



Relations

1 Why

How can we relate the elements of two sets?

2 Definition

A **relation** between two non-empty sets A and B is a subset of $A \times B$. A relation on a single set C is a subset of $C \times C$.

Let $a \in A$ and $b \in B$. The pair (a, b) may or may not be in a relation on A and B . If $A \neq B$, then (b, a) is not a member of the product $A \times B$, and therefore not in any relation on A and B . If $A = B$, however, it may be that (b, a) is in the relation.

2.1 Notation

Let A and B be nonempty sets with $a \in A$ and $b \in B$. Since relations are sets, we can use upper case Latin letters. Let R be a relation on A and B . We denote that $(a, b) \in R$ by aRb , read aloud as "a in relation R to b."

When $A = B$, we tend to use other symbols instead of letters.

For example, \sim , $=$, $<$, \leq , \prec , and \preceq .