

Second Grade Nemeth Braille Code Curriculum Module 2: Subtraction to 100 and the Cancellation Indicators

Note: *It is recommended that this module be completed with hard copy braille and a braillewriter instead of a refreshable braille display.*

It's time to prepare for a ride in a bus! Before we begin our journey, locate the title at the top of the page and read the title to me.

Yes, it says Second Grade Nemeth Code Curriculum Module 2: Subtraction to 100 and the Cancellation Indicators.

Move your hands down to the sixth line of braille on the page. There is just one symbol on the line. What is this symbol called and what is its purpose?

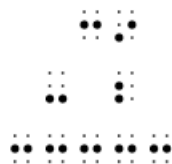


You got it! It is called an opening Nemeth Code indicator, and it tells us that we are going to read math or science.

Fun fact: The largest bus in the world holds 300 passengers.

For the first part of our adventure, let's review how to read subtraction problems that are vertically aligned. This format is very helpful when we calculate or compute the answer!

Directly below the opening Nemeth Code indicator, there is a problem for you to explore with your hands. The minuend is written directly above the subtrahend in the equation.



Math problems are considered to be in spatial format when the numbers are vertically aligned. When we read and write subtraction problems and equations in vertical alignment, we do not use numeric indicators.

The problem begins with what number in the first line?

That's right. It begins with the number 39. Now move your hands down to the next line. You will find a minus sign. Which dots make the minus sign?

You got it! Dots 3-6 make the minus sign. Notice that there is not a numeric indicator after the minus sign.

Now it is time to read the next problem. Yes, this problem is $48-3$. Use the count back strategy to determine what $48-3$ equals. You got it! Forty-eight minus three equals forty-five.

Locate the braille page number at the bottom of the page. What page are we reading?

Yes, we are reading page 1.

Note: *If needed, point out that braille page numbers are placed at the right margin on the last line. Also point out that braille page numbers are transcribed in Unified English Braille, not the Nemeth braille code.*

Fun fact: The first horse-drawn bus was introduced in Paris by Blaise Pascal more than 350 years ago.

Activity time: Let's use flash cards to practice reading problems in vertical alignment and use the count back method to find the difference. Read each problem and then tell me the answer before moving to the next flash card.

Note: *Flash cards are available in braille within the curriculum. It may be helpful to place the flash cards on a nonslip surface such as a rubber shelf liner for this activity.*

Good work, Nemeth superstar! We need to walk down the street on the sidewalk to the bus stop because the bus will be arriving soon!

For the second part of the adventure, let's use what we know about skip counting and the Counting to 120 Chart to subtract within 100. Before we begin, let's practice skip counting by 10s to 120 together.

10 20 30 40 50 60 70 80 90 100 110 120

Now let's use our Counting to 120 Chart as we skip count by 10s.

Note: *Count by 10s, beginning with 10. Have the student keep their place on 10 with their left hand and move their right hand to the next row. As needed, have the student count to 10 with you each time. Make sure they notice that their right hand ends up directly under where they started. Don't give this away, but try to help them discover the pattern.*

What pattern did you notice? Yes, all of the numbers for skip counting by 10s are in the same column. A column goes up and down.

What do you think will happen if I change the starting number to 3?

Will the pattern for skip counting by 10s remain the same or will it change?

Note: Give the student time to discover this pattern on their own.

Will all of the numbers be in the same column? How do you know?

Let's skip count by 10s beginning with 3, using our chart, and find out.

3 13 23 33 43 53 63 73 83 93 103 113

Note: Count by 10s, beginning with 3. As needed, have the student move their hands from left to right and count to 10 with you each time.

Notice how all of the numbers for skip counting by 10s beginning with 3 are in the same column again. The last digit for all of the numbers is 3.

We can also skip count backwards! Help me count backwards from 120 to 10 by 10s. Ready, set, go!

120 110 100 90 80 70 60 50 40 30 20 10

Note: If needed, skip count backwards by 10s, beginning with 120, several times.

Now let's use our Counting to 120 Chart as we skip count backwards by 10s.

Note: Count backwards by 10s, beginning with 120. Have the student keep their place on 120 with their left hand and move their right hand to the previous row as they count. As needed, have the student count to 10 with you each time. Make sure they notice that their right hand ends up directly above where they started. Don't give this away, but try to help them discover the pattern.

120 110 100 90 80 70 60 50 40 30 20 10

Let's use our chart and skip count backwards by 10s beginning with 85.

85 75 65 55 45 35 25 15 5

Notice how all of the numbers for skip counting backwards from 85 by 10s are in the same column too. The last digit for all of the numbers is 5.

Let's try one more together. Skip count backwards by 10s beginning with 117, using our chart.

117 107 97 87 77 67 57 47 37 27 17 7

Fun fact: Buses are an important part of public transportation all over the world. Many people who do not own cars, use buses to get around. Buses make it easy for people to get to where they want to go.

Now turn to page 2 in your braille document and locate the first subtraction problem. It is at the top of the page. Then read the problem to me.

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Yes, the problem is 37-20. We can determine the difference by locating 37 on the Counting to 120 Chart and then skip counting backwards by 10s using our column pattern. Remember 20 is two 10s.

37 27 17

Note: *If needed, remind the student to keep their place on 37 with their left hand and move their right hand to the previous row each time.*

That is correct! The difference is 17. Now read the next problem.

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You got it! The problem is 61-30. Let's use your Counting to 120 Chart and then skip count backwards by 10s. Remember 30 is three 10s.

61 51 41 31

Yes, the answer is 31. Read the next two vertically aligned subtraction problems on the braille page and then use what you know about skip counting backwards and the Counting to 120 Chart to determine the difference.

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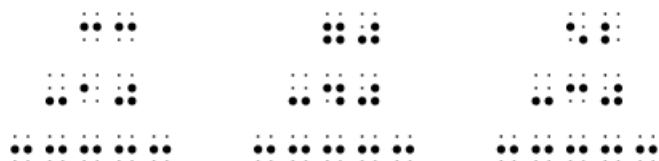
Yes, that's right. The first of these two problems is 85-10. What is the difference?

That's correct. The difference is 75. Now it is time to read the next problem.

Yes, this problem is 98-40. Use your Counting to 120 Chart and tell me the difference.

Outstanding! Ninety-eight minus forty equals fifty-eight.

We have three more problems at the bottom of the page. This time, the problems are side-by-side.



We are going to read each problem, determine the difference, and write the answer before moving to the next problem. Please follow these specific instructions:

Begin by placing page 2 in the brailewriter, and then roll the paper into the brailewriter by using the knobs on either side of the brailewriter. The paper should stop automatically.

We will write the answer to each subtraction problem on the line that is below the separation line. So, use your line spacing key and find the row of problems toward the bottom of the page. Now press the line spacing key until the embossing head is on the line below the separation line.

Then we will use the space bar to line up the embossing head so that we can write the difference directly under the subtrahend. You can see once again how vertical aligned problems make it easier to calculate or compute the answer!

Note: Provide assistance as needed. Also remind the student to move his/her fingers across the braille and check his/her work if needed. An answer key in braille is provided on page 1 of the document entitled "B3 Module 2_Answer Key for Writing Activities_2".

Now read the first problem.

You got it! The problem is 33-10. Use your chart and tell me the difference.

Yes, the sum of 33-10 equals 23. Now write your answer!

Excellent work! Now read the second problem.

That's correct. The second problem is 70-40. What is the difference?

You are on a roll! The difference is 30. Write your answer!

Just one more problem to complete before activity time! Begin by reading the third problem and then tell me the difference.

Yes, the problem would be read as 52-30, and the difference is 22. Write your answer! You may now remove your paper from the braillewriter.

Fun fact: The word bus comes from the Latin word "omnibus". It means "for everyone".

Activity time: You are going to place page 3 into your braillewriter, read each of the subtraction problems on the page, use one of the strategies we have learned to determine the difference, and write the answer before moving to the next problem.

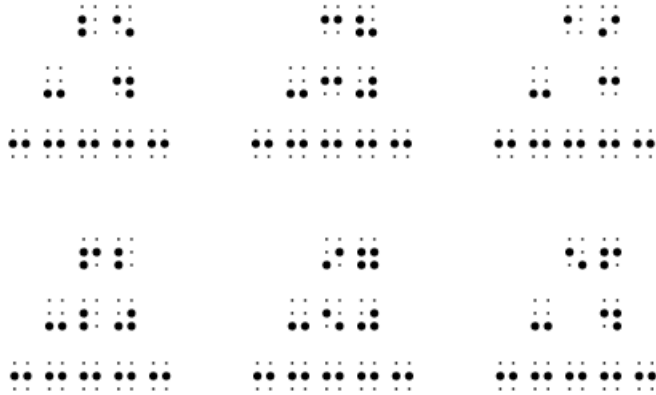
Some problems can be more easily answered using the count back strategy, and others can be more easily completed by using the Counting to 120 Chart. You can do it, Nemeth superstar!

Note: *Provide assistance as needed. Also remind the student to move his/her fingers across the braille and check his/her work if needed. An answer key in braille is provided on pages 1-2 of the document entitled "B3 Module 2_Answer Key for Writing Activities_2".*

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Since it is almost time for the bus to arrive, listen for the bus to pull up to the bus stop. When it arrives, you will hear the doors open. Then it will be time for us to get on the bus.

It is important that we ask the driver which local bus we are entering since most cities have many buses! This will help us make sure that we get to our destination! Once we have confirmed that we are on the right bus, it will be time to pay the bus fare or show our bus pass to the driver!

For the third part of the journey, let's review how to write spatially aligned subtraction problems. We will begin by getting out a new piece of braille paper and writing:

$$\begin{array}{r} 75 \\ - 41 \\ \hline \end{array}$$

Note: Repeat saying each problem as many times as needed. Also remind the student to move his/her fingers across the braille and check his/her work if needed. An answer key in braille is provided on page 3 in the document entitled "B3 Module 2_Answer Key for Writing Activities_2".

In this problem, the minuend in the first line will begin in cell 3 because the minus sign on the second line will begin in cell 2 and the separation line will begin in cell 1 on the third line. Place your fingers on the correct keys on your braillewriter, and let's get started. In order to braille the number 75 beginning in cell 3, press the space bar twice.

Then write the number. We will not need a numeric indicator since the problem is vertically aligned.

Press the line spacing key only once and move to the next line. The number 41 will be brailled directly below the minuend in the first line. The digits should be aligned according to their place value.

Where will we braille the minus sign? Yes, we will place the minus sign one cell to the left of the number 41 on the second line. Use the backspace key to line up the embossing head so that we can write the minus sign one cell to the left of the number 41. Then press the line spacing key once and move to the next line.

Now you are ready to braille the separation line below the minus sign and number 41. How do you braille a separation line? Yes, we press the dots 2-5 five times to make the separation line. It will begin in cell 1 and continue one cell to the right of the numbers.

Way to go, Nemeth superstar! Let's write another problem together, but first press your line spacing key three times.

$$\begin{array}{r} 68 \\ - 5 \end{array}$$

What should we braille first? Yes, begin by brailing the minuend on the first line. What cell will it begin in?

You got it! The number 68 will begin in the third cell in this problem. Place your fingers on the correct keys on your braillewriter and press the space bar twice so that we can write the number 68, beginning in the third cell.

We will not need a numeric indicator again since the problem is vertically aligned.

What should we do next?

That's correct. We need to press the line spacing key only once to go the next line and braille the minus sign and number 5. Just like in our last problem, the digits should be aligned according to their place value. That means that the number 5 will be placed in the ones column.

Also remember that the minus sign should be one cell to the left of the widest number in the problem. Move your embossing head to where you should braille the minus sign! You got it!

Once you are finished, press the line spacing key only once and move to the next line. Now you are ready to braille the separation line below the minus sign and numbers. How do you braille a separation line? Yes, press the dots 2-5 to make the separation line. It will begin in cell 1 and continue one cell to the right of the numbers.

Fun fact: A place on a sidewalk where people wait for a bus is called a bus stop. A building where lots of city buses meet or where people wait for a long-distance bus is called a bus station.

Try writing a subtraction problem by yourself! Begin by pressing your line spacing key three times. Then write the following problem:

$$\begin{array}{r} 42 \\ - 30 \\ \hline \end{array}$$

Very nice! Now it is time for you to write more subtraction problems! After you write each problem, press your line spacing key three times.

Note: Repeat saying each problem as many times as needed. Also remind the student to move his/her fingers across the braille and check his/her work if needed. An answer key in braille is provided on pages 3-4 of the document entitled "B3 Module 2_Answer Key for Writing Activities_2".

$$\begin{array}{r} 53 \\ - 6 \\ \hline \end{array}$$

$$\begin{array}{r} 68 \\ - 20 \\ \hline \end{array}$$

$$\begin{array}{r} 17 \\ - 4 \\ \hline \end{array}$$

$$\begin{array}{r} 88 \\ - 1 \\ \hline \end{array}$$

$$\begin{array}{r} 46 \\ - 30 \\ \hline \end{array}$$

$$\begin{array}{r} 71 \\ - 40 \\ \hline \end{array}$$

Fun fact: After more than a 100 year break, the horse drawn bus appeared again in 1812.

The next bus stop is Main Street! For the fourth part of the adventure, let's learn about the cancellation indicators.

Locate the top line of braille on page 4, and softly guide your fingers across it. In the middle of the line, you will find the Nemeth symbol for the opening cancellation indicator. There is a line of dots 2-5 before and after the opening cancellation indicator.

Now it is your turn to find the opening cancellation indicator in each line of braille. Move your fingers lightly across the line of braille and say "opening cancellation indicator" when you locate the indicator!

Great work, Nemeth superstar! In the middle of the next line of braille, you will find the Nemeth symbol for the closing cancellation indicator. There is a line of dots 2-5 before and after the opening cancellation indicator.

Now find the closing cancellation indicator in each line of braille. Move your fingers lightly across the line of braille and say "closing cancellation indicator" when you locate the indicator!

Excellent reading! We use these new Nemeth symbols when a number is crossed out or cancelled. Guide your fingers across the next to the last line of braille on page 5 as I read an example aloud.

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It begins with an opening cancellation indicator, followed by the number 8. It ends with a closing cancellation indicator. This could also be read as a cancelled 8 or perhaps as a crossed out 8.

Now you try reading the last line of braille, character by character.

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Yes, that's right. It begins with an opening cancellation indicator, followed by the number 2. It ends with a closing cancellation indicator.

Fun fact: In the 1830s, steam-engine powered buses and electric trolley buses began to operate.

Cancellation indicators are sometimes used in vertically arranged subtraction problems, especially in example problems in math textbooks and worksheets.

Let's use base ten blocks to solve a problem together and then we will learn how to read the problem that includes cancellation indicators in Nemeth Code.

The problem is 42-5.

Note: *Digi-blocks may be used as needed.*

Begin by building the number 42. Do we have enough ones to subtract 5? How do you know?

No, we do not have enough ones. 5 ones is more than 2 ones.

We can exchange a tens rod for 10 ones. This is called regrouping. We are regrouping 1 ten as 10 ones.

How many tens rods and one blocks do you have now?

Yes, you have 3 tens rods and 12 ones. Now we can subtract 5.

How many blocks do you have after subtracting 5?

Yes, you have 3 tens rods and 7 one blocks left, so $42 - 5$ equals what number?

Excellent work! Forty-one minus five equals thirty-seven.

Now let's explore the same problem in Nemeth Code. It is the first problem on page 5.

Note: *Although students are introduced to reading the opening and closing cancellation indicators in this lesson, they are not introduced to writing these symbols. Students who read braille should be able to read subtraction problems with these indicators, but they are not usually expected to rewrite and compute subtraction problems using these indicators since this would be more complex on a braillewriter. Instead, students may use an abacus, especially since using an abacus is more time efficient and will reinforce place value.*

42 - 5 = 37

The problem contains 4 lines in braille. The top line of the problem contains the renamed numbers. When we realized that there was not enough ones to subtract 5 from 2, we exchanged a tens rod for 10 unit blocks. Then we had 3 tens rods and 12 ones blocks. These are the numbers written in the first line of the problem.

The second line contains the minuend of 42. When cancellation is needed in a subtraction problem, we align the numbers to help us compute the answer.

Since we exchanged a tens rod, we cancelled the four before writing the number 3 above. So there is an opening cancellation indicator before the number 4 and a closing cancellation indicator after the number.

Since we now have 12 one blocks instead of 2 blocks, we needed to cancel the number 2 in the ones column. There is an opening cancellation indicator before the number 2 and a closing cancellation indicator after the number. Notice that there is also a space between the opening cancellation indicator and the number.

When you regroup, where do you write the regrouped numbers before subtracting?

Yes, we write the numbers above the minuend. What number should we write in the tens column and what number should we write in the ones column?

That's right. Yes, the number 8 should be written in the tens column since we now have 8 tens rods. In addition, the number 14 should be written in the ones column since we have 14 ones.

Now we are ready to subtract 7.

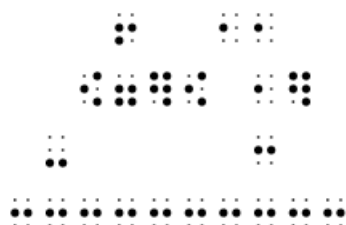
How many blocks do you have after subtracting 7?

Yes, you have 8 tens rods and 7 one blocks left, so $94 - 7$ equals what number?

Excellent work! Ninety-four minus seven equals eighty-seven. Now write your answer below the separation line. Be sure to line up your embossing head!

Note: An answer key in braille is provided on page 5 of the document entitled "B3 Module 2_Answer Key for Writing Activities_2".

Move to the third subtraction problem on the page and read it. Afterwards, talk through the process you use to figure out the difference.



Note: Offer assistance as needed if the student has difficulty explaining the process or determining the difference.

Excellent! The problem is $71 - 3$, and the answer is 68.

Fun fact: Some of the first buses in the United States were operated by sightseeing companies in New York City.

Activity time: Read each of the subtraction problems that include cancellation indicators on pages 6-7. Write each answer on another piece of paper, using your braillewriter, before moving to the next problem. Leave one space between your answers.

Note: Offer assistance as needed. An answer key in braille is provided on pages 6-7 of the document entitled "B3 Module 2_Answer Key for Writing Activities_2". If preferred, there is adequate space in the braille document for students to write their answer below the separation line in each problem and the answer key is provided in this format.

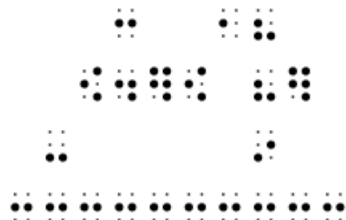
$$\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$$

$$\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$$

$$\frac{3}{4} \times \frac{2}{3} = \frac{1}{1}$$

$$\frac{1}{3} \times \frac{2}{5} = \frac{2}{15}$$

$$\frac{2}{5} \times \frac{3}{4} = \frac{3}{10}$$



Below the last problem, there is a Nemeth Code terminator.



This symbol tells us that we are almost finished with our math adventure. Sometimes this symbol comes at the end of a braille document, just like it is this time. This symbol can also be used in other places within a document to tell us that we are finishing a math section and are moving to literary material.

Fun fact: A double decker bus has two floors and can carry about 70 people.

The bus is stopping! Let's ask the bus driver to confirm that we are at our destination, Main Street!

Yay! We did it! Taking the bus is a fun way to travel! Let's finish our adventure with a follow-up activity.

Follow-up activity: We are going to play a new game for two or more players. The player who is closer to 10, but not less than 10, when the timer rings, wins the game! You will need your braillewriter, braille paper, a timer, and a die.

Note: *If any of the students read print, then they will need paper and a pencil instead of a braillewriter and braille paper. As needed, base ten blocks or Digi-Blocks can be used.*

Additional directions are included in the Teacher Reference document.

First, decide how long the game will last and set a timer. Second, have the students write the number 99 at the top of his/her page. Third, decide which player will roll the die first.

As each player rolls the die, they can either take the number as a one or a ten. For example, if the player rolls a 3, they can take it as a 3 or a 30. Students subtract their numbers until a person either hits 10 or the timer rings!

The first number rolled is subtracted from 99, using spatial format. So if the player decides to take it as a 30, the problem would be:

$$\begin{array}{r} 99 \\ -30 \\ \hline 69 \end{array}$$

So if the player decides to take it as a 3, the problem would be:

$$\begin{array}{r} 99 \\ -3 \\ \hline 96 \end{array}$$

The goal is to reach 10 or be closer to 10 than your opponents when the timer rings, so choose your number carefully each time! If your number is less than 10, you automatically lose! Good luck, Nemeth superstar!