Symmetry:

A symmetrical object is one which can be observed from different points of view and appear the same. For example, a block or a sphere.

Nature is symmetric under a translation if no experiment you could perform would allow you to tell whether the change had been made.

Is nature symmetric under charge exchange?
What would happen if all the positive charges became negative and all the negative charges became positive? Could you perform an experiment to tell you this had happened?

Is nature symmetric under parity exchange?
What would happen if you turned the world into its mirror image? Would there be any changes in the fundamental force laws or the laws of motion?

Is nature symmetric under time reversal?
What would happen if you reversed time?

**Nature is symmetric with respect to changes in position**
We believe the laws of nature are the same everywhere in the universe. (Sometimes this belief is called “position symmetry”)

**Nature is symmetric with respect to changes in time**
We believe the laws of nature are the same as they were in the remote past and will be in the remote future. (Sometimes this belief is called “time symmetry”)

The laws of nature are the same for all observers who are in uniform motion. You cannot detect uniform motion. There is no answer to the question “how fast am I really going?”

Accelerated motion can be detected: car races, rotation of earth, orbit of earth.

**Occam’s Razor:** William of Occam (1284-1347) was an English philosopher and theologian. His idea that a problem should be stated in its basic and simplest terms became known as Occam’s Razor: the simplest theory that fits the facts of a problem is the one that should be selected.