GASPARD MONGE (May 9, 1746 – July 28, 1818)

by HEINZ KLAUS STRICK, Germany

GASPARD MONGE grew up as the son of a merchant in Beaune (Burgundy) and he attended a church school there. Due to his excellent performance, he was allowed to give his own courses in physics at the age of 17 at a school in Lyon.

When he returned to Beaune, he drew up a plan of the town based on his own surveys, which impressed a teacher at the Royal School of Engineering in Mézières so much that he found employment as a drawing teacher. He was not particularly satisfied with the work, as his mathematical skills were not much in demand. This changed when, a year later, he was commissioned to design a fortress and the new construction and representation methods he had developed were subject to military secrecy.

At the age of 23 he published his first scientific paper on curves in space and became professor of mathematics and experimental physics at the engineering school. In 1771 he made contact with the leading French mathematicians D'ALEMBERT and CONDORCET and submitted papers on various mathematical subjects to the *Academy of Sciences*. 1780 he became professor for hydrodynamics in Paris and a member of the *Academy*. He published numerous papers, including on physical and chemical problems.

The French Revolution, however, changed his life completely.

GASPARD MONGE supported the revolution from the beginning and even became a member of the notorious Welfare Committee (ROBESPIERRE, SAINT-JUST) and he became a member of the Committee on Weights and Measures, which introduced the decimal system that is still used today.

After the abolition of the monarchy in 1792, he was even appointed Minister for the Navy and Colonies. However, he only held this post for a few months and was not happy with the daily changing political conditions. For example, one day the National Convention agreed to his proposals for reforming the education system, the next day the decision was revoked and even the *Academy of Sciences* was temporarily abolished. He worked tirelessly for the military survival of the young republic and among other things, he took care of the production of cannons and gunpowder.

In parallel with his many political tasks, MONGE took up a teaching post for descriptive geometry at the *École Polytechnique*, which he himself had initiated. However, he hardly had the time to fulfil this new task, as he had committed himself to sifting through Italian art treasures in the territories conquered by the French Revolutionary Army and transporting them to Paris.

He became friends with Napoleon, who even persuaded him to take part in the Egyptian campaign. Napoleon appointed him president of the Egyptian Institute in Cairo and, after the Egyptian adventure was broken off, director of the *École Polytechnique*. Appointments as an officer of the Legion of Honour, Senator, President of the Senate and finally even *Count of Péluse* followed.

Monge followed Napoleon unconditionally, supporting him until his political downfall. After Napoleon's defeat at the Battle of Waterloo, he fled abroad and on his return in 1816 the new French government banned him from resuming teaching.

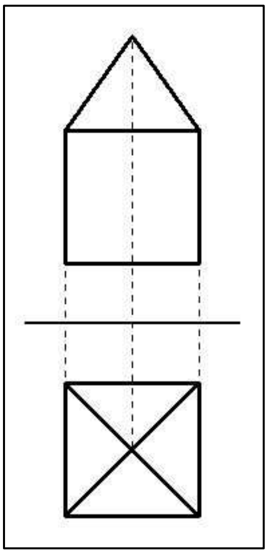
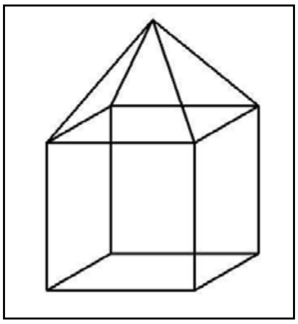
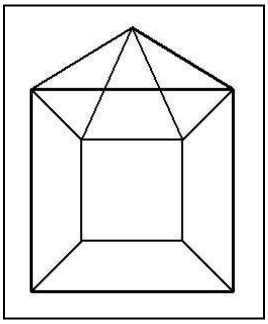
In 1818 he died poor, lonely and embittered. At his funeral in the *Père Lachaise* cemetery, the government tried unsuccessfully to stop the sympathy of his students, who had always adored him. A large monument to him was later erected there.

To mark the 200th anniversary of the French Revolution, his remains were transferred to the *Panthéon* and a special stamp was issued by the French postal service.

Albrecht Dürer (1471 – 1528) had already dealt with the question of how three-dimensional objects could be represented in a two-dimensional drawing (*Underweysung der Messung mit dem Zirckel und Richtscheydt in Linien, Ebenen und gantzen Corporen*, 1525) and in Italy he had learned the method of central perspective.

MONGE is regarded as the real inventor of *descriptive geometry*. In his book *Leçons de géometrie descriptive*, published in 1795, he systematically dealt with the representation of points, straight lines, planes, and also of curves and intersecting bodies, in space as well as with the resulting shadow pictures. The aim of *descriptive geometry* is to design the drawings in such a way that one can read in them all the properties and even the sizes of the three-dimensional objects.

MONGE's particular achievement is that he developed descriptive geometry into a systematically structured, independent branch of mathematics.

The representation of a body, e.g. a cube with an attached half octahedron, in a 3-dimensional rectangular coordinate system can be done in different ways. In the case of the *single plane projection*, an object is projected onto a drawing plane. The *perpendicular projection* onto the *x-y*-plane in a coordinate system is usually called the *ground plan*, the projection onto the *y-z*-plane is called the *elevation*, and the projection onto the *x-z*-plane is called the *lateral elevation*. In the two panel method (fig. left), the ground plan and elevation of a body are shown.

In axonometry (central fig.), the body to be imaged is represented by rays running parallel to each other and impinging obliquely on the projection surface (*oblique parallel projection*).

In central perspective (fig. right) the rays – as in "one-eyed" vision – start from one point and map the points of the body onto the image plane (*projection surface*). One has the impression that the edges lying parallel to each other are converging towards a vanishing point on the horizon.

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Translated 2020 by John O'Connor, University of St Andrews

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