



GST 59 – Sets

Formal Description

A set is a formally defined collection of distinct entities regarded as a single entity. The members of a set are identified by one or more specified criteria, and membership is determined solely by whether an entity satisfies those criteria. A set does not, in itself, imply causal interaction or organisation between its members.

Plain English Explanation

In the previous module, we learned that a collection is simply a group of entities considered together because they share something in common. A set takes this idea one step further by providing a precise and formal way of defining such a group.

For example, we might define the set of all even numbers, the set of all oak trees in a woodland, or the set of all books written by a particular author. Once the rule for membership has been defined, an entity either belongs to the set or it does not.

The important point is that a set is a single entity rather than a plural collection of entities. The members of the set may be scattered across different locations and need not interact with one another in any way. The set simply provides a formal method for describing the group.

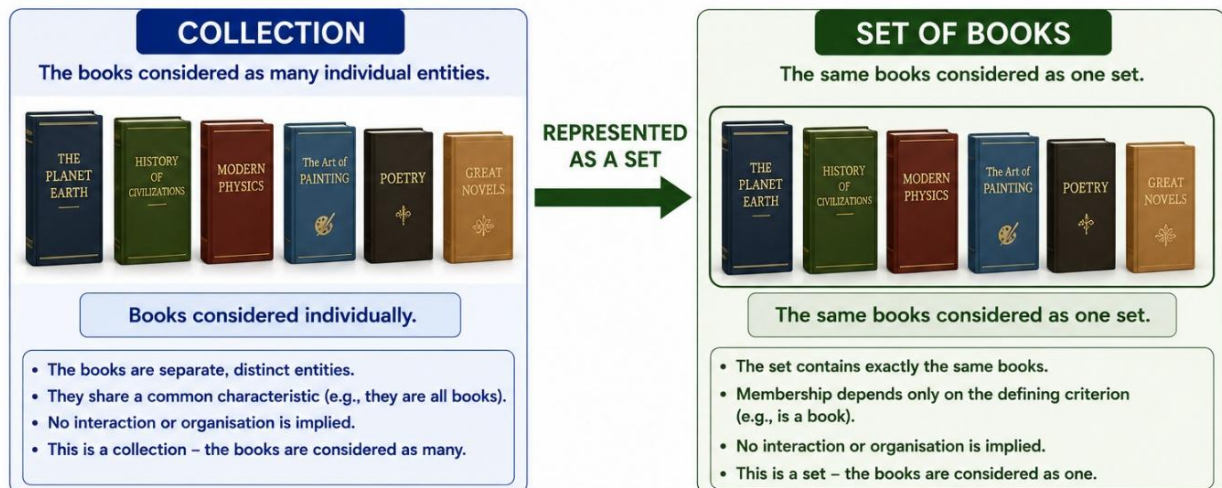
For example, the set of all red cars includes every red car that satisfies the chosen definition. Those cars do not become connected simply because they belong to the same set. Likewise, the set of all people born in a particular year contains individuals who may never meet or influence one another. Sets are extremely useful because they allow us to classify, compare and analyse groups in a clear and consistent way. Mathematics depends heavily upon sets, while scientists, engineers and social researchers use similar ideas whenever they define populations, categories or samples for investigation.

Understanding sets also helps us avoid confusion with systems. A system requires organised causal interactions between its components. A set merely specifies which entities belong to a formally defined group.



SETS: THE SAME ENTITIES, DIFFERENT PERSPECTIVE

A collection and a set contain the same entities.
What changes is the way they are represented.



KEY POINT

A set is a **formal representation** of a collection.
Membership depends only on the defining criterion and
does not imply interaction or organisation.

The entities are the same. Only the perspective – *many* or *one* – has changed.

Examples

The set of all prime numbers contains every whole number that is divisible only by itself and one. The numbers satisfy the defining rule, but they do not interact simply because they belong to the same set.

A health researcher may define the set of all patients over the age of sixty living within a particular city. The individuals belong to the set because they satisfy the selection criteria, not because they form a system or interact with one another.

Provenance and Links

The modern concept of a set was developed during the nineteenth century, particularly through the work of Georg Cantor, and forms one of the foundations of modern mathematics. Set theory provides a precise language for describing collections of entities and underpins much of mathematics, logic and computer science. General Systems Theory adopts the concept of sets as a formal means of representing collections while distinguishing them clearly from systems, whose defining feature is organised causal interaction.



Practical Exercise

Choose a group of objects or people that interests you.

Write a clear rule defining a set based on a shared characteristic. Identify several entities that belong to the set and several that do not.

Then explain why the members of your set do or do not form a system. Identify any organised causal interactions that would be necessary for the set to become a system.