

Mark's principles for doing math

- I. You don't always have to write things from beginning to end. But your readers have to read from beginning to end, so when you're done, it should be a coherent story.
- II. Try something. If the first thing you try doesn't work, try something else.
- III. Don't quit until it's beautiful.
- IV. A good pattern for solving a hard problem:
 - A. Accumulate some data.
 - B. Look for a pattern in the data.
 - C. Propose a general solution.
 - D. (The most important step, not to be omitted) Justify why the pattern in the data **MUST** continue to agree with your solution. It is never enough to just identify the pattern. You have to explain it.
- V. Try to surround a problem. That is, figure out its edges, the way you would construct the edges of a jigsaw puzzle before filling in the middle.
- VI. *Always* look for a way to check your answer. Don't publish without confirmation.
- VII. Not all who wander are lost.
- VIII. Simplify as much as possible, as often as possible. There may be more than one way to do this. If so, try several.
- IX. Then again, there are times when not simplifying helps you to see a pattern. So try that too.
- X. Your calculator is not an oracle. It is only as good as what you put into it. It will never understand math as well as you are capable of understanding math.
- XI. Draw a picture.
- XII. Use your visual and physical intuition.
- XIII. Problems do not have a single solution. If you ask "Is this what am I supposed to do?", the answer will be: "Do, or do not. There is no supposed to."
- XIV. A lot of times in life, the right question is, "What do I do?". But that's not the ultimate question in mathematics, or in your life. Instead, try asking, "What's true?", "What can I prove?", and "What do I *get* to do?"
- XV. Never be afraid to start over on a new sheet of paper. It will go better the second time.
- XVI. To quote Albert Einstein: Make things as simple as possible, but no simpler.