

First Grade Module 2

Vertical Spatial Problems, Including Problems with Omissions

Teacher Guide

Prerequisite Skills

- Ability to identify the numbers 1-10
- Ability to 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

Symbols and Concepts

- Separation line used in spatially aligned problems
- Problems and equations in a vertical format
- 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:

- Read problems involving addition in a vertical format that include numbers 0-10, plus sign, and a separation line
- Read equations involving subtraction in a vertical format that include numbers 0-10, minus sign, and a separation line
- Fluently add within 10, including with equations in a vertical format
- Read a general omission symbol in a problem in a vertical format
- Determine the unknown whole number in an addition equation in a vertical format within 10 that relates three whole numbers
- Fluently subtract within 10, including equations in a vertical format
- Determine the unknown whole number in a subtraction equation in a vertical format within 10 that relates three whole numbers

- Read numbered and unnumbered problems that contain a general omission symbol involving addition within 10 in a vertical format
- Read numbered and unnumbered problems that contain a general omission symbol involving subtraction within 10 in a vertical format
- Write a separation line in problems and equations
- Write answers to addition or subtraction problems in a vertical format
- Use the braillewriter to write problems and equations involving addition in a vertical format
- Use the braillewriter to write problems and equations involving subtraction in a vertical format

Other ECC Skills Addressed

Note: ECC stands for Expanded Core Curriculum.

- 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

Required Materials

- Braillewriter
- Braille paper
- Index cards
- Braille documents available within the curriculum
 - Student braille document
 - Flashcards
 - Find the Path activity page
 - Roll and Race game cards
- Wikki Stix®
- Work and/or sorting trays
- Timer
- Assortment of stickers, including large stickers

- Tactile graphic supplies such as buttons, cork board, cardboard, felt or textured paper
- Magnets with two each of the Nemeth numbers 0-10 without the numeric indicator, plus sign, and separation line that is 5 cells long
- Cookie sheet or magnetic board
- Tactile die or homemade cube labeled with Nemeth numbers 1-6
- Tactile markers

Optional Materials

- Nonslip surface such as rubber shelf liner
- Pipe cleaners
- Braille documents available within the curriculum
 - Writing answers braille document
 - Answer key for the Find the Path activity (also available in print)
 - Five frame and ten frame (or Tactile Five and Ten Frames from the American Printing House for the Blind [APH])
- Math Window Braille Basic Math Kit in Nemeth
- Small storage boxes
- Velcro dots and 1-inch embossed graph paper from APH
- Pennies
- Cork board and pushpins

Teaching Tips

- Before opening any BRF files in Duxbury,
 - Go into the Global menu.
 - Select "**Formatted Braille Importer.**"
 - Select 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.
- All braille files in the curriculum are formatted with a 32-cell width by default.
- 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 symbols or equation incorrectly, tell the student the correct way to read the symbol or equation.
- Sorting trays often define the workspace. 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 their fingers across the braille and check their 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.
- We maintain a list of [commercially available materials](#) that can be used to supplement instruction.

Activities

Activity 1

- Students will use flashcards to practice reading addition problems in vertical alignment and determine missing numbers.
- You can either create flashcards with the problems below using index cards or emboss the flashcards on pages 1-2 of the braille document entitled "G1-M2-Flashcards.brf". Answers are provided in parentheses to assist you in placing the answers on the back.

[6 plus 2 equals 8, 3 plus 3 equals 6, and 2 plus 1 equals 3]

$$\begin{array}{r} 6 \\ +2 \\ \hline (8) \end{array} \quad \begin{array}{r} 3 \\ +3 \\ \hline (6) \end{array} \quad \begin{array}{r} 2 \\ +1 \\ \hline (3) \end{array}$$

[1 plus 5 equals 6, 0 plus 0 equals 0, and 7 plus 2 equals 9]

$$\begin{array}{r} 1 \\ +5 \\ \hline (6) \end{array} \quad \begin{array}{r} 0 \\ +0 \\ \hline (0) \end{array} \quad \begin{array}{r} 7 \\ +2 \\ \hline (9) \end{array}$$

[8 plus 1 equals 9, 5 plus 5 equals 10, and 3 plus 3 equals 6]

$$\begin{array}{r} 8 \\ +1 \\ \hline (9) \end{array} \quad \begin{array}{r} 5 \\ +5 \\ \hline (10) \end{array} \quad \begin{array}{r} 3 \\ +3 \\ \hline (6) \end{array}$$

[7 plus 0 equals 7, 4 plus 5 equals 9, and 2 plus 5 equals 7]

$$\begin{array}{r} 7 \\ +0 \\ \hline (7) \end{array} \quad \begin{array}{r} 4 \\ +5 \\ \hline (9) \end{array} \quad \begin{array}{r} 2 \\ +5 \\ \hline (7) \end{array}$$

[3 plus 4 equals 7, 2 plus 2 equals 4, and 8 plus 0 equals 8]

$$\begin{array}{r} 3 \\ +4 \\ \hline (7) \end{array} \quad \begin{array}{r} 2 \\ +2 \\ \hline (4) \end{array} \quad \begin{array}{r} 8 \\ +0 \\ \hline (8) \end{array}$$

- Cut out the upper right corner of each flashcard for easy identification of orientation. If you would like for the student to be able to use the flashcards independently, place the answers on the back of each flashcard using the Feel 'n Peel Stickers: Nemeth Braille-Print Numbers from APH.
- Begin by shuffling the flashcards, and then have the student select a card. After the child reads each problem in vertical alignment and tells you the answer, have them use a sorting tray to separate which cards they have read and which cards they have not read.

Activity 2

All information is provided in the teacher script.

Activity 3

- The student will complete a set of math problems to find a path that will help a pilot locate her airplane.
- The Find the Path 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.
- Even though the "BANA Guidelines for the Transcription of Early Educational Materials from Print to Braille" says two blank lines should follow a centered heading, we have used one blank line instead so that the activity will fit on a single page.

Activity 4

- 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 0-10 without the numeric indicator as well as the plus sign and separation line. After brailleing 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 half sheet of 1-inch graph paper from APH 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 activity, 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 to build the vertically aligned problems. It is important to invite the student to place their hands on top of your hands as you build the first problem so that they can see how you are building the problem.
- If preferred, this may be completed using Math Window Braille Basic Math Kit in Nemeth.

Activity 5

- The student will listen carefully and then write the vertically aligned addition problems that they hear. It is highly recommended that this activity be completed using a braillewriter and braille paper since spatially aligned problems require more than one line in braille.
- Remind the student to check their work. An answer key has been provided for this activity in the braille document entitled "G1-M2-Writing-Answers.brf".

Activity 6

Activity 6 is the same as Activity 5. However, some of the addition problems will have a two-digit number.

Activity 7

- Create flashcards with the problems below using index cards or emboss the flashcards on pages 3-4 of the braille document entitled "G1-M2-Flashcards.brf". Answers are provided in parentheses to assist you in placing the answers on the back.

[6 minus 3 equals 3, 3 minus 1 equals 2, and 2 minus 2 equals 0]

$$\begin{array}{r} 6 \\ -3 \\ \hline (3) \end{array} \quad \begin{array}{r} 3 \\ -1 \\ \hline (2) \end{array} \quad \begin{array}{r} 2 \\ -2 \\ \hline (0) \end{array}$$

[8 minus 4 equals 4, 10 minus 9 equals 1, and 7 minus 5 equals 2]

$$\begin{array}{r} 8 \\ -4 \\ \hline (4) \end{array} \quad \begin{array}{r} 10 \\ -9 \\ \hline (1) \end{array} \quad \begin{array}{r} 7 \\ -5 \\ \hline (2) \end{array}$$

[8 minus 3 equals 5, 5 minus 1 equals 4, and 9 minus 8 equals 1]

$$\begin{array}{r} 8 \\ -3 \\ \hline (5) \end{array} \quad \begin{array}{r} 5 \\ -1 \\ \hline (4) \end{array} \quad \begin{array}{r} 9 \\ -8 \\ \hline (1) \end{array}$$

[7 minus 1 equals 6, 4 minus 2 equals 2, and 9 minus 5 equals 4]

$$\begin{array}{r} 7 \\ -1 \\ \hline (6) \end{array} \quad \begin{array}{r} 4 \\ -2 \\ \hline (2) \end{array} \quad \begin{array}{r} 9 \\ -5 \\ \hline (4) \end{array}$$

[10 minus 4 equals 6, 6 minus 5 equals 1, and 7 minus 6 equals 1]

$$\begin{array}{r} 10 \\ -4 \\ \hline (6) \end{array} \quad \begin{array}{r} 6 \\ -5 \\ \hline (1) \end{array} \quad \begin{array}{r} 7 \\ -6 \\ \hline (1) \end{array}$$

[3 minus 2 equals 1, 5 minus 4 equals 1, and 10 minus 3 equals 7]

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

- Similar to the other flashcard activities, cut out the upper right corner of each flashcard for easy identification of orientation. If you would like for the student to be able to use the flashcards independently, place the answers on the back of each flashcard using the Feel 'n Peel Stickers: Nemeth Braille-Print Numbers from APH.
- Begin by shuffling the flashcards, and then have the student select a card. After the child reads each problem in vertical alignment and tells you the answer, have them use a sorting tray to separate which cards they have read and which cards they have not read.

Activity 8

All information is provided in the teacher script.

Activity 9

Activity 9 is similar to Activity 5. However, students will practice writing numbered vertically aligned subtraction problems.

Activity 10

All information is provided in the teacher script.

Activity 11

Activity 11 is similar to Activity 5. However, students will practice writing unnumbered vertically aligned addition problems containing a general omission symbol.

Activity 12

- This 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 APH. 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 they will stick to the paper more easily. Other options are 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.

Fun Facts

Lehnardt, K. (2017, February 18). *72 interesting facts about airplanes*. Fact retriever. Retrieved June 4, 2020, from

<https://www.factretriever.com/airplane-facts>

Sheoran, S. (2019, February 13). *44 interesting facts about aviation and airplanes you never knew*. Incomopedia. Retrieved June 4, 2020, from <http://incomopedia.com/aviation-and-airplanes-interesting-facts/>