THE NEMETH CODE
FOR MATHEMATICS AND
SCIENCE NOTATION
1972 REVISION

2007 Update

B A N A

**Developed by the Mathematics Braille Technical Committee
of the Braille Authority of North America**

**Dorothy Worthington, Chairperson
Mary Archer, Board Liaison
Helen McMillan
Allison O'Day
Susan Osterhaus
Jean Simpson
Joanne Baldwin, Consultant
Mary Denault, Consultant**

Betsy McBride, Consultant

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Table of Changes

Rule	Page	Change
I	6	Keystroke indicator added to list of shape indicators
II: §11b	15	Non-use of numeric indicator modified
II: §11b(4)	15	Example revised
II: §16	18	Numerals in diagrams revised
V: §33a	39-40	Examples (1)-(4) updated
IX: §55e	68	Rule edited; Examples (12)-(14) added
XII: §64	77-78	Parenthetical expressions edited
XVI	110	Adds keystroke indicator to interior shape modification indicator list
XVI	111	Corrects the print shape for "is perpendicular to"
XVI: §111a	115	Additional paragraph added
XVI: §111d	116	Adds new subsection on calculator or computer keystrokes
XVI: §115e	118	Adds new subsection that deals with spacing between keystroke constructions
XVII: §119a	121	Edited rule
XVII: §119c	122	Example (7) modified to show correct spacing
XVIII: §120	124	Braille in example (14) corrected
XVIII: §126	126	Braille in example (3) corrected
XVIII: §128a	127	Braille in example (1) corrected
XXIV: §128c	170	Rule on division clarified; additional examples given

Rule	Page	Change
XXIV: §184a	183	Example (1) corrected to show proper use of numeric indicators in unified expressions
XXV: §185biii	186	Typographical error corrected
XXV: §191bvi	197	Typographical error corrected
XXV: §196	207	New section on stem-and-leaf plots added
Appendix A	208	Braille examples corrected
Appendix B	219	Several index entries corrected
Appendix B	238	Braille entry for empty set corrected
General Index	249, 251	Index items corrected

RULE I--BRAILLE INDICATORS

Shape Indicators

[page 6]:

Keystroke Indicator (10-07)   ⠿⠇

(Limited to use with calculator and computer-related text.)

§11. Non-Use of the Numeric Indicator:

[page 15] Change sentence to read:

b. (10-07) The numeric indicator must not be used in work arranged in columns and aligned for addition, subtraction, or multiplication, or in spatial arrangements for division.

(4) Draw a line under the print example and replace the example with the following:

⠿⠿⠿⠿⠿

§16. Numerals in Diagrams:

[page 18] Change first sentence to read:

(10-07) In diagrams which contain numeric labels, the numeric indicator must be used, except for the numeric labels on number lines in which case the numeric indicator should be omitted.

RULE V -- TYPE FORMS

§33a. Examples (1)-(4):

[pages 39 and 40] Mathematical statements should begin in cell 3 with runovers in cell 1 (not 1-3 as shown). (Refer to Rule XXV, §194.a.ii, page 204.)

RULE IX -- CONTRACTIONS AND SHORT-FORM WORDS

§55e. Non-Use of Contractions and Short-Form Words:

[page 68] Change the first sentence to read:

The one-cell, whole-word alphabet contractions for *but, can, … you, as* and the lower-sign whole-word contractions for *be, enough, were, his, in, was, to, into, by*, whether capitalized, italicized, or neither, must not be used when these words are in direct contact with any grouping symbol.

Change the last sentence to read:

When this rule precludes the use of a contraction in one part of a word, no part of the word may be contracted except in the case of the whole-word lower-sign contraction for *enough, were,* and *into*, which may be partially contracted.

Add the following examples:

(12) (into vs. onto)　　⠣⠔⠖⠐⠉　⠧⠎⠲　⠕⠝⠖⠕⠖⠜

(13) (enough work done)　⠣⠢⠥⠦　⠺⠅　⠙⠕⠝⠑⠜

(14) (as it were)　⠣⠰⠁⠁　⠭　⠶⠺⠢⠜

RULE XII -- FRACTIONS

§64. Mixed Numbers, Examples (3) and (4):

[page 77] Change parenthetical explanation to read:

(this is not a mixed number; expression begins with a letter)

§64. Mixed Numbers, Example (5):

[page 78] Change parenthetical explanation to read:

(this is not a mixed number; fraction contains a letter)

RULE XVI -- SHAPES

Interior Shape-Modification Indicator

[page 110] Add subentry

Keystroke Indicator ⠫⠄
(Limited to use with calculator and computer related text.)

Basic Shapes

[page 111] Change the print shape representing "Is Perpendicular To" to ⊥

§111a. Shape with Interior Modification:

[page 115] Add the following paragraph:

(10-07) The numeric indicator must be used before a numeral or before a decimal point and a numeral following the interior shape-modification indicator.

§111d. Shape with Interior Modification:

[page 116] Add the following new subsection d.:

d. (10-07) When a shape with interior modification depicts a labeled calculator or computer key within the instructional text, it must be represented in a contracted form employing a keystroke shape symbol/indicator.

i. The key label will immediately follow the keystroke indicator.

ii. The shape of the key is irrelevant. The actual shape(s) used in a particular text should be specified on the Transcriber's Notes page.

iii. No single keystroke construction may be divided between braille lines.

iv. The rules for preferred division of mathematical expressions do not apply; do not drop to a new line because the symbol on the key is a sign of comparison. If it is possible, duplicate the print lines when such lines are arranged in a logical sequence.

v. No contractions may be used in a word, part of a word, or an abbreviation in contact with this symbol/indicator whether capitalized, italicized, neither or both.

vi. No space may be left between keystroke constructions and other similar constructions or mathematical symbols in a sequence of related calculations. Arrows contained in the labels on the keys should not be spaced from the material to which they apply.

vii. The numeric indicator is not required within the contracted keystroke construction.

(1) ⊕ *or* ⊞

(2) ⟮ 2 ⊠ 3 ⊞ 4 ⟯ ⊠ 5 ⊟

(3) n ⊠ P ⊠ ⟮ ⟮1 ⊟ ⟮1 ⊞ i ▣ ⟯ ⊡

n ⊞⁄⊟ ⟯ ÷ i ▣ ⟯ ⊡1 ⊞⁄⊟ ⊟ P ⊟

(4) 2 ⊡ 75 ⊡ ⊡ 34 ⊞⁄⊟ ⊟

(5) ENTER ↑

(6) → °C

(7) [x≥y]

(8) ⑧

§115e. **Spacing with Symbols of Shape**:

[page 118] Add new e.:

e. (10-07) No space may be left between keystroke constructions and other similar constructions of mathematical symbols in a sequence of related calculations. Arrows contained in the labels on the keys should not be spaced from material to which they apply.

RULE XVII -- FUNCTION NAMES AND THEIR ABBREVIATIONS

§119. Spacing with Function Names and Their Abbreviations:

[page 121] Change sentence to read:

a. (10-07) A space must be left after an unmodified function name or its abbreviation. If the function name or its abbreviation carries a superscript, subscript, modifier, or other braille indicator, the space must follow the superscript, subscript, termination of modifier, or other braille indicator.

§119c. Spacing with Function Names and Their Abbreviations:

[page 122] Change Example (7) braille to:

⠰⠮⠀⠎⠊⠝⠑⠀⠷⠼⠃⠦⠀⠨⠏�⠀⠊⠎⠀⠼⠁⠚⠀⠰��

§120. Symbols of Grouping, Example (14):

[page 124] Change braille to:

⠿⠐⠣⠰⠂⠉⠹⠃⠌⠁⠜⠄⠺⠣�⠀⠰⠷⠹⠦⠆⠴⠫⠺⠩⠖⠳⠤��⠿
　　⠐⠣⠿⠐⠣�⠴⠖�⠿

§126. Use of Enlarged Grouping Symbols, Example (3):

[page 126] Change braille to:

⠿　⠐⠣　⠐⠂⠨⠮⠐⠌　⠐⠌　⠿　⠰⠿⠄⠅　⠶⠶
　　　　⠐⠂⠮⠐⠌　⠐⠌　⠿　⠐⠼　⠴⠨⠄⠒

§128a. Spacing with Symbols of Grouping, Example (1):

[page 127] Numeric indicators are required after the comparison signs. (Refer to §126 (1) (page 126.) Change braille to:

⠐⠁⠮⠐⠌⠄⠀⠿　⠐⠣　　⠴⠆⠴⠴⠿
⠐⠁⠿　⠿⠴⠖⠿　⠐⠣　⠴⠴⠴⠴⠒⠿

§180c. Division:

[page 170] Change the third sentence to read:

(10-07) However, when the division arrangement contains only a divisor and a dividend composed entirely of numerals with or without decimal points and/or commas, but no quotient and no partial products and differences, …

Add the following examples:

$6\overline{)48}$ ⠿⠿⠿⠿⠿⠿

$7\overline{)104.58}$ ⠿⠿⠿⠿⠿⠿⠿⠿⠿

$6\overline{)1\,\text{ft.}\,6\,\text{in.}}$ ⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿

§184a. Unified Expressions, Example (1):

[page 183] Numeric indicators are required after the comparison signs. (Refer to Example (2).) Change braille to:

§185biii. Spatial Arrangements:

[page 186] Change word "principle" to "principal".

§191bvi. Margins for Non-Spatial Itemized Material, Example (3)

[page 197] Third braille line, first visible cell should be:

⠐⠒

§196. (10-07) Stem-and-Leaf Plots:

A stem-and-leaf plot is a method of showing data distribution. It is a specialized table that is brailled in Nemeth notation using the rules for Tables and Columns in *Braille Formats: Principles of Print to Braille Transcription.*

A stem-and-leaf plot is made up of columns and rows which usually include a heading. The data may be shown as numbers or letters. A key is almost always provided and <u>must</u> be brailled beginning in cell 1 preceding the stem-and-leaf plot.

The symbols used in a stem-and-leaf plot do not need to be included on a Special Symbols page unless the text is an elementary math book below the 4th grade.

a. The stem-and-leaf plot resembles a horizontal bar graph, and therefore, it is important to retain the shape. A vertical line (dots 456) separates the column headings and extends to the end of the plot. One blank cell precedes and follows the vertical line. The data on the left (stem) is right justified to the vertical line and the data on the right (leaf) is left justified to the vertical line.

   i. Avoid running over lines if possible. If necessary to runover the line, indent the line two cells to the right. <u>Exception</u>: in back-to-back plots that have a runover in the left column, the indention is two cells to the left.

   ii. A runover of leaves shown in print should be ignored. Use the full width of the braille column before beginning an indented row.

   iii. The next stem-and-leaf row entry begins on the line after the runover.

   iv. <u>Note</u>: Do not follow the *Braille Formats* rules for blank spaces that occur across the width of a column in tables. A blank space in a stem-and-leaf plot column is left blank and may occur in either the stem or leaf.

   v. Every effort should be made to be consistent throughout a transcription.

b. If a key is provided in print, it must precede the stem-and-leaf plot, even though it may appear in a different location in print. The portion of the key that replicates an entry in the plot is brailled without the numeric indicator or English letter indicator and including vertical lines as it would appear within the plot. The value assigned to the key is brailled using the numeric indicator or English letter indicator as required by the Nemeth Code. The key is formatted in cell 1 with any runover in cell 3.

When two keys are shown in print for back-to-back plots, the left column key is brailled first, followed by the right column key. Each is brailled beginning in cell 1 with any runover in cell 3.

c. When the data is represented by numbers in the body of the plot:

i. omit the numeric indicator in the body of the plot,

ii. braille single digit entries unspaced,

iii. entries consisting of groups of two or more digits require one blank cell between entries, (*See example 26D.*)

iv. omit a comma or other punctuation shown between units of data.

d. When the data is represented by letters in the body of the plot:

i. single cap each capital letter,

ii. omit the English letter indicator in the body of the plot,
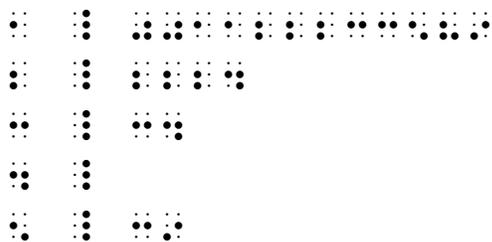
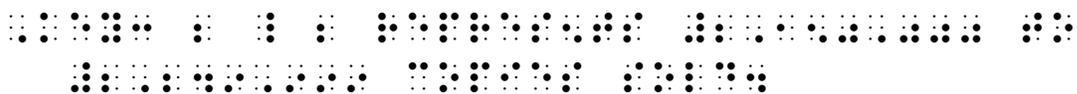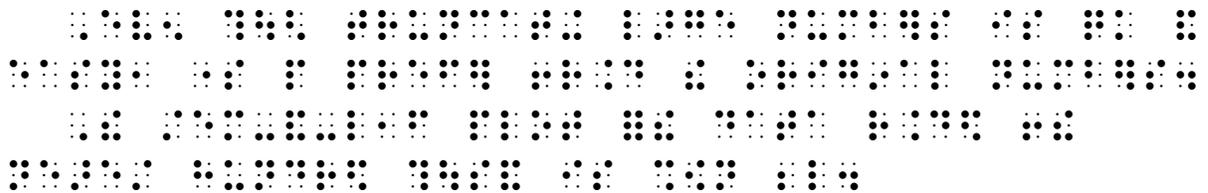**iii**. single letters are brailled unspaced,

iv. entries consisting of groups of two or more letters require one blank cell between each entry,

v. omit a comma or other punctuation shown between units of data.

(1) This example is a basic stem-and-leaf plot with designated columns and a runover in print in the first line under "Leaf." Notice that no numeric indicator is used in either column and that there is no space between numbers.

Stem	Leaf
1	2 2 2 3 4 4 5 5 5 5 6 6 7
	7 7 7 8 8 9 9 9 9 9
2	0 1 1 1 2 6 6 8
3	0

1/2 = 12

⠼⠁⠀⠀⠿⠀⠿⠀⠿⠿⠀⠿⠿⠿

⠠⠎⠞⠑⠍⠀⠿⠀⠠⠇⠑⠁⠋
⠿⠿⠿⠿⠀⠿⠀⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿
⠀⠀⠿⠀⠿⠀⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿⠿
⠿⠀⠀⠿⠀⠿⠿⠿⠿⠿⠿⠿⠿
⠿⠀⠀⠿⠀⠿

(2) This example is also a basic stem-and-leaf plot but without designated column headings. It also has a blank space in the leaf column next to stem #4.

Even though truncating large numbers is quick and easy, some people prefer to round the original numbers.
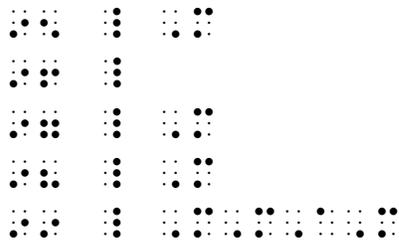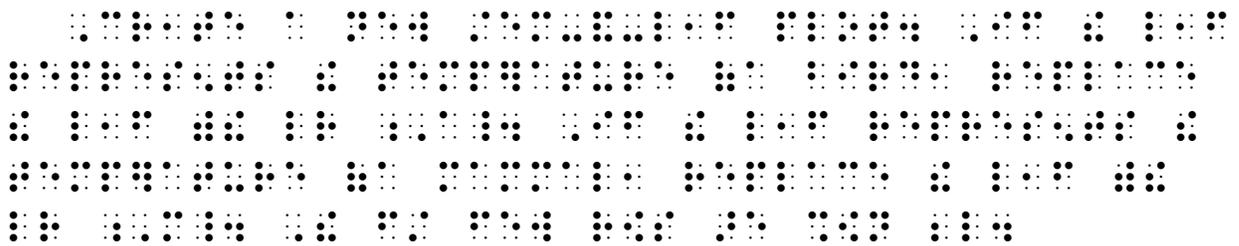
The stem-and-leaf plot for the data rounded to the nearest hundred thousand is shown below.

```
1 | 0 0 1 1 2 2 2 3 3 5 8 9
2 | 2 2 2 4
3 | 3 4
4 |
5 | 3 9
```

Key: 2|2 represents 2,150,000 to 2,249,999 copies sold
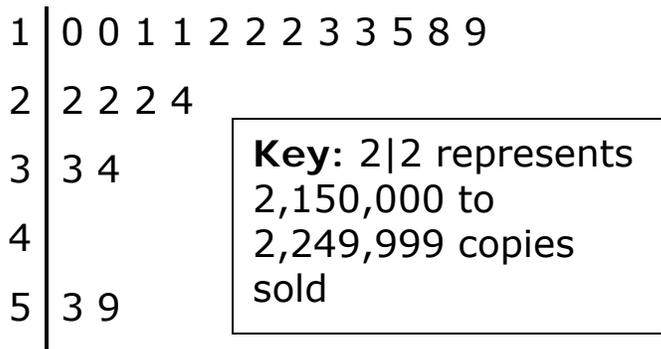
(3) This example is another undesignated plot with letters instead of numbers in the leaf column. No spaces are needed between letters, whether capitalized or not.

Create a new stem-and-leaf plot. If the leaf represents the temperature of a bird, replace the leaf with the letter *A*. If the leaf represents the temperature of a mammal, replace the leaf with the letter M. The first few rows are shown below.

95	M
96	
97	M
98	M
99	M M A M

⠀⠀⠠⠉⠗⠑⠁⠞⠑⠀⠁⠀⠝⠑⠺⠀⠎⠞⠑⠍⠤⠁⠝⠙⠤⠇⠑⠁⠋⠀⠏⠇⠕⠞⠲⠀⠠⠊⠋⠀⠞⠞�</br>
⠀⠞⠓⠑⠀⠇⠑⠁⠋⠀⠗⠑⠏⠗⠑⠎⠑⠝⠞⠎⠀⠠⠁⠀⠞⠑⠍⠏⠑⠗⠁⠞⠥⠗⠑⠀⠕⠋⠀⠁⠀⠃⠊⠗⠙⠂⠀⠗⠑⠏⠇⠁⠉⠑⠀⠞⠓⠑⠀⠇⠑⠁⠋⠀⠺⠊⠞⠓⠀⠞⠓⠑⠀⠇⠑⠞⠞⠑⠗⠀⠠⠁⠲⠀⠠⠊⠋⠀⠞⠓⠑⠀⠇⠑⠁⠋⠀⠗⠑⠏⠗⠑⠎⠑⠝⠞⠎⠀⠞⠓⠑⠀⠞⠑⠍⠏⠑⠗⠁⠞⠥⠗⠑⠀⠕⠋⠀⠁⠀⠍⠁⠍⠍⠁⠇⠂⠀⠗⠑⠏⠇⠁⠉⠑⠀⠞⠓⠑⠀⠇⠑⠁⠋⠀⠺⠊⠞⠓⠀⠞⠓⠑⠀⠇⠑⠞⠞⠑⠗⠀⠠⠍⠲⠀⠠⠞⠓⠑⠀⠋⠊⠗⠎⠞⠀⠋⠑⠺⠀⠗⠕⠺⠎⠀⠁⠗⠑⠀⠎⠓⠕⠺⠝⠀⠃⠑⠇⠕⠺⠲

⠼⠊⠑⠀⠸⠂⠀⠠⠍⠀</br>
⠼⠊⠋⠀⠸⠂</br>
⠼⠊⠛⠀⠸⠂⠀⠠⠍</br>
⠼⠊⠓⠀⠸⠂⠀⠠⠍</br>
⠼⠊⠊⠀⠸⠂⠀⠠⠍⠠⠍⠠⠁⠠⠍

(4) This example has numbers with decimals in the leaf column.

Stem	Leaf
5	8.3
6	4.3 5.1 5.5 6.7 7.0 8.7 9.3
7	0.0 2.8 3.2 5.8 7.4 7.4 *5/8.3 = 58.3*

(5) This example is called a back-to-back stem-and-leaf plot and is used when two sets of data are to be compared. Notice that there are two keys in these types of plots. Always put the left column key first followed by the right column key, both at the margin preceding the plot. Runovers to the left column are two cells to the left; runovers to the right column are two cells to the right.

Mr. Abel's Test Scores

Second Grade Classes		Fifth Grade Classes
0 | 5 | represents a score of 50		| 5 | 2 represents a score of 52
4220	5	2469
453150	6	24790
987776655521	7	11122333455666789900
99999888877665544332110	8	122244455789
98877753320	9	223577780
	10	00

APPENDIX A COMBINATIONS OF TYPE-FORM, ALPHABETIC, AND CAPITALIZATION INDICATORS

LOWER-CASE LETTERS

[page 208] Sanserif: Change braille to:

⠨ ⠰ ⠰

CAPITALIZED LETTERS

Sanserif: Change braille to:

⠨ ⠠ ⠰⠠

APPENDIX B -- INDEX OF BRAILLE SYMBOLS

[page 219] Change print page number for Hebrew tsadi from 152 to 24; single integral print page number from 25 to 122. Add print page 25 for Russian yerih.

[page 238] Change braille example for "Empty Set" to:

⠰⠦⠴

GENERAL INDEX

[page 249] The last column at the bottom of the page, under "Empty Set" the item "Runovers in … §195b, page 206" should be listed as the last item under "Enclosed List". (It is under the wrong category.)

[page 251] The page reference for "Minutes" should be 156, not 172.