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Interactive applets in Moodle using JSXGraph

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ITEMS project

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Presentation outline

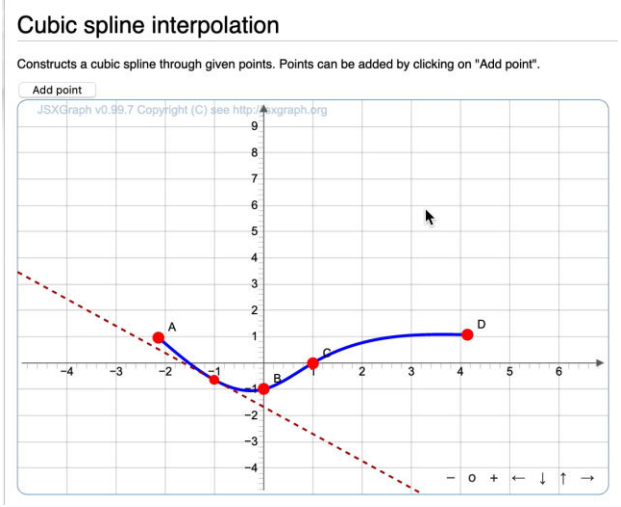
1. *JSXGraph library*
2. *JSXGraph Moodle plugin*
3. *JSXGraph book*
4. *JSXGraph in Moodle as a tool for visualizing constructions*
5. *ITEMS Project*
6. *JSXGraph and Moodle Formulas plugin*
7. *JSXGraph and Stack plugin, Abacus consortium*
8. *JSXGraph Conference in 2020*

JSXGraph library

www: https://jsxgraph.org/

Interactive geometry, plotting, visualization

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




```
var board = JXG.JSXGraph.initBoard('box', {boundingbox: [-5, 10, 7, -5], axis:true});
var p = [];
p[0] = board.create('point', [-1,2], {size: 4, face: 'o'});
p[1] = board.create('point', [0,-1], {size: 4, face: 'o'});
p[2] = board.create('point', [1,0], {size: 4, face: 'o'});
p[3] = board.create('point', [2,1], {size: 4, face: 'o'});

var c = board.create('spline', p, {strokeWidth:3});

var g = board.create('glider', [1.5,0,c], {name:'',style:8});
var t = board.create('tangent', [g], {dash:2,strokeColor:'#aa0000'});

function addPoint() {
    p.push(board.create('point',[(Math.random()-0.5)*10,(Math.random()-0.5)*3],{size: 4, face: 'o'}));
    board.update();
}
```

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JSXGraph Moodle plugin

- https://moodle.org/plugins/filter_jsxgraph
- https://github.com/jsxgraph/moodle-filter_jsxgraph
- Build constructions in Moodle Activities or Moodle Resources

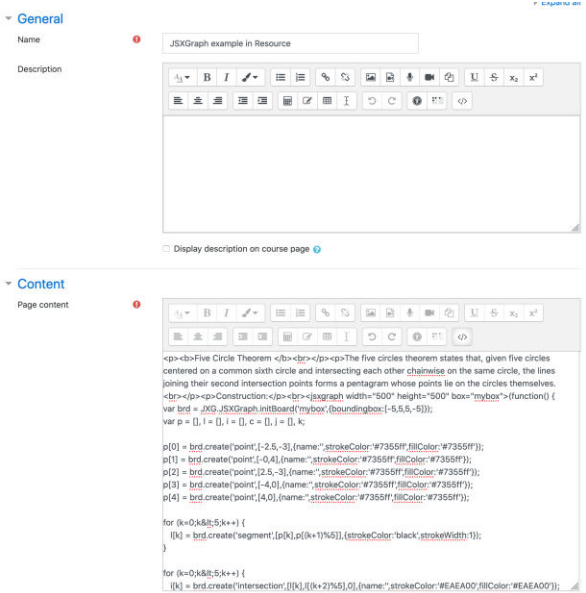
Example:

```
<jsxgraph width="600" height="500" box="mybox">
    (function() {
        var brd = JXG.JSXGraph.initBoard('mybox', {boundingbox:[-5,5,5,-5], axis:true});
        var p = brd.create('point', [1,2]);
    })();
</jsxgraph>
```

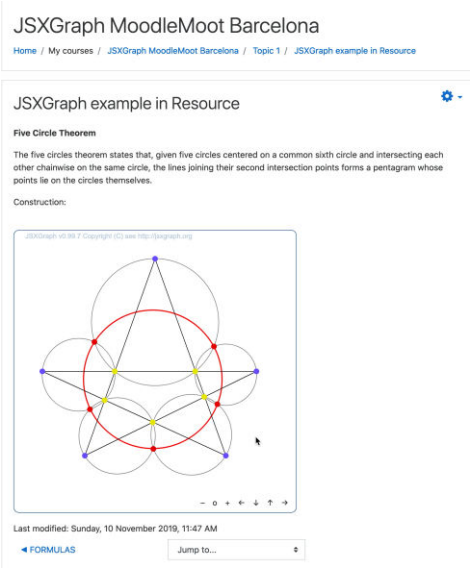
JSXGraph in Moodle as a tool for visualizing constructions

- every JSXGraph construction can be embedded in Moodle

Input



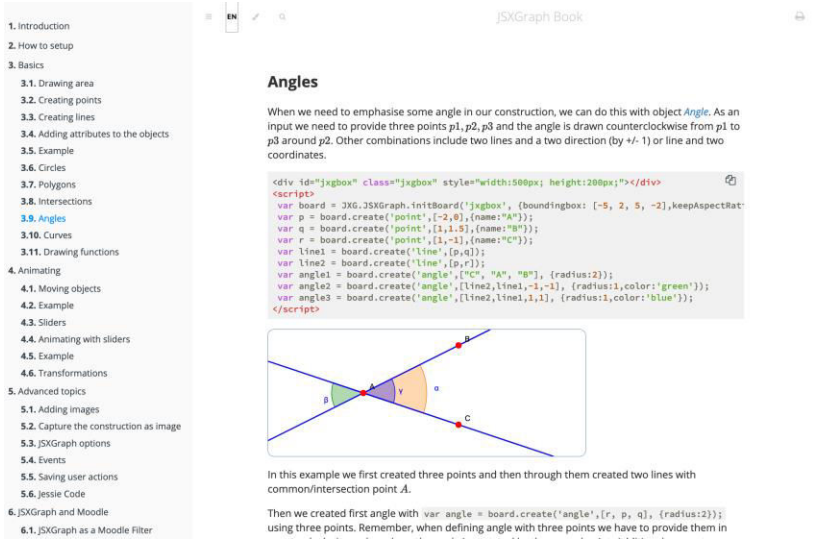
Result



Link

JSXGraph Book

- **Introduction to programming with JSXGraph**
- https://ipesek.github.io/jsxgraphbook/
- Under active development
- Multilanguage (English, German, Spanish, Czech, Slovene, Finnish, etc)



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ITEMS project

www: https://itemspro.eu/

Objectives

- To create ICT STEM-based modules integrating e-assessment tools and assignments
- To research on the use of JSXGraph software
- To monitor the pedagogical effectiveness of materials by means of Learning Analytics tools
- To promote professional development training activities and the mentoring of educators involved.
- To distribute materials created as Open Education Resources (OER) and through MOOCs.

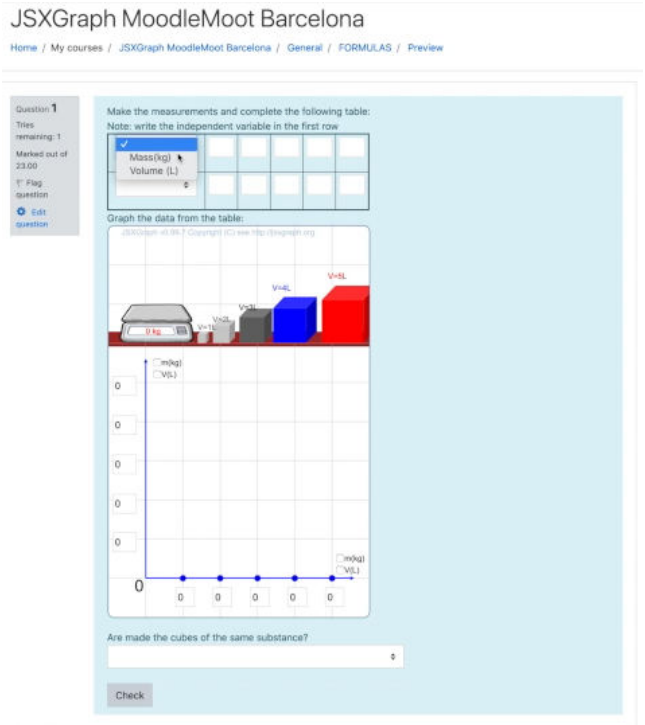
ITEMS moodle

- https://moodle.itemspro.eu/
- accessible also through Google account
- LTI connection possible on the content
- Content (using JSXGraph)
  - Physics
  - Mathematics
  - Science

Co-funded by the Erasmus+ Programme of the European Union

JSXGraph and Moodle Formulas question type plugin

- JSXGraph interacts with Moodle Formulas question type (https://moodleformulas.org/)
- introducing randomization in the questions
- saves user interaction



JSXGraph and STACK question type, Abacus

- The STACK question type adds a sophisticated assessment in mathematics and related disciplines, with emphasis on formative assessment underpinned by computer algebra.
- www: https://moodle.org/plugins/qtype_stack

- Abacus is a material bank for STEM education based at Aalto University, Finland. We seek to produce, share and host high-quality educational material between collaborators.
- www: https://abacus.aalto.fi
- More than 9000 problems, 7000 of them as STACK questions.
  - Aalto University => more than 200k STACK questions answered,
  - Open University (UK) => 500k STACK questions answered

Question 1

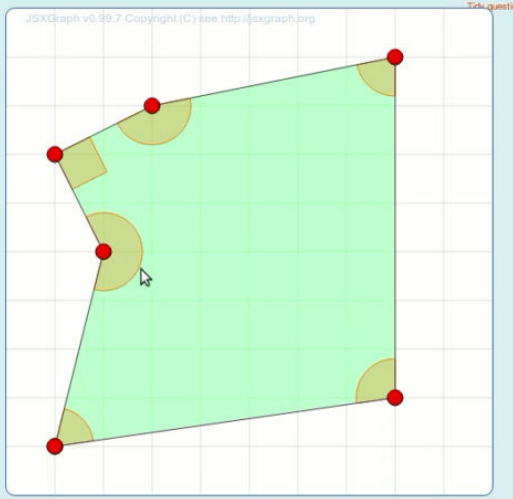
Not complete

Marked out of 1.00

Flag question

Edit question

Tidy question | Question tests & deployed versions



Place the vertices of the hexagon so that

- Three of the angles are either **acute** or **obtuse** angles i.e. between 0° and 180°.
- The other three angles are **reflex** angles i.e. between 180° and 360°.

Note that the hexagon has to be non-self-intersecting!

Check

Next page

Save in category: JSXGraph+STACK (6)

Question name: Complex Multiplication

Question tests & deployed versions

Question variables:

```
z1 : 1+i;
ta1 : i;
```

Random group:

Question text:

```
<div style="max-width:70em">
<br>

<span class="multilang" lang="fi"><p>Määritä sellainen kompleksiluku \(w\), että kertolasku
\(w\cdot z_1\) kiertää pistettä \(z_1\) origon ympäri \(90^\circ\) vastapäivään.</p></span>
<span class="multilang" lang="en"><p>Find a complex number \(w\) such that the multiplication
\(w\cdot z_1\) rotates the point \(z_1\) \(90^\circ\) degrees around the origin.</p></span>

<br>

<p>\(w=~\)[[input:ans1]]</p>
<p>[[validation:ans1]]</p>

<script type="text/javascript">
var startAnimation;
</script>

[[jsxgraph width="500px" height="500px"]]

MathJax.Hub.processSectionDelay = 0;

var board = JXG.JSXGraph.initBoard(divid, {
 boundingbox : [-5,5,5,-5],
 axis : false,
```

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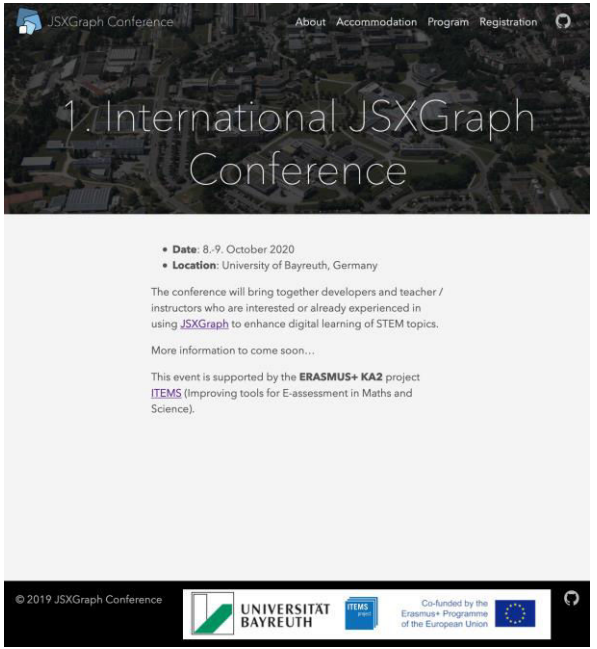
JSXGraph conference in 2020

Date: 8.-9. October 2020
Location: University of Bayreuth, Germany

Topics:
- JSXGraph
- JSXGraph and Moodle



www: https://jsxgraph.org/conf/

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Questions?