

# 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.  
 $\pi$  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.

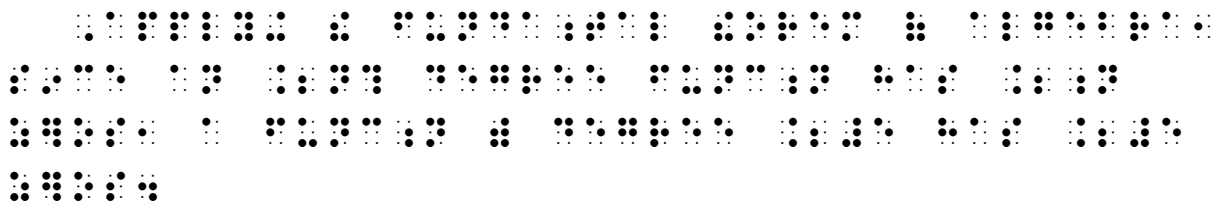
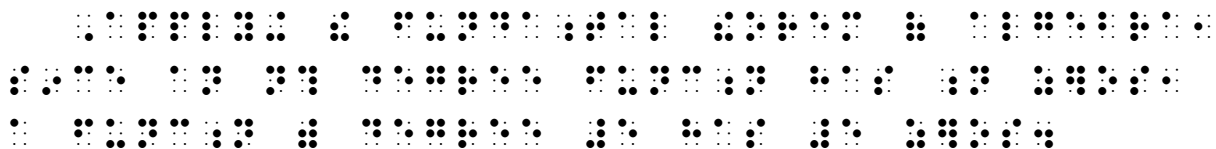
*Example:* Let **n** be the smaller number, and **13+n** be the larger number.

*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 *ns* and the two *5s*. 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 transcribed 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.

A Braille transcription of the text "Applying the fundamental theorem of algebra, since an nth degree function has n zeros, a function with degree 5 has 5 zeros." where the letters 'n' and the numbers '5' are transcribed with the Braille italic indicator (dots 4-5-6) to indicate italics.A Braille transcription of the same text as above, but where the letters 'n' and numbers '5' are transcribed in a standard, non-italicized Braille font.

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.

<b>Boldface Typeform Indicator</b>	⠠⠠⠠
<b>Italic Typeform Indicator</b>	⠠⠠⠠
<b>Sanserif Typeform Indicator</b>	⠠⠠⠠⠠
<b>Script Typeform Indicator</b>	⠠⠠⠠

**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	<b>a</b>	⠠⠠⠠
boldface English capital a	<b>A</b>	⠠⠠⠠⠠
boldface Greek lowercase alpha	<b>α</b>	⠠⠠⠠
boldface German lowercase ah	<b>ɑ</b>	⠠⠠⠠
boldface German capital ah	<b>Ɑ</b>	⠠⠠⠠⠠
boldface Russian lowercase ah	<b>а</b>	⠠⠠⠠⠠
italic English lowercase a	<i>a</i>	⠠⠠⠠
italic English capital a	<i>A</i>	⠠⠠⠠⠠

italic German lowercase ah	<b><i>a</i></b>	
sanserif English lowercase h	h	
sanserif English capital h	H	
script English lowercase a	<i>a</i>	
script English capital a	<i>A</i>	

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.

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*  $\pi$ ,  $e$ , and  $\phi$  are famous irrational numbers.  $\theta$  is commonly used to denote angle measures.

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  $C \in \mathcal{G}$ ,  $[C] = \{x \in \mathcal{G} \mid x \cong C\}$ .

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*  $\mathbf{J} = \Delta \mathbf{p} = m \Delta \mathbf{v}$

**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	<i>ℓ</i>	⠠⠠⠠⠠
script Greek Psi	<i>ψ</i>	⠠⠠⠠⠠
script Hebrew aleph	א	⠠⠠⠠⠠
script Russian yah	я	⠠⠠⠠⠠

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*Instructions:* Transcribe only the forty letters, using the typeform indicated before each set: boldface\*, script, or sanserif. Do not transcribe the descriptions or the names—just transcribe 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 Ꞛ 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 Е и Я*

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

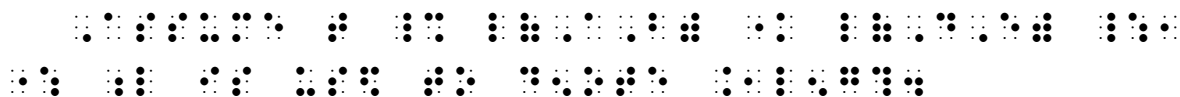
*Use SANSERIF typeform for these ...*

**K R h p**

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

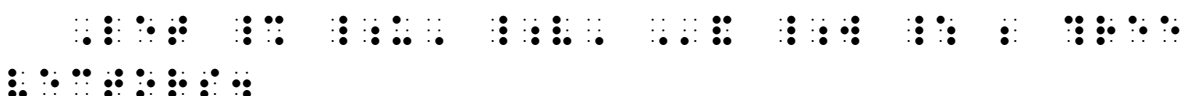
**7.5.2 Script Letter of Special Interest:** Print publishers often use the script form of the lower-case English letter "ell" simply to differentiate it visually from the numeral 1 (one). Since the letter and the numeral cannot be confused in braille, there is no reason to retain the script font.

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



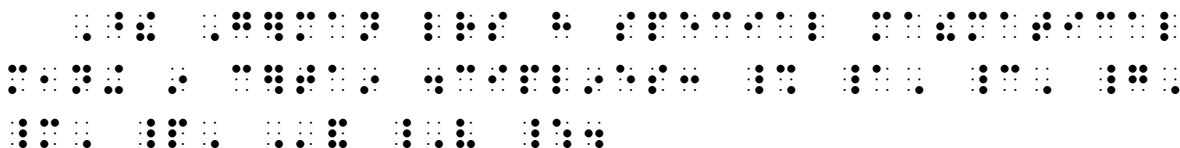
**7.5.3 Boldface Letters of Special Interest—Vectors:** Boldface type used to identify letters as vectors must be preserved in the braille transcription. A switch to Nemeth Code is required for the single bold letter in the narrative—UEB typeform indicators are not used in mathematical context.

*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: **α**, **Ϸ**, **g**, **m**, **p**, and **℔**.



*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.

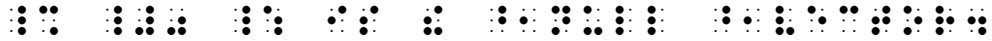
**7.6 Typeform Indicators with One Numeral:** The appropriate typeform indicator of the Nemeth Code is used when it is determined that the nonregular type is mathematically significant. The numeric indicator is required between a typeform indicator and a numeral or decimal point. Here are isolated examples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

**7.6.1 Boldface Zero:** An example of boldface type that has mathematical significance is the boldface zero as the "null vector". The boldface typeform is retained in braille. A switch to Nemeth Code is required because the boldface typeform will be retained when this special zero appears in a mathematical expression.

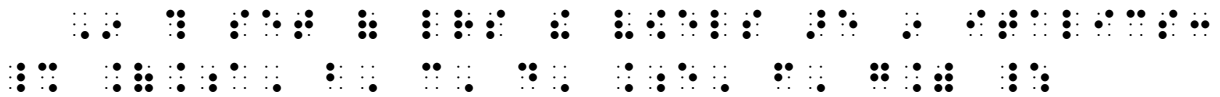
*Example 7.6-1* 0 is the null vector.



**7.7 Nonregular Typeform next to Signs of Grouping:** Because a letter or numeral in nonregular type must include a numeric or alphabetic indicator, rules regarding such letters or numerals when in contact with grouping signs are different from rules regarding letters or numerals in regular type.

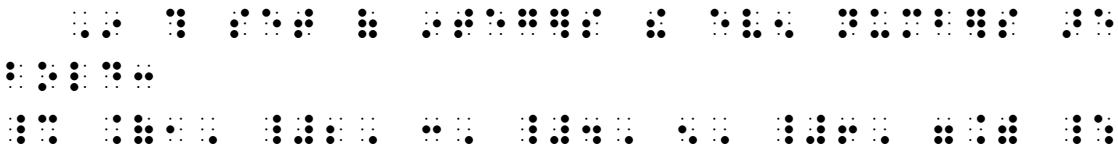
**7.7.1 Nonregular Typeform in an Enclosed List:** When letters or numerals in an enclosed list are printed in nonregular typeform and that typeform is retained in braille, each typeform indicator is followed by an appropriate letter indicator or numeric indicator. ("Enclosed list" is defined in **Lesson 5**.)

*Example 7.7-1* In this set of letters the vowels are in italics: {a, b, c, d, e, f, g}



*In the enclosed list, the English letters in regular type do not require an English letter indicator.*

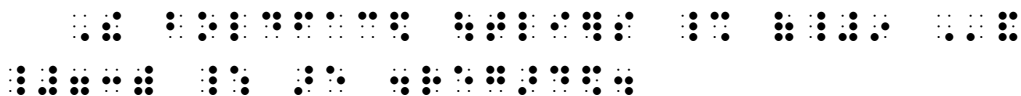
*Example 7.7-2* In this set of integers the even numbers are bold: {1, 2, 3, 4, 5, 6, 7}



*In the enclosed list, the numerals in regular type do not require a numeric indicator.*

**7.7.2 Nonregular Typeform in Contact with a Grouping Symbol:** A numeric or alphabetic indicator is required for numbers or letters in nonregular type even when touching or enclosed between grouping symbols.

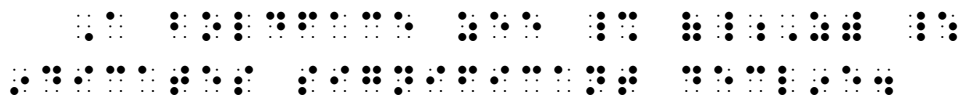
*Example 7.7-3* The boldfaced outliers (**9** and **73**) are disregarded.



*A numeral in regular type would not need a numeric indicator when following a sign of grouping.*



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.

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### 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  $(\mathbf{a}, \mathbf{b}, \mathbf{c})$  can it be said that  $\mathbf{a} + (\mathbf{b} + \mathbf{c}) = (\mathbf{a} + \mathbf{b}) + \mathbf{c}$ ?
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## *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.

<b>AB</b>		(boldface English A and B)
<b>ab</b>		(boldface English a and b)
<b>αβ</b>		(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 <b>q</b> r <b>s</b>		(regular English p, boldface q and r, regular s)
x <b>i</b> y <b>j</b>		(regular English x, boldface i, regular y, boldface j)
α <b>a</b>		(regular Greek alpha, boldface English a)
H <b>H</b>		(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.

<b>123</b>		(all three numerals are boldface)
<i>456</i>		(boldface 4, italic 5, regular 6)
<b>4567</b>		(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)
<i>28</i> - <b>571</b>		(italic 28, hyphen, boldface 571)
<i>47</i> -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.

The image shows the Braille representation of the text from Example 7.10-1. It includes the Nemeth Code for the underlined words 'rational' and 'real', and the double-struck symbol  $\mathbb{R}$ . The double-struck symbol is formed using the script typeform indicator followed by the letter R.

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

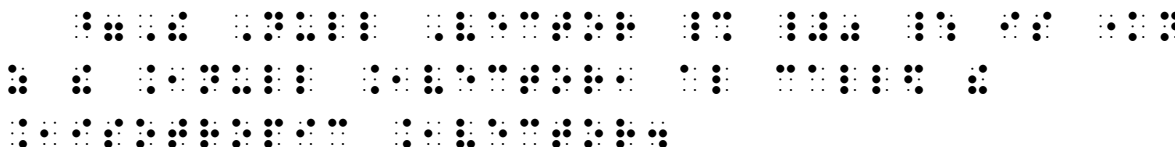
*Example 7.10-2*  $\mathbb{I}(\mathbb{E}/\mathbb{Q})[p]$  is trivial for  $p \neq 2, 3, 5, 7$ .

The image shows the Braille representation of the text from Example 7.10-2. It includes the double-struck symbol  $\mathbb{I}$  (the Sha), the underlined words 'E' and 'Q', and the variable  $p$  in boldface. The Sha symbol is formed using the script typeform indicator followed by the letter I.

**7.11 Termination of a UEB Typeform Passage:** A switch from UEB to Nemeth Code terminates the effect of a UEB typeform indicator. A UEB typeform terminator is not needed before an opening Nemeth Code indicator.

The next example shows a boldfaced paragraph heading followed by the special boldfaced mathematical numeral zero.

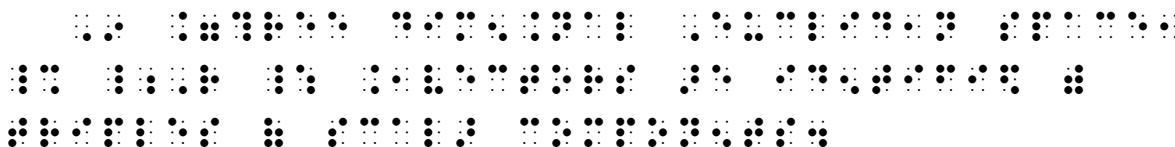
*Example 7.11-1*    **The Null Vector** **0** is known as the *null vector*, also called the *isotropic vector*.



*A UEB boldface terminator is not needed because the phrase is immediately followed by an opening Nemeth Code indicator.*

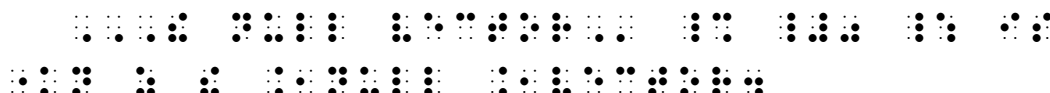
If the nonregular typeform continues after the termination of the mathematical portion, a UEB typeform indicator must be re-entered.

*Example 7.11-2*    In *three dimensional Euclidean space*, **R** vectors are identified with triples of scalar components.



**7.11.1 Capitalization:** Capitalization is not a typeform and must be explicitly terminated.

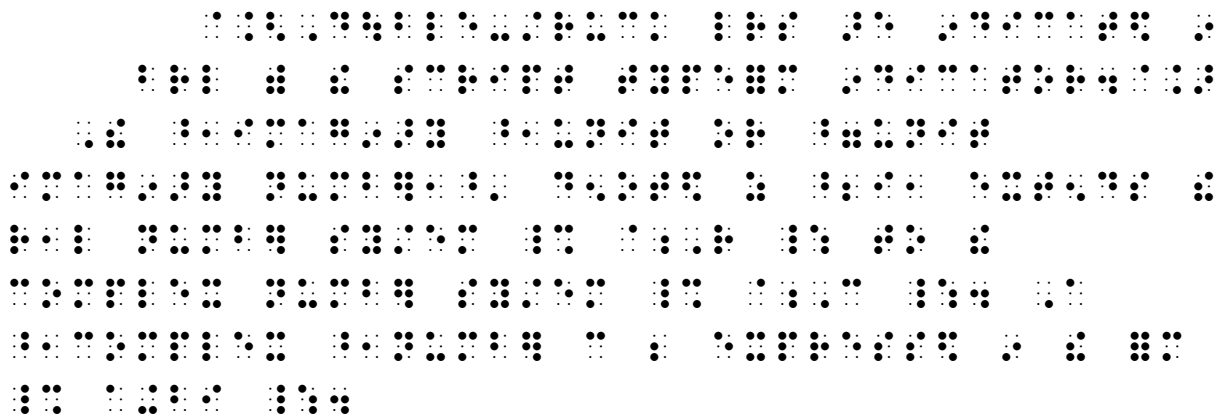
*Example 7.11-3*    **THE NULL VECTOR** **0** is known as the *null vector*.



*A capitals terminator is required at the end of this paragraph heading. (The boldface is disregarded in a fully-capitalized paragraph heading according to Braille Formats.)*

**7.12 Context Clues:** The boldfaced words in the next example indicate to the reader that they are defined in a glossary. But what about the boldfaced letter "i"? Search the surrounding text to determine whether the letter "i" retains the bold typeform within a mathematical expression. If it does, the boldface is mathematical and a switch to Nemeth Code is required. However, you can see in the expression  $a + bi$  that the imaginary unit is not printed in bold. Therefore, the first mention of *i* is transcribed in UEB, using the UEB boldface symbol indicator. The italic typeform is disregarded in both cases.

*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  $a + bi$ .




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*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  $250 + \mathbf{250} = 0$ ?
  3.  $c(\mathbf{a}, \mathbf{b}) = (c\mathbf{a}, \mathbf{b})$  as well as  $(\mathbf{a}, c\mathbf{b})$ .  $\mathbf{a}$  and  $\mathbf{b}$  are **vectors**. Define  $\mathbf{ab}$ .
  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  $\mathbb{Z}$ .
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Example 7.13-3  $a \times c = b \times d$  if and only if  $a = c$  and  $b = d$ .

$\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$   $\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$   $\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$   $\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$   $\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$   $\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$   $\textcircled{\bullet}$   $\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$   $\textcircled{\bullet} \textcircled{\bullet}$

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**7.13.3 Grouping Signs in Boldface Type:** When square brackets or vertical bars are printed in mathematically-significant boldface,  $\textcircled{\bullet}$  is used before the grouping symbol.

<b>Boldface Opening Bracket</b>	[	$\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$
<b>Boldface Closing Bracket</b>	]	$\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$
<b>Boldface Vertical Bar</b>		$\textcircled{\bullet} \textcircled{\bullet}$
<b>Boldface Double Vertical Bar</b>		$\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$

Double boldface vertical bars are usually read as "the norm of."

$\textcircled{\bullet} \textcircled{\bullet}$  || f ||  $\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$

Boldface brackets are often used to designate the "integer function".

$\textcircled{\bullet} \textcircled{\bullet}$  [ x ]  $\textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet} \textcircled{\bullet}$

*Instructions:* Practice brailleing the isolated symbols according to Nemeth Code. Follow the print format of a 3-column list. After the centered heading, place the opening Nemeth Code indicator in cell 1 on line 3. Begin the list on the next line (lines 4-6). Follow the list with the Nemeth Code terminator in cell 1 (line 7). Transcribe the two itemized sentences starting on line 9.

### PRACTICE 7D

=	+ -	- +
+	+ -	- +
-	+ -	- +

A. Find the greatest integer function where  $[z]$  is the greatest integer  $\geq z$ .

B. ... where || || is the norm of Y, written ||Y||.

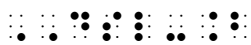
## COMPOUND EXPRESSIONS

**7.14 Definition of "Compound Expression":** A compound expression consists of a numeral or a letter joined to a word or an abbreviation by a hyphen. Here are some examples of compound expressions.

x-axis	(letter-word)
3-dimensional	(numeral-word)
n-mi.	(letter-abbreviation)
35-ft	(numeral-abbreviation)
Special-K	(word-letter)
Uranium-235	(word-numeral)
DSL-w	(abbreviation-letter)
DC-10	(abbreviation-numeral)

The compound expression may be transcribed in UEB unless the expression itself is in mathematical context or if the numeral or letter requires a switch. In such cases, the entire compound expression is transcribed inside the switches.

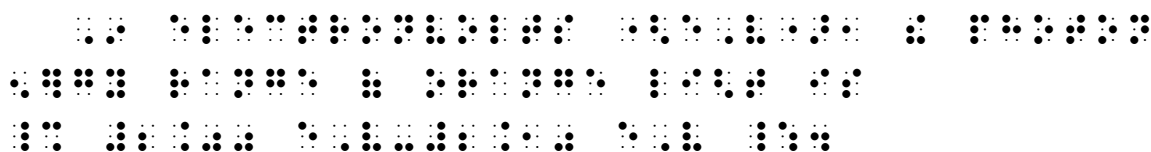
**7.14.1 Extent of Capitalization:** The effect of the double capitalization indicator of the Nemeth Code is terminated by a space or by any symbol other than a letter.

➤ DSL-β 

*The hyphen terminates the effect of the double capitalization indicator. The beta is lowercase.*

**7.14.2 Hyphen Followed by a Number:** A numeric indicator is required when a numeral is connected to a preceding word or abbreviation by a hyphen.

*Example 7.14-1* In electronvolts (eV), the photon energy range of orange light is 2.00 eV-2.10 eV.



*Note that the abbreviation is not spaced away from the hyphen. You can be sure this is a hyphen and not a minus sign if you can substitute the word "to" for the hyphen.*

**7.15 Typeform Indicators in Compound Expressions:** If one or both components of a compound expression are printed in a nonregular typeform, the typeform is retained in the braille transcription only if it is required for emphasis or distinction, or if the typeform has mathematical significance. The compound expression may be transcribed in UEB unless the expression itself is in mathematical context or if the numeral or letter requires a switch. In such cases, the entire compound expression is transcribed inside the switches.

Context will determine your decision to switch codes. If the compound expression is transcribed in Nemeth, the following indicators are used.



<b>Italic Typeform Indicator</b>	⠠
<b>Boldface Typeform Indicator</b>	⠡

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 transcribed before the hyphen. In Nemeth, 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.

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*Instructions:* Transcribe the following compound expressions in Nemeth, applying the typeforms shown.

### PRACTICE 7E

*x-axis*

*35-ft*

DC-10

**Bismuth-210**

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### *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) | <b>4925</b>     | ⠠⠠⠠⠠⠠⠠          |
| (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 and -5)	⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠
(i)	3.4-3.8	⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠
(j)	{.5, .7, .9, 1.1}	⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠
(k)	987 656 000	⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠
(l)	2/3	⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠
(m)	7NT45Z	⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

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

*Instructions:* Use Nemeth 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	

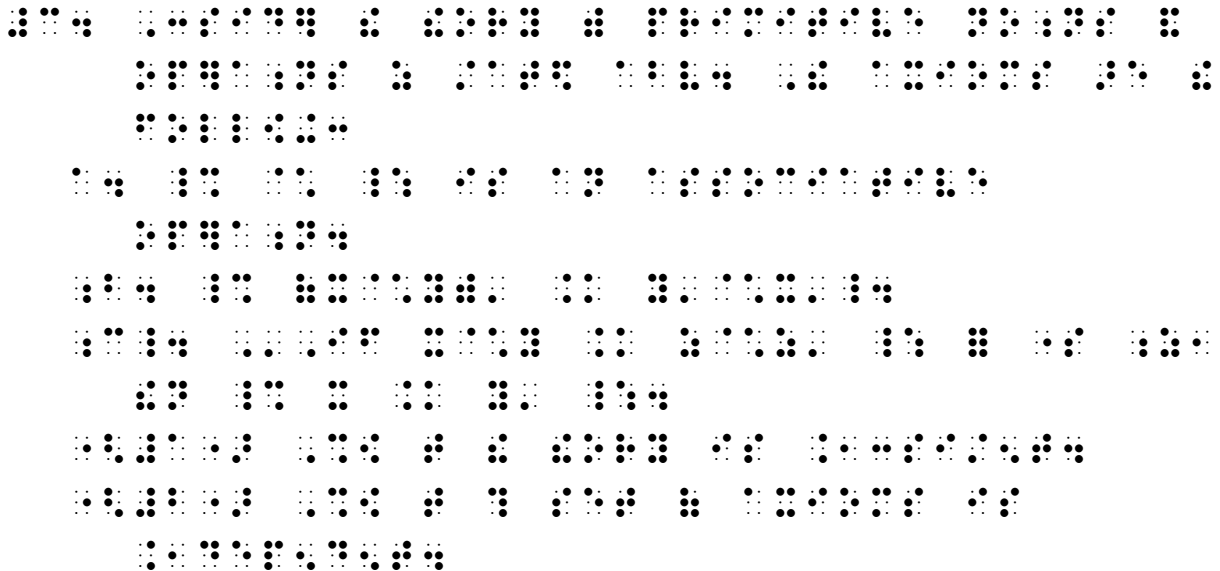
*FORMAT*

**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 the 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,  $0.85x = 36.21$ .

- What is the meaning of 0.85 in the equation?
- 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.

- 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.





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**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*

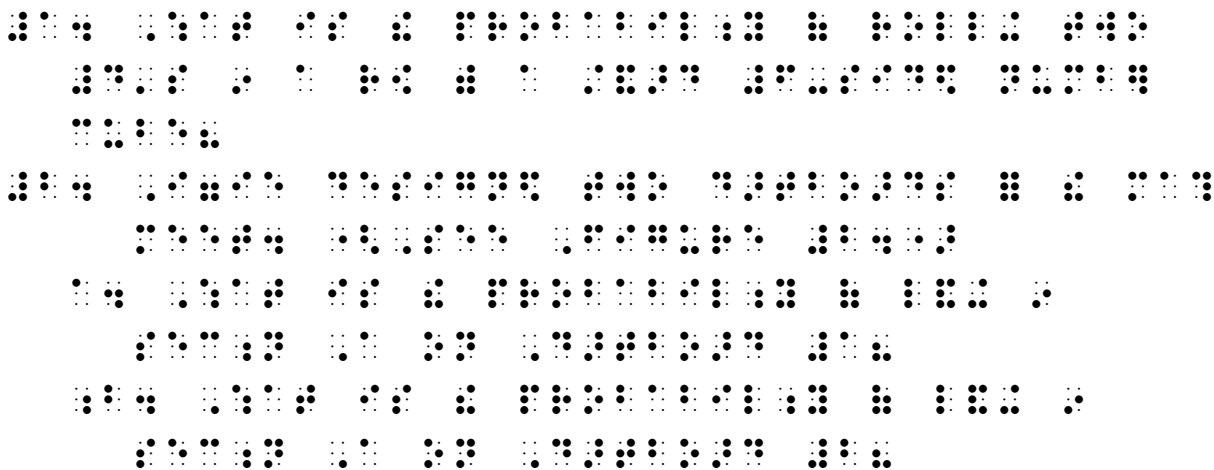
	a	b	c	d
1.	16 + 9	17 + 4	14 + 23	37 + 18
2.	46 + 15	87 + 12	95 + 54	101 + 43
3.	157 + 452	134 + 63	458 + 12	935 + 298

⠠⠠⠠  
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**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.*



# ANSWERS TO PRACTICE MATERIAL

1. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

1. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

1. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

1. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.





