

**AN INTRODUCTION TO  
BRAILLE MATHEMATICS  
USING NEMETH CODE WITHIN  
UEB CONTEXTS  
A Course for Transcribers**

*Provisional Online Edition 2017*

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I believe that I could not have reached my potential in mathematics without the Nemeth Code. With it, I am able to read and write mathematics, as well as other sciences, at all levels, limited only by my talent and my ambition.

—Dr. Abraham Nemeth, creator of the braille code for  
mathematics and science notation

## DEDICATION

I credit my interest in the continued training of braille transcribers in the Nemeth Code to my friend and mentor, Helen Hay, whose fascination and enthusiasm about this braille code was contagious. —Lindy Walton

## THANKS

I offer my gratitude to the original authors of this lesson manual, Helen Roberts, Bernard M. Krebs, and Barbara Taffet, for their insight into the learning process and for their eye for detail. Many of the excellent examples from the original book are preserved in this edition. I also wish to thank my supervisors and colleagues in the Madison Metropolitan School District for realizing the importance of the development of this curriculum. —Lindy Walton

## ABOUT THE PROVISIONAL ONLINE EDITION

Due to the need to make this training manual available to transcribers as soon as possible, we are offering a provisional version of the lessons in downloadable electronic format before being completely field tested and while BANA is revising the Nemeth Code. Exercises at the end of each lesson will not be available until a path toward certification is established. You may proceed through the course as each lesson is released with the understanding that certain details are still under construction and that some rules may change. A certification exam will not be available until the revised Nemeth Code is released. To apply for the exam, you must have turned in passing transcriptions of each of the yet-to-be-released lesson exercises.

We encourage you to contact us to report errors or to comment on topics that are unclear. As a result of user feedback, you can expect changes to appear in the online edition. All changes will be documented. A running list will be maintained and will be posted on [www.nfb.org/transcribers](http://www.nfb.org/transcribers).

Once a final version is approved, this lesson book will also be available in printed form.

To contact us by e-mail, send your message to [transcribers@nfb.org](mailto:transcribers@nfb.org).

## FOREWORD TO THE 2017 EDITION

The first edition of the *Introduction to Braille Mathematics* was published in 1978 and was written by the late Helen Roberts and Bernard M. Krebs. It was my privilege to complete the text with Mr. Krebs after Helen passed away. Since that time, numerous corrections and updates have been made both to the Nemeth Code itself and to this manual. Now, however, a major change has necessitated a complete re-writing of the lessons. 2016 was the implementation year in the United States for new transcriptions to be produced using the Unified English Braille Code. Because Nemeth Code works *within* UEB, many of the rules of Nemeth Code must be modified.

After the first lesson most examples, practices, and exercises are shown in a text-like context. In this way, the student can see how the Nemeth Code works in a real setting such as found in texts of many grade levels and complexities.

The practices within each lesson are available for self-checking by the student. Answers to the practices are given at the end of each lesson. Braille reading practice will soon be offered in Appendix A. In the future, each lesson will conclude with an exercise which will be graded and evaluated by your teacher or by your NFB-assigned grader.

The braille examples are written on a 38-cell line in the lesson manual to allow for a reasonable margin on the given page size. However, the student should use the standard 40-cell line when transcribing the practices and exercises.

The student should understand that the Nemeth Code itself is the authoritative source for all mathematics transcriptions. The student should also be thoroughly familiar with the sourcebooks listed in the PREREQUISITES which follow this Foreword.

It has long been my hope that this manual could be brought into the present era. Lindy Walton, an experienced transcriber who works with the NLS Nemeth certification program, led the writing of this Second Edition. Once again, it is my honor to work with an exceptional member of the braille transcriber community.

Both Lindy and I thank the following for their support and help: Mary Denault, Peggy Jackson, Bill Jackson, Kyle Dejute, Julie Sumwalt, Lynnette Taylor, the members of the BANA Nemeth Code Technical Committee, and the Grafton Braille Service Center. We would also like to thank the National Federation of the Blind which has lent support to the development and publication of this comprehensive manual.

**Barbara Taffet**

## PREREQUISITES

A prerequisite to the study of the Nemeth Code within UEB context is certification in Unified English Braille, adequate experience in literary braille transcription, and confidence in your production method. Before beginning this course of study the student should also be thoroughly familiar with current methods for transcribing a textbook. Rules and guidelines are found in the following sourcebooks, all of which are available from the Braille Authority of North America (BANA) at [www.brailleauthority.org](http://www.brailleauthority.org). Dates shown below are the editions used as a resource in this lesson manual.

*The Rules of Unified English Braille, Second Edition 2013*

*Guidance for Transcription Using the Nemeth Code within UEB Contexts, 2016*

*Braille Formats: Principles of Print-to-Braille Transcription, 2016*

*The Nemeth Braille Code for Mathematics and Science Notation, 1972 Revision,  
2007-2015 Updates*

*Guidelines and Standards for Tactile Graphics, 2010*

*Braille Code for Chemical Notation 1997*

## STUDY TIPS

### HOW TO BECOME AN EXCELLENT NEMETH BRAILLE TRANSCRIBER

Don't race through the lesson material.

- Read carefully and deliberately as the narrative is compact and the language is exact.
- Study the examples and understand the point being made with each one but do not rely on the examples alone for an understanding of the rules. Braille the examples to reinforce the rule.
- Do the practice drills. Proofread them before checking the answers. See more tips below.
- Try back-translating the braille examples and practices without looking at the print.
- Take special note of rules regarding spacing, punctuation, abbreviations, and format.
- Make lists to help you remember differences between Nemeth and UEB rules.
- Don't be afraid to underline, highlight, or write notes in the margins of your lesson manual.

If the braille or the print doesn't make sense to you ...

- Compare new information to similar topics learned in previous lessons.
- Some of the lesson material is grouped in "use of" and "nonuse of." Compare them and look closely at the braille examples.

### THE PRACTICE MATERIAL

- Slow down. By using 6-key entry instead of a translator you will better understand the braille from the reader's point of view.
- Compare your braille to the answers to the practice material found at the end of each lesson. Read each cell closely.
- At the end of each line, look at the braille cell in the line above and in the line below and compare it to the answer key. Any misalignment indicates an error on that line.
- When you identify your errors, return to the lesson to review the applicable rule.

### PREPARING THE EXERCISE FOR GRADING

- Don't try to copy braille examples that look like the exercise material – understand and apply the rule.
- Don't guess. Don't rely on the proofreader's report to find your mistakes.
- Proofread carefully before turning in for grading. Your knowledge and understanding of the Nemeth Code will improve dramatically if you proofread from an embossed copy or from a simulated braille (print) copy, without looking at the print.
- Make note of items you are unsure of. If your transcription is correct, look these items over again after receiving your report to reinforce the rule.

## **RESEARCH/REVIEW**

- Analyze the mistakes found in your exercise and make sure you understand your errors before moving ahead to the next lesson. Ask questions until you are sure of the rule.
- Return to earlier lessons. Topics will make more sense to you in retrospect.
- Read the index. Terminology used there will help you understand the language of Nemeth braille.
- Review format rules learned in earlier lessons. Study the examples.
- Go back to an earlier lesson exercise and back-translate the practices or your braille exercise by writing in longhand. Don't look at the print copy until you are finished. Giving yourself some distance from the lesson material is a good review strategy.
- In later lessons, research the topic in the Nemeth Code in addition to studying the lesson book. Not only will this enrich your understanding of the current subject, you will also review material already learned in a new context.

## **PROOFREADING TIPS**

Accuracy is crucially important in technical work. Your proofreading skills will be challenged.

- Is your lighting adequate?
- Use a magnifier when print is questionable.
- Use a straightedge when levels are in question.
- Take breaks when your concentration wanes. Then go back a few pages when resuming proofreading.
- Read the braille dots. Compare often to the print copy.
- Vary your reading medium -- don't always proofread from the screen or from simulated braille or from embossed braille.

## **BRAILLE TRANSLATION SOFTWARE**

Many students of the Nemeth Code have been braille for years and have thousands of pages of braille to their credit. They also have been taking advantage of the many electronic input and proofreading aids available to transcribers and are quite adept at turning out high quality work. We expect you are one of those transcribers.

You are undertaking a serious study of one of the technical braille codes, and we would like you to consider stepping back a bit and learning the old fashioned way, using 6-key entry in your braille software program. It is our experience that the best braille transcribers are those that can read and write braille as the 6-dot code that it is, not solely reading a back translation or a source file and not using another input code to 'type' math problems. Using proofreading and production aids for more accurate and faster work is certainly something you will continue to use – it is important that you understand how your particular software and translation tools work in Nemeth mode – but we are convinced you will understand the Code better if you take the 6-key approach while learning.

Best of luck to you!



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#### 9.12 Terminology

#### 9.13 The Termination Indicator

#### 9.14 Spacing

#### 9.15 Index of Radical

*Practice 9F*

#### 9.16 Nested Radical Expressions

##### 9.16.1 Nested Radical Expression with an Index

- 9.17 Radical Expressions and the Baseline Indicator
- 9.18 Radical Expressions and the Ellipsis and Long Dash
- 9.19 Radical Expressions and Abbreviations
- 9.20 Enclosed Lists with Radical Expressions

*Practice 9G*

*LINKED EXPRESSIONS*

- 9.21 Definition of Linked Expression
- 9.22 Division of Linked Expressions
  - 9.22.1 Restrictions
  - 9.22.2 Other Considerations
- 9.23 *Special Case: Certain Displayed Linked Expressions*

*Practice 9H*

*Format: Margin Requirements for a Linked Expression Requiring Special Margins*

- 9.23.1 In Narrative
- 9.23.2 In Itemized Text Without Subdivisions
- 9.23.3 In Itemized Text With Subdivisions

*Practice 9I*

*Answers to Practice Material*

**Lesson 10**

*ARROWS*

- 10.1 Arrows Used in Mathematics

*Construction of Braille Arrows*

- 10.2 Introduction to the Shape Indicator
- 10.3 Horizontal Arrow Shafts
- 10.4 Arrowheads
  - 10.4.1 Barbed Arrowheads
- 10.5 Arrows With Barbed Ends
- 10.6 Spacing and Punctuation with Arrows
- 10.7 The Contracted Form of the Right-Pointing Arrow
  - 10.7.1 Nonuse of the Contracted Form

of the Right-Pointing Arrow

*Practice 10A*

- 10.8 Arrows With Dotted Ends
- 10.9 Arrows With Other Types of Arrowheads

*Practice 10B*

*Vertical, Slanted, and Curved Arrow Shafts*

- 10.10 Arrow Direction Indicators
  - 10.10.1 Vertical Arrow Directions
  - 10.10.2 Slanted Arrow Directions

- 10.11 Curved Arrows

*Practice 10C*

*Boldface and Compounded Arrows*

- 10.12 Boldface Arrows
- 10.13 Arrows Used as Signs of Comparison Compounded Vertically

- 10.14 Arrows Used as Signs of Comparison  
    Compounded Horizontally
- 10.15 Other Arrows

*Practice 10D*

*INTRODUCTION TO SPATIAL ARRANGEMENTS*

- 10.16 Background

*Spatial Arrangements with Addition and Subtraction*

- 10.17 Numeric Indicator
- 10.18 Separation Line
- 10.19 Alignment with Addition and Subtraction
- 10.20 Placement of Symbols
  - 10.20.1 Operation Symbols
  - 10.20.2 Currency Symbols
- 10.21 Side-by-Side Layout
  - 10.20.1 Page Number Restriction

*Practice 10E*

- 10.22 Blank Lines
- 10.23 Omissions in Work Arranged Spatially for Computation
- 10.24 Polynomials
- 10.25 Abbreviations
- 10.26 Fractions
- 10.27 Placement of Identifiers
  - 10.27.1 Side-by-Side Arrangement
  - 10.27.2 Page Number Restriction
- 10.28 Carried Numbers with Addition
  - 10.28.1 Placement of Identifiers with Carried Numbers

*Practice 10F*

*Introduction to Cancellation*

- 10.29 Cancellation in Subtraction Problems
  - 10.29.1 Placement of Identifiers with Spatial Subtraction

*Practice 10G*

*Arrangement on the Page*

- 10.30 Blank Lines and the Page Change Indicator
- 10.31 Pagination and Blank Lines
  - 10.31.1 Starting a Braille Page with a Spatial Arrangement
  - 10.31.2 Ending a Braille Page with a Spatial Arrangement
- 10.32 Wide Arrangements
- 10.33 Itemized Spatial Problems with Subdivisions

*Placement of Code Switch Indicators*

- 10.34 Opening Nemeth Code Indicator
- 10.35 Nemeth Code Terminator
- 10.36 Braille Page Turn
- 10.37 Instructions Preceding Itemized Spatial Arrangements
- 10.38 Displayed Spatial Arrangements

*Answers to Practice Material*

## Lesson 11

### *SIGNS OF SHAPE*

#### 11.1 Definition

#### *Basic Shapes*

#### 11.2 Basic Signs of Shape Represented by Numbers—Regular Polygons

##### 11.2.1 Unlisted Regular Polygons

#### 11.3 Basic Signs of Shape Represented by Letters—Irregular Polygons

##### 11.3.1 Unlisted Irregular Polygons

#### 11.4 Other Basic Signs of Shape Represented by Letters

##### 11.4.1 Other Unlisted Basic Shapes

#### 11.5 Basic Signs of Shape Represented by Other Dot Combinations

#### 11.6 Filled-In and Shaded Shapes

*Practice 11A*

#### *Shapes with Structural Modification*

#### 11.7 Definition and Construction

#### 11.8 Structurally Modified Triangles

#### 11.9 Structurally Modified Angles

#### 11.10 Unlisted Shapes with Structural Modification

*Practice 11B*

#### *Shapes with Interior Modification*

#### 11.11 Definition and Construction

#### 11.12 Circles with Interior Modification

#### 11.13 Angles with Interior Modification

#### 11.14 Rectangles and Squares with Interior Modification

#### 11.15 Words Enclosed in Shapes

#### 11.16 Two or More Vertically Arranged Modifiers

#### 11.17 Two or More Horizontally Arranged Modifiers

#### 11.18 Unlisted Shapes with Interior Modification

*Practice 11C*

#### *Other Details*

#### 11.19 Spacing with Signs of Shape

#### 11.20 Punctuation with Signs of Shape

#### 11.21 Plurals/Possessives

#### 11.22 Further Considerations Regarding Transcriber-Devised Shapes

##### 11.22.1 Usage Rules Regarding Interior Numerals and Arrows

##### 11.22.2 Shapes Represented by Drawing

*Practice 11D*

#### *Calculators and Keyboards*

#### 11.23 The Keystroke Indicator

##### 11.23.1 Shape in Print

#### 11.24 Other Details Concerning Keystrokes

##### 11.24.1 The Label

##### 11.24.2 Spacing

#### 11.25 Long Keystroke Constructions

#### *Icons*

#### 11.26 Consistency in Representation of Icons

*Shapes Used as Signs of Omission*

- 11.27 Spacing
- 11.28 The English Letter Indicator and Comparison Signs
- 11.29 Use of the Multipurpose Indicator
- 11.30 Omissions in Spatially-Arranged Problems

*Practice 11E*

*Identified Signs of Shape*

- 11.31 Spacing
  - 11.31.1 Keep Together
  - 11.31.2 Surrounding Symbols
- 11.32 A Shape Within a Superscript or a Subscript
- 11.33 A Shape Which Carries a Superscript or a Subscript
- 11.34 The English Letter Indicator
  - 11.34.1 The Letter "m"
- 11.35 Use of the Numeric Indicator in an Enclosed List

*Practice 11F*

*LABELED FORMATS, cont.*

*Displayed Material with Labels*

- 11.36 Recognition
  - 11.36.1 Braille Layout
  - 11.36.2 Transcriber's Note Required
- 11.37 Page Number Citation

*Practice 11G*

*TYPEFORMS, cont.*

*Labeled Mathematical Statements*

- 11.38 Recognition of a Labeled Mathematical Statement
  - 11.38.1 The Label
  - 11.38.2 The Statement
  - 11.38.3 Spacing and Margins
- 11.39 Significant Typeface

*Practice 11H*

*Typeform Indicators for Mathematical Words and Phrases*

- 11.40 Italic and Boldface Typeform Indicators
  - 11.40.1 One Word in Italics or Boldface
  - 11.40.2 A Phrase in Italics or Boldface
- 11.41 Code Switching Within an Emphasized Passage
- 11.42 Revisiting Typeform in Labeled Statements

*Practice 11I*

*Answers to Practice Material*

## **Lesson 12**

*MODIFIERS AND MODIFIED EXPRESSIONS*

- 12.1 Definition
- 12.2 Construction of Simple Modified Expressions – The Five-Step Rule

*Common Modifiers*

- 12.3 Arrows as Modifiers

<i>Special Situations Involving Arrows</i>	
12.3.1	When to Omit Arrows
12.3.2	When the Arrow is Being Modified
12.3.3	When Other Rules Apply
	<i>Practice 12A</i>
12.4	Carets as Modifiers
12.5	Horizontal Bar as a Modifier
12.5.1	The Contracted Form of Bar Over/Bar Under
12.5.1.a	Bar Above
12.5.1.b	Bar Below
	<i>Practice 12B</i>
12.6	Other Symbols as Modifiers
12.6.1	Dot
12.6.2	Arc
12.6.3	Tilde
12.6.4	Question Mark
12.7	Expressions as Modifiers
12.7.1	Binomial Coefficient
	<i>Practice 12C</i>
12.8	Spacing with Modified Expressions
	<i>Practice 12D</i>
<i>Modified Expressions and Superscripts/Subscripts</i>	
12.9	Modified Expression on the Baseline
12.9.1	Superscript/Subscript After the Modification
12.9.2	Superscript/Subscript Within the Modification
12.9.3	Binomial Coefficient
	<i>Practice 12E</i>
12.9.4	Modified Expression on the Baseline That <u>Follows</u> a Superscript or a Subscript
12.10	Modified Expression <u>Within</u> a Superscript or Subscript
	<i>Practice 12F</i>
12.11	Horizontal Grouping Signs as Modifiers
<i>Modified Signs of Comparison</i>	
12.12	Definition
12.13	Transcription
	<i>Practice 12G</i>
<i>Expressions with More Than One Modifier</i>	
12.14	Modifiers of Higher Order
12.14.1	Parallel Horizontal Bars
12.15	Individual Modifiers
12.16	Simultaneous Modifiers
	<i>Practice 12H</i>
<i>Format: FORMAL PROOF</i>	
12.17	Definition
12.17.1	Spacing and Margins
12.17.2	Auxiliary Captions
12.17.3	Step-Number Format
	<i>Practice 12I</i>
	<i>Practice 12J</i>
<i>SPATIAL ARRANGEMENT WITH MULTIPLICATION</i>	
12.18	Alignment
12.19	Placement of Multiplication Symbol

- 12.20 Separation Line
- Alignment of Partial Products*
- 12.21 Partial Products
  - 12.21.1 Spacing *Practice 12K*
- 12.22 Omissions
- 12.23 Fractions and Mixed Numbers
- 12.24 Polynomials
- 12.25 Subscripts Denoting Nondecimal Bases
- 12.26 Carried Numbers with Multiplication
- 12.27 Placement of Identifiers with Spatial Multiplication *Practice 12L*

*Answers to Practice Material*

## **Lesson 13**

### *MISCELLANEOUS SYMBOLS*

#### *Unspaced Miscellaneous Symbols*

- 13.1 Spacing Rules for Unspaced Symbols
  - 13.1.1 Caret
    - 13.1.1.a Use of the UEB Caret
  - 13.1.2 Crossed Letters
  - 13.1.3 Del
  - 13.1.4 Derivative and Partial Derivative (round d)
  - 13.1.5 Empty Set (null set, void set)
  - 13.1.6 Factorial Sign
  - 13.1.7 Infinity
  - 13.1.8 Integral
    - 13.1.8.a Upper and Lower Integral Signs
  - 13.1.9 Quantifiers *Practice 13A*

#### *Spaced Miscellaneous Symbols*

- 13.2 Spacing Rules for Spaced Symbols
  - 13.2.1 "At" Sign in Mathematical Context
  - 13.2.2 Check Mark
  - 13.2.3 Ditto Marks
  - 13.2.4 Since (because)
  - 13.2.5 Therefore
  - 13.2.6 Boldface Vertical Bar (end of proof) *Practice 13B*

#### *Spacing with the Angstrom Unit and Tally Marks*

- 13.3 Angstrom Unit
  - 13.3.1 Punctuation
- 13.4 Tally Mark
  - 13.4.1 Grouping
  - 13.4.2 Spacing
  - 13.4.3 Punctuation *Practice 13C*



*SUPERPOSED SIGNS*

- 13.5 Definition and Analysis
- 13.6 Transcription of Superposed Signs
  - 13.6.1 Integral Modified by Superposition
  - 13.6.2 Signs of Operation Modified by Superposition
  - 13.6.3 Horizontal and Vertical Bars Modified by Superposition
  - 13.6.4 Signs of Shape Modified by Superposition
  - 13.6.5 Signs of Comparison Modified by Superposition
  - 13.6.6 Symbols That Are Not Superposed Signs

*Practice 13D*

*AMBIGUOUS SIGNS*

- 13.7 Context
  - 13.7.1 Vertical Bar and Colon
  - 13.7.2 Spacing
  - 13.7.3 Uppercase Greek Letters
  - 13.7.4 Chemical Notation

*Practice 13E*

*MULTIPURPOSE INDICATOR*

- 13.8 Review
- 13.9 Additional Uses of the Multipurpose Indicator
  - 13.9.1 Letter Followed by a Decimal Point and a Numeral
  - 13.9.2 Numeric Subscript Followed by a Numeral
  - 13.9.3 Decimal Point Followed by a Nonnumeric Character
  - 13.9.4 Side-by-Side Vertical Bars

*Practice 13F*

*DIVISION PROBLEMS*

- 13.10 Linear Representation

*Practice 13G*

*SPATIAL ARRANGEMENTS WITH DIVISION*

- 13.11 Notation Devices
  - 13.11.1 Length of the Separation Line
- 13.12 When a Spatial Arrangement is Required
  - 13.12.1 More Than Just Numerals
    - 13.12.1.a Spacing with Abbreviations
  - 13.12.2 A Quotient is Present
    - 13.12.2.a A Quotient with a Remainder
  - 13.12.3 Long Division
- 13.13 Blank Lines Required
- 13.14 Omissions
- 13.15 Carried Numbers in Long Division
- 13.16 Cancellation in Long Division
- 13.17 Placement of Identifiers with Spatial Division

*Practice 13H*

*Practice 13I*

*Answers to Practice Material*

## Lesson 14

### *FUNCTION NAMES AND THEIR ABBREVIATIONS*

- 14.1 Functions
  - 14.1.1 Code Switching
- 14.2 Spacing of Function Names
  - 14.2.1 Spacing with Signs of Operation
  - 14.2.2 Spacing with Indicators *Practice 14A*
- 14.3 Nonuse of the English Letter Indicator
- 14.4 Unabbreviated Function Names in Mathematical Context
- 14.5 Consecutive Function Names
  - 14.5.1 "Arc" in Context
    - 14.5.1.a Do Not Confuse
- 14.6 Punctuation
- 14.7 Keep Together
- 14.8 *Clarification*—Function Names in an Enclosed List *Practice 14B*
- 14.9 Function Names and Superscripts/Subscripts
  - 14.9.1 Use/Nonuse of the Subscript Indicator
  - 14.9.2 Function Names Within a Superscript or a Subscript *Practice 14C*
- 14.10 Modifiers with Function Names
  - 14.10.1 *Special Case*: Upper Limit and Lower Limit *Practice 14D*

### *Format: Division of Mathematical Expressions Between Braille Lines*

- 14.11 Review
- 14.12 The Concept of Logical Mathematical Units
  - 14.12.1 The Priority List
- 14.13 Priority #1—Before a Sign of Comparison
  - 14.13.1 Identifier May Stand Alone
  - 14.13.2 Logical Mathematical Units
- 14.14 Priority #2—Before a Sign of Operation
  - 14.14.1 Logical Mathematical Units *Practice 14E*
- 14.15 Priority #3—Before a Fraction Line
  - 14.15.1 Logical Mathematical Units
- 14.16 Priority #4—Before a Baseline Indicator
  - 14.16.1 Logical Mathematical Units *Practice 14F*
- 14.17 Priority #5—Before a Level Indicator
- 14.18 Priority #6—Between Grouped Factors
  - 14.18.1 Logical Mathematical Units
- 14.19 Priority #7—After a Termination Indicator *Practice 14G*
- 14.20 Application of this Rule to Special Linked Expressions
  - 14.20.1 Long Anchor
  - 14.20.2 Long Link *Practice 14H*
- 14.21 Margins for Embedded Expressions
- 14.22 Items That Must Not Be Divided

- 14.22.1 Symbols to Keep Together
- 14.22.2 Expressions to Keep Together

*Spatial Arrangements, cont.*

*SQUARE ROOT DIVISION*

- 14.23 Review of Terminology
- 14.24 Spatial Arrangement for Square Root Problems
- 14.25 Placement of Identifiers with Spatial Radical Expressions *Practice 14I*

*OTHER PRINT LAYOUTS SHOWING DIVISION*

- 14.26 Partial Quotients
- 14.27 Synthetic Division
  - 14.27.1 Alignment and Spacing
  - 14.27.2 Vertical Line
  - 14.27.3 Another Print Style—Divisor on the Right
  - 14.27.4 Another Print Style—Boxed Divisor
  - 14.27.5 Placement of Identifiers with Synthetic Division *Practice 14J*

*Answers to Practice Material*

## **Lesson 15**

*SPATIAL ARRANGEMENTS OF FRACTIONS*

- 15.1 Spatial Fraction Line
- 15.2 Numerator and Denominator
- 15.3 Placement of Identifiers with Spatially Arranged Fractions

*Situations Requiring Spatial Presentation*

- 15.4 Simple Fractions Arranged Spatially for Illustration *Practice 15A*
- 15.5 Cancellation Within Fractions
  - 15.5.1 Extent of Cancellation
  - 15.5.2 Cancellation and Level Indicators
  - 15.5.3 Canceled Abbreviations

- 15.6 Chemistry Exception *Practice 15B*

*HYPERCOMPLEX FRACTIONS*

- 15.7 Definition and Recognition
- 15.8 Hypercomplex Fraction Indicators
- 15.9 Higher Orders of Complexity *Practice 15C*

*CONTINUED FRACTIONS*

- 15.10 Definition and Recognition *Practice 15D*

*Format: REMARKS AND COMMENTS*

- 15.11 Guidelines
  - 15.11.1 OPTION #1—Continue the Commentary on the Same Line
  - 15.11.2 OPTION #2—Indent the Commentary on the Next Line *Practice 15E*

*Format: STEM-AND-LEAF PLOTS*

- 15.12 Definition and Recognition

- 15.13 The Table
- 15.14 The Key
- 15.15 Data Consisting of More Than One Character; Punctuation Between Entries
- 15.16 Alphabetic Data
  - 15.16.1 Alphabetic Key
- 15.17 Blank Entries
- 15.18 Runovers Within the Table
- 15.19 Back-To-Back Plot

*Practice 15F*

*Answers to Practice Material*

## **Lesson 16**

### *SYSTEMS OF EQUATIONS*

- 16.1 Definition and Recognition
- 16.2 Transcription Rules for Systems of Equations
- 16.3 Unified System of Equations and Enlarged Grouping Signs

*Practice 16A*

#### *Enlarged Signs of Grouping*

- 16.4 Transcription Rules for Enlarged Signs of Grouping
  - 16.4.1 Enlarged Left Brace
  - 16.4.2 Enlarged Right Brace
- 16.5 Embedded Vertical Groupings
- 16.6 Enlarged Parentheses
- 16.7 Placement of Symbols
- 16.8 Placement of Identifiers and Punctuation
- 16.9 Grouping Symbols Shown Taller in Print
- 16.10 Remarks Printed Next to Spatial Arrangements
  - 16.10.1 Remarks Brailled Beside Unified Expressions
  - 16.10.2 Remarks Brailled Below the Arrangement
- 16.11 More Enlarged Signs of Grouping

*Practice 16B*

*Practice 16C*

*Practice 16D*

*Practice 16E*

### *DETERMINANTS AND MATRICES*

- 16.12 Definition and Recognition
- 16.13 Transcription Rules for Determinants and Matrices
  - 16.13.1 Blank Lines
  - 16.13.2 Grouping Symbols
  - 16.13.3 Placement of Items
  - 16.13.4 Numeric and Letter Indicators
  - 16.13.5 Placement of Identifiers, Symbols, and Punctuation

*Practice 16F*

#### *Further Considerations with Determinants and Matrices*

- 16.14 Multiplying Arrays
- 16.15 Omission Dots
  - 16.15.1 No Dots Are Printed Between Columns
  - 16.15.2 Dots Are Printed Between Columns or  
Some Entries are Blank

*Practice 16G*

- 16.16 Space-Saving Techniques
  - 16.16.1 Runovers With Indentation
  - 16.16.2 Runovers Without Indentation
  - 16.16.3 Fractions in Arrays
  - 16.16.4 Keying *Practice 16H*
- 16.17 Row Matrix
- 16.18 Embedded Arrays *Practice 16I*
- 16.19 Use of Tactile Graphics for Enlarged or Horizontal Grouping Signs

*Answers to Practice Material*

## **Lesson 17**

### *TABLES*

- 17.1 Structure of Tables
- 17.2 Table Label and Title
- 17.3 Column Headings
- 17.4 Table Entries
  - 17.4.1 Tables in UEB
  - 17.4.2 Tables in Nemeth Code
  - 17.4.3 Code Switching Decisions *Practice 17A*
- 17.5 When Row Headings are Words *Practice 17B*

### *Boxed Tables*

- 17.6 Code Switching and Box Lines
  - 17.6.1 Switching Within the Table
  - 17.6.2 Switching Within the Box Lines
  - 17.6.3 Technical Material Before or After a Box
  - 17.6.4 Placement of Transcriber's Note *Practice 17C*

### *Table Rules Specific to the Nemeth Code*

- 17.7 Table of Numbers *Practice 17D*

### *FIGURES AND DIAGRAMS*

- 17.8 Which Code?
  - 17.8.1 Letters Used as Diagram Labels
- 17.9 Switch Indicators and Tactile Graphics
- 17.10 Graphic Number Lines
- 17.11 Diagrams in Exercise Material *Practice 17E*

### *KEYING TECHNIQUE*

- 17.12 Keying
  - 17.12.1 Alphabetic Key
  - 17.12.2 Numeric Key
  - 17.12.3 The Key List *Practice 17F*

CHEMISTRY

17.13 Two BANA Publications

*Answers to Practice Material*

**Lesson 18**

18.1 Preparing for the Certification Exam

18.2 The Nemeth Codebook

18.3 Beyond the Nemeth Code

*Structuring a Textbook*

18.4 Transcriber-Generated Pages and Front Matter

18.4.1 Special Symbols Page

18.4.1.a Braille Order

18.4.2 Transcriber's Notes Page

*Practice 18A*

18.5 Body of Text

18.5.1 Follow Nemeth Code Formatting Rules

18.5.2 Follow *Braille Formats* Formatting Guidelines

18.5.3 Context-Dependent Formats

*Four Practices*

*Practice 18B*

*Practice 18C*

*Practice 18D*

*Practice 18E*

*Answers to Practice Material*

**Appendices**

Appendix A Reading Practice

Appendix B Glossary Of Terms

Appendix C Nemeth Code Format Summaries

Appendix D Sample Page