

This lesson shows how to refer to numbered elements in a document, like figures, tables and sections.

1 The label and ref mechanism

To have LaTeX remember a spot in your document you have to **label** it, and then in other places, you **refer** to it.

```
\begin{document}
Hey world!
```

```
This is a first document.
```

```
\section{Title of the first section}
```

```
Text of material for the first section.
```

```
\subsection{Subsection of the first section}
\label{subsec:labelone}
```

```
Text of material for the first subsection.
```

```
\begin{equation}
e^{i\pi}+1 = 0
\label{eq:labeltwo}
\end{equation}
```

```
In subsection~\ref{subsec:labelone} is equation~\ref{eq:labeltwo}.
\end{document}
```

The `subsec:` and `eq:` aren't used by LaTeX; rather, it just keeps track of what it has most recently processed. But when you are writing these help you remember what the label is about.

Notice the tilde ~ characters before the references. You don't want a line break between subsection and its number, or between equation and its number. Putting in a tilde means LaTeX won't break the line there.

2 Where to put label

The `\label` command always refers to the previous numbered entity: a section, an equation, a float, etc. That means that `\label` always has to come after the thing you want to refer to. In particular, when you create floats, the `\label` has to come after (or better, in), the `\caption` command, but within the float environment.

3 Exercises

Ex1 Try adding new numbered parts (sections, subsections, enumerated lists) to the test document and finding out how many runs are needed to make `\label` commands work.

It took me 1 time to successfully refer to the section 3.

Ex2 Add some floats and see what happens when you put `\label` before the `\caption` instead of after; can you predict the result?

Figure 1 is an image of Jimmy Page.

Answer: LaTeX uses `\caption` to set the number of the figure or table, and `\label` picks up this number. When you place `\label` after `\caption`, it correctly references that figure or table. However, if you



Figure 1: Jimmy Page

place `\label` before `\caption`, the `\label` might refer to the most recently defined figure or table number (or none at all if it's the first instance).

Ex3 What happens if you put a `\label` for an equation after the `\end{equation}`?

$$S = v \times t \tag{1}$$

Equation 1 is the formula for computing the distance based on time and velocity.

Answer: Reference doesn't work if `\label` is outside the environment. No explanation.