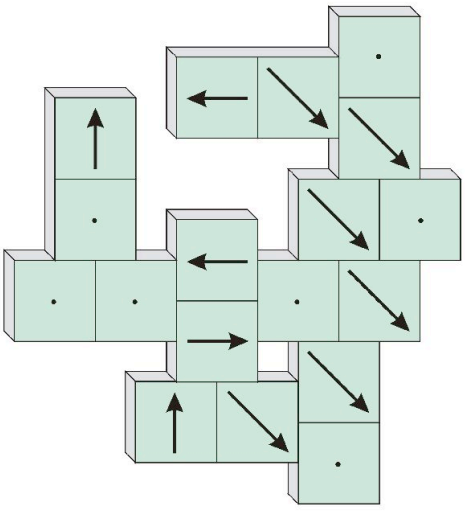
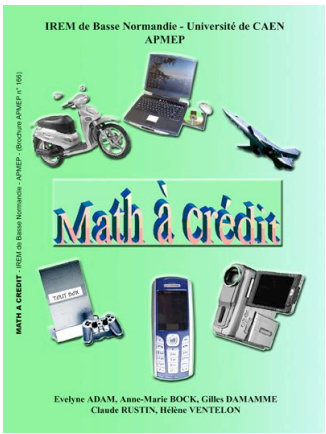
THE FRENCH
irem
NETWORK
AND THE IREM OF LOWER NORMANDIE AT CAEN

Université de Caen
Basse-Normandie

The acronym IREM means "**Institute of research on the teaching of mathematics**". The first three French IREMs were created in October 1968 in Paris, Lyon and Strasbourg. The IREM of Lower Normandy at Caen followed a couple of years later. Most major French universities now include an IREM. They are independant of each other, but closely collaborate inside a **national network**. More recently, the French model gave rise to creation of IREMs in other countries, notably in Europe and South America, and of an **international network**.

The purpose of an IREM is to bring together teachers from primary schools, from secondary schools (general, technological or professional) and from universities to do research in common on the teaching of mathematics. It works out and circulates **educational aids** (such as articles, booklets, handbooks, journals, software, multi-media documents, etc.) that are based on this research and provides **continuing education sessions** for mathematics teachers.





OUR RESEARCH AND OUR ACTIVITIES.

At the time IREMs were created, modern mathematics were introduced into secondary education and IREM strove to provide for the subsequent need for professional training. Later on, concerns naturally evolved. Here we describe some of the themes that are nowadays actively worked on in the IREM network and especially in the IREM of Lower Normandy.

Making sense of mathematics.

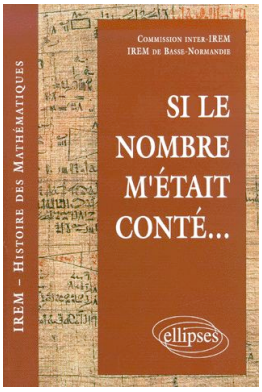
Although they never were as important in social and professional life as they now are, mathematics are getting increasingly difficult to teach. They arouse a lack of interest that finds expression in either intellectual passivity or deep rejection. *At all levels of education*, there is a major work to be done to lead as many pupils and students as possible to make more sense of mathematics and to get inside the problematics that mathematics urge them to tackle. That is the heart of the task. At the IREM of Lower Normandy, we work out teaching strategies and activities, notably on constructive geometries, statistics, mathematics of everyday's life (e. g. subjects linked with consuming), on geometrical patterns in architectural heritage, etc. On all of these themes, we propose continuing education sessions for all mathematics teachers of secondary schools.

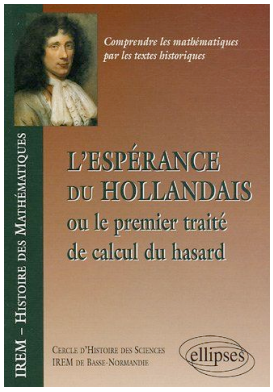
Thinking about the role of computers.

Since the early seventies, the IREM network developed a reflection about computers and the teaching activities they allow for. Nowadays many tools are available that are suitable to the teaching of mathematics : calculators, computer algebra or dynamical geometry software, etc. How can they be used to help the student to enrich his/her own mental universe, to make more sense of what he/she learns and to think more ? How can teachers be helped to remain autonomous with respect to the tools offered by computer science and to the technological market ? At the IREM of Lower Normandy, we have been working for a long time on these issues and train teachers to use new geometry software or exercises servers.

Bringing an historical perspective in the teaching of mathematics.

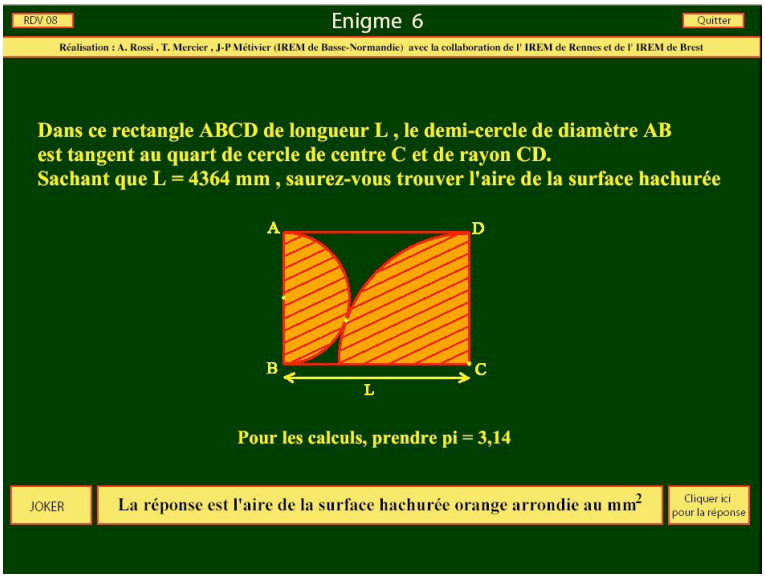
The IREM network contributes a lot to the development of research in *history of mathematics* in France. It makes available ancient mathematical sources that are difficult to find and makes proposals about bringing an historical perspective in the teaching of mathematics, liable to further the understanding of difficult notions. The IREM of Lower Normandy has a very active team in history of mathematics, which published numerous works, notably on the history of numbers, of calculus, of geometry, of probability and of statistics, and presented many continuing education sessions for mathematics teachers. We shall also welcome in May 2010 a national conference on the subject "Circulation, legacy and transmission in mathematics".





Creating different motivations through the mathematical game and the mathematical rally.

A *mathematical game* proposes to the pupil to use mathematical tools with an aim differing from the ones he is used to (answering a question, solving a problem). It also favours attention, concentration, regard for the rules and respect towards other players.
A *mathematical rally* is a competition between teams of youths from the same school level consisting in solving a set of enigmas. It is played on the Internet or sometimes in some symbolic or historical place. For them as for their teacher, it is more stimulating and exciting than the traditional way of teaching.
The IREM of Lower Normandy already created 15 different original mathematical games and uses video to analyse the behaviour of the pupils during the game. We are also proud of our successful "dynamical and virtual mathematical rally" for which 120 classes compete each year. Its seventh edition will take place in April 2010.



Spreading mathematics outside of the classroom.

The IREMs seize many opportunities to popularize mathematics outside of the school sphere and to improve their image in the general public. The national "Science days" for instance are a good opportunity to contact all generations. In Lower Normandy, people respond massively to the invitation!

International relations.

The IREM network, through different local IREMs, established relationships with similar institutions in various countries, aiming at comparing experiences. The most recent conventions were signed with the IREM of Sao Paulo (Brazil) in 2008 and the House of mathematics at Ispahan (Iran) in 2009. At the IREM of Lower Normandy, we signed protocoles of international cooperation with the IREM of Lima (Peru) and the National administration of public education (Uruguay).

The IREM of Lower Normandy now wishes *to establish relationships with persons interested in the teaching of mathematics in arabic countries*. This project is lead by :

- Dr. Pierre Ageron, maître de conférences at the University of Caen, specialized in history of arabic mathematics, director of the IREM of Lower Normandy

- Dr. Mohamed Ghassan Alaouf, doctor of the University of Rouen, specialized in didactics of mathematics, member of the IREM of Lower Normandy.