CHAPTER OVERVIEW

16: Newton’s Laws of Motion

Classical mechanics (sometimes called Newtonian mechanics) is based on three laws of motion described by physicist Sir Isaac Newton (1643-1727) in his monumental work Philosophice Naturalis Principia Mathematica ("Mathematical Principles of Natural Philosophy”) in 1687.

Newton's three laws of motion are, in modern language and notation: [1]

1. Law of Inertia. A body at rest will remain at rest, and a body moving with constant velocity will continue moving with that velocity, unless acted upon by some outside force.
2. $F = ma$: If a force F is applied to a body of mass m, it will accelerate with acceleration $a = F/m$.
3. Forces always come in pairs that act in opposite directions. If body 1 acts on body 2 with a force F, then body 2 will act back on body 1 with force F (equal in magnitude and opposite in direction).

Figure 16.1: Sir Isaac Newton.

1. Appendix R gives Newton's laws of motion in their original form.