

Adding text to equations

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1 Basic text

I doubt it will be every day that you will need to include some text within an equation. However, sometimes it needs to be done. Just sticking the text straight in the maths environment won't give you the results you want. For example:

```
\begin{equation}
  50 apples \times 100 apples = lots of apples
\end{equation}
```

Gives,

$$50apples \times 100apples = lotsofapples \quad (1)$$

There are two noticeable problems. Firstly, there are no spaces between numbers and text, nor spaces between multiple words. Secondly, the words don't look quite right — the letters are more spaced out than normal. Both issues are simply artifacts of the maths mode, in that it doesn't expect to see words. Any spaces that you type in maths mode are ignored and L^AT_EX spaces elements according to its own rules. It is assumed that any characters represent variable names. To emphasise that each symbol is an individual, they are not positioned as closely together as with normal text.

There are a number of ways that text can be added properly. The typical way is to wrap the text with the `\mbox{ . . . }` command. This command hasn't been introduced before, however, it's job is basically to create a text box just width enough to contain the supplied text. Text within this box cannot be broken across lines. Let's see what happens when the above equation code is adapted:

$$50apples \times 100apples = lots of apples \quad (2)$$

The text looks better. However, there are no gaps between the numbers and the words. Unfortunately, you are required to explicitly add these. There are many ways to add spaces between maths elements, however, for the sake of simplicity, I find it easier, in this instance at least, just to literally add the space character in the affected `\mbox(s)` itself (just before the text.)

```
\begin{equation}
  50 \mbox{ apples} \times 100 \mbox{ apples} =
  \mbox{lots of apples}
\end{equation}
```

$$50 apples \times 100 apples = lots of apples \quad (3)$$

2 Formatted text

Using the `\mbox` is fine and gets the basic result. Yet, there is an alternative that offers a little more flexibility. You may recall from Tutorial 7 — Formatting¹ the introduction of font formatting commands, such as `\textrm`, `\textit`, `\textbf`, etc. These commands format the argument accordingly, e.g., `\textbf{bold text}` gives **bold text**. These commands are equally valid within a maths environment to include text. The added benefit here is that you can have better control over the font formatting, rather than the standard text achieved with `\mbox`.

```
\begin{equation}
  50 \textrm{ apples} \times 100 \textbf{ apples} =
  \textit{lots of apples}
\end{equation}
```

$$50 \text{ apples} \times 100 \textbf{ apples} = \textit{lots of apples} \quad (4)$$

However, as is the case with L^AT_EX, there is more than one way to skin a cat! There are a set of formatting commands very similar to the font formatting ones just used, except they are aimed specifically for text in maths mode. So why bother showing you `\textrm` and co if there are equivalents for maths? Well, that's because they are subtly different. The maths formatting commands are:

Command	Format	Example
<code>\mathrm</code>	Roman	$e = mc^2$
<code>\mathit</code>	Italic	$e = mc^2$
<code>\mathbf</code>	Bold	$e = \mathbf{mc}^2$
<code>\mathsf</code>	Sans serif	$e = mc^2$
<code>\mathtt</code>	Typewriter	$e = mc^2$
<code>\mathcal</code>	Calligraphy	$\mathcal{J} = \mathcal{J}^\epsilon$

The maths formatting commands can be wrapped around the entire equation, and not just on the textual elements: they only format letters, numbers, and uppercase Greek, and the rest of the maths syntax is ignored. So, generally, it is better to use the specific maths commands if required. Note that the calligraphy example gives rather strange output. This is because for letters, it requires upper case characters. The reminding letters are mapped to special symbols.

¹<http://www.comp.leeds.ac.uk/andyr/misc/latex/latextutorial7.html>