1 Basic Document

A very basic document would consist of something like the following in a plain text file with a `.tex` extension.

```
\documentclass{article}
\begin{document}
\end{document}
```

2 Text Content

Text content should be composed just as you would write text in any other document—nothing special—except for a few tricks to do things you can't with plain text.

- Quotes are written as ``quote here''—with two back–ticks, and two apostrophes. For single quotes, use one back-tick and one apostrophe.
- Hyphens should be made with one minus signs (ie `-`), dashes indicating a range of numbers should be made with two minus signs (ie `--`), and dashes in sentences should be made with three minus signs (ie `---`).
- Percent signs denote comments in LaTeX (which should be used) but to create a percent sign use `\%`.
- Dollar signs and ampersands should be prefixed with a backslash. (ie `\$` and `\&`)
- Paragraphs are made by leaving a blank line, with no indentation necessary:

  ```
  Paragraph number one text...

  Paragraph number two text...
  ```

3 Sectioning

A document can be separated into a hierarchical structure (and the table of contents automatically updated) by using the following lines in the document:

1. `\section{Section Name}`
2. `\subsection{SubSection Name}`
3. `\subsubsection{SubSubSection Name}`
4. `\paragraph{Paragraph Name}`
5. `\subparagraph{SubParagraph Name}`

4 Tables

4.1 Including Tables

For clarity and organization, I recommend that tables be composed as separate files and included in documents as follows.

```
\begin{table}[tb]
\input{tables/tablename.tex}
\caption{Caption for the Table}
\label{tab:referencetag}
\end{table}
```

This example assumes that the table file is located in a sub-folder called `tables`. Also, in this example, `tab:referencetag` is the text string which is used to reference the table in the text of the document, so make is descriptive (but without spaces or numbers).

4.2 Making Tables

Making tables in LaTeX can become very complex, so only what is necessary to make a simple table will be addressed here. (For further information, please visit the tables section [https://en.wikibooks.org/wiki/LaTeX/Tables] of the LaTeX documentation website.) Figure 1 is an example of how to create a basic table in LaTeX.

```
\begin{tabular}{ r || r | c | l }
Parameter & Num1 & Num2 & Num3 \\ \hline \hline
Param1 & 23 & 32 & 86 \\
Param2 & 26 & 51 & 19 \\ \hline
Param3 & 32 & 80 & 31 \\
\end{tabular}
```

Parameter	Num1	Num2	Num3
Param1	23	32	86
Param2	26	51	19
Param3	32	80	31

Figure 1: Sample Table

As shown, ampersand symbols (`&`) are used to separate columns within a row. Rows are placed on new lines with two backslashes (`\\`) separating them. To define the alignment of each column, `r c l` are used to denote right, center, and left alignment, respectively. Pipes `|` are used to denote either one or two lines dividing columns. To divide rows, `\hline` is placed in between the rows it will separate.

5 Figures

Figures (images) are included in a document in much the same way as tables.

```
\begin{figure}[tb]
\includegraphics{figures/imagename.png}
\caption{Caption for the Image}
\label{fig:referencetag}
\end{figure}
```

This example assumes that the image file is located in a sub–folder called `figures`. It should be noted that LaTeX accepts PNG and JPEG images. For simplicity, do not include spaces in the filename. Also, in this example, `fig:referencetag` is the text string which you will use to reference the figure in the text of the document, so make is descriptive (but without spaces or numbers).

Note: `\usepackage{graphicx}` must be before `\begin{document}` if you would like to include images.

6 Internal Referencing

In a technical document, one is often required to reference tables, figures and other sections. To reference tables or figures use `Table~\ref{tab:referencetag}` and `Figure~\ref{fig:referencetag}` respectively.

To reference a section, one must first include a label to reference the section with. Under the `\section{. . .}` line, `\label{sec:sectiontag}` can be used to label a section where `sectiontag` is a text string related to the content. To then reference this section from another, use `Section~\ref{sec:sectiontag}`.

7 Equations

A complete explanation of formatting equations in LaTeXis far beyond this document, though Figure 2 gives an example. Further information can be found in the mathematics section [https://en.wikibooks.org/wiki/LaTeX/Mathematics] of the LaTeX documentation website.

```
\begin{equation}
x=\sin \left( \cfrac{1}{\sqrt[3]{\omega_0}} \right)
\end{equation}
```

$$x = \sin\left(\frac{n^5}{\sqrt[3]{\omega_0}}\right) \tag{1}$$

Figure 2: Sample Equation

8 Packages

If any special features of LaTeX are required to typeset the desired content, they will likely require additional packages. To include a package, simply put `usepackage{packagename}` between the `\documentclass` and `\begin{document}` lines.

9 Pronunciation

LaTeX is generally pronounced either LAY-TEK or LAH-TEK (though I prefer the latter due to the fact that it was derived from Leslie Lamport's last name) with the emphasis on the second syllable.

10 Further Information

All the functions of LaTeX cannot be covered in one short document—this was just meant to get you going. The LaTeX documentation website [`https://en.wikibooks.org/wiki/LaTeX`] is a great reference for all the finer details.

11 Sample Document

```
\documentclass[10pt,letterpaper,oneside]{article}

\usepackage{fullpage}

\begin{document}
\author{Your Name}
\title{The Title}
\maketitle

\section{Some Section}
Content!

\end{document}
```

12 Software

To get started with LaTeX all you really need is a text editor and a LaTeX *distribution*, however I recommend installing a front end if you prefer not to use the command line—or just to get started even if you do.

On all operating systems, I recommend installing the TeXworks front-end for LaTeX which has syntax highlighting and will show you your finished document alongside the plain text file.

12.1 GNU/Linux

TeX Live is the most common LaTeX *distribution* used on GNU/Linux, and is likely available through your package manager (ie. `sudo apt-get install texlive`)

12.2 Mac OS

MacTeX is the most common LaTeX *distribution* used on Mac OS, and can be installed the same as any other piece of software.

12.3 Microsoft Windows

MiKTeX is the most common LaTeX *distribution* used on Microsoft Windows, and can be installed the same as any other piece of software.