yields $\overset{\text{def}}{:=}$
`\bullet`	$\bullet$	`&#x2219;` class BIN
`\Bumpeq` AMSsymbols	$\Bumpeq$	`&#x224E;` class REL
`\bumpeq` AMSsymbols	$\bumpeq$	`&#x224F;` class REL

C

`\cal`		class ORD turns on calligraphic mode; only affects uppercase letters and digits `{\cal ... }` Examples: `\cal ABCDEFGHIJKLMNOPQRSTUVWXYZ` yields $\mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$ `\cal 0123456789` yields $\mathcal{0123456789}$ `\cal abcdefghijklmnopqrstuvwxyz` yields $\mathcal{abcdefghijklmnopqrstuvwxyz}$ `abcdefghijklmnopqrstuvwxyz` yields $abcdefghijklmnopqrstuvwxyz$ `{\cal AB}AB` yields $\mathcal{AB}AB$ `\cal AB \rm AB` yields $\mathcal{AB}\mathrm{AB}$ `\cal{AB}CD` yields $\mathcal{ABCD}$ see also: \oldstyle, \mathcal

`\cancel`		Used to 'cancel' (strikeout).
		`\cancel #1`
		`\bcancel #1`
		Examples:
		`\frac{(x+1)\cancel{(x+2)}}{3\cancel{(x+2)}}` yields $\frac{(x+1)\cancel{(x+2)}}{3\cancel{(x+2)}}$
		`\frac{\bcancel{\frac13}}{\bcancel{\frac13}} = 1` yields $\frac{\bcancel{\frac{1}{3}}}{\bcancel{\frac{1}{3}}} = 1$

`\Cap` AMSsymbols	⋒	`&#x22D2;` class BIN see also: \bigcap, \cap, \Cup, \cup, \doublecap, \doublecup
`\cap`	∩	`&#x2229;` class BIN see also: \bigcap, \Cap, \Cup, \cup, \doublecap, \doublecup

`\cases`		class OPEN
		for piecewise-defined functions
		`\cases{ <math> & <math> \cr <repeat as needed> }`
		a double-backslash can be used in place of `\cr`;
		the final `\\` or `\cr` is optional
		In TeX, the second column is automatically in text-mode, while in MathJax it is in math-mode. This behavior will be changed to be consistent with TeX in a future release of MathJax.
		Example:
		`|x| =`
		`\cases{`
		`x & \text{if } x\ge 0\cr` yields $\|x\| = \begin{cases} x & \text{if } x \ge 0 \\ -x & \text{if } x < 0 \end{cases}$
		`-x & \text{if } x\lt 0`
		`}`

`\cdot`	·	`&#x22C5;` class BIN centered dot Examples: `a\cdot b` yields $a \cdot b$ `a\cdotp b` yields $a \cdotp b$ `a\centerdot b` yields $a \centerdot b$ see also: \cdotp, \cdots, \centerdot
`\cdotp`	·	`&#x22C5;` class PUNCT centered dot, punctuation symbol Examples: `\rm s \cdot h` yields $\mathrm{s} \cdot \mathrm{h}$ `\rm s \cdotp h` yields $\mathrm{s} \cdotp \mathrm{h}$ see also: \cdot, \centerdot
`\cdots`	⋯	`&#x22EF;` class INNER centered dots; dot dot dot Example:

		`x_1 + \cdots + x_n` yields $x_1 + \cdots + x_n$ see also: \dots, \ldots
`\centerdot` AMSsymbols	·	`&#x22C5;` class BIN centered dot Examples: `a\cdot b` yields $a \cdot b$ `a\cdotp b` yields $a \cdotp b$ `a\centerdot b` yields $a \centerdot b$ see also: \cdot, \cdotp
`\cfrac` AMSmath		use for continued fractions `\cfrac #1 #2` Examples: `\frac{2}{1+\frac{2}{1+\frac{2}{1}}}` yields $\frac{2}{1+\frac{2}{1+\frac{2}{1}}}$ `\cfrac{2}{1+\cfrac{2}{1+\cfrac{2}{1}}}` yields $\cfrac{2}{1+\cfrac{2}{1+\cfrac{2}{1}}}$ see also: \above, \abovewithdelims, \atop, \atopwithdelims, \dfrac, \frac, \genfrac, \over, \overwithdelims

`\check`	ˇ	`&#x02C7;`
		check accent
		`\check #1`
		Usually, `#1` is a single letter; otherwise, accent is centered over argument.
		
		Examples:
		`\check o` yields $\check{o}$
		`\check O` yields $\check{O}$
		`\check oe` yields $\check{o}e$
		`\check{oe}` yields $\check{oe}$

`\checkmark` AMSsymbols	✓	`#x2713;` class ORD
`\chi`	χ	`&#x03C7;` class ORD lowercase Greek letter chi
`\choose`		notation commonly used for binomial coefficients; different versions for inline and display modes `{ <subformula1> \choose <subformula2> }` There are separate local groups for `subformula1` and `subformula2` ; if these local groups are not explicit, then unexpected results may occur, as illustrated next. Examples (showing the math delimiters): `$\displaystyle n+1 \choose k+2 $` yields $\displaystyle n+1 \choose k+2$ Without an explicit braced group, the local group for `subformula1` extends back to the opening math delimiter. That is, this code is interpreted as (color added for emphasis): `${\displaystyle n+1}\choose{k+2}$` Now it is clear that only the `n+1` is affected by the `\displaystyle` switch. `$\displaystyle {n+1 \choose k+2} $` yields $\displaystyle {n+1 \choose k+2}$ Here, an explicit braced group is used for the `\choose` command, making both subformulas clear—and the expected result is obtained. Note that it may appear that `\displaystyle` is taking an argument, but this is not the case: instead, `\displaystyle` acts as a switch which turns on display mode, and the entire `choose` command is affected. Examples (showing math delimiters): `$n+1 \choose k+2$` yields $n+1 \choose k+2$ `$$n+1 \choose k+2$$` yields $$n+1 \choose k+2$$ `$1+{n \choose 2}+k$` yields $1+{n \choose 2}+k$ see also: \binom, \dbinom, \tbinom

\circ	○	∘ class BIN Examples: (f\circ g)(x) = f(g(x)) yields $(f \circ g)(x) = f(g(x))$ 45^\circ yields 45°
\circeq AMSsymbols	≗	≗ class REL
\circlearrowleft AMSsymbols \circlearrowright AMSsymbols	↺ ↻	↺ counterclockwise class REL ↻ clockwise class REL
\circledast AMSsymbols \circledcirc AMSsymbols \circleddash AMSsymbols	⊛ ⊚ ⊝	⊛ circled asterisk class BIN ⊚ circled circle class BIN ⊝ circled dash class BIN
\circledR AMSsymbols \circledS AMSsymbols	® Ⓢ	® circled R class ORD Ⓢ circled S class ORD

\class [HTML]		non-standard; extension is loaded automatically when used;
		used to specify a CSS class for styling mathematics
		
		\class #1 #2
		
		where:
		
		• #1 is a CSS class name (without quotes)
		• #2 is the mathematics to be styled
		
		Example:
		Suppose this CSS style information is provided outside of math mode:
		
		<style type="text/css">
		.smHighlightRed {
		font-size:small;
		background-color:yellow;
		color:red;
		}
		</style>
		
		Then,
		ab\class{smHighlightRed}{cdef}gh yields $ab\class{smHighlightRed}{cdef}gh$

\clubsuit	♣	♣ class ORD see also: \diamondsuit, \heartsuit, \spadesuit
\colon	:	: class PUNCT a colon, treated as a punctuation mark (instead of a relation) Examples: f:A\to B yields $f:A \to B$ f\colon A\to B yields $f\colon A \to B$
\color	□	used to specify a color in mathematics \color #1 #2 where: #1 is the desired color #2 is the mathematics to be colored This works differently from standard LaTeX (where \color is a switch). In a future version of MathJax, it will be possible to load an extension to make the command behave like the LaTeX version. Examples: \color{red}{ \frac{1+\sqrt{5}}{2} } yields $\color{red}{ \frac{1+\sqrt{5}}{2} }$ \color{#0000FF}AB yields $\color{#0000FF}AB$
\complement AMSsymbols	∁	∁ class ORD
\cong	≅	≅ class REL congruent see also: \ncong

`\coprod`	$\coprod$	`&#x2210;` class OP coproduct
`\cos`	$\cos$	class OP cosine; does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for more examples Examples: `\cos x` yields $\cos x$ `\cos(2x-1)` yields $\cos(2x-1)$ see also: \sin
`\cosh`	$\cosh$	class OP hyperbolic cosine; does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for more examples hyperbolic cosine Examples: `\cosh x` yields $\cosh x$ `\cosh(2x-1)` yields $\cosh(2x-1)$ see also: \sinh
`\cot`	$\cot$	class OP cotangent; does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for more examples Examples: `\cot x` yields $\cot x$ `\cot(2x-1)` yields $\cot(2x-1)$ see also: \tan
`\coth`	$\coth$	class OP hyperbolic cotangent; does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for more examples Examples: `\coth x` yields $\coth x$ `\coth(2x-1)` yields $\coth(2x-1)$
`\cr`		carriage return; line separator in alignment modes and environments in MathJax, these are essentially the same: \\, \newline
`\csc`	$\csc$	class OP cosecant does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for more examples Examples: `\csc x` yields $\csc x$ `\csc(2x-1)` yields $\csc(2x-1)$ see also: \sec
`\cssId` `[HTML]`		non-standard; class ORD; extension is loaded automatically when used; used to set a MathML element's ID attribute, so it can be accessed dynamically (e.g., to add an event handler, add CSS styling, or set display status) `\cssId #1 #2` where: • `#1` is an ID attribute (without quotes) • `#2` is the mathematics to be identified by the ID

			Example:
			
			Suppose this HTML and Javascript is provided outside of math mode:
			
			`<button type="button" onclick="turnRed();">`
			`Click button to turn something red`
			`</button>`
			
			`<script type="text/javascript">`
			`function turnRed() {`
			`document.getElementById('testID').style.color = "red";`
			`}`
			`</script>`
			
			Suppose further that the following MathJax code is provided:
			
			`$$`
			`abc`
			`\cssId{testID}{def\text{ Something will turn red! }ghi}`
			`jkl`
			`$$`
			
			Then, this HTML/Javascript/MathJax produces:
			
			Click button to turn something red
			
			$abcdef$ Something will turn red! $ghijkl$
			
			A more meaningful example (with well-commented source code) is provided by Design Science, Inc., and shows how you can display the steps in a proof one line at a time.

`\Cup`	`AMSsymbols`	⋓	`&#x22D3;` class BIN see also: \bigcup, \Cap, \cap, \cup, \doublecap, \doublecup
`\cup`		∪	`&#x222A;` class BIN see also: \bigcup, \Cap, \cap, \Cup, \doublecap, \doublecup
`\curlyeqprec`	`AMSsymbols`	⋞	`&#x22DE;` class REL
`\curlyeqsucc`	`AMSsymbols`	⋟	`&#x22DF;` class REL
`\curlyvee`	`AMSsymbols`	⋎	`&#x22CE;` class BIN
`\curlywedge`	`AMSsymbols`	⋏	`&#x22CF;` class BIN
`\curvearrowleft`	`AMSsymbols`	↶	`&#x21B6;` counterclockwise class REL
`\curvearrowright`	`AMSsymbols`	↷	`&#x21B7;` clockwise class REL

D

\dagger \ddagger	† ‡	† dagger class BIN ‡ double dagger class BIN
\daleth AMSsymbols	ℸ	ℸ class ORD Hebrew letter daleth
\dashleftarrow AMSsymbols \dashrightarrow AMSsymbols	⇠ ⇢	⇠ dashed left arrow; non-stretchy class REL ⇢ dashed right arrow; non-stretchy class REL
\dashv	⊣	⊣ class REL
\dbinom AMSmath		notation commonly used for binomial coefficients; display version (in both inline and display modes) \dbinom #1 #2 Examples: \dbinom n k yields (inline mode) $\binom{n}{k}$ \dbinom n k yields (display mode) $\binom{n}{k}$ \dbinom{n-1}k-1 yields $\binom{n-1}{k}-1$ \dbinom{n-1}{k-1} yields $\binom{n-1}{k-1}$ see also: \binom, \choose, \tbinom
\dot \ddot \dddot AMSmath \ddddot AMSmath	˙ ¨ ⋯ ⋯⋯	˙ dot accent ¨ double dot accent triple dot accent quadruple dot accent \dot #1 \ddot #1 \dddot #1 \ddddot #1 Usually, #1 is a single letter; otherwise, accent is centered over argument. Examples: \dot x yields $\dot{x}$ \ddot x yields $\ddot{x}$ \dddot x yields $\dddot{x}$ \ddddot x yields $\ddddot{x}$ \ddot x(t) yields $\ddot{x}(t)$ \ddddot{y(x)} yields $\ddddot{y(x)}$
\ddots	⋱	⋱ class INNER three diagonal dots
\DeclareMathOperator AMSmath		Multi-letter operator names (like log , sin , and lim) are traditionally typeset in a roman font. \DeclareMathOperator allows you to define your own operator names; they are subsequently typeset using the proper font and spacing; you can control the way that limits appear (see examples below) \DeclareMathOperator #1 #2 where: • #1 is the operator name, including the preceding backslash; only letters a–z and A–Z are allowed; in particular, no numbers are allowed in operator names • #2 is the replacement text for the operator name A named operator is available in any mathematics that appears *after* it is defined on the page. Examples: myOp(x) yields $myOp(x)$ poor style; the function name should appear in a roman font

		`\text{myOp}(x)`	yields	$\text{myOp}(x)$	better; a nuisance to type if used frequently
		`\DeclareMathOperator {\myOp}{myOp}` `\myOp(x)`	yields	$\text{myOp}(x)$	best; once an operator is declared, it can be used in any subsequent mathematics
		`\myOp_a^b(x)`	yields (inline mode)	$\text{myOp}_a^b(x)$	standard subscript and superscript position for inline mode
		`\myOp_a^b(x)`	yields (display mode)	$\text{myOp}_a^b(x)$	standard subscript and superscript position for display mode
		`\DeclareMathOperator*` `{\myOP}{myOP}` `\myOP_a^b(x)`	yields (inline mode)	$\text{myOP}_a^b(x)$	operator names are case-sensitive, so `\myOp` is different from `\myOP` ; if displaystyle limits are desired in *both* inline and display modes, then use `DeclareMathOperator*` instead of `DeclareMathOperator`

`\def`		for defining your own commands (control sequences, macros, definitions); must appear (within math delimiters) before it is used; alternatively, you can define macros using the MathJax configuration options in the `<head>`
		`\def\myCommandName{ <replacement text> }`
		Example:
		`\def\myHearts{\color{purple}{\heartsuit}\kern-2.5pt\color{green}{\heartsuit}}` `\myHearts\myHearts`
		yields: ♡♡
		A definition may take one or more arguments:
		Example:
		`\def\myHearts#1#2{\color{#1}{\heartsuit}\kern-2.5pt\color{#2}{\heartsuit}}` `\myHearts{red}{blue}`
		yields: ♡♡
		see also: \newcommand			

`\deg`	deg	class OP degree; does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples			
`\Delta`	Δ	`&#x0394;` uppercase Greek letter delta class ORD			
`\delta`	δ	`&#x03B4;` lowercase Greek letter delta class ORD see also: \varDelta			
`\det`	det	class OP determinant; does not change size; default limit placement can be changed using `\limits` and `\nolimits`; does not change size; see the Big Operators Table for more examples Examples: `\det_{\rm sub}` yields (inline mode) $\det_{\text{sub}}$ `\det_{\rm sub}` yields (display mode) $\det\limits_{\text{sub}}$ `\det\limits_{\rm sub}` yields (inline mode) $\det\limits_{\text{sub}}$ `\det\nolimits_{\rm sub}` yields (display mode) $\det_{\text{sub}}$			
`\dfrac` AMSmath		fractions; display version (in both inline and display modes) `\dfrac #1 #2` Examples: `\dfrac a b` yields (inline mode) $\dfrac{a}{b}$ `\dfrac a b` yields (display mode) $\dfrac{a}{b}$ `\frac a b` yields (inline mode) $\frac{a}{b}$			

			\dfrac{a-1}b-1 yields $\dfrac{a-1}{b}-1$ \dfrac{a-1}{b-1} yields $\dfrac{a-1}{b-1}$ see also: \above, \abovewithdelims, \atop, \atopwithdelims, \cfrac, \frac, \genfrac, \over, \overwithdelims
\diagdown	AMSsymbols	╲	╲ diagonal down (from left to right) class ORD
\diagup	AMSsymbols	╱	╱ diagonal up (from left to right) class ORD
\Diamond	AMSsymbols	◊	◊ large diamond class ORD
\diamond		⋄	⋄ small diamond class BIN
\diamondsuit		♢	♢ class ORD see also: \clubsuit, \heartsuit, \spadesuit
\digamma	AMSsymbols	F	ϝ class ORD
\dim		dim	class OP dimension; does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples

\displaylines			to display any number of centered formulas (without any alignment)
			\displaylines{ <math> \cr <repeat as needed> }
			a double-backslash can be used in place of the \cr;
			the final \\ or \cr is optional
			Example:
			\displaylines{
			a = a\\
			\text{if } a=b \text{ then } b=a\\
			\text{if } a=b \text{ and } b=c \text{ then } a=c
			}
			yields $a=a$
			if $a=b$ then $b=a$
			if $a=b$ and $b=c$ then $a=c$
			see also: gather

\displaystyle			class ORD used to over-ride automatic style rules and force display style; stays in force until the end of math mode or the braced group, or until another style is selected { \displaystyle ... } Example: In inline mode: \frac ab+\displaystyle\frac ab+\textstyle\frac ab +\scriptstyle\frac ab+\scriptscriptstyle\frac ab yields: $\frac{a}{b}+\frac{a}{b}+\frac{a}{b}+\frac{a}{b}+\frac{a}{b}$ Example: In inline mode: \frac ab + {\displaystyle \frac cd + \frac ef} + \frac gh yields $\frac{a}{b}+\frac{c}{d}+\frac{e}{f}+\frac{g}{h}$ Example: In inline mode: \frac ab + \displaystyle{\frac cd + \frac ef} + \frac gh yields $\frac{a}{b}+\frac{c}{d}+\frac{e}{f}+\frac{g}{h}$ see also: \textstyle, \scriptstyle, \scriptscriptstyle
\div		÷	÷ class BIN division symbol
\divideontimes	AMSsymbols	⋇	⋇ class BIN
\Doteq	AMSsymbols	≑	≑ class REL
\doteq		≐	≐ class REL
\dotplus	AMSsymbols	∔	∔ class BIN

\dots	…	… class INNER lower dots; ellipsis; ellipses; dot dot dot In LaTeX , \dots chooses either \cdots or \ldots depending on the context; MathJax, however, always gives lower dots. Examples: x_1, \dots, x_n yields $x_1, \dots, x_n$ x_1 + \dots + x_n yields $x_1 + \dots + x_n$ x_1 + \dotsb + x_n yields $x_1 + \dots + x_n$ x_1 + \cdots + x_n yields $x_1 + \dots + x_n$ see also: \cdots, \ldots, \dotsb, \dotsc, \dotsi, \dotsm, \dotso
\dotsb		⋯ \dotsb class INNER dots with binary operations and relations $x_1 + x_2 + \dots + x_n$
\dotsc		… \dotsc class INNER dots with commas $x_1, x_2, \dots, x_n$
\dotsi		⋯ \dotsi class INNER dots with integrals $\int_{A_1}\int_{A_2}\cdots\int_{A_n}$
\dotsm		⋯ \dotsm class INNER dots with multiplication $x_1 x_2 \cdots x_n$
\dotso		… \dotso class INNER other dots $A_1 \dots A_n$ see also: \cdots, \dots, \ldots
\doublebarwedge AMSsymbols	⩞	⩞ BIN
\doublecap AMSsymbols	⋒	⋒ class BIN
\doublecup AMSsymbols	⋓	⋓ class BIN see also: \Cap, \Cup, \cap, \cup
\downarrow	↓	↓ down arrow; non-stretchy class REL
\Downarrow	⇓	⇓ double down arrow; non-stretchy class REL
\downdownarrows AMSsymbols	⇊	⇊ class REL down down arrows; non-stretchy
\downharpoonleft AMSsymbols	⇃	⇃ down harpoon left; non-stretchy class REL
\downharpoonright AMSsymbols	⇂	⇂ down harpoon right; non-stretchy class REL see also: \leftharpoondown, \leftharpoonup

E

\ell	ℓ	ℓ class ORD
\emptyset	$\emptyset$	∅ class ORD empty set see also: \varnothing
\end		used in \begin{xxx} ... \end{xxx} environments
\enspace		\enspace is a 0.5em space Example: |\enspace|\enspace| yields | |
\epsilon	ϵ	ϵ class ORD lowercase Greek letter epsilon see also: \varepsilon

\eqalign		equation alignment;
		for aligning multi-line displays at a single place
		\eqalign{ <math> & <math> \cr <repeat as needed> }
		the ampersand is placed where alignment is desired;
		a double-backslash can be used in place of the \cr ;
		the final \\ or \cr is optional;
		supports only a single \tag, which is vertically centered
		
		Example:
		`\eqalign{`
		`3x - 4y &= 5\cr`
		`x + 7 &= -2y`
		`}`
		
		yields:
		$$\begin{aligned} 3x - 4y &= 5 \\ x + 7 &= -2y \end{aligned}$$
		
		Example:
		A <math> component may be empty:
		`\eqalign{`
		`(a+b)^2 &= (a+b)(a+b) \\`
		`&= a^2 + ab + ba + b^2 \\`
		`&= a^2 + 2ab + b^2`
		`}`
		
		yields:
		$$\begin{aligned} (a+b)^2 &= (a+b)(a+b) \\ &= a^2 + ab + ba + b^2 \\ &= a^2 + 2ab + b^2 \end{aligned}$$
		
		Example:
		The result of \eqalign is a vertically-centered block;
		you can use more than one in the same display:
		`\left\{`
		`\eqalign{`
		`a &= 1\\`
		`b &= 2\\`
		`c &= 3`
		`}\right\}`
		`\qquad`
		`\eqalign{`
		`ax + by &= c \\`
		`x + 2y &= 3`
		`}`
		
		yields:
		$$\left\{\begin{aligned} a &= 1 \\ b &= 2 \\ c &= 3 \end{aligned}\right\} \qquad \begin{aligned} ax + by &= c \\ x + 2y &= 3 \end{aligned}$$
		
		see also: \eqalignno, the align environment, \tag

\eqalignno		equation alignment with optionally numbered (tagged) lines \eqalignno{ <math> & <math> & <equation tag> \cr <repeat as needed> }

		the first ampersand is placed where alignment is desired;
		the second ampersand is used just before a tag;
		if there is no tag, then the final `& <equation tag>` is omitted;
		a double-backslash can be used in place of the `\cr` ;
		the final `\\` or `\cr` is optional
		
		Example:
		`\eqalignno{`
		`3x - 4y &= 5 &(\dagger) \cr`
		`x + 7 &= -2y &(\ddagger)\cr`
		`z &= 2`
		`}`
		yields:
		$$3x - 4y = 5 \quad (\dagger)$$
		$$x + 7 = -2y \quad (\ddagger)$$
		$$z = 2$$
		see also: \eqalign, \leqalignno, the align environment

`\eqcirc` AMSsymbols	≖	`&#x2256;` class REL
`\eqsim` AMSsymbols	≂	`&#x2242;` class REL
`\eqslantgtr` AMSsymbols	⪖	`&##x2A96;` class REL
`\eqslantless` AMSsymbols	⪕	`&##x2A95;` class REL
`\equiv`	≡	`&#x2261;` class REL
`Error Messages;` `page processing log`		When you're working with a MathJax page, you may want to see the log of messages generated during page processing (particularly if something has gone wrong). To do this, type `javascript:alert(MathJax.Message.Log())` in the browser's location URL box, and then refresh the page. If the alert box is too big to see the close button, just press 'enter' to close the alert box.
`\eta`	η	`&#x03B7;` class ORD lowercase Greek letter eta
`\eth` AMSsymbols	ð	`&#x00F0;` class ORD
`\exists`	∃	`&#x2203;` class ORD there exists see also: \nexists
`\exp`	exp	class OP exponential function; does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples

F

\fallingdotseq AMSsymbols	≒	≒ class REL falling dot sequence; see also: \risingdotseq
\fbox		puts a box around argument; argument is in text mode equivalent to: \boxed{\text{#1}} \fbox #1 where #1 is rendered as text Examples: \boxed{Hi there!} yields *Hithere!* \fbox{Hi there!} yields Hi there! see also: \boxed
\Finv AMSsymbols	Ⅎ	Ⅎ class ORD
\flat	♭	♭ class ORD musical flat symbol see also: \natural, \sharp
\forall	∀	∀ class ORD universal quantifier; for all; for every; for each
\frac AMSmath		fractions; displays differently in inline and display modes \frac #1 #2 Examples: \frac a b yields (inline mode) $\frac{a}{b}$ \frac a b yields (display mode) $\frac{a}{b}$ \frac{a-1}b-1 yields $\frac{a-1}{b}-1$ \frac{a-1}{b-1} yields $\frac{a-1}{b-1}$ see also: \above, \abovewithdelims, \atop, \atopwithdelims, \cfrac, \dfrac, \genfrac, \over, \overwithdelims
\frak		class ORD turns on fraktur; affects uppercase and lowercase letters, and digits {\frak ... } Examples: \frak ABCDEFGHIJKLMNOPQRSTUVWXYZ yields 𝔄𝔅ℭ𝔇𝔈𝔉𝔊ℌℑ𝔍𝔎𝔏𝔐𝔑𝔒𝔓𝔔ℜ𝔖𝔗𝔘𝔙𝔚𝔛𝔜ℨ \frak 0123456789 yields 0123456789 \frak abcdefghijklmnopqrstuvwxyz yields 𝔞𝔟𝔠𝔡𝔢𝔣𝔤𝔥𝔦𝔧𝔨𝔩𝔪𝔫𝔬𝔭𝔮𝔯𝔰𝔱𝔲𝔳𝔴𝔵𝔶𝔷 {\frak AB}AB yields $\mathfrak{AB}AB$ \frak AB \rm AB yields $\mathfrak{AB}\mathrm{AB}$ {\frak AB \cal AB} AB yields $\mathfrak{AB}\mathcal{AB}AB$ see also: \mathfrak
\frown	⌢	⌢ class REL see also: \smallfrown, \smallsmile, \smile

G

\Game AMSsymbols	⅁	⅁ class ORD
\Gamma	Γ	Γ class ORD uppercase Greek letter gamma see also: \varGamma
\gamma	γ	γ class ORD lowercase Greek letter gamma
\gcd	gcd	class OP greatest common divisor; does not change size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples Examples: \gcd_{\rm sub}^{\rm sup} yields (inline mode) $\gcd_{\rm sub}^{\rm sup}$ \gcd_{\rm sub}^{\rm sup} yields (display mode) $\gcd\limits_{\rm sub}^{\rm sup}$
\ge \geq	≥	≥ \ge ≥ \geq
\geqq AMSsymbols \geqslant AMSsymbols	≧ ⩾	≧ \geqq ⩾ \geqslant all class REL greater than or equal to see also: \ngeq, \ngeqq, \ngeqslant
\genfrac AMSmath		the most general command for defining fractions with optional delimiters, line thickness, and specified style \genfrac #1 #2 #3 #4 #5 #6 where: • #1 is the left delimiter (empty, for no left delimiter) • #2 is the right delimiter (empty, for no right delimiter) • #3 is the fraction bar thickness (set to 0pt to make it disappear) • #4 is either 0, 1, 2, or 3, where: ◦ 0 denotes \displaystyle ◦ 1 denotes \textstyle ◦ 2 denotes \scriptstyle ◦ 3 denotes \scriptscriptstyle • #5 is the numerator • #6 is the denominator Example: \genfrac(]{0pt}{2}{a+b}{c+d} yields $\genfrac(]{0pt}{2}{a+b}{c+d}$ see also: \above, \abovewithdelims, \atop, \atopwithdelims, \cfrac, \dfrac, \frac, \over, \overwithdelims
\gets	←	← class REL left arrow; non-stretchy
\gg	≫	≫ class REL
\ggg AMSsymbols \gggtr AMSsymbols	⋙ ⋙	⋙ class REL ⋙ class REL
\gimel AMSsymbols	ℷ	ℷ class ORD Hebrew letter gimel
\gtrapprox AMSsymbols \gnapprox AMSsymbols	⪆ ⪊	⪆ class REL ⪊ class REL
\gneq AMSsymbols \gneqq AMSsymbols \gvertneqq AMSsymbols	⪈ ≩ ≩	⪈ class REL ≩ class REL ≩ class REL
\gtrsim AMSsymbols	≳	≳ class REL

\gnsim AMSsymbols	$\gtrsim$	⋧ class REL
\grave	`	ˋ grave accent \grave #1 Usually, #1 is a single letter; otherwise, accent is centered over argument. Examples: \grave e yields $\grave{e}$ \grave E yields $\grave{E}$ \grave eu yields $\grave{e}u$ \grave{eu} yields $e\grave{u}$
\gt	>	> class REL greater than see also: \ngtr
\gtrdot AMSsymbols	$\gtrdot$	⋗ class REL
\gtreqless AMSsymbols	$\gtreqless$	⋛ class REL
\gtreqqless AMSsymbols	$\gtreqqless$	⪌ class REL
\gtrless AMSsymbols	$\gtrless$	≷ class REL

H

\hat	ˆ	ˊ non-stretchy hat accent \hat #1 Usually, #1 is a single letter; otherwise, accent is centered over argument. Examples: \hat\imath yields $\hat{\imath}$ \hat\jmath yields $\hat{\jmath}$ \hat ab yields $\hat{a}b$ \hat{ab} yields $\hat{ab}$ see also: \widehat
\hbar	$\hbar$	ℏ class ORD Planck's constant
\hbox		class ORD horizontal box; contents are treated as text, but you can switch to math mode inside; text appears in \rm \hbox #1 Examples: \hbox{\alpha a }\alpha a yields \alpha a αa \hbox{This is a sentence.} yields This is a sentence. \hbox{for all $x > 0$} yields for all $x > 0$ in MathJax, these are essentially the same: \text, \mbox see also: \rm
\hdashline \hline		works in many of the environments to create a horizontal line (\hline), or a horizontal dashed line (\hdashline) Putting \hdashline or \hline first or last encases the entire structure (which is different from standard LaTeX behavior): \begin{matrix} \hdashline x_{11} & x_{12} \\ x_{21} & x_{22} \\ x_{31} & x_{32} \end{matrix} yields $\hdashline x_{11} & x_{12} \\ x_{21} & x_{22} \\ x_{31} & x_{32}$ \begin{matrix} x_{11} & x_{12} \\ x_{21} & x_{22} \\ x_{31} & x_{32} \\ \hline \end{matrix} yields $\begin{matrix} x_{11} & x_{12} \\ x_{21} & x_{22} \\ x_{31} & x_{32} \\ \hline \end{matrix}$ Putting \hdashline or \hline at the beginning of any subsequent row puts a line **over** that row: \begin{matrix} x_{11} & x_{12} \\ x_{21} & x_{22} \\ \hline x_{31} & x_{32} \end{matrix} yields $\begin{matrix} x_{11} & x_{12} \\ x_{21} & x_{22} \\ \hline x_{31} & x_{32} \end{matrix}$ You can combine effects, and put in struts (as desired) for additional vertical spacing: \begin{matrix} \hline x_{11} & x_{12} \\ x_{21} & x_{22} \strut \\ \hdashline x_{31} & x_{32} \strut \end{matrix} yields $\begin{matrix} \hline x_{11} & x_{12} \\ x_{21} & x_{22} \\ \hdashline x_{31} & x_{32} \end{matrix}$
\heartsuit	♡	♡ class ORD see also: \clubsuit, \diamondsuit, \spadesuit
\hfil \hfill		horizontal glue; horizontal fill (added in MathJax 2.5); can be used to set horizontal alignment in matrices and arrays (as in old-fashioned TeX layout); it 'expands' to fill available horizontal space, pushing contents on right or left to the boundary

		Example:
		`\begin{matrix}`
		`xxxxxx & xxxxxx & xxxxxx \cr`
		`ab & \hfil ab & ab\hfil\cr`
		`\end{matrix}`
		yields
		$\begin{matrix} xxxxxx & xxxxxx & xxxxxx \\ ab & ab & ab \end{matrix}$
		see also: \hskip, \hspace, \kern, \mkern, \mskip, \mspace

\hom	hom	class OP homomorphism; does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples
\hookleftarrow \hookrightarrow	$\hookleftarrow$ $\hookrightarrow$	↩ non-stretchy ↪ non-stretchy both class REL

\hphantom		class ORD
		horizontal phantom
		
		Sometimes you want to *pretend* that something is there, for spacing reasons,
		but you don't want it to appear—you want it to be invisible—you want it to be a phantom.
		
		The box created by `\hphantom` has the width of its argument,
		but its height and depth are zero (so it doesn't contribute to any vertical spacing issues).
		In other words, `\hphantom` creates horizontal space equal to that produced by its argument,
		but doesn't create any vertical space.
		`\hphantom #1`
		Example:
		`\begin{array}{l}`
		`\text{Side Angle Side}\\`
		`\text{S}\hphantom{\text{ide }}\text{A}\hphantom{\text{ngle }}\text{S}`
		`\end{array}`
		yields
		$\begin{array}{l} \text{Side Angle Side} \\ \text{S}\hphantom{\text{ide }}\text{A}\hphantom{\text{ngle }}\text{S} \end{array}$
		see also: \phantom, \vphantom

\href		used to make a math object into a link `\href{ <url> } #1` where the argument (`#1`) is the clickable area Example: `\href{http://www.onemathematicalcat.org}{M^{A^{T^H}}}` yields $M^{A^{T^H}}$

\hskip		horizontal glue; horizontal space; horizontal skipping;
		`\hskip <dimen>`
		Example:
		`w\hskip1em i\hskip2em d\hskip3em e\hskip4em r`
		yields
		$w \hskip1em i \hskip2em d \hskip3em e \hskip4em r$
		in MathJax, these all behave the same: \hspace, \kern, \mkern, \mskip, \mspace

\hslash AMSsymbols	$\hslash$	ℏ class ORD perhaps an alternative form of Planck's constant

\hspace		horizontal glue; horizontal space; horizontal skipping
		`\hspace <dimen>`
		Example:
		`s\hspace7ex k\hspace6ex i\hspace5ex n\hspace4ex n\hspace3ex i\hspace2ex e\hspace1ex r`

		yields $s \quad k \quad i \quad n \quad n \quad i \quad e \quad r$ in MathJax, these all behave the same: \hskip, \kern, \mkern, \mskip, \mspace
\Huge \huge		both class ORD turns on huge mode and an even bigger Huge mode {\Huge ... } {\huge ... } Examples: \huge AaBb\alpha\beta123\frac ab\sqrt x yields $AaBb\alpha\beta123\frac{a}{b}\sqrt{x}$ {\huge A B} A B yields AB_{AB} A\alpha\huge A\alpha \Huge A\alpha yields $_{A\alpha}A\alpha A\alpha$ see also: \LARGE, \Large, \large

I

`\iddots`	$\ddots$
	
	Not in MathJax Library
		inner diagonal dots;
		
		This macro must be supplied by the user, if desired.
		Davide Cervone provided the code (given here) in the MathJax User Group.
		
		To use this macro, put the following definition in either inline or display mathematics:
		
		`$`
		`\def\iddots{`
		`  {\kern3mu\raise1mu{.}\kern3mu\raise6mu{.}\kern3mu\raise12mu{.}}}`
		`$`
		
		Then, in any subsequent mathematics:
		
		`\iddots` yields $\iddots$
		
		Instead of providing the definition inside math delimiters in the body,
		you can add the definition to your configuration using the `Macros` property of the `TeX` block:
		
		`<script type="text/x-mathjax-config">`
		`MathJax.Hub.Config({`
		`TeX: {`
		`Macros: {`
		`  iddots: "{\\kern3mu\\raise1mu{.}\\kern3mu\\raise6mu{.}\\kern3mu\\raise12mu{.}}"`
		`}}});`
		`</script>`

`\idotsint` AMSmath	$\int\cdots\int$	class OP changes size; can change limit placement using \limits; see the Big Operators Table for examples
`\iff`	$\Longleftrightarrow$	`&#x27FA;` with a thick space on both sides if and only if; is equivalent to; non-stretchy Example: `A\iff B` yields $A \Longleftrightarrow B$

`\iiiint` AMSmath
`\iiint`
`\iint`
`\int`
	$\iiiint$
	$\iiint$
	$\iint$
	$\int$
		four occurrences of `&#x222B;`
		`&#x222D;`
		`&#x222C;`
		`&#x222B;`
		all class OP;
		see the Big Operators Table for examples
		
		Compare the different limit placements (both in display mode):
		
		`\int_a^b` yields $\int_a^b$
		
		`\intop_a^b` yields $\intop_a^b$
		
		see also: \intop

`\intop`	$\intop$	`&#x222B;` (with movable limits) class OP See the Big Operators Table for examples. see also: \iiiint, \iiint, \iint, \int
`\Im`	$\Im$	`&#x2111;` class ORD
`\imath`	$\imath$	`&#x0131;` class ORD a dotless ‘i’; better to use when accented Examples: `\hat i` yields $\hat{i}$ `\hat\imath` yields $\hat{\imath}$ see also: \jmath

\impliedby AMSsymbols	$\Longleftarrow$	⟸ with a thick space on both sides non-stretchy Example: P\impliedby Q yields $P \Longleftarrow Q$
\implies AMSsymbols	$\Longrightarrow$	⟹ with a thick space on both sides non-stretchy Example: P\implies Q yields $P \Longrightarrow Q$
\in	$\in$	∈ class REL is in; is an element of; indicates membership in a set; see also: \ni, \notin, \owns
\inf	$\inf$	class OP infimum; greatest lower bound; does not change size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples Examples: \inf_{\rm limit} yields (inline mode) $\inf_{\rm limit}$ \inf_{\rm limit} yields (display mode) $\inf\limits_{\rm limit}$ see also: \sup
\infty	∞	∞ class ORD infinity
\injlim AMSmath	$\varinjlim$	class OP injective limit; does not change size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples see also: \varinjlim
\intercal AMSsymbols	$\intercal$	⊺ class BIN
\iota	ι	ι class ORD lowercase Greek letter iota
\it		class ORD turns on math italic mode; to return to math italic mode if it had been turned off {\it ... } Examples: {\bf ab \it ab} ab yields $\mathbf{ab}ab$ \rm for\ all\ {\it x}\ in\ \Bbb R yields for all x in $\mathbb{R}$ \Delta\Gamma\Lambda{\it \Delta\Gamma\Lambda} yields $\Delta\Gamma\Lambda\mathit{\Delta\Gamma\Lambda}$ see also: \mathit, \mit

J

\jmath	$\jmath$	ȷ class ORD a dotless 'j'; better to use when accented Examples: \hat j yields $\hat{j}$ \hat\jmath yields $\hat{\jmath}$ see also: \imath
\Join AMSsymbols	$\Join$	⋈ class REL

K

\kappa	κ	κ class ORD lowercase Greek letter kappa see also: \varkappa
\ker	ker	class OP kernel; does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples
\kern		to get a specified amount of horizontal space; a negative argument forces 'backing up', so items can overlap \kern <dimen> Examples: |\kern 2ex|\kern 2em|\kern 2pt| yields | | || \rm I\kern-2.5pt R yields $\mathbb{R}$ in MathJax, these all behave the same: \hskip, \hspace, \mkern, \mskip, \mspace

L

`\Lambda`	Λ	uppercase Greek letter lambda `&#x039B;` class ORD
`\lambda`	λ	lowercase Greek letter lambda `&#x03BB;` class ORD see also: \varLambda
`\land`	$\land$	logical AND `&#x2227;` class BIN see also: \lor, \wedge

`\langle`	$\langle$	left angle bracket; `&#x27E8;` class OPEN
		non-stretchy when used alone;
		stretchy when used with `\left` or `\right` (see below)
		
		Example:
		`\left\langle`
		`\matrix{a & b\cr c & d}` yields $\left\langle \begin{matrix} a & b \\ c & d \end{matrix} \right.$
		`\right\rangle`
		
		see also: \rangle

`\LARGE`
`\Large`
`\large`
		turns on large typestyles; affects all math — all class ORD
		`{\LARGE ... }`
		`{\Large ... }`
		`{\large ... }`
		Examples:
		`\Large AaBb\alpha\beta123\frac ab` yields $AaBb\alpha\beta123\frac{a}{b}$
		`{\Large A B} A B` yields AB_{AB}
		`AB \large AB \Large AB \LARGE AB` yields $_{AB}AB^{AB}AB$
		`\Large{AB}CD` yields $ABCD$
		see also: \huge, \Huge

`\LaTeX`	$\LaTeX$	the LaTeX logo — class ORD Example: `\rm\LaTeX` yields LaTeX see also: \TeX
`\lbrace`	{	left brace: — class OPEN non-stretchy when used alone; stretchy when used with `\left` or `\right` (see below) Examples: `\lbrace \frac ab, c \rbrace` yields $\{\frac{a}{b}, c\}$ `\left\lbrace \frac ab, c \right\rbrace` yields $\left\{\frac{a}{b}, c\right\}$ see also: \rbrace, \{ \}
`\lbrack`	[	left bracket: — class OPEN non-stretchy when used alone; stretchy when used with `\left` or `\right` (see below); Examples: `\lbrack \frac ab, c \rbrack` yields $[\frac{a}{b}, c]$ `\left\lbrack \frac ab, c \right\rbrack` yields $\left[\frac{a}{b}, c\right]$ see also: \rbrack, [ ]

`\lceil`	⌈	left ceiling; `&#x2308;` class OPEN
		non-stretchy when used alone;
		stretchy when used with `\left` or `\right` (see below)
		
		Example:
		`\left\lceil`
		`\matrix{a & b\cr c & d}` yields $\left\lceil \begin{matrix} a & b \\ c & d \end{matrix} \right.$
		`\right\rceil`
		
		see also: \rceil, \lfloor, \rfloor

\ldotp		.	lower dot, punctuation symbol . class PUNCT Examples: \rm s \ldotp h yields s. h \rm s.h yields s. h see also: \cdotp
\ldots		⋯	lower dots; ellipsis; ellipses; dot dot dot … class INNER Example: x_1,\ldots,x_n yields $x_1,\ldots,x_n$ see also: \cdots, \dots
\le		≤	less than or equal to ≤ class REL
\leq		≤	less than or equal to ≤ class REL
\leqq	AMSsymbols	≦	less than or equal to ≦ class REL
\leqslant	AMSsymbols	⩽	less than or equal to ⩽ class REL see also: \nleq, \nleqq, \nleqslant
\leadsto	AMSsymbols	⇝	⇝ class REL
\left		□	used for stretchy delimiters; see the Variable-Sized Delimiters Table for details Examples: \left(\frac12 \right) yields $\left(\frac{1}{2}\right)$ \left\updownarrow \right\Updownarrow yields $\left\updownarrow \right\Updownarrow$ see also: \right
\leftarrow		←	left arrow; non-stretchy ← class REL
\Leftarrow		⇐	left arrow; non-stretchy ⇐ class REL see also: \nleftarrow, \nLeftarrow
\leftarrowtail	AMSsymbols	↢	left arrow tail; non-stretchy ↢ class REL see also: \rightarrowtail
\leftharpoondown		↽	left harpoon arrow; non-stretchy ↽ class REL
\leftharpoonup		↼	left harpoon arrow; non-stretchy ↼ class REL
\leftleftarrows	AMSsymbols	⇇	left left arrows; non-stretchy ⇇ class REL
\leftrightarrow		↔	left right arrow; non-stretchy ↔ class REL
\Leftrightarrow		⇔	left right arrow; non-stretchy ⇔ class REL see also: \nleftrightarrow, \nLeftrightarrow
\leftrightarrows	AMSsymbols	⇆	left right arrows; non-stretchy ⇆ class REL
\leftrightharpoons	AMSsymbols	⇋	left right harpoons; non-stretchy ⇋ class REL
\leftrightsquigarrow	AMSsymbols	↭	left right squiqqle arrow; non-stretchy ↭ class REL
\leftroot			used to fine-tune the placement of the index inside \sqrt or \root (see examples) \sqrt[... \leftroot #1 ...]{...} \root ... \leftroot #1 ... \of {...} where the argument is a small integer: a positive integer moves the index to the left; a negative integer moves the index to the right Examples: \sqrt[3]{x} yields $\sqrt[3]{x}$ \sqrt[3\leftroot1]{x} yields $\sqrt[3]{x}$ \root 3 \of x yields $\sqrt[3]{x}$ \root 3\leftroot{-1} \of x yields $\sqrt[3]{x}$ \root 3\leftroot{-1}\uproot2 \of x yields $\sqrt[3]{x}$ see also: \uproot, \root

\leftthreetimes AMSsymbols	⋋		⋋ class BIN

\leqalignno		equation alignment with optionally numbered (tagged) lines;
		in TEX , \leqalignno puts the tags on the left, but MathJax doesn't implement this behavior;
		currently, tags appear in a column on the right separated from the equations by a fixed amount of space (so they don't work like tags in the AMS math environments);
		this may be fixed in a future version of MathJax
		\leqalignno{ <math> & <math> & <equation tag> \cr <repeat as needed> }
		the first ampersand is placed where alignment is desired;
		the second ampersand is used just before a tag;
		if there is no tag, then the final & <equation tag> is omitted;
		a double-backslash can be used in place of the \cr ;
		the final \\ or \cr is optional;
		output is the same in both inline and display modes
		(except for the amount of vertical space before and after);
		Example:
		\leqalignno{
		3x - 4y &= 5 &(\dagger) \cr
		x + 7 &= -2y &(\ddagger)\cr
		z &= 2
		}
		yields:
		(†) $3x - 4y = 5$
		(‡) $x + 7 = -2y$
		$z = 2$
		see also: \eqalignno; the align environment	

\lessapprox AMSsymbols	⪅	see also: \lnapprox	⪅ class REL
\lessdot AMSsymbols	⋖		⋖ class REL
\lesseqgtr AMSsymbols	⋚		⋚ class REL
\lesseqqgtr AMSsymbols	⪋		⪋ class REL
\lessgtr AMSsymbols	≶		≶ class REL
\lesssim AMSsymbols	≲	see also: \lnsim	≲ class REL
\lfloor	⌊	left floor; non-stretchy when used alone; stretchy when used with \left or \right see also: \rfloor, \lceil, \rceil	⌊ class OPEN
\lg	lg	does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples	class OP
\lgroup	⟮	left group; non-stretchy when used alone; stretchy when used with \left or \right Example: \left\lgroup \matrix{a & b\cr c & d} yields $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ \right\rgroup see also: \rgroup	⟮ class OPEN
\lhd AMSsymbols	◁	left-hand diamond see also: \rhd	⊲ class REL
\lim	lim	limit; does not change size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples	class OP

		Examples: `\lim_{n\rightarrow\infty} f(x) = \ell` (inline mode) yields $\lim_{n\rightarrow\infty} f(x) = \ell$ `\lim_{n\rightarrow\infty} f(x) = \ell` (display mode) yields $$\lim_{n\rightarrow\infty} f(x) = \ell$$
`\liminf`	lim inf	limit inferior; class OP does not change size; can change limit placement using `\limits` and `\nolimits`; see the Big Operators Table for examples Examples: `\liminf_{n\rightarrow\infty} x_n = \ell` (inline mode) yields $\liminf_{n\rightarrow\infty} x_n = \ell$ `\liminf_{n\rightarrow\infty}\ x_n = \ell` (display mode) yields $$\liminf_{n\rightarrow\infty}\ x_n = \ell$$ see also: \varliminf
`\limits`		used to set limits above/below any token of class OP; see the Big Operators table for more information and examples Examples: `\int_a^b f(x)\,dx` (inline mode) yields $\int_a^b f(x)\,dx$ `\int\limits_a^b f(x)\,dx` (inline mode) yields $\int\limits_a^b f(x)\,dx$ `\int_a^b f(x)\,dx` (display mode) yields $$\int_a^b f(x)\,dx$$ `\int\limits_a^b f(x)\,dx` (display mode) yields $$\int\limits_a^b f(x)\,dx$$ `\mathop{x}\limits_0^1` yields $\mathop{x}\limits_0^1$ see also: \nolimits
`\limsup`	lim sup	limit superior; class OP does not change size; can change limit placement using `\limits` and `\nolimits`; see the Big Operators Table for examples Examples: `\limsup_{n\rightarrow\infty} x_n` (inline mode) yields $\limsup_{n\rightarrow\infty} x_n$ `\limsup_{n\rightarrow\infty}\ x_n` (display mode) yields $$\limsup_{n\rightarrow\infty}\ x_n$$ see also: \varlimsup
`\ll`	$\ll$	`&x226A;` class REL
`\llap`		left overlap class ORD `\llap #1` creates a box of width zero; the argument is then placed just to the left of this zero-width box (and hence will overlap whatever lies to the left); proper use of `\llap` and `\rlap` in math expressions is somewhat delicate Examples: `a\mathrel{{=}\llap{/}}b` yields $a \mathrel{{=}\llap{/}} b$ {=} forces the equal to not have REL spacing (since it is not adjacent to ORD's) and \mathrel{} forces the compound symbol (equal with overlapping slash) to be treated as a single REL `a\mathrel{{=}\llap{/\,}}b` yields $a \mathrel{{=}\llap{/\,}} b$ the thinspace '\,' improves the spacing

			`a=\mathrel{\llap{/\,}}b` yields $a=\mathrel{\llap{/\,}}b$ this works because the spacing between adjacent `REL`'s is zero see also: \rlap
`\llcorner`	AMSsymbols	⌞	lower left corner `&#x2514;` class REL
`\lrcorner`	AMSsymbols	⌟	lower right corner `&#x2518;` class REL These are technically delimiters, but MathJax doesn't stretch them like it should. see also: \ulcorner, \urcorner
`\Lleftarrow`	AMSsymbols	⇚	non-stretchy `&#x21DA;` class REL
`\lll`	AMSsymbols	⋘	`&#x22D8;` class REL
`\llless`	AMSsymbols	⋘	`&#x22D8;` class REL

`\lmoustache`		⎰	left moustache; `&#x23B0;` class OPEN
			non-stretchy when used alone;
			stretchy when used with `\left` or `\right` (see below)
			Example:
			`\left\lmoustache`
			`\phantom{\matrix{a & b\cr c & d}}` yields ⎰ ⎱
			`\right\rmoustache`
			see also: \rmoustache

`\ln`		ln	natural logarithm; class OP does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples
`\lnapprox`	AMSsymbols	⪉	see also: \lessapprox `&#x2A89;` class REL
`\lneq`	AMSsymbols	⪇	see also: \leq `&#x2A87;` class REL
`\lneqq`	AMSsymbols	≨	see also: \leqq `&#x2268;` class REL
`\lnot`		¬	logical not `&#x00AC;` class ORD see also: \neg
`\lnsim`	AMSsymbols	⋦	see also: \lesssim `&#x22E6;` class REL
`\log`		log	logarithm; class OP does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for examples
`\longleftarrow`		⟵	non-stretchy `&#x27F5;` class REL
`\Longleftarrow`		⟸	non-stretchy `&#x27F8;` class REL
`\longrightarrow`		⟶	non-stretchy `&#x27F6;` class REL
`\Longrightarrow`		⟹	non-stretchy `&#x27F9;` class REL
`\longleftrightarrow`		⟷	non-stretchy `&#x27F7;` class REL
`\Longleftrightarrow`		⟺	non-stretchy `&#x27FA;` class REL
`\longmapsto`		⟼	long maps to `&#x27FC;` class REL see also: \mapsto
`\looparrowleft`	AMSsymbols	↫	non-stretchy `&#x21AB;` class REL
`\looparrowright`	AMSsymbols	↬	non-stretchy `&#x21AC;` class REL
`\lor`		∨	logical OR `&#x2228;` class BIN see also: \land, \vee
`\lower`			`\lower <dimen> #1` lowers the argument by the amount specified in <dimen>; in actual TEX , the argument to `\lower` (and `\raise`) must be an `\hbox` ,

			but in MathJax it can be any expression (using an `\hbox` is allowed, but not required) Example: `l\lower 2pt {owe} r` yields $l_{owe}r$ see also: \raise
`\lozenge`	AMSsymbols	◊	`&#x25CA;` class ORD
`\Lsh`	AMSsymbols	↰	left shift; non-stretchy see also: \Rsh `&#x21B0;` class REL
`\lt`		<	less than see also: \nless `&#x003C;` class REL
`\ltimes`	AMSsymbols	⋉	see also: \rtimes `&#x22C9;` class BIN
`\lvert`	AMSmath	|	both non-stretchy when used alone; `&#x2223;` class OPEN
`\lVert`	AMSmath	‖	stretchy when used with `\left` or `\right` `&#x2225;` class OPEN Example: `\left\lvert\frac{\frac ab}{\frac cd}\right\rvert` yields $\left\lvert\frac{\frac{a}{b}}{\frac{c}{d}}\right\rvert$ see also: \rvert, \rVert, |, \\|
`\lvertneqq`	AMSsymbols	≨	`&#x2268;` class REL

M

\maltese AMSsymbols	✠	✠ class ORD
\mapsto	↦	maps to; non-stretchy math operator ↦ class REL see also: \longmapsto
\mathbb		blackboard-bold for uppercase letters and lowercase 'k'; class ORD if lowercase blackboard-bold letters are not available, then they are typeset in a roman font \mathbb #1 Whether lower-case letters are displayed in blackboard-bold, or not, depends on the fonts being used. The MathJax web-based fonts don't have lowercase blackboard-bold, but the STIX fonts do; so users with the STIX fonts installed will be able to display lowercase blackboard-bold letters. Examples: \mathbb R yields $\mathbb{R}$ \mathbb ZR yields $\mathbb{Z}R$ \mathbb{AaBbKk}Cc yields $\mathbb{AaBbKk}Cc$ \mathbb{ABCDEFGHIJKLMNOPQRSTUVWXYZ} yields $\mathbb{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$ see also: \Bbb
\mathbf		boldface for uppercase and lowercase letters and digits class ORD \mathbf #1 Examples: \mathbf{AaBb\alpha\beta123} yields $\mathbf{AaBb\alpha\beta123}$ \mathbf ZR yields $\mathbf{Z}R$ \mathbf{uvw}xyz yields $\mathbf{uvw}xyz$ see also: \bf, \boldsymbol
\mathbin		gives the correct spacing to make an object into a binary operator; class BIN binary operators have some extra space around them; creates an element of class BIN \mathbin #1 Examples: a\text{op} b yields $a\text{op}b$ a\mathbin{\text{op}} b yields $a \text{ op } b$ a\Diamond b yields $a\Diamond b$ a\mathbin{\Diamond}b yields $a \Diamond b$
\mathcal		calligraphic font for uppercase letters and digits class ORD \mathcal #1 Examples: \mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ} yields $\mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$ \mathcal{0123456789} yields $\mathcal{0123456789}$ \mathcal{abcdefghijklmnopqrstuvwxyz} yields $\mathcal{abcdefghijklmnopqrstuvwxyz}$ abcdefghijklmnopqrstuvwxyz yields $abcdefghijklmnopqrstuvwxyz$ \mathcal{AB}AB yields $\mathcal{AB}AB$ see also: \cal, \oldstyle
\mathchoice		provides content that is dependent on the current style (display, text, script, or scriptscript); can be used in defining a macro for general use \mathchoice #1 #2 #3 #4 where: • #1 is rendered when the \mathchoice appears in display style • #2 is rendered when the \mathchoice appears in text style • #3 is rendered when the \mathchoice appears in script style • #4 is rendered when the \mathchoice appears in scriptscript style Examples: \mathchoice{D}{T}{S}{SS} (in display style) yields D

		`\mathchoice{D}{T}{S}{SS}` (in text style) yields T `\mathchoice{D}{T}{S}{SS}` (in script style) yields S `\mathchoice{D}{T}{S}{SS}` (in scriptscript style) yields SS Here's a nice example from the TEX Book: Define: `\def\puzzle{\mathchoice{D}{T}{S}{SS}}` Then: `\puzzle{\puzzle\over\puzzle^{\puzzle^\puzzle}}` yields (in display mode) $D\frac{T}{T^{S^{SS}}}$ `\puzzle{\puzzle\over\puzzle^{\puzzle^\puzzle}}` yields (in inline mode) $T\frac{S}{S^{SS}}$
`\mathclose`		forces the argument to be treated in the 'closing' class; for example, like ') ' and '] '; creates an element of class CLOSE — class CLOSE `\mathclose #1` Examples: `a + \lt b\gt + c` yields $a+<b>+c$ `a + \mathopen\lt b\mathclose\gt + c` yields $a+<b>+c$ see also: \mathopen
`\mathfrak`		fraktur font for uppercase and lowercase letters and digits (and a few other characters) — class ORD `\mathfrak #1` Examples: `\mathfrak{ABCDEFGHIJKLMNOPQRSTUVWXYZ}` yields $\mathfrak{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$ `\mathfrak{0123456789}` yields 0123456789 `\mathfrak{abcdefghijklmnopqrstuvwxyz}` yields $\mathfrak{abcdefghijklmnopqrstuvwxyz}$ `\mathfrak{AB}AB` yields $\mathfrak{AB}AB$ see also: \frak
`\mathinner`		some constructions are meant to appear 'inside' other formulas, and should be surrounded by additional space in certain circumstances; this classification is forced on the argument by using `\mathinner` — class INNER `\mathinner #1` Examples: `ab\text{inside}cd` yields $ab\text{inside}cd$ `ab\mathinner{\text{inside}}cd` yields $ab\,\text{inside}\,cd$
`\mathit`		math italic mode — class ORD `\mathit #1` Examples: `\rm abc \mathit{def} ghi` yields abcdefghi in MathJax, this is the same as: \mit and \it
`\mathop`		forces the argument to be treated in the 'large operator' class; for example, like '$\sum$ '; creates an element of class OP — class OP `\mathop #1` Examples: `atbtc` yields $atbtc$ `a\mathop{t}b\mathop{t}c` yields $a\,t\,b\,t\,c$ `\star_a^b` yields (in display mode) $\star_a^b$ `\mathop{\star}_a^b` yields (in display mode) $\overset{b}{\underset{a}{\star}}$

\mathopen

forces the argument to be treated in the 'opening' class; for example, like '(' and '[';
creates an element of class OPEN

class OPEN

```
\mathopen #1
```

Examples:

```
a + \lt b\gt + c
```
yields $a+<b>+c$

```
a + \mathopen\lt b\mathclose\gt + c
```
yields $a+<b>+c$

see also: \mathclose

\mathord

forces the argument to be treated in the 'ordinary' class; for example, like '/ ';
spacing is determined by pairs of tokens;
there is no extra spacing between adjacent ORD's (as in the second example below);
there is extra spacing between an ORD and a BIN (as in the first example below);
creates an element of class ORD

class ORD

```
\mathord #1
```

Examples:

```
a+b+c
```
yields $a+b+c$

```
a\mathord{+}b\mathord{+}c
```
yields $a+b+c$

```
1,234,567
```
yields $1,234,567$

```
1\mathord{,}234{,}567
```
yields $1,234,567$

\mathpunct

forces the argument to be treated in the 'punctuation' class; for example, like ', ';
punctuation tends to have some extra space after the symbol;
returns an element of class PUNCT

class PUNCT

```
\mathpunct #1
```

Examples:

```
1.234
```
yields 1.234

```
1\mathpunct{.}234
```
yields 1.234

\mathrel

forces the argument to be treated in the 'relation' class; for example, like '= ' and '> ';
relations have a bit more space on both sides than binary operators;
returns an element of class REL

class REL

```
\mathrel #1
```

Examples:

```
a \# b
```
yields $a\#b$

```
a \mathrel{\#} b
```
yields $a\ \#\ b$

\mathring AMSmath

°

˚

```
\mathring #1
```

Examples:

```
\mathring A
```
yields $\mathring{A}$

```
\mathring{AB}C
```
yields $\mathring{AB}C$

\mathrm

roman typestyle for uppercase and lowercase letters

class ORD

```
\mathrm #1
```

Examples:

```
\mathrm{AaBb\alpha\beta123}
```
yields $\mathrm{AaBb\alpha\beta123}$

```
\mathrm ZR
```
yields ZR

```
\mathrm{uvw}xyz
```
yields $\mathrm{uvw}xyz$

see also: \rm

\mathscr

script typestyle for uppercase letters;
if lowercase script letters are not available, then they are typeset in a roman typestyle

class ORD

```
\mathscr #1
```

Whether lower-case letters are displayed in script, or not, depends on the fonts being used.
The MathJax web-based fonts don't have lowercase script, but the STIX fonts do;
so users with the STIX fonts installed will be able to display lowercase script letters.

Examples:

```
\mathscr{ABCDEFGHIJKLMNOPQRSTUVWXYZ}
```
yields $\mathscr{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$

$\mathscr{0123456789}$

		`\mathscr{0123456789}` yields `\mathscr{abcdefghijklmnopqrstuvwxyz}` yields abcdefghijklmnopqrstuvwxyz `abcdefghijklmnopqrstuvwxyz` yields $abcdefghijklmnopqrstuvwxyz$ `\mathscr{AB}AB` yields $\mathscr{A}\mathscr{B}AB$ see also: \scr
`\mathsf`		sans serif typestyle for uppercase and lowercase letters and digits; class ORD also affects uppercase greek (as do the other font switches, like `\rm`, `\it`, `\bf`, `\mathrm`, `\mathit`, `\mathbf`, etc). `\mathsf #1` Examples: `\mathsf{ABCDEFGHIJKLMNOPQRSTUVWXYZ}` yields ABCDEFGHIJKLMNOPQRSTUVWXYZ `\mathsf{0123456789}` yields 0123456789 `\mathsf{abcdefghijklmnopqrstuvwxyz}` yields abcdefghijklmnopqrstuvwxyz `\Delta\Gamma\Lambda\mathsf{\Delta\Gamma\Lambda}` yields $\Delta\Gamma\Lambda\Delta\Gamma\Lambda$ `abcdefghijklmnopqrstuvwxyz` yields $abcdefghijklmnopqrstuvwxyz$ `\mathsf{AB}AB` yields ABAB see also: \sf
`\mathstrut`		an invisible box whose width is zero; class ORD its height and depth are the same as a parenthesis '('; can be used to achieve more uniform appearance in adjacent formulas Examples: `\sqrt3 + \sqrt\alpha` yields $\sqrt{3}+\sqrt{\alpha}$ `\sqrt{\mathstrut 3} + \sqrt{\mathstrut\alpha}` yields $\sqrt{3}+\sqrt{\alpha}$
`\mathtt`		typewriter typestyle for uppercase and lowercase letters and digits; class ORD also affects uppercase Greek `\mathtt #1` Examples: `\mathtt{ABCDEFGHIJKLMNOPQRSTUVWXYZ}` yields ABCDEFGHIJKLMNOPQRSTUVWXYZ `\mathtt{0123456789}` yields 0123456789 `\mathtt{abcdefghijklmnopqrstuvwxyz}` yields abcdefghijklmnopqrstuvwxyz `abcdefghijklmnopqrstuvwxyz` yields $abcdefghijklmnopqrstuvwxyz$ `\Delta\Gamma\Lambda\mathtt{\Delta\Gamma\Lambda}` yields $\Delta\Gamma\Lambda\Delta\Gamma\Lambda$ `\mathtt{AB}AB` yields ABAB see also: \tt
`\matrix`		matrix (without any delimiters) `\matrix{ <math> & <math> ... \cr <repeat as needed> }` alignment occurs at the ampersands; a double-backslash can be used in place of the `\cr` ; the final `\\` or `\cr` is optional Example: `\matrix{ a & b \cr c & d }` yields $\begin{matrix} a & b \\ c & d \end{matrix}$ see also: \array
`\max`	max	maximum; class OP does not change size; can change limit placement using `\limits` and `\nolimits`; see the Big Operators Table for examples Examples: `\max_{\rm sub}` yields (inline mode) $\max_{\rm sub}$ `\max_{\rm sub}` yields (display mode) $\max\limits_{\rm sub}$ see also: \min
`\mbox`		creates a box just wide enough to hold the text in its argument; class ORD no linebreaks are allowed in the text; text appears in `\rm`

		\mbox <text argument> Examples: `a + b \mbox{ (are you paying attention?) } = c` yields $a + b \text{ (are you paying attention?) } = c$ `a + b \text{ (are you paying attention?) } = c` yields $a + b \text{ (are you paying attention?) } = c$ in MathJax, these are essentially the same: \text, \hbox see also: \rm
\measuredangle AMSsymbols	$\measuredangle$	∡ class ORD
\mho AMSsymbols	$\mho$	℧ class ORD
\mid	$\mid$	the spacing is perfect for use in set-builder notation — ∣ class REL Examples: `\{x | x\gt 1\}` yields $\{x \mid x > 1\}$ `\{x \mid x\gt 1\}` yields $\{x \mid x > 1\}$ see also: \nmid, \shortmid, \nshortmid
\min	$\min$	minimum; — class OP does not change size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples Examples: `\min_{\rm sub}` yields (inline mode) $\min_{\rm sub}$ `\min_{\rm sub}` yields (display mode) $\min\limits_{\rm sub}$ see also: \max
\mit		math italic typestyle — class ORD \mit #1 Examples: `\mit{\Gamma\Delta\Theta\Omega}` yields $\mit{\Gamma\Delta\Theta\Omega}$ `\mathit{\Gamma\Delta\Theta\Omega}` yields $\mathit{\Gamma\Delta\Theta\Omega}$ `\Gamma\Delta\Theta\Omega` yields $\Gamma\Delta\Theta\Omega$ in MathJax, this is the same as: \mathit and \it
\mkern		\mkern <dimen> gives horizontal space Examples: `ab` yields ab `a\mkern18mu b` yields $a \mkern18mu b$ `a\mkern18pt b` yields $a \mkern18pt b$ in MathJax, these all behave the same: \hskip, \hspace, \kern, \mskip, \mspace
\mod	mod	modulus operator; modulo; the leading space depends on the style: displaystyle has 18 mu, others 12 mu; 2 thinspaces of following space; for things like equations modulo a number \mod #1 Example: `3\equiv 5 \mod 2` yields $3 \equiv 5 \mod 2$ see also: \pmod, \bmod
\models	$\models$	⊨ class REL
\moveleft \moveright		shifts boxes to the left or right \moveleft <dimen> <box> \moveright <dimen> <box> In actual TEX , these require an \hbox (or some box) as an argument, and can only appear in vertical mode; MathJax is less picky: you don't need an actual box, and MathJax doesn't have a vertical mode; these are not really designed as user-level macros, but instead allow existing macros to work; the box takes up its original space (unlike something like \llap or \rlap), but its contents are shifted (without affecting its bounding box)

		Examples: `\rm tight` yields tight `\rm t\moveleft3pt ight` yields t ght `\rm t\moveleft3pt i\moveleft3pt g\moveleft3pt h\moveleft3pt t` yields tght `\rm t\moveleft3pt i\moveleft6pt g\moveleft9pt h\moveleft12pt t` yields t t `\square\square\moveleft 2em {\diamond\diamond}` yields ◇◇□ `\square\square\moveright 2em {\diamond\diamond}` yields □□ ◇◇ see also: \raise, \lower
`\mp`	∓	minus plus `&#x2213;` class BIN see also: \pm
`\mskip`		`\mskip <dimen>` gives horizontal space Examples: `ab` yields ab `a\mskip18mu b` yields $a\ b$ `a\mskip18pt b` yields $a\ b$ in MathJax, these all behave the same: \hskip, \hspace, \kern, \mkern, \mspace
`\mspace`		`\mspace <dimen>` gives horizontal space Examples: `ab` yields ab `a\mspace18mu b` yields $a\ b$ `a\mspace18pt b` yields $a\ b$ in MathJax, these all behave the same: \hskip, \hspace, \kern, \mkern, \mskip
`\mu`	μ	lowercase Greek letter mu `&#x03BC;` class ORD
`\multimap` `AMSsymbols`	⊸	`&#x22B8;` class REL

N

\nabla	∇	∇ class ORD
\natural	$\natural$	see also: \flat, \sharp ♮ class ORD
\ncong AMSsymbols	$\ncong$	not congruent see also: \cong ≆ class REL
\ne	$\ne$	not equal see also: equals, \neq ≠ class REL
\nearrow	$\nearrow$	northeast arrow; non-stretchy see also: \nwarrow, \searrow, \swarrow ↗ class REL
\neg	$\neg$	negate; negation see also: \lnot ¬ class ORD
\negthinspace AMSmath \negmedspace AMSmath \negthickspace AMSmath		negative thin space negative medium space negative thick space Examples: ab yields ab a\negthinspace b yields $a\negthinspace b$ a\negmedspace b yields $a\negmedspace b$ a\negthickspace b yields $a\negthickspace b$ see also: \thinspace
\neq	$\neq$	see also: equals, \ne ≠ class REL
\newcommand		for defining your own commands (control sequences, macros, definitions); \newcommand must appear (within math delimiters) before it is used; if desired, you can use the TeX.Macros property of the configuration to define macros in the head \newcommand\myCommandName [<optional # of arguments, from 1 to 9>] { <replacement text> } The bracketed # of arguments is omitted when there are no arguments. Example (no arguments): \newcommand\myHearts {\color{purple}{\heartsuit}\kern-2.5pt\color{green}{\heartsuit}} \myHearts\myHearts yields: ♡♡♡♡ A definition may take one or more arguments: Example (two arguments): \newcommand\myHearts[2] {\color{#1}{\heartsuit}\kern-2.5pt\color{#2}{\heartsuit}} \myHearts{red}{blue} yields: ♡♡ see also: \def, \newenvironment
\newenvironment		for defining your own environments; \newenvironment must appear (within math delimiters) before it is used \newenvironment{myEnvironmentName} [<optional # of arguments, from 1 to 9>] { <replacement text for each occurrence of \begin{myEnvironmentName}> } { <replacement text for each occurrence of \end{myEnvironmentName}> } The bracketed # of arguments is omitted when there are no arguments. There must not be a command having the same name as the environment: for example, to use \begin{myHeart}...\end{myHeart} there may not be a command \myHeart. Example (no arguments): \newenvironment{myHeartEnv} {\color{purple}{\heartsuit}\kern-2.5pt\color{green}{\heartsuit}} {\text{ forever}}

			`\begin{myHeartEnv}`
			`\end{myHeartEnv}`
			
			yields: ♡♡ forever
			
			An environment may take one or more arguments:
			
			Example (two arguments):
			
			`\newenvironment{myHeartEnv}[2]`
			`  {\color{#1}{\heartsuit}\kern-2.5pt\color{#2}{\heartsuit}}`
			`  {\text{ forever}}`
			
			`\begin{myHeartEnv}{red}{blue}`
			`\end{myHeartEnv}`
			
			yields: ♡♡ forever
			
			see also: \def, \newcommand

`\newline`			line separator in alignment modes and environments in MathJax, these are essentially the same: \cr, \\
`\nexists`	AMSsymbols	∄	see also: \exists `&#x2204;` class ORD
`\ngeq`	AMSsymbols	≱	not greater than or equal to `&#x2271;` class REL
`\ngeqq`	AMSsymbols	≱	not greater than or equal to `&#x2271;` class REL see also: \geq, \geqq
`\ngeqslant`	AMSsymbols	⩾̸	slanted not greater than or equal to `&#x2A88;` class REL see also: \geqslant
`\ngtr`	AMSsymbols	≯	not greater than `&#x226F;` class REL see also: \gt
`\ni`		∋	backwards 'in'; contains `&#x220B;` class REL see also: \in
`\nleftarrow`	AMSsymbols	↚	`&#x219A;` class REL
`\nLeftarrow`	AMSsymbols	⇍	`&#x21CD;` class REL see also: \leftarrow, \Leftarrow
`\nleftrightarrow`	AMSsymbols	↮	`&#x21AE;` class REL
`\nLeftrightarrow`	AMSsymbols	⇎	`&#x21CE;` class REL see also: \leftrightarrow, \Leftrightarrow
`\nleq`	AMSsymbols	≰	not less than or equal to `&#x2270;` class REL
`\nleqq`	AMSsymbols	≰	not less than or equal to `&#x2270;` class REL see also: \leq, \leqq
`\nleqslant`	AMSsymbols	⩽̸	slanted not less than or equal to `&#x2A87;` class REL see also: \leqslant
`\nless`	AMSsymbols	≮	see also: \lt `&#x226E;` class REL
`\nmid`	AMSsymbols	∤	see also: \mid `&#x2224;` class REL
`\nobreakspace`	AMSmath		Example: ` ` class ORD `a\nobreakspace b` yields $a\,b$ in MathJax, this is the same as: \ (backslash space)
`\nolimits`		□	used to change the default placement of limits; only allowed on items of class `OP` Examples: `\sum_{k=1}^n a_k` yields (in display mode) $\sum_{k=1}^{n} a_k$ `\sum\nolimits_{k=1}^n a_k` yields (in display mode) $\sum_{k=1}^{n} a_k$ see also: \limits
`\normalsize`			turns on normal size class ORD

		{\normalsize ... } Example: \rm \scriptsize script \normalsize normal \large large yields scriptnormallarge see also: \scriptsize	
\not		/	used to negate relations Examples: \not\gt yields ≯ \ngtr yields ≯	/ class REL
\notag AMSmath			used in AMS math environments that do automatic equation numbering, to suppress the equation number; since MathJax doesn't implement auto-numbering (as of version 1.1a), it is basically a no-op, although it *will* cancel an explicit \tag ; when auto-numbering is added, then this will work as expected; \notag is included now for compatibility with existing TeX code (to prevent throwing an error, even though it has no effect)	class ORD
\notin		∉	see also: \in	∉ class REL
\nparallel AMSsymbols		∦	not parallel see also: \parallel	∦ class REL
\nprec AMSsymbols		⊀	see also: \prec	⊀ class REL
\npreceq AMSsymbols		⋠	see also: \preceq	⋠ class REL
\nrightarrow AMSsymbols		↛		↛ class REL
\nRightarrow AMSsymbols		⇏	see also: \rightarrow, \Rightarrow	⇏ class REL
\nshortmid AMSsymbols		∤	see also: \mid, \shortmid	∤ class REL
\nshortparallel AMSsymbols		∦	see also: \parallel, \shortparallel	∦ class REL
\nsim AMSsymbols		≁	see also: \sim	≁ class REL
\nsubseteq AMSsymbols		⊈		⊈ class REL
\nsubseteqq AMSsymbols		⫅̸	see also: \subseteq, \subseteqq	⊈ class REL
\nsucc AMSsymbols		⊁		⊁ class REL
\nsucceq AMSsymbols		⋡	see also: \succ, \succeq	⋡ class REL
\nsupseteq AMSsymbols		⊉		⊉ class REL
\nsupseteqq AMSsymbols		⫆̸	see also: \supseteq, \supseteqq	⊉ class REL
\ntriangleleft AMSsymbols		⋪		⋪ class REL
\ntrianglelefteq AMSsymbols		⋬	see also: \triangleleft, \trianglelefteq	⋬ class REL
\ntriangleright AMSsymbols		⋫		⋫ class REL
\ntrianglerighteq AMSsymbols		⋭	see also: \triangleright, \trianglerighteq	⋭ class REL
\nu		ν	lowercase Greek letter nu	ν class ORD
\nVDash AMSsymbols		⊯		⊯ class REL
\nVdash AMSsymbols		⊮		⊮ class REL
\nvDash AMSsymbols		⊭		⊭ class REL
\nvdash AMSsymbols		⊬	see also: \Vdash, \vDash, \vdash	⊬ class REL
\nwarrow		↖	northwest arrow; non-stretchy see also: \nearrow, \searrow, \swarrow	↖ class REL

O

\odot	$\odot$	⊙ class BIN
\ominus	$\ominus$	⊖ class BIN
\oplus	$\oplus$	⊕ class BIN
\oslash	$\oslash$	⊘ class BIN
\otimes	$\otimes$	⊗ class BIN
\oint	$\oint$	changes size; can change limit placement using \limits; see the Big Operators Table for examples — ∮ class OP
\oldstyle		this is intended for oldstyle numbers; it is a switch that turns on oldstyle mode; the way it works in TEX is to select the caligraphic font (which is where the oldstyle numbers are stored), so it has the side effect of selecting caligraphic upper-case letters; MathJax does the same for compatibility — class ORD {\oldstyle ... } Examples: \oldstyle 0123456789 yields 0123456789 \oldstyle ABCDEFGHIJKLMNOPQRSTUVWXYZ yields $\mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$ \oldstyle abcdefghijklmnopqrstuvwxyz yields abcdefghijklmnopqrstuvwxyz abcdefghijklmnopqrstuvwxyz yields $\mathit{abcdefghijklmnopqrstuvwxyz}$ {\oldstyle AB}AB yields $\mathcal{AB}AB$ \oldstyle AB \rm AB yields $\mathcal{AB}$AB \oldstyle{AB}CD yields $\mathcal{ABC}D$ see also: \cal, \mathcal
\omega	ω	lowercase Greek letter omega — ω class ORD
\Omega	Ω	uppercase Greek letter omega — Ω class ORD see also: \varOmega
\omicron	o	lowercase Greek letter omicron — ο class ORD
\operatorname AMSmath		This is similar to \DeclareMathOperator, but rather than defining a macro, it produces an instance of an operator like \lim . — class OP For example, \operatorname{myOp} is equivalent to the use of \myOp , after having defined \DeclareMathOperator{\myOp}{myOp} If displaystyle limits are desired in both inline and display modes, then use operatorname* instead of operatorname Examples: \operatorname{myFct}(x) yields $\operatorname{myFct}(x)$ \operatorname*{myFct}_a^b(x) yields (in inline mode) $\operatorname{myFct}_a^b(x)$ See \DeclareMathOperator for further explanation and examples.
\over		general command for making fractions { <subformula1> \over <subformula2> } Creates a fraction: numerator: subformula1 denominator: subformula2 Examples: a \over b yields $\frac{a}{b}$ a+1 \over b+2 yields $\frac{a+1}{b+2}$ {a+1 \over b+2}+c yields $\frac{a+1}{b+2}+c$ see also: \above, \abovewithdelims, \atop, \atopwithdelims, \cfrac, \dfrac, \frac, \genfrac, \overwithdelims

\overbrace		puts a (stretchy) over-brace over the argument; can use '^' to place an optional superscript over the overbrace; can use '_' to place an optional subscript below the argument \overbrace #1 Example: \overbrace{x + \cdots + x}^{n\rm\ times}_{\text{(note here)}} yields $\overbrace{x+\cdots+x}^{n\text{ times}}_{\text{(note here)}}$ see also: \underbrace
\overleftarrow \overrightarrow \overleftrightarrow	← → ↔	← stretchy over left arrow → stretchy over right arrow ↔ stretchy over left right arrow \overleftarrow #1 \overrightarrow #1 \overleftrightarrow #1 Examples: \overleftarrow{\text{the argument}} yields $\overleftarrow{\text{the argument}}$ \overrightarrow{AB} yields $\overrightarrow{AB}$ \overrightarrow{AB\strut} yields $\overrightarrow{AB}$ \overleftrightarrow{\hspace1in} yields $\overleftrightarrow{\hspace{1in}}$
\overline	¯	stretchy overline ‾ \overline #1 Examples: \overline{AB} yields $\overline{AB}$ \overline a yields $\overline{a}$ \overline{\text{a long argument}} yields $\overline{\text{a long argument}}$
\overparen		puts a (stretchy) over-parenthesis (over-arc, frown) over the argument (new in MathJax 2.6) \overparen #1 Example: \overparen a \quad \overparen ab \quad \overparen{ab} \quad \overparen{abc} \quad \overparen{abcdef} \quad \overparen{\underparen{abcd}} yields $\overparen{a}\quad\overparen{ab}\quad\overparen{ab}\quad\overparen{abc}\quad\overparen{abcdef}\quad\overparen{\underparen{abcd}}$ see also: \underparen, \smallfrown, \frown, \smallsmile, \smile
\overset		\overset #1 #2 oversets argument #1 (in scriptstyle) over argument #2 Examples: \overset{\rm top}{\rm bottom} yields $\overset{\text{top}}{\text{bottom}}$ \overset ab yields $\overset{a}{b}$ a\,\overset{?}{=}\,b yields $a\overset{?}{=}b$ see also: \atop, \underset

\overwithdelims		general command for making fractions; uses default thickness for fraction bar for current size specifies left and right enclosing delimiters `{ <subformula1> \overwithdelims <delim1> <delim2> <subformula2> }` Creates a fraction: numerator `subformula1` denominator `subformula2` `delim1` is put before the fraction `delim2` is put after the fraction For an empty delimiter, use '.' in place of the delimiter. Examples: `a \overwithdelims [ ] b` yields $\left[\frac{a}{b}\right]$ `a+1 \overwithdelims . | b+2` yields $\frac{a+1}{b+2}\Big\vert$ `{a+1 \overwithdelims \{ \} b+2}+c` yields $\left\{\frac{a+1}{b+2}\right\}+c$ see also: \above, \abovewithdelims, \atop, \atopwithdelims, \cfrac, \dfrac, \frac, \genfrac, \over
\owns	∋	see also: \ni, \in ∋ class REL

P

\parallel	$\parallel$	see also: \nparallel ∥ class REL
\partial	∂	Example: \frac{\partial f}{\partial x} yields $\frac{\partial f}{\partial x}$ ∂ class ORD
\perp	$\perp$	perpendicular to ⊥ class REL
\phantom		phantom (both horizontal and vertical) class ORD Sometimes you want to *pretend* that something is there, for spacing reasons, but you don't want it to appear—you want it to be invisible—you want it to be a phantom. The box created by \phantom has width, height and depth equal to its argument. In other words, \phantom creates horizontal and vertical space equal to that of its argument, even though the argument isn't visible. \phantom #1 Examples: \sqrt{\frac ab} \sqrt{} yields $\sqrt{\frac{a}{b}}\sqrt{}$ \frac{2x+3y-z} {x+y+5z} yields $\frac{2x+3y-z}{x+y+5z}$ \Gamma^{j}_{ik} yields Γ^{j}_{ik} \matrix{1&-1\cr 2&3} yields $\matrix{1&-1\cr 2&3}$ see also: \hphantom, \vphantom
\phi	ϕ	lowercase Greek letter phi &##x03D5; class ORD
\Phi	Φ	uppercase Greek letter phi Φ class ORD see also: \varphi, \varPhi
\pi	π	lowercase Greek letter pi π class ORD
\Pi	Π	uppercase Greek letter Pi Π class ORD see also: \varpi, \varPi
\pitchfork AMSsymbols	$\pitchfork$	⋔ class REL
\pm	$\pm$	plus or minus &x00B1; class BIN see also: \mp
\pmatrix		matrix enclosed in parentheses class OPEN \pmatrix{ <math> & <math> ... \cr <repeat as needed> } alignment occurs at the ampersands; a double-backslash can be used in place of the \cr ; the final \\ or \cr is optional Example: A = \pmatrix{ a_{11} & a_{12} & \ldots & a_{1n} \cr a_{21} & a_{22} & \ldots & a_{2n} \cr \vdots & \vdots & \ddots & \vdots \cr a_{m1} & a_{m2} & \ldots & a_{mn} \cr } yields $A = \pmatrix{a_{11} & a_{12} & \ldots & a_{1n} \cr a_{21} & a_{22} & \ldots & a_{2n} \cr \vdots & \vdots & \ddots & \vdots \cr a_{m1} & a_{m2} & \ldots & a_{mn} \cr}$ see also: \matrix
\pmb		poor man's bold; class ORD it works by duplicating its argument slightly offset, giving a bold effect (at least in the horizontal direction); doesn't work well for horizontal lines, like $-$ or $+$ \pmb #1 Examples: a \pmb a \boldsymbol a yields $a\pmb{a}\boldsymbol{a}$ \pmb{a+b-c}\ \ a+b-c yields $\pmb{a+b-c}$ $a+b-c$

\pmod	$(\mathrm{mod}\ )$	parenthesized modulus operator; parenthesized modulo; 18 mu of leading space before the opening parenthesis in display style; 8 mu of leading space before the opening parenthesis in other styles; 6 mu of space after the word mod \pmod #1 Examples: 5\equiv 8 \pmod 3 yields $5 \equiv 8 \pmod 3$ \pmod{n+m} yields $\pmod{n+m}$ see also: \mod, \bmod
\pod	()	parenthesized argument with leading space; 18 mu of leading space before the opening parenthesis in display style; 8 mu of leading space before the opening parenthesis in other styles \pod #1 Examples: x=y\pod{\text{inline mode}} yields $x=y\ (\text{inline mode})$ x=y\pod{\text{display mode}} yields $x=y\ (\text{display mode})$
\Pr	$\Pr$	does not change size; class OP default limit placement can be changed using \limits and \nolimits; does not change size; see the Big Operators Table for more examples Examples: \Pr_{\rm sub} yields (inline mode) $\Pr_{\rm sub}$ \Pr_{\rm sub} yields (display mode) $\Pr\limits_{\rm sub}$
\prec	$\prec$	see also: \nprec ≺ class REL
\precapprox AMSsymbols	$\precapprox$	⪷ class REL
\precnapprox AMSsymbols	$\precnapprox$	⪹ class REL
\preccurlyeq AMSsymbols	$\preccurlyeq$	≼ class REL
\preceq	$\preceq$	⪯ class REL
\precneqq AMSsymbols	$\precneqq$	⪵ class REL see also: \npreceq
\precsim AMSsymbols	$\precsim$	≾ class REL
\precnsim AMSsymbols	$\precnsim$	⋨ class REL
\prime	$\prime$	prime character ′ class ORD Examples: f' yields f' f\prime yields $f\prime$ f^\prime yields $f^\prime$ f^{\prime\prime} yields $f^{\prime\prime}$ f'' yields f'' see also: \backprime, prime symbol
\prod	$\prod$	changes size; ∏ class OP can change limit placement using \limits and \nolimits; see the Big Operators Table for more examples Examples: \prod_{j=1}^n yields (in inline mode) $\prod_{j=1}^{n}$ \prod_{j=1}^n yields (in display mode) $\prod\limits_{j=1}^{n}$
\projlim AMSmath	$\varprojlim$	projective limit; class OP does not change size;

		can change limit placement using \limits and \nolimits; see the Big Operators Table for examples see also: \varprojlim	
\propto	$\propto$	see also: \varpropto	∝ class REL
\psi	ψ	lowercase Greek letter psi	ω class ORD
\Psi	Ψ	uppercase Greek letter psi see also: \varPsi	Ω class ORD

Q

\quad \qquad		\quad is a 1em space \qquad is a 2em space Examples: |\quad|\quad| yields | | | |\qquad\hphantom{|}| yields | |	

R

\raise		\raise <dimen> #1 raises the argument by the amount specified in <dimen>; in actual TEX , the argument to \raise (and \lower) must be an \hbox , but in MathJax it can be any expression (using an \hbox is allowed, but not required) Example: h\raise 2pt {ighe} r yields $h^{ighe}r$ see also: \lower
\rangle	⟩	right angle bracket; ⟩ class CLOSE non-stretchy when used alone; stretchy when used with \left or \right (see below) Example: \left\langle \matrix{a & b\cr c & d} yields $\left\langle \begin{matrix} a & b \\ c & d \end{matrix} \right.$ \right\rangle see also: \langle
\rbrace	}	right brace; class CLOSE non-stretchy when used alone; stretchy when used with \left or \right (see below) Example: \left\lbrace \matrix{a & b\cr c & d} yields $\left\{ \begin{matrix} a & b \\ c & d \end{matrix} \right.$ \right\rbrace see also: \lbrace
\rbrack	]	right bracket; class CLOSE non-stretchy when used alone; stretchy when used with \left or \right (see below) Examples: \lbrack \frac ab, c \rbrack yields $[\frac{a}{b}, c]$ \left\lbrack \frac ab, c \right\rbrack yields $\left[\frac{a}{b}, c\right]$ see also: \lbrack, [ ]
\rceil	⌉	right ceiling; ⌉ class CLOSE non-stretchy when used alone; stretchy when used with \left or \right (see below) Example: \left\lceil \matrix{a & b\cr c & d} yields $\left\lceil \begin{matrix} a & b \\ c & d \end{matrix} \right.$ \right\rceil see also: \lceil, \lfloor, \rfloor
\Re	ℜ	ℜ class ORD
\renewcommand		equivalent to \newcommand; for clarity of code, you may choose to use \renewcommand when re-defining a macro; this is different from actual TEX , where \renewcommand only allows redefining of an existing command see also: \def, \newcommand, \newenvironment
\require (non-standard)		This is a MathJax-specific macro that can be used to load MathJax TEX extensions (like the AMSmath extension) from within math mode, rather than having to include it in the configuration. For example, $\require{AMSsymbols}$ would cause MathJax to load the extensions/TeX/AMSsymbols.js file at that point. Since many people use MathJax in blogs and wikis that may not have all the extensions loaded, this makes it possible to load a lesser-used extension on a particular page, without having to include it in *every* page.

\restriction AMSsymbols	$\restriction$		↾ class REL
\rfloor	$\rfloor$	right floor; non-stretchy when used alone; stretchy when used with \left or \right see also: \lfloor, \lceil, \rceil	⌋ class CLOSE
\rgroup	$\rgroup$	right group; non-stretchy when used alone; stretchy when used with \left or \right Example: \left\lgroup \matrix{a & b\cr c & d} yields $\left\lgroup \matrix{a & b\cr c & d} \right\rgroup$ \right\rgroup see also: \lgroup	⟮ class CLOSE
\rhd AMSsymbols	$\rhd$	right-hand diamond see also: \lhd	⊳ class REL
\rho	ρ	lowercase Greek letter rho see also: \varrho	&#x0000; class ORD
\right		used for stretchy delimiters; see the Variable-Sized Delimiters Table for details Can be followed by: delimiter: sample code: yields: ( ) \left(\frac12 \right) $\left(\frac12\right)$ \updownarrow \left\updownarrow \right\Updownarrow $\updownarrow$ $\Updownarrow$ \Updownarrow see also: \left	
\rightarrow	$\rightarrow$	non-stretchy	→ class REL
\Rightarrow	$\Rightarrow$	non-stretchy see also: \nrightarrow, \nRightarrow, \to	⇒ class REL
\rightarrowtail AMSsymbols	$\rightarrowtail$	right arrow tail; non-stretchy see also: \leftarrowtail	↣ class REL
\rightharpoondown	$\rightharpoondown$	non-stretchy	⇁ class REL
\rightharpoonup	$\rightharpoonup$	non-stretchy see also: \leftharpoondown, \rightharpoondown	⇀ class REL
\rightleftarrows AMSsymbols	$\rightleftarrows$	right left arrows; non-stretchy	⇄ class REL
\rightleftharpoons AMSsymbols	$\rightleftharpoons$	right left harpoons; non-stretchy	⇌ class REL
\rightrightarrows AMSsymbols	$\rightrightarrows$	right right arrows; non-stretchy	⇉ class REL
\rightsquigarrow AMSsymbols	$\rightsquigarrow$	right squiggle arrow; non-stretchy	⇝ class REL
\rightthreetimes AMSsymbols	$\rightthreetimes$	right three times	⋌ class BIN
\risingdotseq AMSsymbols	$\risingdotseq$	rising dot sequence see also: \fallingdotseq	≓ class REL
\rlap		right overlap \rlap #1 creates a box of width zero; the argument is then placed just to the right of this zero-width box (and hence will overlap whatever lies to the right) Example: a\mathrel{\rlap{\;/}{=}}b yields $a \mathrel{\rlap{\;/}{=}} b$ In this example, {=} forces the equal to not have REL spacing (since it is not adjacent to ORD's); \mathrel{} forces the compound symbol (equal with overlapping slash) to be treated as a single REL;	class ORD

		the `\;` improves the spacing for the slash. see also: \llap
`\rm`		turns on roman; affects uppercase and lowercase letters, and digits; class ORD also affects uppercase Greek `{\rm ... }` Examples: `\rm AaBb\alpha\beta123` yields AaBb$\alpha\beta$123 `{\rm A B} A B` yields ABAB `\Delta\Gamma\Lambda{\rm\Delta\Gamma\Lambda}` yields $\Delta\Gamma\Lambda$ABC `\rm AB \bf CD` yields AB**CD** `\rm{AB}CD` yields ABCD see also: \text, \hbox, \mathrm

`\rmoustache`	⎱	right moustache; ⎱ class CLOSE
		non-stretchy when used alone;
		stretchy when used with `\left` or `\right` (see below)
		Example:
		`\left\lmoustache`
		`\phantom{\matrix{a & b\cr c & d}}` yields $\left\lmoustache\phantom{\matrix{a & b\cr c & d}}\right.$
		`\right\rmoustache`
		see also: \lmoustache

`\root ... \of`		`\root <index> \of #1` Examples: `\root 3 \of x` yields $\sqrt[3]{x}$ `\root 13 \of {\frac 12}` yields $\sqrt[13]{\frac{1}{2}}$ `\root n+1 \of x + 2` yields $\sqrt[n+1]{x}+2$ see also: \sqrt, \leftroot, \uproot
`\Rrightarrow` AMSsymbols	⇛	non-stretchy ⇛ class REL
`\Rsh` AMSsymbols	↱	right shift; non-stretchy ↱ class REL see also: \Lsh
`\rtimes` AMSsymbols	⋊	see also: \ltimes ⋊ class BIN
`\Rule` (non-standard)		a MathJax-specific macro giving a rule with a specified width, height, and depth `\Rule <dimenWidth> <dimenHeight> <dimenDepth>` where each argument is a dimension Examples: `x\Rule{3px}{1ex}{2ex}x` yields $x\,x$ `x\Rule{3px}{2ex}{1ex}x` yields $x\,x$
`\rvert` AMSmath `\rVert` AMSmath	| ‖	∣ class CLOSE ∥ class CLOSE both non-stretchy when used alone; stretchy when used with `\left` or `\right` Example: `\left\lvert\frac{\frac ab}{\frac cd}\right\rvert` yields $\left\lvert\frac{\frac ab}{\frac cd}\right\rvert$ see also: \lvert, \lVert, |, \\|

S

\S	§	section symbol	꜀ class ORD
\scr		turns on script typestyle for uppercase letters; lowercase letters are in a roman typestyle { \scr ... } Examples: \scr ABCDEFGHIJKLMNOPQRSTUVWXYZ yields $\mathscr{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$ \scr 0123456789abcdefghijklmnopqrstuvwxyz yields 0123456789abcdefghijklmnopqrstuvwxyz 0123456789abcdefghijklmnopqrstuvwxyz yields 0123456789$\mathscr{abcdefghijklmnopqrstuvwxyz}$ {\scr AB}AB yields $\mathscr{AB}AB$ \scr AB \rm AB yields $\mathscr{AB}$AB \scr{AB}CD yields $\mathscr{ABC}D$ see also: \mathscr	class ORD
\scriptscriptstyle		used to over-ride automatic style rules and force scriptscript style; stays in force until the end of math mode or the braced group, or until another style is selected { \scriptscriptstyle ... } Example: In inline mode: \frac ab+\displaystyle\frac ab+\textstyle\frac ab+\scriptstyle\frac ab+\scriptscriptstyle\frac ab yields: $\frac{a}{b}+\frac{a}{b}+\frac{a}{b}+\frac{a}{b}+\frac{a}{b}$ Example: In inline mode: \frac ab + {\scriptscriptstyle \frac cd + \frac ef} + \frac gh yields $\frac{a}{b}+\frac{c}{d}+\frac{e}{f}+\frac{g}{h}$ Example: In inline mode: \frac ab + \scriptscriptstyle{\frac cd + \frac ef} + \frac gh yields $\frac{a}{b}+\frac{c}{d}+\frac{e}{f}+\frac{g}{h}$ see also: \displaystyle, \scriptstyle, \textstyle	class ORD
\scriptsize	□	turns on script size { \scriptsize ... } Example: \rm \scriptsize script \normalsize normal \large large yields scriptnormallarge see also: \normalsize	class ORD
\scriptstyle		used to over-ride automatic style rules and force script style; stays in force until the end of math mode or the braced group, or until another style is selected { \scriptstyle ... } Example: In inline mode: \frac ab+\displaystyle\frac ab+\textstyle\frac ab+\scriptstyle\frac ab+\scriptscriptstyle\frac ab yields: $\frac{a}{b}+\frac{a}{b}+\frac{a}{b}+\frac{a}{b}+\frac{a}{b}$ Example: In inline mode: \frac ab + {\scriptstyle \frac cd + \frac ef} + \frac gh yields $\frac{a}{b}+\frac{c}{d}+\frac{e}{f}+\frac{g}{h}$ Example: In inline mode: \frac ab + \scriptstyle{\frac cd + \frac ef} + \frac gh yields $\frac{a}{b}+\frac{c}{d}+\frac{e}{f}+\frac{g}{h}$ see also: \displaystyle, \scriptscriptstyle, \textstyle	class ORD

\searrow	↘	southeast arrow; non-stretchy ↘ class ORD see also: \nearrow, \nwarrow, \swarrow
\sec	sec	secant; class OP does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for more examples Examples: \sec x yields $\sec x$ \sec(2x-1) yields $\sec(2x-1)$ see also: \csc
\setminus	∖	set minus ∖ class BIN Examples: A\setminus B yields $A \setminus B$ A\backslash B yields $A \backslash B$ see also: \backslash
\sf		turns on sans serif mode for uppercase and lowercase letters and digits, and for uppercase Greek class ORD { \sf ... } Examples: \sf ABCDEFGHIJKLMNOPQRSTUVWXYZ yields ABCDEFGHIJKLMNOPQRSTUVWXYZ \sf 0123456789 yields 0123456789 \sf abcdefghijklmnopqrstuvwxyz yields abcdefghijklmnopqrstuvwxyz ABCDE 01234 abcde yields $ABCDE$01234$abcde$ {\sf AB\Delta\Gamma\Lambda}\ AB\Delta\Gamma\Lambda yields AB$\Delta\Gamma\Lambda$ $AB\Delta\Gamma\Lambda$ \sf AB \rm AB yields ABAB \sf{AB}CD yields ABCD see also: \mathsf
\sharp	♯	musical sharp symbol ♯ class ORD see also: \flat, \natural
\shortmid AMSsymbols	∣	see also: \nshortmid, \mid ∣ class REL
\shortparallel AMSsymbols	∥	see also: \nshortparallel ∥ class REL
\shoveleft AMSmath \shoveright AMSmath		forces flush left or flush right typesetting in a \multline or \multline* environment (see examples) Example: \begin{multline} (a+b+c+d)^2 \\ + (e+f)^2 + (g+h)^2 + (i+j)^2 + (k+l)^2 \\ + (m+n)^2 + (o+p)^2 + (q+r)^2 + (s+t)^2 + (u+v)^2 \\ + (w+x+y+z)^2 \end{multline} yields $$(a+b+c+d)^2 + (e+f)^2 + (g+h)^2 + (i+j)^2 + (k+l)^2 + (m+n)^2 + (o+p)^2 + (q+r)^2 + (s+t)^2 + (u+v)^2 + (w+x+y+z)^2$$ Example: \begin{multline} (a+b+c+d)^2 \\ \shoveleft{+ (e+f)^2 + (g+h)^2 + (i+j)^2 + (k+l)^2} \\ \shoveright{+ (m+n)^2 + (o+p)^2 + (q+r)^2 + (s+t)^2 + (u+v)^2} \\ + (w+x+y+z)^2 \end{multline} yields

		$(a+b+c+d)^2$ $+(e+f)^2+(g+h)^2+(i+j)^2+(k+l)^2$ $+(m+n)^2+(o+p)^2+(q+r)^2+(s+t)^2+(u+v)^2$ $+(w+x+y+z)^2$
\sideset AMSmath		used for putting symbols at the four 'corners' of a large operator (like $\sum$ or $\prod$) \sideset{_#1^#2}{_#3^#4} <large operator> where: • #1 = lower left • #2 = upper left • #3 = lower right • #4 = upper right Examples: \sideset{_1^2}{_3^4}\sum yields ${}_{1}^{2}\sum_{3}^{4}$
\sigma \Sigma	σ Σ	lowercase Greek letter sigma σ class ORD uppercase Greek letter sigma Σ class ORD see also: \sum, \varsigma, \varSigma
\sim \simeq	$\sim$ $\simeq$	∼ class REL ≃ class REL see also: \nsim
\sin	sin	sine; class OP does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for more examples Examples: \sin x yields $\sin x$ \sin(2x-1) yields $\sin(2x-1)$ see also: \cos
\sinh	sinh	hyperbolic sine; class OP does not change size; default limit placement is the same in both inline and display modes; can change limit placement using \limits; see the Big Operators Table for more examples Examples: \sinh x yields $\sinh x$ \sinh(2x-1) yields $\sinh(2x-1)$ see also: \cosh
\skew		used to finely adjust the positioning on accents; particularly useful for adjusting superaccents (accents on accents); usually requires trial-and-error adjustment for proper positioning \skew #1 <accent> where #1 is a positive integer (the skew amount) Examples: \hat A yields $\hat{A}$ \skew7\hat A yields $\skew{7}\hat{A}$ \tilde M yields $\tilde{M}$ \skew{8}\tilde M yields $\skew{8}\tilde{M}$ \hat{\hat A} yields $\hat{\hat{A}}$ \skew4\hat{\hat A} yields $\skew{4}\hat{\hat{A}}$

`\small`			turns on small size; affects all math
			`{\small ... }`
			Example:
			`\rm\tiny tiny \Tiny Tiny`
			`\small small \normalsize normal`
			`\large lg \Large Lg \LARGE LG`
			`\huge hg \Huge Hg`
			yields tinyTinysmallnormallgLgLGhgHg
			`\def\myExp{\alpha\frac xy}`
			`\tiny\myExp \Tiny\myExp`
			`\small\myExp \normalsize\myExp`
			`\large\myExp \Large\myExp \LARGE\myExp`
			`\huge\myExp \Huge\myExp`
			yields $\alpha\frac{x}{y}\alpha\frac{x}{y}\alpha\frac{x}{y}\alpha\frac{x}{y}\alpha\frac{x}{y}\alpha\frac{x}{y}\alpha\frac{x}{y}$
			`ab{\small cd} cd` yields $abcdcd$
			`ab\small{cd} cd` yields $abcdcd$
			see also: \tiny, \Tiny, \normalsize, \large, \Large, \LARGE, \huge, \Huge
				class ORD

`\smallfrown`	AMSsymbols	⌢	small frown see also: \frown, \smile, \smallsmile	`&#x2322;` class REL
`\smallint`		∫	small integral see also: \int	`&#x222B;` class OP
`\smallsetminus`	AMSsymbols	∖	small set minus see also: \setminus	`&#x2216;` class BIN
`\smallsmile`	AMSsymbols	⌣	small smile see also: \smile, \frown, \smallfrown	`&#x2323;` class REL

`\smash`			By using `\smash`, \phantom, \hphantom, \vphantom, \rlap, \llap, you can typeset any mathematics, yet give it the width and/or height and/or depth of any other mathematics.
			`\smash #1`
			Typesets the argument in a box with the same width as the argument, but with height and depth equal to zero. In other words: the argument of `\smash` is visible, and has its natural width, but does not contribute any height or depth to the surrounding mathematics (hence leaving the surrounding mathematics to dictate height and depth). Here are some scenarios:
			• to vertically `\smash` the box containing `this` and make it instead behave vertically like `that` :
			`\smash{this}\vphantom{that}`
			Examples:
			`\sqrt{\frac ab}`
			`\sqrt{\smash{7}\vphantom{\frac ab}}` yields $\sqrt{\frac{a}{b}}\sqrt{7}$
			`\sqrt{\frac{\frac ab}{\frac cd}}`
			`\sqrt{\smash{\frac ef}\vphantom{\frac{\frac ab}{\frac cd}}}` yields $\sqrt{\frac{\frac{a}{b}}{\frac{c}{d}}}\sqrt{\frac{e}{f}}$
			• to horizontally compress the box containing `this` and make it instead behave horizontally like `that` :
			`\rlap{this}\hphantom{that}`
			or
			`\hphantom{that}\llap{this}`
			Examples:
			`\sqrt{\rm very\ wide}`
			`\sqrt{\rlap{\rm thin}\hphantom{\rm very\ wide}}` yields $\sqrt{\text{very wide}}\sqrt{\text{thin}}$
			`\sqrt{\rm very\ wide}`
			`\sqrt{\hphantom{\rm very\ wide}\llap{\rm thin}}` yields $\sqrt{\text{very wide}}\sqrt{\text{thin}}$
			• to both vertically smash and horizontally compress the box containing `this` and make it instead behave both vertically and horizontally like `that` :
			`\rlap{\smash{this}}\phantom{that}`
				class ORD

		or
		`\phantom{that}\llap{\smash{this}}`
		
		Examples:
		`\sqrt{\matrix{a & b\cr c & d}}`
		`\sqrt{`
		`\rlap{\smash{\rm Hi!}}}` yields $\sqrt{\begin{matrix}a & b\\ c & d\end{matrix}}\sqrt{\text{Hi!}}$
		`\phantom{\matrix{a & b\cr c & d}}`
		`}`
		
		see also: \hphantom, \vphantom, \phantom, \llap, \rlap

`\smile`	⌣	smile `&#x2323;` class REL see also: \smallsmile, \frown, \smallfrown
`\space`		Example: ` ` class ORD `a\space b` yields $a\ b$ in MathJax, this is the same as: \ (backslash space), \nobreakspace
`\Space` (non-standard)		a MathJax-specific macro giving space with a specified width, height, and depth `\Space <dimenWidth> <dimenHeight> <dimenDepth>` where each argument is a `dimension` Compare: `a\Rule{5px}{4ex}{2ex}^b_c d` yields $a\ {}^{b}_{c}\ d$ `a\Space{5px}{4ex}{2ex}^b_c d` yields $a\ {}^{b}_{c}\ d$ see also: \Rule
`\spadesuit`	♠	see also: \clubsuit, \diamondsuit, \heartsuit `&#x2660;` class ORD
`\sphericalangle` AMSsymbols	∢	`&#x2222;` class ORD
`\sqcap`	⊓	square cap `&#x2293;` class BIN
`\sqcup`	⊔	square cup `&#x2294;` class BIN

`\sqrt`	√	square root (and other roots) class ORD
		`\sqrt #1`
		`\sqrt[n]{op}` is equivalent to `\root n \of {op}`
		Examples:
		`\sqrt x` yields $\sqrt{x}$
		`\sqrt xy` yields $\sqrt{x}y$
		`\sqrt{xy}` yields $\sqrt{xy}$
		`\sqrt[3]{x+1}` yields $\sqrt[3]{x+1}$
		
		see also: \root

`\sqsubset` AMSsymbols	⊏	square subset `&#x228F;` class REL
`\sqsupset` AMSsymbols	⊐	square superset `&#x2290;` class REL
`\sqsubseteq`	⊑	`&#x2291;` class REL
`\sqsupseteq`	⊒	`&#x2292;` class REL
`\square` AMSsymbols	□	`&#x25A1;` class ORD
`\stackrel`		stack relations; you can stack anything (not just relations) but it creates an item of class `REL` (and usually the bottom is a `REL` to start with, but doesn't have to be) `\stackrel #1 #2` where `#1` (in superscript style) is stacked on top of `#2` Examples: `\stackrel{\rm def}{=}` yields $\overset{\text{def}}{=}$

		`\stackrel{\rm top}{\rm bottom}` yields $\stackrel{\rm top}{\rm bottom}$
`\star`	⋆	`&#x22C6;` class BIN

`\strut`		an invisible box with no width, height 8.6pt and depth 3pt;
		note that `\mathstrut` changes with the current size, but `\strut` does not
		
		Examples:
		
		`\sqrt{(\ )}`
		`\sqrt{\mathstrut\rm mathstrut}` yields $\sqrt{(\,)}\sqrt{\mathstrut\rm mathstrut}\sqrt{\strut\rm strut}$
		`\sqrt{\strut\rm strut}`
		
		`\Tiny`
		`\sqrt{(\ )}`
		`\sqrt{\mathstrut\rm mathstrut}` yields $\sqrt{(\,)}\sqrt{\mathstrut\rm mathstrut}\sqrt{\strut\rm strut}$
		`\sqrt{\strut\rm strut}`
		
		`\Large`
		`\sqrt{(\ )}`
		`\sqrt{\mathstrut\rm mathstrut}` yields $\sqrt{(\,)}\sqrt{\mathstrut\rm mathstrut}\sqrt{\strut\rm strut}$
		`\sqrt{\strut\rm strut}`
		
		see also: `\mathstrut`

`\style`		[HTML] non-standard;
		used to apply CSS styling to mathematics
		
		`\style #1 #2`
		
		where:
		
		• `#1` is a (single) CSS style declaration
		• `#2` is the mathematics to be styled
		
		Examples:
		
		`\frac{\style{color:red}{x+1}}{y+2}` yields $\frac{\style{color:red}{x+1}}{y+2}$
		
		`\style{background-color:yellow}{\frac{x+1}{y+2}}` yields $\style{background-color:yellow}{\frac{x+1}{y+2}}$
		
		Example:
		
		Consider the following HTML/Javascript/MathJax code:
		
		`<button type="button" onclick="makeVisible()">Click to reveal answer</button>`
		
		`<script type="text/javascript">`
		`function makeVisible() {`
		`document.getElementById('answer').style.visibility = "visible";`
		`}`
		`</script>`
		
		`$$`
		`(x+1)^2 = \cssId{answer}\style{visibility:hidden}{(x+1)(x+1)}`
		`$$`
		
		Then, the result of this HTML/Javascript/MathJax code is:
		
		Click to reveal answer
		
		$(x+1)^2 =$
		
		see also: `\class`, `\cssId`

`\subset`	⊂	`&#x2282;` class REL
`\Subset` AMSsymbols	⋐	`&#x22D0;` class REL
`\subseteq`	⊆	`&#x2286;` class REL
`\subsetneq` AMSsymbols	⊊	`&#x228A;` class REL
`\subseteqq` AMSsymbols	⫅	`&#x2AC5;` class REL
`\subsetneqq` AMSsymbols	⫋	`&#x2ACB;` class REL see also: `\nsubseteq`, `\nsubseteqq`, `\varsubsetneq`, `\varsubsetneqq`
`\substack` AMSmath		use for multi-line subscripts or superscripts Examples:

		`\sum_{`
		`\substack{`
		`1\lt i\lt 3 \\`
		`1\le j\lt 5`
		`}}`
		`a_{ij}`
		yields (display mode) $\sum_{\substack{1<i<3\\1\le j<5}} a_{ij}$
		
		`^{\substack{\text{a very} \\`
		`\text{contrived} \\`
		`\text{example}`
		`}}`
		`{\frac ab}_{\substack{`
		`\text{isn't} \\`
		`\text{it?}`
		`}}`
		yields (display mode) $\overset{\substack{\text{a very}\\\text{contrived}\\\text{example}}}{\frac{a}{b}}_{\substack{\text{isn't}\\\text{it?}}}$
		
		see also: \begin{subarray}

`\succ`	$\succ$	see also: \nsucc `&#x227B;` class REL
`\succapprox` AMSsymbols	$\succapprox$	`&#x2AB8;` class REL
`\succnapprox` AMSsymbols	$\succnapprox$	`&#x2ABA;` class REL
`\succcurlyeq` AMSsymbols	$\succcurlyeq$	`&#x227D;` class REL
`\succeq`	$\succeq$	`&#x2AB0;` class REL
`\succneqq` AMSsymbols	$\succneqq$	`&#x2AB6;` class REL see also: \nsucceq
`\succsim` AMSsymbols	$\succsim$	`&#x227F;` class REL
`\succnsim` AMSsymbols	$\succnsim$	`&#x22E9;` class REL
`\sum`	$\sum$	summation notation; changes size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples see also: \Sigma `&#x2211;` class OP
`\sup`	sup	supremum; least upper bound; does not change size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples Examples: `\sup_{\rm limit}` yields (inline mode) $\sup_{\rm limit}$ `\sup_{\rm limit}` yields (display mode) $\sup\limits_{\rm limit}$ see also: \inf class OP
`\supset`	$\supset$	`&#x2283;` class REL
`\Supset` AMSsymbols	$\Supset$	`&#x22D1;` class REL
`\supseteq`	$\supseteq$	`&#x2287;` class REL
`\supsetneq` AMSsymbols	$\supsetneq$	`&#x228B;` class REL
`\supseteqq` AMSsymbols	$\supseteqq$	`&#x2AC6;` class REL
`\supsetneqq` AMSsymbols	$\supsetneqq$	`&#x2ACC;` class REL see also: \nsupseteq, \nsupseteqq, \varsupsetneq, \varsupsetneqq
`\surd`	$\surd$	`&#x221A;` class ORD
`\swarrow`	$\swarrow$	southwest arrow; non-stretchy `&#x2199;` class REL see also: \nearrow, \nwarrow, \searrow

T

`\tag` AMSmath		used primarily in AMS math environments to get tags (equation numbers, labels);
		can, however, be used on any equation;
		the argument of `\tag` is typeset in text mode, but math mode can be used within the text:
		for example, `\tag{\$\bullet\$}`
		You can use dollar signs in text-mode regardless of the settings of the `inlineMath` delimiters in the tex2jax preprocessor.
		`\tag #1`
		Example:
		`\eqalign{`
		`3x - 4y &= 5\cr`
		`x + 7 &= -2y`
		`}`
		`\tag{3.1c}`
		yields $3x - 4y = 5$
		$x + 7 = -2y$ (3.1c)

`\tan`	tan	tangent; class OP does not change size; default limit placement is the same in both inline and display modes; can change limit placement using `\limits`; see the Big Operators Table for more examples Examples: `\tan x` yields $\tan x$ `\tan(2x-1)` yields $\tan(2x-1)$ see also: `\cot`
`\tanh`	tanh	hyperbolic tangent; class OP does not change size; default limit placement is the same in both inline and display modes; can change limit placement using `\limits`; see the Big Operators Table for more examples Examples: `\tanh x` yields $\tanh x$ `\tanh(2x-1)` yields $\tanh(2x-1)$ see also: `\cosh`, `\sinh`
`\tau`	τ	lowercase Greek letter tau `&#x03C4;` class ORD
`\tbinom` AMSmath		notation commonly used for binomial coefficients; in textstyle `\tbinom #1 #2` Examples: `\tbinom n k` yields (inline mode) $\binom{n}{k}$ `\tbinom n k` yields (display mode) $\binom{n}{k}$ `\binom n k` yields (display mode) $\binom{n}{k}$ `\tbinom{n-1}k-1` yields $\binom{n-1}{k} - 1$ `\tbinom{n-1}{k-1}` yields $\binom{n-1}{k-1}$ see also: `\binom`, `\choose`, `\dbinom`
`\TeX`	T_EX	the TeX logo class ORD Examples: `\TeX` yields T_EX `\rm\TeX` yields TEX see also: `\LaTeX`

`\text`
`\textbf`
`\textit`
`\textrm`
`\textsf`
`\texttt`
		`\text`: text class ORD
		`\textbf`: boldface text
		`\textit`: italic text
		`\textrm`: roman text
		`\textsf`: sans serif text (added in MathJax 2.4)
		`\texttt`: typewriter text (added in MathJax 2.4)

			used to produce text-mode material (in a given font) within a mathematical expression;
			MathJax does not process any macros within the text (unlike TEX itself);
			you can get math mode within the text using `\(...\)` delimiters
			`\text #1`
			`\textbf #1`
			`\textit #1`
			`\textrm #1`
			`\textsf #1`
			`\texttt #1`
			Examples:
			`|x| = x \text{ for all \(x \ge 0\)}` yields $\|x\| = x$ for all $x \ge 0$
			`\text{\alpha in text mode }\alpha` yields \alpha in text mode α
			`\textbf{\alpha in textbf mode }\alpha` yields $\mathbf{\alpha\ in\ textbf\ mode}\ \alpha$
			`\textit{\alpha in textit mode }\alpha` yields $\mathit{\alpha\ in\ textit\ mode}\ \alpha$
			`\textrm{\alpha in textrm mode }\alpha` yields \alpha in textrm mode α
			`\textsf{\alpha in textsf mode }\alpha` yields \alpha in textsf mode α
			`\texttt{\alpha in texttt mode }\alpha` yields $\mathtt{\alpha\ in\ texttt\ mode}\ \alpha$
			see also: \bf, \mathbf ; \it, \mathit ; \rm, \mathrm ; \sf, \mathsf ; \tt, \mathtt

`\textstyle`			used to over-ride automatic style rules and force text (inline) style; class ORD
			stays in force until the end of math mode or the braced group, or until another style is selected
			`{ \textstyle ... }`
			Example:
			In display mode:
			`\frac ab + {\textstyle \frac cd + \frac ef} + \frac gh`
			yields
			$\frac{a}{b} + \frac{c}{d} + \frac{e}{f} + \frac{g}{h}$
			Example:
			In inline mode:
			`\frac ab+{\displaystyle\frac ab}+\frac ab+\scriptstyle\frac ab+\scriptscriptstyle\frac ab`
			yields:
			$\frac{a}{b} + \frac{a}{b} + \frac{a}{b} + \frac{a}{b} + \frac{a}{b}$
			see also: \displaystyle, \scriptstyle, \scriptscriptstyle

`\tfrac` AMSmath			textstyle fraction `\tfrac #1 #2` Examples: `\tfrac ab \frac ab` (display mode) yields $\frac{a}{b}\frac{a}{b}$ `\tfrac ab \frac ab` (inline mode) yields $\frac{a}{b}\frac{a}{b}$ see also: \frac, \dfrac
`\therefore` AMSsymbols	∴		`&#x2234` class REL
`\theta` `\Theta`	θ Θ	lowercase Greek letter theta uppercase Greek letter theta see also: \vartheta, \varTheta	`&#x03B8;` class ORD `&#x0398;` class ORD
`\thickapprox` AMSsymbols	≈	Example: `approx\ \ \thickapprox` yields ≈ ≈ see also: \approx	`&#x2248;` class REL
`\thicksim` AMSsymbols	∼	Example: `sim\ \ \thicksim` yields ∼ ∼	`&#x223C;` class REL
`\thinspace`		thin space; normally $\frac{1}{6}$ of a quad Example: thinspaces between letters: $a\,b\,c\,d$	

		see also: symbols for spaces, \negthinspace
\tilde	~	non-stretchy tilde accent ˜ \tilde #1 Usually, #1 is a single letter; otherwise, accent is centered over argument. Examples: \tilde e yields $\tilde{e}$ \tilde E yields $\tilde{E}$ \tilde eu yields $\tilde{e}u$ \tilde{eu} yields $e\tilde{u}$
\times	×	× class BIN
\tiny		turns on tiny; a bit smaller than \Tiny class ORD {\tiny ... } Examples: \tiny AaBb\alpha\beta123 yields AaBbαβ123 {\tiny A B} A B yields $_{AB}AB$ \tiny AB \Tiny CD yields $_{AB}AB$ \tiny{AB}CD yields $_{ABCD}$
\Tiny non-standard		turns on Tiny; a bit bigger than \tiny class ORD {\Tiny ... } Examples: \Tiny AaBb\alpha\beta123 yields AaBbαβ123 {\Tiny A B} A B yields $_{AB}AB$ \Tiny AB \tiny CD yields $_{AB}AB$ \Tiny{AB}CD yields $_{ABCD}$
\to	→	non-stretchy → class REL see also: \rightarrow
tool tips		Tool tips are not built into MathJax, but you can click here to benefit from a posting by Davide P. Cervone (April 2011) at the MathJax Users Group.
\top	⊤	⊤ class ORD
\triangle	△	△ class ORD
\triangledown AMSsymbols	▽	▽ class ORD see also: \ntriangleleft, \ntriangleright, \vartriangle, \vartriangleleft, \vartriangleright
\triangleleft	◁	◃ class BIN
\triangleright	▷	▹ class BIN see also: \ntriangleleft, \ntriangleright, \vartriangle, \vartriangleleft, \vartriangleright
\trianglelefteq AMSsymbols	⊴	⊴ class REL
\trianglerighteq AMSsymbols	⊵	&#x22B5 class REL see also: \ntrianglelefteq, \ntrianglerighteq
\triangleq AMSsymbols	≜	≜ class REL
\tt		turns on typewriter type class ORD {\tt ... } Examples: \tt AaBb\alpha\beta123 yields AaBbαβ123 {\tt A B} A B yields ABAB \tt AB \rm CD yields ABAB \tt{AB}CD yields ABCD
\twoheadleftarrow AMSsymbols	↞	non-stretchy ↞ class REL
\twoheadrightarrow AMSsymbols	↠	non-stretchy ↠ class REL

U

`\ulcorner` AMSsymbols	⌜	upper left corner `&#x250C;` class REL
`\urcorner` AMSsymbols	⌝	upper right corner `&#x2510;` class REL These are technically delimiters, but MathJax doesn't stretch them. They are valid after `\left`, `\right`, and the various `\big` commands. see also: \llcorner, \lrcorner
`\underbrace`		puts a (stretchy) under-brace under the argument; can use '^' to place an optional superscript over the argument; can use '_' to place an optional subscript below the underbrace `\underbrace #1` Example: `\underbrace{x + \cdots + x}_{n\rm\ times}^{\text{(note here)}}` yields $\overbrace{x+\cdots+x}^{\text{(note here)}}_{n\text{ times}}$ see also: \overbrace
`\underleftarrow`	←	stretchy under left arrow `&#x2190;`
`\underrightarrow`	→	stretchy under right arrow `&#x2192;`

`\underleftrightarrow`	↔	stretchy under left right arrow `&#x2194;`
		`\underleftarrow #1`
		`\underrightarrow #1`
		`\underleftrightarrow #1`
		Examples:
		`\underleftarrow{\text{the argument}}` yields $\underleftarrow{\text{the argument}}$
		`\underrightarrow{AB}` yields $\underrightarrow{AB}$
		`\underrightarrow{AB\strut}` yields $\underrightarrow{AB}$
		`\underleftrightarrow{\hspace1in}` yields $\underleftrightarrow{\hspace{1in}}$

`\underline`	_	stretchy underline `&#x005F;` `\underline #1` Examples: `\underline{AB}` yields $\underline{AB}$ `\underline a` yields $\underline{a}$ `\underline{\text{a long argument}}` yields $\underline{\text{a long argument}}$

`\underparen`		puts a (stretchy) under-parenthesis (under-arc, smile) under the argument (new in MathJax 2.6)
		`\underparen #1`
		Example:
		`\underparen a \quad`
		`\underparen ab \quad`
		`\underparen{ab} \quad`
		`\underparen{abc} \quad`
		`\underparen{abcdef} \quad`
		`\underparen{\overparen{abcd}}`
		yields
		$\underset{\frown}{a}\quad\underset{\frown}{ab}\quad\underset{\frown}{ab}\quad\underset{\frown}{abc}\quad\underset{\frown}{abcdef}\quad\underset{\frown}{\overset{\frown}{abcd}}$
		
		see also: \overparen, \smallfrown, \frown, \smallsmile, \smile

`\underset`		`\underset #1 #2` undersets argument #1 (in scriptstyle) under argument #2; the top item is properly aligned with the surrounding text (their baselines match) Examples:

		`\underset{\rm bottom}{\rm top}` yields $\underset{\text{bottom}}{\text{top}}$ `\underset ab` yields $\underset{a}{b}$ see also: \overset
`\unicode` non-standard		implements a `\unicode{}` extension to TEX that allows arbitrary unicode code points to be entered in mathematics; class ORD can optionally specify height and depth of character (width is determined by browser); can optionally specify the default font from which to take the character; once a size and font are provided for a given unicode point, they need not be specified again in subsequent `\unicode{}` calls for that character `\unicode[optHeight,optDepth][optFont]#1` Examples: `\unicode{x263a}` yields ☺ `&#x263a;` yields (in math mode) ☺ `\unicode[.55,0.05]{x22D6}` yields ⋖ less-than with dot, with height 0.55em and depth 0.05em `\unicode[.55,0.05][Geramond]{x22D6}` yields ⋖ same, taken from Geramond font `\unicode[Geramond]{x22D6}` yields ⋖ same, but with default (height,depth) of (0.8em,0.2em)
`\unlhd` AMSsymbols `\unrhd` AMSsymbols	◁ ▷	underlined left-hand (left-pointing) diamond `&#x22B4;` class REL underlined right-hand (right-pointing) diamond `&#x22B5;` class REL
`\uparrow` `\Uparrow`	↑ ⇑	non-stretchy `&#x2191;` class REL non-stretchy `&#x21D1;` class REL
`\updownarrow` `\Updownarrow`	↕ ⇕	non-stretchy `&#x2195;` class REL non-stretchy `&#x21D5;` class REL
`\upharpoonleft` AMSsymbols `\upharpoonright` AMSsymbols	↿ ↾	non-stretchy `&#x21BF;` class REL non-stretchy `&#x21BE;` class REL
`\uplus`	⊎	`&#x228E;` class BIN

`\uproot`		used to fine-tune the placement of the index inside `\sqrt` or `\root` (see examples)
		`\sqrt[... \uproot #1 ...]{...}`
		`\root ... \uproot #1 ... \of {...}`
		where the argument is a small integer:
		a positive integer moves the index up;
		a negative integer moves the index down
		In actual TeX, `\uproot` is not allowed in `\root`,
		so this is a difference between MathJax and TEX.
		Examples:
		`\sqrt[3]{x}` yields $\sqrt[3]{x}$
		`\sqrt[3\uproot2]{x}` yields $\sqrt[3]{x}$
		`\root 3 \of x` yields $\sqrt[3]{x}$
		`\root 3\uproot{-2} \of x` yields $\sqrt[3]{x}$
		see also: \leftroot, \root

`\upsilon` `\Upsilon`	υ Υ	lowercase Greek letter upsilon `&#x03C5;` class ORD uppercase Greek letter upsilon `&#x03A5;` class ORD see also: \varupsilon, \varUpsilon
`\upuparrows` AMSsymbols	⇈	non-stretchy `&#x21C8;` class REL

V

\varDelta	AMSsymbols	$\varDelta$	uppercase Greek letter delta; variant see also: \Delta	Δ class ORD
\varepsilon		ε	lowercase Greek letter epsilon; variant see also: \epsilon	ε class ORD
\varGamma	AMSsymbols	$\varGamma$	uppercase Greek letter gamma; variant see also: \Gamma	Γ class ORD
\varinjlim	AMSmath	$\varinjlim$	injective limit; variant; does not change size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples see also: \injlim	class OP
\varkappa	AMSsymbols	$\varkappa$	lowercase Greek letter kappa; variant see also: \kappa	ϰ class ORD
\varLambda	AMSsymbols	$\varLambda$	uppercase Greek letter lambda; variant see also: \Lambda	Λ class ORD
\varlimsup \varliminf	AMSmath AMSmath	$\varlimsup$ $\varliminf$	limit superior; variant limit inferior; variant do not change size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples see also: \limsup, \liminf	class OP class OP
\varnothing	AMSsymbols	$\varnothing$	see also: \emptyset	∅ class ORD
\varOmega	AMSsymbols	$\varOmega$	uppercase Greek letter omega; variant see also: \Omega	Ω class ORD
\varphi		φ	lowercase Greek letter phi; variant see also: \phi	φ class ORD
\varPhi	AMSsymbols	$\varPhi$	uppercase Greek letter phi; variant see also: \Phi	Φ class ORD
\varpi		ϖ	lowercase Greek letter pi; variant see also: \pi	ϖ class ORD
\varPi	AMSsymbols	$\varPi$	uppercase Greek letter pi; variant see also: \Pi	Π class ORD
\varprojlim	AMSmath	$\varprojlim$	projective limit; variant; does not change size; can change limit placement using \limits and \nolimits; see the Big Operators Table for examples see also: \projlim	
\varpropto	AMSsymbols	$\varpropto$	proportional to; variant see also: \propto	∝ class REL
\varPsi	AMSsymbols	$\varPsi$	uppercase Greek letter pi; variant see also: \Psi	Ψ class ORD
\varrho	AMSsymbols	ϱ	lowercase Greek letter rho; variant see also: \rho	ϱ class ORD
\varsigma	AMSsymbols	ς	lowercase Greek letter sigma; variant see also: \sigma	ς class ORD
\varSigma	AMSsymbols	$\varSigma$	uppercase Greek letter sigma; variant see also: \Sigma	ς class ORD

\varsubsetneq AMSsymbols \varsubsetneqq AMSsymbols	$\varsubsetneq$ $\varsubsetneqq$	⊊ class REL ⫋ class REL see also: \subsetneq, \subsetneqq
\varsupsetneq AMSsymbols \varsupsetneqq AMSsymbols	$\varsupsetneq$ $\varsupsetneqq$	⊋ class REL ⫌ class REL see also: \supsetneq, \supsetneqq
\vartheta \varTheta AMSsymbols	ϑ $\varTheta$	lowercase Greek letter theta; variant ϑ class ORD uppercase Greek letter theta; variant Θ class ORD see also: \theta, \Theta
\vartriangle AMSsymbols \vartriangleleft AMSsymbols \vartriangleright AMSsymbols	$\vartriangle$ $\vartriangleleft$ $\vartriangleright$	△ class REL ⊲ class REL ⊳ class REL see also: \triangle, \triangleleft, \triangleright
\varUpsilon AMSsymbols	$\varUpsilon$	uppercase Greek letter upsilon; variant Υ class ORD see also: \upsilon
\varXi AMSsymbols	$\varXi$	uppercase Greek letter xi; variant Ξ class ORD see also: \Xi
\vcenter		\vcenter #1 centers the argument on the 'math axis', which is at half the height of an 'x', or about the position of a minus sign; one of the reasons for \vcenter is to get stretchy delimiters to match the contents better Examples: \left(\Rule{1ex}{2em}{0pt}\right) yields $\left(\vcenter{\Rule{1ex}{2em}{0pt}}\right)$ \left(\vcenter{\Rule{1ex}{2em}{0pt}}\right) yields $\left(\vcenter{\Rule{1ex}{2em}{0pt}}\right)$ \left(\frac{a+b}{\dfrac{c}{d}}\right) yields $\left(\frac{a+b}{\dfrac{c}{d}}\right)$ \left(\vcenter{\frac{a+b}{\dfrac{c}{d}}}\right) yields $\left(\vcenter{\frac{a+b}{\dfrac{c}{d}}}\right)$
\vdash	$\vdash$	see also: \nvdash ⊢ class REL
\Vdash AMSsymbols \vDash AMSsymbols	$\Vdash$ $\vDash$	⊩ class REL ⊨ class REL see also: \nVdash, \nvDash
\vdots	$\vdots$	vertical dots ⋮ class ORD
\vec		non-stretchy vector symbol \vec #1 Examples: \vec v yields $\vec{v}$ \vec{AB} yields $\vec{AB}$ see also: \overrightarrow

\vee	$\vee$	see also: \lor ∨ class BIN
\veebar AMSsymbols	$\veebar$	⊻ class BIN
\verb		verbatim mode; useful for code snippets and for displaying special characters 'as is' (i.e., not interpreted by MathJax). Only works in display mode. Usually, verbatim content is typeset in a sans serif font. \verb ◇ <non-interpreted material> ◇ where ◇ denotes a non-letter character that does *not* appear in the <non-interpreted material>. To use \verb : • First look through the material that is to be typeset 'as is' (verbatim). • Choose a non-letter character that does *not* appear in this material. • This chosen non-letter character will mark the beginning and end of the verbatim material, as illustrated in the examples below. Examples (in display mode): \verb*$x^2\sqrt y$* \text{ yields } x^2\sqrt y yields: $x^2\sqrt y$ yields $x^2\sqrt{y}$ \verb!Text and $\frac ab$ in \verb mode! yields: Text and $\frac ab$ in \verb mode
\vert	$\vert$	class ORD
\Vert	$\Vert$	∥ class ORD both non-stretchy when used alone; stretchy when used with \left or \right see also: |, \\|, \lvert, \lVert, \rvert, \rVert
\vphantom		vertical phantom Sometimes you want to *pretend* that something is there, for spacing reasons, but you don't want it to appear—you want it to be invisible—you want it to be a phantom. The box created by \vphantom has the height and depth of its argument, but its width is zero (so it doesn't contribute to any horizontal spacing issues). In other words, \vphantom creates vertical space equal to that produced by its argument, but doesn't create any horizontal space. \vphantom #1 Examples: \binom{\frac ab}c \binom{\vphantom{\frac ab}?}c yields $\binom{\frac ab}{c}\binom{?}{c}$ see also: \phantom, \hphantom, \smash
\Vvdash AMSsymbols	$\Vvdash$	⊪ class REL

W

\wedge	$\wedge$	see also: \land ∧ class BIN
\widehat	$\widehat{}$	stretchy hat accent ˆ \widehat #1 Examples: \widehat a yields $\widehat{a}$ \widehat A yields $\widehat{A}$ \widehat AB yields $\widehat{AB}$ \widehat{AB} yields $\widehat{AB}$ see also: \hat
\widetilde	$\sim$	stretchy tilde accent ˜ \widetilde #1 Examples: \widetilde a yields $\tilde{a}$ \widetilde A yields $\widetilde{A}$ \widetilde AB yields $\widetilde{AB}$ \widetilde{AB} yields $\widetilde{AB}$
\wp	$\wp$	'wriggly' letter p ℘ class ORD
\wr	$\wr$	'wriggle' symbol; ≀ class BIN

X

\Xi	Ξ	uppercase Greek letter xi Ξ class ORD see also: \varXi
\xi	ξ	lowercase Greek letter xi ξ class ORD
\xleftarrow AMSmath \xrightarrow AMSmath		stretchy arrows with mathematical overset and optional mathematical underset class REL \xleftarrow[optionalArgument] #1 \xrightarrow[optionalArgument] #1 where the optional arguments (inside brackets, if desired) appear below the arrows (see examples). Examples: \xrightarrow a yields $\xrightarrow{a}$ \xrightarrow ab yields $\xrightarrow{a} b$ \xrightarrow{ab} yields $\xrightarrow{ab}$ \xleftarrow{\text{see equation (1)}} yields $\xleftarrow{\text{see equation (1)}}$ \xrightarrow[f]{\text{see (1)}} yields $\xrightarrow[f]{\text{see (1)}}$

Y

\yen AMSsymbols	¥	¥ class ORD

Z

\zeta	ζ	lowercase Greek letter zeta ζ class ORD

environments

LaTeX environments of the form `\begin{XXX} ... \end{XXX}` are provided, as listed in the table below.
The `processEnvironments` value in the `tex2jax` block of the MathJax configuration controls processing behavior:

- `processEnvironments: true` (the default) causes environments to be processed both inside *and outside* of math delimiters
- `processEnvironments: false` causes environments to be processed only when they appear inside math delimiters

`align` AMSmath
 	
`\begin{align}`
`... \end{align}`
	□	For vertical alignment of two or more lines at one or more places:
		• ampersand(s) '&' are used to indicate desired alignments (see examples below)
		• a double backslash '`\\`' or carriage return '`\cr`' separates lines
		• individual lines may be tagged using the `\tag{}` command:
		◦ default input for `\tag{}` is text
		◦ you may get mathematical content inside `\tag{}` by using math delimiters; e.g., `\tag{$\alpha$}`
		
		EXAMPLES:
		
		Alignment at a single location:
		
		• use a single ampersand where alignment should occur
		• you may tag (or not tag) any desired subset of lines
		
		`\begin{align}`
		`(a+b)^2 &= (a+b)(a+b) \tag{3.1c} \\`
		`&= a^2 + ab + ba + b^2 \tag{$\dagger$} \\`
		`&= a^2 + 2ab + b^2 \tag{$\ast$}`
		`\end{align}`
		
		yields
		
		$$\begin{aligned}(a+b)^2 &= (a+b)(a+b) && (3.1c)\\ &= a^2 + ab + ba + b^2 && (\dagger)\\ &= a^2 + 2ab + b^2 && (\ast)\end{aligned}$$
		
		Alignment at more than one location is trickier.
		It is best illustrated with an example: show/hide more info
		Let n denote the number of places where alignment is desired.
		Then, there will be $2n-1$ ampersands used.
		
		• STEP 1:
		The odd-numbered ampersands (1st, 3rd, 5th, etc.) are placed where alignment is desired.
		Position these ampersands first:
		
		`a &= bbbbbb &= cc &= d \\`
		`aaa &= bbbb &= cccccc &= ddd`
		
		• STEP 2:
		Now, focus attention on the content *between* the previously-positioned ampersands.
		What part of this content belongs on the left? On the right?
		In each group, use an ampersand to separate the content into two pieces (a piece may be empty).
		Think of this ampersand as a solid 'wall' that is pushing content to the left or right.
		
		Compare these three scenarios:
		Pushing all content to the left:
		
		`\begin{align}`
		`a &= bbbbbb& &= cc& &= d \\`
		`aaa &= bbbb& &= cccccc& &= ddd`
		`\end{align}`
		
		yields
		
		$$\begin{aligned}a &= bbbbbb &&= cc &&= d\\ aaa &= bbbb &&= cccccc &&= ddd\end{aligned}$$
		
		Pushing all content to the right:
		
		`\begin{align}`
		`a &= &bbbbbb &= &cc &= d \\`
		`aaa &= &bbbb &= &cccccc &= ddd`
		`\end{align}`
		
		yields
		
		$$\begin{aligned}a &= & bbbbbb &= & cc &= d\\ aaa &= & bbbb &= & cccccc &= ddd\end{aligned}$$

Splitting the content, with half left and half right:

```
\begin{align}
a   &= bbb&bbb &=   c&c   &= d \\
aaa &=  bb&bb  &= ccc&ccc &= ddd
\end{align}
```

yields

$$a = bbb \quad bbb = c \quad c = d$$
$$aaa = bb \quad bb = ccc \quad ccc = ddd$$

see also: \eqalign, \eqalignno, \leqalignno

align* AMSmath		[May 2011] same as align

alignat AMSmath

```
\begin{alignat}
{<num>}
    ... \end{alignat}
```

For vertical alignment of two or more lines at one or more places;
produces a more horizontally-compressed display than align:

- the alignat environment is started with `\begin{alignat}{<num>}` ,
  where `num` is a positive integer $(1, 2, 3, \dots)$ that indicates the number of places
  where alignment is desired
- ampersand(s) '&' are used to indicate desired alignments (see examples below)
- a double backslash '`\\`' or carriage return '`\cr`' separates lines
- individual lines may be tagged using the `\tag{}` command:
  - default input for `\tag{}` is text
  - you may get mathematical content inside `\tag{}` by using math delimiters;
    e.g., `\tag{$\alpha$}`

Let n denote the number of places where alignment is desired.
Then, there will be $2n - 1$ ampersands used, as follows:

- STEP 1:
  The odd-numbered ampersands (1st, 3rd, 5th, etc.) are placed where alignment is desired.
  Position these ampersands first:

```
a   &= bbbbbb &=   cc   &= d \\
aaa &=  bbbb  &= cccccc &= ddd
```

- STEP 2:
  Now, focus attention on the content *between* the previously-positioned ampersands.
  What part of this content belongs on the left? On the right?
  In each group, use an ampersand to separate the content into two pieces (a piece may be empty).
  Think of this ampersand as a solid 'wall' that is pushing content to the left or right.

  Compare these three scenarios:

  Pushing all content to the left:

```
\begin{alignat}{3}
a   &= bbbbbb& &=   cc&   &= d \tag{3.1} \\
aaa &=  bbbb&  &= cccccc& &= ddd \tag{3.2}
\end{alignat}
```

yields

$$a = bbbbbb = cc \quad = d \tag{3.1}$$
$$aaa = bbbb \quad = cccccc = ddd \tag{3.2}$$

Pushing all content to the right:

```
\begin{alignat}{3}
a   &= &bbbbbb &=   &cc   &= d \\
aaa &=  &bbbb  &= &cccccc &= ddd
\end{alignat}
```

yields

$$a = bbbbbb = \quad cc = d$$
$$aaa = \quad bbbb = cccccc = ddd$$

Splitting the content, with half left and half right:

```
\begin{alignat}{3}
a   &= bbb&bbb &=   c&c   &= d \\
aaa &=  bb&bb  &= ccc&ccc &= ddd
\end{alignat}
```

yields

$$a = bbbbbb = c \quad c = d$$
$$aaa = bb \quad bb = cccccc = ddd$$

see also: \eqalignat, \eqalignatno, \leqalignatno

alignat* AMSmath		[May 2011] same as alignat
array \begin{array} {<justification info>} ... \end{array}	□	Used to create an array (matrix), where columns can be individually left-justified, centered, or right-justified. • suppose that n columns are desired in the array; then, $n-1$ ampersands are used to separate the columns • the array environment is started with \begin{array}{<justification info>} , where <justification info> is a series of n letters, one for each column: ◦ 'l' for left-justified ◦ 'c' for centered ◦ 'r' for right-justified ◦ pipe character(s) '|' can be used in the justification information to specify optional separating vertical line(s) (see example below) • a double backslash '\\' or carriage return '\cr' separates rows Compare these scenarios: both columns left-justified: \begin{array}{ll} aaa & b\cr c & ddd \end{array} yields $\begin{array}{ll} aaa & b \\ c & ddd \end{array}$ both columns right-justified: \begin{array}{rr} aaa & b\cr c & ddd \end{array} yields $\begin{array}{rr} aaa & b \\ c & ddd \end{array}$ both columns centered, with separating line: \begin{array}{c|c} aaa & b\cr c & ddd \end{array} yields $\begin{array}{c\|c} aaa & b \\ c & ddd \end{array}$ first column left-justified; second column right-justified: \begin{array}{lr} aaa & b\cr c & ddd \end{array} yields $\begin{array}{lr} aaa & b \\ c & ddd \end{array}$ Putting a pipe character '|' at the beginning or end of the justification info encloses the entire structure, which is different from standard TEX : \begin{array}{|lr} aaa & b\cr c & ddd \end{array} yields

		$\begin{vmatrix} aaa & b \\ c & ddd \end{vmatrix}$ see also: \begin{matrix}, \begin{subarray}

`Bmatrix`
 	
`\begin{Bmatrix}`
`... \end{Bmatrix}`
		Used to create a matrix (an array) with braces { , } as enclosing delimiters;
		columns are centered.
		• suppose that n columns are desired in the array;
		then, $n-1$ ampersands are used to separate the columns
		• a double backslash '\\' or carriage return '\cr' separates rows
		
		Example:
		
		`\begin{Bmatrix}`
		`aaa & b\cr`
		`c & ddd`
		`\end{Bmatrix}`
		yields $\begin{Bmatrix} aaa & b \\ c & ddd \end{Bmatrix}$
		
		see also: \begin{array}, \begin{matrix}

`bmatrix`
 	
`\begin{bmatrix}`
`... \end{bmatrix}`
		Used to create a matrix (an array) with brackets [,] as enclosing delimiters;
		columns are centered.
		• suppose that n columns are desired in the array;
		then, $n-1$ ampersands are used to separate the columns
		• a double backslash '\\' or carriage return '\cr' separates rows
		
		Example:
		
		`\begin{bmatrix}`
		`aaa & b\cr`
		`c & ddd`
		`\end{bmatrix}`
		yields $\begin{bmatrix} aaa & b \\ c & ddd \end{bmatrix}$
		
		see also: \begin{array}, \begin{matrix}

`cases`
 	
`\begin{cases}`
`... \end{cases}`
		Used for piecewise-defined functions
		• an ampersand '&' is used to separate the function cases and their definitions
		• a double backslash '\\' or carriage return '\cr' separates rows
		
		Example:
		
		`|x| =`
		`\begin{cases}`
		`x & \text{ if } x\ge 0 \\`
		`-x & \text{ if } x \lt 0`
		`\end{cases}`
		yields $\|x\| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$
		
		see also: \cases

`eqnarray`
 	
`\begin{eqnarray}`
`... \end{eqnarray}`
		for 'equation arrays';
		aligns at one or more places;
		surround the character(s) to be aligned with ampersands, as shown below;
		content between alignment characters (or between alignment characters and end-of-line) is left-justified;
		a double backslash '\\' or carriage return '\cr' separates rows
		
		Examples:
		
		`\begin{eqnarray}`
		`y &=& (x-1)^2 \\`
		`&=& (x-1)(x-1) \\`
		`&=& x^2 - 2x + 1`
		`\end{eqnarray}`
		
		yields
		
		$$\begin{aligned} y &= (x-1)^2 \\ &= (x-1)(x-1) \\ &= x^2 - 2x + 1 \end{aligned}$$
		
		`\begin{eqnarray}`
		`(x-1)^2 &=& (x-1)(x-1) &=& x^2-2x + 1 \\`
		`(x-1)^3 &=& (x-1)(x-1)(x-1) &=& (x-1)^2(x-1)`
		`\end{eqnarray}`
		
		yields
		
		$$\begin{aligned} (x-1)^2 &= (x-1)(x-1) &&= x^2-2x+1 \\ (x-1)^3 &= (x-1)(x-1)(x-1) &&= (x-1)^2(x-1) \end{aligned}$$

`eqnarray*`		[May 2011] same as equarray

`equation`
 	
`\begin{equation}`
`  ... \end{equation}`
		[May 2011] ignored, until MathJax implements automatic numbering

`equation*`		[May 2011] ignored

`gather` AMSmath		to display any number of centered formulas (without any alignment);
		a double backslash '`\\`' or carriage return '`\cr`' separates rows;
		individual lines may be tagged using the `\tag{}` command:
		• default input for `\tag{}` is text
		• you may get mathematical content inside `\tag{}` by using math delimiters; e.g., `\tag{$\alpha$}`
		
		Example:
		`\begin{gather}`
		`a = a \tag{$*$}\\`
		`\text{if } a=b \text{ then } b=a \tag{$\dagger$}\\`
		`\text{if } a=b \text{ and } b=c \text{ then } a=c\tag{3.1}`
		`\end{gather}`
		yields:
		$$a = a \qquad (*)$$
		$$\text{if } a = b \text{ then } b = a \qquad (\dagger)$$
		$$\text{if } a = b \text{ and } b = c \text{ then } a = c \qquad (3.1)$$
		see also: \displaylines

`gather*` AMSmath		[May 2011] same as gather

`matrix`
 	
`\begin{matrix}`
`...`
`\end{matrix}`
		Used to create a matrix (an array) without any enclosing delimiters;
		columns are centered.
		• suppose that n columns are desired in the array; then, $n-1$ ampersands are used to separate the columns
		• a double backslash '`\\`' or carriage return '`\cr`' separates rows
		
		Example:
		`\begin{matrix}`
		`aaa & b\cr`
		`c  & ddd`
		`\end{matrix}`
		yields $\begin{matrix} aaa & b \\ c & ddd \end{matrix}$
		
		see also: \begin{array}

`multline` AMSmath
 	
`\begin{multline}`
`  ... \end{multline}`
		a multi-line environment;
		typically used for formulas/equations that don't fit on a single line
		• the first (or only) line is displayed left-justified
		• the last line is displayed right-justified
		• any intermediate line(s) are centered
		
		The justification of intermediate lines can be adjusted with \shoveleft and \shoveright.
		
		Examples:
		`\begin{multline}`
		`\rm first\ line \\`
		`\rm second\ line \\`
		`\rm third\ line \\`
		`\rm fourth\ line`
		`\end{multline}`
		yields:
		first line
		second line
		third line
		fourth line
		
		`\begin{multline}`
		`\rm first\ line \\`
		`\shoveleft\rm second\ line \\`
		`\shoveright\rm third\ line \\`
		`\rm fourth\ line`
		`\end{multline}`
		yields:

first line
second line
third line
fourth line

see also: \begin{split}

multline* [AMSmath]		[May 2011] same as multline see also: \shoveleft, \shoveright
pmatrix \begin{pmatrix} ... \end{pmatrix}		Used to create a matrix (an array) with parentheses (,) as enclosing delimiters; columns are centered. • suppose that n columns are desired in the array; then, $n-1$ ampersands are used to separate the columns • a double backslash '\\' or carriage return '\cr' separates rows Example: \begin{pmatrix} aaa & b\cr c & ddd \end{pmatrix} yields $\begin{pmatrix} aaa & b \\ c & ddd \end{pmatrix}$ see also: \begin{array}, \begin{matrix}
smallmatrix AMSmath \begin{smallmatrix} ... \end{smallmatrix}		Used to create a small matrix (an array); particularly suited for use in text; columns are centered. • suppose that n columns are desired in the array; then, $n-1$ ampersands are used to separate the columns • a double backslash '\\' or carriage return '\cr' separates rows Examples: the matrix $\begin{smallmatrix} aaa & b\cr c & ddd \end{smallmatrix}$ is... yields the matrix $\begin{smallmatrix} aaa & b \\ c & ddd \end{smallmatrix}$ is... \left[\begin{smallmatrix} aaa & b\cr c & ddd \end{smallmatrix} \right] yields (in display mode) $\left[\begin{smallmatrix} aaa & b \\ c & ddd \end{smallmatrix}\right]$ \left[\begin{smallmatrix} aaa & b\cr c & ddd \end{smallmatrix} \right] yields (in inline mode) $\left[\begin{smallmatrix} aaa & b \\ c & ddd \end{smallmatrix}\right]$ see also: \begin{array}, \begin{matrix}
split AMSmath		for single equations that are too long to fit on one line, and hence must be split into multiple lines; allows for (optional) alignment at one or more places, using '&' to mark alignment points Examples: \begin{split} \text{first line}\\ &\text{first aligned place} &\text{second aligned place} \\ &\text{and more first aligned}\qquad &\text{and more second aligned} \\ \text{no ampersands on this line} \\ & &\text{aligned at second place} \\ \text{no amps here either} \end{split} yields: first line first aligned place second aligned place and more first aligned and more second aligned no ampersands on this line aligned at second place no amps here either see also: \begin{multline}

`subarray`
 	
`\begin{subarray}{<justification info>}`
`... \end{subarray}`
		a more compact version of \begin{array};
		can be used for multi-subscripts and multi-superscripts on large operators;
		columns can be individually left-justified, centered, or right-justified
		• suppose that n columns are desired in the subarray;
		then, $n-1$ ampersands are used to separate the columns
		• the subarray environment is started with `\begin{subarray}{<justification info>}`,
		where `<justification info>` is a series of n letters, one for each column:
		◦ 'l' for left-justified
		◦ 'c' for centered
		◦ 'r' for right-justified
		• a double backslash '`\\`' or carriage return '`\cr`' separates rows
		
		Example:
		`\prod_{\begin{subarray}{rl}`
		`i\lt 5 & j\gt 1 \\`
		`k\ge2,\,k\ne 5 \quad & \ell\le 5,\,\ell\ne 2`
		`\end{subarray}}`
		`x_{ijk\ell}`
		
		yields
		$$\prod_{\substack{i<5 \\ k\ge 2,\, k\ne 5}} \quad \prod_{\substack{j>1 \\ \ell\le 5,\, \ell\ne 2}} x_{ijk\ell}$$
		see also: \substack, \begin{array}

`Vmatrix`
 	
`\begin{Vmatrix}`
`... \end{Vmatrix}`
		Used to create a matrix (an array) with $\|$, $\|$ as enclosing delimiters;
		columns are centered.
		• suppose that n columns are desired in the array;
		then, $n-1$ ampersands are used to separate the columns
		• a double backslash '`\\`' or carriage return '`\cr`' separates rows
		
		Example:
		`\begin{Vmatrix}`
		`aaa & b\cr`
		`c & ddd`
		`\end{Vmatrix}`
		yields $\begin{Vmatrix} aaa & b \\ c & ddd \end{Vmatrix}$
		
		see also: \begin{array}, \begin{matrix}

`vmatrix`
 	
`\begin{vmatrix}`
`... \end{vmatrix}`
		Used to create a matrix (an array) with $\|$, $\|$ as enclosing delimiters;
		columns are centered.
		• suppose that n columns are desired in the array;
		then, $n-1$ ampersands are used to separate the columns
		• a double backslash '`\\`' or carriage return '`\cr`' separates rows
		
		Example:
		`\begin{vmatrix}`
		`aaa & b\cr`
		`c & ddd`
		`\end{vmatrix}`
		yields $\begin{vmatrix} aaa & b \\ c & ddd \end{vmatrix}$
		
		see also: \begin{array}, \begin{matrix}

Syntax for TEX Commands available in MathJax

The following syntax is used in TeX Commands available in MathJax:

- ARGUMENTS:
  Arguments are denoted by #1, #2, #3, etc.
  Multi-token arguments should be enclosed in (curly) braces: ' { } '
- GROUPING CONSTRUCTS:
  There are two basic grouping constructs that use braces;
  I refer to them as 'arguments' versus 'braced groups'.
  If you're not aware which construct is in force, then you can get unexpected results.
  These examples illustrate the difference.
- DIMENSIONS:
  ⟨dimen⟩ denotes:
  ⟨optional sign⟩⟨number⟩⟨unit⟩
  Examples: `-5pt` or `-5 pt` or `3.5pt`
  Click here for a table of dimension units
- CLASS INFORMATION:
  Math operators are divided into several distinct classes, which control the spacing between elements in the typeset expression.
  For example, REL uses a little more space than BIN.
  - ORD: an 'ordinary' item, like a variable name or Greek letter
  - OP: a 'big operator', usually having moveable limits (though not always)
    and different sizes for display and in-line modes (though not always)
    Click here for a table of Big Operators classifying mode behavior
  - BIN: a 'binary operator' like $+$ and $-$
  - REL: a 'binary relation' like $<$ and $\leq$
  - OPEN: an 'opening delimiter' like $($
  - CLOSE: a 'closing delimiter' like $)$
  - PUNCT: a 'punctuation' like $:$
  - INNER: a special class used for fractions and some other things
- DELIMITERS:
  Delimiters are symbols used to enclose expressions (e.g., parentheses, brackets, and braces)
  or used as operators (e.g., vertical lines for absolute value).
  In MathJax, delimiters can be of class OPEN, CLOSE, REL, or ORD.
  Click here for a table of MathJax Delimiters
- BROWSER-SPECIFIC SUGGESTIONS:
  - Set explicit widths for table-cells that contain math content;
    in native MathML environments, some unusual line-breaking in math can occur otherwise.

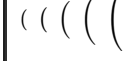
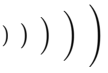
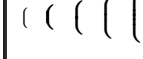
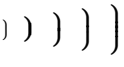
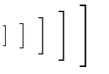
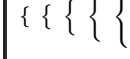
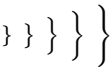
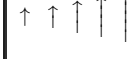
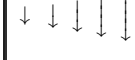
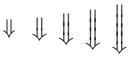
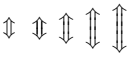
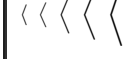
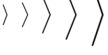
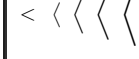
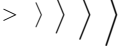
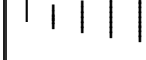
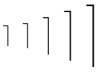
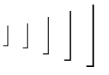
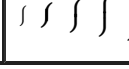
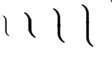
DIMENSION UNITS:

em	a relative measure; depends on current font	approximately the width of capital 'M' in current font	1 em spaces: | | | compare with M in a small font | | | compare with M in a medium font | | | compare with M in a large font | | | in scriptstyle (medium font) | | | in scriptscriptstyle (medium font)
ex	a relative measure; depends on current font	$1\text{ ex} = 0.43\text{ em}$ approximately the height of lowercase 'x' in current font; gives information about the height of lowercase letters	1 ex spaces: | | | compare with x in a small font | | | compare with x in a medium font | | | compare with x in a large font | | | in scriptstyle (medium font) | | | in scriptscriptstyle (medium font)

pt	point a relative measure; depends on current font; not affected by superscript level	$1\text{ pt} = \frac{1}{10}\text{em}$	10 pt (1 em) spaces: | | | in a small font | | | in a medium font | | | in a large font | | | in scriptstyle (medium font) | | | in scriptscriptstyle (medium font)
pc	pica a relative measure; depends on current font; not affected by superscript level	$1\text{ pc} = 12\text{ pt}$	1 pc spaces: | | | in a small font | | | in a medium font | | | in a large font | | | in scriptstyle (medium font) | | | in scriptscriptstyle (medium font)
mu	a relative measure; depends on current font; changes with superscript level	$1\text{ mu} = \frac{1}{18}\text{em}$	18 mu (1 em) spaces: | | | in a small font | | | in a medium font | | | in a large font | | | in scriptstyle (medium font) | | | in scriptscriptstyle (medium font)
cm mm	centimeter millimeter absolute measure; does not depend on current font	$10\text{ mm} = 1\text{ cm}$	1 cm (10 mm) spaces: | | | in a small font | | | in a medium font | | | in a large font | | | in scriptstyle (medium font) | | | in scriptscriptstyle (medium font)
in	inch absolute measure; does not depend on current font	$1\text{ in} = 2.54\text{ cm}$	1 in spaces: | | in a small font | | in a medium font | | in a large font | | in scriptstyle (medium font) | | in scriptscriptstyle (medium font)
px	screen pixel		10 px spaces on your own screen: | | | in a small font | | | in a medium font | | | in a large font | | | in scriptstyle (medium font) | | | in scriptscriptstyle (medium font)

VARIABLE-SIZED DELIMITERS

When used with `\left` and `\right`, these symbols expand to the height of the enclosed math expression.
They can also be used with \Bigg, \bigg, \Big, \big (or, the left/right/middle versions) to produce fixed-height large delimiters.
Each is illustrated below in sizes: normal, `\big`, `\Big`, `\bigg`, `\Bigg`

(class OPEN		) class CLOSE	
\lgroup class OPEN		\rgroup class CLOSE	
[class OPEN		] class CLOSE	
\{ class OPEN		\} class CLOSE	
\uparrow class REL		\Uparrow class REL	
\downarrow class REL		\Downarrow class REL	
\updownarrow class REL		\Updownarrow class REL	
\langle class OPEN		\rangle class CLOSE	
< class REL		> class REL	
| or \vert class ORD		\\| or \Vert class ORD	
\arrowvert class ORD		\Arrowvert class PUNCT	
\bracevert class ORD			
\lceil class OPEN		\rceil class CLOSE	
\lfloor class OPEN		\rfloor class CLOSE	
/ class ORD		\backslash class ORD	
\lmoustache class OPEN		\rmoustache class CLOSE	

BIG OPERATORS

For some of these operators (as indicated in the table), default limit positions can be changed using the `\limits` and `\nolimits` commands. Both commands should follow immediately after the base symbol to which they apply. For example, compare:

`\coprod_{i=1}^n` (inline mode)	`\coprod\limits_{i=1}^n` (inline mode)	`\coprod_{i=1}^n` (display mode)	`\coprod\nolimits_{i=1}^n` (display mode)
$\coprod_{i=1}^{n}$	$\coprod\limits_{i=1}^{n}$	$\coprod_{i=1}^{n}$	$\coprod\nolimits_{i=1}^{n}$

operator name	default inline mode behavior	inline with `\limits`	default display mode behavior	display with `\nolimits` (unless otherwise indicated)
`\arccos, \arcsin, \arctan` do not change size; default limit placement is the same in both inline and display modes; can change limit placement using `\limits`	$\arccos_{\text{sub}}^{\text{sup}}$	$\operatorname*{arccos}_{\text{sub}}^{\text{sup}}$	$\arccos_{\text{sub}}^{\text{sup}}$	display with `\limits` $\operatorname*{arccos}_{\text{sub}}^{\text{sup}}$
`\arg` does not change size; default limit placement is the same in both inline and display modes; can change limit placement using `\limits`	$\arg_{\text{sub}}^{\text{sup}}$	$\operatorname*{arg}_{\text{sub}}^{\text{sup}}$	$\arg_{\text{sub}}^{\text{sup}}$	display with `\limits` $\operatorname*{arg}_{\text{sub}}^{\text{sup}}$
`\bigcap, \bigcup` both change size; can change limit placement using `\limits` and `\nolimits`	$\bigcap_{\text{sub}}^{\text{sup}}$	$\bigcap\limits_{\text{sub}}^{\text{sup}}$	$\bigcap\limits_{\text{sub}}^{\text{sup}}$	$\bigcap_{\text{sub}}^{\text{sup}}$
`\bigodot, \bigoplus, \bigotimes` all change size; can change limit placement using `\limits` and `\nolimits`	$\bigodot_{\text{sub}}^{\text{sup}}$	$\bigodot\limits_{\text{sub}}^{\text{sup}}$	$\bigodot\limits_{\text{sub}}^{\text{sup}}$	$\bigodot_{\text{sub}}^{\text{sup}}$
`\bigsqcup` changes size; can change limit placement using `\limits` and `\nolimits`	$\bigsqcup_{\text{sub}}^{\text{sup}}$	$\bigsqcup\limits_{\text{sub}}^{\text{sup}}$	$\bigsqcup\limits_{\text{sub}}^{\text{sup}}$	$\bigsqcup_{\text{sub}}^{\text{sup}}$
`\biguplus` changes size; can change limit placement using `\limits` and `\nolimits`	$\biguplus_{\text{sub}}^{\text{sup}}$	$\biguplus\limits_{\text{sub}}^{\text{sup}}$	$\biguplus\limits_{\text{sub}}^{\text{sup}}$	$\biguplus_{\text{sub}}^{\text{sup}}$
`\bigvee, \bigwedge` both change size; can change limit placement using `\limits` and `\nolimits`	$\bigvee_{\text{sub}}^{\text{sup}}$	$\bigvee\limits_{\text{sub}}^{\text{sup}}$	$\bigvee\limits_{\text{sub}}^{\text{sup}}$	$\bigvee_{\text{sub}}^{\text{sup}}$
`\coprod` changes size; can change limit placement using `\limits` and `\nolimits`	$\coprod_{\text{sub}}^{\text{sup}}$	$\coprod\limits_{\text{sub}}^{\text{sup}}$	$\coprod\limits_{\text{sub}}^{\text{sup}}$	$\coprod_{\text{sub}}^{\text{sup}}$

`\cos, \sin, \tan, \sec, \cot, \csc`
`\cosh, \sinh, \tanh, \coth`
do not change size;
default limit placement is the same in both inline and display modes;
can change limit placement using `\limits`
	$\cos_{\text{sub}}^{\text{sup}}$	$\operatorname*{cos}_{\text{sub}}^{\text{sup}}$	$\cos_{\text{sub}}^{\text{sup}}$	display with `\limits`
				$\operatorname*{cos}_{\text{sub}}^{\text{sup}}$

`\deg` does not change size;	$\deg_{\text{sub}}^{\text{sup}}$	$\operatorname*{deg}_{\text{sub}}^{\text{sup}}$	$\deg_{\text{sub}}^{\text{sup}}$	

default limit placement is the same in both inline and display modes; can change limit placement using `\limits`				display with `\limits` $\underset{\text{sub}}{\overset{\text{sup}}{\deg}}$
`\det` does not change size; can change limit placement using `\limits` and `\nolimits`	$\det_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\det}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\det}}$	$\det_{\text{sub}}^{\text{sup}}$
`\dim` does not change size; default limit placement is the same in both inline and display modes; can change limit placement using `\limits`	$\dim_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\dim}}$	$\dim_{\text{sub}}^{\text{sup}}$	display with `\limits` $\underset{\text{sub}}{\overset{\text{sup}}{\dim}}$
`\exp` does not change size; default limit placement is the same in both inline and display modes; can change limit placement using `\limits`	$\exp_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\exp}}$	$\exp_{\text{sub}}^{\text{sup}}$	display with `\limits` $\underset{\text{sub}}{\overset{\text{sup}}{\exp}}$
`\gcd` does not change size; can change limit placement using `\limits` and `\nolimits`	$\gcd_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\gcd}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\gcd}}$	$\gcd_{\text{sub}}^{\text{sup}}$
`\hom` does not change size; default limit placement is the same in both inline and display modes; can change limit placement using `\limits`	$\hom_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\hom}}$	$\hom_{\text{sub}}^{\text{sup}}$	display with `\limits` $\underset{\text{sub}}{\overset{\text{sup}}{\hom}}$
`\idotsint` changes size; can change limit placement using `\limits`	$\int\cdots\int_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\int\cdots\int}}$	$\int\cdots\int_{\text{sub}}^{\text{sup}}$	display with `\limits` $\underset{\text{sub}}{\overset{\text{sup}}{\int\cdots\int}}$
`\iiiint`, `\iiint`, `\iint`, `\int` all change size; can change limit placement using `\limits`; common behavior is illustrated here using `\iint`	$\iint_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\iint}}$	$\iint_{\text{sub}}^{\text{sup}}$	display with `\limits` $\underset{\text{sub}}{\overset{\text{sup}}{\iint}}$
`\intop` changes size; can change limit placement using `\limits` and `\nolimits`	$\int_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\int}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\int}}$	$\int_{\text{sub}}^{\text{sup}}$
`\inf`, `\sup` do not change size; can change limit placement using `\limits` and `\nolimits`	$\inf_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\inf}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\inf}}$	$\inf_{\text{sub}}^{\text{sup}}$
`\injlim`, `\varinjlim` do not change size; can change limit placement using `\limits` and `\nolimits`	$\operatorname{inj\,lim}_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\operatorname{inj\,lim}}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\operatorname{inj\,lim}}}$	$\operatorname{inj\,lim}_{\text{sub}}^{\text{sup}}$
`\ker` does not change size; default limit placement is the same in both inline and display modes; can change limit placement using `\limits`	$\ker_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\ker}}$	$\ker_{\text{sub}}^{\text{sup}}$	display with `\limits` $\underset{\text{sub}}{\overset{\text{sup}}{\ker}}$

`\lg` does not change size; default limit placement is the same in both inline and display modes; can change limit placement using `\limits`	$\lg_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\lg}}$	$\lg_{\text{sub}}^{\text{sup}}$	display with `\limits` $\underset{\text{sub}}{\overset{\text{sup}}{\lg}}$
`\lim, \liminf, \limsup, \varliminf, \varlimsup` do not change size; can change limit placement using `\limits` and `\nolimits`	$\lim_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\lim}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\lim}}$	$\lim_{\text{sub}}^{\text{sup}}$
`\ln, \log` does not change size; default limit placement is the same in both inline and display modes; can change limit placement using `\limits`	$\ln_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\ln}}$	$\ln_{\text{sub}}^{\text{sup}}$	display with `\limits` $\underset{\text{sub}}{\overset{\text{sup}}{\ln}}$
`\max, \min` do not change size; can change limit placement using `\limits` and `\nolimits`	$\max_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\max}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\max}}$	$\max_{\text{sub}}^{\text{sup}}$
`\oint` changes size; can change limit placement using `\limits`	$\oint_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\oint}}$	$\oint_{\text{sub}}^{\text{sup}}$	display with `\limits` $\underset{\text{sub}}{\overset{\text{sup}}{\oint}}$
`\Pr` does not change size; can change limit placement using `\limits` and `\nolimits`	$\Pr_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\Pr}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\Pr}}$	$\Pr_{\text{sub}}^{\text{sup}}$
`\prod` changes size; can change limit placement using `\limits` and `\nolimits`	$\prod_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\prod}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\prod}}$	$\prod_{\text{sub}}^{\text{sup}}$
`\projlim, \varprojlim` does not change size; can change limit placement using `\limits` and `\nolimits`	$\operatorname{proj\,lim}_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\operatorname{proj\,lim}}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\operatorname{proj\,lim}}}$	$\operatorname{proj\,lim}_{\text{sub}}^{\text{sup}}$
`\sum` changes size; can change limit placement using `\limits` and `\nolimits`	$\sum_{\text{sub}}^{\text{sup}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\sum}}$	$\underset{\text{sub}}{\overset{\text{sup}}{\sum}}$	$\sum_{\text{sub}}^{\text{sup}}$