objects. The *product* of X and Y is:

Constituents

1. an object  $Z \in \mathsf{Ob}_{\mathbb{C}}$  (this is "the product" of X and Y);

2. *projection morphisms*  $\pi_1: Z \to X$  and  $\pi_2: Z \to Y$ ,

**Definition** (Categorical Product). Let C be a category and let  $X, Y \in Ob_{\mathbb{C}}$  be

## Conditions

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