



planetmath.org

Math for the people, by the people.

concrete category

Canonical name	ConcreteCategory
Date of creation	2013-03-22 16:03:51
Last modified on	2013-03-22 16:03:51
Owner	kompik (10588)
Last modified by	kompik (10588)
Numerical id	13
Author	kompik (10588)
Entry type	Definition
Classification	msc 18A05
Related topic	YonedaEmbedding
Related topic	FunctorCategory
Defines	forgetful functor
Defines	underlying functor
Defines	construct

A *concrete category* over a category \mathcal{B} is a category \mathcal{A} together with a faithful functor $U : \mathcal{A} \rightarrow \mathcal{B}$. (The functor U is sometimes called the *forgetful functor* or the *underlying functor*.)

A concrete category over **Set** is called a *construct*. (Here **Set** denotes the category of sets.)

This means that in a construct objects can be interpreted as sets and morphisms as maps.

Remarks:

1. An alternative meaning of a *concrete category* is that of a category with objects that have elements; such objects can be classes, semigroups, monoids, groups, groupoids, topological spaces, and so on.
2. Note also the Yoneda-Grothendieck Lemma that relates a category \mathcal{C} to the functor category $\hat{\mathcal{C}}$ of contravariant functors from \mathcal{C} to **Sets**, the category of sets.

References

- [1] J. Adámek, H. Herrlich, and G. Strecker. *Abstract and Concrete Categories*. Wiley, New York, 1990.