CTEBVI 2016: Workshop 402

Producing UEB Math with Duxbury DBT

Introduction

Now that we are using UEB in the United States, math is being brailled as UEB math or as Nemeth Code in UEB context. Within the framework laid out by statewide special education departments, teachers are choosing which system to use, sometimes based on the grade level or other circumstances.

But that is a different topic entirely. By attending this workshop, you are expressing your interest in producing some UEB math.

The guidance on the desired braille under this system is in the document *Unified English Braille Guidelines for Technical Material* (2008 version updated August 2014). It is available for download on the UEB page of the International Council on English Braille (ICEB) website at: http://www.iceb.org/ueb.html
or go to the BANA site, select **UEB Information**, and then use the link for the UEB page of the ICEB website.

There are quite a few ways to enter math for producing braille math with DBT, and thus quite a few ways to enter math for producing UEB math with DBT.

All files used in this presentation can be found in http://www.duxburysystems.com/downloads/ctebvi-402.zip

---

Data Entry Methods

1. Enter math in DBT itself.
2. Use MathType to create math in a BANA template Word document to open in DBT.
3. Enter math in MS Word direcly using tools build into Word's autocorrect system; then convert to MathType.
4. Use Scientific Notebook to create a .tex file to open in DBT.
5. Work with a TeX or LaTeX file created in other ways, perhaps written out by a math professor or created from math OCR with InftyReader.

Comments on These Data Entry Methods

Each numbered comment refers to the data entry method above with the same number:

1. DBT does not offer an extensive array of tools to help you with direct math entry.
2. MathType with the BANA template gives good math data entry and editing tools, good ability to structure the braille format, with a sighted-friendly view of the math.
3. Using the autocorrect method for entering mathematics in Word and then converting to MathType offers most or all of the advantages of using MathType directly and is also more accessible.
4. Scientific Notebook is still popular in the Duxbury community. But not as many tools for formatting the braille as when working with Word and the BANA template.
5. LaTeX files from professors or from InftyReader are Very nice when available, most often in colleges.

In general, my personal recommendation is to use MS Word with the BANA Braille 2015 template and MathType, perhaps using the special method for entering mathematics in Microsoft Word. This gives you good tools for creating and displaying the math and for getting the desired BANA format. MathType is fairly inexpensive, especially for schools. Some schools already have multi-user licenses for other purposes.

The Recommended Tool Set

1. DBT 11.3 sr1 or higher
2. SWIFT 4.0 or higher
3. MS Word (2007 or above)
4. BANA Braille 2015 template for Word
5. Mathtype (currently at version 6.9)

Comments

1. DBT 11.3 sr1 was released in December 2015. Use **Help**, **Check for Updates** to make sure you are using this version. Please use the **English (UEB) - BANA** DBT Template.
2. SWIFT 4.0 is a free product from Duxbury Systems that was released in late March 2016. Install SWIFT 4.0 from http://www.duxburysystems.com/swift.asp
See the section below about setting up SWIFT and Word.
3. Microsoft Word is available from many sources.
4. The BANA Braille 2015 template is supplied with DBT 11.3 SR1; SWIFT 4.0 makes it easy to attach this Word template to your Word documents.
5. Mathtype is available from Design Science at http://www.dessci.com/en/products/mathtype for the price of $97 (academic price $57).

The Basics

Whichever method you use to create files for producing UEB braille, it is best to use the DBT template called **English (UEB) - BANA**. This template gives more BANA-specific formatting options than the DBT template called **English (UEB) - Basic**.

The style **math** is for technical notation.

The style **math-TextInMath** is intended for use within the math style for enclosed nontechnical notation.

When importing from Word documents with MathType objects, the MathType objects are assigned the math style. Similarly, when importing from a LaTeX file, the items in math mode are assigned the math style.

The autocorrect method for entering mathematics is available in your copy of Word. To learn about it, go to the Duxbury Systems website, click on **FAQs**, then click on the last question. If you Google for **"linear-format equations" Word**, this is the first result. Be sure to bookmark this URL.
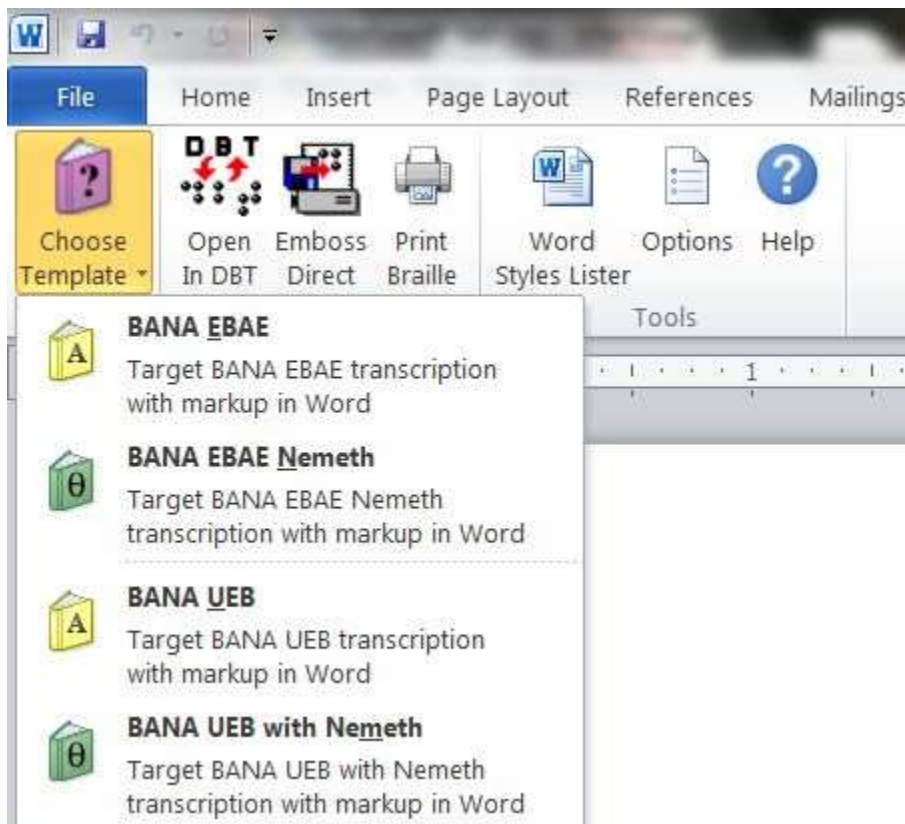

Setting up SWIFT and Word

Installing SWIFT adds a **Braille Tab** in MS Word. This is shown on the top right of the above graphic.
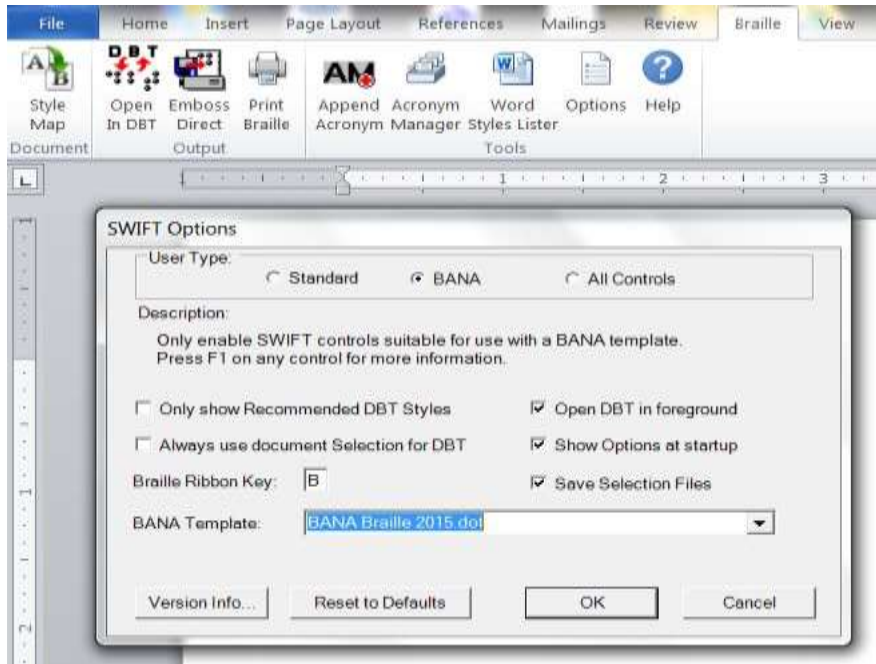
Your first step should be to go to the **options menu** in SWIFT and check **BANA** as your **User type**.

Once you set the **User type** to **BANA**, you will see that the left-most option in SWIFT is **Choose Template**. The Template you want to choose is **BANA UEB**

Issues That Come Up When Producing UEB Math With or Without DBT

- Familiarize yourself with the UEB symbols. Using DBT can help with this. If DBT's UEB translation table does not know the UEB braille for a particular print symbol, translation of that print symbol will give the UEB shape symbol for U+####, where #### is the Unicode number for the print symbol.
- If adding spaces around signs of comparison or around both signs of comparison and signs of operation, use appropriate tools to do this consistently.
- Know the general guidelines for use of the grade 1 indicator in math.
- Pay attention to how and where to break the line in a long math expression that has no spaces.


Why is the Math Style Important?

- When importing from Word/MathType or from a LaTeX file, any adding of spaces that happens during importing happens only in the items marked in the math style.
- Spaces are added around signs of comparison in math items if you have set that up in DBT's Global settings.
- During file import, within math items, spaces are added to the left of those function names that are preceded by technical notation without a space, as in xsin theta!!
- On the print side in DBT, you can use a hyphen as a shortcut inside the math style for entering the minus sign character. Inside the math style it becomes the UEB minus sign, dots 5, 36; outside of the math style it is treated like a hyphen.
- Any DBT code that affects UEB math translation is effective only within the math style. One such code is the [utpN] code, where N is 0, 1, or 2.

To apply a style in DBT, highlight some text, press **F8**, and select the correct DBT style from the list.

Spacing in UEB Math

There is an option in UEB to add spaces around signs of comparison, like the equals sign and less than sign, around both signs of comparison and signs of operation, like the plus sign, or around neither of these. Adding spaces around only signs of comparison seems to be the most

common preference for UEB transcribers, except that those producing material for students in the first few grades may want to add spaces around signs of operation as well. For DBT users adding spaces around signs of comparison only, there is an option to have these spaces added around signs of comparison as you import a Word or LaTeX file.
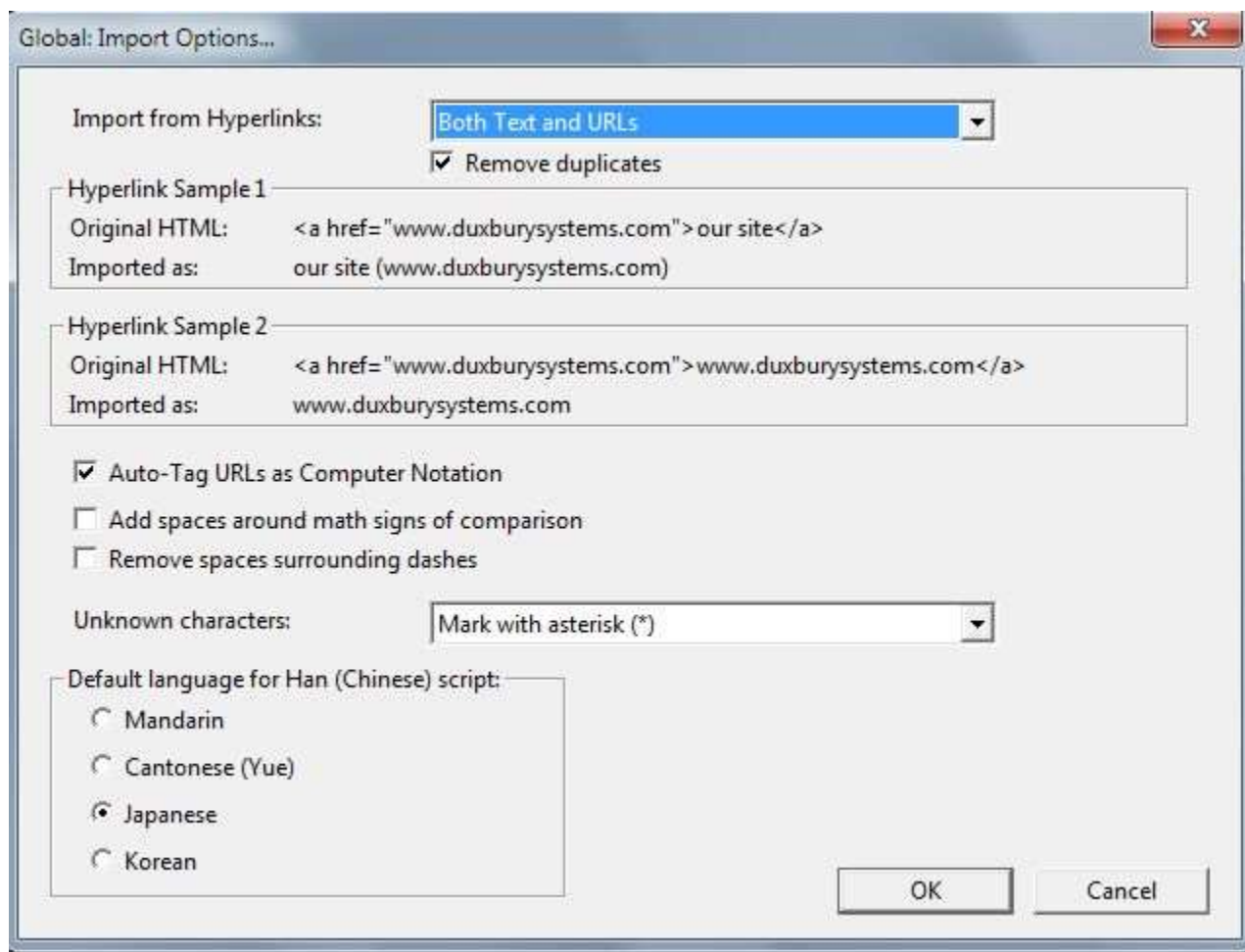
We will also look into adding an option like this for adding spaces around signs of operation.

Previously we recommended use of the DBT code [amspN] for setting up the adding of spaces around signs of comparison or both signs of comparison and signs of operation. That code still works, but we are downplaying it, because it can have some unwanted side effects. That led us to creating the import option for adding spaces around signs of comparison.

- The default of [amsp0] does not add any spaces.
- [amsp1] adds spaces around signs of comparison.
- [amsp3] adds spaces around both signs of comparison and signs of operation (common usage for early elementary school students).

Grade 1 Indicators in UEB Math

Please see the last three pages of this handout, which are an excerpt from *Unified English Braille Guidelines for Technical Material*

DBT and Grade 1 Indicators in UEB Math

As mentioned above, UEB gives some leeway for deciding when and where to use grade one character, word, and passage indicators in math, with more than one correct result. If you do not like some of the choices that DBT makes in this regard, you can influence DBT's decisions with a [utpN] code.

utp stands for "use transcriber preference." The N is the number 0, 1, or 2 as described below.

- [utp0] -- Use dBT's default logic on this; the same as using no [utpN] code.
- [utp1] -- favor grade 1 math usage, with more use of grade 1 word or passage indicators.
- [utp2] -- favor grade 2 math usage, with less use of grade 1 word and passage indicators.

A Real Life Example

```
\documentclass{article}
\begin{document}
CALCULUS 1250
TAKE HOME TEST 1 due Friday 9/4/2015
Work all six problems. SHOW YOUR WORK. Circle your answers.
Each problem is worth 10 points maximum.
1. Using the definition, find ImportStayInMathStart $f'(x)$ for
$f(x)=\frac{1}{\sqrt[3]{x}}$ ImportStayInMathEnd
2. Using the definition, find
ImportStayInMathStart $f'(x)$ for \(f(x)= \frac{1}{x^{3}}\)
ImportStayInMathEnd
3. Find the derivatives of ImportStayInMathStart
(a) $ \frac{x^{2}+1}{\sqrt{x}+1}$
(b) $ \frac{\sqrt{x}}{\sqrt{x}+1}$ ImportStayInMathEnd
4. Find an equation of the line tangent to the graph of
ImportStayInMathStart $y=\sqrt{x}$ at $x=4$ ImportStayInMathEnd.
 Then find an equation of a line normal
 to the graph at $x=4$.
5. Find an equation of the line tangent to the graph of
 $y=\frac{1}{x}$ and passing through the point $(0,-8)$
6. Find an equation of a line through the origin,
with positive slope, which is tangent to the parabola
$y=x^{2}-2x+3$.
\end{document}
```

[tcs]

<para.>CALCULUS 1250</para.>

<para.>TAKE HOME TEST 1 due Friday 9/4/2015</para.>

<para.>Work all six problems. SHOW YOUR WORK. Circle your answers.</para.>

<para.>Each problem is worth 10 points maximum.</para.>

<para.>1. Using the definition, find <math>

$f'(x)$<math-TextInMath>

<OneWordBridge>for</OneWordBridge></para.>

<para.></math-TextInMath>$f(x)=$[fs]1[fl][ixrts]3[ixrtd]X [ixrte][fe]</math></para.>

<para.>2. Using the definition, find</para.>

<para.><math>$f'(x)$<math-TextInMath>

<OneWordBridge>for</OneWordBridge></math-TextInMath>$f(x)=$

[fs]1[fl]X[ps]3[pe][fe]

</math></para.>

<para.>3. Find the derivatives of <math><math-TextInMath></para.>

<para.>(a) </math-TextInMath>[fs]X[ps]2[pe]$+1$[fl][sqrts]X [sqrte]$+1$[fe]<math-TextInMath></para.>

<para.>(b) </math-TextInMath>[fs][sqrts]X[sqrte][fl] [sqrts]X[sqrte]$+1$[fe]

</math></para.>

<para.>4. Find an equation of the line tangent to the graph of</para.>

<para.><math>$y=$[sqrts]X [sqrte]<math-TextInMath> <OneWordBridge>at</OneWordBridge>

</math-TextInMath>$X=4$

</math>.</para.>

<para.>Then find an equation of a line normal</para.>

<para.>to the graph at $X=4$.</para.>

<para.>5. Find an equation of the line tangent to the graph of</para.>

<para.>$y=$[fs]1[fl]X[fe]$ and passing through the point $(0,-8)$</para.>

<para.>6. Find an equation of a line through the origin,</para.>

<para.>with positive slope, which is tangent to the parabola</para.>

<para.>$y=X$[ps]2[pe]$-2x+3$.</para.>

[toe]

The Duxbury Braille Translator - [takehome.dxb -- Braille Document]

File   Edit   View   Layout   Table   Document   Global   Help

A Few Tips

When viewing math in a .dxp file, always use the coded view since some of the math is shown as codes. Pressing Alt+F3 switches this on or off.

What do you do if you know what sign you want in UEB but you do not know how to enter it in Word or MathType?

1. Start a new braille document in DBT in the English (UEB) - BANA template.

2. Enter the desired UEB sign.
3. Translate to print.
4. Make sure that in Global > View preferences, the checkbox **Use verbose labels for non-ANSI characters in coded view** is checked. You see the Unicode number for the desired character on the status line.
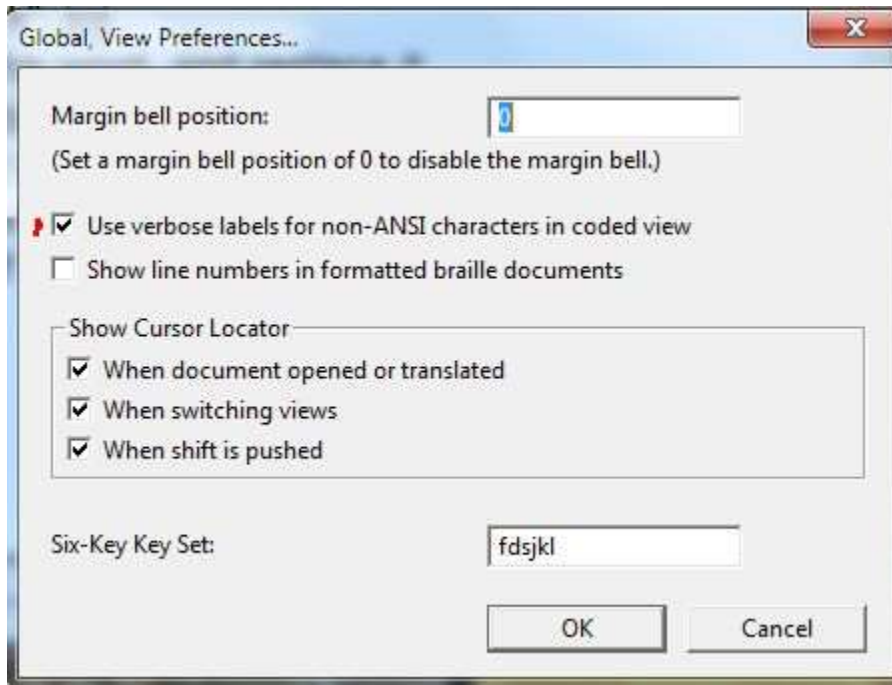
Duxbury Tools Related to This Topic That Need Improvement at the Current Time

Users have suggested that we need a choice in **Global > Import options** to add spaces around signs of operation.

It would be helpful to have styles to insert constructs like:

- The dot locator: ⠒⠿
- The in-use dot locator: ⠄ ⠄⠿
- The grade 1 passage indicator: ⠄ ⠄⠿ ⠒ ⠒ ⠒ (on a line of its own)
- The grade 1 passage terminator: ⠄ ⠄⠿ ⠒⠄ (on a line of its own)

1.7 Use of Grade 1 indicators

⠐⠰⠄   grade 1 symbol indicator

⠐⠰⠄⠄   grade 1 word indicator

⠰⠰⠄⠄⠄   grade 1 passage indicator

⠰⠰⠄⠄⠄   grade 1 passage terminator

⠰⠰⠄⠄ ⠄⠄ ⠄⠄ ⠄⠄   grade 1 passage indicator on a line of its own

⠰⠰⠄⠄ ⠄⠄ ⠄⠄ ⠄⠄   grade 1 passage terminator on a line of its own

1.7.1 Grade 1 indicators will not be needed for simple arithmetic problems involving numbers, operation signs, numerical fractions and mixed numbers.

Evaluate the following:
$3 - 2\frac{1}{2} =$

⠰⠀⠑⠧⠁⠇⠥⠁⠞⠑ ⠸⠀⠹⠑⠀⠋⠕⠇⠇⠪⠔⠛⠒

⠼⠉ ⠤ ⠼⠃⠌⠃ ⠐⠶

1.7.2 Simple algebraic equations which include letters but no fraction or superscript indicators may need grade 1 symbol indicators where letters stand alone or follow numbers. (See [Section 1.2](#) for the underlying rules and [Section 3.2](#) for more examples.)

$y = x+4c$
⠽ ⠐⠶ ⠭⠬⠼⠙⠰⠉

1.7.3 More complex algebraic equations are best enclosed in grade 1 passage indicators. This will ensure that isolated letters and indicators such as superscript, subscript, fractions, radicals, arrows and shapes are well defined without the need for grade 1 symbol indicators.

Consider the following equation:
$3x-4y+y^2 = x^2$

⠐⠰⠼⠒⠭⠤⠼⠙⠽⠲⠽⠰⠔ ⠐⠶ ⠐⠡⠎�⠘⠀⠀⠀⠀

⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀ ⠐⠶ ⠀⠀⠀⠀⠀⠀

Note that this particular equation could also be written

⠼⠒⠭⠤⠼⠙⠽⠖⠽⠔⠆ ⠐⠶ ⠭⠰⠆

because the left hand side of the equation is in grade 1 mode following the numeric indicator (see [Section 1.2](#)).

Similarly
$$\frac{x^2 + 2x}{1 + x^2} = 1$$
(fraction: x squared plus 2x all over 1 + x squared close fraction)
can be safely written as

⠐⠰⠹⠭⠘⠆⠐⠖⠼⠃⠭⠌⠼⠂⠐⠖⠭⠘⠆⠼⠻ ⠐⠶ ⠼⠂⠰⠔

but could also be written

⠰⠰⠹⠭⠘⠆⠐⠖⠼⠃⠭⠌⠼⠂⠐⠖⠭⠘⠆⠼⠻ ⠐⠶ ⠼⠂

See [Section 11.5](#) for more examples of the use of grade 1 passage indicators.

1.7.4 If a complex algebraic expression does not include a comparison sign (such as an equals sign) then it is unlikely to include interior spaces in braille (see [Section 1.1.2](#)). In this case a grade 1 word indicator will be enough to ensure that superscript, subscript, fractions, radicals, arrows and shape indicators are well defined without the need for grade 1 symbol indicators.

Evaluate $\sqrt{(y - x^2)}$.

⠸⠩�⠀⠀⠀ ⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀

See [Section 7.3](#) for more examples of the use of grade 1 word indicators.

1.7.5 When entire worked examples or sets of exercises are enclosed in grade 1 passage indicators, the grade 1 indicators can be preceded by the "use indicator" and placed on a line of their own.

Solve the following quadratic equations:
1. $x^2-x-2 = 0$
2. $x^2-4x-3 = 0$
3. $2x^2-x = 1$

⠀⠀⠸⠎⠕⠇⠧⠑⠀⠸⠲⠀⠋⠕⠇⠇⠪⠛⠀⠟⠥⠁⠙⠗⠁⠞⠊⠉⠀⠑⠟⠥⠁⠰⠰⠎⠒
⠄⠄⠿⠇⠲⠆⠲
⠼⠁⠨⠀⠭⠘⠆⠐⠤⠭⠤⠼⠃⠀⠐⠶⠀⠼⠚
⠼⠃⠨⠀⠭⠘⠆⠐⠤⠼⠙⠭⠤⠼⠉⠀⠐⠶⠀⠼⠚
⠼⠉⠨⠀⠼⠃⠭⠘⠆⠐⠤⠭⠀⠐⠶⠀⠼⠁
⠄⠄⠿⠇⠰⠆

1.7.6 When only a few contracted words are involved, the grade 1 passage indicator can be used to enclose entire worked examples and sets of exercises. In this situation any words occurring in the exercises will be written in uncontracted braille and isolated letters will not need letter signs. Where there is more text involved it is better to stay in grade 2 and use grade 1 passage, word or symbol indicators only as required.

1.7.7 In the examples in this document, grade 2 mode is assumed to be in effect, and grade 1 indicators have been included according to the guidelines in this section. Minimising the number of indicators must be balanced against reducing clutter within the expression itself. A grade 1 symbol indicator which occurs half way through an expression may be more disruptive to the reader than a word or passage indicator, even if these take up more cells. It is also important to use a consistent approach when transcribing a particular text. Overall the focus should be on mathematical clarity for the reader.

Further guidance will be given when more feedback has been received from students.