

# Joseph-Louis Lagrange

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**Born:** 25 Jan 1736 in Turin, Sardinia-Piedmont (now Italy)

**Died:** 10 April 1813 in Paris, France



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**Publications:** *Reflections on the Algebraic Resolution of Equations* (1770), *Analytical Mechanics* (1788), *Theory of Analytical Functions* (1797)

**Remembered for:** Application of theoretical mathematics (algebra, geometry, and calculus) to mechanical problems in astronomy

**Quotation:** "Before we take to sea we walk on land, Before we create we must understand."

Joseph-Louis LaGrange was a theoretical mathematician whose work often revolved around practical applications in astronomy. The areas of mathematics in which LaGrange made contributions include calculus, differential equations, number theory, probability, and algebra. In addition to work related to astronomy, LaGrange researched sound and the vibrations of strings.

LaGrange was born to a well-to-do family in what is now Italy. However, his father lost most of his property, so LaGrange had to rely on his own abilities to make a name for himself.

While attending the College of Turin, he read Edmund Halley's work on the use of algebra in optics and became interested in mathematics.

Although largely self taught, LaGrange was appointed professor of mathematics at the Royal Artillery School in Turin in 1755 at the age of 19. A year later, LaGrange was elected to the Berlin Academy of Sciences at the recommendation of Leonhard Euhler, who was the Academy's director of mathematics.

In 1764, LaGrange won the Grand Prix from the Paris Academy of Science for explaining how we can see slightly more than 50% of the moon's surface since its axis moves as it rotates around the Earth. He won again in 1766 for mathematically explaining the orbits of Jupiter's moons. In that same year, Frederick II of Prussia invited "the greatest mathematician in Europe" to come to Berlin to replace Leonhard Euler, who had returned to St. Petersburg, Russia. LaGrange served as director of mathematics at the Berlin Academy from 1766 to 1787.

In 1772, LaGrange discovered five special points in the vicinity of two orbiting masses where the combined gravitational forces are zero. Thus, a third, smaller mass can orbit at a fixed distance from the larger masses. These special balance points in geometry of the orbits of satellites are called LaGrangian points in honor of their discoverer. In 1808, LaGrange further explained how the motions of objects are affected by their gravitational attractions for each other.

Following Frederick II's death in 1787, LaGrange moved to Paris to become a member of the Academie des Sciences at the invitation of King Louis XVI. In 1788, he published his monumental treatise, *Mecanique Analytic*, which summarized all the work done in the field of mechanics since the time of Sir Isaac Newton. He became the influential chairman of the French commission on weights and measures in 1793. During the French Revolution, he was protected by his friendships with important government officials. He helped Europe adopt decimal mathematics as the basis of the metric system.

When the Ecole Polytechnique opened in December 1794, LaGrange was its first professor of analysis. The next year, he began teaching elementary mathematics at the Ecole Normale, a teacher training school. LaGrange continued to receive awards throughout his life. Napoleon named him to the Legion of Honour and Count of Empire in 1808. In 1813 he was named grand croix of the Order Imperial de la Reunion. He died a week later in Paris at the age of 77. He is one of 72 French scientists that are commemorated on the Eiffel Tower and has a moon crater named in his honor: Crater LaGrange.