

EUROMATH

MathsAccess4All



EuroMath - Enhanced support to teachers and learners with visual impairments in inclusive educational settings through innovative ICT-based math instruction

EuroMath

EuroMath application is:

The result of three Polish, Irish and Dutch partners cooperating

A cross-platform web application (Windows, Android, iOS) that provides accessibility mechanisms for teachers, vision-impaired and blind students.

The main EuroMath application offers the following facilities

- Text editing formatting;
- Mathematical formulae editing using three editors-AsciiMath, UnicodeMath and Braille editor into the mathematical notation of BNM or UEB
- The navigating system based on both English/Polish languages
- Importing/Exporting Graphics for (SVG, PNG, JPG)
- Describing SVG graphics imported (e.g. from GeoGebra) saved without layers
- Text, formulae and numbers importing from, e.g. MS Word, AllerCalc

- Single/Multiple choices and open questions quiz designing include all elements such as text, formulae, graphics, and embedded Desmos object)
- Quiz editing and navigating
- Combining expressions, graphics, texts
- Creating tasks and sets of mathematical tasks in multi-page documents saved in the EPUB3 format
- Document operating such as new, open, save, delete, save as export/import to/from the repository
- Saving in the system of local files, repository or file system in the cloud Google Drive, OneDrive
- Navigating through document pages or contents of one page of a document.

Requirements

Hardware requirements: PC computer, laptop or tablet

Software requirement: Web Browsers Edge, Chrome or Firefox (other web browsers in most cases work)

Assistive technology or communication interface

- Internet Web browser, plus NVDA or JAWS screen reader for blind users
- Magnifier Supernova for the partially sighted user
- Synthetic speech for reading semantic formulas in Polish and English.
- Braille display for reading a text and mathematical formulae in BNM and UEB.
- QWERTY keyboards for writing text and math formulas in AsciiMath.
- Virtual Braille keyboard emulated on a QWERTY keyboard for entering formulae Braille in BNM and UEB notation

External applications interaction

The EuroMath system interacts with the below external applications:

Desmos, <https://www.desmos.com/>

GeoGebra, <https://www.GeoGebra.org/>,

- A teacher in the EuroMath application embeds the Desmos Graphing Calculator
- A blind student in the embedded object Desmos Graphing Calculator edits expressions and creates graphs with sound. Vision impaired students can evaluate their results using embedded Desmos.

DCU Converters and Translators

A User writes text and formulae in the Euromath application document using Ascii math, Unicode Math editor or braille editor.

Ctrl + P print braille document.

Text is converted to braille using DCU translator and formulae are converted with MathML2UEB.

For both text and formulae, DCU also provided back translation.

Worksheet collection

This collection was provided to emphasize practice and encourage teachers to be creative as much as possible.

On average the topics in the school math curriculum include Algebra, Data, Measures, Shape/Space & Geometry, and Number.

These subjects aim to develop student skills in problem-solving, Communicating and expressing, integrating and connecting, Reasoning, Implementing and Understanding and recalling.

There is no difference in representing text-based material to sighted and VI.

25% of all topics contain visual aspects like shape, pattern, number line, chart, graph, diagram, picture, and table.

Visual-based topics were investigated in terms of the object behind them and finding a textbase alternative.