AN INTRODUCTION TO BRAILLE MATHEMATICS USING UEB WITH NEMETH
A Course for Transcribers

LESSON 1

- INTRODUCTION TO CODE SWITCHING
  - Placement of the Switch Indicators
- THE HYPHEN AND THE DASH
- SIGNS OF OMISSION
- INTRODUCTION TO IDENTIFIERS

Format

- Keep Together—Mathematical Expression
- Margins for Narrative (3-1)
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GRADING GUIDELINES

Answers to Practice Material

LESSON PREVIEW

Introduction to the rules regarding code switching and use of code switch indicators. The hyphen and the short dash are studied. Three signs of omission are introduced: the ellipsis, the long dash, and the general omission symbol. Two Nemeth formats are illustrated: 3-1 narrative and 1-3 itemized material.

Do not begin Lesson 1 until you have completed the Preliminary Lesson.

INTRODUCTION TO CODE SWITCHING

1.1 A Complete Transcription

The base code used in a "UEB with Nemeth" transcription is Unified English Braille ("UEB"). When mathematical content occurs anywhere in the transcription, the nonmathematical notation follows UEB rules while the mathematical notation follows the rules of the Nemeth Code. The reader will be reading Unified English Braille unless signaled otherwise by the use of a code switch indicator.

⠸⠩	`Opening Nemeth Code indicator`
⠸⠱	`Nemeth Code terminator`

These symbols must be listed on the Special Symbols page in the transcriber-generated portion of each volume. The Final Lesson will give details about preparing a Special Symbols page in a UEB with Nemeth transcription.

The opening Nemeth Code indicator is followed by a space (one blank cell). The Nemeth Code terminator is preceded by a space (one blank cell). These spaces do not represent a space in print.

The opening Nemeth Code indicator and the Nemeth Code terminator may also be referred to as "code switch indicators" or "switches".

The following principle is central to a smooth reading of UEB with Nemeth transcription: *UEB symbols are not used inside of the switches. Nemeth symbols are not used outside the switches.*

1.2 Use of the Code Switch Indicators

Switch to Nemeth by inserting an opening Nemeth Code indicator when a mathematical symbol or a mathematical expression is encountered. Terminate Nemeth by inserting a Nemeth Code terminator before continuing UEB text.

The code switch indicators are highlighted throughout this lesson.

Example 1-1

Use either the + or the × symbol to make the statements TRUE.

⠠⠥⠎⠑ ⠑⠊ ⠮ ⠸⠩ ⠬ ⠸⠱ ⠕⠗ ⠮ ⠸⠩ ⠈⠡ ⠸⠱ ⠎⠽⠍⠃⠕⠇
⠞⠕ ⠍⠁⠅⠑ ⠮ ⠎⠌⠁⠞⠑⠰⠞⠎ ⠠⠠⠞⠗⠥⠑⠲

Recall that the space after the opening Nemeth Code indicator and the space before the Nemeth Code terminator do not represent a space in print.

Example 1-2

2 + 2 = 22 is Grampa’s favorite joke.

⠀⠀⠸⠩ ⠼⠆⠬⠆ ⠨⠅ ⠼⠆⠆ ⠸⠱ ⠊⠎ ⠠⠛⠗⠁⠍⠏⠁⠄⠎
⠋⠁⠧⠕⠗⠊⠞⠑ ⠚⠕⠅⠑⠲

Instructions: Transcribe PRACTICE 1A by beginning each sentence in cell 3, with any runovers in cell 1. Compare your transcription to the answers at the end of this lesson. (Read about the practice material in the Preliminary Lesson on page P-4.)

PRACTICE 1A

What does 16 + 4 + 100 equal?

If 10 × 10 × 10 = 1,000 what does 10 × 10 × 10 × 10 equal?

Does 5 ÷ 2 name a whole number?

% ("percent") means parts per hundred; ‰ ("per mille") means parts per thousand.

1.3 Which Code?

1.3.1 **UEB Required.** Recall that page numbers and labels to figures, tables, sections, etc. are transcribed in UEB. Examples are shown in Section P3.1 of the Preliminary Lesson. Here is another example that does not require code switching.

Example 1-3

To prepare for tomorrow's quiz, review Chapters 3-4 and Table 3.1.7 on page T14.

⠠⠞⠕ ⠏⠗⠑⠏⠜⠑ ⠿ ⠞⠍⠄⠎ ⠟⠥⠊⠵⠂ ⠗⠑⠧⠊⠑⠺ ⠠⠡⠁⠏⠞⠻⠎
⠼⠉⠤⠼⠙ ⠯ ⠠⠞⠁⠃⠇⠑ ⠼⠉⠲⠁⠲⠛ ⠕⠝ ⠏⠁⠛⠑ ⠠⠞⠼⠁⠙⠲

1.3.2 **UEB Allowed.** In order to avoid excessive code switching, some "math" items are allowed to be transcribed in UEB when the surrounding text is UEB. Recall from the Preliminary Lesson that numbers may be transcribed in UEB if (and only if) the number is freestanding and unmodified. ("Unmodified" in this context means there is no mathematical symbol associated with the number such as a monetary symbol, percent sign, minus sign, or decimal point.)

The definition of "freestanding" numbers includes numbers with internal commas, with an ordinal ending, or with a plural ending such as "s" or "apostrophe-s". This applies to incidental numbers encountered in narrative, as well as to freestanding numbers in a word problem. When the surrounding text is UEB, there is no need to switch to Nemeth for such numbers. (This rule does not apply if a long number must be divided. See Section 1.7.1.)

Example 1-4

A scale model of the *Nautilus* as depicted in the 1954 Disney film *20,000 Leagues Under the Sea* is shown in the 1st drawing in §5.7.

1 ⠠⠁ ⠎⠉⠁⠇⠑ ⠍⠕⠙⠑⠇ ⠷ ⠮ ⠨⠂⠠⠝⠁⠥⠞⠊⠇⠥⠎ ⠵
2 ⠙⠑⠏⠊⠉⠞⠫ ⠔ ⠮ ⠼⠁⠊⠑⠙ ⠠⠲⠝⠑⠽ ⠋⠊⠇⠍ ⠨⠶⠼⠃⠚⠂⠚⠚⠚
3 ⠠⠇⠂⠛⠥⠑⠎ ⠠⠐⠥ ⠮ ⠠⠎⠑⠁⠨⠄ ⠊⠎ ⠩⠪⠝ ⠔ ⠮ ⠼⠁⠎⠞
4 ⠙⠗⠁⠺⠬ ⠔ ⠘⠎⠼⠑⠲⠛⠲

Line 2: The number with the internal comma is transcribed in UEB.
Line 3: The ordinal is transcribed in UEB.
Line 4: The UEB section sign is used for the section reference.

Example 1-5

A bag contains 10 marbles: 2 purple, 4 orange, 1 yellow, and 3 green. If the bag contains 1,000 marbles, what are the chances of drawing 4 yellow marbles on the 1st draw of 12 marbles?

1 ⠀⠀⠠⠁ ⠃⠁⠛ ⠒⠞⠁⠔⠎ ⠼⠁⠚ ⠍⠜⠃⠇⠑⠎⠒ ⠼⠃ ⠏⠥⠗⠏⠇⠑⠂ ⠼⠙
2 ⠕⠗⠁⠝⠛⠑⠂ ⠼⠁ ⠽⠑⠇⠇⠪⠂ ⠯ ⠼⠉ ⠛⠗⠑⠢⠲ ⠠⠊⠋ ⠮ ⠃⠁⠛
3 ⠒⠞⠁⠔⠎ ⠼⠁⠂⠚⠚⠚ ⠍⠜⠃⠇⠑⠎⠂ ⠱⠁⠞ ⠜⠑ ⠮ ⠡⠨⠑⠎ ⠷
4 ⠙⠗⠁⠺⠬ ⠼⠙ ⠽⠑⠇⠇⠪ ⠍⠜⠃⠇⠑⠎ ⠕⠝ ⠮ ⠼⠁⠌ ⠙⠗⠁⠺ ⠷
5 ⠼⠁⠃ ⠍⠜⠃⠇⠑⠎⠦

In this word problem, the freestanding, unmodified numbers are transcribed in UEB, including the ordinal on line 4.

Example 1-6

Which is more: two 3’s, or three 2’s? There are five 2s in 10. How many 5s are in 10?

⠀⠀⠠⠱ ⠊⠎ ⠍⠒ ⠞⠺⠕ ⠼⠉⠄⠎⠂ ⠕⠗ ⠹⠗⠑⠑ ⠼⠃⠄⠎⠦ ⠠⠐⠮
⠜⠑ ⠋⠊⠧⠑ ⠼⠃⠎ ⠔ ⠼⠁⠚⠲ ⠠⠓⠪ ⠸⠍ ⠼⠑⠎ ⠜⠑ ⠔ ⠼⠁⠚⠦

In this word problem, plural numerals are transcribed in UEB.

a. When an unmodified number is touching literary punctuation such as quotes or parentheses, it is still considered to be freestanding and may be transcribed in UEB.

Example 1-7

Is the "5" in the number "5093" in the hundreds place (500) or in the thousands place (5,000)?

⠀⠀⠠⠊⠎ ⠮ ⠦⠼⠑⠴ ⠔ ⠮ ⠝⠥⠍⠃⠻ ⠦⠼⠑⠚⠊⠉⠴ ⠔ ⠮
⠓⠥⠝⠙⠗⠫⠎ ⠏⠇⠁⠉⠑ ⠐⠣⠼⠑⠚⠚⠐⠜ ⠕⠗ ⠔ ⠮ ⠹⠳⠎⠯⠎
⠏⠇⠁⠉⠑ ⠐⠣⠼⠑⠂⠚⠚⠚⠐⠜⠦

Throughout this course, isolated samples which illustrate Nemeth constructions are marked with a chevron symbol. Nemeth switch indicators are omitted in order to focus on the construction itself. In the context of a complete transcription, code switch indicators are required. In many cases, the isolated construction is incorporated into the example which follows, where use of the code switch indicators is also demonstrated.

1.3.3 **Nemeth Required.** If a freestanding number or letter is combined with anything other than an ordinal, an internal comma, or a plural, it is considered to be modified and is transcribed in Nemeth. Here are some examples.

a. A numeral associated with an operation sign, a monetary symbol, or a percent sign must be transcribed in Nemeth.

⋙	10 × 12	⠼⠂⠴⠈⠡⠂⠆
⋙	$7	⠈⠎⠶
⋙	5%	⠼⠢⠈⠴

Example 1-8

How many cans of paint does Rosie need to paint her 10×12 foot bedroom? At $7 per can, plus 5% tax, what will it cost to complete the job?

```
1     ⠠⠓⠪ ⠸⠍ ⠉⠁⠝⠎ ⠷ ⠏⠁⠔⠞ ⠙⠕⠑⠎ ⠠⠗⠕⠎⠊⠑ ⠝⠑⠫ ⠞⠕
2   ⠏⠁⠔⠞ ⠓⠻ ⠸⠩ ⠼⠂⠴⠈⠡⠂⠆ ⠸⠱ ⠋⠕⠕⠞ ⠃⠫⠗⠕⠕⠍⠦ ⠠⠁⠞
3   ⠸⠩ ⠈⠎⠶ ⠸⠱ ⠏⠻ ⠉⠂ ⠏⠇⠥⠎ ⠸⠩ ⠼⠢⠈⠴ ⠸⠱ ⠞⠁⠭⠂ ⠱⠁⠞
4   ⠺ ⠭ ⠉⠕⠌ ⠞⠕ ⠉⠕⠍⠏⠇⠑⠞⠑ ⠮ ⠚⠕⠃⠦
```

A switch to Nemeth is required for the multiplication symbol (line 2), for the monetary symbol (line 3), and for the percent sign (line 3). The numbers associated with those symbols are also transcribed in Nemeth.

b. A negative numeral must be transcribed in Nemeth. A decimal number with mathematical meaning is transcribed in Nemeth.

⋙	−5	⠤⠼⠢
⋙	3.14159	⠼⠒⠨⠂⠲⠂⠢⠔

Example 1-9

Which is colder, −5 degrees Celsius or 5 degrees Fahrenheit?
What does this famous decimal number represent? 3.14159

```
1     ⠠⠱ ⠊⠎ ⠉⠕⠇⠙⠻⠂ ⠸⠩ ⠤⠼⠢ ⠸⠱ ⠙⠑⠛⠗⠑⠑⠎
2   ⠠⠉⠑⠇⠎⠊⠥⠎ ⠕⠗ ⠼⠑ ⠙⠑⠛⠗⠑⠑⠎ ⠠⠋⠁⠓⠗⠢⠓⠑⠊⠞⠦
3     ⠠⠱⠁⠞ ⠙⠕⠑⠎ ⠹ ⠋⠁⠍⠳⠎ ⠙⠑⠉⠊⠍⠁⠇ ⠝⠥⠍⠃⠻
4   ⠗⠑⠏⠗⠑⠎⠢⠞⠦ ⠸⠩ ⠼⠒⠨⠂⠲⠂⠢⠔ ⠸⠱
```

A switch to Nemeth is required for the minus symbol (line 1) and for the decimal numeration (line 4). The numbers associated with those symbols are also transcribed in Nemeth. The freestanding, unmodified number 5 (line 2) is transcribed in UEB.

c. Except for a freestanding, unmodifed number or letter in UEB context, a switch to Nemeth is required for any Nemeth symbol even if a UEB symbol exists for that sign. This is true even when the symbol is standing alone. For example, even though UEB has a symbol for percent, the Nemeth symbol must be transcribed in a Nemeth transcription.

Example 1-10

The % sign evolved from the Italian *per cento*, meaning "for a hundred".

⠠⠮ ⠎⠊⠛⠝ ⠸⠩ ⠈⠴ ⠸⠱ ⠑⠧⠕⠇⠧⠫ ⠋ ⠮ ⠠⠊⠞⠁⠇⠊⠁⠝
⠨⠂⠏⠻ ⠨⠂⠉⠢⠞⠕⠂ ⠍⠂⠝⠬ ⠦⠿ ⠁ ⠓⠥⠝⠙⠗⠫⠴⠲

A switch to Nemeth is required for the percent symbol, even though UEB has a symbol for this sign. See Section P11 in the Preliminary Lesson.

Example 1-11

What was the formula to convert $ to Swiss ₣ in the year 2000?

⠠⠱⠁⠞ ⠴ ⠮ ⠿⠍⠥⠇⠁ ⠞⠕ ⠒⠧⠻⠞ ⠸⠩ ⠈⠎ ⠸⠱ ⠞⠕
⠠⠎⠺⠊⠎⠎ ⠸⠩ ⠈⠋ ⠸⠱ ⠔ ⠮ ⠽⠑⠜ ⠼⠃⠚⠚⠚⠦

A switch to Nemeth is required for monetary symbols, even when the symbol is constructed using the same dot configuration as the UEB symbol. See Section P10 in the Preliminary Lesson for a list of monetary symbols.

1.3.4 **Nemeth Allowed.** A freestanding unmodifed number or letter does not have to be transcribed in UEB. When such a number or letter is surrounded by Nemeth material, it makes sense to transcribe the item in Nemeth. This results in smoother reading.

Example 1-12

Counting backwards from 3: 3, 2, 1, 0, −1, −2, −3

⠠⠉⠨⠞⠬ ⠃⠁⠉⠅⠺⠜⠙⠎ ⠋ ⠼⠉⠒ ⠸⠩ ⠼⠒⠠ ⠼⠆⠠ ⠼⠂⠠
⠼⠴⠠ ⠤⠼⠂⠠ ⠤⠼⠆⠠ ⠤⠼⠒ ⠸⠱

For smoother reading, the first number 3 is transcribed in UEB because it is at the end of a UEB phrase. The next number 3 is transcribed in Nemeth because it begins a string of numbers which includes some negative numbers which must be transcribed in Nemeth.

1.4 Placement of Literary Punctuation

When Nemeth is terminating and punctuation follows, the function of the punctuation mark must be determined. If the punctuation applies to the structure of the sentence and is not actually part of the math expression, the Nemeth Code terminator is transcribed first. The punctuation mark will follow the termination indicator. There is no space between the terminator and the punctuation mark.

⋙ 931 684 572 ⠼⠔⠒⠂ ⠖⠦⠲ ⠢⠶⠆

Example 1-13

931684572 can be divided into groups of three digits each: 931 684 572.

⠼⠊⠉⠁⠋⠓⠙⠑⠛⠃ ⠉ ⠆ ⠙⠊⠧⠊⠙⠫ ⠔⠞⠕ ⠛⠗⠳⠏⠎ ⠷ ⠹⠗⠑⠑
⠙⠊⠛⠊⠞⠎ ⠑⠁⠡⠒ ⠸⠩ ⠼⠔⠒⠂ ⠖⠦⠲ ⠢⠶⠆ ⠸⠱⠲

> *The period is placed outside of the Nemeth Code terminator. Note that the first numeral is transcribed in UEB because it is a freestanding, unmodified numeral. The second numeral requires a switch because the UEB numeric space indicator is not used in a Nemeth transcription. Review the topic of partitioned numbers in Section P4.1 of the Preliminary Lesson.*

Instructions: Center the heading. Begin each problem in cell 3 with runovers in cell 1.

PRACTICE 1B

We use a + sign to add. We use a − sign to subtract. What sign do we use to multiply?

If $47 - 41 > 1$, do you suppose that $41 - 47 < 1$? Why or why not?

If $5 + 10$ equals 15, what does $10 + 5$ equal? Explain.

Format

1.5 Keep Together—General Principle Regarding Mathematical Expressions

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.

Note: In the examples, full cells of shadow dots show the space remaining on the line.

Placement of the Switch Indicators

1.5.1 **Keep Together If Possible.** Within a paragraph, the switch indicators should appear on the same line as the related expression if the mathematical expression and the two indicators will fit on one braille line within the current margins. A new line begins with the opening Nemeth Code indicator even if the indicator could fit on the previous line.

Example 1-14

The final term can be expressed as 2 × 100 + 1 in this series.

⠠⠮ ⠋⠔⠁⠇ ⠞⠻⠍ ⠉ ⠆ ⠑⠭⠏⠗⠑⠎⠎⠫ ⠵
⠸⠩ ⠼⠆⠈⠡⠂⠴⠴⠬⠂ ⠸⠱ ⠔ ⠹ ⠎⠻⠊⠑⠎⠲

The math expression does not fit on line 1. It is placed on line 2, along with the two related code switch indicators.

Example 1-15

Catherine says she can prove that 0.999 = 1 but I need convincing.

⠠⠉⠁⠮⠗⠔⠑ ⠎⠁⠽⠎ ⠩⠑ ⠉ ⠏⠗⠕⠧⠑ ⠞
⠸⠩ ⠼⠴⠨⠔⠔⠔ ⠨⠅ ⠼⠂ ⠸⠱ ⠃ ⠠⠊ ⠝⠑⠫ ⠒⠧⠔⠉⠬⠲

The equality does not fit on line 1. It is placed on line 2, along with the two related code switch indicators.

Clarification: An equality is considered to be one mathematical expression.

a. If two or more math expressions occur 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.

Example 1-16

Geoff and his friends collected the following donations during Trick-Or-Treat for UNICEF: $9.43, 95¢, $16.58, $24.15, and one plastic spider ring.

1 ⠀⠀⠠⠛⠑⠷⠋ ⠯ ⠦ ⠋⠗⠎ ⠉⠕⠇⠇⠑⠉⠞⠫ ⠮ ⠋⠕⠇⠇⠪⠬
2 ⠙⠕⠝⠁⠰⠝⠎ ⠙⠥⠗⠬ ⠠⠞⠗⠊⠉⠅⠤⠠⠕⠗⠤⠠⠞⠗⠂⠞ ⠿
3 ⠠⠠⠥⠝⠊⠉⠑⠋⠒ ⠸⠩ ⠈⠎⠔⠨⠲⠒⠠ ⠼⠔⠢⠈⠉⠠ ⠈⠎⠂⠖⠨⠢⠦⠠
4 ⠈⠎⠆⠲⠨⠂⠢ ⠸⠱⠂ ⠯ ⠐⠕ ⠏⠇⠁⠌⠊⠉ ⠎⠏⠊⠙⠻ ⠗⠬⠲

Line 3: The Nemeth portion is composed of four individual monetary amounts. This is not one mathematical expression. The first three fit on line 3.
Line 4: The last monetary amount is on the same line as the Nemeth Code terminator.

b. Within a paragraph, a switch indicator should not stand alone on a line if there is room for it on the line with the math expression to which it applies.

Example 1-17

Jill and her friends collected the following donations during their trick-or-treating: $18.21, $10.90, $11.87, $25.25, and one movie coupon.

1 ⠀⠀⠠⠚⠊⠇⠇ ⠯ ⠓⠻ ⠋⠗⠎ ⠉⠕⠇⠇⠑⠉⠞⠫ ⠮ ⠋⠕⠇⠇⠪⠬
2 ⠙⠕⠝⠁⠰⠝⠎ ⠙⠥⠗⠬ ⠸⠮ ⠞⠗⠊⠉⠅⠤⠕⠗⠤⠞⠗⠂⠞⠬⠒
3 ⠸⠩ ⠈⠎⠂⠦⠨⠆⠂⠠ ⠈⠎⠂⠴⠨⠔⠴⠠ ⠈⠎⠂⠂⠨⠦⠶⠠
4 ⠈⠎⠆⠢⠨⠆⠢ ⠸⠱⠂ ⠯ ⠐⠕ ⠍⠕⠧⠊⠑ ⠉⠳⠏⠕⠝⠲

Line 3: The opening Nemeth Code indicator is placed on the same line as the first dollar amount, even though there is room for just the indicator on the previous line.
Line 4: The last dollar amount is placed on the same line as the Nemeth Code terminator, even though there is room for just the dollar amount on the previous line.

1.5.2 **A Switch Indicator May Stand Alone on a Line.** If a math expression will fit on one line but there is not room for one or both of the switch indicators, one or both switch indicators may stand alone on a line. Keeping the mathematical expression intact is the priority. Several layouts are illustrated below.

Example 1-18

Multiplication can be expressed as addition. For example, 14×12 is the same as twelve fourteens, or 14 + 14 + 14 + 14 + 14 + 14 + 14 + 14 + 14 + 14 + 14 + 14.

```
1     ⠠⠍⠥⠇⠞⠊⠏⠇⠊⠉⠁⠰⠝ ⠉ ⠆ ⠑⠭⠏⠗⠑⠎⠎⠫ ⠵ ⠁⠙⠙⠊⠰⠝⠲
2   ⠠⠿ ⠑⠭⠁⠍⠏⠇⠑⠂ ⠸⠩ ⠼⠂⠲⠈⠡⠂⠆ ⠸⠱ ⠊⠎ ⠮ ⠎⠁⠍⠑ ⠵
3   ⠞⠺⠑⠇⠧⠑ ⠋⠳⠗⠞⠑⠢⠎⠂ ⠕⠗ ⠸⠩
4   ⠼⠂⠲⠬⠂⠲⠬⠂⠲⠬⠂⠲⠬⠂⠲⠬⠂⠲⠬⠂⠲⠬⠂⠲⠬⠂⠲⠬⠂⠲⠬⠂⠲⠬⠂⠲ ⠸⠱⠲
```

Line 3: The opening Nemeth Code indicator is placed on the line before the long expression.

Example 1-19

Similarly, 13×12 is the same as 13 + 13 + 13 + 13 + 13 + 13 + 13 + 13 + 13 + 13 + 13 + 13.

```
1     ⠠⠎⠊⠍⠊⠇⠜⠇⠽⠂ ⠸⠩ ⠼⠂⠒⠈⠡⠂⠆ ⠸⠱ ⠊⠎ ⠮ ⠎⠁⠍⠑ ⠵⠀⠀
2   ⠸⠩ ⠼⠂⠒⠬⠂⠒⠬⠂⠒⠬⠂⠒⠬⠂⠒⠬⠂⠒⠬⠂⠒⠬⠂⠒⠬⠂⠒⠬⠂⠒⠬⠂⠒⠬⠂⠒
3   ⠸⠱⠲
```

Line 1: The opening Nemeth Code indicator does not fit on the line.
Line 2: There is not room for the Nemeth Code terminator after the long expression.
Line 3: The Nemeth Code terminator (along with the related period) falls here.

Example 1-20

... Reducing to prime factors, 252 = 4 · 63 = 4 · 3 · 21 = 2 · 2 · 3 · 3 · 7.

```
⠲⠲⠲ ⠠⠗⠫⠥⠉⠬ ⠞⠕ ⠏⠗⠊⠍⠑ ⠋⠁⠉⠞⠕⠗⠎⠂ ⠸⠩⠀⠀⠀⠀⠀⠀⠀⠀⠀
⠼⠆⠢⠆ ⠨⠅ ⠼⠲⠡⠖⠒ ⠨⠅ ⠼⠲⠡⠒⠡⠆⠂ ⠨⠅ ⠼⠆⠡⠆⠡⠒⠡⠒⠡⠶
⠸⠱⠲
```

Because the expression takes up the full available line width, both the opening Nemeth Code indicator and the Nemeth Code terminator must be placed on separate lines.

Note: A sign of comparison links the symbols on the left side of the comparison sign with the symbols on the right side of the comparison sign and so is considered to be one mathematical expression. The math portion Example 1-20 is one expression, not four, and should not be divided between lines if it will fit on one line within the current margins.

1.5.3 **Switch Indicators at Braille Page Turns.** The effect of the opening Nemeth Code indicator is not terminated by transition to a new braille page. If, however, the switch to Nemeth occurs at a braille page turn, place the opening switch indicator on the same braille page as the mathematical material to which it applies. Similarly, the Nemeth Code terminator should be placed on the same braille page as the end of the mathematical material.

Example 1-21

... Reducing to prime factors, $252 = 4 \cdot 63 = 4 \cdot 3 \cdot 21 = 2 \cdot 2 \cdot 3 \cdot 3 \cdot 7$.

```
25  ⠲⠲⠲ ⠠⠗⠫⠥⠉⠬ ⠞⠕ ⠏⠗⠊⠍⠑ ⠋⠁⠉⠞⠕⠗⠎⠂         ⠼⠁⠁
— — — — — — — — — — — — — — — — — — — — — — — — — — —
1   ⠸⠩                                 ⠃⠼⠙⠙
2   ⠼⠆⠢⠆ ⠨⠅ ⠼⠲⠡⠖⠒ ⠨⠅ ⠼⠲⠡⠒⠡⠆⠂ ⠨⠅ ⠼⠆⠡⠆⠡⠒⠡⠒⠡⠶
3   ⠸⠱⠲
```

Line 25: Although the opening switch indicator will fit after the word "factors", it cannot go here because it would not appear on the same page as the math to which it applies.
Line 1: The opening switch is at the top of the braille page.

Example 1-22

... 36 reduces to four prime factors. $36 = 2 \cdot 18 = 2 \cdot 2 \cdot 9 = 2 \cdot 2 \cdot 3 \cdot 3$

```
24  ⠲⠲⠲ ⠼⠉⠋ ⠗⠫⠥⠉⠑⠎ ⠞⠕ ⠋⠳⠗ ⠏⠗⠊⠍⠑ ⠋⠁⠉⠞⠕⠗⠎⠲
25                                      ⠼⠁⠁
— — — — — — — — — — — — — — — — — — — — — — — — — — —
1                                      ⠃⠼⠙⠙
2   ⠸⠩ ⠼⠒⠖ ⠨⠅ ⠼⠆⠡⠂⠦ ⠨⠅ ⠼⠆⠡⠆⠡⠔ ⠨⠅ ⠼⠆⠡⠆⠡⠒⠡⠒ ⠸⠱
```

Challenge: The math expression and the two switch indicators must appear on the same braille page.
Lines 24-25: Although the opening switch indicator will fit after the word "factors" and the math will fit on line 25, there would not be room for the Nemeth Code terminator because of the braille page number.
Lines 1-2: This expression and its code switch indicators require 40 cells. The print page number shortens the available room on line 1, so the opening switch is placed on line 2 in cell 1, the runover position of a narrative paragraph.

Switch indicators at print page turns will be discussed in Lesson 3.

Instructions: Begin each paragraph in cell 3 with runovers in cell 1.

PRACTICE 1C

How many squares can you find on an 8×8 checkerboard? (*Hint*: There are more than 65 squares.) First determine how many 1×1 squares, then how many 2×2 squares, and so on, you can find.

12×11 is also the same as twelve elevens, or $11 + 11 + 11 + 11 + 11 + 11 + 11 + 11 + 11 + 11 + 11 + 11$.

1.6 Consistency with Mathematical Symbols

Although UEB provides symbols for math notation and measurement, the transcriber's objective is to maintain consistency in the appearance of the mathematical symbols throughout the transcription. A symbol that is used in mathematical context is transcribed in Nemeth, even within narrative. This includes the symbols learned in the Preliminary Lesson—signs of operation, signs of comparison, monetary, percent, and prime signs.

This sample uses Nemeth symbols for prime signs representing minutes and seconds of arc. A switch to Nemeth is required.

⪢ 67'44'' ⠼⠖⠶⠄⠲⠲⠄⠄

Example 1-23

Convert 67'44'' to decimal degree form.

⠠⠒⠧⠻⠞ ⠸⠩ ⠼⠖⠶⠄⠲⠲⠄⠄ ⠸⠱ ⠞⠕ ⠙⠑⠉⠊⠍⠁⠇ ⠙⠑⠛⠗⠑⠑
⠿⠍⠲

The next sample uses the Nemeth decimal point in a mathematical numeral. A switch to Nemeth is required.

⪢ 1.6180339887 ⠼⠂⠨⠖⠂⠦⠴⠒⠒⠔⠦⠦⠶

Example 1-24

1.6180339887 is known as the Golden Number, **Phi.**

⠸⠩ ⠼⠂⠨⠖⠂⠦⠴⠒⠒⠔⠦⠦⠶ ⠸⠱ ⠊⠎ ⠐⠅⠝ ⠵ ⠮ ⠠⠛⠕⠇⠙⠢
⠠⠝⠥⠍⠃⠻⠂ ⠘⠂⠠⠏⠓⠊⠲

PRACTICE 1D

Percent to Decimal. To convert 48.6% to a decimal number, divide the percent by 100. For example, to convert 48.6%, 48.6 ÷ 100 = 0.486.

With a 7% sales tax added, how much will a $6 bus ticket actually cost?

Julio's lot measures 56' wide and 100' deep. The garden shed sits 20'8'' back from the street.

THE HYPHEN AND THE DASH

1.7 The Hyphen and the Dash As Punctuation

The hyphen and the dash will most often be found in nonmathematical context, in which case the UEB symbols and rules are applied. When these symbols are encountered within mathematical context, the Nemeth symbols are used, and Nemeth spacing rules are followed. The hyphen symbol is the same in either code. The dash symbol is not. If a dash occurs in mathematical context, the "short dash" of the Nemeth Code is transcribed.

⠤	`Hyphen`	-
⠤⠤	`Dash ("short")`	—

1.7.1 **A Hyphen May Divide a Long Numeral.** If a long numeral cannot be contained on one braille line it is divided after a comma and a hyphen is inserted. A divided number must be transcribed in Nemeth, even if it is freestanding and unmodified. A numeric indicator is inserted before the first digit of the numeral on the runover line.

Example 1-25

One decillion can be written as 1,000,000,000,000,000,000,000,000,000,000,000.

⠠⠐⠕ ⠙⠑⠉⠊⠇⠇⠊⠕⠝ ⠉ ⠆ ⠺⠗⠊⠞⠞⠢ ⠵ ⠸⠩ ⠼⠂⠠⠴⠴⠴⠠⠤
⠼⠴⠴⠴⠠⠴⠴⠴⠠⠴⠴⠴⠠⠴⠴⠴⠠⠴⠴⠴⠠⠴⠴⠴⠠⠴⠴⠴⠠⠴⠴⠴⠠⠴⠴⠴⠠⠴⠴⠴
⠸⠱⠲

Because this long numeral must be divided, it is transcribed in Nemeth. A numeric indicator is inserted at the beginning of the runover line (line 2).

a. **No Comma.** If the long numeral does not contain a comma, the hyphen may be inserted after any digit.

Example 1-26

Name the Greek irrational number that begins as 3.14159265358979323846264338327950288419716939; then write the next five digits.

1 ⠠⠐⠝ ⠮ ⠠⠛⠗⠑⠑⠅ ⠊⠗⠗⠁⠰⠝⠁⠇ ⠝⠥⠍⠃⠻ ⠞ ⠆⠛⠔⠎ ⠵
2 ⠸⠩ ⠼⠒⠨⠂⠲⠂⠢⠔⠆⠖⠢⠒⠢⠦⠔⠶⠔⠒⠆⠒⠦⠲⠖⠆⠖⠲⠒⠒⠦⠒⠆⠶⠔⠢⠴⠆⠤
3 ⠼⠦⠦⠲⠂⠔⠶⠂⠖⠔⠒⠔ ⠸⠱⠆ ⠮⠝ ⠺⠗⠊⠞⠑ ⠮ ⠝⠑⠭⠞ ⠋⠊⠧⠑
4 ⠙⠊⠛⠊⠞⠎⠲

Line 3: The semicolon applies to the sentence structure and is placed after the Nemeth Code terminator.

1.7.2 **A Hyphen May Connect Numerals.** Freestanding, unmodified numbers which are connected by a hyphen may be transcribed in UEB. If one or both numbers are modified, the two numbers are transcribed in Nemeth. In Nemeth, the numeric indicator is not used after the hyphen.

⫸ 5.5-7.0 ⠼⠢⠨⠢⠤⠶⠨⠴

⫸ 4-5" ⠼⠲⠤⠢⠄⠄

Example 1-27

Plants thrive in soils that measure from 5.5-7.0 on the pH scale.

⠠⠏⠇⠁⠝⠞⠎ ⠹⠗⠊⠧⠑ ⠔ ⠎⠕⠊⠇⠎ ⠞ ⠍⠂⠎⠥⠗⠑ ⠋
⠸⠩ ⠼⠢⠨⠢⠤⠶⠨⠴ ⠸⠱ ⠕⠝ ⠮ ⠏⠠⠓ ⠎⠉⠁⠇⠑⠲

Because the numbers representing quantities contain a decimal point, they are transcribed in Nemeth.

Example 1-28

Does 4-5" mean 4-5 feet or 4-5 inches?

⠠⠙⠕⠑⠎ ⠸⠩ ⠼⠲⠤⠢⠄⠄ ⠸⠱ ⠍⠂⠝ ⠼⠙⠤⠼⠑ ⠋⠑⠑⠞ ⠕⠗
⠼⠙⠤⠼⠑ ⠔⠡⠑⠎⠦

Nemeth is required for 5" because of the double prime sign. The entire hyphenated range 4-5" is transcribed in Nemeth. The other freestanding unmodified number ranges are transcribed in UEB.

a. **UEB Context.** Nonmathematical or nonscientific numerals connected by hyphens such as dates, page number ranges, chapter or section ranges, etc. follow the rules of UEB.

Example 1-29

Your assignment for 3-6-17 is to read Sections 5.4-5.5 on pages 72-86.

⠠⠽⠗ ⠁⠎⠎⠊⠛⠝⠰⠞ ⠿ ⠼⠉⠤⠼⠋⠤⠼⠁⠛ ⠊⠎ ⠞⠕ ⠗⠂⠙
⠠⠎⠑⠉⠰⠝⠎ ⠼⠑⠲⠙⠤⠼⠑⠲⠑ ⠕⠝ ⠏⠁⠛⠑⠎ ⠼⠛⠃⠤⠼⠓⠋⠲

The decimal points in the section numbers are transcribed in UEB.

1.7.3 **The Short Dash.** A dash as a mark of punctuation implies a pause or a break in thought. The numbers on either side of a dash may be transcribed in different codes. As in UEB context, follow print spacing before and after a dash. A dash may begin or end a line but the sign itself must not be divided.

In mathematical context, the Nemeth short dash is used to represent a dash used as a mark of punctuation. A numeric indicator is required following a dash even though that number may not be preceded by a space.

⋙ $47,689—2.6% ⠈⠎⠲⠶⠠⠖⠦⠔⠤⠤⠼⠆⠨⠖⠈⠴

⋙ $47,689 — 2.6% ⠈⠎⠲⠶⠠⠖⠦⠔ ⠤⠤ ⠼⠆⠨⠖⠈⠴

Example 1-30

The final cost was $47,689 — 2.6% more than advertised.

⠀⠀⠠⠮ ⠋⠔⠁⠇ ⠉⠕⠌ ⠴ ⠸⠩ ⠈⠎⠲⠶⠠⠖⠦⠔ ⠤⠤ ⠼⠆⠨⠖⠈⠴ ⠸⠱
⠍ ⠹⠁⠝ ⠁⠙⠧⠻⠞⠊⠎⠫⠲

The numbers on both sides of this dash must be transcribed in Nemeth. The Nemeth short dash is transcribed. Spacing follows print.

Example 1-31

The final cost was $47,689—3 percent more than advertised.

⠀⠀⠠⠮ ⠋⠔⠁⠇ ⠉⠕⠌ ⠴ ⠸⠩ ⠈⠎⠲⠶⠠⠖⠦⠔ ⠸⠱⠠⠤⠼⠉ ⠏⠻⠉⠢⠞
⠍ ⠹⠁⠝ ⠁⠙⠧⠻⠞⠊⠎⠫⠲

The first number is modified with a monetary symbol and so must be transcribed in Nemeth. The second number is unmodified and may be transcribed in UEB. Nemeth is terminated after the dollar amount and the UEB dash is transcribed. Spacing follows print.

a. Even though the symbols differ between UEB and Nemeth, you may use the two dash forms within a sentence.

Example 1-32

Jayce carefully recited the last five facts from the "sevens" times table.
"7 × 6 = 42 — 7 × 7 = 49 — 7 × 8 = 56 — 7 × 9 = 63 — 7 × 10 = 70 — Phew!"

1 ⠀⠀⠠⠚⠁⠽⠉⠑ ⠉⠜⠑⠰⠇⠇⠽ ⠗⠑⠉⠊⠞⠫ ⠮ ⠇⠁⠌ ⠋⠊⠧⠑ ⠋⠁⠉⠞⠎
2 ⠋ ⠮ ⠦⠎⠑⠧⠢⠎⠴ ⠐⠞⠎ ⠞⠁⠃⠇⠑⠲ ⠦⠸⠩ ⠼⠶⠈⠡⠖ ⠨⠅ ⠼⠲⠆
3 ⠤⠤ ⠼⠶⠈⠡⠶ ⠨⠅ ⠼⠲⠔ ⠤⠤ ⠼⠶⠈⠡⠦ ⠨⠅ ⠼⠢⠖ ⠤⠤
4 ⠼⠶⠈⠡⠔ ⠨⠅ ⠼⠖⠒ ⠤⠤ ⠼⠶⠈⠡⠂⠴ ⠨⠅ ⠼⠶⠴ ⠸⠱ ⠠⠤
5 ⠠⠏⠓⠑⠺⠖⠴

Lines 3-4: The Nemeth dash is used in the math portion. Each dash is preceded and followed by a space, as in print.
Line 4:The UEB dash is used after Nemeth is terminated. The *dash is preceded and followed by a space, as in print. (The space before the Nemeth Code terminator does not represent a space in print.)*

1.7.4 **Hyphen, Dash, or Minus Sign?** Read carefully to determine whether a symbol is a hyphen, a dash or a minus/negative sign. A space must come between a hyphen and a minus sign or between a dash and a minus sign in order to distinguish the similar constructions.

Example 1-33

Moving right to left on the number line, Carl spoke very carefully: 0— −5— −10— −15— −20.

⠠⠍⠕⠧⠬ ⠐⠗ ⠞⠕ ⠇⠑⠋⠞ ⠕⠝ ⠮ ⠝⠥⠍⠃⠻ ⠇⠔⠑⠂ ⠠⠉⠜⠇
⠎⠏⠕⠅⠑ ⠧ ⠉⠜⠑⠰⠇⠇⠽⠒ ⠸⠩ ⠼⠴⠤⠤ ⠤⠼⠢⠤⠤ ⠤⠼⠂⠴⠤⠤
⠤⠼⠂⠢⠤⠤ ⠤⠼⠆⠴ ⠸⠱⠲

Although the numbers will fit all together on one line, they are five individual expressions and so the fullest available extent of the line is used. See [Section 1.3.4] regarding the switch to Nemeth before the zero.

Example 1-34

In degrees Celsius, Earth's temperature ranges from 58.2- −99.7.

⠠⠔ ⠙⠑⠛⠗⠑⠑⠎ ⠠⠉⠑⠇⠎⠊⠥⠎⠂ ⠠⠑⠜⠹⠄⠎ ⠞⠑⠍⠏⠻⠁⠞⠥⠗⠑
⠗⠁⠝⠛⠑⠎ ⠋ ⠸⠩ ⠼⠢⠦⠨⠆⠤ ⠤⠼⠔⠔⠨⠶ ⠸⠱⠲

Because a space must be inserted between the hyphen and the minus sign, a numeric indicator is required for the negative number.

PRACTICE 1E

Represent cents as decimals—$0.89—not like this—89¢.

Marcus' answer was 37¢ — 38¢ is the correct change.

In degrees Fahrenheit, Earth's temperature ranges from −126-136.

Expressed in seconds, the shortest meaningful interval of time (Planck Time) contains 46 decimal places: 0.0000000000000000000000000000000000000000000054!

SIGNS OF OMISSION

1.8 General Use of Signs of Omission

Omission of mathematical or literary material may be shown by dots, a low line (underscore), a blank space, a question mark, or a combination of these or other signs devised by the author. Unless otherwise stated, the omission symbol used in braille should correspond to the print sign.

1.9 Ellipsis

An ellipsis is a series of dots which represent an omission. In UEB context, the UEB ellipsis is transcribed. In Nemeth context, the ellipsis of the Nemeth Code is transcribed. Three dot 3s represent the Nemeth ellipsis, regardless of how many dots are used in print. (One exception will be presented in Lesson 17 for ellipses within an array.) Note that, in mathematics, the ellipsis may be printed on the midline. This will be addressed in Lesson 2.

⠄⠄⠄	Ellipsis	...

Example 1-35

What is the secret clue in this series? 5.0, 8.2, 11.4, 14.6, ...

⠠⠱⠁⠞ ⠊⠎ ⠮ ⠎⠑⠉⠗⠑⠞ ⠉⠇⠥⠑ ⠔ ⠹ ⠎⠻⠊⠑⠎⠦
⠸⠩ ⠼⠢⠨⠴⠠ ⠼⠦⠨⠆⠠ ⠼⠂⠂⠨⠲⠠ ⠼⠂⠲⠨⠖⠠ ⠄⠄⠄ ⠸⠱

The Nemeth ellipsis is used inside the switches.

Example 1-36

Marissa counted by 4s: 4, 8, 12, 16, 20, ...

⠠⠍⠜⠊⠎⠎⠁ ⠉⠨⠞⠫ ⠃⠽ ⠼⠙⠎⠒ ⠼⠙⠂ ⠼⠓⠂ ⠼⠁⠃⠂ ⠼⠁⠋⠂
⠼⠃⠚⠂ ⠲⠲⠲

The UEB ellipsis is used in nonmathematical context.

1.10 Long Dash

When a low line (underscore) is used to denote an omission in print, within mathematical context the Nemeth "long dash" is transcribed. Outside of the code switches, the UEB underscore is used.

⠤⠤⠤⠤	Long Dash	____

Example 1-37

Multiply: 79 × 542 = _____

⠠⠍⠥⠇⠞⠊⠏⠇⠽⠒ ⠸⠩ ⠼⠶⠔⠈⠡⠢⠲⠆ ⠨⠅ ⠤⠤⠤⠤ ⠸⠱

The Nemeth long dash is used inside the switches.

Example 1-38

Two and ___ are ten.

⠠⠞⠺⠕ ⠯ ⠨⠤ ⠜⠑ ⠞⠢⠲

The UEB underscore is used in nonmathematical context.

Exception: When a low line (underscore) is used to show omission internal to a number, see Section 1.11.c.

1.11 General Omission Symbol

An omission may be printed as a question mark, or a blank space may indicate a missing sign. The printed question mark can be standing alone, underlined, or be shown with hyphens. In all cases, the general omission symbol is transcribed.

⠿ General Omission Symbol

All four samples shown below are transcribed the same way.

- 92 ÷ 2 = ? ⠼⠔⠆⠨⠌⠆ ⠨⠅ ⠿
- 92 ÷ 2 = -?- ⠼⠔⠆⠨⠌⠆ ⠨⠅ ⠿
- 92 ÷ 2 = ⠼⠔⠆⠨⠌⠆ ⠨⠅ ⠿
- 92 ÷ 2 = _?_ ⠼⠔⠆⠨⠌⠆ ⠨⠅ ⠿

a. The general omission symbol follows the spacing rules of the material which it represents.

- 6 + ? = 15 ⠼⠖⠬⠿ ⠨⠅ ⠼⠂⠢

  The omitted digit is unspaced from the plus sign and spaced from the equals sign.

- 1,5?4 + 200 = 1,734

  ⠼⠂⠠⠢⠿⠲⠬⠆⠴⠴ ⠨⠅ ⠼⠂⠠⠶⠒⠲

  The omitted digit in the tens place is unspaced from the digits in the hundreds place and the ones place.

Example 1-39

Greater than or less than? 24 ÷ 3 ? 24 ÷ 4

⠠⠛⠗⠞⠻ ⠹⠁⠝ ⠕⠗ ⠇⠑⠎⠎ ⠹⠁⠝⠦⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀
⠸⠩ ⠼⠆⠲⠨⠌⠒ ⠿ ⠼⠆⠲⠨⠌⠲ ⠸⠱

The omitted comparison sign is preceded and followed by a space, according to the spacing rules for signs of comparison.

b. The number of general omission symbols used in braille must correspond to the number of omission signs used in print. A box or a shaded region that does not show a specific number of places is represented by a single general omission symbol.

Example 1-40

678 × 27 = ? ? ? ? ?

⠸⠩ ⠼⠖⠶⠦⠈⠡⠆⠶ ⠨⠅ ⠿⠿⠿⠿⠿ ⠸⠱

A 5-digit answer is implied by showing five omission signs, which represent the five question marks shown in print.

c. A special rule allows for the use of a general omission symbol to represent omission when a low line or underscore is *internal* to a number.

Example 1-41

Fill in the blank: 35___,862 rounds to 350,000.

⠠⠋⠊⠇⠇ ⠔ ⠮ ⠃⠇⠁⠝⠅⠒ ⠸⠩ ⠼⠒⠢⠿⠠⠦⠖⠆ ⠸⠱ ⠗⠨⠙⠎ ⠞⠕
⠼⠉⠑⠚⠂⠚⠚⠚⠲

The omission is printed as a low line. Only the number with the omission requires a switch to Nemeth.

1.12 Spacing of the Ellipsis and Long Dash

The ellipsis and the long dash are preceded and followed by a space in most circumstances, even when next to an operation sign. The print copy may or may not show a space but to avoid misreading the ellipsis or the long dash as other math symbols Nemeth spacing rules must be followed.

a. DO insert a space between an ellipsis or a long dash and a symbol of operation.

≫ ___ + 5 ⠤⠤⠤⠤ ⠬⠢

Example 1-42

There are many ways to write "10". Here are just a few: ____ + 5, ____ − 3, 2 × ____,
50 ÷ ____.

⠠⠐⠮ ⠜⠑ ⠸⠍ ⠺⠁⠽⠎ ⠞⠕ ⠺⠗⠊⠞⠑ ⠦⠼⠁⠚⠴⠲ ⠠⠐⠓ ⠜⠑ ⠚
⠁ ⠋⠑⠺⠒ ⠸⠩ ⠤⠤⠤⠤ ⠬⠢⠠ ⠤⠤⠤⠤ ⠤⠼⠒⠠
⠼⠆ ⠈⠡ ⠤⠤⠤⠤⠠ ⠼⠢⠴ ⠨⠌ ⠤⠤⠤⠤ ⠸⠱⠲

Each long dash is spaced from the preceding or following operation symbol. Note that the math expression 2 × ____ is not divided between lines even though there is a space before the long dash.

b. DO NOT insert a space between an ellipsis or long dash and a related symbol such as a decimal point, monetary symbol, percent, or prime sign, even if a space is present in print.

⋙ ____.6 ⠤⠤⠤⠤⠨⠖
⋙ $ ____ ⠈⠎⠤⠤⠤⠤
⋙ ... % ⠄⠄⠄⠈⠴
⋙ ____' ⠤⠤⠤⠤⠄

Example 1-43

Fill in the blank. 14.9 − 12.3 = ____.6

⠠⠋⠊⠇⠇ ⠔ ⠮ ⠃⠇⠁⠝⠅⠲
⠸⠩ ⠼⠂⠲⠨⠔⠤⠂⠆⠨⠒ ⠨⠅ ⠤⠤⠤⠤⠨⠖ ⠸⠱

The long dash is unspaced from the related decimal point.

Example 1-44

Subtract: $3.52 − $7.14 = $ ____

⠠⠎⠥⠃⠞⠗⠁⠉⠞⠒
⠸⠩ ⠈⠎⠒⠨⠢⠆⠤⠈⠎⠶⠨⠂⠲ ⠨⠅ ⠈⠎⠤⠤⠤⠤ ⠸⠱

The long dash is unspaced from the related monetary symbol.

Example 1-45

Multiply. 92% × .04 = ... %

⠠⠍⠥⠇⠞⠊⠏⠇⠽⠲ ⠸⠩ ⠼⠔⠆⠈⠴⠈⠡⠨⠴⠲ ⠨⠅ ⠄⠄⠄⠈⠴ ⠸⠱

The ellipsis is unspaced from the related percent symbol.

Example 1-46

Convert inches to feet: 24'' = ___'

⠠⠒⠧⠻⠞ ⠔⠡⠑⠎ ⠞⠕ ⠋⠑⠑⠞⠒
⠸⠩ ⠼⠆⠲⠄⠄ ⠨⠅ ⠤⠤⠤⠤⠄ ⠸⠱

The long dash is unspaced from the related prime symbol.

1.13 Other Omission Symbols

Omissions are frequently shown in other ways besides a blank space, a question mark, a dash, or an ellipsis. A shape, such as a square or a circle, may indicate an omission. If the omission sign used in print has no braille equivalent in the code, the sign may be represented by a devised braille symbol or by a drawing. Shape symbols, devised symbols, and drawings will be discussed in Lesson 11.

Format

1.14 Paragraph Margins for Narrative Portions of Text (3-1)

The Nemeth Code states that each paragraph begins in cell 3, with runovers in cell 1. Nemeth formats are applied throughout a Nemeth transcription, including the UEB portions of text. If the print copy uses blocked paragraphing style, the transcriber must follow Nemeth format rules and begin each new paragraph in cell 3. There is no blank line inserted between paragraphs unless another situation requires a blank line according to *Braille Formats* or according to other Nemeth formats (yet to be studied).

1.14.1 **Code Switching Between Paragraphs.** Nemeth stays in effect between paragraphs. When a paragraph ends in Nemeth, do not terminate Nemeth when the next paragraph begins in Nemeth.

Instructions: Treat the marginal heading as a cell-5 heading.

PRACTICE 1F

Numerical Prefixes

Here are some examples of numeral prefixes: "Tetra-" means 4; "hexa-" means 6; "hepta-" means 7; "deca-" means 10; "dodeca-" means 12.

If a *dodecagon* is a 12-sided figure, a *dodecahedron* is a __-faced solid. A 10-faced solid is called a ________.

INTRODUCTION TO IDENTIFIERS

1.15 Terminology

When material is identified sequentially by number or letter, as in exercise material, it is referred to as *itemized material*. The number or letter is referred to as the *identifier*. Itemized subentries are referred to as *subdivisions*.

Labeled steps such as "Step 1" are not considered to be itemized material.

Format

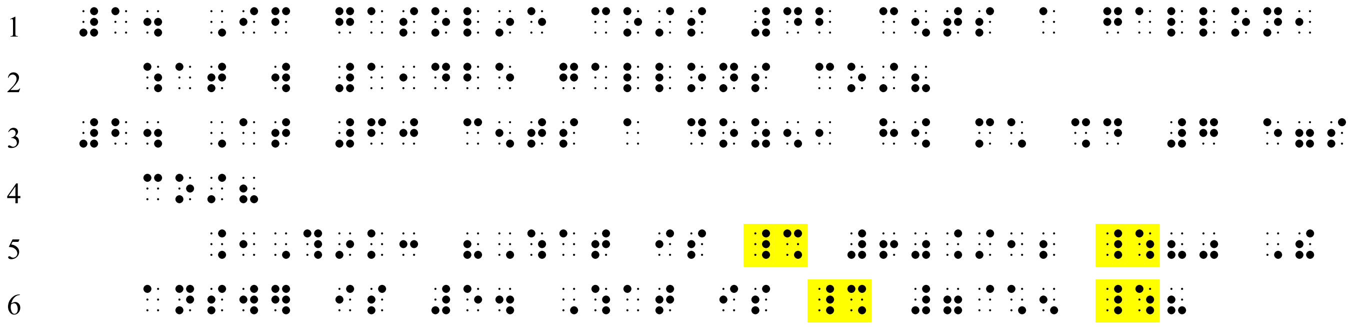
1.16 Margins for Itemized Material with No Subdivisions (1-3)

The identifier begins in cell 1; runovers begin in cell 3. If the material contains more than one paragraph, each subparagraph begins in cell 5 with runovers in cell 3.

Example 1-47

1. If gasoline costs 42 cents a gallon, what will 1,425 gallons cost?
2. At 60 cents a dozen, how much should 7 eggs cost?

   Think: "What is 60 ÷ 12 ?" The answer is 5. What is 7 × 5 ?



Lines 5-6: The subparagraph begins in cell 5 with runovers in cell 3.

Use clues from the print layout as well as the information in the paragraph to determine if the new paragraph is indeed a continuation of the item or if it is separate material. Compare Example 1-47 with Example 1-48.

Example 1-48

A. If gasoline costs 42 cents a gallon, what will 1,425 gallons cost?
B. At 60 cents a dozen, how much should 7 eggs cost?

Think: "Should I multiply or should I divide? Can I solve the problem in one step?"

```
1 ⠠⠁⠲ ⠠⠊⠋ ⠛⠁⠎⠕⠇⠔⠑ ⠉⠕⠌⠎ ⠼⠙⠃ ⠉⠢⠞⠎ ⠁ ⠛⠁⠇⠇⠕⠝⠂
2   ⠱⠁⠞ ⠺ ⠼⠁⠂⠙⠃⠑ ⠛⠁⠇⠇⠕⠝⠎ ⠉⠕⠌⠦
3 ⠰⠠⠃⠲ ⠠⠁⠞ ⠼⠋⠚ ⠉⠢⠞⠎ ⠁ ⠙⠕⠵⠢⠂ ⠓⠪ ⠍⠡ ⠩⠙ ⠼⠛
4   ⠑⠶⠎ ⠉⠕⠌⠦
5 ⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀
6   ⠨⠂⠠⠹⠔⠅⠒ ⠦⠠⠩⠙ ⠠⠊ ⠍⠥⠇⠞⠊⠏⠇⠽ ⠕⠗ ⠩⠙ ⠠⠊
7 ⠙⠊⠧⠊⠙⠑⠦ ⠠⠉ ⠠⠊ ⠎⠕⠇⠧⠑ ⠮ ⠏⠗⠕⠃⠇⠑⠍ ⠔ ⠐⠕ ⠌⠑⠏⠦⠴
```

Line 5: A blank line follows the itemized portion according to Braille Formats *guidelines for exercise material.*

1.16.1 **Pagination.** In this course we follow the *Braille Formats* guideline that an itemized problem should not be divided between braille pages.

Instructions: Format the first sentence as a narrative paragraph. Retain boldface for the paragraph heading. Insert a blank line before the itemized exercise material. Ignore typeface of the identifiers.

PRACTICE 1G

Refresher. These problems will test your skill with decimals.

1. First, addition: $42.6 + 37.23 + 3.215 \ =$

2. Now subtract: $87.6 - 51.35 \ =$

3. Try multiplication: $625.1 \times 2.7 \ =$

4. And now divide: $4.864 \div 3.2 \ =$

FORMAT SUMMARY #1

Here is a summary of the Nemeth formats encountered so far in this course.

General Principles   When an item in a UEB transcription requires the use of Nemeth 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* should be followed.

Mathematical Expressions—Keep Together   If a mathematical expression will fit on one braille line within the current margins, it must not be divided between lines. The entire expression is brought down to the next line.

Paragraph Margins for Narrative Portions of Text (3-1)   In a document governed by Nemeth formatting, an unitemized paragraph in explanatory portions of text begins in cell 3 and all runovers begin in cell 1. Blocked paragraphing is not used in a Nemeth transcription.

Margins for Itemized Material with No Subdivisions (1-3)   The identifier begins in cell 1; runovers begin in cell 3. If the material contains more than one paragraph, each subparagraph begins in cell 5 with runovers in cell 3. A blank line is inserted before and after a set of itemized exercise material according to *Braille Formats* guidelines. An itemized exercise problem should not be divided between braille pages.

Placement of Code Switch Indicators with an Embedded Math Expression   Place the entire math expression and the two code switch indicators on the same braille line if they will fit within the current margins. If the entire string will not fit on one line, a switch indicator may stand alone on a line to allow the math expression to remain undivided. When a code switch occurs at a braille page turn, the switch indicator is placed on the same braille page as the mathematical material to which it applies.

For further practice, see Addendum 1—Reading Practice.

THE EXERCISES

Lessons 1-18 end with an exercise which you will prepare and submit to your instructor for grading. Instructions for preparation of the exercises are given on the first page of the Exercise Packet.

Submit Exercise 1 to your instructor.

Our grading guidelines can be found on the next two pages.

GRADING GUIDELINES

Your transcriptions will be scored according to a modified version of the guidelines used by the certification test graders. This policy has been proven to be the best way to prepare for the certification test as it enables you to become aware of the level of accuracy required for certification in UEB with Nemeth. The score is for your information only; you are not being graded on your lessons. We provide this as a way for you to track your progress.

You will be doing your own proofreading and studying before being told exactly what your errors are. By following this system, you will develop skills in recognizing problems and researching solutions. Many students also notice a marked improvement in their proofreading skills.

Your lesson exercises and your test will be scored according to the rules of the most current edition of *The Rules of Unified English Braille, Braille Formats Principles of Print-to-Braille Transcription*, and *The Nemeth Braille Code for Mathematics and Science Notation* as well as any Updates which apply to these three publications.

Here is what you can expect from the report.

1 Your first submission:

If your score is **90** or better, you have passed the lesson.

If your score is **70** or better, a detailed report will list your errors by LINE NUMBER. The TYPE of error will be given. Sections of the lesson manual or the code books may be cited for you to review. Examples of error types are on the next page. When you edit your file, pay particular attention to format issues that may occur if linage is affected.

If your score is less than 70, you will not receive a report. You will be asked to re-submit the lesson exercise after doing a careful review and making necessary corrections.

2 Your second submission:

If your score is **90** or better, you have passed the lesson.

If your score is **80** or better, a report will be prepared listing your errors by LINE NUMBER. The TYPE of error will be given. Sections of the lesson manual or the code books may be cited for you to review. Examples of error types are on the next page.

If your score is less than 80, you will not receive a report. You will be asked to re-submit the lesson exercise after doing a careful review and making necessary corrections.

3 Your third submission:

If your score is **90** or better, you have passed the lesson.

If your score is less than 90, you will be removed from the course and may request re-entry after a 6 month waiting period.

To pass the lesson exercise in only two or three submissions, you need to be confident in your understanding of the material and your proofreading skills need to be sharp. Take the time to study carefully. I urge you to ask questions about rules that don’t make sense to you, even if you transcribed the exercise correctly.

It is a large leap from the final lesson to the certification test and the bar is high. To achieve certification, you must receive a score of 80 or better on the test. As with your literary trial manuscript, this allows for an average of one error every three or four pages. By grading your lesson exercises in a similar manner, you will be better aware of the quality of work needed to pass the test as you follow your progress and gauge your readiness.

SAMPLE GRADING REPORT

Key: Braille page number/line number: error type [points] citation

1/7: Misformed mathematical symbol [-2] Review P3.2
3/23: UEB contraction error [-2]
4/19: Unnecessary letter indicator [-2] Review 3.12.2

6 points deducted
Score: 94

You have passed this lesson. If you would like to send me your final corrections, I am happy to look them over one more time.

%%%

Here is a sample list of error types. Note that most are 2-point errors.

NEMETH AND UEB CONSTRUCTION

Incorrect mathematical symbol [-2]
Indicator errors:
  Incorrect __ indicator [-2]
  Misformed __ indicator [-2]
  Omitted __ indicator [-2]
  Unnecessary __ indicator [-2]
Punctuation mode [-2]
Spacing [-2]

PROOFREADING

Added, omitted, or repeated mathematical material [-3]
Added, omitted, or repeated text [-2]
Added or missing punctuation [-2]
Capitalization error [-2]
Misformed character [-2]
Misformed letter [-2]
Misformed mathematical symbol [-2]
Misformed number [-2]
Misread symbol or term [-2]
Misspelling [-2]
Omitted page [-3]
Stray dot or character [-2]
UEB contraction error [-2]

CODE SWITCHING

Code switch indicator placement [-1]
Excessive code switching [-1]
Missing code switch indicator [-2]
Wrong code [-2]

FORMAT

Alignment in a spatial arrangement [-2]
Braille Formats error regarding ___ [-1]
  See BF ___
Braille Formats pagination issue [-1]
  See BF ___
Incorrect division of linked expression [-2]
Incorrect division of mathematical expression [-2]
"Keep Together" linage error [-2]
Linage (more room on the line) [-1]
Nemeth format error regarding ___ [-2]
Nemeth pagination issue [-2]
Unnecessary division of mathematical expression [-1]

ANSWERS TO PRACTICE MATERIAL

PRACTICE 1A

⠠⠱⠁⠞ ⠙⠕⠑⠎ ⠸⠩ ⠼⠂⠖⠬⠲⠬⠂⠴⠴ ⠸⠱ ⠑⠟⠥⠁⠇⠦
⠠⠊⠋ ⠸⠩ ⠼⠂⠴⠈⠡⠂⠴⠈⠡⠂⠴ ⠨⠅ ⠼⠂⠠⠴⠴⠴ ⠸⠱ ⠱⠁⠞
⠙⠕⠑⠎ ⠸⠩ ⠼⠂⠴⠈⠡⠂⠴⠈⠡⠂⠴⠈⠡⠂⠴ ⠸⠱ ⠑⠟⠥⠁⠇⠦
⠠⠙⠕⠑⠎ ⠸⠩ ⠼⠢⠨⠌⠆ ⠸⠱ ⠐⠝ ⠁ ⠱⠕⠇⠑ ⠝⠥⠍⠃⠻⠦
⠸⠩ ⠈⠴ ⠸⠱ ⠐⠣⠦⠏⠻⠉⠢⠞⠴⠐⠜ ⠍⠂⠝⠎ ⠐⠏⠎ ⠏⠻
⠓⠥⠝⠙⠗⠫⠆ ⠸⠩ ⠈⠴⠴ ⠸⠱ ⠐⠣⠦⠏⠻ ⠍⠊⠇⠇⠑⠴⠐⠜ ⠍⠂⠝⠎
⠐⠏⠎ ⠏⠻ ⠹⠳⠎⠯⠲

PRACTICE 1B

⠠⠺⠑ ⠥⠎⠑ ⠁ ⠸⠩ ⠬ ⠸⠱ ⠎⠊⠛⠝ ⠞⠕ ⠁⠙⠙⠲ ⠠⠺⠑ ⠥⠎⠑
⠁ ⠸⠩ ⠤ ⠸⠱ ⠎⠊⠛⠝ ⠞⠕ ⠎⠥⠃⠞⠗⠁⠉⠞⠲ ⠠⠱⠁⠞ ⠎⠊⠛⠝ ⠙
⠺⠑ ⠥⠎⠑ ⠞⠕ ⠍⠥⠇⠞⠊⠏⠇⠽⠦
⠠⠊⠋ ⠸⠩ ⠼⠲⠶⠤⠲⠂ ⠨⠂ ⠼⠂ ⠸⠱⠂ ⠙ ⠽ ⠎⠥⠏⠏⠕⠎⠑ ⠞
⠸⠩ ⠼⠲⠂⠤⠲⠶ ⠐⠅ ⠼⠂ ⠸⠱⠦ ⠠⠱⠽ ⠕⠗ ⠱⠽ ⠝⠦
⠠⠊⠋ ⠸⠩ [illegible] ⠸⠱ [illegible]
⠸⠩ [illegible] ⠸⠱ [illegible]

PRACTICE 1C

⠀⠀⠠⠓⠪ ⠸⠍ ⠎⠟⠥⠜⠑⠎ ⠉ ⠽ ⠋⠔⠙ ⠕⠝ ⠁⠝
⠸⠩ ⠼⠦⠈⠡⠦ ⠸⠱ ⠡⠑⠉⠅⠻⠃⠕⠜⠙⠦ ⠐⠣⠨⠂⠠⠓⠔⠞⠒ ⠠⠐⠮ ⠜⠑
⠍ ⠹⠁⠝ ⠼⠋⠑ ⠎⠟⠥⠜⠑⠎⠲⠐⠜ ⠠⠋⠌ ⠙⠑⠞⠻⠍⠔⠑ ⠓⠪ ⠸⠍
⠸⠩ ⠼⠂⠈⠡⠂ ⠸⠱ ⠎⠟⠥⠜⠑⠎⠂ ⠮⠝ ⠓⠪ ⠸⠍ ⠸⠩ ⠼⠆⠈⠡⠆ ⠸⠱
⠎⠟⠥⠜⠑⠎⠂ ⠯ ⠎ ⠕⠝⠂ ⠽ ⠉ ⠋⠔⠙⠲
⠀⠀⠸⠩ ⠼⠂⠆⠈⠡⠂⠂ ⠸⠱ ⠊⠎ ⠁⠇ ⠮ ⠎⠁⠍⠑ ⠵ ⠞⠺⠑⠇⠧⠑
⠑⠇⠑⠧⠢⠎⠂ ⠕⠗ ⠸⠩
⠼⠂⠂⠬⠂⠂⠬⠂⠂⠬⠂⠂⠬⠂⠂⠬⠂⠂⠬⠂⠂⠬⠂⠂⠬⠂⠂⠬⠂⠂⠬⠂⠂⠬⠂⠂ ⠸⠱⠲

PRACTICE 1D

⠀⠀⠘⠶⠠⠏⠻⠉⠢⠞ ⠞⠕ ⠠⠙⠑⠉⠊⠍⠁⠇⠲⠘⠄ ⠠⠞⠕ ⠒⠧⠻⠞
⠸⠩ ⠼⠲⠦⠨⠖⠈⠴ ⠸⠱ ⠞⠕ ⠁ ⠙⠑⠉⠊⠍⠁⠇ ⠝⠥⠍⠃⠻⠂ ⠙⠊⠧⠊⠙⠑
⠮ ⠏⠻⠉⠢⠞ ⠃⠽ ⠼⠁⠚⠚⠲ ⠠⠿ ⠑⠭⠁⠍⠏⠇⠑⠂ ⠞⠕ ⠒⠧⠻⠞
⠸⠩ ⠼⠲⠦⠨⠖⠈⠴⠠ ⠼⠲⠦⠨⠖⠨⠌⠂⠴⠴ ⠨⠅ ⠼⠴⠨⠲⠦⠖ ⠸⠱⠲
⠀⠀⠠⠾ ⠁ ⠸⠩ ⠼⠶⠈⠴ ⠸⠱ ⠎⠁⠇⠑⠎ ⠞⠁⠭ ⠁⠙⠙⠫⠂ ⠓⠪ ⠍⠡
⠺ ⠁ ⠸⠩ ⠈⠎⠖ ⠸⠱ ⠃⠥⠎ ⠞⠊⠉⠅⠑⠞ ⠁⠉⠞⠥⠁⠇⠇⠽ ⠉⠕⠌⠦
⠀⠀⠠⠚⠥⠇⠊⠕⠄⠎ ⠇⠕⠞ ⠍⠂⠎⠥⠗⠑⠎ ⠸⠩ ⠼⠢⠖⠄ ⠸⠱ ⠺⠊⠙⠑ ⠯
⠸⠩ ⠼⠂⠴⠴⠄ ⠸⠱ ⠙⠑⠑⠏⠲ ⠠⠮ ⠛⠜⠙⠢ ⠩⠫ ⠎⠊⠞⠎
⠸⠩ ⠼⠆⠴⠄⠦⠄⠄ ⠸⠱ ⠃⠁⠉⠅ ⠋ ⠮ ⠌⠗⠑⠑⠞⠲

PRACTICE 1E

1 ⠀⠀⠠⠗⠑⠏⠗⠑⠎⠢⠞ ⠉⠢⠞⠎ ⠵ ⠙⠑⠉⠊⠍⠁⠇⠎⠠⠤
2 ⠸⠩ ⠈⠎⠴⠨⠦⠔ ⠸⠱⠠⠤⠝ ⠇ ⠹⠠⠤⠸⠩ ⠼⠦⠔⠈⠉ ⠸⠱⠲
3 ⠀⠀⠠⠍⠜⠉⠥⠎⠄ ⠁⠝⠎⠺⠻ ⠴ ⠸⠩ ⠼⠒⠶⠈⠉ ⠤⠤ ⠼⠒⠦⠈⠉ ⠸⠱
4 ⠊⠎ ⠮ ⠉⠕⠗⠗⠑⠉⠞ ⠡⠁⠝⠛⠑⠲
5 ⠀⠀⠠⠔ ⠙⠑⠛⠗⠑⠑⠎ ⠠⠋⠁⠓⠗⠢⠓⠑⠊⠞⠂ ⠠⠑⠜⠹⠄⠎
6 ⠞⠑⠍⠏⠻⠁⠞⠥⠗⠑ ⠗⠁⠝⠛⠑⠎ ⠋ ⠸⠩ ⠤⠼⠂⠆⠖⠤⠂⠒⠖ ⠸⠱⠲
7 ⠀⠀⠠⠑⠭⠏⠗⠑⠎⠎⠫ ⠔ ⠎⠑⠉⠕⠝⠙⠎⠂ ⠮ ⠩⠕⠗⠞⠑⠌ ⠍⠂⠝⠬⠰⠇
8 ⠔⠞⠻⠧⠁⠇ ⠷ ⠐⠞ ⠐⠣⠠⠏⠇⠁⠝⠉⠅ ⠠⠐⠞⠐⠜ ⠒⠞⠁⠔⠎ ⠼⠙⠋
9 ⠙⠑⠉⠊⠍⠁⠇ ⠏⠇⠁⠉⠑⠎⠒ ⠸⠩ ⠼⠴⠨⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠤
10 ⠼⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠴⠢⠲ ⠸⠱⠖

Line 2: Because the UEB dashes are unspaced (as in print), the code switch indicators may touch the dash.

PRACTICE 1F

1 ⠀⠀⠀⠀⠠⠝⠥⠍⠻⠊⠉⠁⠇ ⠠⠏⠗⠑⠋⠊⠭⠑⠎
2 ⠀⠀⠠⠐⠓ ⠜⠑ ⠐⠎ ⠑⠭⠁⠍⠏⠇⠑⠎ ⠷ ⠝⠥⠍⠻⠁⠇ ⠏⠗⠑⠋⠊⠭⠑⠎⠒
3 ⠦⠠⠞⠑⠞⠗⠁⠤⠴ ⠍⠂⠝⠎ ⠼⠙⠆ ⠦⠓⠑⠭⠁⠤⠴ ⠍⠂⠝⠎ ⠼⠋⠆
4 ⠦⠓⠑⠏⠞⠁⠤⠴ ⠍⠂⠝⠎ ⠼⠛⠆ ⠦⠙⠑⠉⠁⠤⠴ ⠍⠂⠝⠎ ⠼⠁⠚⠆
5 ⠦⠙⠕⠙⠑⠉⠁⠤⠴ ⠍⠂⠝⠎ ⠼⠁⠃⠲
6 ⠀⠀⠠⠊⠋ ⠁ ⠨⠂⠙⠕⠙⠑⠉⠁⠛⠕⠝ ⠊⠎ ⠁ ⠼⠁⠃⠤⠎⠊⠙⠫
7 ⠋⠊⠛⠥⠗⠑⠂ ⠁ ⠨⠂⠙⠕⠙⠑⠉⠁⠓⠫⠗⠕⠝ ⠊⠎ ⠁ ⠨⠤⠤⠋⠁⠉⠫
8 ⠎⠕⠇⠊⠙⠲ ⠠⠁ ⠼⠁⠚⠤⠋⠁⠉⠫ ⠎⠕⠇⠊⠙ ⠊⠎ ⠉⠁⠇⠇⠫ ⠁ ⠨⠤⠲

PRACTICE 1F does not require any Nemeth switches. Rules of UEB are followed for the underscores.

PRACTICE 1G

⠀⠀⠘⠂⠠⠗⠑⠋⠗⠑⠩⠻⠲ ⠠⠘⠮ ⠏⠗⠕⠃⠇⠑⠍⠎ ⠺ ⠞⠑⠌ ⠽⠗
⠎⠅⠊⠇⠇ ⠾ ⠙⠑⠉⠊⠍⠁⠇⠎⠲

⠼⠁⠲ ⠠⠋⠌⠂ ⠁⠙⠙⠊⠰⠝⠒
⠀⠀⠸⠩ ⠼⠲⠆⠨⠖⠬⠒⠶⠨⠆⠒⠬⠒⠨⠆⠂⠢ ⠨⠅ ⠿ ⠸⠱
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