Eine Woche, ein Beispiel
7.17 formalism

Here I collect some formalisms which enhance well-known theories.
Somehow it also explains the polularity of the abstraction in mathematics. We want to have a better understand, so we invent new languages and theories, which in turn causes more troubles for beginners. Hug those formalisms!

Axiomatic set Theory $\rightsquigarrow$ Grothendieck Universe

Both let us be away from paradoxes. The latter is more convenient.

Category Theory $\rightsquigarrow$ Infinite Category Theory

[adjoint fctor $\Leftrightarrow$ preserve (co)limits] is some cases

(· /Braided /Symmetric) Monoidal Categories $\rightsquigarrow$ Categorification

Extract combinatorical informations from categories

Examples $\rightsquigarrow$ Classification

Specify and generalization.

See https://github.com/ramified/personal_tex_collection/blob/main/%E8%9B%99%E9%B8%A39-7/latest%20version.pdf

Parameter space $\rightsquigarrow$ Moduli space

Structures on parameter spaces are important.

See https://github.com/ramified/moduli_in_algebraic_geometry

Topology $\rightsquigarrow$ Grothendieck Topology

Get étale topology.

Topological Space $\rightsquigarrow$ Condensed Set

Get abelian category.

Scheme $\rightsquigarrow$ Functor

Get more objects. e.g. Ind-Sch, stack, ...

Snake lemma $\rightsquigarrow$ homological algebra. spectral sequence

Diagram chasing all the time!

(co)homdogy $\rightsquigarrow$ derived category, six- fctor formalism.

Reduce important properties to categorical non-sense.

https://www.math.uni-bonn.de/people/schwede/EnhancedSeminar-WS2223.pdf

Finite field $\rightsquigarrow$???

Should contain "field with one element".

Moreover, AR theory tells us the structure of indecomposable reps,
Bruhat-Tits theory tells us the structure of p-adic groups,
Artin- Schreier theory tells us the structure of deg p extensions. char F = p