What is...quantum topology - part 3?

Or: Categories 1 from Chapter 1

Category theory?



FIGURE 2. It does not matter what is modern and what is not modern. In the end we all love the same thing: Venn diagrams \odot

The picture is a variation of https://xkcd.com/2769/.



An example before the definition



The collection of sets Set "Category" contains sets "Objects"
It also contains maps "Arrows"
We can compose maps in a nice way

Another example before the definition



► The collection 1Cob "Category" contains points (0-manifolds) "Objects"

► It also contains lines (1-manifolds) "Arrows"

▶ We can compose lines in a nice way

- A category C is a quadruple $C = (Ob(C), hom_C, id, \circ)$ consisting of:
- ► A class *Ob*(*C*) of object
- ▶ For $X, Y \in Ob(C)$ a set hom_C(X, Y) of arrows
- ▶ For $X \in Ob(C)$ and identity arrow id_X
- ▶ A composition for $f: X \to Y$ and $g: Y \to Z$ denoted $gf = g \circ f: X \to Z$ such that:
- $\bullet \ \circ$ is associative
- *id_X* are identities
- the sets $hom_C(X, Y)$ are pairwise disjoint



Coherence ((A) and (B) are equivalent)



• (A) "
$$h(gf) = (hg)f$$
"

- (B) "Same result regardless of how valid pairs of parentheses are inserted"
- ► These are equivalent (this is a nice exercise)

Thank you for your attention!

I hope that was of some help.