# JSXGraph - presence & future

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# Dynamic geometry / mathematics in Bayreuth

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## sketchometry

- Dynamic geometry system
- Audience: student

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## JessieCode

- Programming language and compiler
- Audience: web author, programmer, (student)

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## JSXGraph

- Javascript library
- Audience: web developer, programmer

# JSXGraph

*JSXGraph is a cross-browser JavaScript library for **interactive geometry**, **function plotting**, **charting**, and **data visualization** in the web browser.*

- http://jsxgraph.org
- Open source http://github.com/jsxgraph/jsxgraph
- License: LGPL and MIT
- First presented in 2008

# Technical specifications

- Standalone library
- Needs approx. **140 kB** (including JessieCode)
- Supports mouse, pointer, multi-touch
- Runs in every **web browser** and in **ebooks** (epub3, ibook)
- Runs even in IE 5.5+
- Seamless integration into HTML page
- Server-based computations easily possible
- High quality graphics output: SVG or canvas or VML
- Supports Mathjax

# Content

- Dynamic geometry
- Function plotting
- (Parametric and polar) curves
- ...

# Example

```
var board = JXG.JSXGraph.initBoard('box',
        {boundingbox: [-1.5, 2, 1.5, -1], keepaspectratio:true});

var A = board.create('point', [1, 0]),
    B = board.create('point', [-1, 0]),
    C = board.create('point', [0.2, 1.5]),
    pol = board.create('polygon',[A,B,C], {
            fillColor: '#FFFF00',
            lines: {
                strokeWidth: 2,
                strokeColor: '#009256'
            }
        });

var pABC = board.create('perpendicular', [pol.borders[0], C]),
    pBCA = board.create('perpendicular', [pol.borders[1], A]),
    pCAB = board.create('perpendicular', [pol.borders[2], B]),
```

# Special features

- Various curve types
- Turtle graphics
- Differential equations
- Animations
- ...
- Moodle plug-in
- STACK plug-in

# JessieCode

- **Programming language** and **compiler** for geometry and mathematical visualization
- Example and reference: http://bin.sketchometry.org
- Open source http://github.com
- License: LGPL and MIT

# Example

```
p = point(-1, 0);
circ = circle(p, 3);
q = glider(-1.7, 3.1, circ);

segment(p, q);
```

# Why JessieCode?

- Input easier than JavaScript
- Security (e.g. when used in web forum)
- Allows math syntax instead of JavaScript input
- Compiles to JavaScript and JessieCode

# JavaScript vs. JessieCode

## JavaScript:

```
var s = board.create('slider', [[-2,2], [2,2], [-10, 1, 10]]);

var f = function {return s.Value() * Math.sin(x * x); };

var plot = board.create('functiongraph', [f]);
```

## JessieCode:

```
s = slider([[-2,2], [2,2], [-10, 1, 10]]);

f = map (x) -> s * sin(x^2);

plot = functiongraph(f);
```

# Features

- Parsed language (JavaScript-like):
  - All JSXGraph objects, e.g. `point(x,y)`
  - Loops,
  - conditional statements,
  - functions,
  - maps, ...

# sketchometry

- https://sketchometry.org
- Dynamic geometry system
- based on *JSXGraph* and *JessieCode*
- Translated in many languages
- Focus on - but not restricted to - *touch devices*
- Interaction by *sketching*
- Responsive design: even usable on smartphones
- Free

- ***sketchometry* is not an *authoring tool* for teachers:**
- Teachers like to use dynamic geometry systems to create sophisticated constructions which they
  - present in classroom
  - give to students for exploration
- ***sketchometry* is a sketching tool for students:**
- Students sketch their ideas on a (nearly) blank *sketchometry* canvas
- and write down their results in their (paper) notebook

# JSXGraph - presence

- ERASMUS+ projects **COMPASS** and **SCORE**: create content and questions for STEM courses in moodle.
- ERASMUS+ project **ITEMS**: teach how to use JSXGraph standalone, in moodle and/or using STACK
- Examples:
  - https://examples.jsxgraph.org
  - More during this workshop

# JSXGraph - future

- JSXGraph conference: https://jsxgraph.org/conf/
- 8./9. October 2020: Bayreuth, Germany

# Thank you!

http://jsxgraph.org/