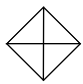


Why

We would like to speak about an object, which is a member of some set, and some attributes of this objects—without knowing the precise identity of the object. Such language would be especially useful in discussing games of chance.

Definition

Suppose Ω is a set which includes all possible objects. We call it the *sample space*. We call an element of this set an *outcome*. Other terms for outcome include *possibility*, *sample*, *elementary event*, *simple event*, *sample point*.

One often uses a set of outcomes when thinking about running an experiment or in a given situation. We leave these terms undefined.

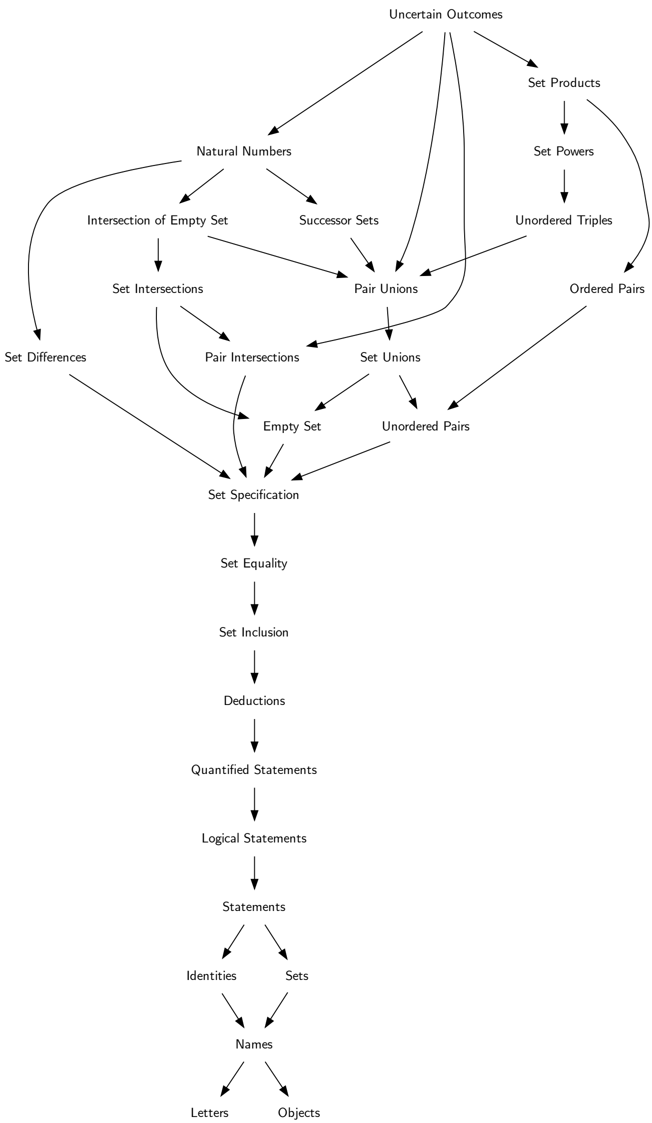
Examples of modeling

A model for flipping a coin. We want to talk about the result of flipping a coin. The coin has two sides. When we flip the coin, it lands heads or tails. We may model these outcomes with the set $\{0, 1\}$. If the coin lands tails, we say that outcome 0 has occurred. If the coin lands heads, we say that outcome 1 has occurred.

A model for rolling a die. We want to talk about the result of rolling a die. The die has six sides. When we roll the die, it lands with one of its six sides facing up. We may model this uncertain outcome as an element of the set $\{1, 2, 3, 4, 5, 6\}$. Here we have used the first six natural numbers. We say that event 1 occurs if there is one pip showing, that event 2 occurs if there are two pips showing, and so on.

A model for rolling two dice at once. We want to talk about the result of a simultaneous throw of two dice. We may model this uncertain outcome as an element of the set $\Omega = \{1, \dots, 6\}^2$. Given a numbering on the die, $(\omega_1, \omega_2) \in \Omega$, ω_1 is the number of pips showing on the first die—the die numbered 1—and ω_2 is the number of pips showing on the second die—the die labeled two.

A model for rolling one die twice. We may model this uncertain outcome as an element of the set $\Omega = \{1, \ldots, 6\}^2$. We interpret $(\omega_1, \omega_2) \in \Omega$ so that ω_1 is the number of pips showing on the die after the first roll and ω_2 is the number of pips showing on the second die after the second roll. We emphasize that we have used the same set of outcomes as in the previous case. In other words, we can use the same set of outcomes to model two different situations.


Uncertain Outcomes
Set Products
Natural Numbers
Set Powers
Intersection of Empty Set
Successor Sets
Unordered Triples
Set Intersections
Pair Unions
Ordered Pairs
Set Differences
Pair Intersections
Set Unions
Empty Set
Unordered Pairs
Set Specification
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects