

Definition (Semcategory). A *semicategory* \mathbf{C} is:

Constituents

1. Objects: a collection $\mathbf{Ob}_{\mathbf{C}}$, whose elements are called *objects*.
2. Morphisms: for every pair of objects $X, Y \in \mathbf{Ob}_{\mathbf{C}}$, there is a set $\mathbf{Hom}_{\mathbf{C}}(X; Y)$, elements of which are called *morphisms* from X to Y . The set is called the “hom-set from X to Y ”.
3. Composition operations: given any morphism $f \in \mathbf{Hom}_{\mathbf{C}}(X; Y)$ and any morphism $g \in \mathbf{Hom}_{\mathbf{C}}(Y; Z)$, there exists a morphism $f \circ g \in \mathbf{Hom}_{\mathbf{C}}(X; Z)$ which is the *composition of f and g* .

Conditions

1. Associativity: for any morphisms $f \in \mathbf{Hom}_{\mathbf{C}}(X; Y)$, $g \in \mathbf{Hom}_{\mathbf{C}}(Y; Z)$, and $h \in \mathbf{Hom}_{\mathbf{C}}(Z; W)$,

$$(f \circ g) \circ h = f \circ (g \circ h).$$