



Blaise Pascal [blɛz paskal]

1623 - 1662

Chronology

- 1642 – 44
 - Invents and produces a calculating device to aid his father
 - In effect, this is the first digital calculator
- 1647
 - On summit of Puy de Dome, proves air pressure decreases at higher altitudes
- 1655
 - Abandons his studies and enters the Jansenist retreat at Port-Royal
- 1670
 - Pascal's Wager

Pascal's Wager

- “Belief is a wise wager. Granted that faith cannot be proved, what harm will come to you if you gamble on its truth and it proves false? If you gain, you gain all; if you lose, you lose nothing. Wager, then, without hesitation, that He exists.”

Pascal

- A French mathematician, physicist, and religious philosopher
- Educated by his father
- Earliest work was in the **natural and applied sciences** where he made important contributions to the construction of **mechanical calculators**, the study of **fluids**, and clarified the concepts of **pressure** and **vacuum** by generalizing the work of **Evangelista Torricelli**
- Also wrote in defense of the scientific method

Pascal

- Wrote a significant treatise on the subject of projective geometry at the age of sixteen
- Later corresponded with Pierre de Fermat on **probability theory**, strongly influencing the development of modern **economics** and **social science**

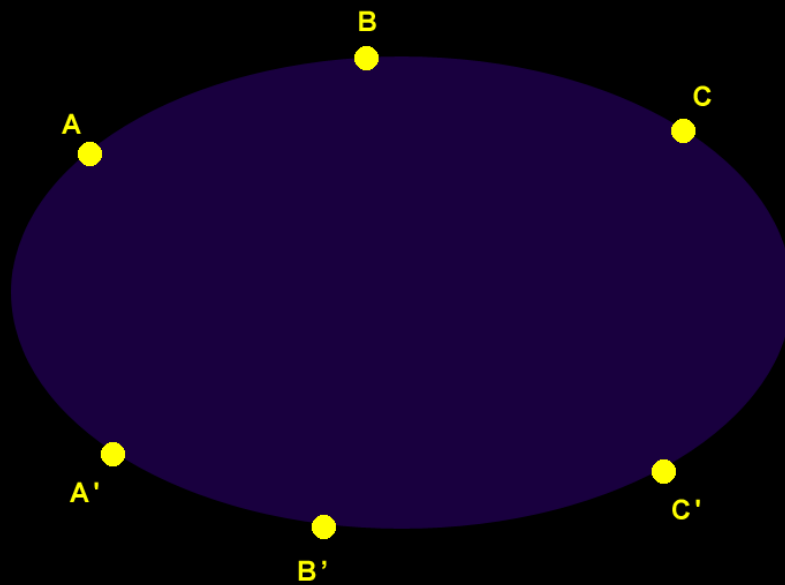
Pascal

- Following a **mystical** experience in late 1654, he abandoned his scientific work and devoted himself to philosophy and **theology**
- His two most famous works date from this period: the **Lettres provinciales** and the **Pensées**

Pascal's Theorem

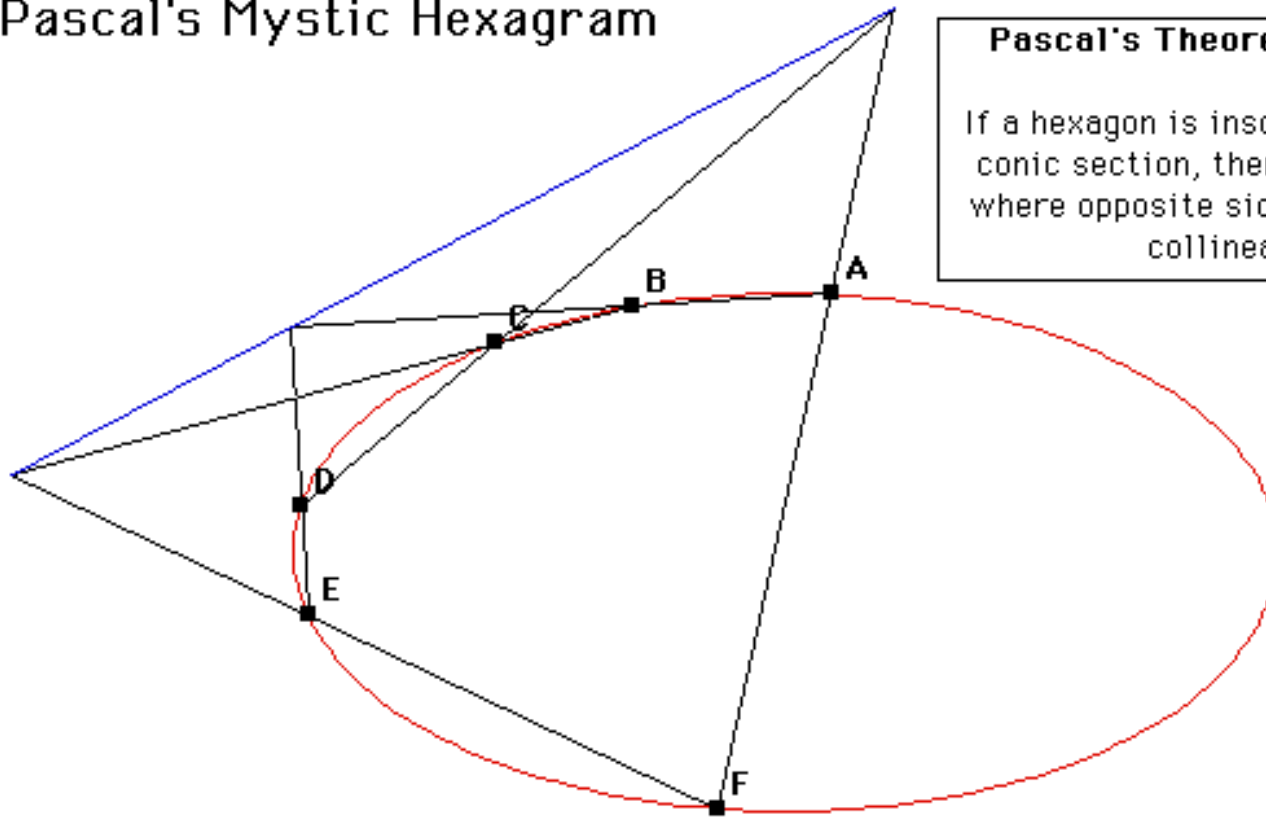
1. Take a cone
2. Take a simple plane and slice the cone in two going across.
3. If the plane is straight across, the section cut out will be a circle.
4. If the plane is at an angle, the section cut out will be an ellipse.
5. Draw a six-sided figure inside the ellipse. The figure does not have to be regular, and may intersect itself.
6. Now take a pencil and make big dots on the vertices of the hexagram, and draw lines between the vertices. Then, extend the lines out to where they cross.
7. The three points of the intersections where the lines cross will always form a straight line, for any conic section and any hexagram.

Pascal's Theorem



Pascal's Theorem

Pascal's Mystic Hexagram



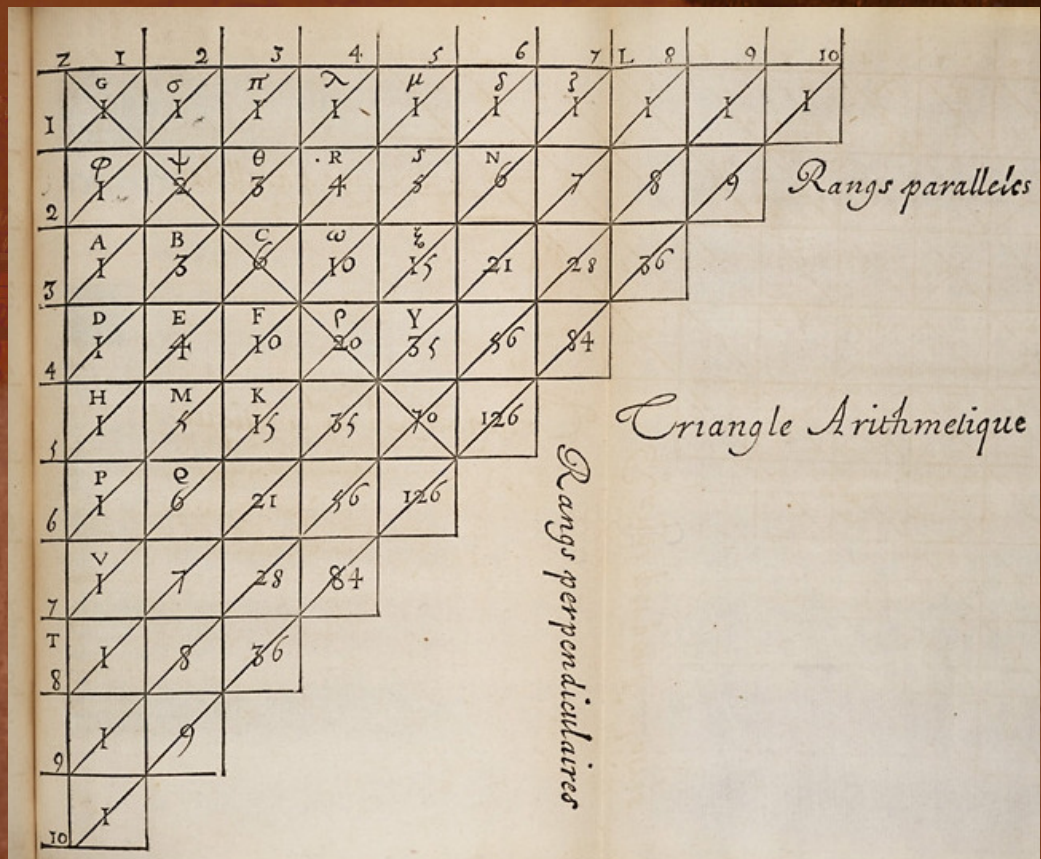
Pascal's Theorem states:

If a hexagon is inscribed in any conic section, then the points where opposite sides meet are collinear

Arithmetical Triangle

- Although Pascal was not the first to study the Pascal triangle, his work on the topic in *Treatise on the Arithmetical Triangle* was the most important on this topic
- Through the work of Wallis, Pascal's work on the binomial coefficients was to lead Newton to his discovery of the general binomial theorem for fractional and negative powers

Arithmetical Triangle



Arithmetical Triangle

The image shows a white square containing the first five rows of an arithmetical triangle. A thick black diagonal line runs from the top-right corner to the bottom-left corner, passing through the numbers 1, 4, 10, 20, and 35. The numbers are arranged in a triangular pattern, with each row containing one more number than the row above it. The numbers are: Row 1: 1, 1, 1, 1, 1; Row 2: 1, 2, 3, 4, 5; Row 3: 1, 3, 6, 10, 15; Row 4: 1, 4, 10, 20, 35; Row 5: 1, 5, 15, 35, 70.

1	1	1	1	1
1	2	3	4	5
1	3	6	10	15
1	4	10	20	35
1	5	15	35	70

Arithmetical Triangle



Pascaline

- Not yet nineteen, constructed a mechanical calculator capable of addition and subtraction, called **Pascal's calculator** or the **Pascaline**
- The calculator failed to be a great commercial success because it was extraordinarily expensive
- Became little more than a toy, and status symbol, for the very rich both in France and throughout Europe

Pascaline



Blaise Pascal, *Pensées* #72

“For after all what is man in nature? A nothing in relation to infinity, all in relation to nothing, a central point between nothing and all and infinitely far from understanding either. The ends of things and their beginnings are impregnably concealed from him in an impenetrable secret. He is equally incapable of seeing the nothingness out of which he was drawn and the infinite in which he is engulfed.”

Jansenism

- **Jansenism** was a branch of Catholic Gallican thought which arose in the frame of the Counter-Reformation and the aftermath of the Council of Trent (1545-1563). It emphasized original sin, human depravity, the necessity of divine grace, and predestination. Originating in the writings of the Dutch theologian Cornelius Otto Jansen, Jansenism formed a distinct movement within the Roman Catholic Church from the 16th to 18th centuries, and found its most important stronghold in the Parisian convent of Port-Royal, haven of many important theologians and writers (Antoine Arnauld, Pierre Nicole, Blaise Pascal, Jean Racine, etc.).
- The term itself was coined by its Jesuit opponents, who accused them of being close to Calvinists, as Jansenists self-identified as rigorous followers of Augustinism.^[1] Several propositions supported by Jansenists, in particular concerning the relationship between human's free will and "efficacious grace", were condemned by the Pope, and the movement thus deemed heretical