

MathJax basic tutorial and quick reference

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1. To see how any formula was written in any question or answer, including this one, right-click on the expression and choose "Show Math As > TeX Commands". (When you do this, the '\$' will not display. Make sure you add these. See the next point. There are also [other possibilities](#) how to view the code for the formula or the whole post.)

2. For **inline formulas**, enclose the formula in `$...$`. For **displayed formulas**, use `$$...$$`.

These render differently. For example, type

```
\sum_{i=0}^n i^2 = \frac{(n^2+n)(2n+1)}{6}
```

to show $\sum_{i=0}^n i^2 = \frac{(n^2+n)(2n+1)}{6}$ (which is inline mode) or type

```
$$\sum_{i=0}^n i^2 = \frac{(n^2+n)(2n+1)}{6}$$
```

to show

$$\sum_{i=0}^n i^2 = \frac{(n^2 + n)(2n + 1)}{6}$$

(which is display mode).

3. For **Greek letters**, use `\alpha`, `\beta`, ..., `\omega`: $\alpha, \beta, \dots, \omega$. For uppercase, use `\Gamma`, `\Delta`, ..., `\Omega`. Some Greek letters have variant forms: `\epsilon`, `\varepsilon`, `\phi`, `\varphi`, and others.
4. For **superscripts and subscripts**, use `^` and `_`. For example, `x_i^2`: x_i^2 , `\log_2 x`: $\log_2 x$.
5. **Groups**. Superscripts, subscripts, and other operations apply only to the next "group". A "group" is either a single symbol, or any formula surrounded by curly braces `{ ... }`. If you do `10^10`, you will get a surprise: 10^10 . But `10^{\{10\}}` gives what you probably wanted: 10^{10} . Use curly braces to delimit a formula to which a superscript or subscript applies: `x^5^6` is an error; `{x^y}^z` is x^{yz} , and `x^{y^z}` is x^{y^z} . Observe the difference between `x_i^2` x_i^2 and `x_{i^2}` x_{i^2} .
6. **Parentheses** Ordinary symbols `()[]` make parentheses and brackets $(2 + 3)[4 + 4]$. Use `\{` and `\}` for curly braces $\{ \}$.

These do *not* scale with the formula in between, so if you write `(\frac{\sqrt{x}}{y^3})` the parentheses will be too small: $(\frac{\sqrt{x}}{y^3})$. Using `\left(... \right)` will make the sizes adjust

automatically to the formula they enclose: `\left(\frac{\sqrt{x}}{y^3}\right)` is $\left(\frac{\sqrt{x}}{y^3}\right)$.

`\left` and `\right` apply to all the following sorts of parentheses: `(` and `)` (x) , `[` and `]` $[x]$, `\{` and `\}` $\{x\}$, `|` $|x|$, `\vert` $\|x\|$, `\angle` and `\rangle` $\langle x \rangle$, `\lceil` and `\rceil` $\lceil x \rceil$, and `\lfloor` and `\rfloor` $\lfloor x \rfloor$. `\middle` can be used to add additional dividers. There are also invisible parentheses, denoted by `.`: `\left.\frac{1}{2}\right\rbrace` is $\frac{1}{2}$.

If manual size adjustments are required:

```
\Biggl(\biggl(\Bigl(\bigl((x)\bigr)\Bigr)\biggr)\Biggr) gives  $\left(\left(\left(\left((x)\right)\right)\right)\right)$ .
```

7. **Sums and integrals** `\sum` and `\int`; the subscript is the lower limit and the superscript is the upper limit, so for example `\sum_{i=1}^n` \sum_1^n . Don't forget `{ ... }` if the limits are more than a single symbol. For example, `\sum_{i=0}^{\infty} i^2` is $\sum_{i=0}^{\infty} i^2$. Similarly, `\prod` \prod , `\int` \int , `\bigcup` \bigcup , `\bigcap` \bigcap , `\iint` \iint , `\iiint` \iiint , `\idotsint` $\int \cdots \int$.

8. **Fractions** There are [three ways to make these](#). `\frac ab` applies to the next two groups, and produces $\frac{a}{b}$; for more complicated numerators and denominators use `{ ... }`: `\frac{a+1}{b+1}` is $\frac{a+1}{b+1}$. If the numerator and denominator are complicated, you may prefer `\over`, which splits up the group that it is in: `{a+1\over b+1}` is $\frac{a+1}{b+1}$. Using `\cfrac{a}{b}` command is useful for continued fractions $\frac{a}{b}$, more details for which [are given in this sub-article](#).

9. Fonts

- Use `\mathbb` or `\Bbb` for "blackboard bold": CHNQRZ.
- Use `\mathbf` for boldface: **ABCDEFGHIJKLMNOPQRSTUVWXYZ**
abcdefghijklmnopqrstuvwxyz.
 - For expression based characters, use `\boldsymbol` instead: α
- Use `\mathit` for italics: *ABCDEFGHIJKLMNOPQRSTUVWXYZ*
abcdefghijklmnopqrstuvwxyz.
- Use `\pmb` for boldfaced italics: ***ABCDEFGHIJKLMNOPQRSTUVWXYZ***
abcdefghijklmnopqrstuvwxyz.
- Use `\mathtt` for "typewriter" font: ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz.
- Use `\mathrm` for roman font: ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz.
- Use `\mathsf` for sans-serif font: ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz.
- Use `\mathcal` for "calligraphic" letters: *ABCDEFGHIJKLMNOPQRSTUVWXYZ*
abcdefghijklmnopqrstuvwxyz
- Use `\mathscr` for script letters:
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
abcdefghijklmnopqrstuvwxyz
- Use `\mathfrak` for "Fraktur" (old German style) letters:
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
abcdefghijklmnopqrstuvwxyz.

10. **Radical signs / roots** Use `\sqrt`, which adjusts to the size of its argument: `\sqrt{x^3}` $\sqrt{x^3}$; `\sqrt[3]{\frac{xy}{y}}` $\sqrt[3]{\frac{xy}{y}}$. For complicated expressions, consider using `{...}^{1/2}` instead.

11. Some **special functions** such as "lim", "sin", "max", "ln", and so on are normally set in roman font instead of italic font. Use `\lim`, `\sin`, etc. to make these: `\sin x` $\sin x$, not `\sin x` $\sin x$. Use subscripts to attach a notation to `\lim`: `\lim_{x \rightarrow 0}`

$$\lim_{x \rightarrow 0}$$

Nonstandard function names can be set with `\operatorname{foo}(x)` $\operatorname{foo}(x)$.

12. There are a very large number of **special symbols and notations**, too many to list here; see [this shorter listing](#), or [this exhaustive listing](#). Some of the most common include:

- `\lt \gt \le \leq \leqq \leqslant \ge \geq \geqq \geqslant \neq` $<, >, \leq, \leq, \leq, \leq, \geq, \geq, \geq, \neq$. You can use `\not` to put a slash through almost anything: `\not\lt` \nless but it often looks bad.
- `\times \div \pm \mp \cdot` $\times, \div, \pm, \mp, \cdot$. `\cdot` is a centered dot: $x \cdot y$
- `\cup \cap \setminus \subset \subseteq \subsetneq \supset \supsetneq \in \notin \emptyset \varnothing` $\cup, \cap, \setminus, \subset, \subseteq, \subsetneq, \supset, \supsetneq, \in, \notin, \emptyset, \varnothing$
- `{n+1 \choose 2k}` or `\binom{n+1}{2k}` $\binom{n+1}{2k}$
- `\to \rightarrow \leftarrow \Rightarrow \Leftarrow \mapsto` $\rightarrow, \rightarrow, \leftarrow, \Rightarrow, \Leftarrow, \mapsto$
- `\land \lor \lnot \forall \exists \top \bot \vdash \dashv` $\wedge, \vee, \neg, \forall, \exists, \top, \bot, \vdash, \dashv$
- `\star \ast \oplus \circ \bullet` $\star, \ast, \oplus, \circ, \bullet$
- `\approx \sim \simeq \cong \equiv \prec \preceq \therefore` $\approx, \sim, \simeq, \cong, \equiv, \prec, \preceq, \therefore$
- `\infty \aleph_0 \nabla \partial \Im \Re \mathfrak{I}, \mathfrak{R}` $\infty, \aleph_0, \nabla, \partial, \Im, \Re, \mathfrak{I}, \mathfrak{R}$
- For modular equivalence, use `\pmod` like this: `a \equiv b \pmod n` $a \equiv b \pmod n$.
- For the binary mod operator, use `\bmod` like this: `a \bmod 17` $a \bmod 17$.
- Avoid using `\mod`, as it produces extra space: compare the above with `a \mod 17` $a \mod 17$.
- `\ldots` is the dots in a_1, a_2, \dots, a_n . `\cdots` is the dots in $a_1 + a_2 + \cdots + a_n$
- Script lowercase l is `\ell`.

[Detexify](#) lets you draw a symbol on a web page and then lists the TeX symbols that seem to resemble it. These are not guaranteed to work in MathJax but are a good place to start. To check that a command is supported, note that MathJax.org maintains a [list of currently supported \$LaTeX\$ commands](#), and one can also check Dr. Carol JVF Burns's page of [\$TeX\$ Commands Available in MathJax](#).

13. **Spaces** MathJax usually decides for itself how to space formulas, using a complex set of rules.

Putting extra literal spaces into formulas will not change the amount of space MathJax puts in:

`a_b` and `a_{}b` are both ab . To add more space, use `\,` for a thin space $a\,b$; `\;` for a wider space $a\;b$. `\quad` and `\qquad` are large spaces: $a\quad b, a\qquad b$.

To set plain text, use `\text{...}`: $\{x \in s \mid x \text{ is extra large}\}$. You can nest `\$...$` inside of `\text{...}`, for example to access spaces.

14. **Accents and diacritical marks** Use `\hat` for a single symbol \hat{x} , `\widehat` for a larger formula \widehat{xy} . If you make it too wide, it will look silly. Similarly, there are `\bar` \bar{x} and `\overline` \overline{xyz} , and `\vec` \vec{x} and `\overrightarrow` \overrightarrow{xy} and `\overleftarrow` \overleftarrow{xy} . For dots, as in $\frac{d}{dx} x \dot{x} = \dot{x}^2 + x \ddot{x}$, use `\dot` and `\ddot`.

15. Special characters used for MathJax interpreting can be escaped using the `\` character: `\$` $\$$, `\{` $\{$, `_` $_$, etc. If you want `\` itself, you should use `\backslash` (symbol) or `\setminus` ([binary](#)).

[operation](#)) for `\`, because `\\` is for a new line.

(Tutorial ends here.)

It is important that this note be reasonably short and not suffer from too much bloat. To include more topics, please create short addenda and post them as answers instead of inserting them into this post.

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