Categories

A *category* consists of:

1. a class of $\mathcal{C}$ of **objects**,
2. for each pair $x, y \in \mathcal{C}$, a set $\mathcal{C}(x, y)$ of pairwise disjoint **morphisms**, and
3. for each triple $x, y, z \in \mathcal{C}$, a map $\mathcal{C}(x, y) \times \mathcal{C}(y, z) \to \mathcal{C}(x, z)$, called a **composition** and denoted $(\alpha, \beta) \to \beta\alpha$, such that
   - *(Associativity)* $\gamma(\beta\alpha) = (\gamma\beta)\alpha$ for all **morphisms** α, β, γ, and
   - *(Identity)* for all $x \in \mathcal{C}$, there exists an **identity morphism** $1_x \in \mathcal{C}(x, x)$ such that $1_x\alpha = \alpha$ and $\beta 1_x = \beta$ for any **morphisms** α, β where the indicated **composition** is defined.