

## **Definition** (Categorical Product)

Let  $\mathbf{C}$  be a category and let  $X, Y \in \mathbf{Ob}_{\mathbf{C}}$  be objects. The *product* of  $X$  and  $Y$  is:  
Constituents

1. an object  $Z \in \mathbf{Ob}_{\mathbf{C}}$  (this is “the product of  $X$  and  $Y$ ”);
2. *projection morphisms*  $\pi_1 : Z \rightarrow X$  and  $\pi_2 : Z \rightarrow Y$ ,

## Conditions

1. For any  $T \in \mathbf{Ob}_{\mathbf{C}}$  and any morphisms  $f : T \rightarrow X$ ,  $g : T \rightarrow Y$ , there exists a *unique* morphism  $\phi_{f,g} : T \rightarrow Z$  such that  $f = (\phi_{f,g}) \circ \pi_1$  and  $g = (\phi_{f,g}) \circ \pi_2$ .