

## **LESSON 13**

- MISCELLANEOUS SYMBOLS
  - Unspaced Symbols
  - Spaced Symbols
  - Spacing with the Angstrom Unit and Tally Marks
- SUPERPOSED SIGNS
- AMBIGUOUS SIGNS
- MULTIPURPOSE INDICATOR
- REFERENCE SIGNS AND SYMBOLS

*Answers to Practice Material*

### **LESSON PREVIEW**

Symbols not previously covered are collected in this lesson. Spacing rules differ among the symbols; the spacing rules are grouped accordingly. Signs printed one atop another are examined. Several look-alike print signs are compared. After a review of the multipurpose indicator, four more uses of this indicator are explored. Reference signs in Nemeth context are discussed.

## MISCELLANEOUS SYMBOLS

### [NC Rule 23]

In this lesson, symbols are grouped according to spacing rules: unspaced, spaced, and those with special rules. Within each section, the symbols are presented in alphabetical order. See Lesson 5 regarding spacing with the crosshatch symbol and the diagonal slash.

### *Unspaced Symbols*

#### 13.1 Spacing Rules for Unspaced Symbols

No space is left between the symbols listed below and any other symbol or quantity to which they apply, regardless of print spacing. However, a space must be left between these symbols and a word, an abbreviation, a sign of comparison, or other symbol which specifically requires a space before or after it.

##### 13.1.1 Caret



The caret was first seen in Lesson 10 in the context of a long division problem. Used as a place indicator, the caret is treated as a numeric symbol.

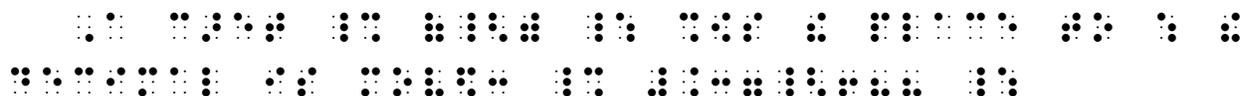
➤ .37<sup>^</sup>688      

The caret was also encountered in Lesson 12, as a modifier.

➤  $\hat{k}$       

#### Example 13-1

A caret ( $\wedge$ ) shows the place to which the decimal is moved: .37<sup>^</sup>688



- Use of the UEB Caret.** The caret may be transcribed more than one way within a document. The distinction is based on meaning. In mathematical context, use the Nemeth caret. In nontechnical context, use the UEB caret  to indicate the insertion of literary material, or the UEB circumflex  to indicate a modified letter or accent. In UEB context, follow UEB rules for spacing of the caret or circumflex symbol.



$$\begin{aligned} &\gg \frac{\partial f}{\partial x} \\ &\gg \partial/\partial y(\partial b/\partial x) \\ &\gg \frac{\partial h}{\partial u} = \frac{\partial f}{\partial x} \frac{\partial x}{\partial u} \end{aligned}$$

*Example 13-3*

**Geometry** The partial derivative of  $V$  with respect to  $r$  is  $\frac{\partial V}{\partial r} = \frac{2\pi r h}{3}$ .

$$\frac{\partial V}{\partial r} = \frac{2\pi r h}{3}$$

13.1.5 **Empty Set (null set, void set)**

The print symbols  $\emptyset$  and  $\Phi$  used to denote the empty set must not be mistaken for the Greek uncapitalized phi ( $\varphi$  or  $\phi$ ) which they resemble. When facing braces are used to denote the empty set, one space is left between the braces.

$\emptyset$	Empty Set (null set, void set)	$\emptyset$ or $\Phi$
	Represented by Zero with a Slanted or Vertical Bar through it	
$\{ \}$	Empty Set Represented by Facing Braces	$\{ \}$

$$\begin{aligned} &\gg A \cap \emptyset = \emptyset \\ &\gg \emptyset \subseteq A \\ &\gg S \cup \{ \} \end{aligned}$$

*Example 13-4*

The solution set  $\emptyset$  is written  $R = \emptyset$  or  $R = \{ \}$ .

$$R = \emptyset \text{ or } R = \{ \}$$





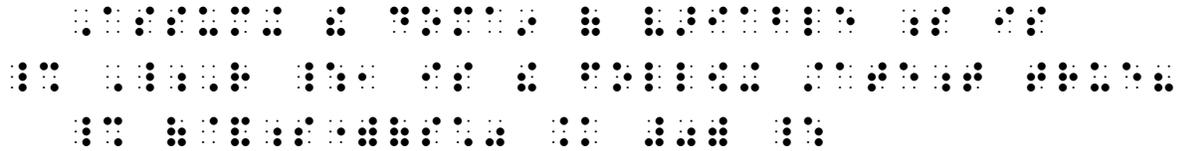




Example 13-8

Assuming the domain of variable  $s$  is  $\mathbb{R}$ , is the following statement true?

$$(\forall_s)(s \cdot 0 = 0)$$



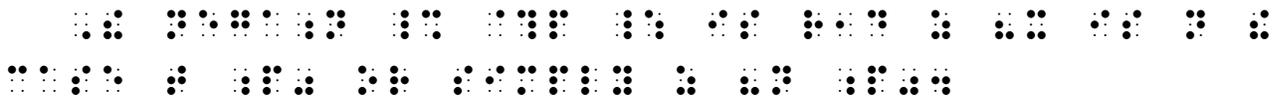
13.1.10 **Transcriber-Devised Symbols.** When a symbol is encountered that is not represented in the Nemeth Code, the transcriber may substitute another symbol as long as it is not being used with another meaning within the same subject matter. Another option is to invent a symbol for temporary use. A transcriber-devised symbol should be constructed in keeping with usage and according to the general rules of the Nemeth Code. In either case, the symbol must be explained in a transcriber's note.

- a. **"Not-p".** One example of a symbol that is not represented in the Nemeth Code is the negation sign  $\neg$  which is commonly used in the topic of logic. Since this particular print sign is not listed in the Nemeth Code, the transcriber must devise one. A little research reveals that UEB has a braille symbol for this print sign. Although UEB symbols cannot be used inside the Nemeth switches, it can be used here as a transcriber-devised Nemeth symbol. Checking Appendix B of the Nemeth Code, we find that this dot configuration has no other meaning in Nemeth. Sample transcriber's note:

The symbol  $\neg$  represents the negation symbol, which is printed as a small horizontal bar with a down-pointing end.

Example 13-9

The negation  $\neg p$  is read as "it is not the case that  $p$ " or simply as "not  $p$ ".



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## PRACTICE 13A

### Unspaced Miscellaneous Symbols

1.2<sub>^</sub>

$(v > \phi \hbar)$

R: 24 grams

$\|\nabla f(a)\|$

$\frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y}$

$\{ \} \cap \{ \}$

$\binom{n}{r} = \frac{n!}{(n-r)!r!}$

$-\infty < x < \infty$

$f'(x) = 0$  or  $\infty$

$\int_a^b f(x) dx = F(x) \Big|_a^b$

$\int_{x=a}^{x=b} f(t) dt$

$(\exists x)(\exists y)[x + y = 85]$

$\exists |x$

$\forall_x \in A$

---





### 13.2.5 Therefore

Therefore		
⋮⋮	Normal	∴
⋮⋮⋮	Negated (it does not follow that)	∴

- ∴ CM ⊥ AB    ⋮⋮    ⋮⋮⋮⋮    ⋮⋮    ⋮⋮⋮⋮
- ∴ R = S    ⋮⋮⋮    ⋮⋮    ⋮⋮    ⋮⋮

Example 13-12

∴ the solution set is {±3}.

⋮⋮    ⋮⋮    ⋮⋮    ⋮    ⋮⋮⋮⋮⋮⋮⋮    ⋮⋮⋮    ⋮⋮    ⋮⋮    ⋮⋮⋮⋮⋮⋮⋮⋮⋮    ⋮⋮⋮

### PRACTICE 13B

#### Spaced Miscellaneous Symbols

1. Su bought 25 boxes of tissue for her classroom. Priced @99¢, can she pay with only one \$20 bill?

$$25 \times \$0.99 = \$24.75$$

$$\checkmark \$24.75 > \$20$$

*Answer:* No. Su needs more than \$20 to buy the tissues.

2. ∴  $8x + 3y = 15$ , substituting 0 for x gives  $8(0) + 3y = 15$ , or  $3y = 15$ . ∴  $y = 5$ .







## ***SUPERPOSED SIGNS***

### **13.5 Definition and Analysis**

Superposed signs are signs which are printed one upon another so that one sign extends beyond the boundary of the other. Contrast this with "shapes with interior modification" presented in Lesson 11, where one symbol is printed inside the boundaries of the other. Here are some examples of superposed signs.

$\oint$        $\subset$        $\Rightarrow$        $\ll$        $\sphericalangle$

In order to transcribe a superposed sign, the basic sign and the superposed sign need to be determined because the basic sign is transcribed first. The following order of preference is used as a guide. A symbol lower on the list is regarded as being superposed upon a symbol higher on the list.

Integral sign  
Signs of operation  
Horizontal and vertical bars  
Signs of shape  
Signs of comparison  
Signs not listed above

Here is an analysis the first three print examples shown above.

- $\oint$  The basic sign is an integral sign; the superposed sign is a sign of shape (circle).
- $\subset$  The basic sign is a sign of operation (dot); the superposed sign is a sign of comparison (inclusion).
- $\Rightarrow$  The basic sign is a vertical bar; the superposed sign is a sign of comparison (arrow).

If two signs belong to the same category, the superposition may be represented in either order, provided the same order is followed consistently throughout the transcription. Here is an analysis the last two print examples shown above.

- $\ll$  Both signs belong to the same category – signs of comparison (nested "less than" signs).
- $\sphericalangle$  Both signs belong to the same category – signs of shape (an angle and an arc).



13.6.3 **Horizontal and Vertical Bars Modified by Superposition.** The most common symbols are shown below. Unlisted bars modified by superposition are transcribed in accordance with the rules for superposed signs.

⠠⠠⠠⠠⠠⠠	Horizontal Bar through inclusion sign	⊔
⠠⠠⠠⠠⠠⠠	Horizontal Bar through reverse inclusion sign	⊓
⠠⠠⠠⠠⠠⠠	Vertical Bar through shaft of right-pointing arrow	➔
⠠⠠⠠⠠⠠⠠	Vertical Bar through shaft of left-pointing arrow	➔

➤ ⊖ ⠠⠠⠠⠠⠠⠠

*"Horizontal bar" is higher on the list than a sign of shape (the circle).*

13.6.4 **Signs of Shape Modified by Superposition**

➤ ⚡ ⠠⠠⠠⠠⠠⠠

*"Triangle" is a sign of shape, which is higher on the list than "perpendicular to," which is a sign of comparison.*

When both signs are signs of shape, the superposition may be represented in either order, provided the same order is followed consistently throughout the transcription.

➤ ⚡ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠

*This arc shape extends beyond the boundary of the angle shape, making this a shape modified by superposition. Compare this symbol to the "angle with interior arc" (Lesson 11) which has a different braille form.*

When the print copy uses an "angle with interior arc" symbol throughout the text to simply mean "angle", the two-cell angle symbol may be used: ⠠⠠. A transcriber's note is required to inform the reader of the substitution. Sample note on the Transcriber's Notes page: "In print, the angle shape image includes an interior arc."

Signs of shape modified by superposition are spaced and punctuated as other signs of shape. (See Lesson 11).

13.6.5 **Two Signs of Comparison Modified by Superposition.** When both signs are signs of comparison, the superposition may be represented in either order, provided the same order is followed consistently throughout the transcription. Spacing and punctuation follow the same rules as for any other sign of comparison.

Equals Sign Through Inclusion Sign		
		$\equiv\subseteq$
or		
Equals Sign Through Reverse Inclusion Sign		
		$\equiv\supseteq$
or		
Nested Greater Than Signs (means "is large compared with")		
		with straight sides $\gg$
		with curved sides $\ggg$
Nested Less Than Signs (means "is small compared with")		
		with straight sides $\ll$
		with curved sides $\lll$

13.6.6 **Negated Symbols and Tally Marks.** Negated symbols are not transcribed as superposed signs. As seen in Lessons 5 and 11, as well as in Section [13.2.5](#), negated symbols simply include dots 34 in their construction. Also, the print method of showing a group of five tally marks as a long diagonal stroke superposed on four vertical strokes does not follow the Nemeth rules for superposed signs, as shown in Section 13.4 above.

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*Instructions:* See Lesson 11 to review shapes with interior modification, and Lessons 5, 11, and 13 regarding negated symbols.

### PRACTICE 13D

<u>Superposed Signs</u>	<u>Interior Modification</u>	<u>Negated Relations</u>
$\phi$	$\odot$	$\therefore$
$\psi$	$\square\cdot$	$\neq$
$\ominus$	$\ominus$	$\nparallel$
$\angle C$	$\sphericalangle$	$\nless$
$5 \ll y$	$\sphericalangle_{45^\circ}$	$\notin$
$R \ni s$	$\textcircled{13}$	$\neq$
$Q \leftrightarrow R$	$\star$	$\dagger$

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13.7.1 **Vertical Bar and Colon.** The symbols that give transcribers the most trouble due to their ambiguity are the vertical bar and the colon. The vertical bar can be a grouping sign, an operation sign, a comparison sign, or an “end of proof” symbol. The colon can be a ratio symbol or a punctuation mark. You need to recognize the meaning of the sign in order to transcribe the proper symbol.

- ⋮ Vertical bar used as a sign of grouping, or as a sign of operation meaning "is a factor of", or as a sign of comparison meaning "such that" or "given"
- ⋮ ⋮ Colon used as a ratio symbol
- ⋮ Colon used in digital time, or meaning "is to", or meaning "such that", or used in mapping notation, or used as sentence punctuation. Preceded by a punctuation indicator when unspaced.
- ⋮ ⋮ ⋮ ⋮ ⋮ Boldface vertical bar as an “end of proof” icon.

13.7.2 **Spacing.** Some signs use the same braille symbol but have different spacing rules depending on their meaning. You can't depend upon the print copy to show the spacing according to Nemeth rules so you need to recognize the meaning of the sign in order to apply proper spacing. Generally speaking, signs of comparison are spaced; signs of operation are unspaced; punctuation marks are followed by a space but not preceded by a space; signs of grouping are preceded by a space (opening) or followed by a space (closing).

- | Is the vertical bar a grouping sign, an operation sign, or a comparison sign?
- ~ Is the tilde an operation sign ("not") or is it a comparison sign ("is related to" or "is similar to")?
- ' Is this an apostrophe or single quotation mark (a punctuation mark) or is it a math symbol (prime sign)?
- / Is the slash mathematical (meaning "per", "over", or "divided by") or is it a UEB solidus?
- : Are the two vertical dots a ratio symbol (a sign of comparison) or are they a punctuation mark?

13.7.3 **Capital Greek Letters.** Some capital Greek letters are indistinguishable from English letters. Unless the text identifies the letter as Greek, you can safely assume it is an English letter.

13.7.4 **Chemical Notation.** Some signs have yet another meaning in chemical notation. For example, the following symbols can be certain types of chemical bonds.

= || ≡ — | / \ · : ::

Details can be found in *Chemical Notation Using the Nemeth Braille Code*.

## MULTIPURPOSE INDICATOR

$\cdot\cdot$ Multipurpose Indicator
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### 13.8 Review

In addition to being a baseline indicator, dot 5 assumes several other functions in the Nemeth Code. Dot 5 is called the *multipurpose indicator* in the following situations which have been discussed previously.

- A multipurpose indicator is used between two unspaced signs to indicate that they are printed horizontally.
  - side-by-side plus and minus signs. See Section 5.2.
  - side-by-side tildes. See Section 5.4.9.b.
  - side-by-side signs of comparison. See Section 5.9.
  - a number printed on the baseline to the right of a letter. See Section 6.11.1.c.
  - consecutive superscripts and subscripts. See Section 6.16.
  - side-by-side arrows. See Section 9.12.
  - side-by-side modifiers within a sign of shape. See Section 11.17.
- A multipurpose indicator is used between a regular polygon representing a sign of operation and a numeral immediately following it. See Section 11.29.
- A multipurpose indicator begins a modified expression. See Section 12.2.
- A multipurpose indicator is placed between a tally mark and a following punctuation indicator to avoid misreading the similar symbols. See Section 13.4.c.

### 13.9 Additional Uses of the Multipurpose Indicator

13.9.1 **Letter Followed by a Decimal Point and a Numeral.** When a letter on the baseline of writing is immediately followed by a decimal point and a numeral, a multipurpose indicator is placed between the letter and the decimal point to show that the decimal point and numeral are not subscripts to the letter.

➤ x.4     $\cdot\cdot$   $\cdot\cdot$   $\cdot\cdot$   $\cdot\cdot$

13.9.2 **Numeric Subscript Followed by a Numeral.** A multipurpose indicator is used after a numeric subscript if the subscript is followed by a numeral on the baseline of writing.

➤  $x_7$ 10     $\cdot\cdot$   $\cdot\cdot$   $\cdot\cdot$   $\cdot\cdot$   $\cdot\cdot$



## REFERENCE SIGNS AND SYMBOLS

### 13.10 Reference Signs and Symbols

Reference signs are used in both literary and technical context. Within UEB context, UEB symbols are transcribed. Within Nemeth context, the Nemeth symbols shown below are transcribed.

- 13.10.1 **Asterisk, Daggers, Star, and Icons.** We have seen these symbols being used elsewhere, in other contexts. The asterisk and the daggers were introduced in Lesson 5 as operation signs; the star was introduced in Lesson 11 as a sign of shape. When these signs are used as reference markers within Nemeth context, the familiar symbols are transcribed.

When a reference sign occurs for which no provision exists in the Nemeth Code such as pictures and icons, the transcriber devises a suitable symbol with an explanatory transcriber's note or a listing in the Special Symbols list. Icons were discussed in Lesson 11.

⠠⠠⠠⠠	Asterisk	*
⠠⠠⠠⠠⠠	Single Dagger	†
⠠⠠⠠⠠⠠⠠	Double Dagger	‡
⠠⠠⠠⠠⠠	Star	☆

- 13.10.2 **Numerals or Letters.** When reference to a footnote is denoted by a number or a letter, the general reference indicator is used. The number or letter immediately follows the indicator. A numeric indicator or English-letter indicator is required.

⠠⠠⠠	General Reference Indicator
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- 13.10.3 **Layout and Spacing.** Reference signs are often printed in the superscript position, unspaced from the referenced item. In braille, the superscript position is ignored and the reference symbol is spaced away from the word, letter, or number to which it applies. If there is a punctuation mark associated with a reference symbol, no space is left between them. Follow print as to the left-to-right order of reference sign, item being referenced, and punctuation.

Assume that Nemeth continues following each of the examples, below.

*Reference sign is printed before the item*

➤ \*6.3      ⠠⠠⠠    ⠠⠠⠠⠠⠠⠠

➤ †2.6      ⠠⠠⠠    ⠠⠠⠠⠠⠠⠠

*Reference sign is printed after the item*

➤ 6.3\*      ⠠⠠⠠⠠⠠⠠    ⠠⠠⠠





*Instructions:* Explain the function of the multipurpose indicator in each example. Then transcribe the text after the last example. Assume that the equation is the last item on the print page, before the footnote.

### PRACTICE 13E

1.  $x^3, R_{10}$
2.  $120^\circ + n320^\circ$
3.  $C = \pi 2r$
4.  $\omega 2 = \omega \neq 2\omega$
5.  $140te4t5_{12} + e5_{12}$
6.  $\frac{A_0}{2} = A_0 2^{-0.05T}$
7.  $x_2 = n_1 5^{-1} - 1n_2 5^{-1}$
8.  $0. \alpha_1 \alpha_2 \alpha_3 \dots \alpha_n$
9.  $.\%$
10.  $4\% = .\underline{\hspace{1cm}}$
11.  $5. +.6 = 5.6$
12.  $\|x\| \|y\|$
13.  $\| |x| \|$

### Finding an Equation for a Sinusoidal Graph

Figure 47 can be viewed as the graph of a sine function with amplitude  $A = 5^*$ , where  $T = 4$ .

\* The equation could also be viewed as a cosine function with a horizontal shift.

*For further practice, see Appendix A—Reading Practice.*

### **EXERCISE 13**

Prepare Exercise 13 for your grader.





### PRACTICE 13D

1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

*Guide dots are not used because the items are not related across the rows.*

### PRACTICE 13E

1. A multipurpose indicator is used when a letter is followed by a numeral and they are both on the baseline of writing.
2. The first dot 5 is a baseline indicator because the plus sign is on the baseline and it follows a raised hollow dot. The second dot 5 is a multipurpose indicator which is needed to show that the numeral "3" is not a subscript to the letter "n".
3. The same rule applies to letters in any alphabet – a multipurpose indicator is needed to show that the numeral "2" is not a subscript to the Greek letter pi.
4. Same as #3 regarding Greek letter omega followed by numeral "2" in " $\omega^2$ ". Note that a multipurpose indicator is not needed for a letter following a numeral, as in " $2\omega$ ".
5. A baseline indicator precedes the plus sign, following the subscript "12". (The multipurpose indicator is not used following the "t" and "e" because they represent numerals in base 12.)
6. A multipurpose indicator is needed after the second numeric subscript "0" because the subscript is followed by a numeral on the baseline of writing (" $2^0$ ").

