

## MathML Tutorial and Resources

MathML is a markup language (a variant of XML) for rendering math symbols and equations in a browser. MathML is relevant to 508 compliance because it enables persons with vision disabilities to access complex mathematical formulas and symbols by using their screen reader. As of October 2011:

- MathML released a new version (v3) that works with HTML5 and is automatically rendered by all modern browsers (plus has a workaround for IE)
- MathML has been officially recommended by the W3C for displaying equations in HTML.
- MathML is now considered accessible – either natively in the modern browsers or with some javascript-assisted technology for IE and smart phones.

### **Social Security Administration (SSA) workflow for MathML:**

Equations only really appear in our research papers and articles. Authors supply the equations within their Word documents/manuscripts. These are created by the authors using MathType. For our print/PDF production process, we export from MathML to EPS for inclusion in Adobe InDesign layouts - these are NOT accessible.

For our HTML workflow (accessible), we open the equation in MathType. (If we don't have a MathType version of the equation, we would build it from scratch in MathType - currently version 6 is being used in our office.) Under the Preferences menu in MathType, choose Translators. Select "Translation to other language (text) - MathML 2.0 (no namespace)" and deselect "Include translator name in translation" and "Include MathType data in translation." (These settings will stay from file to file and only have to be set once.)

Once those settings are in, simply click and drag to highlight the equation in the big, white workspace. Select copy (or Ctrl-C). Open your HTML file in an editor (we use Dreamweaver), and select paste (or Ctrl-V). Even though you selected a visual representation of the equation, it will paste into the HTML editor as MathML 2.0.

We've found that the equations render better if we remove the outer <semantics> tags around the equation code as well as the <annotation> tag at the bottom.

MathML renders well in all modern browsers (Chrome, Firefox, Opera, Safari, IE9). For the benefit of IE8 and earlier, we include an external javascript called MathJax. The following code goes in the head section of our HTML page:

```
<!--MathJax script --><script src="http://cdn.mathjax.org/mathjax/latest/MathJax.js?config=Accessible"></script>
```

Learn more about MathJax here: <http://www.mathjax.org/>

Learn more about MathType here: <http://www.dessci.com/en/products/mathtype/>

(Once HTML5 adoption becomes more common, we'll go back and strip the MathJax script from our pages.)

Concerns: MathJax script requires javascript to be enabled in the browser. If javascript is disabled, equation won't show. (Only a problem for IE8 and earlier.) For a page with a LOT of equations, see 2nd federal/SSA example below, it can take a long time for the math to render onscreen. There are some rendering differences in complex equations between the Webkit browsers and IE/MathJax. We've decided these aren't dealbreakers because IE8 and earlier will eventually be obsolete.

Bottom line: We've decided to move to MathML now, in anticipation of wider dissemination of HTML5 in the near future. We had articles that simply weren't posted because we didn't have equation alt text and so we decided it was in the greatest good to post these with MathML now even if a small percentage of users might be on older browsers and older assistive technologies that couldn't render them. Also, we found that MathML is generally

accepted as MORE accessible than images with alternative text because the underlying metadata conveys more detailed info for screen readers and MathML can be easily enlarged for users with other vision problems.

**Questions:** Contact Jessie Dalrymple, [jessie.dalrymple@ssa.gov](mailto:jessie.dalrymple@ssa.gov), SSA Production Specialist

**Tutorials on MathML language and syntax:**

[A primer in MathML](#) (Sunil Kumar Singh, Connexions website)

[A Gentle Introduction to MathML](#) (Robert Miner and Jeff Schaeffer, Design Science)

[A Beginner's Guide to MathML](#) (Daniel Scully, freelance web designer, Coventry UK)

**Overview of MathML in presentation format:**

[MathML: Presenting and Capturing Mathematics for the Web](#) (Michael Kohlhase, Carnegie Mellon University) – [PDF]

[World Wide Web Consortium \(W3C\) Math Home page](#) (MathML)

**Federal government examples using MathML:**

[http://www.socialsecurity.gov/policy/docs/statcomps/income\\_pop55/2006/apn.html](http://www.socialsecurity.gov/policy/docs/statcomps/income_pop55/2006/apn.html)

<http://www.socialsecurity.gov/policy/docs/workingpapers/wp111.html>

**Appearance of Greek/math symbols in narrative text parts of PDF documents:**

SSA's Accessibility Center tested screen reader interpretation of symbols in narrative parts of PDF document: "This sample does not read the symbols correctly  $\sigma$  and  $\Sigma$  are both read as "s",  $\alpha$  is read over unintelligible. Our best practice is to have a text description of the formula either directly on the page or in ALT text - which in a PDF can be applied to anything."

In Acrobat, you can use the TouchUp Text tool to select a single character in the text. Then right-click to get the contextual menu and choose "Properties" at the bottom. From the resulting pop-up box, choose the "Content" tab. You can type the appropriate read-aloud text in the "Expansion Text" box. That expansion text will then replace the symbol during the reading.