LESSON 3

- WORDS
  - Introduction to Abbreviations
  - Single-Word Switch Indicator
- LETTERS
  - Introduction to the English-Letter Indicator
  - Mathematical Letter Combinations

Format

- Keep Together
- FORMAT SUMMARY #2

Answers to Practice Material

LESSON PREVIEW

Transcription of words in mathematical context requires a close look at punctuation, capitalization, and nonuse of contractions. Abbreviations require special treatment. A single narrative word may be transcribed within the code switches by using a single-word switch indicator. Code switching at page turns is examined. "Single letters" in Nemeth are defined, and the English-letter indicator is introduced.

WORDS

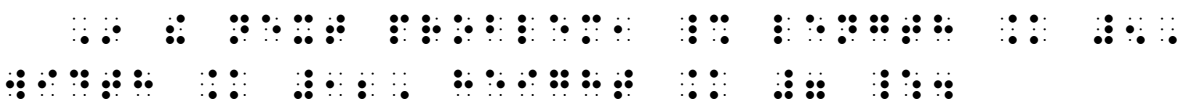
3.1 Words in Mathematical Context

When words are part of an equation or math expression the words are included in the technical notation—that is, the whole expression is placed inside the Nemeth switches. No contractions are used within Nemeth switches. Spacing rules of the Nemeth Code are followed.

Exception: Words used for math symbols such as "plus", "equals", etc., are not included in this rule. Such words are transcribed in UEB. Examples are shown later in this lesson.

Example 3-1

In the next problem, length = 5, width = 12, height = 7.



Inside the switches, words are transcribed without contractions.

In the next example, words are substituted for values in a formula. The words are part of the math expression and are transcribed without contractions. The division symbol is unspaced from the words according to Nemeth Code rules for spacing of operation signs.

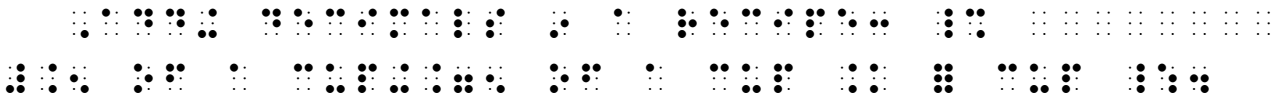
Example 3-2

Dividend ÷ Divisor = Quotient

As part of a math problem expressed in symbols and words, the words are included in the switch.

Example 3-3

Adding decimals in a recipe: .5 of a cup + .75 of a cup = ? cup.



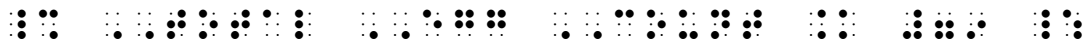
The operation sign (+) *is unspaced; the comparison sign* (=) *is spaced, according to the rules of the Nemeth Code.*

3.1.1 **Capitalization.** Each fully capitalized word in mathematical context is preceded by the double capitalization indicator of the Nemeth Code. The UEB capitalized passage indicator is not used in Nemeth context.

⠨⠨	Double Capitalization Indicator

Example 3-4

TOTAL EGG COUNT = 79



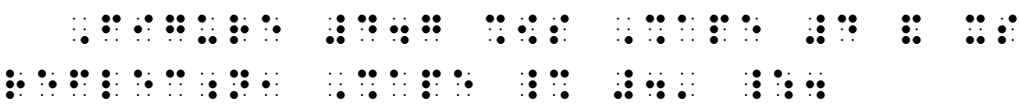
3.2 Words in Narrative

When a word in UEB narrative is associated with an expression that requires Nemeth, the word is not included inside the Nemeth switches. The word and its associated expression may fall on separate braille lines, with the line wrapping at the space between them. Note that this rule differs from an abbreviation associated with a Nemeth expression. (See Section 3.4.)

a. Words Labeling a Math Item

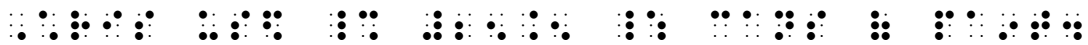
Example 3-5

Figure 4.7 shows Shape 4 and its reflection, Shape 4′.



Example 3-6

Chris used 25.5 cans of paint.



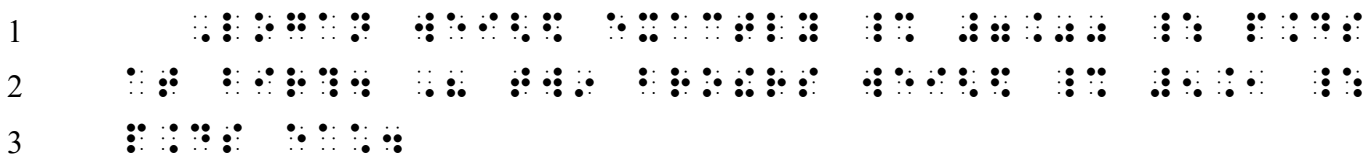
Example 3-7

What is 5.5 percent of 72?

b. Units of Measure

Example 3-8

Logan weighed exactly 7.00 pounds at birth. His twin brothers weighed 5.1 pounds each.



Lines 1 and 2: Only the decimal numbers are inside the switches.
Lines 2-3: The number need not fall on the same line with its associated word.

Example 3-9

When situated on the far side of the sun, Mars measures only 4.1 arcseconds.

Function names such as arcsecond, which is a word, will be examined in more detail in Lesson 14.

3.3 Punctuation With Words

Words are not punctuated mathematically, even when they are transcribed in mathematical context. For a comma, the dot 2 comma is used; for other punctuation marks, no punctuation indicator is used. The next example shows a set of class members using mathematical braces to enclose the set. Set notation is transcribed in Nemeth.

Example 3-10

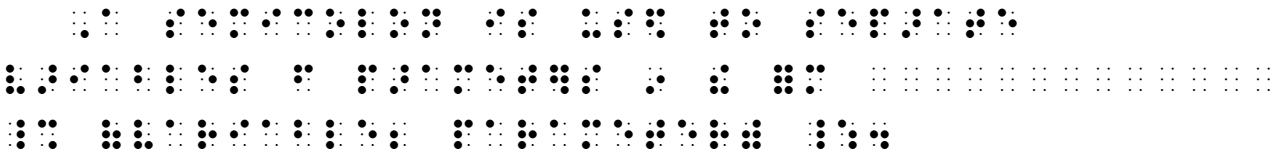
{Richard, Daniel, Steven}

The literary comma is used when a comma follows a word, even in mathematical context.

In the next example, the math form being described is illustrated with words. Because the model is a math expression, a switch to Nemeth is recommended.

Example 3-11

A semicolon is used to separate variables from parameters in the form (variable; parameter).



The semicolon does not require a punctuation indicator because words are punctuated in literary mode, even in mathematical context.

PRACTICE 3A

A. If 1 pound of Swiss cheese costs $2.50, how much does 4.8 pounds cost?

B. JMHS's set of high-jump champions: {Terry, Leslie, Traci}

C. The parts of a subtraction problem are named as follows: minuend − subtrahend = difference.

D. Did you know that 98.6 degrees Fahrenheit is not necessarily "normal" body temperature for everyone?

Introduction to Abbreviations

This lesson examines abbreviations within narrative.

3.4 Abbreviations

An abbreviation by itself is not mathematical and does not require a switch to Nemeth Code. However, when the value requires Nemeth, both the value and the abbreviation are placed inside the Nemeth switches.

- 1.5 min

  No contractions are used in Nemeth.

The same rule applies to a two-part abbreviation, as well as a two-part unit when one part is a whole word and the other part is an abbreviation.

- 4.5 sq. in.
- 4.5 sq. inches

Example 3-12

SAS means "side angle side".

Even though SAS is a special abbreviation in the field of mathematics, as used in this example it is simply an abbreviation in the narrative and is transcribed in UEB.

Example 3-13

In hours, how long is the 8 a.m.-3 p.m. school day?

A freestanding unmodified numeral and any associated abbreviation does not require a code switch.

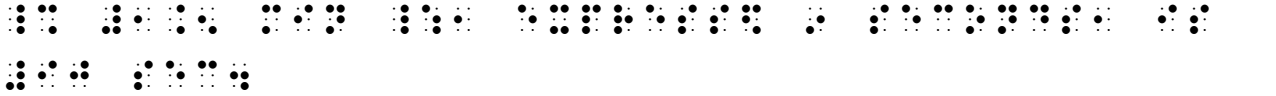
Example 3-14

15 mm can be expressed as 1.5 cm.

The abbreviation cm applies to the number 1.5 and so the abbreviation is included in the switches.

Example 3-15

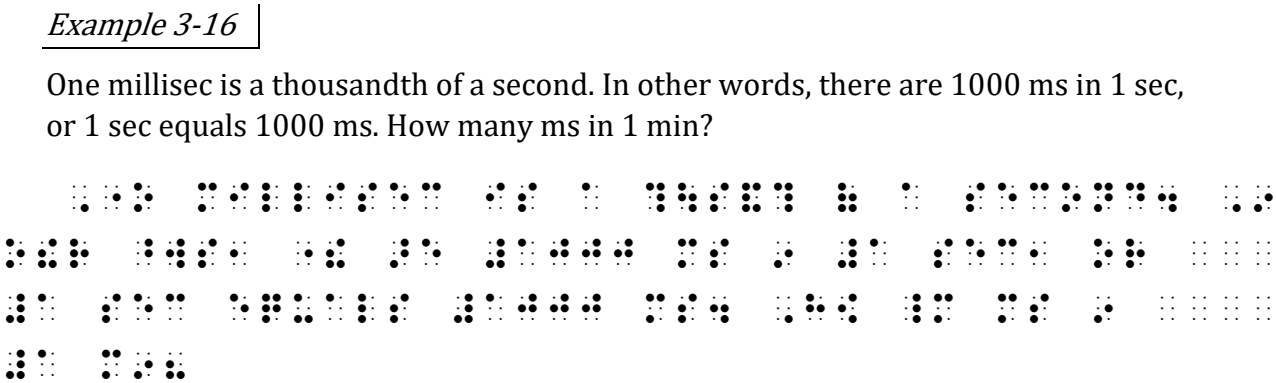
There are 60 sec in 1 min. It follows that 1.5 min, expressed in seconds, is 90 sec.



3.4.1 **Format—Keep Together.** An abbreviation and a preceding or following numeral to which it applies must not be divided between braille lines. Because Nemeth format rules are applied throughout a technical transcription, this rule also applies in the UEB text. Note that the print copy may not follow this format, but it must be applied in the braille transcription.

Example 3-16

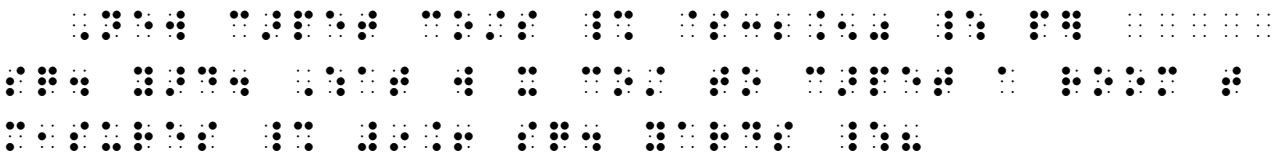
One millisec is a thousandth of a second. In other words, there are 1000 ms in 1 sec, or 1 sec equals 1000 ms. How many ms in 1 min?



The number 1 is placed on the same line as its related abbreviation (1 sec and 1 min).

Example 3-17

New carpet costs $32.50 per sq. yard. What will it cost to carpet a room that measures 9.6 sq. yards?



sq. yard must not be divided between lines, even in UEB context. sq. yards is associated with a decimal value and so is included inside the code switches.

3.4.2 **Punctuation with Abbreviations.** Abbreviations are punctuated in literary mode, even when they are transcribed in mathematical context. For a comma, the dot 2 comma is used; for other punctuation marks, no punctuation indicator is used. Note in the example below that the periods following min. and sec. do not require a punctuation indicator.

⟫ 4.72 min. = 283.2 sec.

⠠⠁⠲⠛⠼⠁⠉ ⠍⠊⠝⠲ ⠶ ⠼⠃⠓⠓⠲⠃ ⠎⠑⠉⠲

Example 3-18

Converting minutes to seconds, 4.72 min. = 283.2 sec.

⠠⠊⠝⠉⠕⠝⠧⠑⠗⠞⠊⠝⠛ ⠞⠊⠍⠑ ⠍⠑⠁⠎⠥⠗⠑⠎ ⠁⠎ ⠉⠕⠝⠞⠑⠭⠞ ⠉⠇⠥⠑⠎ ⠞⠕
⠠⠁⠲⠛⠼⠁⠉ ⠍⠊⠝⠲ ⠶ ⠼⠃⠓⠓⠲⠃ ⠎⠑⠉⠲ ⠠⠁⠲

a. **Abbreviations with a Related Period.** Examine the surrounding material to determine if the abbreviations include a period. If they do, the abbreviation must not be separated from its related period. If a Nemeth Code terminator follows the abbreviation, the period that belongs to the abbreviation is placed before the terminator, unspaced from its abbreviation.

   If a period functions both with an abbreviation and as punctuation at the end of a sentence, keep the period with its abbreviation.

In an isolated problem where there are no context clues to determine whether a period applies to the abbreviation or merely ends the sentence, assume that it applies to the abbreviation.

Example 3-19

1 metric kilogram is equivalent to 2.20 lb., which can also be written as 2 lb. 3.274 oz.

⠠⠁ ⠍⠑⠞⠗⠊⠉ ⠅⠊⠇⠕⠛⠗⠁⠍ ⠊⠎ ⠑⠟⠥⠊⠧⠁⠇⠑⠝⠞ ⠞⠕ ⠼⠃⠲⠃⠚ ⠇⠃⠲⠂
⠠⠁⠇⠞⠓⠕⠥⠛⠓ ⠼⠃ ⠇⠃⠲ ⠊⠞⠎⠑⠇⠋ ⠙⠕⠑⠎ ⠝⠕⠞ ⠗⠑⠥⠊⠗⠑ ⠁ ⠎⠩⠊⠞⠉⠓⠂ ⠃⠑⠉⠁⠥⠎⠑ ⠊⠞
⠠⠊⠎ ⠁ ⠍⠑⠁⠎⠥⠗⠑⠍⠑⠝⠞ ⠞⠓⠁⠞ ⠉⠕⠝⠞⠁⠊⠝⠎ ⠁ ⠙⠑⠉⠊⠍⠁⠇⠂ ⠞⠓⠑ ⠑⠝⠞⠊⠗⠑ ⠺⠑⠊⠛⠓⠞
⠠⠊⠎ ⠞⠗⠁⠝⠎⠉⠗⠊⠃⠑⠙ ⠊⠝ ⠠⠝⠑⠞⠓ ⠞⠕ ⠍⠁⠊⠝⠞⠁⠊⠝ ⠉⠕⠝⠞⠊⠝⠥⠊⠞⠽⠲

The comma is part of the sentence structure and so is placed after the Nemeth Code terminator. Although 2 lb. by itself does not require a switch, because it is part of a measurement that contains a decimal, the entire weight is transcribed in Nemeth to maintain continuity.

Example 3-20

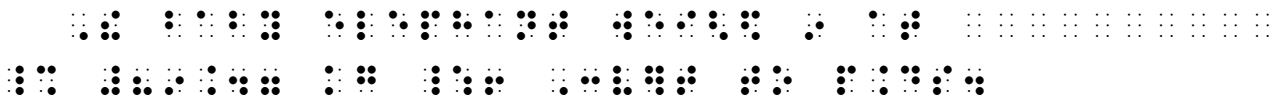
The baby elephant weighed in at 197.28 lb. Convert to kilograms.

⠠⠞⠓⠑ ⠃⠁⠽ ⠑⠇⠑⠏⠓⠁⠝⠞ ⠺⠑⠊⠛⠓⠑⠙ ⠊⠝ ⠁⠞ ⠼⠁⠉⠗⠲⠃⠓ ⠇⠃⠲⠂
⠠⠞⠓⠑ ⠏⠑⠗⠊⠕⠙ ⠊⠎ ⠞⠗⠑⠁⠞⠑⠙ ⠁⠎ ⠊⠋ ⠊⠞ ⠃⠑⠇⠕⠝⠛⠎ ⠞⠕ ⠞⠓⠑ ⠁⠃⠃⠗⠑⠧⠊⠁⠞⠊⠕⠝⠂ ⠃⠑⠉⠁⠥⠎⠑
⠠⠞⠓⠑⠗⠑ ⠁⠗⠑ ⠝⠕ ⠉⠕⠝⠞⠑⠭⠞ ⠉⠇⠥⠑⠎ ⠗⠑⠛⠁⠗⠙⠊⠝⠛ ⠞⠓⠑ ⠋⠥⠝⠉⠞⠊⠕⠝ ⠕⠋ ⠞⠓⠑ ⠏⠑⠗⠊⠕⠙⠲

The period after lb is treated as if it belongs to the abbreviation because there are no context clues regarding the function of the period.

Example 3-21

The baby elephant weighed in at 89.47 kg! Convert to pounds.



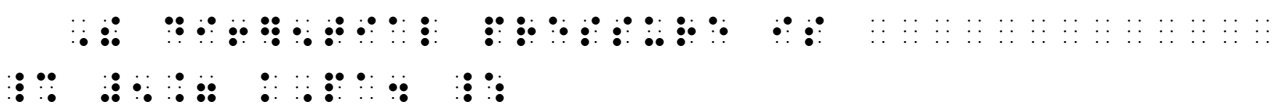
There is no period after kg. The punctuation applies to the sentence.

3.4.3 **Spacing with Abbreviations**.

a. Unless a Nemeth rule states otherwise, a space must be left between an abbreviation and the numeral to which it applies, even if the print copy shows no space. Because Nemeth format rules are applied throughout a technical transcription, this rule also applies in the UEB text.

Example 3-22

The differential pressure is 5.7kPa.



In print, there is no space between 5.7 and the abbreviation kPa.

Example 3-23

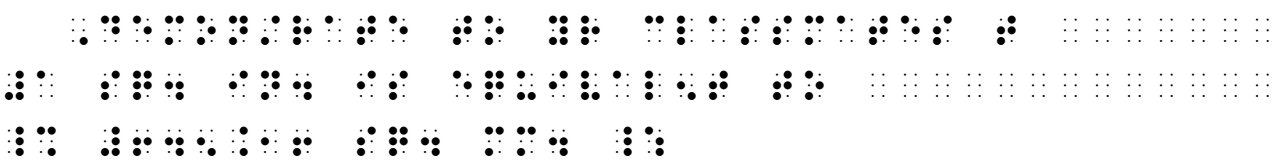
Measure the width of your desk using a 30mm ruler.

In braille, a space is inserted between 30 and mm, even though it is unspaced in print.

b. An abbreviation consisting of two or more components is transcribed as spaced or unspaced to conform with the print text. "Keep together" format applies to the entire abbreviation and its related numeral, even in the UEB text.

Example 3-24

Demonstrate to your classmates that 1 sq. in. is equivalent to 645.16 sq. mm.



In print, there is a space between sq. and mm.

Example 3-25

15.34 fl.oz. of water weighs 1 lb.

In print, there is no space between fl. and oz.

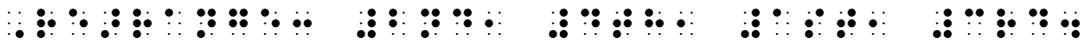
3.5 Numbers with Ordinal Endings

Ordinal endings are not abbreviations. Recall from Lesson 1 that a numeral with an ordinal ending is transcribed in UEB if it occurs in literary context. If the ordinal appears in mathematical context, the ordinal ending becomes part of the expression and is punctuated mathematically.

- 1st,

Example 3-26

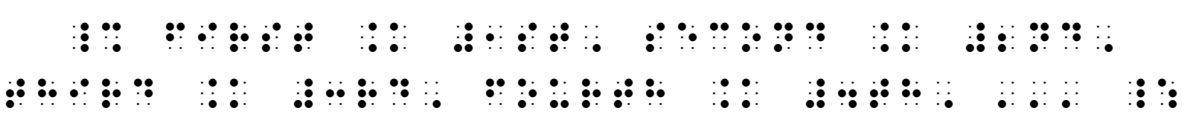
Rearrange: 2nd, 4th, 1st, 3rd.



These ordinals are transcribed in UEB.

Example 3-27

first = 1st, second = 2nd, third = 3rd, fourth = 4th, ...



In Nemeth, ordinal endings are punctuated mathematically.

PRACTICE 3B

1. If 1 lb. of Gouda cheese costs $2.96, what will you pay for 2.5 lbs.?
2. If 2kg Gruyère costs £2,65, what is the cost of a wheel weighing 3kg?
3. Continuing the set of ordinals, fifth = 5th, sixth = 6th, seventh = 7th, eighth = 8th.
4. 1 kcal is equivalent to 3088.03 ft.lb.

More To Come This does not complete the discussion of abbreviations in mathematical context. Single-letter abbreviations, abbreviations that use the same letters as a shortform, and further spacing rules within mathematical expressions will be discussed in Lesson 4.

Single-Word Switch Indicator

3.6 The Single-Word Switch Indicator

Words that do not provide mathematical meaning are transcribed in UEB. When a single word occurs between two math expressions, the single-word switch indicator is used to indicate that the following word is in UEB.

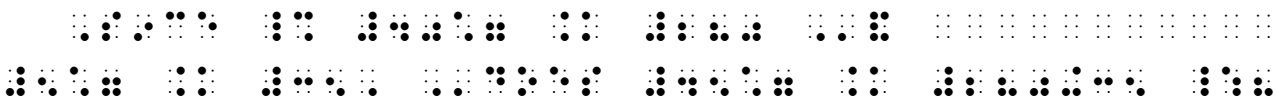
⠸⠸	Single-Word Switch Indicator

Until this symbol becomes widely recognized, we suggest that the single-word switch indicator be listed on the Special Symbols page. See the Final Lesson for details.

3.6.1 **Spacing and Contractions.** The single-word switch indicator is unspaced from the word. Contractions are used according to the rules of UEB. The switch is required on a single word even if the word contains no contractions. The effect of the single-word switch indicator is terminated by a space, and Nemeth Code resumes.

Example 3-28

Since $40 \cdot 7 = 280$ and $5 \cdot 7 = 35$, does $45 \cdot 7 = 280 + 35$?

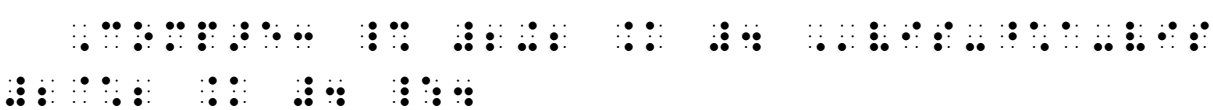


The words are part of the sentence structure—they are not being used mathematically—and so UEB applies.

3.6.2 **With a Hyphenated Word.** The single-word switch indicator can be used with a hyphenated compound word.

Example 3-29

Compare: $2 + 2 = 4$ vis-à-vis $2 \times 2 = 4$.

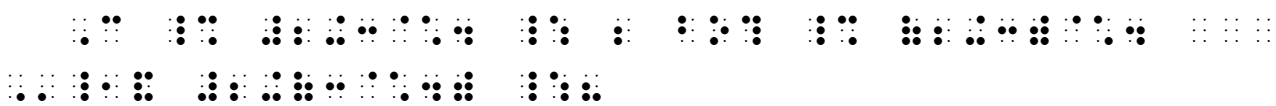


The hyphenated compound word vis-à-vis is considered to be one word. The acute accent follows UEB rules for modified letters.

3.6.3 **With Typeform.** The single-word switch indicator can be used with a word associated with a UEB typeform word indicator.

Example 3-30

Can $2 + 3 \times 4$ be both $(2 + 3) \times 4$ <u>and</u> $2 + (3 \times 4)$?

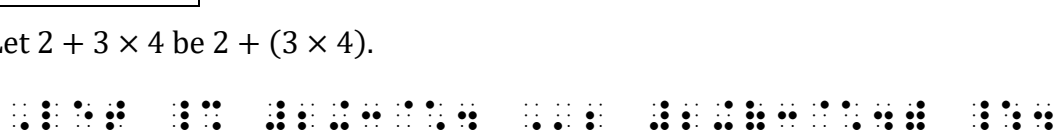


The single-word switch indicator is used on the underlined word <u>and</u>.

3.6.4 **With Lower Wordsigns.** A lower wordsign may be used with a single-word switch indicator without violating the lower sign rule.

Example 3-31

Let $2 + 3 \times 4$ be $2 + (3 \times 4)$.

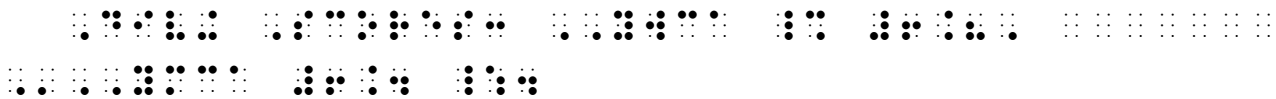


The single-word switch indicator is used on the lower wordsign for be.

3.6.5 **With Abbreviations.** A single-word switch may be used for an abbreviation. But remember, an abbreviation of measurement associated with a Nemeth number is part of the Nemeth expression.

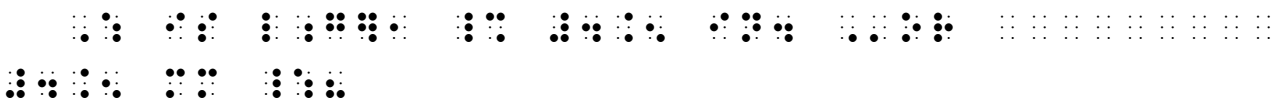
Example 3-32

Diving Scores: YWCA 6.8, YMCA 6.4.



Example 3-33

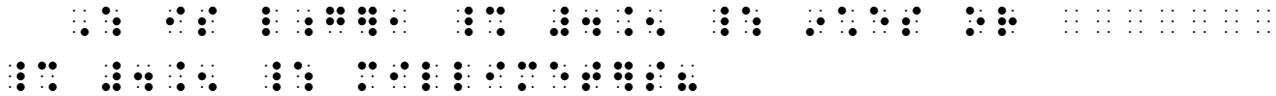
Which is longer, 4.5 in. or 4.5 mm?



The single-word switch is used for the word or.

Example 3-34

Which is longer, 4.5 inches or 4.5 millimeters?

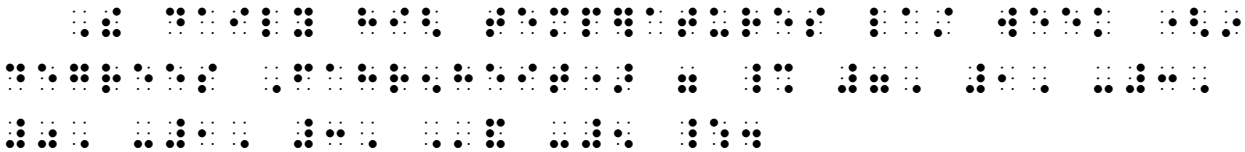


There are two words between the Nemeth numbers. Nemeth Code is terminated before the words are transcribed.

3.6.6 **Switch Considerations.** Just because a numeral can be transcribed in UEB does not mean it must be transcribed in UEB. Consider how cumbersome it would be to read the next example if you used Nemeth only for the negative numbers.

Example 3-35

The daily high temperatures last week (in degrees Fahrenheit) were 7, 1, −3, 0, −1, 3, and −5.



Excessive switching is avoided by including all of the numbers (even the unmodified ones) inside one set of switch indicators.

3.6.7 **With Punctuation.** A single-word switch indicator cannot be placed immediately before a mark of punctuation such as an opening quotation mark or an opening parenthesis.

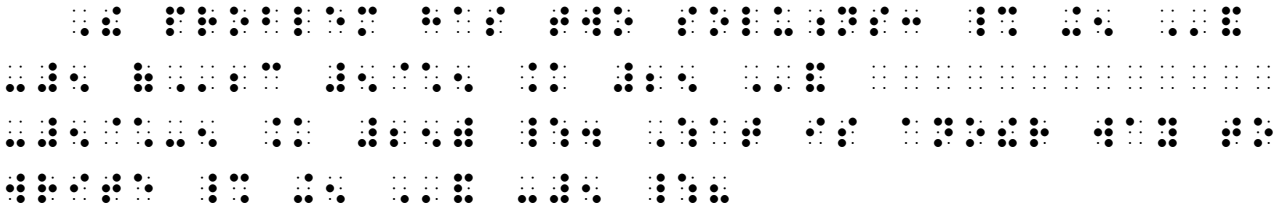
Correct:

Incorrect:

Recall from Lesson 2 that paired grouping symbols must be transcribed in the same code. Examine the treatment of the parentheses in the next two examples. Note that Example 3-37 shows two viable interpretations.

Example 3-36

The problem has two solutions: $+5$ and -5 (because $5 \times 5 = 25$ and $-5 \times -5 = 25$). What is another way to write $+5$ and -5?

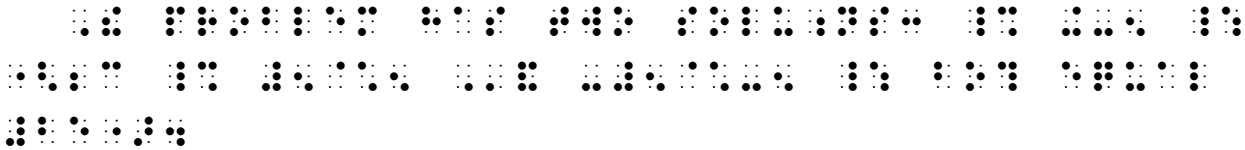


The opening and closing parentheses are in Nemeth. The single-word switch indicator immediately follows the opening parenthesis.

Example 3-37

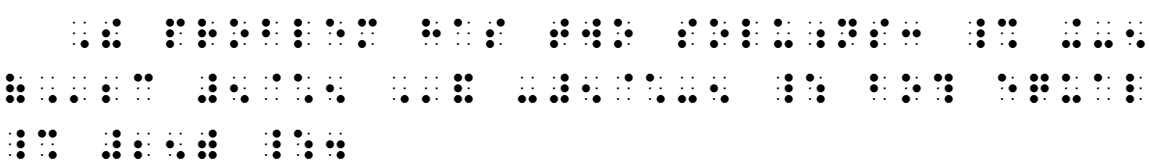
The problem has two solutions: ± 5 (because 5×5 and -5×-5 both equal 25).

Transcription A.



The closing parenthesis is in UEB. The opening parenthesis must also be in UEB. Because a single-word switch indicator cannot be used immediately before an opening parenthesis, Nemeth Code is terminated and then reopened after the word.

Transcription B.



By transcribing the numeral 25 and the closing parenthesis in Nemeth, the opening parenthesis is now done in Nemeth, similar to Example 3-36.

3.6.8 **The Word "of".** The word "of" requires a closer look. Within a narrative sentence, it is a word like any other word and may require a single-word switch indicator. However, when "of" is part of an equation, it is transcribed in Nemeth, uncontracted, without any code switching. Compare the treatment of the word "of" in these examples.

Example 3-38

Estimate the tax: 6% of $5.25

"of" is narrative and so is transcribed in UEB using a single-word switch indicator.

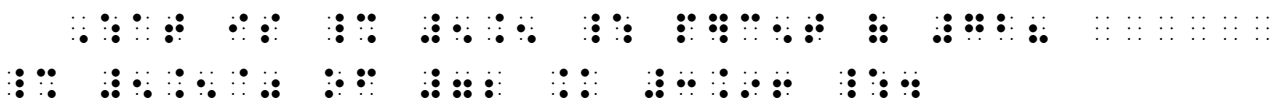
Example 3-39

6% of $5.25 = $.32

"of" is part of the equation ($5.25 alone does not equal $.32) and so "of" is transcribed in Nemeth, uncontracted.

Example 3-40

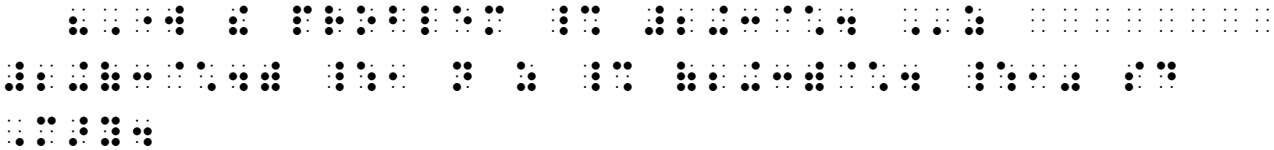
What is 5.5 percent of 72? 5.5% of 72 = 3.96.



3.6.9 **Two or More Words.** When more than one narrative word in succession appears within mathematical context, Nemeth Code must be terminated in order to transcribe the words in UEB.

Example 3-41

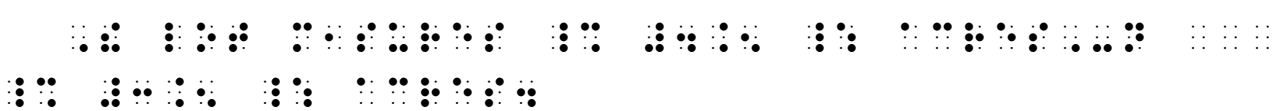
"Work the problem 2 + 3 × 4 as 2 + (3 × 4), not as (2 + 3) × 4," said Mary.



a. **Dashes and Slashes.** Two words separated by a dash or a slash are considered to be more than one word. The single-word switch cannot be applied.

Example 3-42

The lot measures 4.5 acres—not 3.5 acres.



Example 3-43

Use + and/or ×, as necessary.

3.7 More About Switch Indicators at Braille Page Turns

Now that you have had more experience with switch indicators, we will consider more layout issues that occur at braille page turns. Observe the following "keep together" rules as they relate to mathematical expressions within the narrative text.

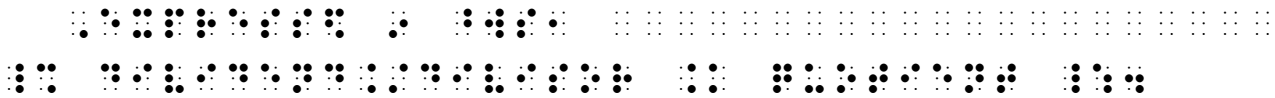
- A mathematical expression that will fit entirely on the braille line must not be divided between lines.
- If the math expression is preceded by the opening Nemeth Code indicator and followed by the Nemeth Code terminator, and if there is room on the line for both switch indicators and the expression, keep them all on the same line.
- If there is not room on the line for both switch indicators and the math expression, one of the switches will fall on a different line.
- If neither switch indicator will fit on the same line as the math expression, priority is given to keeping the math expression intact, placing each switch indicator on another line. The opening Nemeth Code indicator will be the last item on the preceding line; the Nemeth Code terminator will be the first item on the following line.
- If a math expression is preceded by the opening Nemeth Code indicator and followed by the Nemeth Code terminator and it falls at a braille page turn, place each switch indicator on the same braille page as the mathematical material to which it applies. An opening Nemeth Code indicator should not be the last item at the bottom of a braille page; a Nemeth Code terminator should not be the first item at the top of a braille page.
- 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.

Different layouts are illustrated in the next four examples.

3.7.1 **Layout #1.** The first example shows a math expression that will fit on one braille line along with the code switch indicators and the ending punctuation.

Example 3-44

Expressed in words, dividend ÷ divisor = quotient.



(1) Page Turn Adjustment If the text begins on line 24, the page number on line 25 restricts the number of available cells on that line. In this case, placing the opening switch on line 24 will solve the problem.

24 ⠸⠩⠍⠁⠞⠓⠸⠩ ⠊⠝ ⠁ ⠞⠑⠭⠞ ⠊⠎ ⠀⠀⠀

(2) Page Turn Adjustment Since a Nemeth Code terminator cannot be the first item on a new braille page, the entire expression, including the opening Nemeth Code indicator, must be arranged to begin on the next page.

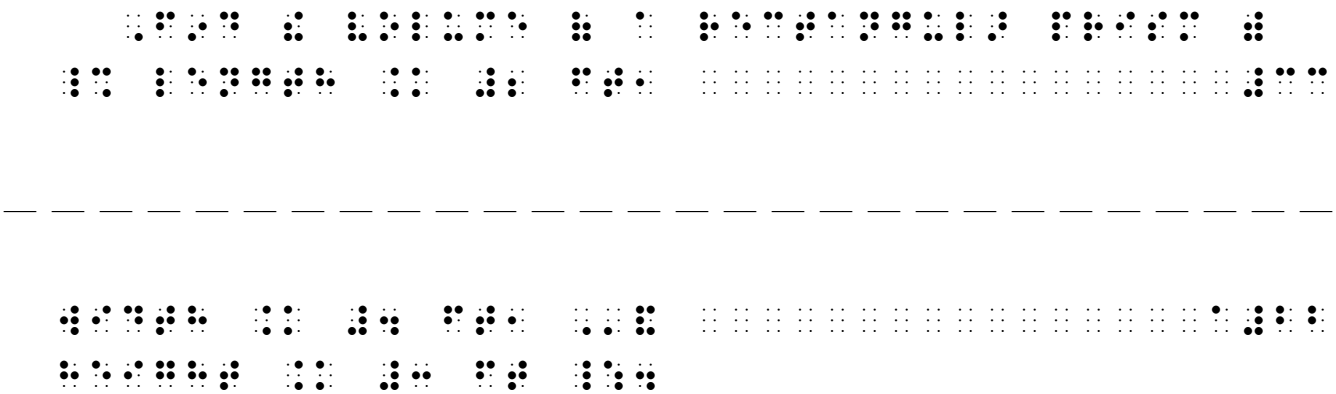
24 ⠸⠮⠠⠍⠁⠞⠓ ⠸⠲ ⠸⠮⠠⠍⠁⠞⠓

25 ⠸⠸⠸

3.7.4 **Layout #4.** In this final example, there is more than one expression between the code switches. Each individual expression is kept together on one braille line, but there is no need to force both of the switches to be on the same page. Nemeth Code continues on the new page. There is no need to repeat the Nemeth indicator after the page turn.

Example 3-47

Find the volume of a rectangular prism with length = 2 ft, width = 4 ft, and height = 3 ft.



Each of the three expressions must not be allowed to wrap before or after the equals sign or between the numeral and the abbreviation ft. The first two occurrences of the abbreviation ft do not have a related period so you must assume that the period following the third occurrence does not relate to the abbreviation; it only ends the sentence and so is placed after the Nemeth Code terminator.

Instructions: Assume that the first paragraph begins on line 24 of a braille page. Use braille page number 55 on line 25, and use print page number a44 on line 1 of the new braille page.

PRACTICE 3C

A unit of work is the foot-pound (ft-lb). One foot-pound converts to 12.000000427771 inch-pounds. How many in-lb is 4.6 ft-lb? How many ft-lb is 247.9927443 in-lb?

If 1 joule = 10 million ergs and 1 megajoule = 1,000,000 joules, how many ergs is 1 megajoule? 1 megajoule = ? ergs

---

3.8 New Print Page

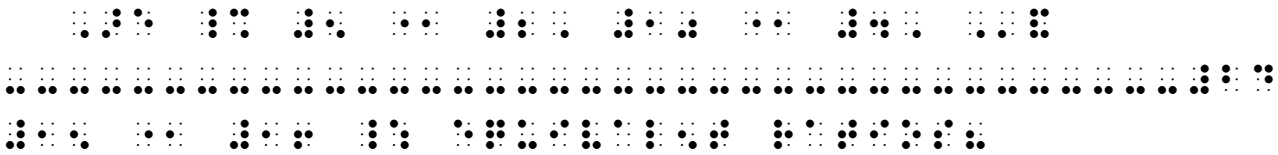
The page change indicator and page number are constructed in the same way in either code. The code in place before the page change indicator remains in effect following the page change indicator. Placement of code switch indicators is not affected by the presence of a page change indicator.

Example 3-48

Are 5 : 2, 10 : 4, and

[print page turn, page 24]

15 : 16 equivalent ratios?



Nemeth Code remains in effect through the page change indicator.

LETTERS

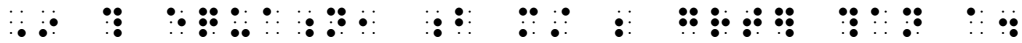
3.9 Single English Letters in Narrative

The language of mathematics uses single letters as mathematical characters. Special provision is made for a single English letter that has mathematical meaning when it appears within UEB narrative.

The rules are similar to those you have learned about freestanding, unmodifed numbers within narrative: when an English letter is freestanding and is unmodified, it may be transcribed in UEB. As with numbers, an unmodified English letter that touches literary punctuation is considered to be freestanding. In a hyphenated term such as "x-axis", the letter is considered to be unmodified. An English letter with an ordinal or with a plural ending is considered to be unmodified. Roman numerals are also included in this definition and will be studied in Lesson 4.

Example 3-49

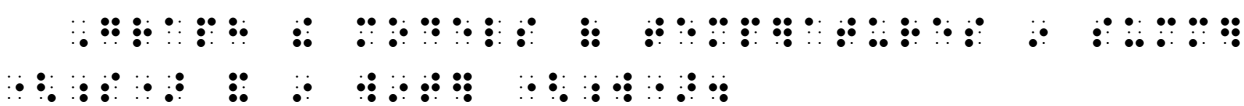
In this equation, b must be greater than a.



The unmodified letter a, transcribed in UEB, is touching punctuation.

Example 3-50

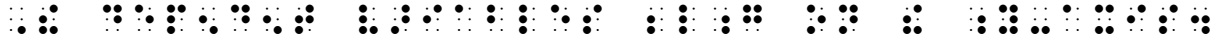
Graph the models of temperatures in summer (s) and in winter (w).



The unmodified letters s and w, transcribed in UEB, are touching punctuation.

Example 3-51

The dependent variables belong on the y-axis.



The letter y is unmodified. The hyphenated term is transcribed in UEB.

Example 3-52

Find the nth term of the arithmetic sequence.

The letter n is unmodified. The ordinal is transcribed in UEB.

3.10 Single English Letters in Nemeth Code

When an English letter that has mathematical meaning appears in technical context—that is, between Nemeth switches—it is transcribed according to the rules of the Nemeth Code. Before presenting the rules, it is helpful to understand how the Nemeth Code defines a "single letter".

3.10.1 **Nemeth Definition of "Single Letter".** To be defined as a "single letter" in Nemeth, Code several criteria must be met. (Throughout this course, when referring to the Nemeth Code's definition of a single letter, the term "single letter" is in quotation marks.)

i. A "single letter" must be from the English alphabet, in regular type*, and unmodified.

These <u>are</u> "single letters" p D z R

These <u>are</u> <u>not</u> "single letters" π **D** $\bar{z}$ $\mathbb{R}$

The first letter is not from the English alphabet, the second and fourth letters are not in regular type, the third letter is modified with a bar over it.

ii. Furthermore, in the print copy the letter must be both preceded by a space or by one or more punctuation marks** <u>and</u> followed by a space or by one or more punctuation marks.

These <u>are</u> "single letters" "y" x, "w S"

Each letter is preceded and followed by punctuation or by a space.

These <u>are</u> <u>not</u> "single letters" −x "wS" y+z

The x, z, and S are not preceded by a space or by punctuation (−x is "negative x"); the y and the w are not followed by a space or by punctuation.

iii. Whether the leading punctuation mark is preceded by a space or not is irrelevant; whether the following punctuation mark is followed by a space or not is irrelevant.

These <u>are</u> "single letters" "x"+"y"

Each letter is both preceded and followed by punctuation.

**Special Case:* A letter representing a mathematical variable is often printed in italics throughout a publication. This universal typeform is disregarded in braille. A variable is considered to be a "single letter" in Nemeth. (Lesson 7 discusses typeform.)

**Nemeth grouping symbols, such as parentheses, are not considered to be punctuation marks. Rules for letters touching grouping symbols will be discussed in Lesson 4.

iv. If the space shown in print is not shown in braille, the letter is no longer a "single letter."

These are not "single letters" r + s

Although each letter is preceded and followed by a space in print, in braille the plus sign is unspaced from the letters.

v. And finally, to be defined as a "single letter" the letter must not be an abbreviation nor can it be a word ("a", "A", "I", or "O").

These are not "single letters" I need 4.5 m of fabric.

I is a word; m is an abbreviation for meters.

Introduction to the English-Letter Indicator

The term "English-letter indicator" clearly describes the function of this indicator—that is, the following letter (singular) is from the English alphabet.

⠰	English-Letter Indicator

It is important to note that the English-letter indicator does not function in the same way as the UEB grade 1 symbol indicator. Several rules are in place regarding situations where the English-letter indicator is or is not used.

3.11 Use of the English-Letter Indicator with a "Single Letter"

Even though no contractions are used in Nemeth, a single letter from the English alphabet used in mathematical context may require an English-letter indicator for clarity. Except as noted in the next section, an English-letter indicator is required when a letter is a "single letter" as defined in 3.10.1, above.

3.11.1 **Capitalization of "Single Letters".** To indicate a single capitalized letter, the capitalization indicator is placed between the English-letter indicator and the letter. The effect of the capitalization indicator extends only to the letter which follows it.

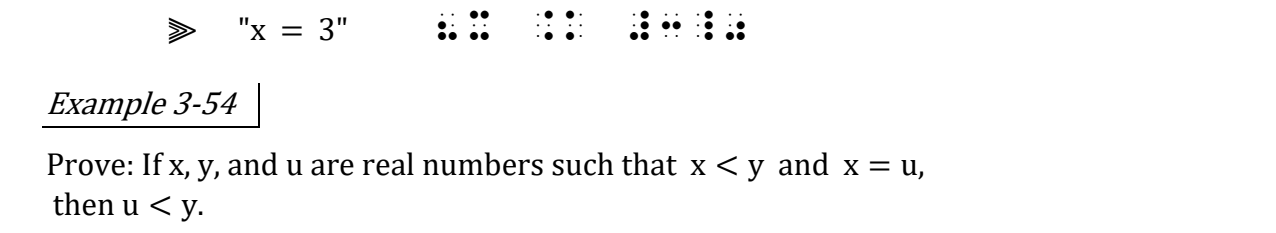
⠰	Capitalization Indicator

3.11.2 **Punctuation of "Single Letters".** A "single letter" is punctuated mathematically if the letter and the punctuation fall within the Nemeth switch indicators.

The examples from 3.10.1 are illustrated below, assuming mathematical context. Note the placement of the capitalization indicator as well as the use of mathematical punctuation.

Example 3-53

p D z R x, "y" "w S" "x"+"y"



Instructions: Demonstrate use of the English-letter indicator and proper punctuation mode in the following series of single letters. Transcribe this practice entirely in Nemeth, using the example, above, as a model.

PRACTICE 3D

c, C; r, R; "l", "L"; "i, j, k"; "l"×"w"×"h".

3.12 <u>Nonuse</u> of the English-Letter Indicator with a "Single Letter"

Even though a letter meets the criteria of "single letter" above , the English-letter indicator is <u>not used</u> when the following conditions are present.

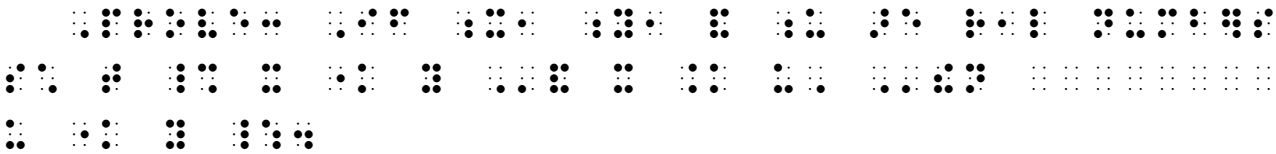
3.12.1 Comparison Sign

a. If the letter is immediately preceded by a sign of comparison or immediately followed by a sign of comparison, an English-letter indicator is not used.

- 4 > x
- x > 2
- a : b :: c : d
- "x = 3"

Example 3-54

Prove: If x, y, and u are real numbers such that x < y and x = u,
then u < y.



b. If punctuation comes between the letter and a sign of comparison, the letter is now a "single letter" by definition, and an English-letter indicator is required.

- "x" = 3 ⠸⠭⠸⠶⠼⠉

3.12.2 **Enclosed Between Grouping Symbols.** If a "single letter" is entirely enclosed between signs of grouping, the English-letter indicator is omitted.

- (a) ⠷⠁⠾
- {P} ⠸⠷⠏⠸⠾
- |y| ⠳⠽⠳

Example 3-55

"The absolute value of y" is notated |y|.

⠠⠞⠓⠑ ⠁⠃⠎⠕⠇⠥⠞⠑ ⠧⠁⠇⠥⠑ ⠕⠋ ⠽" ⠊⠎ ⠝⠕⠞⠁⠞⠑⠙ ⠳⠽⠳
⠊⠎ ⠳⠽⠳ ⠲⠲⠲

3.12.3 **An Unspaced Sequence of Terms.** The English-letter indicator is not used with one or more English letters which occur in an unspaced sequence of mathematical symbols.

- d' ⠙⠄
- N% ⠝⠨⠴
- 2z ⠼⠃⠵
- 2 × z ⠼⠃⠦⠵
- 2nth ⠼⠃⠝⠓

Example 3-56

Sides d' and d are similar.

⠠⠎⠊⠙⠑⠎ ⠙⠄ ⠯ ⠙ ⠁⠗⠑ ⠎⠊⠍⠊⠇⠁⠗⠲

Example 3-57

35 equals N% of 120.

⠼⠉⠑ ⠑⠟⠥⠁⠇⠎ ⠝⠨⠴ ⠕⠋ ⠼⠁⠃⠚⠲

Example 3-58

2· z can also be written as 2z.

⠼⠃⠲ ⠵ ⠉⠁⠝ ⠁⠇⠎⠕ ⠃⠑ ⠺⠗⠊⠞⠞⠑⠝ ⠁⠎ ⠼⠃⠵ ⠲⠲⠲

Example 3-59

Let 5y = the smaller number.

The words "the smaller number" are part of the math expression (they show what 5y equals) and so are included within the switches.

Example 3-60

A field containing the nth roots of unity for odd n also contains the 2nth roots.

a. **Probability Notation.** In probability notation, a letter (often P which represents "the probability of") is followed, unspaced, by the "event" which is written between mathematical grouping symbols (often parentheses). In the next example, the event is "heads". Because the letter P is unspaced from the mathematical grouping sign, the letter is not a "single letter" and so an English-letter indicator is not used.

⫸ P(heads)

Example 3-61

The probability of a flipped coin landing on "heads" is written P(heads).

3.12.4 **Chemical Element Symbols.** Chemical element symbols are transcribed in Nemeth, even within narrative. The English-letter indicator is not used for chemical element symbols. Punctuation mode inside the code switches is mathematical.

Example 3-62

The chemical symbols for carbon, oxygen, and hydrogen are C, O, and H, respectively.

3.13 Letters as Identifiers

Letters used as identifiers are constructed according to the rules of the code which is in effect at the time—UEB or Nemeth. Compare:

Print	UEB	Nemeth
a.	⠁⠁	⠼⠁⠁
B.	⠠⠃⠠⠃	⠼⠃⠃⠠⠃⠠⠃
(a)	⠐⠁⠐⠁	⠷⠁⠁
(B)	⠐⠁⠠⠃⠠⠃⠐⠁	⠷⠃⠠⠃⠷
c)	⠠⠉⠐⠉	⠼⠉⠉⠷

Instructions: Demonstrate the use and the nonuse of the English-letter indicator for "single letters" by transcribing this practice entirely in Nemeth. Place the opening Nemeth Code indicator in cell 1 on the first line. Begin item (a) on the next line. Place the Nemeth Code terminator at the end of the last item, on the same line.

PRACTICE 3E

(a) $\mathrm{r} = \mathrm{rate}$

(b) $\text{"r"} = \mathrm{rate}$

(c) $\mathrm{x},\ \mathrm{y},\ \mathrm{z} < 100$

(d) $\mathrm{n}¢ = \$4.95$

(e) $\mathrm{x} > \text{"3"}$

(f) $\mathrm{a} + \mathrm{b}$

(g) $|\mathrm{y}| = |-\mathrm{y}|$

(h) $|\mathrm{x} + \mathrm{y}| = |\mathrm{x}| + |\mathrm{y}|$

(i) $\mathrm{P}(\text{red and blue})$

Mathematical Letter Combinations

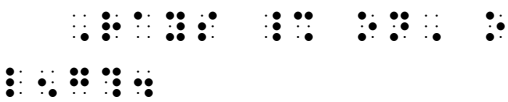
These rules apply to letter combinations which have mathematical meaning. A nonmathematical series of letters, as in a serial number, license plate, or postal code, is transcribed in UEB.

3.14 Mathematical Letter Sequence

The option to remain in UEB to transcribe a mathematical letter applies only to a <u>single freestanding English letter</u>. A mathematical letter sequence must be transcribed in Nemeth and must be punctuated mathematically if the punctuation falls within the Nemeth switch indicators. When a letter sequence is part of a hyphenated expression, the entire expression is transcribed in Nemeth.

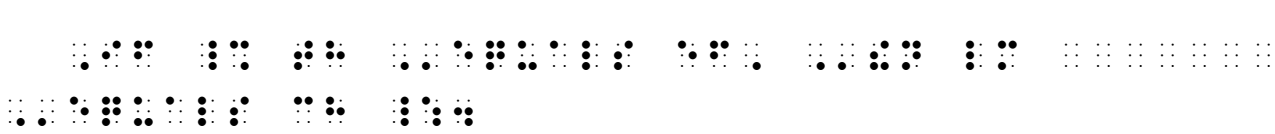
Example 3-63

Rays on, om, and op are the same length.



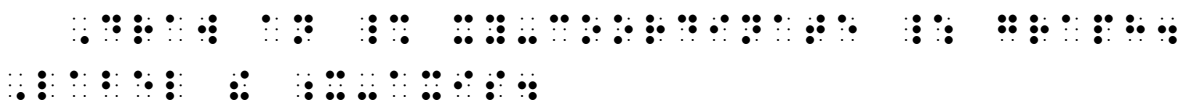
Example 3-64

If th equals ef, then lm equals ch.



Example 3-65

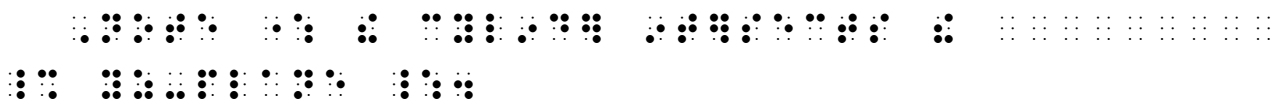
Draw an xy-coordinate graph. Label the x-axis.



The first hyphenated expression is transcribed in Nemeth Code, including the word. No contractions are used. The second hyphenated expression is transcribed in UEB because it contains a "single letter".

Example 3-66

Note where the cylinder intersects the yz-plane.



3.15 Capitalized Letter Sequence

Each capitalized letter in a mathematical sequence of letters must be capitalized individually.

⫸ PQRS

Example 3-67

Prove PQRS is a rhombus.

3.16 Shortform Letter Combinations

Because contractions are not used in Nemeth, a mathematical sequence that corresponds to a shortform of UEB will not be read as a word when it occurs between the switches. No English-letter indicator is needed.

Example 3-68

If a = c = d, then ac = cd.

Example 3-69

Wd means "W times d".

Example 3-70

Mark the abth and jkth columns.

Example 3-71

What is angle acr + angle rcb?

Example 3-72

3g × 3r × 3t = 27grt.

Example 3-73

(ab) and (cd) are not equal.

⠐⠣ ⠁⠃ ⠯ ⠐⠣ ⠉⠙ ⠁⠗⠑ ⠝⠕⠞ ⠑⠟⠥⠁⠇⠲

Example 3-74

The chemical symbol for Aluminum is Al.

⠞⠓⠑ ⠉⠓⠑⠍⠊⠉⠁⠇ ⠎⠽⠍⠃⠕⠇ ⠋⠕⠗ ⠁⠇⠥⠍⠊⠝⠥⠍ ⠊⠎ ⠁⠇⠲

Reminder: Chemical element symbols are transcribed in Nemeth.

Example 3-75

Use mathematical notation to express "x divided by y", "ac times cd", and "cd plus de".

⠠⠭ ⠙⠊⠧⠊⠙⠑⠙ ⠃⠽ ⠽⠰ ⠠⠁⠉ ⠞⠊⠍⠑⠎ ⠉⠙ ⠠⠉⠙ ⠠⠙⠑ ⠞⠕ ⠙⠑⠁⠇ ⠠⠙⠑

Instructions: Explain your decisions regarding use and nonuse of the English-letter indicator.

PRACTICE 3F

(A) Prove: If $a < b$ and $c < 0$, then $ac > bc$. Verify your proof by determining ac and bc when $a = 5$, $b = 7$, and $c = -4$.

(B) $j = 1, 2, ..., n$

(C) 40% of $N = 120$

(D) 40% of "N" $= 120$

(E) If "rcv = rjc" does "v" = "j"?

FORMAT SUMMARY #2

Here is a summary of the Nemeth formats encountered in Lessons 2 and 3.

Side-by-Side Itemized Material When itemized material is arranged side by side across the page in print, the braille format is changed so that all identifiers start in cell 1. (Different rules apply to subitems and to spatial material, which will be studied later.)

Keep Together—Hyphenated Expressions A hyphenated expression containing one or more mathematical components must not be divided between braille lines.

Keep Together—Mathematical Expression If a page number on line 25 or line 1 does not allow the entire mathematical expression to fit on the line, the expression must be brought down to the next line that has enough usable cells. If the expression will fit on one line but the code switch indicators will not, one or both of the indicators can be placed on a different line.

Keep Together—Abbreviation An abbreviation and a preceding or following numeral to which it applies must not be divided between braille lines.

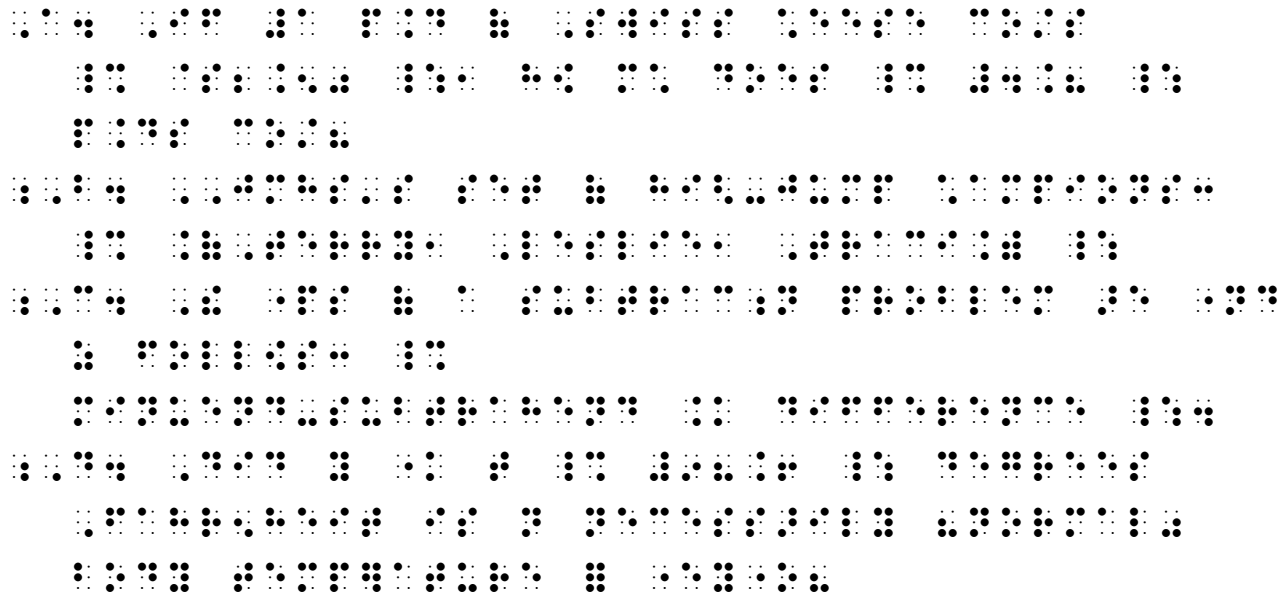
For further practice, see Appendix A—Reading Practice.

EXERCISE 3

Prepare Exercise 3 for your grader.

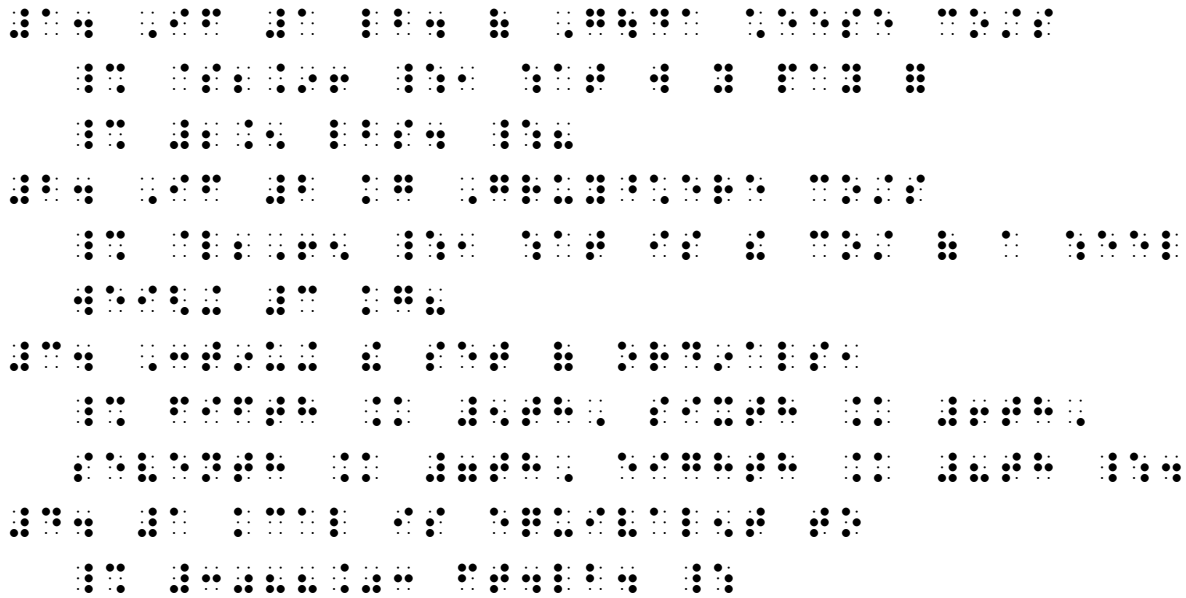
ANSWERS TO PRACTICE MATERIAL

PRACTICE 3A



Lines 2-3: A number and a related word (4.8 pounds) do not have to fall together on the same line.
Line 5: Words are punctuated with the dot 2 comma, even in mathematical context.
Line 8: Following Nemeth spacing rules, the operation sign is unspaced from the words minuend and subtrahend. Words are transcribed without contractions in Nemeth.

PRACTICE 3B



Line 3: A number and a related abbreviation (2.5 lbs.) must not be separated between lines.
Line 4: Reminder: The grave accent would be listed on the Special Symbols page of a transcription containing the modified UEB letter e in Gruyère. See Appendix G of Braille Formats.
Lines 4 and 6: A space is inserted before the abbreviation kg even though there is no space in print.
Line 5: The European decimal point is transcribed as dot 6.
Lines 8 and 9: Care is taken to ensure that each equality is not divided between braille lines.
Line 8: The ordinals are punctuated mathematically within the code switches.
Line 11: The spacing of ft.lb. matches print spacing (unspaced).

PRACTICE 3C

⠠⠁ ⠥⠝⠊⠞ ⠷ ⠐⠺ ⠊⠎ ⠮ ⠋⠕⠕⠞⠤⠏⠨⠙ ⠐⠣⠋⠞⠤⠇⠃⠐⠜⠲
⠠⠐⠕ ⠋⠕⠕⠞⠤⠏⠨⠙ ⠒⠧⠻⠞⠎ ⠞⠕ ⠼⠑⠑

⠸⠩ ⠼⠂⠆⠨⠴⠴⠴⠴⠴⠴⠲⠆⠶⠶⠶⠂ ⠸⠱ ⠔⠡⠤⠏⠨⠙⠎⠲ ⠁⠼⠙⠙
⠠⠓⠪ ⠸⠍ ⠔⠤⠇⠃ ⠊⠎ ⠸⠩ ⠼⠲⠨⠖ ⠋⠞⠤⠇⠃ ⠸⠱⠦ ⠠⠓⠪ ⠸⠍
⠋⠞⠤⠇⠃ ⠊⠎ ⠸⠩ ⠼⠆⠲⠶⠨⠔⠔⠆⠶⠲⠲⠒ ⠊⠝⠤⠇⠃⠦
⠠⠄⠠⠊⠋ ⠼⠂ ⠚⠕⠥⠇⠑ ⠨⠅ ⠼⠂⠴ ⠍⠊⠇⠇⠊⠕⠝ ⠑⠗⠛⠎ ⠠⠄⠯
⠼⠂ ⠍⠑⠛⠁⠚⠕⠥⠇⠑ ⠨⠅ ⠼⠂⠠⠴⠴⠴⠠⠴⠴⠴ ⠚⠕⠥⠇⠑⠎ ⠸⠱⠂ ⠓⠪
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⠸⠩ ⠼⠂ ⠍⠑⠛⠁⠚⠕⠥⠇⠑ ⠨⠅ ⠿ ⠑⠗⠛⠎ ⠸⠱

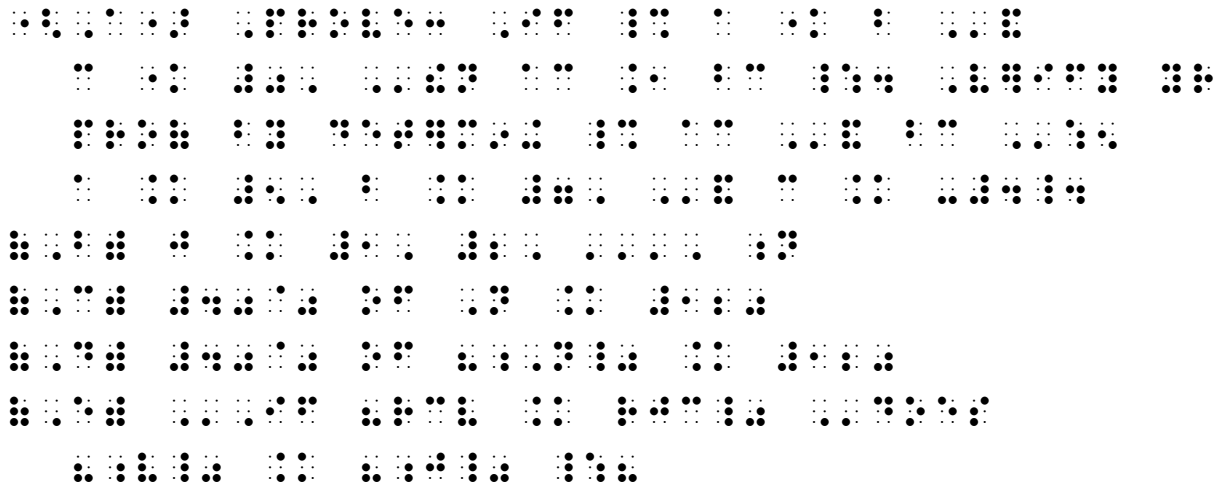
PRACTICE 3D

⠸⠩ ⠰⠉⠠ ⠰⠠⠉⠸⠆ ⠰⠗⠠ ⠰⠠⠗⠸⠆ ⠦⠰⠇⠸⠴⠠ ⠦⠰⠠⠇⠸⠴⠆
⠦⠰⠊⠠ ⠰⠚⠠ ⠰⠅⠸⠴⠆ ⠦⠰⠇⠸⠴⠈⠡⠸⠦⠰⠺⠸⠴⠈⠡⠸⠦⠰⠓⠸⠴ ⠸⠱⠲

PRACTICE 3E

⠸⠩
⠷⠁⠾ ⠗ ⠨⠅ ⠗⠁⠞⠑
⠷⠃⠾ ⠦⠰⠗⠸⠴ ⠨⠅ ⠗⠁⠞⠑
⠷⠉⠾ ⠰⠭⠠ ⠰⠽⠠ ⠵ ⠐⠅ ⠼⠂⠴⠴
⠷⠙⠾ ⠝⠈⠉ ⠨⠅ ⠈⠎⠲⠨⠔⠢
⠷⠑⠾ ⠭ ⠨⠂ ⠦⠼⠒⠸⠴
⠷⠋⠾ ⠁⠬⠃
⠷⠛⠾ ⠳⠽⠳ ⠨⠅ ⠳⠤⠽⠳
⠷⠓⠾ ⠳⠭⠬⠽⠳ ⠨⠅ ⠳⠭⠳⠬⠳⠽⠳
⠷⠊⠾ ⠠⠏⠷⠗⠑⠙ ⠁⠝⠙ ⠃⠇⠥⠑⠾ ⠸⠱

PRACTICE 3F



Lines 1, 2, and 4: Single letters that fall before and after signs of comparison need no English-letter indicator.

Line 3: Two-letter mathematical expressions must be transcribed in Nemeth.

Line 5: Nemeth continues and so the identifier is transcribed in Nemeth. No English-letter indicator is needed when a single letter is enclosed between grouping signs. Letter j is followed by a comparison sign—no English-letter indicator. Letter n is preceded and followed by a space— English-letter indicator required.

Line 6: Letter N is followed by a sign of comparison—no English-letter indicator.

Line 7: Letter N is preceded and followed by punctuation— English-letter indicator required even though equals sign follows.

Line 8: Nemeth continues, so the identifier is transcribed in Nemeth. The word If uses single-word switch indicator.

Line 9: Because letters v and j are each preceded and followed by punctuation, an English-letter indicator is required despite the proximity of the equals sign.