

# Algebraic Geometry Notes

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October 24, 2020

The name of “*Algebraic Geometry*” has always been alluring to me, dangling like bait on a fish hook, a mountain of prerequisites and problems awaiting on the surface above. There are notes for independent reading in Algebraic Geometry, following *The Rising Sea: Foundations of Algebraic Geometry* by Ravi Vakil. The reason I follow this book as opposed to a classical literature like Hartshorne is simply because it’s funnier— usually humorous or entertaining works tend to be more readable (counterexample: Hatcher). Source files: [https://git.simonxiang.xyz/math\\_notes/files.html](https://git.simonxiang.xyz/math_notes/files.html)

## Contents

1 Category Theory

2

*A different image came to me a few weeks ago.  
The unknown thing to be known appeared to me as  
some stretch of eath or hard marl, resisting  
penetration ... the sea advances insensibly in silence,  
nothing seems to happen, nothing moves, the water  
is so far off you hardly hear it ... yet finally it  
surrounds the resistant substance.*

—Alexander Grothendieck

Section 1

## Category Theory

Before we start, here are a handful of entertaining quotes from the introduction.

*“Algebraic geometry ‘seems to have acquired the reputation of being esoteric, exclusive, and very abstract, with adherents who are secretly plotting to wake over all the rest of mathematics!’ ”*

*“Do not be seduced by the lotus eaters into infatuation with untethered abstraction.”*

*“This I promise: if I use the word ‘topoi’, you can shoot me.*

*“Finally, if you attempt to read this without working through a significant number of exercises, I will come to your house and pummel you with Éléments de Géométrie Algébrique until you beg for mercy.”*

— Albert Einstein