

Mathematical Writing & Typography

A Sample and a Guide for Microsoft Word by [Mike Pierce](#)

Students are often surprised by the expectation that they must write in a mathematics class. Perhaps you feel this way too. Rest assured, it's no different than writing in any other context. The point is still to organize your thoughts into words and to convey your ideas to a reader. What's likely new to you though are the mechanics of writing mathematics: How do you think of mathematical expressions grammatically and fit them into sentences? How do you even type math symbols? The purpose of this document is (1) to provide you a sample of mathematical writing to ease your surprise and serve as a minimal model for what your writing should look like, and (2) to be a guide on the mechanics of *how* to incorporate mathematics into your writing and create pleasant-looking documents using Microsoft Word.

Basic Grammar and Typography of Mathematics

Have you ever considered that the equation “ $y = mx + b$ ” is a *sentence*? You can read it out loud as “ y equals m times x , plus b ”. This is a full sentence. The verb is “equals” and the subject is probably “ y ”, or it might be something on the right-hand side of the equality sign depending on the context. Not every bit of mathematics is a sentence though. A mathematical *expression*, like $ax^2 + bx + c$, has no verb. Recognizing whether a bit of mathematics is a full sentence or just an expression helps you incorporate it correctly in your writing. If you're ever unsure how some mathematics should fit into a sentence, read it out loud. It's easier to spot grammar issues, even mathematical ones, by listening to your speech.

Mathematical variables should be italicized, or specially styled some other way (American Mathematical Society, 2022). That is, instead of $y = mx + b$ we should typeset it as $y = mx + b$. You can achieve this effect with Microsoft Word's equation editor, which can be found under [Insert > Equation](#)¹. So far, all the mathematics in this document has fit comfortably inline, but sometimes you'll need to type equations or expressions that are too tall to fit within body text, like

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

¹ Clicking [Insert > Equation](#) every time you want to type math would be a pain. Instead, if you're using the desktop version of Microsoft Word (as opposed to running it in your web browser) the keyboard shortcut `alt + =` on Windows or `control + =` on Mac will start the equation editor quickly. By the way, this piece of text you're reading now is called a *footnote*. Footnotes are helpful for including information that is only tangentially related to the topic of your writing outside of the flow of the body text. Anything you write that you could preface with “by the way” should live in a footnote. You can insert a footnote in Word by going to [References > Insert Footnote](#).

Complicated equations like these should be given their own space and centered, and treated more like a figure (image) in the document than like text.

Typographic Styling in Microsoft Word

It's tedious to style the text in your document manually, making the section headings bigger, changing the font of the title, etc. Don't do this! Word affords you a workflow that is much more efficient. The idea is that you inform Word what each block of text *is* (a title, a section heading, a block quote, etc.), and then choose the appearance of that text uniformly within the document. You do this by highlighting text and assigning it a **Style**, which you can find under **Home > Styles**. After declaring what certain text *is* you can customize the appearance of the document as a whole under the **Design** tab.

Nearly all the design aspects on this page are Microsoft Word's defaults. Here are a few additional typographic recommendations you should consider though:

- Increase the paragraph and line spacing. The default spacing between lines of body text and paragraphs in Microsoft Word is too narrow and should be a bit taller (Butterick, 2022). The *Open* paragraph spacing option under the **Design** tab is more comfortable. Body text should only be double-spaced if you need to leave room for written feedback on the document.
- Either put some space between paragraphs *or* indent paragraphs, but don't do both—the beginning of a new paragraph needs to be indicated only once. Word does the former by default.
- Body text should be *emphasized* by italicizing it. Never underline text; the line adds visual clutter. Bold text should be used only in special circumstances and never together with italic text; it's often a better idea to use SMALL CAPS TEXT instead of bold text².
- End-of-line hyphenation should be enabled. This makes the right side of your body text look cleaner. You can do this in Word by setting **Layout > Page Setup > Hyphenation** to *Automatic*.

There is so much more to good typography beyond this, but discussing the nuance of design isn't the purpose of this document. For further reading, the web-based book *Practical Typography* by Matthew Butterick is a healthy introduction to the subject (Butterick, 2022).

Incorporating Data into your Writing

You'll often want to include a table or figures in your document to support the ideas you're writing about. For example, suppose we conducted a survey of 420 college students and asked them a single

² It's an exercise left to you to figure out how to typeset some text as SMALL CAPS in Microsoft Word. A hint: this setting is buried deeper than any of the previous features of Word mentioned in this document.

question: “How do you prefer to write your linear equations?” You can easily organize data like this in a table in Microsoft Excel and paste that table into a Word document, like so:

Response	Number of Respondents
$y = mx + b$	69
$ax + by = c$	16
$(y - y_0) = m(x - x_0)$	42
I've never written a linear equation before in my life	293

Table 1. Responses to “How do you prefer to write your linear equations?”

Tables of data should either be centered within their own space, or the text should wrap around the table. This latter choice can be a pain to accomplish, so let's not bother. The table has been assigned the *caption* Table 1, which can be done under the **References > Captions** menu³. Giving it a caption allows you to refer to a table or figure precisely in your text, so I can write something like “Noting the data in Table 1, it is clear that most college students who have written a linear equation prefer to write it as $y = mx + b$.” And like tables, you can include figures and charts in your document by copying them from Microsoft Excel.

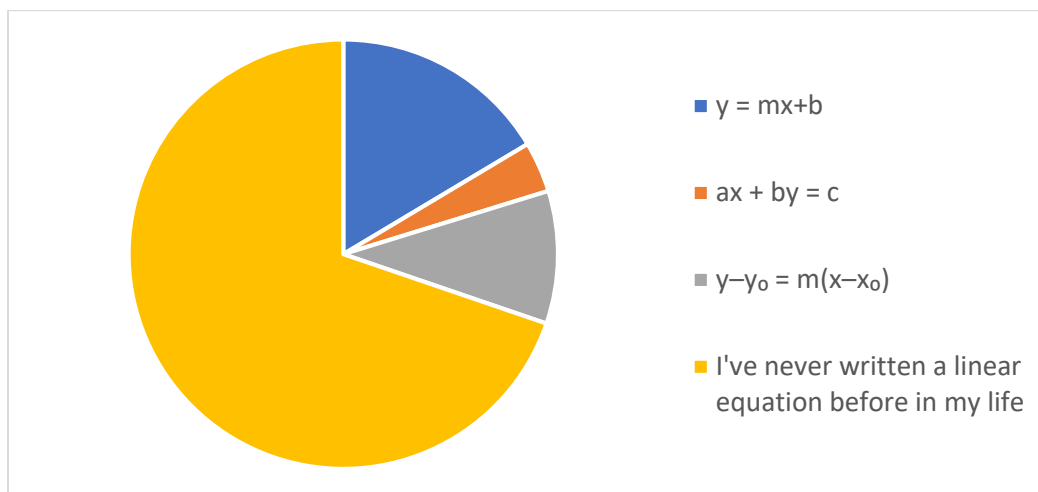


Figure 1. Responses to “How do you prefer to write your linear equations?”

Charts and graphs should also be centered or wrapped in text and assigned a caption to reference.

³ There's the option to create *cross-references* in this menu. A cross-reference is simply the caption text “Table 1” in this case, but inserting that text as a cross-reference means that text will change automatically if your caption changes, if say, for example, you decide to insert another table before this one and your numbering has to change.

Including References & Citations

In your writing you'll often have to draw on the insights of other authors, or on the data or conclusions of researchers. It's important that you provide your reader with directions to find this source of an idea or some data that you reference⁴. There are dozens of style guides describing *how* this referencing should be done in a document (APA, MLA, Chicago, etc.) but they all follow the same pattern: create a list of *references* at the end of your document and include parenthetical *citations* in your document body after each fact that refers to that references. You should look up and use the style favored by your field of study.

Manually managing references can be a pain. Don't! You can automate this process in the desktop version of Microsoft Word. Whenever you need to insert a new citation, click **References > Citations & Bibliography > Insert Citation**. From here you'll be prompted to enter the information for a new source, or insert a citation to a previously used reference. Then as your last step before finishing a document remember to insert a Reference section at the end by clicking **References > Citations & Bibliography > Bibliography**. You can always style the references after you insert the References section.

Once you've finished writing and revising and styling your document and are ready to publish it, you should export/save your document as a PDF. This locks-in your document design, prevents your reader from editing your writing, and creates a more accessible computer file.

References

American Mathematical Society. (2022). *ams.org/publications*. Retrieved from ams.org:

ams.org/publications/authors/AMS-StyleGuide-online.pdf#page=109

Butterick, M. (2022, February). *Practical Typography*. Retrieved from Practical Typography:

practicaltypography.com

Pierce, M. (2022, March 7). *Mathematical Writing & Typography*. Retrieved from

coloradomesa.edu/~mapierce2/mathsampleguide

⁴ Get in the habit of saving links to articles that you read and find useful, just in case you need to include them as a reference in your writing. My usual workflow is to paste the URLs and a brief description of a resource at the end of my work-in-progress document in case I need to reference, then when I'm wrapping up a paper just delete all the URLs I never referred to.