

# PART I

## NEWTONIAN MECHANICS

Newtonian mechanics studies the motion of a system of point masses in three-dimensional euclidean space. The basic ideas and theorems of newtonian mechanics (even when formulated in terms of three-dimensional cartesian coordinates) are invariant with respect to the six-dimensional<sup>1</sup> group of euclidean motions of this space.

A newtonian potential mechanical system is specified by the masses of the points and by the potential energy. The motions of space which leave the potential energy invariant correspond to laws of conservation.

Newton's equations allow one to solve completely a series of important problems in mechanics, including the problem of motion in a central force field.

<sup>1</sup> And also with respect to the larger group of galilean transformations of space-time.