

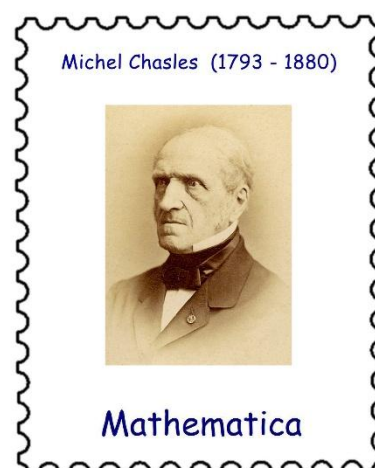
**MICHEL CHASLES** (December 15, 1793 – December 18, 1880)

by HEINZ KLAUS STRICK, Germany

FLORÉAL CHASLES was born on 25 Brumaire in Year II of the French calendar in Épernon (near Chartres) as the first of two sons of the wealthy timber merchant and building contractor CHARLES-HENRI CHASLES and his wife CATHERINE ÉMILIE HARDOUIN.

FLORÉAL was a popular first name during this period, but also the name for one of the three spring months in the Revolutionary Calendar ("Flowering Month" = period roughly from April 20th to May 19th). In 1806, France reverted to the old system of numbering and naming the months in its calendar.

In 1809, the boy took the opportunity to change his first name, which was reminiscent of the revolutionary times, and adopted the (rather traditional) first name MICHEL.



From 1806 onwards, he attended the Latin school in Chartres, excelling in Latin, mathematics, and physics. He continued his successful academic career at the *Lycée Imperial* (*Lycée Louis Le Grand*) in Paris, where he also won a first prize in mathematics. His encounter with SIMÉON DENIS POISSON was disappointing, as the latter spoke to him in a condescending manner.

In 1812 he passed the entrance examination at the *École Polytechnique*, and with 12th place in an intermediate examination he acquired the qualification for the civil service.

In 1814, his class was mobilized by imperial decree to defend Paris against the advancing Prussian and Russian troops. During this action, his comrade GERMINAL PIERRE DANDELIN (the future inventor of DANDELIN bullets) was seriously wounded. Upon returning to the *École Polytechnique*, he was offered a position in the engineering corps. He declined in favour of a classmate from a more modest background, hoping to secure a position in the engineering corps (*Service des Ponts et Chaussées*). Having achieved second place in the final examination, he was actually entitled to such a position, but by that time all positions in the engineering corps had been eliminated. Disappointed, CHASLES returned home.

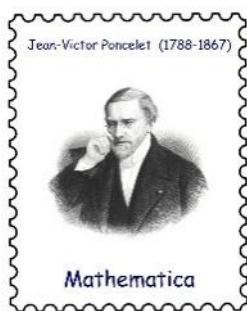
He disliked the position as a stockbroker in Paris, which his father had bought for him, and gave it up after a while. Since he was not dependent on his own income – thanks to his parents' wealth – the confirmed bachelor was able to devote himself entirely to investigating mathematical problems and conducting research into the history of mathematics.

In 1830, he won a competition of the *Académie de Bruxelles* with his essay "*L'examen philosophique des méthodes employées dans la géométrie récente*" (Philosophical Investigation of the Methods Used in Modern Geometry).

This treatise then formed the basis for his 1837 publications: "*Aperçu historique sur l'origine et le développement des méthodes en géométrie* (Historical overview of the origin and development of methods in geometry) and *Mémoire de géométrie sur deux principes généraux de la science: la dualité et l'homographie* (Geometric treatise on two general principles of science: duality and homography).

The principle of *duality* allows new geometric theorems to be derived from old ones. The term *homography* refers to bijective mappings that can distort geometric figures, but in which essential properties such as ratios are preserved.

Simple examples of duality: The sentence "*Two points determine a straight line*" has the dual statement "*Two straight lines intersect at one point*"; the sentence "*Three non-collinear points determine the sides of a triangle*" has the dual statement "*Three non-collinear lines intersect at the vertices of a triangle*".



CHASLES' contributions built upon the considerations regarding the *projective geometry* of JEAN-VICTOR PONCELET, which also led to a return to classical, more intuitive geometry (after a phase in the history of mathematics in which the *analytic* (coordinate) *geometry* of RENÉ DESCARTES had played a stronger role).

In 1841, CHASLES (who was already 48 years old at this point) took over the chair of mechanical engineering and hydraulics, astronomy and geodesy at the *École Polytechnique*. When the university administration then wanted him to also teach mechanics in 1851, he resigned, having already been a professor since 1846. He taught *advanced geometry* at the *Sorbonne*. This position had been created specifically for him – demonstrating the high regard CHASLES had gained by this time through his publications. He wrote widely circulated textbooks to accompany his lectures: *Traité de géométrie supérieure* (1852) and *Traité des sections coniques* (Treatise on Conic Sections, 1865).

From 1864 onwards, he published several articles in the journal *Comptes Rendus* of the *Académie des Sciences* on a new subfield of mathematics, the so-called *enumerative* (counting) *geometry*, which generally deals with questions of the following type:

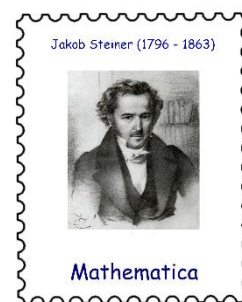
*How many geometric objects fulfil certain conditions?*

JAKOB STEINER had addressed the problem in 1848.

*How many plane conic sections (circles, ellipses, parabolas, hyperbolas) are there that touch five given plane conic sections?*

He gave the answer  $6^5 = 7776$ .

Later, in his 1864 paper, CHASLES was able to correct this number: there are actually "only" 3264 such conic sections.

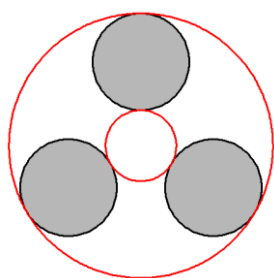


One of the first questions of *enumerative geometry* was posed by APOLLONIUS OF PERGA (265-190 BC):

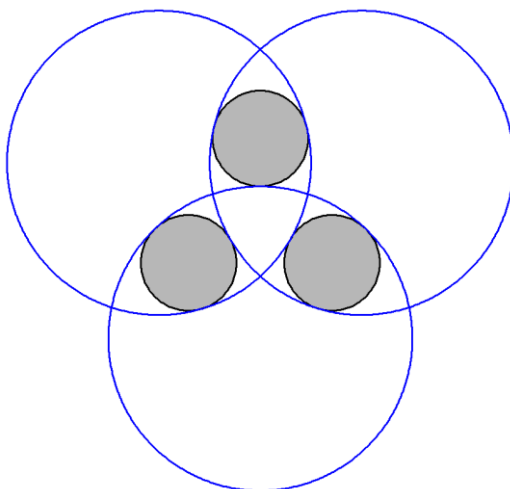
"How many plane circles  $C_1, C_2, C_3$  are there that touch three given circles (tangentially)?"

Solution: There are 8 possible circles that meet this condition: The solution circle touches...

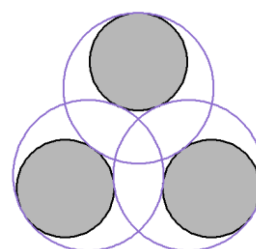
- (1) all three circles  $C_1, C_2, C_3$  on the outside,
- (2) the circle  $C_1$  on the inside, the circles  $C_2, C_3$  on the outside,
- (3) the circle  $C_2$  inside, the circles  $C_1, C_3$  outside,
- (4) the circle  $C_3$  inside, the circles  $C_1, C_2$  outside,
- (5) the circles  $C_1, C_2$  inside, the circle  $C_3$  outside,
- (6) the circles  $C_1, C_3$  inside, the circle  $C_2$  outside,
- (7) the circles  $C_2, C_3$  inside, the circle  $C_1$  outside,
- (8) all three circles  $C_1, C_2, C_3$  inside.



(1) (8)



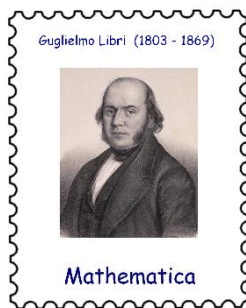
(2) (3) (4)



(5) (6) (7)

CHASLES also dealt with physical topics; a theorem from mechanics bears his name:

*Every spatial motion of a rigid body can be represented as a combination of a rotation about an axis and a translation along the same axis ( i.e., every movement in space can be reduced to a screw motion).*



In 1851, CHASLES was elected as a member of the *Académie des Sciences* (as successor to GUILLAUME LIBRI). From 1854 he became a member of the *Royal Society* of London, which honoured him in 1865 with its highest distinction, the COPLEY Medal. Over the following years, he received further honours from the academies of Brussels, Copenhagen, Naples, Stockholm and St Petersburg, as well as from the *Royal Society* of Ireland and the *National Academy* of the United States. In 1873 he became the first president of the *Société Mathématique de France*.

MICHEL CHASLES received a special posthumous honour in 1889: his name is among the 72 names of famous French scientists commemorated on the EIFFEL Tower in Paris.

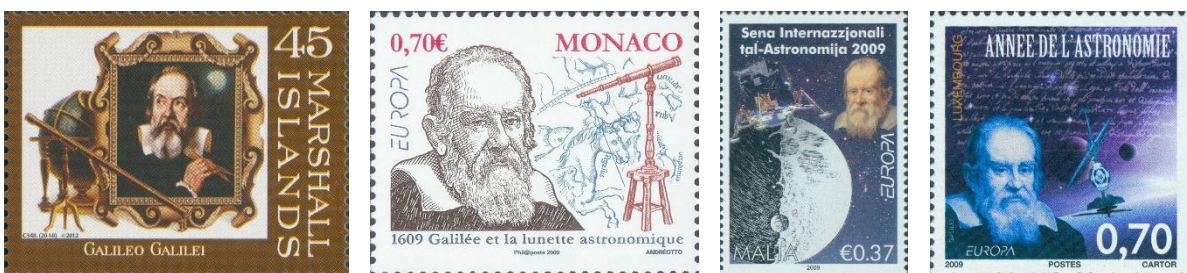


A period in MICHEL CHASLES' life tarnishes the memory of his achievements. The excellent historian of mathematics fell victim to a con man's forgeries – this cost him not only a fortune but also his reputation:

In 1861, he received a visit from DENIS VRAIN-LUCAS, who told him an adventurous story about how he had come into possession of letters from PASCAL. In these letters, PASCAL informs the Irish physicist and chemist ROBERT BOYLE that he had discovered the general principle of gravitation – 20 years before the Englishman NEWTON!



This letter aroused CHASLES' curiosity, and the forger constantly supplied new documents, for example about an alleged correspondence between PASCAL and GALILEO from 1641 (although GALILEO had long since gone blind by this time).



Over eight years, the con man presented him with a total of 27,000 forged documents and was handsomely paid for them. CHASLES also presented the "newly discovered" evidence to the *Académie*; and despite massive opposition (e.g., due to differences in handwriting), CHASLES insisted that parts of the history of science would have to be rewritten – until he finally had to admit that at least some of the alleged documents could not be genuine. In the lawsuit CHASLES brought against the con man, the latter exposed the incredible naiveté of his victim: CHASLES had also purchased purported letters from ALEXANDER THE GREAT to ARISTOTLE, from JULIUS CAESAR to VERCINGETORIX, and from CAESAR to CLEOPATRA – all written in supposed "Old French."

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<https://mathematik-ist-schoen.jimdoweb.com/>

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Here is an important hint for philatelists who also like individual (not officially issued) stamps.

