

UEB WITH NEMETH: BOUILLON CUBES



AMERICAN
PRINTING
HOUSE





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Today's Take-Aways

1. Use of **lower-cell numbers** makes notation concise
2. Meet the symbols \mathbb{Z} and \mathbb{N}
3. Things like \mathbf{x}_2 have slick rules in Nemeth Code
4. APH has **Math Symbol Reference Booklets**
5. Normal people make **templates**, too



TERMINOLOGY AND CODE BOOKS

Terminology: UEB Math/Science & UEB with Nemeth

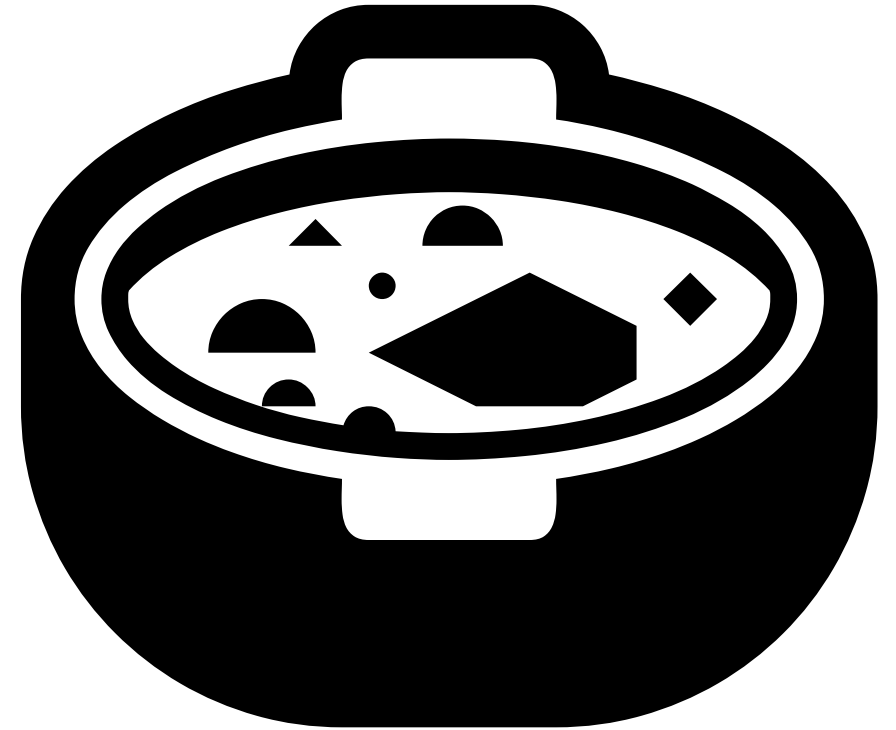
On September 21, 2020, the Braille Authority of North America (BANA) adopted a document entitled “Terminology: **UEB Math/Science** and **UEB with Nemeth.**”

That document has been published on BANA's website, on a page with other [BANA Position Statements and Fact Sheets.](#)

Terminology

The BANA-approved terminology for a transcription created by following The Nemeth Braille Code for Mathematics and Science Notation is

UEB with Nemeth



What is UEB Math/Science (or UEB Technical)?

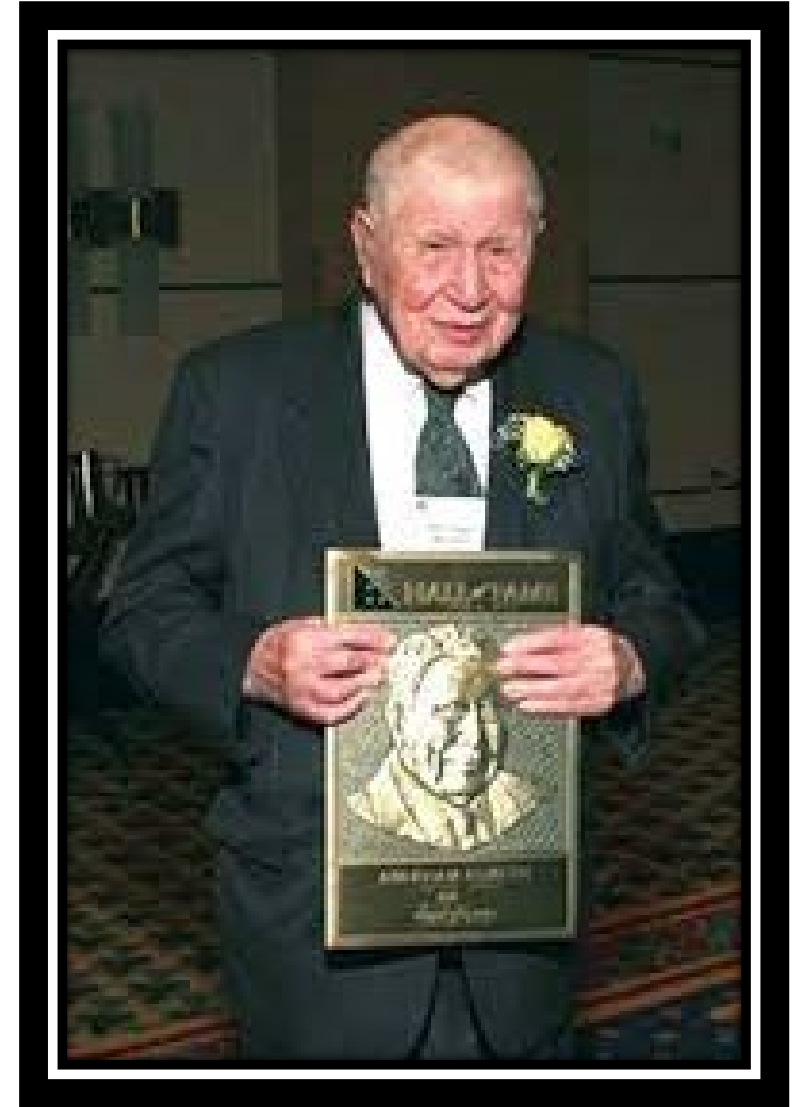
- Following rules in GTM (Guidelines for Technical Material), which is **part of** UEB
- See our webinar [UEB Math/Science Frozen Juice Concentrate](#) for more

The Nemeth Code is separate from Unified English Braille.



What is Nemeth Code?

A braille code (especially good for math and science) designed in the mid-20th century, largely by American mathematician Dr. Abraham Nemeth.





The Nemeth Code is Its Own Code

- Designed by a mathematician
- Active braille code in the U.S.
- Detailed code (specific instructions about symbols and formatting)

A Poll! #1



Poll #1

What is the BANA-recommended terminology for a transcription created by following The Nemeth Braille Code for Mathematics and Science Notation?

- A. Nemeth within UEB contexts
- B. Nemeth Code
- C. UEB with Nemeth
- D. Nothin' but Nemeth

Poll #1, Answer

C. **UEB with Nemeth** (as opposed to “UEB Math/Science”)

Question:

What is the BANA-recommended terminology for a transcription created by following The Nemeth Braille Code for Mathematics and Science Notation?

- A. Nemeth within UEB contexts
- B. Nemeth Code
- C. UEB with Nemeth
- D. Nothin' but Nemeth

Meet the Bubbles

The math and technical notation is presented in Nemeth Code. Nemeth Code happens between code switch indicators that create what I call “bubbles” of Nemeth Code, which are surrounded by UEB.



Meet the Bubbles (cont.)

“Bubbles” of Nemeth Code are created with

opening Nemeth Code indicator ⠠ ⠠ ⠠ ⠠

and

Nemeth Code terminator ⠠ ⠠ ⠠ ⠠



Dumplings? Haha.

Maybe in keeping with today's theme of soup, we could call those pockets of Nemeth Code "dumplings."





LOWER-CELL NUMBERS

Letters Versus Numbers

a b c d e f g h i j

⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠

1 2 3 4 5 6 7 8 9 0

⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠

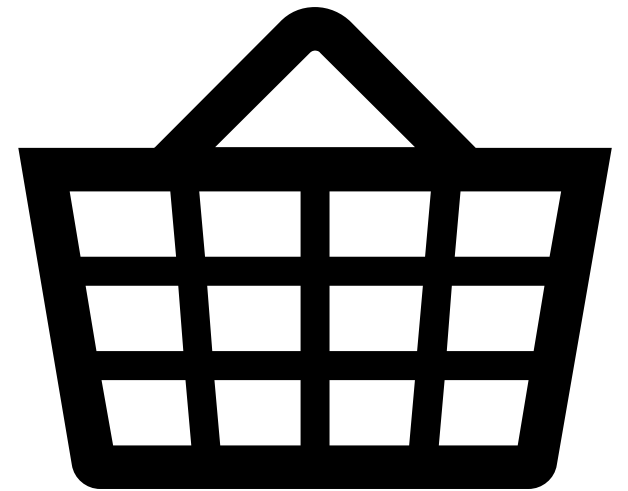
Lower-Cell Numbers Examples

$$A = P(1+rt)$$

⠠⠠ ⠠⠠ ⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

$$2b = 8$$

⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠



When Lower-Cell Numbers Need an Indicator

- They resemble:
 - Punctuation
 - Nemeth Code's *, #, ¶, or §
- After most spaces, with typefaces, ...

See Lesson 7 in the [Provisional Revised Nemeth Course Manual, posted by NFB](#) for more on when a numeric indicator is required.



A Poll! #2



Poll #2

Which is the correct UEB-with-Nemeth transcription of the expression “Arabic-numeral-four c”?

4c

A. ⠠⠼⠠⠨⠠⠨⠠⠨

B. ⠠⠼⠠⠨⠠⠨⠠⠨⠠⠨

C. ⠠⠼⠠⠨⠠⠨⠠⠨⠠⠨⠠⠨

Poll #2, Answer

B. ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

Question:

Which is the correct UEB-with-Nemeth transcription of the expression “Arabic-numeral-four c”?

4c

A. ⠠⠠⠠⠠⠠⠠⠠⠠

B. ⠠⠠⠠⠠⠠⠠⠠⠠

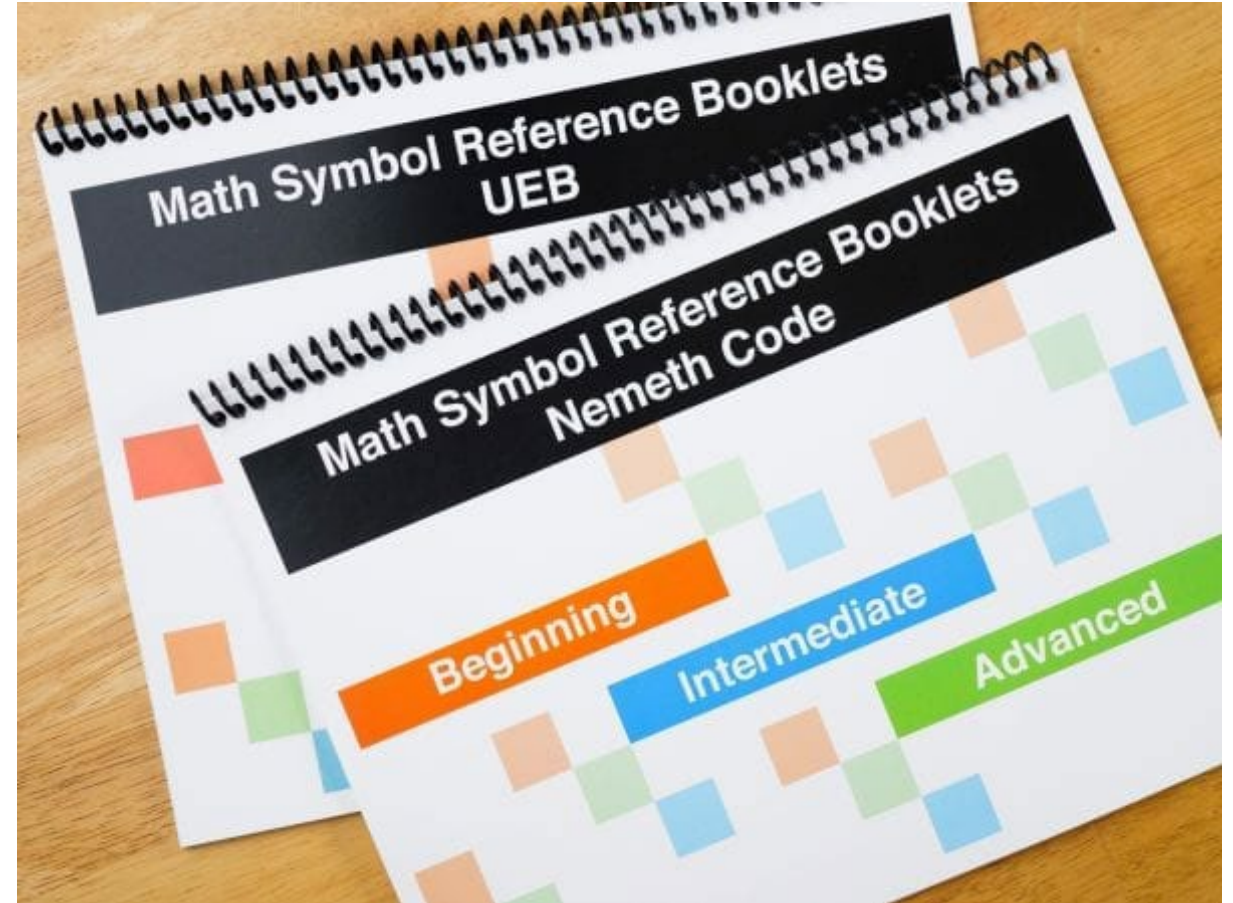
C. ⠠⠠⠠⠠⠠⠠⠠⠠



LOOKING UP SYMBOLS AND STUDYING

APH's Math Symbol Reference Booklets

APH's Math Symbol Reference Booklets are convenient and concise resources.



Math Symbol Reference Booklets

- Two booklets in the set (“Nemeth Code” and “UEB”)
- Listings include
 - name
 - print symbol
 - braille cells
- Symbols are categorized by level
- Yes, there is also an embossed [braille version](#)

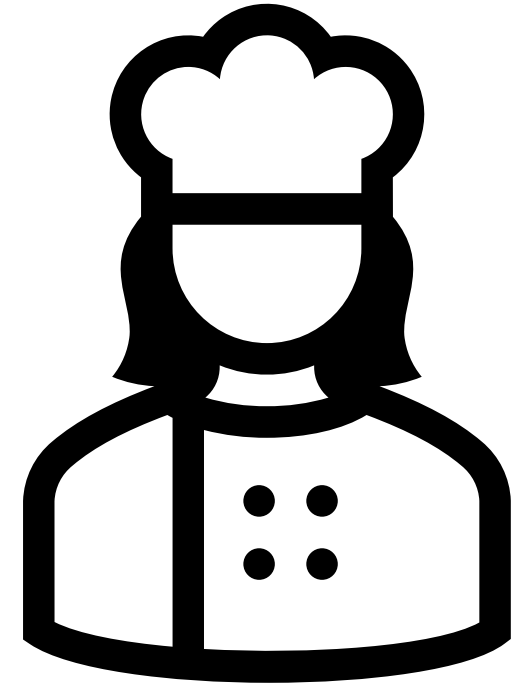


Other “Look Up” Resources

- [Nemeth Symbol Library](#)
from Pearson is a webpage that is supposed “to allow individuals to look up Nemeth symbols and math related terms, using the words a student is accustomed to hearing.”
- [Quizlet flashcards from BrailleTrainer](#)

Study Sources for UEB with Nemeth

- [Nemeth Tutorial from APH](#)
- Project INSPIRE, including its [self-paced courses](#)
- [Nemeth Braille Code Focused Lessons](#) from Pearson
- Support from [NBA](#), [CTEBVI](#), [VAVF](#)



A Peep at Project INSPIRE

From Lesson 2 of Course 4, Activity 2A



NLS Mathematics Braille Transcribing

The official Nemeth certification material is the

[Provisional Revised Nemeth Course Manual](#)

from NLS, posted by NFB



Navigation of Braille Certification

For more about braille study and certification, please visit the webinar [Navigation of Braille Certification](#).



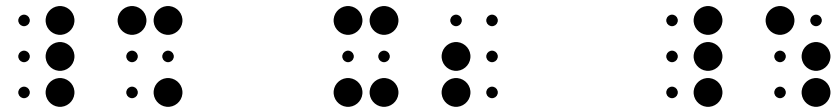


SUBSCRIPTS



How to transcribe “x-subscript-two”

X_2



We do without the subscript indicator for a simple, numeric, right subscript to a letter.
(section 77 of the 1972 Nemeth Code)

Subscript Examples (cont.)

Would you drink H₂O? Sure, you would!

⠠⠠⠠⠠ ⠠ ⠠⠠⠠⠠⠠ ⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠ ⠠⠠⠠⠠

Are H₂O and H₂O₂ the same thing?

⠠⠠⠠⠠ ⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠ ⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠

⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ Opening Nemeth Code indicator

⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ Nemeth Code terminator (Nemeth Code symbol)

⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ Single-word switch indicator (Nemeth Code symbol)

A Warning About Examples

Avoid “dot picking”  

Always make sure that **your** dots accurately represent **your** print.

A Poll! #3



Poll #3

Where can you purchase **Math Symbol Reference Booklets**?

- A. aph.org (APH website)
- B. brailleauthority.org (BANA website)
- C. loc.gov (Library of Congress website)

Poll #3, Answer

A. **aph.org (APH website)**

Question:

Where can you purchase **Math Symbol Reference Booklets**?

- A. aph.org (APH website)
- B. brailleauthority.org (BANA website)
- C. loc.gov (Library of Congress website)

Other Levels (no “slick” rules)

Superscripts need indicators.

x^2

⠠⠠ ⠠⠠⠠ ⠠⠠

Left subscripts need indicators.

${}_6C$

⠠⠠ ⠠⠠⠠⠠⠠ ⠠⠠

Other Levels (cont.)

Sub-subscripts need indicators.

x_{a_2}

⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠

Only a simple, numeric, right subscript to a letter can do without an indicator.



BUBBLES!

What must be in Nemeth Code?

You remember Bubbles, yes?

In a UEB-with-Nemeth transcription, Nemeth Code happens between code switch indicators that create what I call “bubbles” of Nemeth Code, which are surrounded by UEB.



What must be in Nemeth Code? (in short)

- Decimals
- Fractions
- Symbols of operation or comparison
- %, °, \$, etc.
- Numbers and letters modified by being combined with any of the above
- Chemistry notation
- Equations and other technical expressions

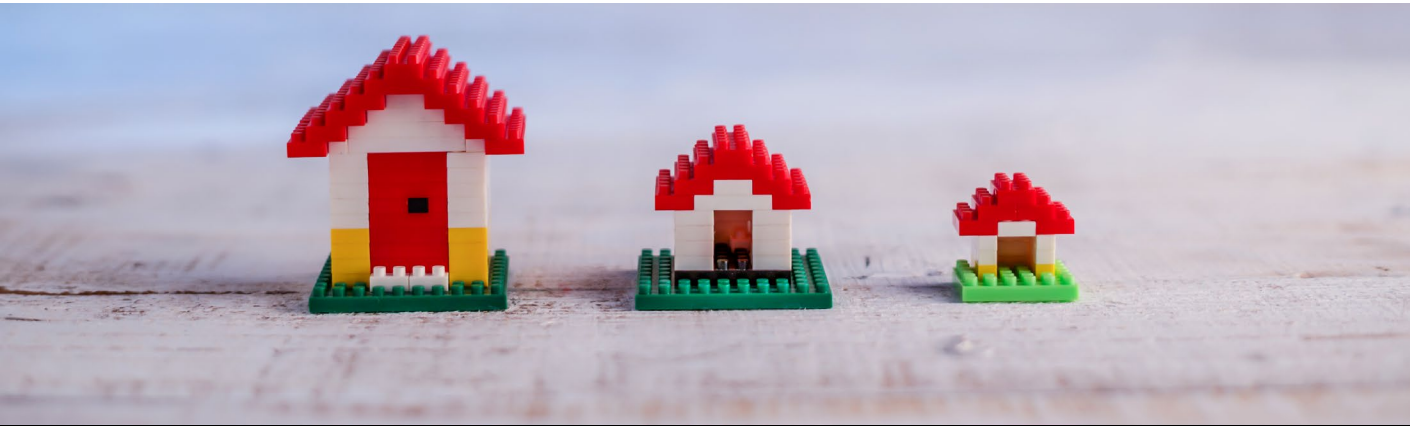
What must be in Nemeth Code?

- Mathematical expressions and fragmentary math expressions, including isolated signs of operation or comparison
- Slash meaning "per", "over", or "divided by"
- A chemical formula or a chemical SYMBOL
- Symbols such as percent, degree, monetary symbols, etc.
- "Modified" numbers or letters
- Letters from non-Roman alphabets
- Fractions and mixed numbers
- Expression consisting of words *and* mathematical symbols

“Bubbles” Examples 2

How much do you make in dollars/hour? 15 huh? Then 30% of your monthly income would be about 790.00 dollars.

⠠ 15 ⠠ huh ⠠ then ⠠ 30% ⠠ of ⠠ your ⠠ monthly ⠠ income ⠠ would ⠠ be ⠠ about ⠠ 790.00 ⠠ dollars.
 ⠠ 15 ⠠ huh ⠠ then ⠠ 30% ⠠ of ⠠ your ⠠ monthly ⠠ income ⠠ would ⠠ be ⠠ about ⠠ 790.00 ⠠ dollars.
 ⠠ 15 ⠠ huh ⠠ then ⠠ 30% ⠠ of ⠠ your ⠠ monthly ⠠ income ⠠ would ⠠ be ⠠ about ⠠ 790.00 ⠠ dollars.



What must be in UEB?

- Most titles of figures, tables, etc.
- Unmodified numbers and/or letters, (including ones with commas, ordinals, and/or a plural “s”) that are not part of a math expression
- A slash in a date, URL, or a slash that separates two words **Exception:** If the slash means "per", "over", or "divided by", see the previous slide



“Popped Bubble” Examples

Refer to Figure 3.2 to answer questions 4-7.

525,600 min.
525,600 min.

525,600 min.

525,600 min.

On 10/16/1918 Dr. Nemeth was born.

On 10/16/1918 Dr. Nemeth was born.

There is So Much More

Remember your study and support resources.

- [CTEBVI](#)
- [VAVF](#)
- [NBA](#)
- [Project INSPIRE](#)
- ...



A Poll! #4



Poll #4

Which is the correct UEB-with-Nemeth transcription of the expression “CD with a double-headed arrow over it”?

\overleftrightarrow{CD}

- A. $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$
- B. $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$
- C. $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$ $\cdot\cdot\cdot\cdot$

Poll #4, Answer

A. ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠

Interestingly, ⠠⠠⠠⠠ is the symbol for a bar, so answer choice B
⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ is the correct transcription of \overline{CD}

Question: Which is the correct UEB-with-Nemeth transcription of the expression “CD with a double-headed arrow over it”?

\overleftrightarrow{CD}

- A. ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠
- B. ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠
- C. ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠

Principles of Nemeth Code

- Logical
- Faithful
- Detailed



A Poll! #5



Poll #5

Which of the following does NOT have to be within Nemeth Code switch indicators?

- A. $\frac{1}{2}$
- B. 1,298
- C. \$5
- D. \pm

Poll #5, Answer

B. 1,298

Question:

Which of the following does NOT have to be within Nemeth Code switch indicators?

- A. $\frac{1}{2}$
- B. 1,298
- C. \$5
- D. \pm

Today's Take-Aways, Summary

1. Using lower-cell numbers allows for fewer braille indicators (makes notation concise)
2. We make bubbles with the opening Nemeth Code indicator and the Nemeth Code terminator (⠆⠆ and ⠆⠆)
3. APH's [Math Symbol Reference Booklets](#) are convenient and concise resources
4. We transcribe letters with subscript numbers without any subscript indicator
5. Templates can make our work more efficient

THANK YOU!

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APH Customer Service team:
cs@aph.org, or 1-800-223-1839



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BONUS MATERIAL

if we have time

Current Status of Nemeth Code revision

As of today (04/25/2022), an updated edition of The Nemeth Braille Code for Mathematics and Science Notation has been written. A team of hardworking volunteers is making adjustments to it based on feedback from a panel of experts. Next step is for BANA representatives to review the updated and adjusted document. Then it can get adjusted again before going through a final preparation process that will make it easy to use and access.

Fractions

- Lesson 1 in Course 3 of Project INSPIRE's self-paced courses
- also in Nemeth Tutorial from APH
 - Lesson 3.4: Simple Fractions
 - Lesson 3.7: Mixed Fractions
 - Lesson 7.1: Complex Fractions

A Poll! #6



Poll #6

Which is the correct UEB-with-Nemeth transcription of the expression “fraction ‘R over 100’”?

$$\frac{R}{100}$$

A. ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠

B. ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠

C. ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠

Poll #6, Answer

C. ⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠

Question:

Which is the correct UEB-with-Nemeth transcription of the expression “fraction ‘R over 100’”?


$$\frac{R}{100}$$

A. ⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠

B. ⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠

C. ⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠

Savor the Flavor

In a transcription that uses The Nemeth Code, it is particularly important to “savor the flavor” of the print before digging into transcription. 

We must get to know the print very well before digging into transcription, because this detailed code gives quite specific rules for symbols and formatting.

The goal of going into such detail is to capture the full meaning of what’s given in print [by knowledgeable and careful print creator(s)] so that the braille user gets the same thing as their print-using colleagues.

A Poll! #7



Poll #7

Which is the correct UEB-with-Nemeth transcription of the expression “T equals Time to double”?

$T = \text{Time to double}$

A. ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

B. ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

C. ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

Poll #7, Answer

B. ⠠⠠ ⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠

Question:

Which is the correct UEB-with-Nemeth transcription of the expression “T equals Time to double”?

$T = \text{Time to double}$

A. ⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠

B. ⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠

C. ⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠

Cells First, Then Formats

Symbols must be accurate
before formatting decisions
can be implemented.

