

LESSON 7

Read about this PROVISIONAL EDITION in the front matter to this book.
Check the NFB website periodically for updates to this lesson.

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TYPEFORMS

7.1 Introduction to Typeforms: The typeform indicators of UEB are used in the narrative text. When it is necessary to indicate emphasis or distinction inside the Nemeth Code switches, the typeform indicators of the Nemeth Code are used. The Nemeth Code has indicators and rules for applying four special typeforms to individual letters, to numerals, and to symbols, as well as indicators and rules for applying typeform to words.

LETTERS AND NUMERALS

7.2 Determining Significance of a Variant Typeform: Typeform is retained in a mathematical expression only if it conveys special mathematical meaning or distinction. Variant typeform which has no mathematical significance is not shown in braille. A few typical print examples for you to consider are shown below.

- If the author has specifically distinguished between two meanings of the same letter, the distinctive typeform is significant.

Example: R denotes the set of rational numbers and \mathcal{R} denotes the set of real numbers.

The second letter R must maintain its distinction in the braille transcription.

- It is common practice to print the letters of all formulas throughout a book in italicized type. Such letters are brailled without typeform indicators.

Examples: The variables x , y , and z are real numbers.
 π is used to determine the circumference of a circle: $2\pi r$.

The italic typeform is not mathematically significant when the letters in all formulas throughout the book are printed in italics.

- A variant typeform is often used for the sole purpose of attracting the reader's attention. This is particularly common at the lower grade levels. Such variant typeforms are not represented in the braille transcription.

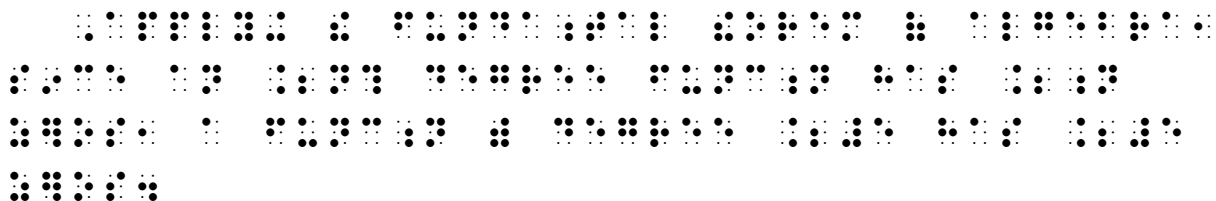
Example: Let n be the smaller number, and $13+n$ be the larger number.

The boldface is not mathematically significant—its purpose is to attract the reader's attention. No typeform indicators are used in the braille transcription.

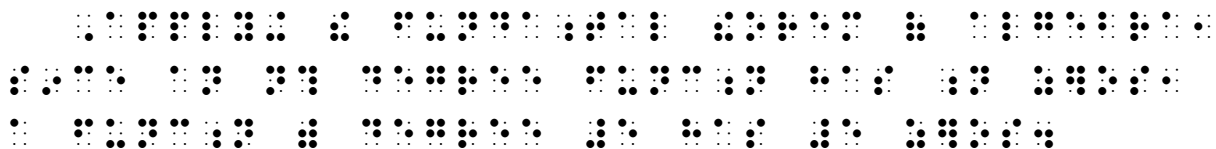
Food For Thought: The decision whether to retain a variant typeform can be difficult. The next example shows two italicized letters and two italicized numbers. The italics in print are the author's way of making a connection between the two n s and the two 5 s. The italics used in the example below is not "mathematically significant" but the transcriber must determine if the non-regular typeform is needed for "emphasis or distinction" according to UEB. Does the italic typeform aid in the understanding of the material or is it functioning simply as a visual device?

The example is brailled two ways. The first transcription retains the italics and the second does not.

Example 7.2-1 Applying the fundamental theorem of algebra, since an n th degree function has n zeros, a function with degree 5 has 5 zeros.



The image shows the Braille transcription of the text "Applying the fundamental theorem of algebra, since an *n*th degree function has *n* zeros, a function with degree *5* has *5* zeros." where the italicized letters and numbers are represented by the standard Braille characters for those characters, without any special indicators.



The image shows the same Braille transcription as above, but with the italicized letters and numbers represented by the standard Braille characters for those characters, without any special indicators.

Either transcription could be supported as being the correct one. The transcriber's responsibility is to apply the decision consistently throughout a document.

THE FOUR MATHEMATICAL TYPEFORM INDICATORS

7.3 Mathematical Typeforms and Their Indicators: Specific provision is made in the Nemeth Code for the transcription of four print typeforms: boldface, italic, script, and sanserif type. The various typeforms may be applied to the letters of the English, German, Greek, Hebrew, and Russian alphabets as well as to numerals, mathematical symbols, and words or phrases in mathematical context.

7.4 Boldface, Italic, Script, and Sanserif Type for Letters and Numerals: Compare characters to the surrounding text to determine whether the print style differs. If it is determined that the typeform is mathematically significant, one of the following Nemeth Code indicators is used.

Boldface Typeform Indicator	⠠⠠⠠
Italic Typeform Indicator	⠠⠠⠠
Sanserif Typeform Indicator	⠠⠠⠠⠠
Script Typeform Indicator	⠠⠠⠠

7.5 Typeform Indicators with One Letter: When the distinction has mathematical significance, a switch to Nemeth Code is required. A typeform indicator must always be followed by an alphabetic indicator. Here is the English letter R in these four styles.

⦿ R	⠠⠠⠠⠠	<i>(boldface letter R)</i>
⦿ R	⠠⠠⠠⠠	<i>(italic letter R)</i>
⦿ R	⠠⠠⠠⠠⠠	<i>(sanserif letter R)</i>
⦿ ℞	⠠⠠⠠⠠	<i>(script letter R)</i>

Note: Sanserif style is recognized by the lack of small lines or serifs at the ends of the letter parts. Only the English (Roman) alphabet has a sanserif style of type.

Review the five alphabetic indicators of the Nemeth Code in **Lessons 4 and 5**. Here are isolated examples of capitalized and uncapitalized letters in the four typeforms.

boldface English lowercase a	a	⠠⠠⠠
boldface English capital a	A	⠠⠠⠠⠠
boldface Greek lowercase alpha	α	⠠⠠⠠
boldface German lowercase ah	a	⠠⠠⠠
boldface German capital ah	A	⠠⠠⠠⠠
boldface Russian lowercase ah	a	⠠⠠⠠⠠
italic English lowercase a	a	⠠⠠⠠
italic English capital a	A	⠠⠠⠠⠠

italic German lowercase ah	<i>a</i>	⠠⠠⠠⠠
sanserif English lowercase h	h	⠠⠠⠠⠠⠠
sanserif English capital h	H	⠠⠠⠠⠠⠠⠠
script English lowercase a	<i>a</i>	⠠⠠⠠⠠
script English capital a	\mathcal{A}	⠠⠠⠠⠠⠠

In the next example, the script typeform of the second English letter R is retained in braille for distinction. Although there is a script typeform indicator in UEB, the letter is mathematically significant and so a switch to Nemeth Code is required.

Example 7.5-1 \mathbb{R} denotes the set of rational numbers and \mathcal{R} denotes the set of real numbers.

$$\mathbb{R} \quad \mathcal{R} \quad \mathbb{R} \quad \mathcal{R} \quad \mathbb{R} \quad \mathcal{R} \quad \mathbb{R} \quad \mathcal{R} \quad \mathbb{R} \quad \mathcal{R} \quad \mathbb{R} \quad \mathcal{R} \quad \mathbb{R} \quad \mathcal{R} \quad \mathbb{R} \quad \mathcal{R}$$

In the next example, pi, e, phi, and theta are printed in italics. Recall that the italic typeform is not mathematically significant when all mathematical letters in the book are printed in italics. No italic indicators are used in the transcription of this example.

Example 7.5-2 π , e , and ϕ are famous irrational numbers. θ is commonly used to denote angle measures.

$$\pi \quad e \quad \phi \quad \theta \quad \pi \quad e \quad \phi \quad \theta \quad \pi \quad e \quad \phi \quad \theta \quad \pi \quad e \quad \phi \quad \theta \quad \pi \quad e \quad \phi \quad \theta \quad \pi \quad e \quad \phi \quad \theta$$

In the next example, the script typeform gives the English letter g a distinct mathematical identity, and so the script typeform is retained in the braille transcription. The italicized letters in the formula are not italicized in braille, according to the general guidelines regarding italicized mathematical letters.

Example 7.5-3 If \mathcal{g} is a collection of geometric figures and if $C \in \mathcal{g}$, $[C] = \{x \in \mathcal{g} \mid x \cong C\}$.


$$\mathcal{g} \quad C \in \mathcal{g} \quad [C] = \{x \in \mathcal{g} \mid x \cong C\}$$


If a bold letter is also printed in italics, determine if the italic typeform is significant as well as the bold. In the next example, the bold typeform is retained in braille because it has mathematical significance, but since all variables and constants in the book are printed in italics, the italic typeform is disregarded in braille.


Example 7.5-4 $J = \Delta p = m \Delta v$

$$J = \Delta p = m \Delta v$$

7.5.1 Recognition of Script Type in Other Alphabets: The alphabet tables in the Nemeth codebook show the print letter for script font styles in each category: English (Roman), German, Greek, Hebrew, and Russian. Use the tables to identify such letters. Then apply the appropriate indicator when it is determined to be mathematically significant. Follow the typeform indicator with the correct alphabetic indicator. Here are some isolated examples.

script German Deh  ⠠⠠⠠⠠

script Greek Psi  ⠠⠠⠠⠠

script Hebrew aleph  ⠠⠠⠠⠠

script Russian yah  ⠠⠠⠠⠠

Instructions: Braille only the forty letters, using the typeform indicated before each set: boldface*, script, or sanserif. Do not braille the descriptions or the names—just braille four letters on each line, with one blank cell between each of the four letters.

Because these letters are out of context, the alphabet and the individual letter name is given. Refer to the alphabet lists in the Nemeth codebook for the German, Hebrew, and Russian letters in order to select the correct braille character. Capital letter names are capitalized in the description. The first line in the practice is shown below to get you started.



**Images have been imported for many of these letters. Please disregard the uneven baseline, spacing, size variances, and dark type in the sections that are not labeled "boldface". Use the boldface typeform indicator only for the letters in the first section.*

PRACTICE 7A

Use BOLDFACE typeform for these ...

a B c D

... English (Roman) letters (a, Bee, cee, Dee)

v ſ η €

... German letters (fao, Yaht, ypsilon, Tseh)

Ч э г Ж

... Russian letters (Cheh, zeh, gheh, Zheh)

ρ Ψ Φ χ

... Greek letters (rho, Psi, Phi, chi)

G g L l

Use SCRIPT typeform for these... [none are bold]

... German letters (Gheh, peh, Beh, tset)

ω λ Σ Η

... Greek letters (omega, lambda, Sigma, Eta)

F f H h

... English (Roman) letters

ז ז צ ק

... Hebrew letters (zayin, ayin, gimel, koph)

э Э и И

... Russian letters: eh, Yeh, shah, Yah

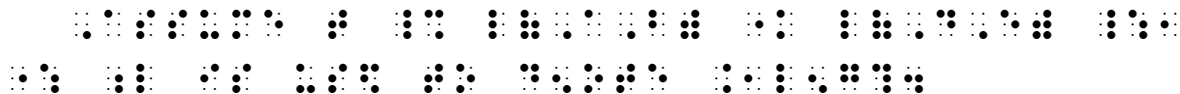
Use SANSERIF typeform for these ...

K R h p

... English (Roman) letters (Kay, Ar, aitch, pee)

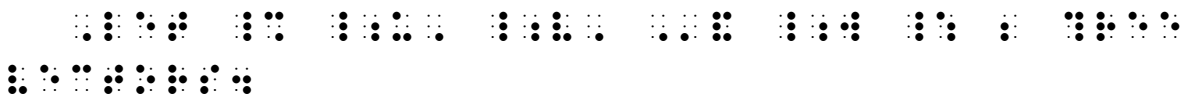
7.5.2 Script Letter of Special Interest: Print publishers often use the script form of the lower-case English letter "ell" simply to differentiate it visually from the numeral 1 (one). Since the letter and the numeral cannot be confused in braille, there is no reason to retain the script font.

Example 7.5-5 Assume that $\ell(AB) < \ell(DE)$, where ℓ is used to denote *length*.



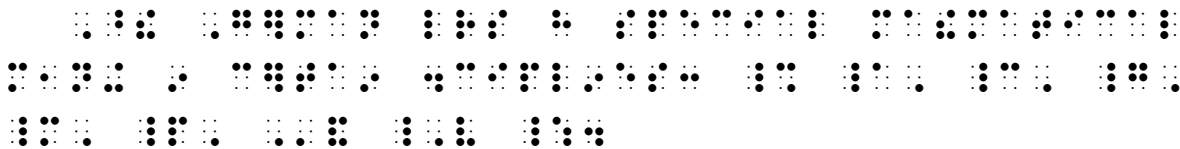
7.5.3 Boldface Letters of Special Interest—Vectors: Boldface type used to identify letters as vectors must be preserved in the braille transcription. A switch to Nemeth Code is required for the single bold letter in the narrative—UEB typeform indicators are not used in mathematical context.

Example 7.5-6 Let u , v , and w be three vectors.



7.5.4 Boldface Letters of Special Interest—German Letters: The letters of the German "fraktur" alphabet may appear to be printed in boldface, but if all German letters in the document are dark, bold typeform is not applied. (*In this example, assume that all German letters in the document are printed in a dark font.*)

Example 7.5-7 These German letters have special mathematical meaning in certain disciplines: \mathfrak{a} , \mathfrak{c} , \mathfrak{g} , \mathfrak{m} , \mathfrak{p} , and \mathfrak{B} .



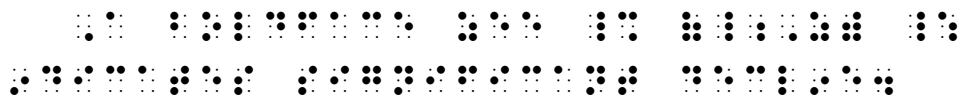
Reminder: ⠠ functions as the German letter indicator when immediately followed by one of the 26 letters of the German alphabet. For ⠠ to mean "boldface letter" the typeform indicator must be immediately followed by an alphabetic indicator.

7.6 Typeform Indicators with One Numeral: The appropriate typeform indicator of the Nemeth Code is used when it is determined that the nonregular type is mathematically significant. The numeric indicator is required between a typeform indicator and a numeral or decimal point. Here are isolated examples of a numeral in the four typeforms.

boldface 4	4	⠠⠠⠠⠠	ordinary plus, boldface 8
italic 4	4	⠠⠠⠠⠠	+8 ⠠⠠⠠⠠⠠
* italic .4	.4	⠠⠠⠠⠠⠠	ordinary minus, boldface 8
script 4	4	⠠⠠⠠⠠	-8 ⠠⠠⠠⠠⠠

**The (46) preceding the numeric indicator is the italic typeform indicator; the (46) following the numeric indicator is the decimal point.*

Example 7.7-4 A boldface zee (**Z**) indicates significant decline.



An English letter in regular type would not need an alphabetic indicator when enclosed between signs of grouping.

PRACTICE 7B

- i. The perimeter of a rectangle is obtained by adding the measurements of the sides—two lengths and two widths—expressed as $P = 2\ell + 2w$. What is P if $\ell = 5.5$ mi and $w = 3.2$ mi ?
 - ii. This expression represents Nate's sock drawer after five days of wear and laundry. Numbers in italics indicate pairs of blue socks; numbers in bold indicate pairs of red socks. How many pairs of red socks are in Nate's drawer after five days? $4 + \mathbf{1} - 1 + \mathbf{3} - \mathbf{1} - 1 - \mathbf{1} + 2 - \mathbf{1}$
 - iii. For vectors (a, b, c) can it be said that $a + (b + c) = (a + b) + c$?
-

Typeform Indicators with More Than One Letter or Numeral

7.8 More Than One Letter: The effect of a typeform indicator extends only to the letter which immediately follows it. Thus, in a sequence of unspaced letters, a typeform indicator must be used before each letter that is not in regular type. Here are some isolated examples.

AB		(boldface English A and B)
ab		(boldface English a and b)
αβ		(boldface Greek alpha and beta)
<i>ab</i>		(italic English a and b)
<i>AB</i>		(script English A and B)
<i>AbCd</i>		(italic English A, boldface b, italic C, script d)
p q r s		(regular English p, boldface q and r, regular s)
x i y j		(regular English x, boldface i, regular y, boldface j)
α a		(regular Greek alpha, boldface English a)
H H		(sanserif English H, regular English H)

Example 7.8-1 Is there a vector s such that $r + s = t$?

Each letter is individually boldfaced; an ELI is required following each typeform indicator.

Example 7.8-2 In $Pv = 0$, v is a vector and 0 is the null vector.

In Pv , the letter P does not require an ELI because it is in regular type and is not followed by a space or a punctuation mark. The boldface letter v requires an ELI because an alphabetic indicator must follow a typeform indicator.

7.9 More Than One Numeral: The effect of a typeform indicator with numerals extends until there is a change in type. Thus, when numerals contain digits in more than one typeform, the appropriate typeform indicator and the numeric indicator must be used before each change in type. When the change is to regular type, only the numeric indicator is used. Here are some isolated examples.

123		(all three numerals are boldface)
456		(boldface 4, italic 5, regular 6)
4567		(boldface 4 and 5, regular 6 and 7)
1234		(regular 1 and 2, boldface 3 and 4)
100 + 200 = 300		
	(boldface 1, 2, and 3; all zeros in regular type)	
28-571		(italic 28, hyphen, boldface 571)
47-653		(italic 47, hyphen, regular 653)

Other Details

7.10 Underlining and Other Typeforms: There is no underline indicator in the Nemeth Code. Underlining of letters, numbers, and mathematical symbols is presented in the lesson about modifiers. Typeforms for which there are no provisions in the Nemeth Code may use one of the four typeform indicators that is not used elsewhere in the document. A transcriber's note should explain the substitution. For example, "double struck" (also called "blackboard bold") is a typeface style sometimes used for certain symbols in mathematical texts. Here is an earlier example shown with this font.

Example 7.10-1 \mathbb{R} denotes the set of rational numbers and \mathbb{R} denotes the set of real numbers.

\mathbb{R} denotes the set of rational numbers and \mathbb{R} denotes the set of real numbers.

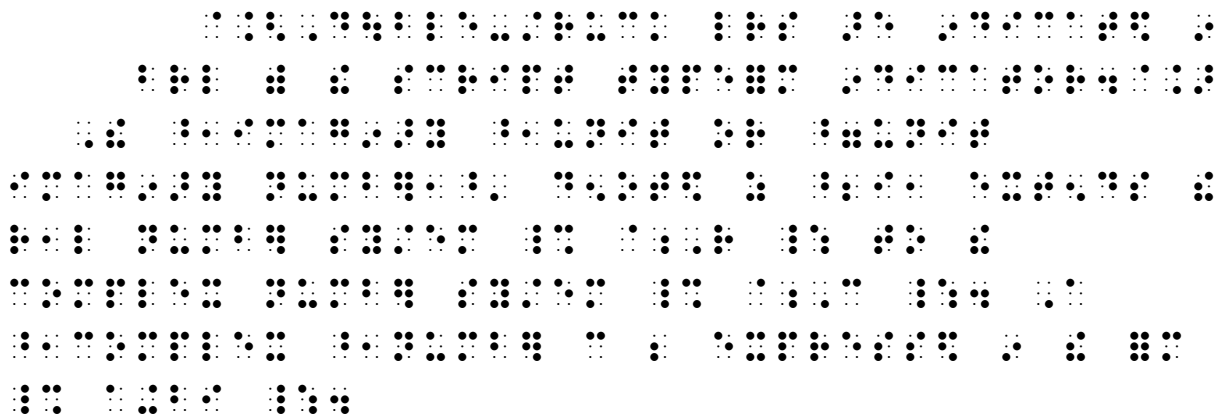
*A transcriber's note will explain the substitution: "Double-struck letters are indicated in braille with the script typeform indicator."
The UEB "underlined" indicator is used in the narrative text.*

The *Sha* (\mathbb{H} from the Cyrillic alphabet) usually keeps company with bold and double-struck letters, as seen in the next example.

Example 7.10-2 $\mathbb{H}(\mathbb{E}/\mathbb{Q})[\mathbf{p}]$ is trivial for $\mathbf{p} \neq 2, 3, 5, 7$.

$\mathbb{H}(\mathbb{E}/\mathbb{Q})[\mathbf{p}]$ is trivial for $\mathbf{p} \neq 2, 3, 5, 7$.

Example 7.12-1 The **imaginary unit** or **unit imaginary number**, denoted as i , extends the real number system \mathbb{R} to the complex number system \mathbb{C} . A **complex number** can be expressed in the form $a + bi$.



Instructions: Begin this practice with a transcriber's note explaining your treatment of the double-struck letters.

PRACTICE 7C

1. The 1-D coordinate system is denoted by \mathbb{R} .
 2. If the boldface number signifies a withdrawal from your account, can you explain why $250 + 250 = 0$?
 3. $c(a, b) = (ca, b)$ as well as (a, cb) . a and b are **vectors**. Define ab .
 4. **Two Number Sets:** \mathbb{N} denotes the set of *natural numbers* – that is, the set of nonnegative integers $\{0, 1, 2, \dots\}$. The set of all integers is denoted by \mathbb{Z} .
-

BOLDFACED MATHEMATICAL SYMBOLS

7.13 Dots 456: In the following cases, ⠠ is considered to be an actual part of the symbol and must not be considered to be a boldface typeform indicator. Do not use ⠠ with any other sign other than those shown in this section.

7.13.1 Signs of Operation in Boldface Type: The signs of operation listed below are to be used to show boldface type only when the distinction between the regular and the boldface forms of the same sign has mathematical significance. The surrounding text should be scrutinized to determine if this is the case. Each symbol consists of ⠠ followed by the appropriate sign of operation. ⠠ *must not be used with any other sign of operation.*

Boldface Plus	+	⠠⠠⠠⠠
Boldface Minus	−	⠠⠠⠠⠠
Boldface Plus Followed by Boldface Minus	+ −	⠠⠠⠠⠠⠠⠠⠠⠠
Boldface Plus Followed by Regular Minus	+ −	⠠⠠⠠⠠⠠⠠⠠⠠
Regular Plus Followed by Boldface Minus	+ −	⠠⠠⠠⠠⠠⠠⠠⠠
Boldface Minus Followed by Boldface Plus	− +	⠠⠠⠠⠠⠠⠠⠠⠠
Boldface Minus Followed by Regular Plus	− +	⠠⠠⠠⠠⠠⠠⠠⠠
Regular Minus Followed by Boldface Plus	− +	⠠⠠⠠⠠⠠⠠⠠⠠

Out of context, the mathematical significance of the boldface in the three examples below is debatable. They are included here for instructional purposes.

Example 7.13-1 $a + b = b + a$ but $a - b \neq b - a$

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

Example 7.13-2 Compare: $a + -b$, $b - +a$

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

7.13.2 Equals Sign in Boldface Type: When it is necessary to show that an equals sign is printed in boldface type, ⠠ is placed before the equals symbol in braille. Boldface equals signs are used only when the distinction between the regular and boldface forms of the same sign has mathematical significance. The surrounding text should be scrutinized to determine if this is the case.

Boldface Equals	=	⠠⠠⠠⠠⠠⠠
------------------------	----------	--------

Italic Typeform Indicator	⠄
Boldface Typeform Indicator	⠠

The compound expression "Carbon-14" is used below to illustrate several combinations of typeforms. These examples are purely illustrative. The decision to follow UEB or to switch to Nemeth Code as well as the decision to retain the nonregular typeform can only be determined in context.

- The effect of the typeform indicator continues through the hyphen.

Carbon-14 (entirely bold)

UEB: ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

NC: ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

Carbon-14 (entirely italics)

UEB: ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

NC: ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

- If there is a change from regular to nonregular type after the hyphen, the appropriate typeform indicator is used after the hyphen.

Carbon-14 (word is normal; number is bold)

UEB: ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

NC: ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

- If there is a change from one typeform to a different typeform after the hyphen, the appropriate typeform indicator is used before each part of the expression. In UEB, a typeform terminator is brailled before the hyphen. In Nemeth Code, the typeform of the word terminates when a new typeform indicator follows the hyphen. No explicit terminator is needed.

Carbon-14 (word is in italics; number is bold)

UEB: ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

NC: ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

- If there is a change from nonregular to regular type after the hyphen, the typeform must be terminated before the hyphen.

Carbon-14 (word is bold; number is not)

UEB: ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

The BANA Nemeth Code Technical Committee is discussing details regarding termination of typeform in a compound expression. This section will be completed after decisions are made.

Instructions: Braille the following compound expressions in Nemeth Code, applying the typeforms shown.

PRACTICE 7E

x-axis

35-ft

DC-10

Bismuth-210

Typeform Summary

The typeform indicators presented in this lesson apply to letters, numerals, certain math symbols, and compound expressions. Indicators are provided for letters printed in boldface, italics, sanserif, and script. Boldface and italic indicators can be applied to numerals or to either or both components of a compound expression. The boldface indicator can be applied only to certain specific math symbols.

Typeform indicators for words and phrases in mathematical context will be discussed in a later lesson.

Food for Thought You may have noticed that the italic typeform indicator is the same symbol as the decimal point, the Greek letter indicator, as well as the first cell in several math symbols; and that the boldface indicator is the same symbol as the punctuation indicator, the German letter indicator, and the first cell in several symbols and indicators. The dots' functions are determined in context.

UNSPACED NUMBER/LETTER COMBINATIONS

7.16 Number/Letter Combinations Without Hyphens: Letters that occur in unspaced number/letter combinations are not considered to be abbreviations in the Nemeth Code. If a letter/number combination appears in mathematical context, each capital letter is preceded by the single capitalization indicator. Letter/number combinations are punctuated mathematically if the punctuation falls inside the Nemeth Code switches.

➤ 4WD ⠠⠠⠠⠠⠠⠠⠠⠠

➤ 1074FE ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

If a number follows a letter, a multipurpose indicator (dot 5) precedes the number. A numeric indicator is not used.

➤ MP3 ⠠⠠⠠⠠⠠⠠⠠⠠

➤ WD40 ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

Compare: Note that the presence of a hyphen turns WD40 into a compound expression and a numeric indicator is used.

➤ WD-40 ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

REVISITING THE NUMERIC INDICATOR

7.17 Summary of the Numeric Indicator: It may be helpful to summarize the use and nonuse of the Nemeth Code numeric indicator studied so far. The word "numeral" includes a number that begins with a decimal point or a number that begins with a minus sign as well as a simple numeral. These rules also apply to non-decimal digits such as T and E. Assume mathematical context in example (c).

A numeric indicator is needed ...

- ... when a numeral begins a braille line or is preceded by a space. (a)
- ... when a numeral immediately follows a punctuation mark. (b)
- ... when a hyphen connects a word or an abbreviation to a numeral, or when a hyphen connects a punctuation mark to a numeral. (c)
- ... when a numeral follows a mathematical asterisk, crosshatch, paragraph mark, or section mark. (d)
- ... when a numeral is in non-regular type. (e)
- ... when there is change back to regular type from non-regular type within the same numeral. (f)

- | | | |
|-----|-----------------|------------------------------|
| (a) | .5 -1 t4e | ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ |
| | 0.333 ... 3 ... | ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ |
| (b) | "3.4" | ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ |
| (c) | Uranium-235 | ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ |
| | 6.3?-6.8 | ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ |
| (d) | 3 * 9 = 27 | ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ |
| (e) | 4925 | ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ |
| (f) | 53818 | ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ |

A numeric indicator is not needed ...

- ... when a numeral is unspaced from and follows a mathematical character. (g)
- ... when a numeral is unspaced from and follows an opening grouping sign. (h)
- ... when a numeral follows a hyphen if the hyphen follows a numeral, a letter, or other mathematical expression. (i)
- ... when a numeral in regular type is part of an "enclosed list". (j)
- ... when a single numeral is partitioned into segments with spaces. (k)
- ... when a numeral is unspaced from and follows a slash. (l)
- ... when a numeral is within an unspaced number/letter combination. (m)

- (g) $-7 + 12 - 3 = +2$ ⠠⠨⠠⠆⠠⠃⠠⠆⠠⠐⠠⠒⠠⠕⠠⠐⠠⠐⠠⠒⠠⠒⠠⠐⠠⠔
 \$12.98 ⠠⠑⠠⠁⠠⠒⠠⠐⠠⠑⠠⠒⠠⠑⠠⠒
- (h) $(-4 \text{ and } -5)$ ⠠⠒⠠⠐⠠⠒⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠
- (i) $3.4-3.8$ ⠠⠎⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠
- (j) $\{.5, .7, .9, 1.1\}$ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠
- (k) $987 \text{ 656 } 000$ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠
- (l) $2/3$ ⠠⠠⠠⠠⠠⠠⠠⠠
- (m) $7\text{NT}45\text{Z}$ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

This is not an all-inclusive list. More rules will be presented in later lessons.

Instructions: Use Nemeth Code exclusively for this list of out-of-context number/letter combinations and compound expressions. These are hyphens, not subtraction signs.

PRACTICE 7F

DC-7	Q85p7	23496AC
β-class	712-1-5-AC	n-ary
A-511	DCV-AZ	not-α
764B	10-to-1	

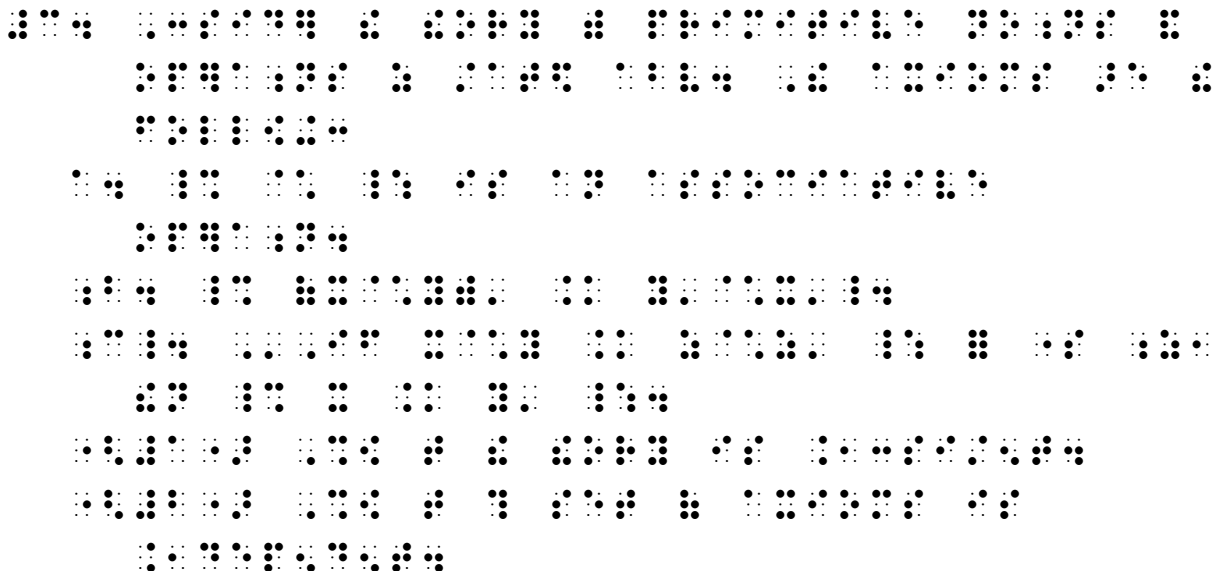
FORMAT

7.18 Margins for Itemized Material with Subdivisions (1-5; 3-5): To transcribe itemized material with lettered or numbered subdivisions, begin the main item designation in cell 1. Place any runovers in cell 5. Cell 3 is reserved for the beginning of each lettered or numbered subdivision. Any runovers to subdivisions also begin in cell 5. In Nemeth Code, "subdivision" applies to all itemized sublevels regardless of the print indentation layout. In other words, for an exercise with any number of subentry levels, use margins 1-5 for the first level, and 3-5 for all sublevels.

The first example shows two indentation levels in the print copy. In braille, all subdivisions begin in cell 3. All runovers are in cell 5.

Example 7.18-1

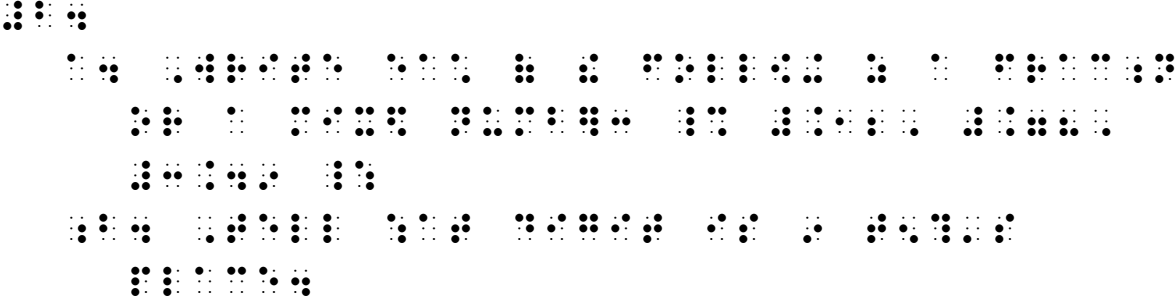
3. Consider the theory with primitive notions and operations as stated above. The axioms are the following:
 - a. \times is an associative operation.
 - b. $(x \times y)' = y' \times x'$.
 - c. If $x \times y = z \times z'$ for some z , then $x = y'$.
 - (1) Show that the theory is *consistent*.
 - (2) Show that this set of axioms is *dependent*.



The next example shows no text following the main item number, with subdivision **a.** beginning on the same line. In braille, subdivisions must begin in cell 3 on a new line.

Example 7.18-2

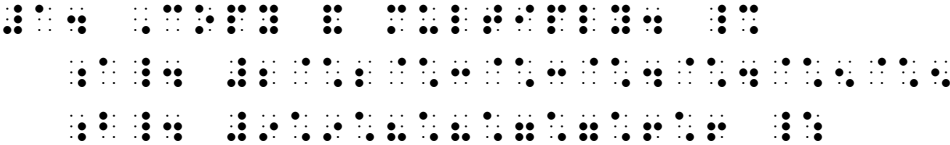
- 2. a. Write each of the following as a fraction or a mixed number: .12, .78, 3.49
- b. Tell what digit is in tenth's place.



In the next example, the subdivisions are printed without indentation. In braille, subdivisions must begin in cell 3 on a new line.

Example 7.18-3

- 1. Copy and multiply.
 - a. $2 \times 2 \times 3 \times 3 \times 4 \times 4 \times 5 \times 5$
 - b. $9 \cdot 9 \cdot 8 \cdot 8 \cdot 7 \cdot 7 \cdot 6 \cdot 6$



Reminder: The identifiers of each subdivision should begin in the same cell (cell 3). When code switching occurs, place the opening Nemeth Code indicator at the end of the line of text that precedes the identifier.

7.18.1 Paragraphs Within Itemized Material with Subdivisions (7-5): If a main item or a subdivision has more than one paragraph, each new paragraph begins in cell 7, and its runovers begin in cell 5. The margins and spacing in the print copy help the transcriber determine the start of a new paragraph within the itemized material.

In the next example, extra spacing between lines in print distinguishes new paragraphs. In the braille transcription, indentation of the first line of each new paragraph organizes the narrative. Within the item and subitem format there are no blank lines between paragraphs or subdivisions.

Example 7.18-4

5. Does the method of creating whole-number x-terms work with decimals?
Consider this example.

A jacket is marked 15% off. The sale cost is \$36.31. Expressed as an equation,
 $0.85x = 36.21$.

- a. What is the meaning of 0.85 in the equation?
b. To eliminate the decimal, multiply both sides of the equation by a number
that will result in an integer coefficient.

Can you find such a number? If you can, list at least one. If you cannot,
explain why not.

- c. Now solve the equation. What was the original price of the jacket?

6. ...

Braille representation of the text above, including the equation $0.85x = 36.21$ and the numbered list items.

PRACTICE 7G

23. Simplify and solve each equation below for x . Show your work and check your answer.
- a. $24 = 3x + 3$ b. $2(x - 6) = x - 14$
 c. $6 + 2.5x = 21$ d. $2(x + 4.5) = 32$
-

7.18.3 Tabular Form: When itemized material is arranged in tabular form so that items are numbered at the margin and subdivisions are aligned beneath lettered column headings, the material should be transcribed in one of the following ways, depending upon whether all of the columns can be accommodated across the braille page.

7.18.3.a When to Retain Column Format: If all the columns can be accommodated across the braille page, the print columnar arrangement is followed. Each problem number begins in cell 1. The letter identifying each column is aligned with the first cell of the related column. A blank line is left above and below the lettered column headings. Two blank cells separate the columns.

Example 7.18-7

	a	b	c
1.	16 + 9	17 + 4	14 + 23
2.	46 + 15	87 + 12	95 + 54
3.	157 + 452	134 + 63	458 + 12

⠠⠠

⠠⠠

⠠⠠

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⠠⠠

The BANA Nemeth Code Technical Committee is discussing placement of the switch indicators in the tabular example, above.

7.18.3.b When Not To Retain Column Format: If all the columns cannot be accommodated across the braille page, each subdivision in each problem must be lettered individually, and the format in 7.18 must be followed.

Example 7.18-8

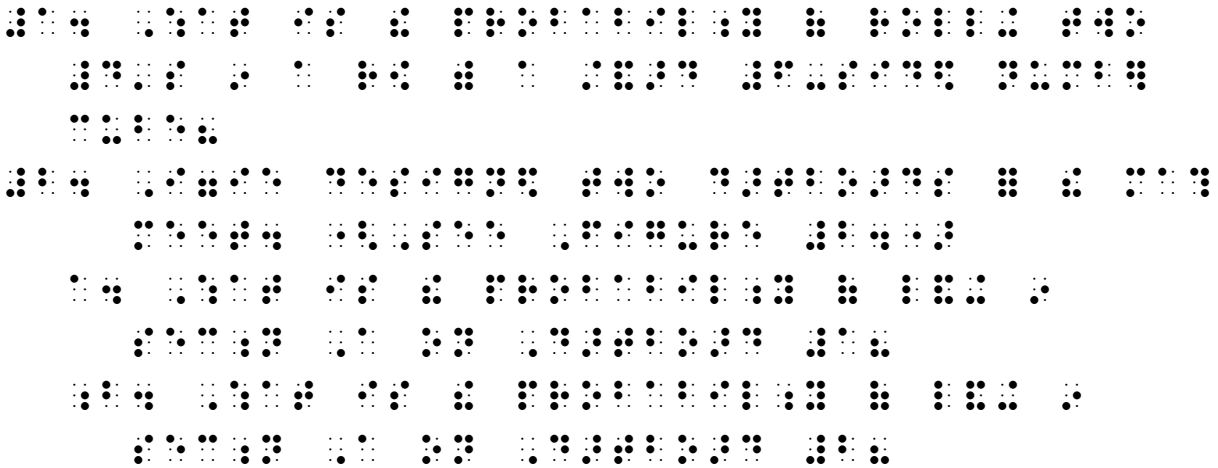
	a	b	c	d
1.	16 + 9	17 + 4	14 + 23	37 + 18
2.	46 + 15	87 + 12	95 + 54	101 + 43
3.	157 + 452	134 + 63	458 + 12	935 + 298

Braille representation of the table above, showing individual lettering for subdivisions in each problem.

7.19 Margins for Exercise Sets: Runover margins for itemized material are determined individually for each question. That is, a problem with no subentries will be (1-3); the next problem may have subentries and so will be (1-5; 3-5), etc.

Example 7.19-1

1. What is the probability of rolling two 4's in a row with a standard 6-sided number cube?
2. Iggie designed two dartboards for the math meet. (See Figure 2.)
 - a. What is the probability of landing in section A on Dartboard 1?
 - b. What is the probability of landing in section A on Dartboard 2?



*For the remainder of the course, Nemeth Code format summaries can be found in **Appendix C**.*

For further practice, see Appendix A—Reading Practice.

