PreTeXt Authoring Quick Reference

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For more details, see

https://pretextbook.org/doc/guide/html/

PreTeXt Documents

For an article

```
<?xml version="1.0" encoding="UTF-8"?>
<pretext>
  <article>
    <title>Hello World!</title>
    <p>This is a PreTeXt document.</p>
  </article>
</pretext>
```

or a book

```
<?xml version="1.0" encoding="UTF-8"?>
<pretext>
  <book>
    <title>Hello World!</title>

    <chapter>
     <title>My Great Chapter</title>
     <p>This is a PreTeXt document.</p>
    </chapter>

  </book>
</pretext>
```

Structure of a PreTeXt Document

PreTeXt documents are structured and may contain divisions such as `<chapter>` (for books), `<section>`, `<subsection>`, and `<p>` (paragraphs).

```
<section>
  <title>Mandatory</title>
  <p>First paragraph. </p>

  <p>Second paragraph.</p>
</section>
```

Divisions may contain other divisions. Divisions require a `<title>`.

```
<section>
  <title>Mandatory</title>
  <introduction>
    <p>Introductory text. (Optional.)</p>
  </introduction>

  <subsection>
    <title>Mandatory</title>
    <p>Subsection content.</p>
  </subsection>

</subsection>

<conclusion>
  <p>Concluding text. (Optional.)</p>
</conclusion>
</section>
```

Blocks

Besides paragraphs (`<p>`) the most common object to include in a division, `<remark>`, `<example>`, `<figure>` and `<table>`.

Cross-References

Any element that you place a `@xml:id` on can become the target of a cross-reference. For example, suppose your source had `<subsection xml:id="subsection-flowers">` and someplace else you wrote `<xref ref="subsection-flowers" />`.

Mathematics in PreTeXt

Since PreTeXt has robust support for mathematical formulas. Inside the tags that delimit math environments, your code is basically LaTeX with the caveat that you must be careful with <, >, and & since they are special symbols for XML. When typing math in your PreTeXt code, use `\lt` for <, `\gt` for >, and `\amp` for &.

For inline math, wrap things in the `<m>` tag: $a^2 + b^2 = c^2$ is produced by `<m>a^2 + b^2 = c^2</m>`.

We get displayed equations via the `<me>` and `<men>`. (to produce a numbered equation) tags. The code

```
<me>
  \frac{d}{dx} \int_1^x \frac{1}{t}\, dt
</me>
<men xml:id="eqn-ftc">
  \int_a^b f(x)\, dx = F(b) - F(a)
</men>
```

produces

$$\frac{d}{dx} \int_1^x \frac{1}{t}\, dt$$

$$\int_a^b f(x)\, dx = F(b) - F(a) \tag{1}$$

For a collection of equations all aligned at a designated point, use `<md>` and `<mrow>` (`<mdn>` for numbered equations.). The code

```
<md>
  <mrow>x \amp = r\cos\theta</mrow>
  <mrow>y \amp = r\sin\theta</mrow>
</md>
```

produces

$$x = r\cos\theta$$
$$y = r\sin\theta.$$

Images, Figures, sidebyside

Images can be included using the `<image>` tag with the `@source`. The `@width` attribute can be used to control the size of the image. Images can be wrapped inside a `<figure>`. A `<figure>` must have a `<caption>`, and the figure will be numbered. The `<sidebyside>` tag provides flexible options for placing several images together or combining figures with subcaptions. PreTeXt provides support for authoring with graphics languages such as Asymptote, TikZ, PGF, PSTricks, and xy-pic in addition to using Sage code to describe a plot or image. In most cases output can be obtained as smoothly-scalable SVG images, in addition to other formats like PDF or PNG. For accessibility, every `<image>` should either have a `<description>` child.

```
<figure xml:id="figure-spring-mass">
  <image width="60\%" xml:id="spring-mass">
    <description>a mass on a table that is
      attached to a wall with a spring</description>
    <latex-image>
      <xi:include href="tikz/spring-mass.tex"
        parse="text"/>
    </latex-image>
  </image>
  <caption>A spring-mass system</caption>
</figure>
```

Lists

The structure of ordered lists (numbered), unordered lists (bullets) and description lists (defined terms) is given by the `<ol>`, `<ul>`, `<dl>` tags (respectively). List items are delimited with the `<li>` tag.

Theorem-Like Elements

The tags `<theorem>`, `<algorithm>`, `<claim>`, `<corollary>`, `<fact>`, `<identity>`, `<lemma>`, and `<proposition>` have the same structure in PreTeXt.

```
<theorem>
    <title>Optional</title>
  <statement>
    <p>Here's the statement of the theorem.</p>
  </statement>

  <proof>
    <p>You don't actually need a proof.</p>
  </proof>
</theorem>
```

Example-Like Elements

The tags `<example>`, `<problem>`, and `<question>` have the same structure in PreTeXt.

```
<example>
  <title>Differentiating a polynomial</title>
  <p>The derivative of the function
  <m>f(x) = 3x^5-7x+5</m> is <m>f'(x) = 15x^4-7</m>.</p>
</example>
```

Axiom-Like Elements

The tags `<assumption>`, `<axiom>`, `<conjecture>`, `<heuristic>`, `<hypothesis>`, and `<principle>` have the same structure in PreTeXt.

```
<axiom>
    <title>Optional</title>
    <creator>Peano</creator>
  <statement>
    <p>Here's the statement of the axiom.</p>
  </statement>
</axiom>
```

Remark-Like Elements

The tags `<convention>`, `<insight>`, `<note>`, `<observation>`, `<remark>`, and `<warning>` have the same structure in PreTeXt.

```
<remark>
  <title>A little remark</title>
  <p>This is a remark.</p>
</remark>
```

Project-Like Elements

The tags `<activity>`, `<exploration>`, `<investigation>`, and `<project>` have the same structure in PreTeXt.

```
<project>
  <title>A structured project</title>
  <introduction>
    <p>Here is the introduction.</p>
  </introduction>

  <task>
    <statement>
      <p>The first step to do.</p>
    </statement>
  </task>

  <task>
    <statement>
      <p>The second step to do.</p>
    </statement>
  </task>

  <conclusion>
    <p>A little wrap up.</p>
  </conclusion>
</project>
```

Exercises

An `<exercise>` in the middle of a division, intermixed between theorems and paragraphs and figures. In this case, it is labeled as a "Checkpoint." You can put several `<exercise>`s as part of an `<exercises>` element within a division, which is the typical way for creating a collection of exercises together at the end of a division such as a chapter or section. An `<exercisegroup>` can group together a collection of exercises that have a set of common instructions.

A specialized division, `<reading-questions>`, can be used to house `<exercise>`s designed to test or guide a reader's comprehension of the material in that division. It is possible to embed WeBWorK exercises into a PreTeXt document

An `<exercise>` has the following structure.

```
<exercise>
  <statement>
    <p>The <c>statement</c> is mandatory.</p>
  </statement>
  <optional-signal/>
  <hint>
    <p>Optional.</p>
  </hint>
  <answer>
    <p>Optional.</p>
  </answer>
  <solution>
    <p>Optional.</p>
  </solution>
</exercise>
```

An element we generically call a "signal" is an important component of an exercise if you want to add something that will be interactive in HTML and Runestone. Signals include `<choices>` for multiple choice questions, `<blocks>` for Parsons (mixed up blocks) problems, `<match>` for matching, `<areas>` for clickable area, `<response>` for short answer, and `<setup>` for fill-in-the-blank. A True/False question simply uses a `correct` attribute on `<statement>` as a signal. The signal element usually has further structure, see `pretextbook.org` for examples and source.

Worksheets

A `<worksheet>` is a specialized division that can be a child of most divisions and can contain most PreTeXt tags.

Tables

Similar to LaTeX PreTeXt provides a `<table>` tag and a `<tabular>` tag. The `<tabular>` tag is used for producing the array of data, while the `<table>` tag provides the number and title.

SageMath Content

A SageMath cell can be included in a PreTeXt document.

```
<sage>
<input>
2+2
</input>
<output>
4
</output>
</sage>
```

SageMath can be used to created an image in a PreTeXt document.

```
<figure xml:id="fig-sage-cubic">
  <caption>A cubic plotted by SageMath on
  <m>[-3,2]</m></caption>

  <image xml:id="sageplot-cubic" width="50%">
    <description>A cubic function on the interval
    [-3,2]</description>

    <sageplot>
    f(x) = (x-1)*(x+1)*(x-2)
    plot(f, (x, -3, 2), color='blue', thickness=3)
    </sageplot>
  </image>
</figure>
```