

APPENDIX C

NEMETH CODE FORMAT SUMMARIES

- General Principles
- “Keep Together”
- Margins
- Itemized Material
- Displayed Mathematical Material
- Mathematical Statements
- Formal Proofs
- Division of Mathematical Expressions Between Braille Lines
- Placement of Code Switch Indicators
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“Formatting” refers to layout on the page, such as indentations (margins), line spacing (blank lines), centering, and pagination. The Nemeth Code specifies certain formats which are summarized in this appendix. For illustrative examples, go to the sections in this lesson material which are cited as bold numbers in brackets.

General Principles

When an item in a UEB transcription requires the use of Nemeth Code symbols, format rules of *The Nemeth Braille Code for Mathematics and Science Notation* are to be applied to the entire transcription including those portions transcribed in UEB. When a format is not specifically addressed in the Nemeth Code, the principles provided in *Braille Formats Principles of Print-to-Braille Transcription* should be followed. [**Preliminary Lesson, Section P7**]

“Keep Together”

A mathematical expression that will fit on one braille line within the current margins must not be divided between lines. The entire expression is brought down to the next line. [**1.5**] If a page number on line 25 or line 1 does not allow the entire expression to fit on the line, the expression is brought down to the next line that has enough usable cells. [**3.7**]

Within a paragraph, a code switch indicator and/or terminator should appear on the same line as the expression to which it applies, if there is room on the line. [**1.5.1**]

A hyphenated expression containing one or more mathematical components must not be divided between braille lines. [**2.19**]

An abbreviation and a preceding or following numeral or letter to which it applies must not be divided between braille lines. [**3.4.1, 4.1.1**]

Items in an enclosed list must not be divided between braille lines if the entire list will fit on a single braille line. If the enclosed list will not fit on a single braille line, use as much of the current line as possible and begin a runover line after a comma. [**4.17.3**]

Unless unavoidable, items within a set should not be divided between lines. [**4.17.3**]

The components of the following symbols must not be divided between braille lines: a symbol of operation using plus and minus [**5.2**]; a symbol of comparison compounded vertically or horizontally [**5.8-5.9**]; a shape symbol with structural or interior modification [**11.7-11.14**]; the components of an expression modified according to the five-step rule. [**12.2**]; superposed signs [**13.5-13.6**]; a two-part function name [**14.5**].

A fraction must not be divided unless the entire fraction will not fit on the line. [**8.3.b**]

A mixed number must not be divided from its fractional part. [**8.5.1**]

A single keystroke construction must not be divided between braille lines. [**11.25**]

A sign of shape and the letter, sequence of letters, or numeral which follows it is regarded as a single mathematical item and therefore should not be divided between braille lines. [**11.31.1**]

Tally marks belonging to the same group must not be divided between braille lines. [**13.4.a**]

A function name or an abbreviated function name and the sign which follows it must not be divided between braille lines. [**14.5**]

Unless unavoidable, items enclosed within grouping signs should not be divided between lines. [**15.2.1**]

Margins: Displayed Mathematical Material

When mathematical material is set apart from the body of the text in the print copy, it is referred to as a displayed expression. Displayed math uses a hanging style. The margins depend upon the layout of the surrounding text. The first cell of the displayed material is indented two cells to the right of the runover cell of the preceding material, whether or not a runover is actually present. Runovers of the displayed math are usually indented two cells further. [7.1]

A line is not skipped above or below displayed mathematical material unless the preceding or following material requires a blank line. [7.1]

When a number or letter is used to identify a displayed mathematical expression it is placed at the left of the expression in braille regardless of the location of the label in the print copy. The label begins in the appropriate cell for displayed material. [7.2.1]

Math Displayed to Narrative

3-to-5 In unitemized explanatory portions of the text, displayed mathematical material begins in cell 3. Runovers begin in cell 5 (hanging style). [Text (3-1); displayed material (3-5)]

\dots	narrative
\dots	runover (cell 1)
\dots	<u>cell 3</u>
\dots	runover (cell 5)

Math Displayed to Itemized Text

5-to-7 In itemized text without subdivisions, displayed mathematical material begins in cell 5. Runovers begin in cell 7 (hanging style). [Text (1-3); displayed material (5-7)]

\dots	itemized
\dots	runover (cell 3)
\dots	"
\dots	<u>cell 5</u>
\dots	runover (cell 7)

Math Displayed to Itemized Text with Subdivisions

7-to-9 In itemized text with subdivisions, displayed mathematical material begins in cell 7. Runovers begin in cell 9 (hanging style). [Main division text (1-5); displayed material (7-9). Subdivision text (3-5); displayed material (7-9)]

	main item
	runover (cell 5)
	"
	<u>cell 7</u>
	runover (cell 9)
	subdivision
	runover (cell 5)
	"
	<u>cell 7</u>
	runover (cell 9)

Math Displayed to Instructions

5-to-7 Within or following instructions, displayed mathematical material begins in cell 5. Runovers begin in cell 7 (hanging style). [Instructions (5-3); displayed material (5-7)] [7.1.5]

	instructions
	runover (cell 3)
	"
	<u>cell 5</u>
	runover (cell 7)
	itemized
	runover (cell 3)

Nested Linked Expressions

A nested linked expression, defined in 8.22, can occur in one of the following displayed layouts. Note that the first cell of the anchor is indented two cells to the right of the runover cell of the preceding material.

- **In Narrative.** When a nested linked expression is displayed to (3-1) unitemized explanatory portions of text, the anchor begins in cell 3. If the anchor has runovers, they begin in cell 7. Each link begins in cell 5. If a link has runovers, they also begin in cell 7. [8.22.2]
- **In Itemized Text Without Subdivisions.** When a nested linked expression is displayed to (1-3) itemized text containing no subdivisions, the anchor begins in cell 5. If the anchor has runovers, they begin in cell 9. Each link begins in cell 7. If a link has runovers, they also begin in cell 9. [8.22.3.a]

- **In Itemized Text With Subdivisions.** When a nested linked expression is displayed to itemized text containing subdivisions (1-5; 3-5), the anchor begins in cell 7. If the anchor has runovers, they begin in cell 11. Each link begins in cell 9. If a link has runovers, they also begin in cell 11. [8.22.3.b]
- **In Itemized Text With No Narrative.** When a nested linked expression follows an identifier with no intervening narrative, the anchor is placed on the same line as the identifier. Each link begins a new line, two cells to the right of the cell in which the identifier begins. Runovers are indented two cells further—that is, four cells to the right of the cell in which the identifier begins. [8.22.4]

Mathematical Statements and Proofs

A line is left blank before the beginning and after the end of a mathematical statement or a proof. Normal paragraphing (3-1) is applied. The label can be formatted as a paragraph heading or as a cell-5 or cell-7 heading. [11.38]

If a mathematical statement or a proof contains auxiliary captions such as *Given*, *Prove*, or *Conclusion*, etc., such captions begin a new paragraph in cell 3 with runovers in cell 1. A line is not skipped above a caption. Capitalization and typeform follows print, but if fully capitalized and also in a nonregular typeform, capitalization is retained and typeform is disregarded. [12.16.d]

Formal Proof in Two Columns

When a formal proof is printed in step-number form and divided into two columns, follow the format described in 12.16.1.

Division of Mathematical Expressions Between Braille Lines

When a mathematical expression is too long to fit on one braille line within the current margins the expression is divided between braille lines according to the rules of the Nemeth Code. A new line need not be forced if there is room on the line to begin the expression, provided the division is made in accordance with the principles defined below. Runovers conform to the margin requirements currently in effect – be it itemized, instructional, explanatory, labeled, subdivided, or displayed material.

Long Numeral

A long numeral is divided after a comma if a comma is present, and a hyphen is inserted. If the numeral does not contain a comma, the hyphen may be inserted after any digit. When a numeral is divided between braille lines, the numeric indicator is used before the first digit of the numeral on the next line. [1.7.1]

Enclosed List

If an enclosed list will not fit on a single braille line, use as much of the current line as possible and begin a runover line after a comma. [4.17.3.a]

Linked Expressions

If a linked expression is too long to fit on one line, the expression continues on the next line, beginning with a sign of comparison. If the expression contains more than one link and the anchor with all links will fit on one line, do not divide it. If all links will not fit, use as much as the line as possible before dividing the expression. The new line begins with a link, placed in the runover cell of the current format. [8.21]

The comparison sign at which the new line begins must be on the baseline. An expression should not be divided before a comparison sign that is part of an item enclosed in grouping symbols, between fraction indicators, or within radical signs. [8.21.1]

A transition to a new braille line made before a sign of comparison terminates the effect of any level indicator used on the line above. [8.21.2]

Mathematical Expressions

Mathematical expressions which will not fit on one braille line within the boundaries of the current margins can be organized into a series of mathematical units in order to choose runover sites. The strategies are given in **Lesson 15**, roughly outlined as follows. (i) Divide before a comparison sign on the baseline [15.3]; (ii) divide before an operation sign on the baseline [15.4]; (iii) divide before a mathematical unit [15.5]; (iv) divide after a termination indicator [15.6].

Placement of Code Switch Indicators

When mathematical content occurs anywhere in a UEB transcription, the nontechnical notation follows the rules of *Unified English Braille* and the technical notation follows the rules of the *Nemeth Braille Code*. Readers will assume they are reading UEB unless signaled otherwise by the use of a UEB code switch indicator, in this case, the opening Nemeth Code indicator. Between the opening Nemeth Code indicator and the Nemeth Code terminator are Nemeth symbols, following Nemeth rules. Nemeth symbols are not used outside of the Nemeth Code switch indicators. [1.1] UEB symbols are not used within the Nemeth Code switch indicators. [1.1] The following symbols may appear in either UEB or Nemeth context: box lines [5.5, 18.6], column separation lines [5.5], guide dots [5.5], icons [11.26], note separation lines [13.10.4], and page change indicators [3.8].

The objective within a paragraph is to keep the switch indicators on the same line as the mathematics to which they apply. Displayed material, spatial arrangements, and tables have other considerations. There are guidelines to follow when the switch indicators do not fall neatly on a line or on a page.

General Principle in Narrative Context

The opening Nemeth Code indicator is followed by a space, unless it ends a line. The Nemeth Code terminator is preceded by a space, unless it begins a line. These spaces do not represent spaces in print. [1.1] Within a paragraph, the switch indicators should be placed on the same line as the math expression. [1.5.1.b] However, a switch indicator may stand alone on a line if there is not room for the math expression and one, or both, of the switch indicators. Keeping the mathematical expression intact on one line is the priority. [1.5.2] If two or more math expressions are transcribed between the same code switch indicators, the line may wrap at the space between the expressions even if the entire Nemeth portion could fit on one line. [1.5.1.a]

Switch Indicators with Itemized Material

Identifiers are transcribed according to the rules for the code in use at the time. All identifiers in a section do not need to be transcribed in the same code. [2.18.2] A code switch indicator does not take the place of the blank line that may be required preceding or following the list. [2.18.1]

- When an entire list consists of Nemeth items and the list is not preceded by text, or if the list is preceded by a centered heading, the opening Nemeth Code indicator is placed in cell 1 on the line before the first item, and the Nemeth Code terminator (if needed) is placed in cell 1 on the line after the last item. [4.25.1] This layout is recommended for both itemized and unitemized lists of Nemeth items.
- When the entire itemized list consists of Nemeth items and the list is preceded by text, the opening Nemeth Code indicator is placed at the end of the line of text that precedes the itemized material. If there is no room on that line, the opening Nemeth Code indicator is placed in the runover position of the narrative. [2.18.1] *Exception:* When itemized mathematical material follows a transcriber's note, the opening Nemeth Code indicator may be placed following the closing transcriber's note indicator only if it fits on the same line. [4.26] This placement may be applied to a heading that precedes the identified Nemeth material, centered heading excepted. [4.25.2] The Nemeth Code terminator (if needed) is placed in cell 1 on the line after the last item. [4.25.1] This layout is also recommended for an unitemized list of Nemeth items.
- When the first two items require Nemeth entirely, placement of the opening Nemeth Code indicator follow same guidelines given in the previous bullet apply. “Nemeth entirely” includes items with a single UEB word where the single-word switch indicator may be used. Nemeth is terminated after the last item. [2.18.2.a]
- When the first two items include both Nemeth and more than one UEB word, the first identifier is transcribed in UEB and the Nemeth code switch indicators are inserted as needed. [2.18.2.b]
- Embedded identifiers follow similar code-switching guidelines to identifiers aligned at the margin. An embedded identifier may fall at the end of a line; it does not need to be placed on the same line as the material with which it is associated. [4.27]

Further details regarding placement of switch indicators in a list of mixed items are given in 2.18.2.

Switch Indicators with Displayed Mathematical Material

When displayed mathematical material is both preceded and followed by UEB text, the expression and its two switch indicators are placed all together on one line if they will fit within current margins. If there is not room on one line, the opening Nemeth Code indicator is placed at the end of the text line preceding the displayed material and the Nemeth Code terminator is placed at the completion of the displayed expression. Either indicator is placed on the following line in the runover position if it will not fit on the current line. [7.1.1]

Switch Indicators with Spatial Arrangements

Code switch indicators are placed outside of the spatial material in order not to interfere with alignment. The blank line required before and after the arrangement are part of the spatial problem and so must be inside the Nemeth switches. The opening Nemeth Code indicator and the Nemeth Code terminator do not take the place of that required blank line. If there is not room for the opening Nemeth Code indicator at the end of the line with the preceding text, it is placed on the next line in cell 1. The required blank line is on the line following the opening switch. To close Nemeth after a spatial problem, first insert the required blank line, then place the Nemeth Code terminator in cell 1 by itself on the following line. [9.29, 9.30]

Switch Indicators and Punctuation

Punctuation that relates to the main text is placed outside of the switch indicators when the surrounding text is in UEB. There is no space between the terminator and the following punctuation. [1.4] To avoid excessive code switching between mathematical items, punctuation which belongs to the sentence structure may be transcribed inside the switches. [2.3] Paired punctuation (parentheses, brackets, braces, quotation marks) are transcribed inside the code switches when they enclose technical material. [2.13]

Switch Indicators after a Heading

An opening Nemeth Code indicator may be placed at the end of a cell-5 or cell-7 heading. [4.25.2] An opening Nemeth Code indicator cannot be placed at the end of a centered heading. [4.25.1]

Switch Indicators and Transcriber's Notes

Transcriber's note indicators are UEB symbols and therefore must be transcribed outside of the Nemeth switches. When the note itself contains mathematical material, code switching occurs within the note. Nemeth Code must be terminated before the closing transcriber's note indicator is transcribed. When itemized or spatial mathematical material follows the transcriber's note, the opening Nemeth Code indicator may be placed following the closing transcriber's note indicator only if it fits on the same line. [4.26]

Switch Indicators at Page Turns

When Nemeth is in effect, Nemeth Code is not terminated by transition to a new braille page or across a page turn line. When code switching occurs at a braille page turn, the opening Nemeth

Code indicator and the Nemeth Code terminator should appear on the same braille page as the expression to which they apply. The opening Nemeth Code indicator should not stand alone at the bottom of a braille page, nor should the Nemeth Code terminator stand alone at the top of a braille page. [1.5.3, 3.7, 3.8]

Switch Indicators with Boxed Material

Box lines may be transcribed in either code. When literary content is followed by boxed mathematical material, if all of the material in the box is in Nemeth, the opening Nemeth Code indicator may be placed at the beginning of the top box line, followed by a blank space and the Nemeth Code terminator may be placed at the end of the bottom box line, preceded by a space. [18.6]

Switch Indicators with Instructional Commentary

When instructional commentary alternates with math problems, switch indicators are used in order to transcribe the comments in contracted braille. When switching into or out of Nemeth before a change of margins, the switch indicators are placed after the last item of the line rather than at the beginning of the next line to maintain clarity in the indented margin pattern. [16.11]

When a comment or condition applies to a spatial arrangement, the comment begins on the top line of the arrangement, to the right of the enlarged grouping symbol (if present) or a transcriber-inserted grouping symbol. [17.10.4] When the comment contains narrative, code switching is not applied, even though the words may not be part of a mathematical expression. The words are uncontracted; the single-word switch indicator is not used. [17.10.2] If there is little room beside the math for the comment, it may be placed before or after the math arrangement. A transcriber's note explains that the comment applies to the spatial arrangement. [17.10.3.a]

Switch Indicators with Instructions

If instructions end with an expression in Nemeth and the subsequent math problem starts with Nemeth, Nemeth Code remains in effect between the end of the instructions and the start of the problem. [5.11.1]

Switch Indicators with Tables

When mathematical data occur in the table, code switching decisions depend upon the content of the entire table and the spacing restrictions encountered on the braille page. Each table must be individually assessed in order to determine the clearest representation in braille. [18.1]

Column headings which contain words are transcribed in UEB. There may be items within the column headings that require switching to Nemeth. [18.3]

It is best if a minimum of code switching is encountered within the body of the table. See 18.4 for various strategies.

When the entire body of the table is transcribed in Nemeth, the opening switch indicator is placed in cell 1 of the line following the column separation line. The entries begin on the next line. The Nemeth Code terminator follows the last line of entries, placed in cell 1. [18.4.2]

Words within the table, including row headings, are transcribed without contractions. If a row heading consists of one word, the single-word switch indicator is not used. [18.5]

Switch Indicators with Tactile Graphics

Nemeth remains in effect for a tactile graphic if the graphic intervenes between two items in Nemeth. If the preceding text is in UEB and if a switch to Nemeth must be made for the tactile graphic, the opening switch indicator is placed at the end of the preceding text or in cell 1 on the line before the required blank line. [18.9]

Spatial Arrangements

Details regarding various spatial arrangements are in the following lesson sections.

Addition	9.14-9.31
Alignment	
with addition	9.16
with cancellation	16.5.1
with determinants and matrices	17.13.3, 17.19
with enlarged signs of grouping	17.4, 17.7, 17.13.3
with fractions	9.22, 10.6
with continued fractions	16.10.1
with long division	10.13.6, 10.14, 10.16, 14.12
with multiplication	10.1-10.10
with polynomials	9.20, 10.7
with square root division	14.10
with subtraction	9.16
with synthetic division	14.13
with systems of equations	17.2, 17.4
Arrays	17.12-17.20
Blank lines	9.26
Cancellation	
in long division problems	10.16
in subtraction problems	9.25
with fractions	16.5. 16.6.1
Code switch indicators, placement of	9.29, 9.30
Determinants	17.12-17.20
Fractions and mixed numbers	16.1-16.10
continued fractions	16.10
hypercomplex fractions	16.7-16.9
General rules regarding spatial arrangements	9.14

Itemized spatial arrangements	9.23-9.25, 9.28, 9.30, 10.10, 10.17, 14.11, 14.13.5, 16.3, 17.8, 17.13.5
Long division	10.13-10.17
partial quotients	14.12
synthetic division	14.13
Matrices	17.12-17.20
augmented matrix	17.16
Multiplication	10.1-10.10
Omissions	9.19, 10.5, 10.14, 11.30
Polynomials	9.20, 10.7
Regrouping numbers	
with addition	9.24
with division	10.15
with multiplication	10.9
with subtraction	9.25
Side-by-side layout	9.18, 9.23.1, 10.17, 17.14
Square root division	14.10-14.11
Stem-and-leaf plots	16.12-16.19
Subscripts denoting nondecimal bases	10.8
Subtraction	9.14-9.31
Wide arrangements	9.27