Blaise Pascal

Blaise Pascal was born on June 19, 1623 in Clermont, France. His mother died when he was three years old so he was raised by his father Etienne. Etienne chose to educate his children by himself. Blaise had inquiring mind and wanted to know the reasons for everything. If a good reason was not given him, Blaise would not stop searching and experimenting until he discovered the solution himself. Etienne had decided that Blaise would not study mathematics until the age of fifteen when his brain was more developed. However, this simply aroused Blaise's curiosity, and Etienne discovered a twelve year old, Blaise sketching on the floor with a piece of charcoal trying to prove that the sum of the angles of a triangle is two right angles. Etienne quickly revised his educational philosophy and gave Blaise mathematical books to study. It soon became clear that Blaise Pascal was mathematical genius.

The Pascal family was living in Paris at this time. Etienne Pascal was a member of Mersenne's weekly discussion group which included many of the great scientific minds of the time. At age twelve or thirteen, Blaise Pascal began to participate in these gatherings listening avidly and sometimes joining in on the debates. At the young age of sixteen, he published an essay entitled "Essay on Conic Sections". This included "what is still the most important theorem of projective geometry, known as Pascal's theorem."[i]

Around this time Etienne Pascal was appointed as tax collector of Normandy. Blaise Pascal observed his father's struggle with tax assessments and invented one of the first calculating machine. This machine was known as the Pascaline and it resembled the mechanical calculators of the 1940's.[ii]

Blaise Pascal also made important contributions to science. He conducted number experiments on atmospheric pressure. As result of his experiments, Pascal concluded that vacuum existed. His conclusions created a storm of controversy since the Aristotelian doctrine that "nature abhors a vacuum" was dominant at this time. A few years later, he conducted an experiment where a tube of mercury was carried up Mt. Puy-de-Dome in a single day. They

observed that as the altitude increased, the mercury level in the tube fell. Further observations of the mercury in tube in regards to changes in the weather led to development of the barometer. Pascal also discovered the Pascal's Principle which stated pressure applied to an enclosed fluid is transmitted undiminished to every part of the fluid, as well as to the walls of the container. This led Pascal to clearly describe the idea of the hydraulic press but technical difficulties prevented the creation of a successful working model.[iii]

Blaise Pascal's greatest contribution to mathematics was in the creation of the mathematical theory of probabilities. This was done in conjunction with another famous mathematician Fermat. Their interest in the topic began when a French nobleman, Chevalier de Mere approached Pascal with problems related to gambling. The two problems were how to divide the stakes if a game of dice is incomplete how many times one must throw a pair of dice before one expects a double six.[iv] Blaise Pascal made extensive use of Pascal's Triangle to solve these probability questions. The probability theory emerged as result of a gambling dispute but it applications extend much further. This theory has been used in a wide variety of subject areas.[v]

Blaise Pascal was a deeply religious man. In 1654, he had an accident with his carriage. The horses bolted and plunged off the bridge. Pascal was miraculously spared when the trace broke leaving the carriage dangling on the bridge. As result, he gave up studying scientific and mathematical questions and turned to religious contemplation until his death. Pascal became a Jansenist and bitter opponent of the Jesuits. He wrote his famous *Provincial Letters* in defense of Arnauld, also a Jansenist, who was on trial for his controversial religious works. *Pensées,* is Pascal's most famous work in philosophy and is "collection of personal thoughts on human suffering and faith in God".[vi] Included in the *Pensées* is 'Pascal's Wager' which used probability to prove that believing in God is rational. Pascal's Wager is summarized in the table. [vii]

	God exists	***God does not exist***
Wager for God	Gain all	Status quo
Wager against God	Misery	Status quo

Pascal would only return to study mathematics once again in 1658. He was suffering due to a severe toothache. Pascal discovered that when he began thinking about mathematical problems, his pain subsided. He worked feverishly on problems regarding the cycloid, the curve traced by a point on the circumference of a rolling circle. After publishing solutions to a number of problems related to cycloid, Pascal again abandoned mathematics. He died at age of 39.[viii]

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[i] George F. Simmons, *Calculus Gems: Brief Lives and Memorable Mathematics.* (Washington D.C.: The Mathematical Association of America, 2007) p. 120.

[ii] J. J. O'Connor, and E. F. Robertson, Blaise Pascal, (July 1999) Accessed October 6, 2010 http://www-history.mcs.st-and.ac.uk/Biographies/Pascal.html

[iii]. Simmons, p. 121

[iv] O'Connor.

[v] E.T. Bell, *Men of Mathematics: The Lives and Achievements of the Great Mathematicians from Zeno to Poincare,* (Toronto: Simon & Schuster, 1937), p.86.

[vi] O'Connor.
[vii] Alan Hajek, "Pascal's Wager" in *Stanford Encyclopedia of Philosophy* (June 4, 2008) Accessed October 6, 2010, http://plato.stanford.edu/entries/pascal-wager/
[viii] Simmons, p. 122.