First Grade Nemeth Braille Code Curriculum
Module 2: Vertical Spatial Equations, Including Equations with Omissions
Teacher Reference Materials

Prerequisite skills:

- Ability to tactually identify the numbers 1-10
- Ability to tactually identify the general omission symbol, plus sign, and minus sign
- Ability to write the numbers 1-10
- Ability to write the general omission symbol, plus sign, and minus sign
- Ability to read and write the numbering of math problems from 1-15 including the punctuation indicator and period
- Ability to represent addition within 10
- Ability to represent subtraction within 10

Math symbols and concepts, including braille knowledge, addressed:

- Separation line used in spatially aligned problems
- Nemeth Braille Code problems and equations in a vertical format
- Nemeth Braille Code equations in a vertical format with omissions
- Fluently add and subtract within 10
- Relationship of three numbers in equations involving addition and subtraction within 10

Objectives:

The student will be able to:

1) Read Nemeth Code problems involving addition in a vertical format that include numbers 0-10, plus sign, and a separation line
2) Read Nemeth Code equations involving subtraction in a vertical format that include numbers 0-10, minus sign, and a separation line
3) Fluently add within 10, including with Nemeth Braille Code equations in a vertical format
4) Read a general omission symbol in a Nemeth Code problem in a vertical format
5) Determine the unknown whole number in an addition equation in a vertical Nemeth format within 10 that relates three whole numbers
6) Fluently subtract within 10, including with Nemeth Braille Code equations in a vertical format
7) Determine the unknown whole number in a subtraction equation in a vertical Nemeth format within 10 that relates three whole numbers

8) Read numbered and unnumbered problems that contain a general omission symbol involving addition within 10 in Nemeth Code in a vertical format
9) Read numbered and unnumbered problems that contain a general omission symbol involving subtraction within 10 in Nemeth Code in a vertical format
10) Write a separation line in Nemeth Braille Code problems and equations
11) Write the answer to an addition or subtraction problem using correct Nemeth Code in a vertical format
12) Use the braillewriter to write Nemeth Braille Code problems and equations involving addition in a vertical format
13) Use the braillewriter to write Nemeth Braille Code problems and equations involving subtraction in a vertical format

Other ECC skills addressed:

Listening skills; concept development; following directions; organization; tactual discrimination; left-to-right tracking; top-to-bottom tracking; spatial alignment; hand positioning; light touch (as opposed to scrubbing); scan and interpret tactile graphics used in math; recreation and leisure

Teaching tips:

- Before opening any BRF files in Duxbury, go into the Global menu. Select "Formatted Braille Importer" and then check the box for "Read formatted braille without interpretation" at the top of the window. This will ensure that nothing is changed when opening the BRF files.
- This module should be completed across multiple sessions.
- It is highly recommended that this module be completed with hard copy braille and a braillewriter instead of a refreshable braille display.
- If a student reads the Nemeth symbols or equation incorrectly, tell the student the correct way to read the symbol or equation.
- Sorting trays often define the work space. If you do not have sorting trays, you can use cafeteria type trays, cookie sheets, small cake pans, and/or small storage boxes.
- Using small storage boxes with labels can make it easier for a child to independently locate stored items.
- It may also help to place the number cards and hard copy braille on a nonslip surface such as rubber shelf liner so they will not move as the student is reading.
- If needed, remind the student to move his/her fingers across the braille and check his/her work during writing activities.

- It is very important to use the correct finger on each key when learning new Nemeth symbols. This will help the student continue to be accurate in their writing!

Materials/technology needed:

- Braillewriter
- Braille paper
- Index cards
- Wikki Stix®
- Work and/or sorting trays
- Cookie sheet and magnets
- Assortment of stickers
- Tactile graphic supplies such as textured paper, cardboard, felt, buttons, and/or other small objects
- Homemade cube labeled with Nemeth numbers 1-6
- Roll and Race game cards (available in print and braille within the curriculum)
- Flash cards (available in the curriculum)

Optional materials for follow-up activities or adaptation of activities:

- Unifix blocks, Digi-Blocks, or base ten unit blocks
- Magnetic counters
- Small storage boxes
- Math Window Braille Basic Math Kit in Nemeth
- Velcro dots and 1-inch embossed graph paper (from American Printing House for the Blind)
- Tactile die
- Five Frame and Ten Frame (available in contracted and uncontracted braille within the curriculum)
- Rubber shelf liner
- Timer
- Pipe cleaners
- Cork board and pushpins

Explanation of activities embedded into module:

1) In some of the activities, students will use flash cards to practice reading addition problems in vertical alignment and determining missing numbers.

   For the activity on page 3 located in the module, you can either create flash cards with the problems below using index cards or emboss the

flash cards on pages 1-2 of the braille document entitled "Flash Cards for Module 2_1". Answers are provided for you in parentheses to assist you in placing the answers on the back of the flash cards.

6	3	2
+2	+3	+1
(8)	(6)	(3)
1	0	7
+5	+0	+2
(6)	(0)	(9)
8	5	3
+1	+5	+3
(9)	(10)	(6)
7	4	2
+0	+5	+5
(7)	(9)	(7)
3	2	8
+4	+2	+0
(7)	(4)	(8)

Cut out the upper right corner of each flash card for easy identification of orientation. If you would like for the student to be able to use the flash cards independently, place the answers on the back of each flash card using the Feel 'n Peel Stickers: Nemeth Braille-Print Numbers from American Printing House for the Blind.

Begin by shuffling the flash cards, and then have the student select a card. After the child reads each problem in vertical alignment and tells you the answer, have him/her use a sorting tray to separate which cards he/she has read and which cards he/she has not read.

2) In the "Find the Path" activity, the student will complete a set of math problems to find a path that will help a pilot locate her airplane.

   The activity page and directions are available within the curriculum. The student will also need a braillewriter, large stickers, and tactile

graphic supplies such as Wikki Stix®, buttons, cork board, cardboard, felt and/or textured paper.

The directions are in braille on the activity page, but here is a quick overview. Begin by writing the answer to each of the vertically aligned addition problems. Then, use tactile graphic supplies to make a picture of the airplane. Afterwards, place stickers on each problem where the number 8 or 9 is the answer to reveal a path from the pilot to the airplane.

It may help to place the activity page on a nonslip surface such as a rubber shelf liner. If preferred, the student may use the braillewriter to create the picture of the plane. An answer key in print and braille is provided in separate documents.

3) The student will learn how to build vertically aligned problems using a cookie sheet and magnets with Nemeth numbers and symbols. You can use a braillewriter and small pieces of index cards to create the number and symbol cards. You will need the numbers 0-9 without the numeric indicator as well as the plus sign and separation line. After you braille the numbers and symbols on individual pieces of index cards, cut out the right top corner on each card and attach it to a magnet.

   If preferred, you can use a ½ sheet of 1-inch graph paper from American Printing House for the Blind to create a board for the activity. Attach a Velcro dot in each square. Afterwards, braille the numbers 0-9 without the numeric indicator as well as the plus sign and separation line. Then cut the numbers apart, cut out the right top corner, and place a Velcro dot on the back of each card.

   Before beginning the activities, have the student place the numbers and symbols in a work tray or on a piece of rubber shelf liner. This will help the cards to not move as much. It may also be helpful to remind the student that the numbers will not begin with a numeric indicator since they will be used in a spatially aligned addition problem.

   Then follow the script in the B1 document to build the vertically aligned problems. It is important to invite the student to place his/her hands on top of your hands as you build the first problem so that he/she can see how you are building the problem.

If preferred, this activity may be completed with the Math Window Braille Basic Math Kit in Nemeth.

4) In some of the activities, the student will listen carefully and then write the braille symbols, problems or equations that he/she hears. It is highly recommended that these activities be completed using a braillewriter and braille paper since spatially aligned problems require more than one line in braille.

   Begin each time by asking the student to listen carefully as you read the braille symbols, problems, or equations. Afterwards he/she will write what he/she hears in braille. Remind the student to check his/her work. An answer key has been provided for these activities in the document entitled "B3 Module 2_Answer Key for Writing Activities_1".

5) For the activity on page 17 in the module, create flash cards with the problems below using index cards or emboss the flash cards on pages 3-4 of the braille document entitled "Flash Cards for Module 2_ 1". Answers are provided for you in parentheses to assist you in placing the answers on the back of the flash cards.

6 -3 (3)	3 -1 (2)	2 -2 (0)
8 -4 (4)	10 -9 (1)	7 -5 (2)
8 -3 (5)	5 -1 (4)	9 -8 (1)
7 -1 (6)	4 -2 (2)	9 -5 (4)
10 -4 (6)	6 -5 (1)	7 -6 (1)

$$\begin{array}{r} 3 \\ -2 \\ \hline (1) \end{array} \qquad \begin{array}{r} 5 \\ -4 \\ \hline (1) \end{array} \qquad \begin{array}{r} 10 \\ -3 \\ \hline (7) \end{array}$$

Similar to the other flash card activities, cut out the upper right corner of each flash card for easy identification of orientation. If you would like for the student to be able to use the flash cards independently, place the answers on the back of each flash card using the Feel 'n Peel Stickers: Nemeth Braille-Print Numbers from American Printing House for the Blind.

Begin by shuffling the flash cards, and then have the student select a card. After the child reads each problem in vertical alignment and tells you the answer, have him/her use a sorting tray to separate which cards he/she has read and which cards he/she has not read.

6) The follow-up activity is a game for 2 or more players called Roll and Race. It is an adaptation of a game available at https://thisreadingmama.com.

Each player will need a Roll and Race game card and markers. The game cards (in both print and braille) are included in separate documents; they are ready to be printed or embossed. You will also need a tactile die or a homemade cube with the Nemeth numbers 1-6. You can use a small box that it is taped shut for the cube. Label the 6 faces of the cube with Nemeth numerals 1-6 using the Nemeth Feel 'n Peel stickers from American Printing House for the Blind. If some of the players read print, add print to the homemade cube.

Small stickers or pieces of Wikki Stix® can be used for markers. If you use Wikki Stix® pieces, roll them into a ball with your hand so that they will stick to the paper more easily. Another option is using pushpins on a cork board or magnets on a cookie sheet.

The first player to get 3 markers in a row wins the game! Each time you find a missing number in an equation with the same value as you rolled on the cube, you will earn the right to place a marker on the problem. Once you have 3 markers horizontally in a row, call out "Roll and Race".

Instructions for playing Roll and Race:

Begin by telling the students that they will play until a winner calls out "Roll and Race". Then have the players use their hands to explore their game card. Let them know that the title is centered on the first line. Below the title the players will find three rows of problems with four addition and/or subtraction problems on each row.

Next, have the students take turns rolling the homemade cube and finding an equation on their game board that has a missing number with the same value as they rolled on the cube. Then they will place a marker on top of that equation. There may be more than one equation with a missing number of the same value, so they get to decide where to place their sticker or Wikki Stix® each time. Think about which one will help you get 3 markers in a row horizontally.

Continue playing until one of the students has 3 markers in a row and calls out "Roll and Race". This activity can easily be completed with several students who read print or braille. You are welcome to play if no other students are available.

Materials Commercially Available:

Materials that could be used from the American Printing House for the Blind (www.aph.org) include

- FOCUS in Mathematics Kit, Second Edition that includes base ten blocks (with print Teacher's Guide 1-08280-01, with braille Teacher's Guide 1-08281-01)
- Small Work-Play Tray with Dividers (1-03751-00, 1-03770-00) *also available within the FOCUS in Mathematics Kit*
- *Feel 'n Peel Stickers: Nemeth Braille-Print Numbers 0-100 (1-08876-00)
- Embossed Graph Sheets: 1 inch Squares, 10 x 10 Grid (1-04058-00)
- *Feel 'n Peel Point Symbols or Stars (1-08846-00; 1-08868-00; 1-08867-00)
- *Feel 'n Peel Stickers: Basic Math Symbols (1-08892-00)
- *Feel 'n Peel Sheets: Carousel of Textures (1-08863-00)
- Addition and Subtraction Table (5-82699-00)
- *Game Kit: Materials Bag with 4 Dice, 6 Game Tokens (61-131-0452; includes 2 tactile dice)

  * *WARNING: CHOKING HAZARD -- Small Parts. Not intended for children ages 5 and under without adult supervision.*

Materials that could be used from Wikki Stix® (https://www.wikkistix.com/) include

- Wikki Stix

Materials that could be used from the Digi-Block Store (https://www.digiblock.com) include

- Classic Block-of-100
- Power Block-of-100

Materials that could be used from Math Window (https://mathwindow.com/) include

- Math Window Braille Basic Math Kit in Nemeth

Fun Facts from:

72 Interesting Facts about Airplanes by Karin Lehnardt
https://www.factretriever.com/airplane-facts

44 Interesting Facts about Aviation and Airplanes You Never Knew by Sudhir Sheoran
http://incomopedia.com/aviation-and-airplanes-interesting-facts/