

NEWTON'S BREAKTHROUGH

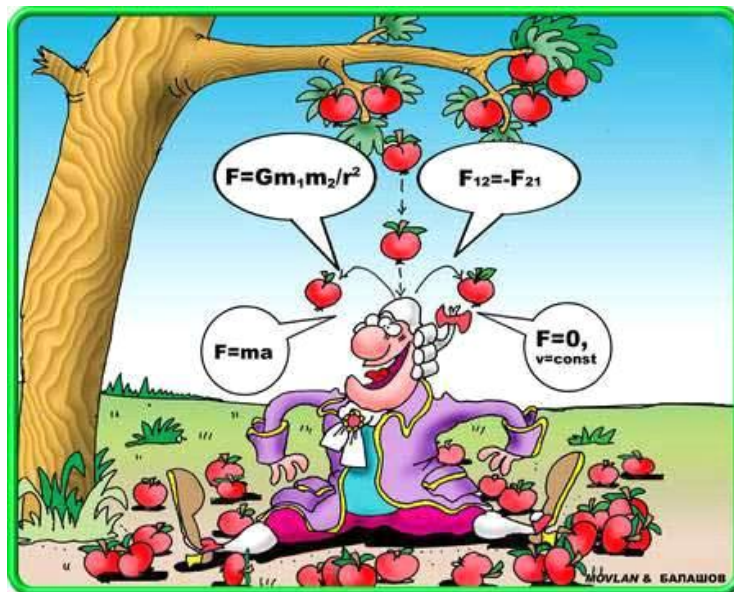
Sir Isaac Newton (1642-1727) developed a paradigm for gravitation that even today explains the behavior of objects in virtually all situations throughout the universe. Indeed, the Newtonian model reigned supreme until the early twentieth century, when Albert Einstein (1879-1955) challenged it on certain specifics.

Even so, Einstein's relativity did not *disprove* the Newtonian system; rather, it showed the limitations of Newtonian mechanics. In the ordinary world of day-to-day experience, the Newtonian system still offers the key to how and why things work as they do.

Like Galileo, Newton began in part with the aim of testing hypotheses put forward by an astronomer, Johannes Kepler (1571-1630). In the early years of the seventeenth century, Kepler published his three laws of planetary motion, which together identified the elliptical path of the planets around the Sun. Newton sought to generalize these principles to explain not only *how* the planets moved but also *why* they did so.

The result was Newton's *Principia* (1687). The book proved to be one of the most influential works ever written. In it, Newton presented his three laws of motion which can be summarized in this way:

- First law (law of inertia): no force, no change in motion.
- Second law: the net force acting upon an object is proportional to its acceleration.
- Third law: forces always arise as a mutual interaction of two bodies.



From the website <http://www.scienceclarified.com>

Drawing on your knowledge and the documents, explain Newton's laws.