

**GeoGebra**  
Dynamic Mathematics for Everyone


Zsolt Lavicza  
University of Cambridge  
<http://www.geogebra.org/IGI>

International GeoGebra Institute 

## Overview


- Short History
- Community
- Research
- Future



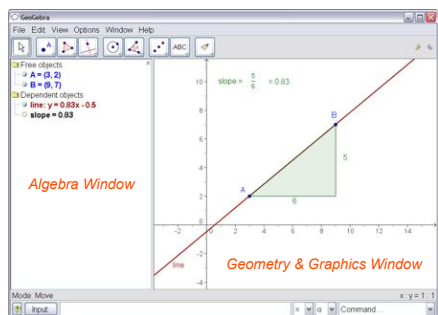

International GeoGebra Institute 

## History of GeoGebra

2001 - 2010


International GeoGebra Institute 

## GeoGebra = Geometry + Algebra




*Algebra Window*

*Geometry & Graphics Window*

International GeoGebra Institute 

## Open Source > Free



Free software is a matter of liberty, not price.

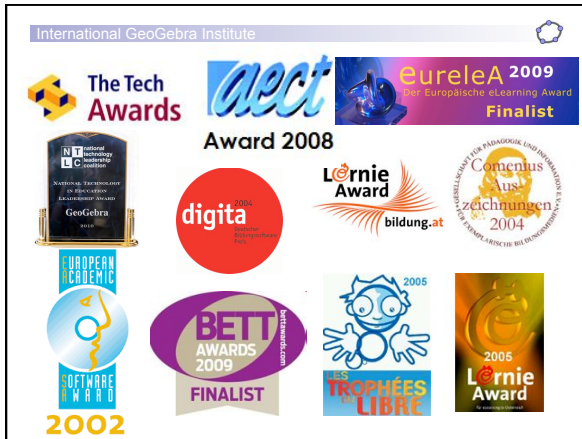
To understand the concept, you should think of free as in free speech, not as in free beer.

(Free Software Foundation)

International GeoGebra Institute 

## 2001-2006: Development

- Mar 2002: Master's thesis in Computer Science & Mathematics Education
- Nov 2002: European Academic Software Award
- Mai 2005: User Forum & GeoGebraWiki
- Feb 2006: PhD project in Mathematics Education funded by Austrian Academy of Sciences
- December 2007: International GeoGebra Institute



International GeoGebra Institute

### Examples of Using GeoGebra

- Visualizing  
students can “see” abstract concepts
- Representations  
students can make connections
- Experiments  
students can discover mathematics

International GeoGebra Institute

### Age 6-10: Adding Integers

$a = 6$     $b = -10$    Move Bunny!    $6 + (-10) = -4$

International GeoGebra Institute

### Age 11-14: Multiplying Fractions

$\frac{2}{5} \cdot \frac{3}{4} =$

International GeoGebra Institute

### Age 15-16: Geometry & Algebra

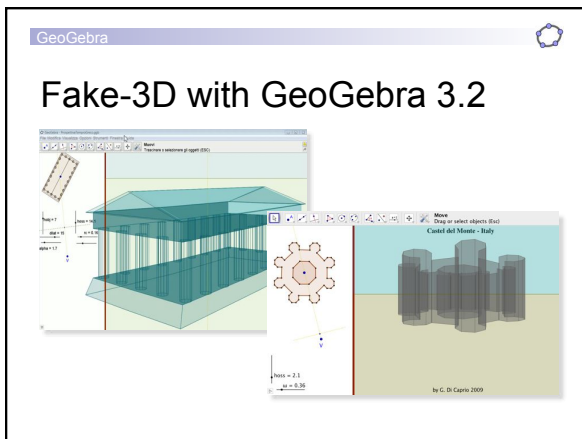
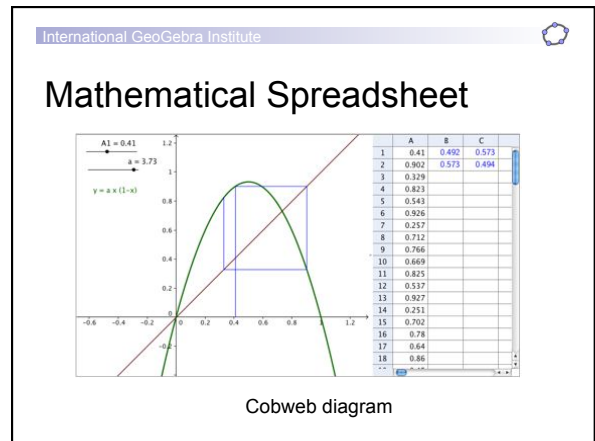
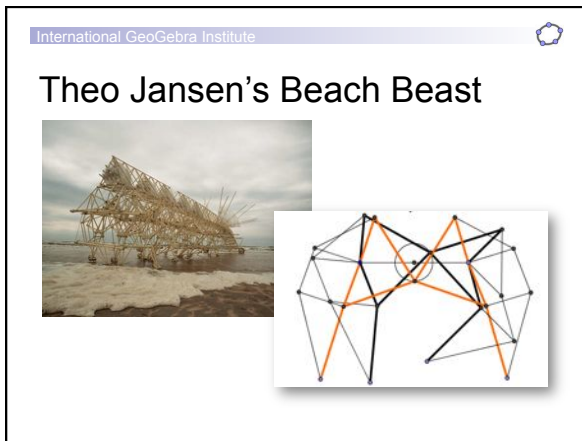
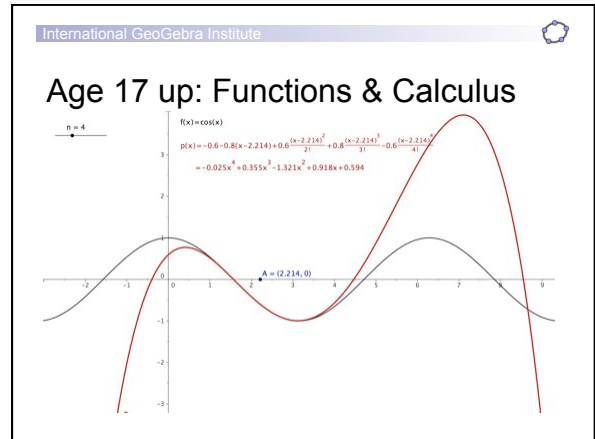
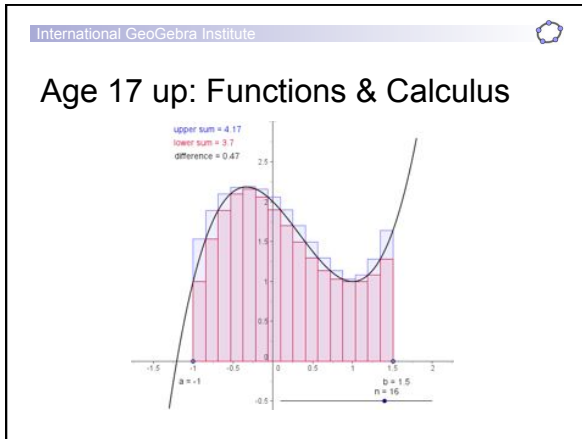
$M = (ab) = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$

International GeoGebra Institute

### Age 17-18: Visualizing Parameters

$f(x) = \sin(a \cdot x + b)$     $a = 2$     $b = 0$   
 $f(x) = \sin(2 \cdot x + 0)$

$g(x) = \sin(c \cdot x + d)$     $c = 10$     $d = 1.4$   
 $g(x) = \sin(10 \cdot x + 1.4)$



International GeoGebra Institute

## GeoGebra's Community

If you want to go fast,  
go alone.

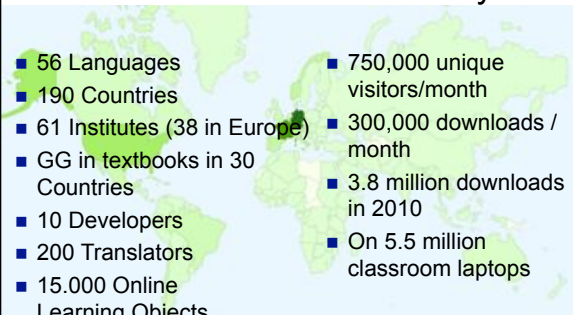
If you want to go far,  
go together.

Warren Buffett

International GeoGebra Institute

## World Wide User Community

- 56 Languages
- 190 Countries
- 61 Institutes (38 in Europe)
- GG in textbooks in 30 Countries
- 10 Developers
- 200 Translators
- 15.000 Online Learning Objects
- 750,000 unique visitors/month
- 300,000 downloads / month
- 3.8 million downloads in 2010
- On 5.5 million classroom laptops




International GeoGebra Institute

## GeoGebraWiki – Shared examples

GeoGebra

Article Discussion View source History

Main Page

Welcome to the International GeoGebraWiki!

GeoGebraWiki is a free pool of teaching materials for the dynamic mathematics software GeoGebra. Everyone can contribute and upload materials! All contents of this pool may be used free of charge.

English - French

Catalan, 中文 (Chinese), Czech, Danish, Dutch, English UK, Finnish, German, Greek, עברית (Hebrew), Hungarian, Indonesian, Italian, 日本語 (Japanese), Malayalam, Norwegian, Persian, Polish, Português, Pусский (Russian), Slovenian, Spanish, Swedish, Swedish, Tamil, Turkish, Українська (Ukrainian), Vietnamese

Workshops - Know How - Tools - Publications

Popular Materials - Archived Assets - GeoGebra Act - New Articles - All Articles

Help for GeoGebraWiki - find out about this Wiki

GeoGebra Upload Manager - to upload your materials

Image Upload - to upload your images

GeoGebra Homepage - everything about the software GeoGebra

International GeoGebra Institute

## GeoGebraForum – Questions/help

GeoGebra

About Download Help Wiki Forum

Log in Register FAQ Search

GeoGebra User Forum

Last visit was: Tue Dec 14, 2010 9:55 am (all times are UTC + 1 Hour)

Forum	Topics	Posts	Last post
English speaking users			
↳ Using GeoGebra	1484	7540	Thu Dec 16, 2010 2:18 am
↳ Technical Questions	708	3482	Thu Dec 16, 2010 12:48 am
↳ Installation, dynamic worksheets, GeoGebraWiki, JavaScript, etc.			
↳ German speaking users			
↳ Hilfe/Anwendung von GeoGebra	620	3236	Wed Dec 15, 2010 9:50 pm
↳ Technische Fragen	370	1420	Tue Dec 14, 2010 9:40 pm
↳ Installation, dynamische Arbeitsblätter, GeoGebraWiki, JavaScript usw.			
↳ French speaking users			
↳ Forum pour les utilisateurs de GeoGebra qui parlent français	1887	13000	Thu Dec 16, 2010 1:13 pm
↳ Věřit	53	378	Sat Dec 11, 2010 9:46 am
↳ Français (Suisse)	146	857	Wed Nov 10, 2010 8:22 pm

International GeoGebra Institute

## Status Quo

- What's there?
  - Free software and material
  - Extensive user community
  - Immense expertise developed by enthusiasts
- What's missing?
  - Not enough training
  - Not enough support for teachers new to technology
  - Limited research on the impact of GeoGebra

International GeoGebra Institute

# International GeoGebra Institute

International GeoGebra Institute

## Core Aims of IGI

- **Teacher training and support**
  - Offer workshops & support
- **Material and software development**
  - Share free materials
- **Research**
  - Encourage and coordinate collaborative research

International GeoGebra Institute

## 61 Current GeoGebra Institutes

more coming soon ...

<http://www.geogebra.org/community>

International GeoGebra Institute

International GeoGebra Institute

## GeoGebra Events

- Individual Workshops
- GeoGebra Conferences (1 in 2009; 12 in 2010; 25 in 2011)

[www.geogebra.org/events](http://www.geogebra.org/events)

International GeoGebra Institute

## Website: [www.geogebra.org/IGI](http://www.geogebra.org/IGI)

International GeoGebra Institute

IGI Homepage

**International GeoGebra Institute**

The International GeoGebra Institute (IGI) is the non-profit organisation behind the free mathematics software GeoGebra. In IGI, teachers and researchers from all over the world work together to promote the learning and teaching of mathematics by supporting and coordinating the following activities:

- develop free GeoGebra workshop materials,
- offer workshops for teachers and future GeoGebra trainers,
- further develop GeoGebra and implement new features of the software,
- develop an on-line support system for teachers,
- evaluate and improve the professional development activities and materials,
- design and implement research projects both on GeoGebra and IGI, and
- deliver presentations at national and international conferences.

**Events**

- Edit the GeoGebra Events map and calendar for GeoGebra workshops and conferences
- IGI Calendar for general conference and grant deadlines
- July 2009: International GeoGebra Conference in Linz, Austria, Conference Report (pdf, Conference Wiki)
- May 2008: First IGI Meeting in Cambridge, UK, IGI Meeting Report (pdf) including vision of IGI

**Local GeoGebra Institutes**

Get in touch with your local GeoGebra Institute and attend a workshop or get involved in a project:


- Map of Local GeoGebra Institutes

If you are interested in setting up a local GeoGebra Institute (GI) in your region or country, please read the article below and have a look at our application and certification documents. If you have any questions, please write to


International GeoGebra Institute

## Future: Partner schools

- Involve more teachers in the community
- Schools experimenting with the use of GeoGebra
- Encourage collaboration among schools and teachers
- Be able to offer more support
- Sponsors can donate to schools


International GeoGebra Institute 

# GeoGebra Research

International GeoGebra Institute 


## Research

- Important part in the aims IGI
- Evidence for improvement
  - Software development
  - Training
  - Teaching and learning
  - User community
- Theoretical basis

International GeoGebra Institute 


## Research priorities

- **Several current research projects with GeoGebra**
  - Teacher research (PD, teaching practices)
  - Research on existing materials (WIKI, workshops)
  - Software development/improvement
  - Community research (WIKI, forum, local groups)
  - Student research (understanding, learning, reasoning, proof)
  - Open-source research (availability, accessibility)
  - Other? Research Committee

International GeoGebra Institute 


## Collaboration and activities

- Share experiences/results with colleagues and at meetings/conferences
- Engage research students
  - Bachelor, masters, PhD thesis
  - Research assistants
  - Fellowships
- Write up and publish work/results (practitioner/ research journals)
- Reach out to developing countries and disadvantaged communities

International GeoGebra Institute 

## Research support

- Experienced colleagues can
  - Help with research design and analysis
  - Writing funding applications and publications
  - Organise research methods workshops
- IGI aims to offer research support
  - Administrative
  - Workshops
  - Consultations
  - Possible funding

International GeoGebra Institute 


# GeoGebra's Future

International GeoGebra Institute 

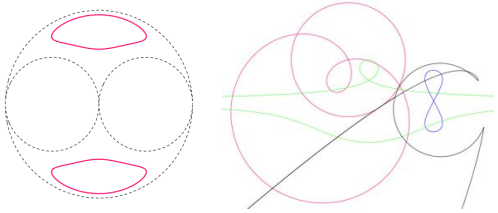
## Google Summer of Code

Grant for GeoGebra to support 5 open source student coding projects in the summer of 2010  
We will have 7 students in 2011


- Philipp Birkbauer, Austria: [Implicit Curves](#)
- Sergio Rodriguez, Spain: [Locus line equation](#)
- Anjneya Varshney, India: [GeoGebraTouch](#)
- Andre Eriksson, Sweden: [GeoGebra3D](#)
- Florian Sonner, Germany: [LayoutManager](#)

International GeoGebra Institute 

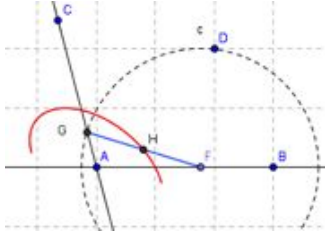
## Implicit Curves: $f(x,y) = 0$




*Philipp Birkbauer, Austria*

International GeoGebra Institute 

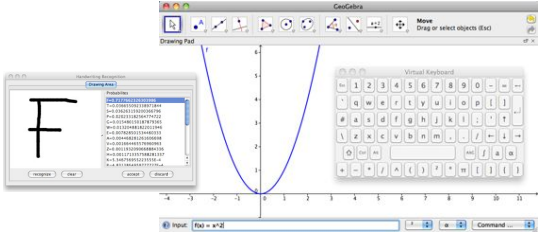
## Locus Line Equation




*Sergio Rodriguez & Miguel Abanades, Spain*

International GeoGebra Institute 

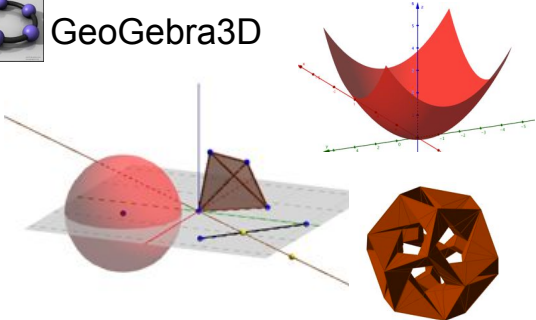
## GeoGebraTouch




*Michael Borchers, UK & Yves Kreis, Luxembourg*

International GeoGebra Institute 

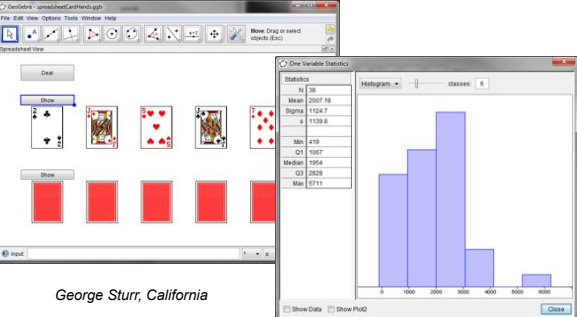
## GeoGebra3D



*Andre Eriksson, Sweden & Mathieu Blossier, France*

International GeoGebra Institute 

## GeoGebraSpreadsheet

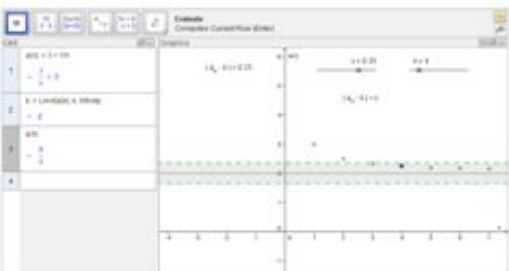


One Variable Statistics
N: 30
Mean: 2007.19
Sigma: 1133.7
Sigma: 1133.8
Min: 410
Q1: 1087
Median: 1954
Q3: 2829
Max: 5711

*George Sturr, California*

International GeoGebra Institute

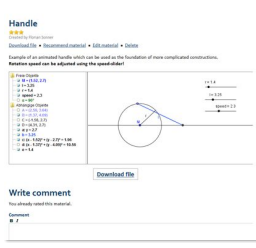
## GeoGebraCAS



- Full integration of a symbolic view in GeoGebra
- Dynamic updates of dependencies
- Easy to use starting from age 13 *Markus Hohenwarter, Austria*

International GeoGebra Institute

## GeoGebraTube



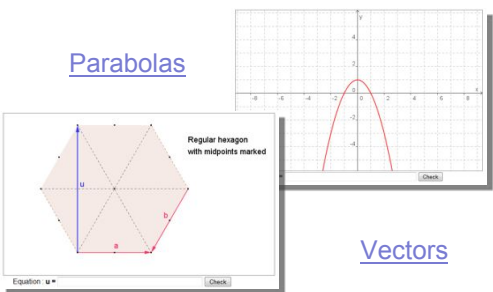
- Material Platform
- Direct upload from GeoGebra
- Rating
- Comments

*Florian Sonner, Germany*

International GeoGebra Institute

## Randomised Exercises

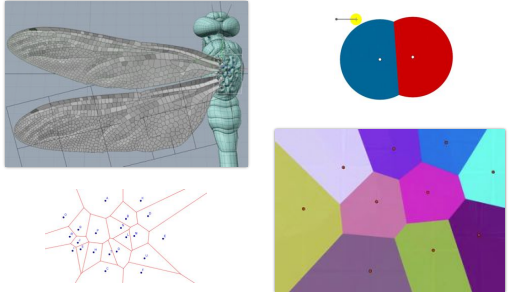
Parabolas



Vectors

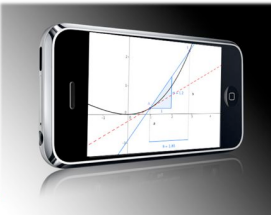
International GeoGebra Institute

## Additional Perspectives



International GeoGebra Institute

## GeoGebraMobile



- GeoGebra Applets should work on Smartphones
- iPhone, iPad, Android

*Gabor Ancsin & Zoltan Kovacs, Szeged, Hungary*

International GeoGebra Institute

## One Laptop per Child Project



*Tata Institute for Fundamental Research, Mumbai, India*



International GeoGebra Institute

## Phoenix: Computer Integrated Science Environments

International GeoGebra Institute

## Argentina 3million netbooks

International GeoGebra Institute

## GeoGebraPrim

■ GeoGebra for Primary schools

International GeoGebra Institute


## Lego Mindstorms Robot project

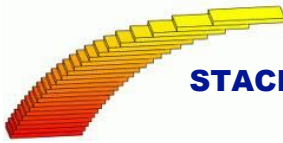
International GeoGebra Institute


## Game consols

International GeoGebra Institute

## GeoGebra and assessment systems

■ **WeBWork, US** 

**STACK, UK** 

**TAO, Luxembourg** 

International GeoGebra Institute

## Textbooks

International GeoGebra Institute

## On-line schools websites

International GeoGebra Institute

## On-line learning – Interactive boards

International GeoGebra Institute

## Facebook: <http://facebook.com/geogebra>

International GeoGebra Institute

## Youtube: <http://www.youtube.com/geogebractionnel>

International GeoGebra Institute


## International GeoGebra Conference

- Hagenberg near Linz Austria
- 29 - 31 August 2011
- Release of GeoGebra 4
  - GeoGebraCAS
  - GeoGebraTube
  - GeoGebraMobile

International GeoGebra Institute 

### Conferences 2011-Events calendar

- **January**
  - GeoGebra South-East Europe, Novi Sad, Serbia
- **February**
  - Barcelona GeoGebra conference, Barcelona, Spain
- **May**
  - GeoGebra Middle East, Teheran, Iran
  - Norma-11 Iceland, GeoGebra day
  - GeoGebra Eastern Europe, Miskolc, Hungary
  - GeoGebra, Andalucia, Spain
  - GeoGebra Institute opening conference, Bari, Italy
- **July**
  - GeoGebra US Midwest, Oxford, Ohio
  - GeoGebra North America, Toronto, Canada
  - PME GeoGebra WG, Ankara, Turkey

International GeoGebra Institute 

### Conferences 2011

- **August**
  - IGI Annual conference, Linz, Austria
- **September**
  - GeoGebra Italy conference, Torino, Italy
  - Second Polish GeoGebra conference, Warsaw, Poland
  - Nordic GeoGebra Network conference, Lithuania
- **October**
  - GeoGebra Ukraine, Kharkiv, Ukraine
- **November**
  - GeoGebra South America, Sao Paulo, Brazil
  - GeoGebra day, Penang, Malaysia
  - GeoGebra Hungary, Budapest, Hungary
- **Further conference will be announced**

  
**GeoGebra**  
<http://geogebra.org>

**THANK YOU!**

**QUESTIONS?**