

# Chapter 1: Nemeth Code Symbols Used in Grades PK-1

## New Symbols Introduced

- ⠠ [dots 3-4-5-6] Numeric indicator (no print equivalent)
- ⠠ [dot 6] Mathematical comma (,)
- ⠠ [dots 4-5-6] Punctuation indicator (no print equivalent)
- ⠠ [dots 4-5-6] Tally mark or hash mark (|)
- ⠠ [dots 1-2-3-4-5-6] General omission symbol (represents a question mark or blank space standing for a missing symbol)
- ⠠ [dots 3-4-6] Plus sign (+)
- ⠠ [dots 3-6] Minus sign (–)
- ⠠ [dots 4-6, dots 1-3] Equals sign (=)
- ⠠ [dot 5, dots 1-3] Less than sign (<)
- ⠠ [dots 4-6, dot 2] Greater than sign (>)

## New BANA Terms

Centered heading: Term used for titles.

## Key Points

- A **numeric indicator** is used to alert the braille reader to a number written in Nemeth Code.
- In Nemeth Code numbers are written in the lower part of the cell.
- The **mathematical comma** is used to separate numbers.
- The **punctuation indicator** is used to “stop” a number and “begin” punctuation.
- **Tally marks** are used in braille similar to the same way they are used in print, typically in groups of 5. In braille, the fifth tally mark is not drawn across the other 4 tally marks. Instead, it is placed next to the fourth tally mark.
- The **general omission** symbol is used to represent a blank or a question mark used to show that a symbol is missing.

- When a math problem is written in horizontal format, it is referred to as **linear format** in the Nemeth Code.
- **Signs of operation** (plus and minus) do not have a space on either side of them in a linear problem.
- **Signs of comparison** (equals, less than, and greater than) have a space before and after them in a linear problem.
- When a number begins a linear problem, a numeric indicator is used with the number.
- In a linear problem, no numeric indicator is used after a sign of operation.
- Consistent formatting of braille materials is important for braille readers.
- Use a **centered heading** for worksheet titles or chapter headings.
- **Print page numbers** are brailled in UEB and are placed on the first line of the braille page to the far right.
- If a print page goes to a second braille page, put the letter “a” in front of the print page number (no grade 1 indicator is used).
- **Braille page numbers** are brailled in UEB and are placed on the last line of the braille page to the far right.
- Use consecutive numbers (1, 2, 3...) when brailing page numbers for a document.

## **Numeric Indicator and Numbers 0-10**

Nemeth instruction usually begins in the preschool years with the numbers 0-10. Sometimes in the Nemeth Code, numbers are referred to as numerals.

Nemeth numerals, in most instances, begin with a **numeric indicator** (Rule II, §9). As a reminder, the rules and sections refer to “The Nemeth Braille Code for Mathematics and Science Notation, 1972 Revision,” often called the Nemeth Code Book or the “green book.”

The numeric indicator is an example of a braille **indicator** (Rule I, §5) since there is not a corresponding sign in print. Similar to UEB, an indicator in the Nemeth Code conveys meaning to the reader about the associated braille characters.



Dots 3-4-5-6 represent the **numeric indicator**.

In the Nemeth Code, there is not a space between an indicator and the associated braille characters (Rule I, §6).

The digits are placed in the lower part of the braille cell (dots 2-3-5-6), and the numbers are made by “dropping” the dot configuration of the first ten letters of the alphabet. Dot 1 for the letter “a” is dropped to dot 2 for the number 1, and dots 1-2 for the letter “b” are dropped to dots 2-3 for the number 2, and so forth (Rule II, §7).

Example 1.1 shows the numbers 1 to 10 in Nemeth Code.

### Example 1.1

1	2	3	4	5
⠠⠠	⠠⠠	⠠⠠	⠠⠠	⠠⠠
6	7	8	9	10
⠠⠠	⠠⠠	⠠⠠	⠠⠠	⠠⠠⠠

There is a numeric indicator at the beginning of each number since there is a space between the numbers. A space terminates, or ends, the effect of the numeric indicator (Rule II, §9).

In the number 10, the numeric indicator is only used at the beginning of the number, and the dot configuration for the letter “j” is dropped to dots 3-5-6 to make the 0.

### Practice 1.1

Interline the numbers.

⠠⠠	⠠⠠	⠠⠠⠠	⠠⠠	⠠⠠	⠠⠠
⠠⠠	⠠⠠	⠠⠠	⠠⠠	⠠⠠	⠠⠠

Now write the numbers 0-10 in braille.

## Numbers to 120

In kindergarten, students usually learn to read numbers to 100 and write numbers to 20 (Common Core State Standards Initiative, 2010; Maryland Department of Education, 2015). During first grade, they learn to read numbers to 120 and write numbers to 100.

Multi-digit numbers are written similarly to the numbers 1-10. Example 1.2 provides several examples of multi-digit numbers.

### Example 1.2

52          38          67          118          90  
⠠⠠⠠⠠    ⠠⠠⠠⠠    ⠠⠠⠠⠠    ⠠⠠⠠⠠⠠⠠    ⠠⠠⠠⠠⠠  
16          109          59          42          100  
⠠⠠⠠⠠    ⠠⠠⠠⠠⠠⠠    ⠠⠠⠠⠠⠠    ⠠⠠⠠⠠⠠    ⠠⠠⠠⠠⠠⠠

### Practice 1.2

Interline the numbers.

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

Write the following numbers in braille.

74 81 113 9 26 57  
63 48 21 73 45 108  
3 16 52 107 30 11

## Mathematical Comma

Students learn to read and write the **mathematical comma** (Rule II, §8b) in a series of numbers in the early grades (Maryland Department of Education, 2015). The dot 6 represents the mathematical comma.

In Example 1.3, there is a mathematical comma after the numbers 28 and 29. Just like in print, there is not a space between the number and the mathematical comma. In contrast, there is a space between the comma and the following number.

### Example 1.3

28, 29, 30  
⠠⠠⠠⠠⠠⠠    ⠠⠠⠠⠠⠠⠠⠠    ⠠⠠⠠⠠⠠⠠

Review three additional examples below in Example 1.4.





Now write the following numbered problems in braille. Don't forget to use the punctuation indicator.

1. 117, 118, 119, 120
2. 105, 106, 107, 108
3. 34, 35, 36, 37
4. 69, 70, 71, 72
5. 20, 30, 40, 50

## Tally Mark

Tally marks are a quick way of counting and keeping track of numbers in groups of five. They are commonly used in the early grades. Sometimes tally marks are called hash marks.

A **tally mark** (Rule XXII, §175) is represented by dots 4-5-6. You will find five tally marks on the next line of braille and then three tally marks in the following example.

### Example 1.7

⠠⠠⠠⠠⠠ ⠠⠠⠠  
⠠⠠⠠

Tally marks can be grouped for easy counting. They are typically grouped into sets of five in both print and braille. The sets of five are separated by a single space. Although a cross tally mark is sometimes used in print, it is "treated just as another tally mark" in the Nemeth Code (Nemeth, 1972, p. 157).

In Example 1.8, you will find eight tally marks. There is a group of five tally marks followed by a space and then three more tally marks.

### Example 1.8

⠠⠠⠠⠠⠠ ⠠⠠⠠

In Example 1.9, you will find fourteen tally marks. There are two groups of five tally marks each followed by a space and then four additional tally marks.

### Example 1.9

⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠

### Practice 1.5

Count the number of tally marks on each line. Then write the number of tally marks in braille. Write your answers all on the same line. Don't forget to put a space between each number.

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

Now practice writing tally marks for the following numbers in braille.

- 8
- 13
- 3
- 19
- 6
- 15
- 11

### General Omission Symbol

The **general omission symbol** (Rule X, §57) indicates a missing symbol. It is represented by a full braille cell (dots 1-2-3-4-5-6).

In Example 1.10 there is a series of 5 numbers, however, the last number is represented by a question mark to indicate it is missing. The general omission symbol is used to show the braille reader that the number has been omitted.



### Example 1.10

2 3 4 5 ?

⠠⠨⠠⠩⠠⠪⠠⠫⠠⠬⠠⠭⠠⠭

In the Nemeth Code, a general omission symbol is used rather than a question mark to indicate to the braille reader that something is missing. Three additional examples showing the use of the general omission symbol follow. Notice that the general omission symbol is used each time that there is a missing number. Also notice in the second example that there are commas between items. There is no space between the general omission symbol and the comma.

### Example 1.11

10, 11, ?, 13

⠠⠠⠨⠠⠠⠩⠠⠠⠪⠠⠠⠫⠠⠠⠭⠠⠠⠭⠠⠠⠭

87 ? 89

⠠⠠⠨⠠⠠⠩⠠⠠⠭⠠⠠⠭⠠⠠⠭

? 45 46 47 48

⠠⠠⠭⠠⠠⠫⠠⠠⠬⠠⠠⠭⠠⠠⠭⠠⠠⠭⠠⠠⠭

### Practice 1.6

Begin by locating the general omission symbol in each line. Then write the number that is missing in braille. Space one time between each missing number.

⠠⠠⠫⠠⠠⠭⠠⠠⠭⠠⠠⠫⠠⠠⠫⠠⠠⠫

⠠⠠⠫⠠⠠⠫⠠⠠⠫⠠⠠⠭

⠠⠠⠫⠠⠠⠫⠠⠠⠫⠠⠠⠫⠠⠠⠫⠠⠠⠫⠠⠠⠫⠠⠠⠫

⠠⠠⠭⠠⠠⠫⠠⠠⠫⠠⠠⠫⠠⠠⠫⠠⠠⠫⠠⠠⠫

⠠⠠⠫⠠⠠⠫⠠⠠⠭⠠⠠⠫⠠⠠⠫

Now write the following four series of numbers that include a missing number in braille. Each response should include a general omission symbol.

58 59 60 61 ?

5, ?, 7, 8, 9

22 23 ? 25

? 115 116 117

## Signs of Operation and Horizontal (Linear) Equations

Students are introduced to addition and subtraction during kindergarten (Common Core State Standards Initiative, 2010; Maryland Department of Education, 2015). As part of these processes, students use the plus sign, minus sign, and equals sign. The plus and minus signs are considered **signs of operation** (Rule XIX).

A **plus sign** (+) is represented by dots 3-4-6. In the middle of the next line of braille, you will find a plus sign.

⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠

**Teaching Tip:** There is a 3-cell line of dots 2-5 and a space before and after the plus sign. This method is sometimes used when introducing young students to a new symbol in braille. It helps them to better feel the position of the symbol in the braille cell.

A **minus sign** (–) is represented by dots 3-6.

In the middle of the next line of braille, you will find a minus sign.

⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠

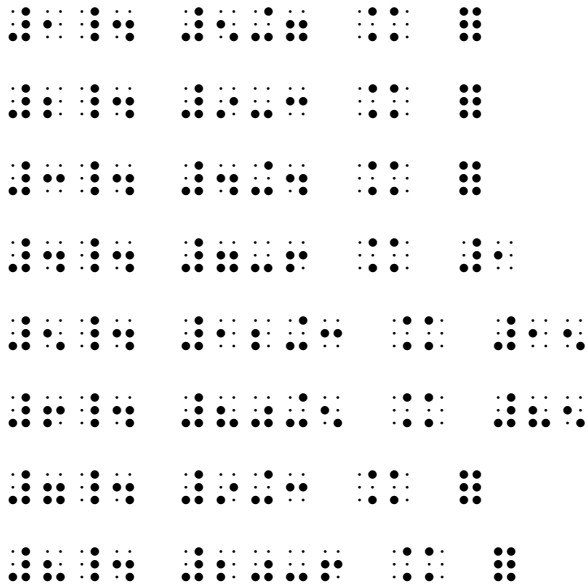
The **equals sign** (=) is a **sign of comparison** (Rule XX). It takes two braille cells to write an equals sign. It is written with dots 4-6 in the first cell, followed by dots 1-3 in the second cell.

In the middle of the next line of braille, there is an equals sign.

⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠







Write the following numbered addition and subtraction problems.

- 1.  $16 - 2 =$
- 2.  $9 + 8 = ?$
- 3.  $4 - 4 = ?$
- 4.  $6 + 7 =$
- 5.  $15 + 5 =$

Write the following numbered equations.

- 1.  $1 + 2 = 3$
- 2.  $20 - 10 = 10$
- 3.  $13 - 4 = 9$
- 4.  $3 + 8 = 11$
- 5.  $9 - 6 = 3$

### Signs of Comparison and Inequalities

Students are introduced to the equals sign in kindergarten, and then the less than sign and greater than sign in first grade (Common Core State Standards Initiative, 2010; Maryland Department of Education, 2015). The

equals sign, less than sign, and greater than sign are **signs of comparison** (Rule XX).

The less than sign and greater than sign are used when comparing two unequal quantities or values. An **inequality** is a mathematical sentence comparing two expressions that are not equal.

It takes two cells to write the **greater than** sign in braille. It is written with dots 4-6 in the first cell, followed by dot 2 in the second cell. When reading an inequality in math, the greater than sign is voiced as "is greater than".

>

⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠

It also take two cells to write the **less than** sign in braille. It is written with dot 5 in the first cell, followed by dots 1-3 in the second cell. When reading an inequality in math, the less than sign is voiced as "is less than".

<

⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠

**Teaching Tip for the Greater Than Sign:** Begin brailleing the greater than sign using two fingers of your right hand, followed by one finger of your left hand. It may be helpful to remember that two fingers are "greater than" one finger, and two dots are "greater than" one dot.

**Teaching Tip for the Less Than Sign:** Begin brailleing the less than sign using one finger of the right hand, followed by two fingers of the left hand. Once again, it may be helpful to remember that one finger is "less than" two fingers, and one dot is "less than" two dots.

**Teaching Tip:** As you likely noticed, there is a pattern. When writing the equals sign, greater than sign, and less than sign in braille, always begin with your right hand!

There are rules to follow when transcribing **inequalities** with numbers on either side of the inequality sign into Nemeth Code.

- Since the greater than sign and less than sign are signs of comparison, there is a space before and after the symbol in braille (Rule XX, §151).
- A numeric indicator is used at the beginning of the inequality (Rule II, §9a).

- A numeric indicator is also used after a space that follows a sign of comparison such as the greater than sign and the less than sign (Rule II, §9a).

Review the spacing and use of the numeric indicator in Example 1.15. Even if the spacing varies in print, the spacing in braille does not.

### Example 1.15

$2 < 18$

$⠠⠨ ⠠⠨⠠⠸ ⠠⠨⠠⠸⠠⠸$

$39 > 13$

$⠠⠸⠠⠨ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

$7 < 100$

$⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸⠠⠸$

### Practice 1.8

Interline the following inequalities in braille.

$⠠⠸⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

$⠠⠸⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

$⠠⠸⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

$⠠⠸⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

$⠠⠸⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

$⠠⠸⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

$⠠⠸⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

$⠠⠸⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

$⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

$⠠⠸⠠⠸⠠⠸ ⠠⠸⠠⠸ ⠠⠸⠠⠸⠠⠸$

Now transcribe the following inequalities into braille.

$1 < 6$

$29 > 28$

$12 < 18$

$8 < 88$

$16 > 12$

$98 > 96$

$30 < 40$

## Formatting Materials for Young Students

Young students should have consistently formatted materials in braille. They need instruction in how to efficiently navigate and locate key information so that they can focus on the content of the material. Instruction about how braille materials are formatted usually begins with two items: centered headings at the top of the page and page numbering.

The Braille Authority of North America (BANA) has published guidelines on how to format a wide range of materials for braille readers. "Braille Formats: Principles of Print-to-Braille Transcription" offers an explanation of the guidelines as well as examples. As a teacher of students with visual impairments, it is important for you to understand that Braille Formats is designed for transcribers, not teachers. Some of the information in Braille Formats pertains to textbook preparation. Over time you will develop an awareness of what information in Braille Formats is most relevant to the materials you prepare as a teacher of students with visual impairments.

Most materials for students in pre-kindergarten, kindergarten, and first grade are double-spaced. As of March 2020, BANA approved new guidelines for transcribing early educational materials. Additional information about formatting for young students will be available on the BANA website.

### Centered Headings

Headings, including **centered headings** (Braille Formats, 4.3 and 4.4), allow readers to quickly scan the page with their hands and learn what is included in the document. Examples of centered headings include chapter titles and worksheet titles.



A 40-cell line is generally used with 11 x 11½ inch braille paper, and the title of the document is usually placed on the first braille line. In order to determine where the centered title will begin on the line, follow this process (National Federation of the Blind, 2015).

- Begin by counting the number of cells needed to transcribe the title in braille. In the count, include letters, contractions, spaces, punctuation, and indicators such as the capital indicator.
- Then, subtract the number of cells needed for the title from 40.
- Next, divide the difference by 2.

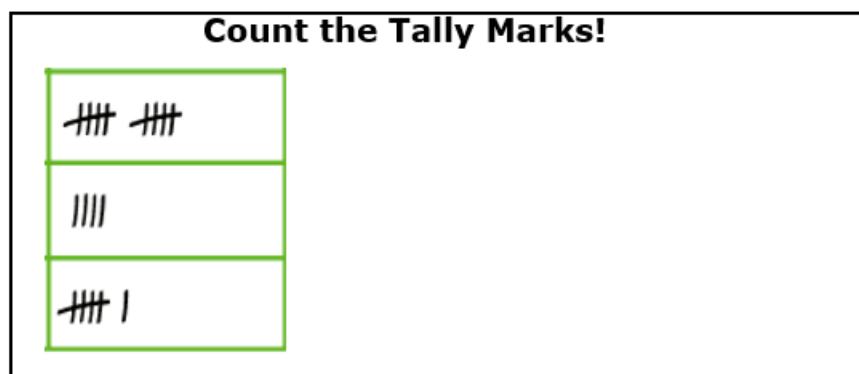
For example, if the title of a worksheet is Place Value, then the title will take 13 cells in braille. This includes a capital indicator for Place, 5 cells for the letters in place since no contractions are used, a space, a capital indicator for Value, and then 5 cells for the letters in value since no contractions are used.

Next subtract 13 from 40. The difference is 27, and 27 divided by 2 is 13½. Since the quotient is 13½, press the space bar 13 times and begin the title in cell 14.

Let's review the process again in Example 1.16.

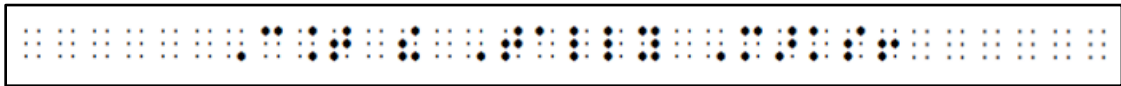
The title of the worksheet is Count the Tally Marks! Begin by counting how many cells will be needed to transcribe the title. Yes, it will take 20 cells in contracted braille. Next subtract 20 from 40. The difference is 20, and 20 divided by 2 is 10. Thus, press the space bar 10 times and begin the title in cell 11.

### Example 1.16



Sometimes 8½ x 11 inch braille paper with either a 30-cell or 32-cell line is used for young students. The same process is used for centering a heading, but instead of subtracting from 40, you subtract from 30 or 32.

- If using a 30-cell line, then subtract 20 from 30. The difference is 10, and 10 divided by 2 is 5. Thus, press the space bar 5 times and begin the title in cell 6.
- If using a 32-cell line, then subtract 20 from 32. The difference is 12, and 12 divided by 2 is 6. Press the space bar 6 times and begin the title in cell 7.



The centered heading begins in cell 7 of the first line since the title is the first item on the worksheet. Capitalization and punctuation of the title follows print. In addition, the centered heading is not bolded since the typeform was included for stylistic purposes and not distinction.

Centered headings are usually followed by a blank line. For young students learning braille, it is recommended that two blank lines are used instead of a single blank line (Braille Formats, 1.7.2).

There are additional guidelines for centering titles. They include:

- At least three blank cells must precede and follow a centered heading (Braille Formats, 4.4.2).
- Long titles may require more than one line. Divide long headings evenly across two or three lines (Braille Formats, 4.4.3).
- Capitalization follows print (Braille Formats, 4.3.7).
- Even when titles are italicized or bolded in print, typeform indicators are not usually used in braille unless needed for distinction (Braille Formats, 4.3.7).

## Page Numbering

Many print materials include page numbers. It is helpful to provide information about page numbers to students who are braille readers, as classroom teachers may request that students locate a certain page in a document or packet of papers.

In braille, the **print page number** (Braille Formats, 1.11) is placed at the end of the first line on each page. UEB numbers are used for page numbers regardless of the content, including math. Additionally, there must be at least 3 blank cells between the end of the text on the first line and the print page number.

If the transcription of a print page extends to a second braille page, put the letter "a" in front of the print page number. If the transcription of a print page extends to a third braille page, put the letter "b" in front of the print page number, etc. The grade 1 indicator is not used (Braille Formats, 1.11.7).

In Example 1.17, the transcription of print page 24 extends to a second braille page. Note how the print page number is preceded with the letter "a".

### Example 1.17

⠠⠠⠠⠠⠠⠠

⠠⠠⠠⠠⠠⠠

The **braille page number** (Braille Formats, 1.15) is placed at the end of the bottom line of the page. UEB numbers are used for page numbers regardless of the content, including math. Braille page numbers begin with 1 and are consecutively numbered across pages (that is 1, 2, 3, etc.). Similar to print page numbers, there must be at least 3 cells between the end of the text of the line and the braille page number.

Even if the text of the page ends before the bottom of the braille page, the braille page number is placed on the end of the last line of the page.

Notice that the print page number on Example 1.18 is 9, and the print page number is indicated in braille on the first line of the transcription. However, since this page is the sixth braille page in the packet being given to the student, it is numbered braille page 6 at the bottom of the page. Also notice that the print page number is on the same line as the worksheet title, which is a centered heading.

This worksheet is the 6<sup>th</sup> page in the packet given to the student so it is numbered braille page 6. On the worksheet two symbols we have not introduced yet are used. ⠠⠠⠠ is the opening Nemeth Code indicator and ⠠⠠⠠ is the Nemeth Code terminator. You will learn about these indicators in Chapter 2.

**Example 1.18**

What Number is Missing?

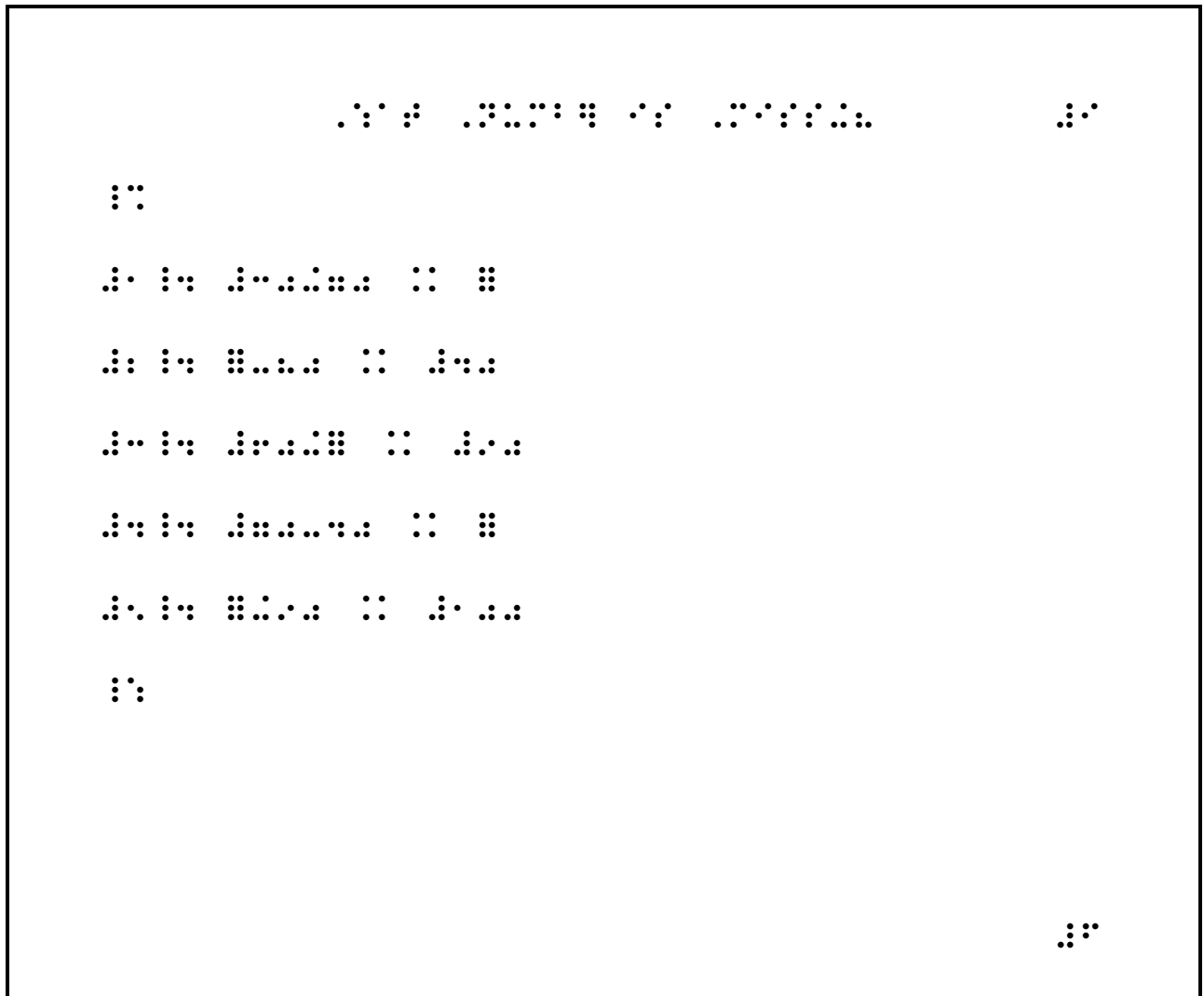
1.  $30 + 70 = ?$

2.  $? - 80 = 40$

3.  $60 + ? = 90$

4.  $70 - 40 = ?$

5.  $? + 90 = 100$



### Practice 1.9

Decide if each statement is true or false. If the statement is false, rewrite the statement so that it is true.

\_\_\_\_ 1. If the title of a worksheet is Greater Than or Less Than, the centered title would begin in cell 12 if using 11½ x 11 inch braille paper.

\_\_\_\_ 2. When transcribing a math worksheet, print page numbers are placed at the right margin of the first line on a page.

\_\_\_\_ 3. If the title of a worksheet is Counting to 120, the centered title would begin in cell 10 if using a 32-cell line on 8½ x 11 inch braille paper.

\_\_\_\_ 4. The correct way to put the braille page number for braille page 7 is to use ⠠⠼⠨ located at the right margin of the last line on a page.

\_\_\_\_ 5. When braille page numbers, use Nemeth numerals when preparing math or science materials.

### Practice 1.10

Transcribe the following worksheet into braille. This page is the fourth braille page in the packet being given to the student. You have not yet learned to use the Opening Nemeth Code indicator and Nemeth Code terminator so you do not need to braille these.

#### Addition and Subtraction

$1 + 1 =$

$5 + 0 = ?$

$? = 3 + 1$

$? = 2 + 7$

$6 + 4 = ?$

$9 + 1 =$

### Interlining

Many individuals, including general education teachers and paraprofessionals, work with beginning braille readers, and it is important that they have a print copy of the braille material so that they can provide

support to the student. When interlining braille, write the text in print directly above each braille line. This allows the student to have their hands on the braille and the adult who may or may not know braille to assist the student as needed. If you interline the print directly below the braille, it will not be possible to view the print when the student has their hands on the braille.

## **Collaboration with Family Members**

Family members are an important part of the educational team. Family members know their child well and can share how the child completes activities at home. They can also support a child's math development by talking about math in fun ways and reinforcing math concepts at home!

Teachers of students with visual impairment can support family members by:

- Communicating routinely with the family about the child's progress in math and Nemeth Code
- Providing strategies to easily reinforce beginning math concepts at home:
  - Count objects and become familiar with numbers
  - Put together shape puzzles
  - Build something (e.g., a block tower, a train car out of fruit) and incorporate counting, adding, or measuring
  - Read children's books that rhyme or contain numbers and tactile pictures
  - Sort objects (e.g., silverware, laundry, toys) and talk about similarities (e.g. color, shape, or size)
  - Sort objects and talk about differences (e.g. which block or toy is bigger?)
  - Make a pattern using different types of pasta
  - Divide playdough into equal parts
  - Take part in cooking activities (e.g., count how many  $\frac{1}{4}$  cups of sugar need to be put into the bowl)
- Sharing information about possible resources such as the American Printing House for the Blind
- Being available to answer any questions that arise

## **Expectations for Young Students**

Students are introduced to a variety of Nemeth symbols, including numbers to 120, during the early grades. By the time students complete first grade,

they should be familiar with all of the signs introduced in this chapter. In addition, they should be able to:

- Scan, locate, and read important information such as centered headings, print page numbers, and braille page numbers
- Represent a given number ranging from 1-20 by making a set of tally marks
- Number math problems from 1-20, including correctly using the punctuation indicator and period
- Read, write, and solve addition and subtraction problems in a horizontal (BANA term: linear) format
- Read and write inequalities in a horizontal (linear) format

## Chapter Summary

### Numeric Indicator, Numbers, and Numbering of Problems

- The numeric indicator is an example of a braille indicator (Rule I, §5). There is no print equivalent.
- The digits of numbers in Nemeth Code are placed in the lower part of the braille cell (dots 2-3-5-6).
- A space terminates the effect of the numeric indicator (Rule II, §9).
- A punctuation indicator is used when numbering problems so that the reader does not confuse the period with a number (Rule VI, §37).

### Tally Marks and the General Omission Symbol

- In braille, tally marks are grouped in sets of 5.
- Leave a space between sets of tally marks.
- To show the braille reader something is missing, such as a number, use a general omission symbol.

### Signs of Operation and Horizontal (Linear) Equations

- Equations written in horizontal format in print are written horizontally in braille.
- Use a numeric indicator at the beginning of the linear problem and then again after the sign of comparison if a number is present (Rule II, §9a; Rule XX, §151).
- With few exceptions, a space is not used before or after a sign of operation, including the plus sign and minus sign (Rule XIX, §138).
- Leave a space before and after the sign of comparison because it is a sign of comparison (Rule XX, §151).

## Formatting Materials for Young Students

- Center the title of the material/worksheet and leave a blank line after the centered title (Braille Formats, 4.3 and 4.4). For younger students in kindergarten or first grade, leave two blank lines after the centered heading.
- Divide long headings evenly across two or three lines (Braille Formats, 4.4.3).
- Follow print for capitalization of centered headings (Braille Formats, 4.3.7).
- Use UEB numbers for page numbers regardless of the content, including math.
- Place the print page number at the end of the first line on each page with at least 3 blank cells between the end of the text and the print page number (Braille Formats, 1.11).
- Place the braille page number at the end of the bottom line on each page with at least 3 blank cells between the end of the text and the print page number (Braille Formats, 1.15).



## Chapter 1: Answer Key

### Answer 1.1

9 3 10 2 7 0

5 8 1 6 9 4

⠠⠨ ⠠⠑ ⠠⠋ ⠠⠒ ⠠⠗ ⠠⠔

⠠⠑ ⠠⠘ ⠠⠇ ⠠⠖ ⠠⠗ ⠠⠔

### Answer 1.2

96 67 59 43 120 34

99 6 102 41 78 19 85

52 27 70 22 16 117

⠠⠑⠖ ⠠⠖⠗ ⠠⠑⠗ ⠠⠔⠑ ⠠⠗⠒ ⠠⠔⠒ ⠠⠑⠗

⠠⠑⠑ ⠠⠖ ⠠⠋⠔⠒ ⠠⠔⠑ ⠠⠗⠘ ⠠⠑⠗ ⠠⠘⠑

⠠⠑⠒ ⠠⠒⠗ ⠠⠗⠐ ⠠⠒⠒ ⠠⠑⠖ ⠠⠑⠑⠗

### Answer 1.3

5, 6, 7

18, 19, 20

1, 2, 3, 4, 5

10, 11, 12, 13

52, 53, 54

96, 97, 98, 99, 100

⠠⠑⠖ ⠠⠖⠗ ⠠⠑⠗ ⠠⠔⠒

⠠⠑⠑ ⠠⠖ ⠠⠋⠔⠒ ⠠⠔⠑ ⠠⠗⠘ ⠠⠑⠗

⠠⠑⠒ ⠠⠒⠗ ⠠⠗⠐

⠠⠑⠖ ⠠⠖⠗ ⠠⠑⠗ ⠠⠔⠒



### Answer 1.5 (continued)

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### Answer 1.6

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### Answer 1.7

1.  $5 + 7 = ?$  or 1.  $5 + 7 =$  (Both options are correct.)
2.  $9 - 3 = ?$  or 2.  $9 - 3 =$  (Both options are correct.)
3.  $4 + 4 = ?$  or 3.  $4 + 4 =$  (Both options are correct.)
4.  $7 - 6 = 1$
5.  $12 + 3 = 15$
6.  $80 + 5 = 85$
7.  $9 + 3 = ?$  or 7.  $9 + 3 =$  (Both options are correct.)





