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.

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 PROGRAM

This course is designed for the UEB certified transcriber who is ready to take on the challenge of transcribing print mathematics and science materials into braille using the Nemeth Braille Code for Mathematics and Science Notation. The program operates under a contract with the National Library Service for the Blind and Print Disabled, Library of Congress (NLS). All transcribing and proofreading course lessons and tests are administered under the National Federation of the Blind Braille Certification Training Program (BCTP). The following information is copied from the (2022) cover letter that the enrolled student will receive when accepted into the course. Up-to-date instructions will be sent at the time of enrollment.

The course is based on The Nemeth Braille Code for Mathematics and Science Notation, 2022, a publication of the Braille Authority of North America (BANA). Course materials do not supersede the authority of the official BANA code book.

Eligibility

- United States citizenship or residency
- High school diploma or equivalent
- Knowledgeable in recommended braille formats for textbooks

Prerequisite

- Library of Congress certification in literary braille transcribing (UEB) for a minimum of six months

Equipment

Any of the following methods may be used in order to submit lesson exercises in braille: a forty-cell slate, a braillewriter, or a computer application that allows for direct input of 6-key braille. Use of back translation is allowed but 6-key entry is a necessity as well. A line length of forty cells is required, regardless of production method.

The Lesson Material

The lessons are available by following the “Mathematics Braille Transcribing” link at www.nfb.org/transcribers. If you are unable to utilize the material from the website, please contact us at transcribers@nfb.org or (410) 659-9314, extension 2510, and we will work with you to ensure you receive the material in a format that is usable for you.

Most lessons conclude with an exercise, which is to be submitted to your grader for evaluation. Students are encouraged to submit their work on a regular basis (at least monthly) and may submit only one lesson at a time.

Revisions to the online course lessons are occasionally necessary. The student should check the website to ensure that any lesson being completed is the current version. To report errors in this instruction manual, please send your message to transcribers@nfb.org.
Your Grader

A student must take the course by correspondence with the NFB. After receiving your transcription of the first exercise, a grader will be assigned. Your grader will evaluate your first submission and will be your point of contact for the rest of the course.

The Certification Test

Upon completion of the course, the student may apply for the certification test. When requesting the test, students who have taken the course locally must include a letter from their Library of Congress certified mathematics braille instructor attesting that the student has successfully completed the course. Certification tests are distributed and evaluated by the National Federation of the Blind. Instructions for preparation and submission will accompany the exam. The Library of Congress remains the certifying authority. Candidates scoring a passing grade will receive a Library of Congress certificate.

How to Enroll

Whether intending to take the course with a local teacher or through correspondence, prospective students must submit the application form before beginning the course. Applicants can enroll in the course in one of two ways.

- Complete the application online at https://nfb.org/programs-services/braille-certification/mathematics-braille-transcribing
- Or mail a print application to the address shown below.

  National Federation of the Blind
  Braille Certification Training Program
  200 East Wells Street at Jernigan Place
  Baltimore, MD 21230

Further Information

For more information about the braille certification training program, you may email, call, or write:

- email: transcribers@nfb.org
- call: 410-659-9314, extension 2510
- write to the address shown above.
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 rewriting 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 is offered in Appendix A. Lessons conclude with an exercise which will be graded and evaluated by your teacher or by your NFB-assigned grader.

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. Dates shown below are the editions used as a resource in this lesson manual.

*Braille Formats: Principles of Print-to-Braille Transcription, 2016*
*The Nemeth Braille Code for Mathematics and Science Notation, 2022*
*Guidelines and Standards for Tactile Graphics, 2022*
*Chemical Notation Using Nemeth Braille Code, 2022*
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. Transcribe 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 transcription 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. Instead, 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 straightsedge 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 transcribing 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 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.
CONTENTS

About the Program iv
Foreword to the 2017 Edition vi
Prerequisites vii
Study Tips viii

Preliminary Lesson
   P1 Philosophy
   P2 Literary vs. Technical Texts

INTRODUCTION TO NUMERALS AND THE NUMERIC INDICATOR
   P3 Representation of Arabic Numerals
   P4 Numeric Indicator

THE PRACTICE MATERIAL
   Practice A

THE MATHEMATICAL COMMA AND DECIMAL POINT
   P5 Mathematical Comma
   P6 Mathematical Decimal Point
   P7 Format: General Principles
      Practice B

INTRODUCTION TO SIGNS OF OPERATION
   P8 Signs of Operation
      Practice C

INTRODUCTION TO SIGNS OF COMPARISON
   P9 Signs of Comparison
      Practice D

MONETARY, PERCENT, AND PRIME SIGNS
   P10 Monetary Signs
   P11 Percent and Per Mille Signs
   P12 Prime Sign
      Practice E

EUROPEAN SYMBOLS
   P13 The European Comma
   P14 The European Decimal Point

Answers to Practice Material

Lesson 1
INTRODUCTION TO CODE SWITCHING
   1.1 A Complete Transcription
   1.2 Use of the Code Switch Indicators
Practice 1A
1.3 Which Code?
1.4 Placement of Literary Punctuation

Practice 1B
1.5 Format: Keep Together—General Principle Regarding Mathematical Expressions
   Placement of the Switch Indicators

Practice 1C
1.6 Consistency with Mathematical Symbols

Practice 1D

THE HYPHEN AND THE DASH
1.7 The Hyphen and the Dash As Punctuation

Practice 1E

SIGNS OF OMISSION
1.8 General Use of Signs of Omission
1.9 Ellipsis
1.10 Long Dash
1.11 General Omission Symbol
1.12 Spacing of the Ellipsis and Long Dash
1.13 Other Omission Symbols
1.14 Paragraph Margins for Narrative Portions of Text (3-1)

Practice 1F

INTRODUCTION TO IDENTIFIERS
1.15 Terminology
1.16 Format: Margins for Itemized Material with No Subdivisions (1-3)

Practice 1G

FORMAT SUMMARY #1

Answers to Practice Material

EXERCISE 1

Lesson 2
MORE ABOUT PUNCTUATION
2.1 Punctuation Mode
2.2 Spacing of UEB Punctuation and Code Switch Indicators
2.3 Nemeth Punctuation

Practice 2A

PUNCTUATION IN NEMETH CODE
2.4 Background
   The Punctuation Indicator
2.5 Role of the Punctuation Indicator
2.6 Punctuation with Omission Signs
2.7 Punctuation and Spacing of Plural or Possessive Endings
   Practice 2B
2.8 Summary of the Use and Nonuse of the Punctuation Indicator

INTRODUCTION TO SIGNS OF GROUPING
2.9 Definition
2.10 Signs of Grouping with Numerals
2.11 Punctuation with Grouping Symbols
2.12 Nested Grouping Symbols

Code-Switching Considerations
2.13 Enclosed Technical Material
2.14 Paired Symbols

Spacing with Signs of Grouping
2.15 Spacing Inside of the Grouping Signs
2.16 Spacing Outside of the Grouping Signs
   Practice 2C

IDENTIFIERS, cont.
2.17 Identifiers and Braille Page Turns
2.18 Code Switching and Identifiers
   Practice 2D
2.19 Format: Keep Together—Hyphenated Expressions
2.20 Format: Margins for Itemized Material with No Subdivisions—Side-by-Side Layout

Answers to Practice Material

EXERCISE 2

Lesson 3

WORDS
3.1 Words in Mathematical Context
3.2 Words in Narrative
3.3 Punctuation With Words
   Practice 3A

Introduction to Abbreviations
3.4 Abbreviations
3.5 Numbers with Ordinal Endings
   Practice 3B

Single-Word Switch Indicator
3.6 The Single-Word Switch Indicator
3.7 More About Switch Indicators at Braille Page Turns
Lesson 4
MORE ABOUT LETTERS

Variables
4.1 Mathematical Variables
   Practice 4A

Roman Numerals
4.2 Code Switching with Roman Numerals
4.3 Capital Roman Numerals
4.4 Lowercase Roman Numerals
4.5 Punctuation with Roman Numerals
4.6 Roman Numerals Used as Identifiers
4.7 Mathematical Letter Combinations Similar to Roman Numerals

Review: Nonuse of the English-letter Indicator
   Practice 4B

Nondecimal Bases
4.8 Letters Used to Represent Numerals in Nondecimal Bases
4.9 Nonalphabetic Symbols Used to Represent Numerals
   Practice 4C

OTHER ALPHABETS
4.10 Alphabetic Indicators
4.11 The Greek Alphabet
   Practice 4D
4.12 The German Alphabet
4.13 The Hebrew Alphabet
4.14 The Russian Alphabet
   Practice 4E
4.15 A Sequence of Unspaced Letters
4.16 Mathematical Constant
   Practice 4F

ENCLOSED LISTS
4.17 Special Case—Definition of "Enclosed List"
   Practice 4G

MORE ABOUT ENGLISH LETTERS
4.18 An English Letters Touching Only One Grouping Symbol
4.19 English Letters with Plural, Possessive, or Ordinal Endings
   Practice 4H

MORE ABOUT ABBREVIATIONS
4.20 More Spacing Rules
4.21 Single-Letter Abbreviations
4.22 Abbreviations Whose Letters Correspond to a Shortform
4.23 Context Clues
4.24 Fully Capitalized Abbreviations – Acronyms and Initialisms

CODE SWITCHING, cont.
4.25 Initiating Nemeth Code Before Itemized Material, Following a Heading
4.26 Transcriber's Notes
   Practice 4I

Answers to Practice Material

EXERCISE 4

Lesson 5

SIGNS OF OPERATION, cont.
   5.1 Review of Signs of Operation
5.2 Signs of Operation Using Plus and Minus
5.3 Signs of Operation That Look Like Literary Symbols
   Practice 5A
5.4 Signs of Operation Unique to Mathematics

Format: Simple Tables
5.5 Introduction to Table Format
Practice 5B

SIGNS OF COMPARISON, cont.
5.6 More Comparison Signs
5.7 Special Case: A Colon Meaning "Such That"
   Practice 5C
5.8 Signs of Comparison Compounded Vertically
   Practice 5D
5.9 Signs of Comparison Compounded Horizontally
5.10 Negated Signs of Comparison
   Practice 5E

Format: Instructions
5.11 Margins for Instructions Preceding Itemized Material (5-3)
5.12 Narrative Directions
   Practice 5F

Answers to Practice Material

EXERCISE 5

Lesson 6
Format:
6.1 Margins for Itemized Material with Subdivisions (1-5; 3-5)
   Practice 6A

LEVEL INDICATORS
6.2 Definition

Superscripts
6.3 Superscript Level Indicator
   Practice 6B
6.4 Returning to the Baseline Level
6.5 Raised Hollow Dot
   Practice 6C

Introduction to the Baseline Indicator
6.6 Function of the Baseline Indicator
   Practice 6D
6.7 Higher Levels of Writing
6.8 Certain Raised Signs
   Practice 6E

Subscripts
6.9 Subscript Level Indicators
   Practice 6F
6.10 Returning to the Baseline Level
   Practice 6G
6.11 Special Case: Nonuse of the Subscript Level Indicator
Practice 6H
6.12 Spaces Within Superscripts and Subscripts

Practice 6I

More about Superscripts and Subscripts
6.13 Superscript and Subscript Combinations

Practice 6J

6.14 Left Subscripts and Superscripts
6.15 Further Combinations
6.16 Consecutive Superscripts and Subscripts
6.17 Simultaneous Superscripts and Subscripts
6.18 Nonsimultaneous Superscripts and Subscripts
6.19 Detached Superscripts and Subscripts
6.20 Literary Symbols and Level Indicators

Summary

Practice 6K
6.21 More About Grouping Symbols and Level Indicators

Practice 6L

Answers to Practice Material

EXERCISE 6

Lesson 7

DISPLAYED FORMATS
7.1 Displayed Mathematical Material

Practices 7A, 7B, 7C
7.2 Displayed Material with Labels
7.3 Displayed Narrative Material

Practice 7D

TYPEFORM
7.4 General Guidelines Regarding Typeform
7.5 The Five Mathematical Typeform Indicators
7.6 Typeform of Letters

Practices 7E, 7F, 7G
7.7 Typeform of Numerals

Practice 7H
7.8 Nonregular Typeform in Contact with a Grouping Symbol

Practice 7I
7.9 Boldface Mathematical Symbols

Practice 7J
7.10 Barred Grouping Symbols and Other Signs of Grouping

Practice 7K
7.11 Further Details Regarding Typeform of Letters and Numerals


Practice 7L

Answers to Practice Material

EXERCISE 7

Lesson 8

INTRODUCTION TO FRACTIONS

Simple Fractions
8.1 Definition
8.2 Simple Fraction Indicators
8.3 The Horizontal Simple Fraction Line
   Practice 8A
8.4 The Diagonal Simple Fraction Line
   Practice 8B

Mixed Numbers
8.5 Definition of Mixed Number
   Practice 8C

Complex Fractions
8.6 Definition of Complex Fraction
   Practice 8D

More Fraction Rules
8.7 Fractions and the Baseline Indicator
8.8 Further Observations Regarding Spacing
8.9 Fractions and the Ellipsis and Long Dash
8.10 Fractions in an Enclosed List
   Practice 8E

RADICAL EXPRESSIONS
8.11 Terminology
8.12 The Termination Indicator
8.13 Spacing
8.14 Index of Radical
   Practice 8F
8.15 Nested Radical Expressions
8.16 Radical Expressions and the Baseline Indicator
8.17 Radical Expressions and the Ellipsis and Long Dash
8.18 Radical Expressions and Abbreviations
8.19 Enclosed Lists with Radical Expressions
   Practice 8G

LINKED EXPRESSIONS
8.20 Definition of Linked Expression
8.21 Division of Linked Expressions
Practice 8H

8.22 Special Case—Nested Linked Expressions

Practices 8I, 8J

Answers to Practice Material

EXERCISE 8

Lesson 9

ARROWS

9.1 Arrows Used in Mathematics
9.2 Construction of Braille Arrows
9.3 Spacing and Punctuation with Arrows
9.4 Horizontal Arrow Shafts
9.5 Barbed Arrowheads
9.6 Special Case: The Contracted Form of the Right-Pointing Arrow

Practice 9A
9.7 Blunted, Straight, and Curved Arrowheads
9.8 Arrows With Dotted Ends

Practice 9B

Vertical, Slanted, and Curved Arrow Shafts

9.9 Arrow Direction Indicators

Practice 9C

Boldface and Compounded Arrows

9.10 Boldface Arrow
9.11 Arrows Used as Signs of Comparison Compounded Vertically
9.12 Arrows Used as Signs of Comparison Compounded Horizontally
9.13 Nonmathematical Arrows

INTRODUCTION TO SPATIAL ARRANGEMENTS

9.14 Background

Spatial Arrangements with Addition and Subtraction

9.15 Separation Line
9.16 Alignment with Addition and Subtraction
9.17 Placement of Symbols
9.18 Side-by-Side Layout

Practice 9D
9.19 Omissions in Work Arranged Spatially for Computation
9.20 Spatially Arranged Polynomials
9.21 Abbreviations
9.22 Fractions
9.23 Placement of Identifiers

Practice 9E
9.24 Regrouping Numbers in Addition Problems
Introduction to Cancellation

9.25 Cancellation in Subtraction Problems

Practice 9F

Arrangement on the Page

9.26 Blank Lines
9.27 Wide Arrangements
9.28 Itemized Spatial Problems with Subdivisions

Placement of Code Switch Indicators

9.29 Code Switching with Unitemized Spatial Arrangements
9.30 Code Switching with Itemized Spatial Arrangements
9.31 Code Switching with Headings and with the Page Change Indicator

Answers to Practice Material

EXERCISE 9

Lesson 10

Review of Format for Spatial Arrangements

SPATIAL ARRANGEMENT WITH MULTIPLICATION

10.1 Alignment
10.2 Placement of Multiplication Symbol
10.3 Separation Line

Alignment of Partial Products

10.4 Partial Products
    Practice 10A
10.5 Omissions in Spatial Multiplication Problems
10.6 Fractions and Mixed Numbers
10.7 Polynomials
10.8 Subscripts Denoting Nondecimal Bases
10.9 Regrouping Numbers with Multiplication
10.10 Placement of Identifiers with Spatial Multiplication
    Practice 10B

DIVISION PROBLEMS

10.11 Notation Devices
10.12 Linear (Nonspatial) Representation of Division Problems
    Practice 10C
10.13 Spatial Representation of Division Problems
    Practice 10D
10.14 Omissions in Spatial Division Problems
10.15 Regrouping in Division
10.16 Cancellation in Long Division
10.17 Placement of Identifiers with Spatial Division
10.18 Other Layouts
Practice 10E

REVISITING SOME RULES

10.19 Summary of the Use and Nonuse of the Numeric Indicator
10.20 Review of Rules for Signs of Grouping

Answers to Practice Material

EXERCISE 10

Lesson 11

SIGNS OF SHAPE

11.1 Definition

Basic Shapes

11.2 Basic Signs of Shape Represented by Numbers—Regular Polygons
11.3 Basic Signs of Shape Represented by Letters—Irrregular Polygons
11.4 Other Basic Signs of Shape Represented by Letters
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

Practice 11D

Calculators and Keyboards

11.23 The Keystroke Indicator
11.24 Other Details Concerning Keystrokes
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
11.32 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
11.35 Use of the Numeric Indicator in an Enclosed List

*Practice 11F*

**TYPEFORM INDICATORS FOR MATHEMATICAL WORDS AND PHRASES**
11.36 Italic and Boldface Typeform Indicators
11.37 Code Switching Within an Emphasized UEB Passage

**MATHEMATICAL STATEMENTS**
11.38 Axioms, Corollaries, Definitions, Laws, Lemmas, Propositions, Theorems

*Practice 11G*

**Answers to Practice Material**

**EXERCISE 11**

**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
   *Practice 12A*
12.4 Carets as Modifiers
12.5 Horizontal Bar as a Modifier
   *Practice 12B*
12.6 Other Symbols Used as Modifiers
12.7 Expressions as Modifiers
   *Practice 12C*
12.8 Spacing with Modified Expressions
   *Practice 12D*
Modified Expressions and Superscripts/Subscripts

12.9 Modified Expression on the Baseline of Writing
   Practice 12E

12.10 Modified Expression Within a Superscript or Subscript
   Practice 12F

Modified Signs of Comparison

12.11 Definition

12.12 Transcription
   Practice 12G

Expressions with More Than One Modifier

12.13 Modifiers of Higher Order

12.14 Individual Modifiers

12.15 Simultaneous Modifiers
   Practice 12H

Format

12.16 Formal Proof
   Practices 12I, 12J

Answers to Practice Material

EXERCISE 12

Lesson 13

MISCELLANEOUS SYMBOLS

Unspaced Symbols

13.1 Spacing Rules for Unspaced Symbols
   Practice 13A

Spaced Symbols

13.2 Spacing Rules for Spaced Symbols
   Practice 13B

Spacing with the Angstrom Unit and Tally Marks

13.3 Angstrom Unit

13.4 Tally Mark
   Practice 13C

SUPERPOSED SIGNS

13.5 Definition and Analysis

13.6 Transcription of Superposed Signs
   Practice 13D

AMBIGUOUS SIGNS

13.7 Context

MULTIPURPOSE INDICATOR

13.8 Review
13.9 Additional Uses of the Multipurpose Indicator

REFERENCE SIGNS AND SYMBOLS
13.10 Reference Signs and Symbols

Practice 13E

Answers to Practice Material

EXERCISE 13

Lesson 14

FUNCTION NAMES AND THEIR ABBREVIATED FORMS
14.1 List of Common Function Names and Their Abbreviated Forms
14.2 Code Switching and Punctuation

Practice 14A
14.3 Spacing of Abbreviated Function Names

Practice 14B
14.4 Nonuse of the English-letter Indicator
14.5 Keep Together
14.6 Clarification—Abbreviated Function Names in an Enclosed List

Practice 14C
14.7 Superscripts and Subscripts

Practice 14D
14.8 Modifiers

Practice 14E

Spatial Arrangements, cont.

SQUARE ROOT DIVISION
14.9 Review of Terminology
14.10 Spatial Arrangement for Square Root Problems
14.11 Placement of Identifiers with Spatial Radical Expressions

Practice 14F

OTHER PRINT LAYOUTS SHOWING DIVISION
14.12 Partial Quotients

Practice 14G
14.13 Synthetic Division

Practice 14H

Answers to Practice Material

EXERCISE 14
Lesson 15
MATHEMATICAL EXPRESSIONS REQUIRING RUNOVERS

15.1 Review
15.2 Mathematical Units
15.3 Step i: Divide Before a Comparison Sign on the Baseline
   Practice 15A
15.4 Step ii: Divide Before an Operation Sign on the Baseline
   Practice 15B
15.5 Step iii: Divide Before a Mathematical Unit
   Practices 15C, 15D
15.6 Step iv: Divide After a Termination Indicator
   Practice 15E
15.7 Function Notation, Integral Notation, Sigma Notation, and Pi Notation
   Practices 15F, 15G, 15H, 15I

Summary

Answers to Practice Material

EXERCISE 15

Lesson 16
SPATIAL ARRANGEMENTS OF FRACTIONS

16.1 Spatial Fraction Line
16.2 Numerator and Denominator
16.3 Placement of Identifiers with Spatially Arranged Fractions

Situations Requiring Spatial Presentation of Simple Fractions

16.4 Fractions Arranged Spatially for Illustration
   Practice 16A
16.5 Cancellation With Replacement Values
   Practices 16B, 16C
16.6 Cancellation Without Replacement Values
   Practice 16D

HYPERCOMPLEX FRACTIONS

16.7 Definition and Recognition
16.8 Transcription of Hypercomplex Fractions
16.9 Higher Orders of Complexity
   Practice 16E

CONTINUED FRACTIONS

16.10 Definition and Recognition
   Practice 16F

INSTRUCTIONAL COMMENTARY

16.11 Format for Instructional Commentary
Practice 16G

STEM-AND-LEAF PLOTS

16.12 Recognition
16.13 The Table
16.14 The Key
16.15 Data Consisting of More Than One Character; Punctuation Between Entries
16.16 Alphabetic Data
16.17 Blank Entries
16.18 Runovers Within the Table
16.19 Back-To-Back Plot

Practice 16H

Answers to Practice Material

EXERCISE 16

Lesson 17

SYSTEM OF EQUATIONS

17.1 Definition and Recognition
17.2 Transcription Rules for Systems of Equations

Practice 17A

Enlarged Signs of Grouping

17.3 A Unified Expression
17.4 Transcription Rules for Enlarged Signs of Grouping
17.5 Embedded Vertical Groupings

Practice 17B

17.6 Enlarged Parentheses
17.7 Placement of Symbols
17.8 Placement of Identifiers and Punctuation
17.9 Nested Grouping Symbols

Practice 17C

17.10 Conditions or Commentary Printed Next to Spatial Arrangements

Practice 17D

17.11 More Enlarged Signs of Grouping

Practice 17E

DETERMINANTS AND MATRICES

17.12 Definition and Recognition
17.13 Transcription Rules for Determinants and Matrices

Practice 17F

Further Considerations with Determinants and Matrices

17.14 Multiplying Arrays
17.15 Ellipses and Blank Fields
Lesson 18

TABLES
18.1 Structure of Tables
18.2 Table Label and Title
18.3 Column Headings
18.4 Table Entries
   Practice 18A
18.5 When Row Headings are Words
   Practice 18B
Boxed Tables
18.6 Code Switching and Box Lines
   Practice 18C
More Table Rules Specific to the Nemeth Code
18.7 A Table of Numbers
   Practice 18D
FIGURES AND DIAGRAMS
18.8 Which Code?
18.9 Switch Indicators and Tactile Graphics
18.10 Number Lines
18.11 Diagrams in Exercise Material
18.12 Molecular Diagrams
   Practice 18E
KEYING TECHNIQUE
18.13 Keying
   Practice 18F

Answers to Practice Material

EXERCISE 18
Final Lesson
   F1  Preparing for the Certification Exam
   F2  The Nemeth Code Book
   F3  Beyond the Nemeth Code

Structuring a Textbook
   F4  Transcriber-Generated Pages and Front Matter
       Practice A
   F5  Body of Text

Four Practices
   Practice B
   Practice C
   Practice D
   Practice E

Answers to Practice Material

Appendices
   Appendix A  Reading Practice
   Appendix B  Glossary Of Terms
   Appendix C  Nemeth Code Format Summaries

To report errors in this instruction manual, please send your message to transcribers@nfb.org.