

Basic rules of writing

- ▶ **Write in complete sentences, and use punctuation.**

Tip: ' $a^2 + 3b$ ' is a noun; '=' is a verb.

- ▶ **Balance symbols and words.**

Too much:

The functions f and g are defined to be equal to the function defined on the set of non-positive integers given by x maps to its square and x maps to the negative of its square respectively.

Not enough:

$$f, g : \mathbb{Z}_{\leq 0} \rightarrow \mathbb{R} \quad x \mapsto \pm 1$$

Just right:

Let f and g be functions defined by

$$f : \mathbb{Z}_{\leq 0} \rightarrow \mathbb{R} \quad \text{and} \quad g : \mathbb{Z}_{\leq 0} \rightarrow \mathbb{R} \\ x \mapsto x^2 \quad \quad \quad x \mapsto -x^2.$$

Tip: Use words to give context to equations.

Style

- ▶ **Know your audience.**

Put yourself in your reader's shoes!

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Use present tense, first person plural, gentle commands.

- ▶ **Decide what's important to say.**

Similar to words vs. symbols: Say too little and your writing won't be clear; say too much and your point will get buried.

- ▶ **Highlight structure.**

Remember the 5 paragraph essay?

Tell them what you're going to tell them,
then tell them,
then tell them what you told them.

Use short paragraphs and "displayed equations".

- ▶ **Revise, revise, revise.**

Print out and mark up, just like you would with an essay.

Proofread for typos, clarity, readability, extra or missing assumptions, etc. Give to a classmate or friend to proofread for you too!

Specifics

- ▶ Equals means equals.

Wrong:
Factors of 6 = 2 and 3.

Right:
The prime factors of 6
are 2 and 3.

- ▶ Don't use arrows.

(Exceptions: specific symbols \rightarrow and \mapsto for functions.)

Wrong:
 $a > 0 \implies -a < 0$

Right:
Since $a > 0$, we have
 $-a < 0$.

- ▶ Start sentences with words, not math.

Wrong:
 X is a finite set.

Right:
The set X is finite.

- ▶ Define any ambiguous notation. (“Observe the culture”)

- ▶ **Change it up (use synonyms).**

Common Mathematical Transition Words:

also	as	because	certainly
consequently	conversely	for example	furthermore
given	hence	in fact	in particular
it follows that	likewise	moreover	similarly
since	that is	therefore	thus

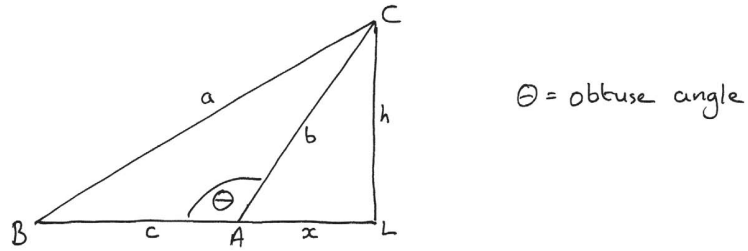
- ▶ **Don't bully your readers.**

Avoid *clearly*, *obviously*, etc. Either it's “clear”, in which you can just state it, or it's not.

Theorem. Suppose that a triangle has edges of length a , b and c with the angle opposite a equal to θ . Then

$$a^2 = b^2 + c^2 - 2bc \cos(\theta).$$

"Proof"



$\triangle CBL$

$$a^2 = (c+x)^2 + h^2$$

$$a^2 = c^2 + 2cx + \underbrace{h^2 + x^2}_{b^2}$$

$\triangle CLA$

$$b^2 = h^2 + x^2$$

$$a^2 = b^2 + c^2 + 2cx$$

In $\triangle CLA$ $\frac{x}{b} = \cos(180 - \theta)$

$$\Rightarrow x = -b \cos \theta$$

Sub into

$$a^2 = b^2 + c^2 - 2cb \cos \theta$$

You try:

1. In groups of 3 or 4 people, process the “proof without words” assigned to you, and together write
 - ▶ a full theorem statement, in complete sentences, defining all relevant terms; and
 - ▶ an outline of of a proof *with* words.
2. On your own, write a first draft of a proof with words. You may use pictures as an aid, but your proof should read in complete sentences. Put your name on your paper!
If you are the first to finish in your group: Come to the board and give your team’s improved theorem statement.
3. Exchange papers in your group, read them over and mark them up with feedback about how things could be improved or where you think the author did well.
4. Take your paper back and write a second draft.
5. Exchange papers with someone in another group for feedback.

Final draft due on homework.

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Reading for next time: Chapter 5.