

GeometryEditor & GeoSite

(1st test version to be released 01/01/2008)

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GeometryEditor Overview

- A Dynamic Geometry System to explore mathematical concepts
 - Manipulative authoring
- A Web-based system
 - No software installation required
- (for developers) A package for building more sophisticated Web applications that need mathematical drawing support
 - GeoSite, BBS, DMAD and so on...

GeoSite Overview

- A Web-based application
 - Manipulative authoring
 - GeometryEditor
 - Other authoring tools following some standards
 - Educational page authoring
 - More than normal WYSIWYG HTML editing
 - Interaction between manipulatives and surrounding HTML
- Repository of manipulatives and educational pages
 - Can be embedded/reused elsewhere

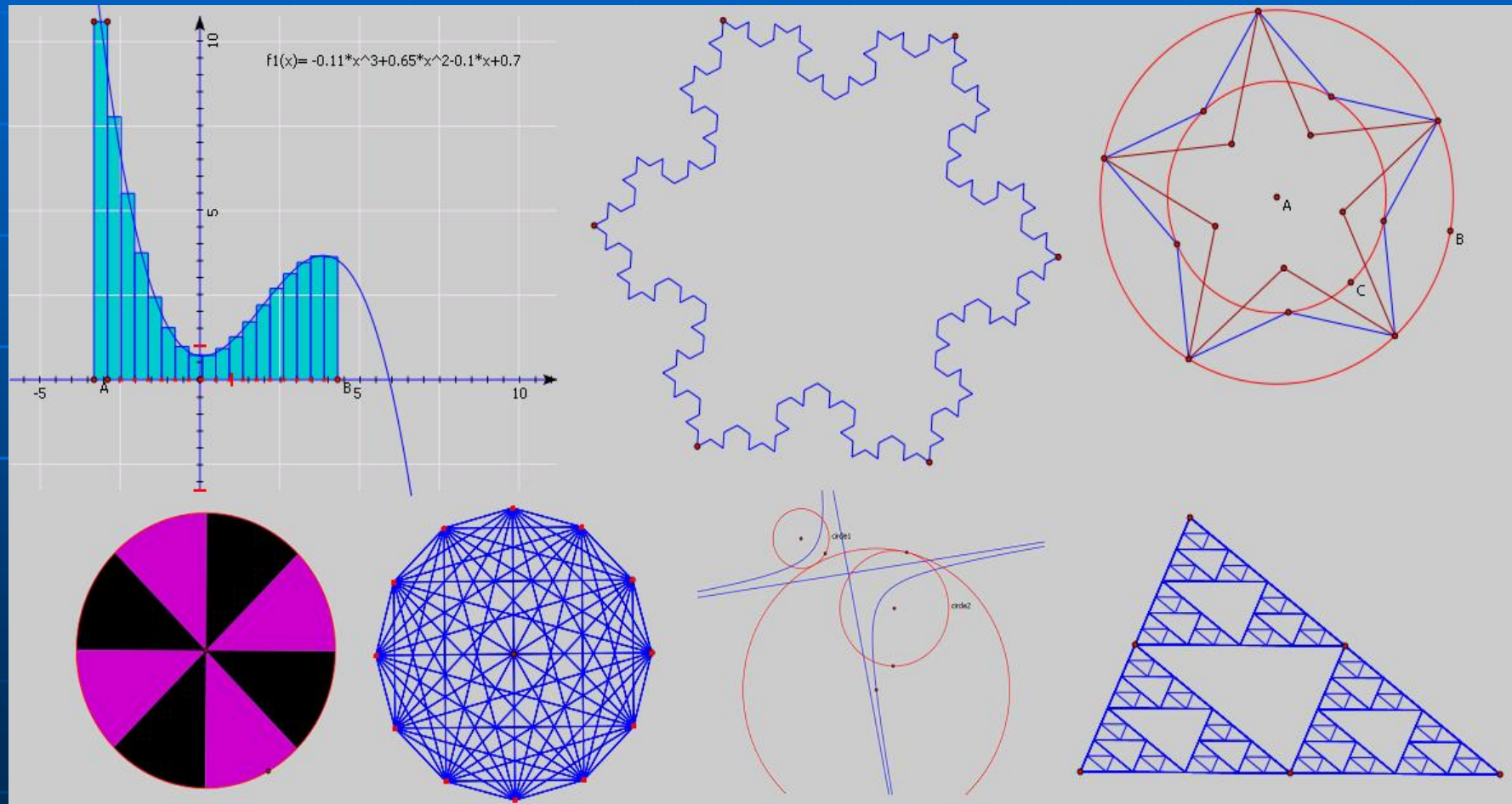
Status of GeometryEditor

- Progress, goals and implemented features
 - <http://www.cs.kent.edu/~xlai/geosite/GeometryEditor/doc/2007/tasks.html> (04/06-02/07)
 - <http://www.cs.kent.edu/~xlai/geosite/GeometryEditor/doc/2007/shorttermTasks.txt> (02/07-present)
 - Need to prioritize unfinished requirements
 - Before or after the release of the first test version
 - First test version to be released (01/01/08)

GeometryEditor Modules Composition

- Graphical core (jsmin-ed)
 - 260KB, 18,000 lines of codes, 110 classes
- GeometryEditor.js: a layer between the graphical core and a client Web application
 - 50KB, 2,000 lines of codes
- Around 40 types of dialogs and their related Javascript files
- Open source libraries used:
 - [Dynarch.com DHTML menus](#) (50KB integrated into GeometryEditor.js)

An authoring tool



A package for building Web-applications

- Documentation:
 - <http://wme.cs.kent.edu/geosvg/documentation.html>
- Selected examples:
 - [Function plotting](#)
 - [Cutting a circle](#)

Calculator in GeometryEditor

- Infix input and MathML display
 - has nothing to do with SVG
- Real-time calculation
- Real-time error message feedback
- Operands can be objects from the canvas
- Can handle numeric, boolean and color expressions
- Can convert different units in distance and angle

http://localhost - Mozilla Firefox

$$\frac{4^2 + \sqrt{5}}{3} = 6.08$$

(4^2+sqrt(5))/3|

true	7	8	9	+	,	inches	Values	▼
false	4	5	6	-	(pixels	Functions	▼
and	1	2	3	*)	degrees	Units	▼
or	0	.	^	/	%	radians	Equation	▼
not	pi	e	x	C	<-	cm	Color	

Cancel OK

Done

Technology detail: algorithms for authoring supports

- Skipped....
 - Who is interested???

Technology detail: GeometryEditor.js

- A layer between the graphical core and a client Web application
- Most problems I encountered and solved may be helpful to your projects
- Relates to the Manipulative Architecture Dr. Wang has defined
 - <http://www.cs.kent.edu/~xlai/geosite/GeometryEditor/doc/2007/manipulative%20arthitecture.txt>
- Will come back to this if time allows

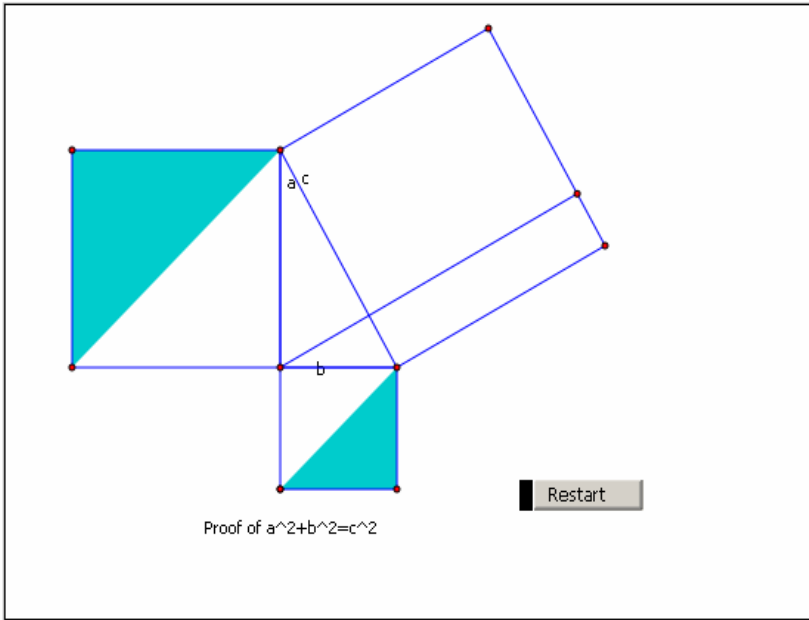
Status of GeoSite

- GeoSite is just a Web-application built upon GeometryEditor
 - GeometryEditor does NOT provide any special codes for GeoSite
- Features that can demonstrate the capability of GeometryEditor are being developed first
- AJAX is extensively used
- First test site will be released with GeometryEditor (01/01/08)
- <http://www.cs.kent.edu/~xlai/geosite/viewfolder.html?id=/tester1/>

GeoSite v0.1 demonstrating GeometryEditor v0.1

>> tester1

<input type="checkbox"/>	Name	Author	Date Modified	Size
<input type="checkbox"/>	geometry	tester1	November 08 2007 23:43:04	
<input type="checkbox"/>	aa	tester1	November 04 2007 17:02:03	1K
<input type="checkbox"/>	complete graph	tester1	November 08 2007 18:20:03	2K
<input type="checkbox"/>	Pythagoras	tester1	November 08 2007 18:10:57	10K
<input type="checkbox"/>	Pythagoras2	tester1	November 08 2007 18:16:05	9K
<input type="checkbox"/>	test	tester1	November 04 2007 17:52:32	3K
<input type="checkbox"/>	Triangle	tester1	November 04 2007 21:36:03	6K
<input type="checkbox"/>	two proofs of Pythagoras	tester1	November 11 2007 16:15:57	3K

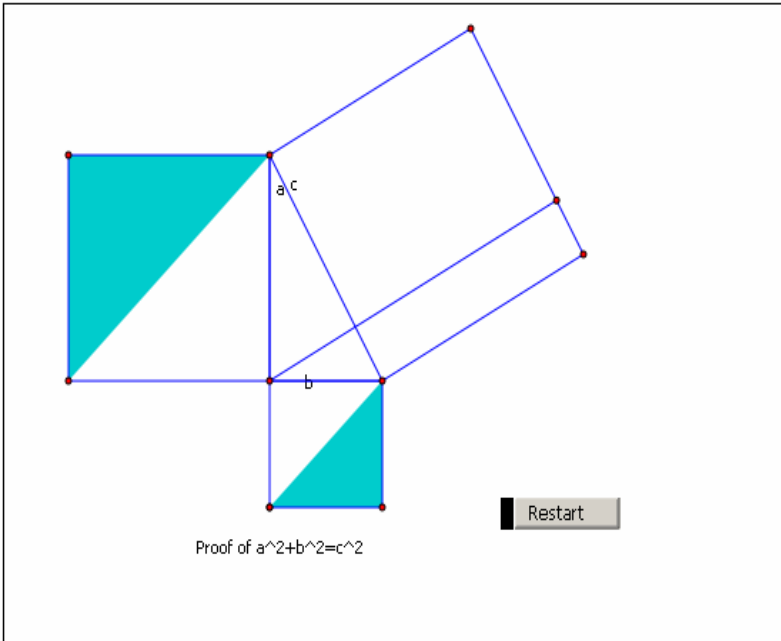


About this manipulative:

Author: tester
ID: /tester1/Pythagoras
Absolute ID: _mq9JAjk1xyEI
URL:
Embed:
Data URL:

GeoSite v0.1 demonstrating GeometryEditor v0.1

>> tester1 > [manipulative] Pythagoras



About this manipulative:

Author: tester1
ID: /tester1/Pythagoras
Absolute ID: _mq9UAjk1xyEI
URL:
Embed:
Data URL:

In [mathematics](#), the **Pythagorean theorem** ([AmE](#)) or **Pythagoras' theorem** ([BrE](#)) is a relation in [Euclidean geometry](#) among the three sides of a [right triangle](#). The theorem is named after the [Greek mathematician Pythagoras](#), who by tradition is credited with its discovery and proof,^[1] although knowledge of the theorem almost certainly predates him. The first recorded use is in [China](#), known as the "Gougu theorem"

The theorem is as follows:

In any right triangle, the area of the [square](#) whose side is the [hypotenuse](#) (the side opposite the right angle) is equal to the sum of the areas of the squares whose sides are the two legs (the two sides that meet at a right angle).

This is usually summarized as:

The square on the hypotenuse is equal to the sum of the squares on the other two sides.

If we let c be the [length](#) of the hypotenuse and a and b be the lengths of the other two sides, the theorem can be expressed as the equation

$$a^2 + b^2 = c^2$$

Embedding in your page a manipulative from GeoSite

- Experience with embedding Youtube videos in your Web pages?
- GeoSite provides the html codes for you to embed a manipulative correctly
- Example:
 - <http://totemmath.blogspot.com/>

Again technology detail in GeometryEditor: GeometryEditor.js

- is the only javascript file you need to include:
 - class *GeometryEditor* is in this file
 - its constructor creates instances
- set up correct connection among
 - the container element
 - embed element
 - window object of the embedded svg document
 - pop-up dialogs
 - data from an URL

GeometryEditor.js (cont.)

- Dialog management
 - simulate modal dialog (checkFocus)
 - disable dialog/window below
 - cascading closing of dialogs: closing an opener will close its descendent dialogs
 - cooperate with the graphical core to determine what objects can be selected as an input to the dialog
 - onload/onunload/onOK/onCancel/onFinish/onStart/onApply
 - communications among dialogs

GeometryEditor.js (cont.)

- data retrieving
 - able to load data string
 - able to load a data URL from anywhere
- menu/toolbar customization and setting-up
 - customization of system provided menu/toolbar
 - adding application-defined menu/toolbar
 - enable/disable menu items and toolbar buttons depending on system status
 - setup menu items or toolbar buttons for macros

GeometryEditor.js (cont.)

- Serialization of data
 - macro
 - data from graphical core
 - menu/toolbar

GeometryEditor.js (cont.)

■ Callback APIs

- Must handle asynchronization correctly
 - svg file loading
 - data update invoked by API (either set dataURL or dataValue)
 - from dataURL: asynchronization inavoidable
 - from dataValue: avoid spendinging too much time interpreting the dataStr
- GeometryEditor_OnCreateDone
- GeometryEditor_onUpdateDone
- onObjectChangeListener
- onSaveListener

GeometryEditor.js (cont.)

- Non-callback APIs
 - addMenuset()
 - addToolbarset()
 - getDataValue()
 - getInitDataValue()
 - getDataURL()
 - addMacro()
 - getMacro()
 - get()
 - addObjectChangeListener()

More APIs??

- It's possible to provide APIs like
 - `newCS(x, y, ...)` // coordinate system
 - `newPoint(x, y)`
 - `newLine(point1, point2)`
 - `newLine(equation)`
- Are they needed?
- Need to see more requirements

Future work

- Release the first test version 01/01/2008
 - **Where to announce it?**
 - Mathforum
 - geometry-software-dynamic@support1.mathforum.org
 - SVG group
 - <http://www.svg.org/>
 - svg-developers@yahoogroups.com
 - **More ??**
- Collect feedbacks
- Finish features listed in that [shorttermTasks.txt](#) file