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The Klein Project:
A Living & Connected View of Mathematics for Teachers
An IMU/ICMI Collaboration: A Short Description

Background

One hundred years ago, in 1908, Felix Klein’s lectures on mathematics for secondary teachers were first published (in German). This comprehensive view of the field challenged both teachers and mathematicians to consider the relationship between learning mathematics and the nature of disciplinary mathematics. The two volumes were republished in 2004 by Dover (see Fig 1 and Fig 2). In the intervening 100 years the nature of the mathematics has changed—the crises in foundations, the advent of computing, new fields, and resolutions of some major mathematical challenges.

It was agreed at the 2007 Executive Meeting of the International Commission on Mathematical Instruction (ICMI) that revisiting the issues presented by linking the topics and approaches of senior secondary or undergraduate mathematics with the field of mathematics would make an appropriate joint project for the ICMI and International Mathematics Union (IMU). At their respective March 2008 and April 2008 meetings, the project was adopted in principle.

Klein was motivated by what he referred to as a double discontinuity:

*It is remarkable that modern developments have passed over the schools without the slightest effect on instruction. … The reason is that mathematical instruction and the onward march of mathematical investigation lost all touch with each other after the beginning of the 19th century.*

The example set by Klein was not to proscribe any “best” approach nor define an ideal curriculum. His intention was to awaken, to broaden, and to provide background
in order to challenge teachers to convey the richness of contemporary mathematics using the school curriculum:

*My task will always be to show you the mutual connection between problems in the various fields. In this way I hope to make it easier for you to acquire that ability to draw from the great body of knowledge a living stimulus for your teaching.*

*With the rareness of genius, … he made it his function, as a teacher, to acquaint his students with mathematics, not as isolated disciplines, but as an integrated living organism.*

*This book is designed solely as such a mental spur, not as a detailed handbook.*

These approaches are adopted for the Klein Project.

**Aim**

The aim of the Klein Project is to relate a comprehensive view of the field of mathematics to the content and approaches of senior secondary and undergraduate mathematical curricula. It will produce resources that will continue to provide for teachers of mathematics the structure, breadth, connectedness, vitality, applicability, beauty, and value of the discipline so that they are able to both indulge their own love for the subject and convey its living wonder to their students.

The objectives are as follows.

- To organise contributions to the project in such a way that all mathematicians and mathematics educators can participate and feel that their views are included.
- To produce a readable but professional book that conveys the connectedness, growth, relevance, and beauty of the discipline of mathematics from its big ideas to the cutting edge of research and applications. It will be of moderate size, available in at least English, French, German, Mandarin and Spanish versions, and will be affordable for teachers worldwide.
- To produce a DVD to supplement the book that acts as a resource for teachers wishing to use the ideas in the book in their classes.
- To design, construct, and maintain a Wikipedia-type website that complements the book, and which will be open to contributions and changes as opportunity allows and the discipline continues to develop.

**Audience**

The resources of the Klein Project are intended to be accessible to all with an interest in mathematics, but it is especially for those who are responsible for conveying mathematics to new learners. The main target will be those teachers with a background of university mathematics, and particularly those who teach students in the final three years of secondary school or the first two years of tertiary education.

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**Project organisation**

The project will be the responsibility of a design team of nine people, three nominated by the ICMI EC, and five nominated by the IMU EC, and a coordinator agreed by both ICMI and IMU. This group will have overall responsibility, including the nature of the outputs, the process for design, preparation and writing of resources, and nominating those undertaking the work.

The book, DVD, and website will have separate development groups, the details of which have still to be decided, but which will each include some members of the design team for coordination. The expected timeline will be about 3 years for the book and DVD.

During the development period, there will be several Klein Conferences, where possible, organised as satellite conferences to existing meetings. The purpose will be to provide opportunities for anyone with an interest to participate in the debates surrounding design and content of all Klein Project materials, and to contribute to their production. They will also act as forums to disseminate information about and materials from the Klein process.

ICMI and IMU make a commitment at the outset that all materials will become available in the five languages English, French, German, Mandarin and Spanish. Where possible, other languages will be supported. The aim is to make it widely available.