



Basic Document Structure

Document Setup

`\documentclass{article}` - Specifies the document class (e.g., article, report, book).

Options:

- `10pt`, `11pt`, `12pt` - Font size.
- `letterpaper`, `a4paper` - Paper size.
- `twocolumn` - Two-column layout.

`\usepackage{package_name}` - Includes a package for extended functionality (e.g., `amsmath`, `graphicx`).

`\title{Document Title}` - Sets the document title.

`\author{Your Name}` - Sets the document author.

`\date{Date}` - Sets the document date. Use `\date{}` for no date.

`\begin{document}` - Begins the document environment.

`\maketitle` - Generates the title.

`\end{document}` - Ends the document environment.

Sectioning

`\section{Section Title}` - Creates a section.

`\subsection{Subsection Title}` - Creates a subsection.

`\subsubsection{Subsubsection Title}` - Creates a subsubsection.

`\paragraph{Paragraph Title}` - Creates a paragraph.

`\ subparagraph{Subparagraph Title}` - Creates a subparagraph.

Text Formatting

Font Styles

`\textbf{text}` Bold text.

`\textit{text}` Italic text.

`\underline{text}` Underlined text.

`\texttt{text}` Typewriter text (monospace).

`\textsc{text}` Small caps.

`\emph{text}` Emphasis (usually italic).

`\textnormal{text}` Normal font style.

Lists

`\begin{itemize}`

`\item Item 1`

`\item Item 2`

`\end{itemize}`

Unordered list.

`\begin{enumerate}`

`\item Item 1`

`\item Item 2`

`\end{enumerate}`

Ordered list.

`\begin{description}`

`\item[Term 1] Definition 1`

`\item[Term 2] Definition 2`

`\end{description}`

Description list.

Math Mode

Inline Math

`$... $` - Inline math mode.

Example:

The equation $y = mx + b$ represents a line.

`\(... \)` - Another way to denote inline math mode.

Example:

The formula ($E = mc^2$) is famous.

Display Math

`\[... \]` - Display math mode (equation on a separate line).

Example:

```
[ \int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi} ]
```

`\begin{equation} ... \end{equation}` - Numbered equation.

Example:

```
\begin{equation}
x^2 + y^2 = r^2
\end{equation}
```

`\begin{align} ... \end{align}` - Align multiple equations (requires `amsmath` package).

Example:

```
\begin{align}
a &= b + c \\
d &= e + f
\end{align}
```

`\begin{gather} ... \end{gather}` - Use gather environment to group equations without alignment.

Example:

```
\begin{gather}
a = b + c \\
d = e + f
\end{gather}
```

Math Symbols

\alpha, \beta, \gamma, \delta	Greek letters.
\pm, \times, \div	Math operators.
\leq, \geq, \neq	Inequality symbols.
\infty, \nabla, \partial	Other symbols.
\sum, \int, \lim	Summation, integral, limit.
\frac{num}{den}	Fraction.
\sqrt{x}	Square root.
x^{y}	Superscript.
x_{y}	Subscript.

Figures and Tables

Figures

```
\begin{figure}[h!]
\centering
\includegraphics[width=0.8\textwidth]{image.jpg}
\caption{Figure caption}
\label{fig:my_label}
\end{figure}
```

Includes an image. Requires the `graphicx` package.

Options for `figure` environment:

- `h` - Place here.
- `t` - Place at the top of the page.
- `b` - Place at the bottom of the page.
- `p` - Place on a separate page.

Tables

```
\begin{table}[h!]
\centering
\begin{tabular}{|c|c|c|}
\hline
Header 1 & Header 2 & Header 3 \\
\hline
Cell 1 & Cell 2 & Cell 3 \\
Cell 4 & Cell 5 & Cell 6 \\
\hline
\end{tabular}
\caption{Table caption}
\label{tab:my_label}
\end{table}
```

Creates a table.

Column specifiers in `tabular` environment:

- `c` - Centered.
- `l` - Left-aligned.
- `r` - Right-aligned.
- `|` - Vertical line.

`\hline` - Horizontal line.

`\multicolumn{cols}{align}{text}` - Cell spanning multiple columns.