

First Grade Nemeth Braille Code Curriculum
Module 4: Subtraction to 20 and Equal Shares of Circles and Rectangles
Teacher Reference Materials

Prerequisite skills:

- Ability to tactually identify the numbers 1-20
- Ability to tactually identify the minus sign and separation line
- Ability to write the numbers 1-20
- Ability to write the minus sign and separation line
- Ability to read and write the numbering of math problems from 1-10, including the punctuation indicator and period
- Ability to represent subtraction within 10
- Tactually identify a circle, rectangle, and half-circle

Math symbols and concepts, including braille knowledge, addressed:

- Nemeth Braille Code problems and equations in a vertical format
- Fluently add and subtract within 10
- Use multiple strategies to subtract within 20
- Relate counting to subtraction
- Subtract within 20 with Nemeth Code problems in a vertical format
- Tactually identify equal shares of circles and rectangles
- Tactually identify unequal shares of circles and rectangles
- Verbally describe attributes of equal shares of circles and rectangles
- Use tactile drawing tools to create shapes and partition them into equal shares

Objectives:

The student will be able to:

- 1) Read unnumbered and numbered Nemeth Code problems involving subtraction in a vertical format that include numbers 0-20, minus sign, and a separation line
- 2) Fluently subtract within 10, including with Nemeth Braille Code equations in a vertical format
- 3) Subtract within 20, including with Nemeth Braille Code equations in a vertical format
- 4) Write the answer to a subtraction problem using correct Nemeth Code in a vertical format
- 5) Use the braillewriter to write Nemeth Braille Code problems and equations involving subtraction within 20 in a vertical format

- 6) Tactually identify circle, rectangle, and half-circle regardless of size and orientation
- 7) Tactually identify shares of a circle and rectangle as equal or unequal
- 8) Verbally describe attributes of equal and unequal shares of a circle and a rectangle
- 9) Use tactile drawing tools to create a circle and a rectangle and partition the shape into equal shares
- 10) Partition manipulatives and tactile graphics of a circle and a rectangle into equal shares
- 11) Describe the shares of circles and rectangles using the words, halves, fourths, and quarters

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 may be helpful to point out that braille page numbers are placed at the right margin on the last line.

- 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!
- General education classroom manipulative kits for 1st grade often include two-dimensional shapes in different sizes.
- Shapes can be created in a variety of ways, including with Wikki Stix® or textured paper.
- Encourage the student to verbalize the process he/she uses when solving problems and identifying shapes and shares of shapes tactually.
- When teaching the child how to tactually discriminate 2-dimensional shapes and equal shares of shapes, use a variety of sizes for the shapes. The child will also need to explore shapes in different orientations.
- It is recommended that shapes be drawn by using a continuous, clockwise motion.
- The student may draw the shapes free-hand or by using stencils.

Materials/technology needed:

- Braillewriter
- Braille paper
- Index cards
- Flash cards (available in braille within the curriculum)
- Work and/or sorting trays
- Supplies such as textured paper, cardboard, and/or foam board to make the 2-dimensional shapes
- Scissors
- Construction paper
- Glue or glue stick
- inTACT Sketchpad or the DRAFTSMAN: Tactile Drawing Board
- Sketchpad stylus
- Stencils
- Playdough
- Circle cookie cutter
- Cutting tool such as a plastic knife
- 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
- Teddy Bear Counters

- Wikki Stix®
- 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)
- Five Frame and Ten Frame (available in contracted and uncontracted braille within the curriculum)
- Rubber shelf liner
- Timer

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 the sum.

For the activity on page 3 located in the module, you can either create flash cards with the following problems using index cards or emboss the flash cards on pages 1-2 of the braille document entitled "Flash Cards for Module 3_1":

15	8	10
<u>-2</u>	<u>-3</u>	<u>-4</u>
(13)	(5)	(6)

12	19	9
<u>-1</u>	<u>-2</u>	<u>-4</u>
(11)	(17)	(5)

14	15	18
<u>-3</u>	<u>-0</u>	<u>-1</u>
(11)	(15)	(17)

19	12	16
<u>-0</u>	<u>-5</u>	<u>-3</u>
(19)	(7)	(13)

13	20	18
<u>-2</u>	<u>-1</u>	<u>-0</u>
(11)	(19)	(18)

$\begin{array}{r} 10 \\ - 4 \\ \hline (6) \end{array}$	$\begin{array}{r} 7 \\ - 3 \\ \hline (4) \end{array}$	$\begin{array}{r} 19 \\ - 1 \\ \hline (18) \end{array}$
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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.

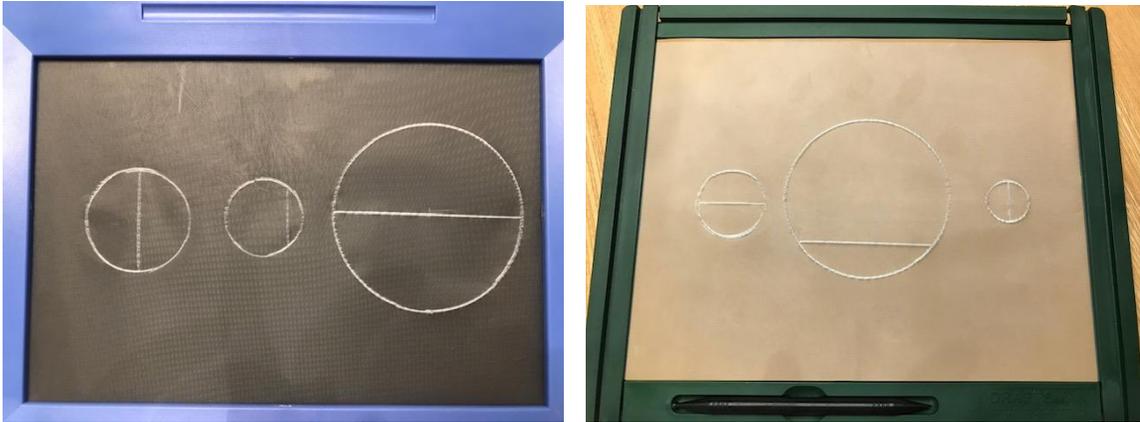
- 2) In some of the activities, the student will listen carefully and then write the braille symbols, problems or equations that he/she hears. It is highly recommended that these activities be completed using a braillewriter and braille paper since spatially aligned problems require more than one line 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 4_Answer Key for Writing Activities_1".

- 3) In an activity embedded in the module on page 12, students will scan tactile graphics of shapes that have been created with either the inTACT Sketchpad or DRAFTSMAN: Tactile Drawing Board.

Before beginning this activity, draw three circles on the tactile film. You may use stencils or draw free-hand. It is recommended that shapes be drawn by using a continuous, clockwise motion. You will get more tactual feedback if you close your eyes when you draw the shapes using a stencil. In addition, the shapes should be of different sizes and orientations. You may also use a ball-point pen instead of a stylus.

Afterwards, divide two of the circles into two equal parts with a line. Then divide one of the circles into two drastically unequal parts with a line.



If preferred, the shapes can be created with Wikki Stix® or textured paper.

The activity will begin by telling the student to use both hands and scan the drawing film from left to right. Then ask the student to tell you about the shapes, moving from left to right. If needed, use hand-under-hand technique to model scanning the drawing film from left to right. Next, direct the student to locate the two circles that have been divided into two equal parts with a line. It may be helpful to point out that a circle can be divided into two equal parts in many different ways, including with either a horizontal or vertical line. Afterwards, ask the student to find the circle that has been divided into two unequal parts with a line.

- 4) In an activity beginning on page 13, students will use tactile drawing tools, including the inTACT Sketchpad or the DRAFTSMAN, to create shapes and then divide the shapes into equal shares. If students are not familiar with the tool, provide an opportunity for the student to explore the tool and learn how to place drawing film in and out of the tool before beginning the activity.

If there is a drawing film with tactile drawings already in the tool as you begin the activity, have the student remove the film from the Sketchpad (or the DRAFTSMAN) and place a new sheet of tactile drawing film in the Sketchpad (or the DRAFTSMAN). Then tell the student that he/she will be using the stylus and a stencil to draw a

circle on the left side of the tactile drawing film. Also let the student know that the stylus is sometimes called a drawing tool. If needed, provide information about how to hold the stylus and/or use hand-under-hand technique to draw the circle together. It is recommended that shapes be drawn by using a continuous, clockwise motion. The student may also use a ball-point pen instead of a stylus. The student may even enjoy drawing the shapes free-hand.

After the student draws the circle, work together to draw a line with a ruler that divides the circle into two equal parts. Encourage the student to check his/her work and tell you about the drawing. Also describe the parts of circles using the word halves.

Afterwards, tell the student that rectangles can also be divided into two equal parts. Then have the student draw a rectangle on the right side of the tactile drawing film with the stylus and a stencil. Since there are several ways to divide a rectangle into two equal parts, ask the student about his/her preference. If needed, discuss the different types of lines such as horizontal, vertical, and diagonal. You can also draw examples of the types of lines using the stylus on the tactile drawing film.

Next, work together with the student to draw a line to divide the rectangle into two equal parts. Once again, encourage the student to check his/her work and tell you about the drawing.

Before moving to the next part of the activity, have the student remove the film from the Sketchpad (or the DRAFTSMAN) and place a new sheet of tactile drawing film in the Sketchpad (or the DRAFTSMAN). Then ask the student to draw another circle and rectangle. Next have the student divide one of the shapes into two equal parts and the other shape into two unequal parts. Afterwards, have the student tell you about the shapes that have been divided into two parts.

- 5) In another activity embedded in the module, the student will learn how to partition a 2-dimensional shape into four equal shares. You will need a piece of construction paper and glue (or a glue stick). Begin by allowing the student to explore the shape. Then work together to divide each shape into 4 equal shares. It is important to describe the shares of the shape using the words fourths and quarters.

Then have the student glue the pieces onto the construction paper and recreate the original shape.

- 6) You will need playdough, a circle cookie cutter (or mold), and a cutting tool such as a plastic knife for the last shape activity. The student will begin the activity by flattening the playdough by pounding or squishing it. Next he/she will create a circle with the playdough. It may be helpful to use the circle cookie cutter (or mold). Afterwards, work together to cut the circle into two equal shares and then carefully place the pieces on top of each other so that the student can ensure that the shares are equal shares. Once again describe the shares as halves.

Then encourage the student to use his/her hands to squash the pieces back together into one piece and then create another circle with the playdough. Next work together to cut the circle into two unequal shares and carefully place the two pieces on top of each other. Ask the student if the shares are the same size. Encourage the student to tell you how the shares differ.

Afterwards, have the student use a similar process to create a circle and then a rectangle. Then work together to divide each shape into four equal shares and carefully place the four pieces on top of each other. Each time ask the student if the shares are the same size and how does he/she know.

If desired, a rectangular mold can be used.

- 7) The follow-up activity is a game called FEED THE MONSTER. Your student will need a braillewriter, notecards, flash cards with various addition and subtraction problems for each child, braille paper, a sorting tray, a timer, and an empty container. Previously made flash cards with subtraction and addition problems within 20 may be used instead of making new flash cards if preferred.

Second, have the student decorate the empty container that will be the "monster". If you would like, the student is welcome to name the monster. He/she can also "decorate" the monster with scented stickers, Wikki sticks, buttons, or textured paper. Next have the student shuffle the cards.

Based on the child's preference, he/she can feed a dog, cat, or other animal instead of a monster.

Instructions for playing FEED THE MONSTER:

- You will need 2 or more players for this game. Shuffle the deck of cards and pass out an equal number of flash cards to each player. You can pass out all of the flash cards or some of the flash cards based on whether you want to work on all of the addition and subtraction facts or select specific facts based on the need for additional practice.
- Begin by telling the student that you will call out a number the monster is hungry for, and the students will race to find a problem with that same number as the answer. For example, if the monster is hungry for the number 5, the student will try to find a problem such as $9-4$ or $11-6$.
- As the student reads each number card, encourage him/her to use a sorting tray to separate which cards have been read and which cards have not been read. As soon as the student finds a problem with that same number as the answer, he or she should try to be the first one to feed the monster. All of the students are reading their own number cards at the same time. The students are not taking turns.
- The monster can only eat the first flash card it is given. It is then ready for the next number. If you would like, you can use a timer to encourage the student(s) to quickly read the cards. You can set the timer or the student can set the timer. This would provide an opportunity to show a student how to use a variety of timers, including timer apps, braille timers, etc.
- Every time your student is the first to feed the monster, have him/her write a tally mark on a piece of braille paper to help him/her keep up with how many times he/she has fed the monster. Remind the student to write the tally marks in sets of five and leave a space between the sets.
- At the end of the game, whoever has fed the monster the most cards is the winner! A game can last 10 minutes or how long it

takes for the winner to feed the monster a certain number of times.

- This game can easily be played with students who read print or braille. If one of the players reads print, add print to each of the flash cards. The length of time you play and the length of time to locate numbers is up to you.

Materials Commercially Available:

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

- 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)
- DRAFTSMAN: Tactile Drawing Board (1-08857-00)
- DRAFTSMAN: Tactile Drawing Film (25 sheets; 1-08858-00)
- DRAFTSMAN: Tactile Drawing Tool (61-151-070)
- DRAFTSMAN: Tactile Ruler, English (61-154-061)
- Graphic Art Tape (1-08878-00)
- Fractional Parts of Wholes Set (1-03290-00)
- MathBuilders, Unit 7: Fractions, Mixed Numbers, and Decimals Kit (7-03564-00)
- MathBuilders, Unit 6: Geometry Kit (7-03563-00)
- Puzzle Form Board Kit (1-03721-00)
- Embossed Graph Sheets: 1 Inch Squares, 10 x 10 Grid (1-04058-00)
- *Picture Maker: Wheatley Tactile Diagramming Kit (1-08838-00) Many of these objects and a blue felt board are also available in the MathBuilders Unit 1 and the FOCUS in Mathematics Kits.
- *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)
** 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 Didax (<http://www.didax.com/>) include

- Teddy Bear Counters
- Unifix cubes

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

Materials that could be used from E.A.S.Y. LLC.

(<http://www.easytactilegraphics.com/intact-products/>) include

- inTACT Sketchpad

Fun Facts from:

Science for Kids

<http://www.scienceforkidsclub.com/helicopters.html>

Science Kids: Fun Science & Technology for Kids

<http://www.sciencekids.co.nz/sciencefacts/vehicles/helicopters.html>

Helicopter International Association

<https://www.rotor.org/resource?ArtMID=493&ArticleID=50>