

First Grade Module 1

Addition and Subtraction to 10, English Letter Indicator for Multiple Choice, and Long Dash Teacher Script Answer Key

Introduction

- All bracketed text should not be read aloud and is for reference only.
- The questions and answers have been numbered in this document to aid teachers and parents. However, the questions are not numbered the same way, if numbered at all, in the student documents.
- Throughout the script, it is assumed that the student is correct. The teacher may need to go off script if the student does not answer a question correctly.

Section 1: Five Frame Review

Section 1 Materials

- Five frame available in braille within the curriculum (Alternatives: Tactile Five and Ten Frames from American Printing House for the Blind [APH], line segments from the APH Picture Maker Wheatley Tactile Diagramming Kit placed in the shape of a five frame)
- Five pennies (Alternatives: APH Tactile Tokens, small pieces of Wikki Stix®, magnetic counters, shapes from the APH Picture Maker Wheatley Tactile Diagramming Kit) in a bowl or work tray
- Optional: nonslip surface such as rubber shelf liner for the five frame (Alternatives: cookie sheet or magnetic board, if using magnets)
- Activity 1: in addition to the other materials used in Section 1,
 - Sorting tray with a 2-section divider
 - Three flashcards for each number from 0-5 shuffled
 - Timer

Section 1 Teacher Notes

- Breaking numbers down into the addition of two numbers or pairs of addends is called decomposition in math. Learning how to decompose numbers allows students to think about numbers in flexible ways and helps students develop the understanding that smaller sets of objects exist within a larger set. This provides a foundation for learning basic

math facts as well as regrouping (renaming) in subtraction in later grades.

- In the first set of problems, there are several possible correct responses. The student may indicate that they counted the empty squares on the five frame or counted in their head. The student may also place additional pennies on the five frame so that every square is filled.
- Activity 1
 - If the student selects the number 5, then no additional pennies would be needed to make 5.
 - The length of time set on the timer should be based on the individual needs of the student.
 - If desired, this game can be played more than once.
 - The length of time can be decreased each time in order to promote fluency.

Section 1 Teacher Script

It's almost time to board the airplane for a fun adventure! While we are waiting at the gate, let's review how to make 5 with a five frame.

Where will you find the title? Yes, it is at the top of the page. The title is Five Frame. There are two five frames on the page.

Now use your hands to turn the paper on its side and locate the top five frame. How many squares are in the five frame?

Now place 3 pennies on the five frame. How many more pennies are needed to make 5? That's right! We need 2 more pennies to make 5. How did you know that we need 2 more pennies to make 5?

Remove the pennies from the five frame and place them back in the work tray. Now place 1 penny on the five frame. How many more pennies are needed to make 5? That's right! We need 4 more pennies to make 5.

Activity 1

Let's play a review game called "Race to 5" with our five frame and pennies! We will also need a sorting tray and 3 flashcards for each number from 0-5.

Shuffle your flashcards and then draw a flashcard. Read the number on the flashcard and then use your five frame and pennies to tell me how many more are needed to make 5. As you read each number card, use a sorting tray to separate which cards you have read and which cards you have not read.

You will win the game if you can tell me how many more are needed to make 5 for all of the numbers before the timer goes off.

Fun Fact 1

Since the days of ancient Greece, people wanted to fly.

Section 2: Reading Equations within 5 Review

Section 2 Materials

- Student Braille Document: G1-M1-Student-Materials.brf
- Five frame available in braille within the curriculum (Alternatives: APH Tactile Five and Ten Frames, line segments from the APH Picture Maker Wheatley Tactile Diagramming Kit placed in the shape of a five frame)
- Five pennies (Alternatives: APH Tactile Tokens, small pieces of Wikki Stix®, magnetic counters, shapes from the APH Picture Maker Wheatley Tactile Diagramming Kit) in a bowl or work tray
- Optional: nonslip surface such as rubber shelf liner for the five frame (Alternatives: cookie sheet, magnetic board, if using magnets)
- Activity 2
 - Timer
 - Pages 1-2 of G1-M1-Flashcards.brf shuffled
 - Optional: nonslip surface such as a rubber shelf liner

Section 2 Teacher Notes

- It may be helpful to point out that braille page numbers are transcribed in Unified English Braille, not the Nemeth braille code.
- Encourage the student to verbalize the process they use to determine what the general omission symbol is standing for in each equation. Provide assistance as needed.

Section 2 Teacher Script

Welcome aboard the airplane! Let's begin the second part of the adventure by finding the first line of braille on the first braille page. Softly glide your fingers across the line. It says First Grade. Now move your hands down to the second line of braille on the page. It says Module 1. Notice how the title of the document is centered in the middle of the line.

Now move your hands down to the third line of braille on the page. It begins in cell 5, and it says Section 2. Afterwards, there is an opening Nemeth Code indicator.



It tells us that we are going to read math or science next. Dots 4-5-6 are in the first cell, and dots 1-4-6 are in the second cell.

The fourth line of braille contains an equation about adding two groups together in braille.

[2 plus 2 equals what number]

The equation begins with the numeric indicator followed by dots 2-3. What number is this? That's right. It's the number 2. Afterwards, there is a plus sign. Which dots make the plus sign? You got it! Dots 3-4-6 make the plus sign. Notice that there is not a numeric indicator after the plus sign. Also notice that there is not a space before or after the plus sign.

After the plus sign, there are the dots 2-3 again. What number is made with dots 2-3? Yes, the number is 2.

So far our equation reads 2+2. What follows the number 2? Yes, there is a space followed by an equals sign after the number 2.

Did you remember that it takes 2 braille cells to write an equals sign? It is dots 4-6 in the first braille cell followed by dots 1-3 in the second braille cell.

What follows the equals sign? That's right. The equals sign is followed by another space. What is the last Nemeth symbol on the line? You got it! It is called a general omission symbol. We use this symbol when there is a missing number for you to write in math. Dots 1-2-3-4-5-6 make a general omission symbol.

What number is the general omission symbol standing for in the equation? Let's use our five frame and pennies to find out.

That's right! Two plus two equals four.

Try reading another equation. What does it begin with?

[Make sure the student is viewing the second problem on page 1 which is 1 plus 3 equals what number.]

You got it! It begins with the number 1. What follows the number 1? Yes, there is a plus sign, followed by a 3. What dots make the plus sign? Yes, dots 3-4-6 make the plus sign. Did you remember that there is not a space before and after the plus sign?

Try reading the rest of the equation. You got it, Nemeth superstar! There is a space and then an equals sign. Afterwards, there is another space, followed by the general omission symbol.

What number is the general omission symbol standing for? Let's use our five frame and pennies to find out.

That's right! One plus three equals four. Let's try reading another equation together.

[Make sure the student is viewing the third problem on page 1 which is 5 plus 0 equals what number.]

Yes, we would read the equation as 5 plus 0 equals what number. Let's use our five frame and pennies to find out what the general omission symbol is standing for.

How should we begin? Yes, we should place 5 pennies on the five frame. How many more pennies should we place on the five frame for the number 0? That is correct. We should not place any more pennies on the five frame because 0 means no objects.

So 5 plus 0 equals what number? Way to go! 5 plus 0 equals 5.

Practice 2.1

Now read the equations below and tell me what number the general omission symbol stands for each time. Good luck, pilot!

[Make sure the student begins with the fourth problem on page 1.]

Fun Fact 2

Approximately 700 years ago, Leonardo da Vinci studied how birds flew and then drew pictures of flapping-wing machines that might help people fly.

Activity 2

Let's use flashcards to practice reading equations. Afterwards, tell me what number the general omission symbol stands for. Once you finish, go back and time how quickly you can read the equations! Do you think you can read the equations even quicker? If so, try one more time!

Way to go, math superstar!

Section 3: Writing Equations within 5 Review

Section 3 Materials

- Braillewriter
- Braille paper
- Optional: G1-M1-Writing-Answers.brf
- Activity 3: same as materials used in the rest of Section 3

Section 3 Teacher Notes

- Repeat saying each equation as many times as needed. Also remind the student to move their fingers across the braille and check their work if needed.
- Activity 3
 - If needed, remind the student how to number the equations, including the dot configuration for the punctuation indicator.
 - Continue to repeat saying each equation as many times as needed.

Section 3 Teacher Script

For the third part of the adventure, let's review how to write equations in braille. Place your fingers on the correct keys on your braillewriter.

Begin by writing 2 plus 1 equals question mark (or what number).

$2+1 = ?$

What should we braille first? Yes, we will begin by brailing the number 2, followed by the plus sign.

How do we write a plus sign in braille? Yes, a plus sign is made with the dots 3-4-6. Remember that there will not be a space before or after the plus sign.

Next, we will write the number 1. We will not need another numeric indicator. So we will press only the dot 2 after the plus sign to write the number 1.

We will need a space after the number 1 so we will press the space bar one time. How do we write the equals sign in braille? Yes, the equals sign begins with the dots 4-6, followed by the dots 1-3.

We will need another space after the equals sign. Then we will need to braille the general omission symbol. Dots 1-2-3-4-5-6 are used to write the general omission symbol.

Super work, Nemeth superstar!

Practice 3.1

Move to the next line by pressing the line spacing key twice. Practice writing 2 plus 1 equals question mark (or what number) several times. You will need to press your line spacing key twice to move to the next line before brailleing the equation each time.

Answer 3.1

The directions are to write 2 plus 1 equals question mark several times, so there may be variation in how many times the problem is written. Any number of times is considered correct. The student can check their answers for Section 3 using pages 1-2 of the writing answers document.

Let's practice brailleing another equation.

3 plus 0 equals question mark (or what number)

 $3+0 = ?$

What should we braille first? Yes, we will begin by brailleing the number 3, followed by the plus sign. How do we write a plus sign in braille? Yes, a plus sign is made with the dots 3-4-6. Will we need a space before or after the plus sign? That's right. We will not need a space.

Next, we will write the number 0. We do not need another numeric indicator because the number is coming after the plus sign. So we would press dots 3-5-6 after the plus sign to write the number 0.

What should we braille next? Yes, we need a space and then an equals sign. How do we write the equals sign in braille? Yes, the equals sign begins with the dots 4-6, followed by the dots 1-3.

Will we need another space after the equals sign? Yes, we will need a space before and after an equals sign in braille. Then we will end the equation with a general omission symbol. What dots are used to write a general omission symbol? Yes, dots 1-2-3-4-5-6 are used to write the general omission symbol in braille.

Practice 3.2

Move to the next line by pressing the line spacing key twice. Practice writing the same problem several times. You will need to press your line spacing key twice to move to the next line before brailleing the equation each time.

Answer 3.2

The directions are to write 3 plus 0 equals question mark several times, so there may be variation in how many times the problem is written. Any number of times is considered correct.

Fun Fact 3

In the mid-1800s, George Cayley studied how a wing works and then built a glider that carried a person a short distance.

Activity 3

You will need your braillewriter and braille paper for this activity.

Practice 3.3

Write the following problems: 1 plus 1 equals what number, 5 plus 0 equals what number, what number equals 3 plus 1, what number equals 2 plus 3, and 0 plus 4 equals what number.

$1+1 = ?$

$5+0 = ?$

$? = 3+1$

$? = 2+3$

$0+4 = ?$

Answer 3.3

The student should write the following problems horizontally: 1 plus 1 equals what number, 5 plus 0 equals what number, what number equals 3 plus 1, what number equals 2 plus 3, and 0 plus 4 equals what number.

$1+1 = ?$

$5+0 = ?$

$? = 3+1$

$? = 2+3$

$0+4 = ?$

Practice 3.4

Let's try a few more. This time number the equations. After you write all the equations, go back and tell me what number the general omission symbols is standing for each time.

Write the following problems: number 1: 1 plus 2 equals what number, number 2: 4 plus 1 equals what number, number 3: what number equals 0 plus 5, number 4: 3 plus 2 equals what number, and number 5: 3 plus 0 equals what number.

1. $1+2 = ?$
2. $4+1 = ?$
3. $? = 0+5$
4. $3+2 = ?$
5. $3+0 = ?$

Answer 3.4

The student should write the following problems horizontally:

Number 1: 1 plus 2 equals what number?

The general omission symbol stands for 3.

Number 2: 4 plus 1 equals what number?

The general omission symbol stands for 5.

Number 3: what number equals 0 plus 5?

The general omission symbol stands for 5.

Number 4: 3 plus 2 equals what number?

The general omission symbol stands for 5.

Number 5: 3 plus 0 equals what number.

The general omission symbol stands for 3.

Section 4: Ten Frame Review

Section 4 Materials

- Ten frame available in uncontracted and contracted braille within the curriculum (Alternatives: APH Tactile Five and Ten Frames, line segments from the APH Picture Maker Wheatley Tactile Diagramming Kit placed in the shape of a ten frame)
- Ten pennies in a bowl or container (Alternatives: APH Tactile Tokens, small pieces of Wikki Stix®, magnetic counters, shapes from the APH Picture Maker Wheatley Tactile Diagramming Kit) in a bowl or work tray
- Optional: nonslip surface such as rubber shelf liner for the ten frame (Alternatives: cookie sheet, magnetic board, if using magnets)
- Activity 4: in addition to the other materials used in Section 4,
 - Timer
 - Sorting tray with a 2-section divider
 - Two flashcards for each number from 0-10 shuffled

Section 4 Teacher Notes

- If you choose to use the APH Tactile Tokens, the two different textures on the tokens can represent the two addends.
- When first working with the ten frame, offer the following hint if needed: Move your hands across the top row of squares from left to right to count.
- Encourage the student to verbalize the process they use for placing the pennies on the ten frame in the first set of problems. Provide assistance as needed. For example, it may be helpful to point out that 8 is three more than 5.
- Encourage the student to verbalize the process they use to determine how many more pennies are needed to make 10 in the second set of problems. There are several possible correct responses. The student may indicate that they counted the empty squares on the ten frame or counted the number of full braille cells in their head. The student may also place 1 additional object or penny on the ten frame so that each square is filled. Provide assistance if needed.
- Activity 4
 - The length of time on the timer for the activity should be based on the individual needs of the student.
 - If desired, this game can be played more than once.
 - The length of time can be decreased each time in order to promote fluency.

Section 4 Teacher Script

The passengers are on the plane, and the suitcases have been loaded in the cargo bins. It is time for the airplane to leave the gate! For the fourth part of the adventure, let's review how to use a ten frame to help us make 10.

Where will you find the title? Yes, it is at the top of the page. The title is Ten Frame. There is a ten frame on the left side of the page, and a ten frame on the right side of the page.

Now use your hands to turn the paper on its side and locate the top row. How many squares are in the top row?

That is correct. There are five squares.

Next, find the bottom row. How many squares are in the bottom row of squares? Yes, there are five squares.

When we use the ten frame, fill the top row up first, before moving to the bottom row. Begin by placing 3 pennies on the ten frame. Good job! You remembered to begin by placing pennies on the top row, beginning on the far left. Remove the pennies from the ten frame and place them in a bowl. Now place 8 pennies on the ten frame.

Remove the pennies from the ten frame and place them in a bowl. Now as I call a number, place that many pennies on the ten frame.

2

9

5

6

10

Fun Fact 4

Orville and Wilbur Wright built a plane with a gas-engine, and in December 1903, they flew it 120 feet and safely landed in Kitty Hawk, North Carolina.

Now remove the pennies from the ten frame and let's work together to determine how many more pennies are needed to make 10.

Begin by placing 9 pennies on the ten frame. How can we find out how many more pennies are needed to make 10?

That's right! We need 1 more penny to make 10. Remove the pennies from the ten frame and place them in a bowl.

Nice work, math superstar! Now place 5 pennies on the ten frame. How can we find out how many more pennies are needed to make 10?

You got it! We need 5 more pennies to make 10. Remove the pennies from the ten frame and place them in a bowl.

Now place 7 pennies on the ten frame. How many more pennies are needed to make 10? Yes, we need 3 more pennies to make 10. How did you know that we need 3 more pennies to make 10?

Activity 4

Let's play a game called "Zoom to 10" with our ten frame and pennies! We will also need a sorting tray and 2 flashcards for each number from 0-10.

Shuffle your flashcards and then draw a flashcard. Read the number on the flashcard and then use your ten frame and pennies to tell me how many more are needed to make 10. As you read each number card, use a sorting tray to separate which cards you have read and which cards you have not read.

You will win the game if you can tell me how many more are needed to make 10 for all of the numbers before the timer goes off.

Fun Fact 5

Before building their plane, Orville and Wilbur Wright read about how others had built planes. They even wrote to the Smithsonian Institution in Washington, D.C. asking for more information. From their research, they realized the one thing that had been missing with the other planes – the ability to control the plane once it left the ground.

Section 5: Addition Problems Using a Ten Frame

Section 5 Materials

- Student Braille Document: G1-M1-Student-Materials.brf
- Ten frame available in uncontracted and contracted braille within the curriculum (Alternatives: APH Tactile Five and Ten Frames, line segments from the APH Picture Maker Wheatley Tactile Diagramming Kit placed in the shape of a ten frame)

- Ten pennies in a bowl or container (Alternatives: APH Tactile Tokens, small pieces of Wikki Stix®, magnetic counters, shapes from the APH Picture Maker Wheatley Tactile Diagramming Kit) in a bowl or work tray
- Optional: nonslip surface such as rubber shelf liner for the ten frame (Alternatives: cookie sheet, magnetic board, if using magnets)

Section 5 Teacher Notes

- It may be helpful to point out that braille page numbers are transcribed in Unified English Braille, not the Nemeth braille code.
- Encourage the student to verbalize the process they use to determine what the general omission symbol is standing for. Provide assistance as needed.

Section 5 Teacher Script

It is time for take-off! Make sure that your seat belt is fastened securely! For the fifth part of the adventure, let's work together to solve addition problems to 10 with our ten frame and pennies.

First, let's find braille page number 2 to make sure that we are on the correct page. It is placed at the right margin on the last line.

You found it! Now go back to the top of the page and softly glide your fingers across the first line of braille. It begins in cell 5, and it says Section 5. It is followed by an opening Nemeth Code indicator.

[dots 4-5-6, dots 1-4-6]

• • • •

This symbol tells us that we are going to read math or science next.

Now read the equation on the second line.

Yes, we would read the equation as 6 plus 1 equals what number. Let's use our ten frame and pennies to find out what the general omission symbol is standing for.

How should we begin? Yes, we should place 6 pennies on the ten frame. How many more pennies should we place on the ten frame for the number 1? That is correct. We should place one more penny on the ten frame.

So 6 plus 1 equals what number? Way to go! 6 plus 1 equals 7. Let's try another one together.

[Make sure the student is viewing the second problem on page 2 which is what number equals 4 plus 3.]

How should we begin? You got it! We would begin by reading the equation.

You try it. Yes, it would be read as what number equals 4 plus 3. Let's use our ten frame and pennies to find out what the general omission symbol is standing for.

What should we do first? Yes, we should place 4 pennies on the ten frame. How many more pennies should we place on the ten frame for the number 3? That is correct. We should place three more pennies on the ten frame.

So what number equals 4 plus 3? Way to go! 7 equals 4 plus 3. Let's try one more together.

[Make sure the student is viewing the third problem on page 2 which is 8 plus 2 equals what number.]

How should we begin? You got it! We would begin by reading the equation.

You try it now. Yes, we would read the equation as 8 plus 2 equals what number.

What should we do next? Yes, we should place 8 pennies on the ten frame. How many more pennies should we place on the ten frame for the number 2? That is correct. We should place two more pennies on the ten frame.

So 8 plus 2 equals what number? Way to go! 8 plus 2 equals 10.

Practice 5.1

Now read the rest of the equations on page 2 and tell me what number the general omission symbol stands for each time. Good luck!

6 + 2 = ?

3 + 5 = ?

7 + 3 = ?

4 + 4 = ?

9 + 0 = ?

5 + 5 = ?

Answer 5.1

Problem 1: what number (or question mark) equals 6 plus 2?
The general omission symbol stands for 8.

Problem 2: 3 plus 5 equals what number (or question mark)?
The general omission symbol stands for 8

Problem 3: 7 plus 3 equals what number (or question mark)?
The general omission symbol stands for 10.

Problem 4: what number (or question mark) equals 4 plus 4?
The general omission symbol stands for 8.

Problem 5: 9 plus 0 equals what number (or question mark)?
The general omission symbol stands for 9.

Problem 6: 5 plus 5 equals what number (or question mark)?
The general omission symbol stands for 10.

Problem 7: what number (or question mark) equal 4+3?
The general omission symbol stands for 7.

Problem 8: 2 plus 4 equals what number (or question mark)?
The general omission symbol stands for 6.

Way to go, pilot! The general omission symbol was standing for a missing number in the equations that we just read. Sometimes we use a different symbol in print and braille when there is a missing number in a math equation or when we need to fill in information. We will learn about this different symbol in the next section.

At the end of the last problem, there is a Nemeth Code terminator.

[dots 4-5-6, dots 1-5-6]



This symbol is used to tell us that we are finishing the math content again.

Fun Fact 6

The first planes were built of wood.

Section 6: Reading a Long Dash

Section 6 Materials

- Student Braille Document: G1-M1-Student-Materials.brf
- Optional: five/ten frame, pennies, work tray, nonslip surface, G1-M1-Writing-Answers.brf
- Activity 5: in addition to the other materials used in Section 6,
 - Braillewriter
 - Braille paper

Section 6 Teacher Note

Encourage the student to verbalize the process they use to determine the missing number. Provide assistance as needed.

Section 6 Teacher Script

The sixth part of the adventure begins on page 3 in your braille document. Let's find the braille page number 3 to make sure that we are on the correct page. It is placed at the right margin on the last line.

You found it! Now go back to the top of the page and softly glide your fingers across the first line of braille. It begins in cell 5, and it says Section 6. It is followed by an opening Nemeth Code indicator.

[dots 4-5-6, dots 1-4-6]



This symbol tells us that we are going to read math or science next.

Now let's learn about another omission symbol. It is called a long dash. We use the long dash in Nemeth when there is a line standing for a missing number in print.

Softly guide your fingers across the second line of braille on the page. In the middle of the line, you will find a long dash. There is a full braille cell before and after the long dash.

⠠ ⠠⠠⠠⠠⠠⠠ ⠠

Great work, co-pilot! Did you notice that the long dash takes 4 cells? It is made up of 4 cells of dots 3-6 in a row.

Practice 6.1

Now it is your turn to find the long dash in each line of braille. Move your fingers lightly across the line of braille and say "nneeaoooww" like a propeller plane flying high in the sky when you find the long dash!

[Five lines of full braille cells on page 3 with a long dash inserted in each line.]

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Answer 6.1

⠠⠠⠠⠠⠠⠠

The student will say "nneeaoooww" each time they point to a long dash at the following places:

Line 1: toward the middle of the line

Line 2: at the beginning of the line

Line 3: toward the end of the line

Line 4: at the end of the line

Line 5: toward the beginning of the line

In the following equation, there is a long dash standing for a missing number. Let's read the equation together.

[Make sure the student is viewing the next to last problem on page 3 which is 4 plus 2 equals blank.]

What does the equation begin with? Yes, it begins with the number 4. What follows the number 4? Yes, there is a plus sign, followed by a 2. Try reading the rest of the equation. You got it, Nemeth superstar! There is a space and then an equals sign. Afterwards, there is another space, followed by the long dash.

When reading an equation with a long dash, you may read the long dash as "blank" or "what number". So we could read the equation as 4 plus 2 equals blank. Another way of reading the equation is 4 plus 2 equals what number.

What is the missing number in the equation? Yes, the missing number is 6 since $4+2 = 6$.

Try reading another equation with a long dash.

[Make sure the student is viewing the last problem on page 3.]

Yes, we would read the equation as 5 plus 5 equals blank. Another way of reading the equation is 5 plus 5 equals what number.

What is the missing number in the equation? Yes, the missing number is 10 since $5+5 = 10$.

Fun Fact 7

The Wright brothers became interested in flight as children after their father gave them a rubber band powered toy helicopter. The brothers were amazed that the toy helicopter would fly across a room.

Activity 5

You will need your braillewriter and braille paper for the activity.

Practice 6.2

Read the numbered equations at the top of page 4 and find the long dash. Sometimes the long dash will be at the beginning of the equation, and sometimes it will be at the end of the equation.

After you find the long dash in the equations, write the missing number. Don't forget to number your problems. Good luck, math superstar!

[Number 1: 3 plus 1 equals blank, number 2: 5 plus 2 equals blank, number 3: blank equals 2 plus 1, number 4: 6 plus 0 equals blank, number 5: 5 plus 4 equals blank, number 6: blank equals 1 plus 7, and number 7: 8 plus 1 equals blank.]

The image displays a 4x4 grid of 16 dot patterns. Each pattern is a 4x4 grid of dots with some dots missing, creating various shapes. The patterns are arranged in a regular grid, with each pattern occupying a 4x4 sub-grid of the overall 16x16 grid.

Answer 6.2

The student can check their answers for this activity using page 3 of the writing answers document.

1. The long dash is at the end of the equation, and the missing number is 4.
2. The long dash is at the end of the equation, and the missing number is 7.
3. The long dash is at the beginning of the equation, and the missing number is 3.
4. The long dash is at the end of the equation, and the missing number is 6.

5. The long dash is at the end of the equation, and the missing number is 9.
6. The long dash is at the beginning of the equation, and the missing number is 8.
7. The long dash is at the end of the equation, and the missing number is 9.

Figure 1 shows four 3x3 dot patterns labeled (a), (b), (c), and (d). Each pattern consists of black dots on a 3x3 grid. Pattern (a) has 6 dots, (b) has 7 dots, (c) has 8 dots, and (d) has 9 dots.

Figure 1 shows four 3x3 dot patterns. Pattern (a) has 6 dots, (b) has 7 dots, (c) has 8 dots, and (d) has 9 dots. The dots are arranged in various configurations within the 3x3 grid.

Figure 1 shows four 3x3 dot patterns labeled (a), (b), (c), and (d). Pattern (a) has 6 dots, pattern (b) has 7 dots, pattern (c) has 8 dots, and pattern (d) has 9 dots. Each pattern consists of black dots on a white background.

At the end of the last problem, there is a Nemeth Code terminator. This symbol tells us that we are finishing the math content again.

Section 7: Finding Unknown Addends

Section 7 Materials

- Student Braille Document: G1-M1-Student-Materials.brf
- Optional: five/ten frame, pennies, work tray, nonslip surface, G1-M1-Writing-Answers.brf
- Activity 6: in addition to the other materials used in Section 7,
 - Braillewriter
 - Braille paper
- Activity 7
 - Timer
 - Pages 3-5 of G1-M1-Flashcards.brf
 - Optional: nonslip surface such as a rubber shelf liner

Section 7 Teacher Notes

- Encourage the student to verbalize the process they use to determine the missing number. Provide assistance as needed.
- Activity 7: Building fluency in reading and answering addition and subtraction problems to 10 is a key skill in first grade. This will require practice across time. Activities such as this one will help the child develop grade-level fluency.

Section 7 Teacher Script

For the seventh part of the adventure, let's learn how to find an unknown addend. It begins towards the bottom of page 4. Begin by finding the braille page number 4 to make sure that we are on the correct page. Where do you find the braille page number?

That's right. The braille page number is placed at the right margin on the last line. Now scan the page for the name of the section. This time it will not be at the top of the page.

You found it! It says Section 7.

Sometimes, the long dash is next to the addition sign when one of the numbers being added together is missing. A number being added to another number to make a new total is called an addend.

Let's read an equation together for an example.

[Make sure the student is viewing the equation below the section title on page 4. The equation is 3 plus blank (what number) equals 4.]

The equation begins with the numeric indicator followed by dots 2-5. What number is this? That's right. It's the number 3. What comes after the number 3? Yes, there is a plus sign after the number 3.

What comes after the space in the equation? Yes, there is a space after the plus sign. What comes next? You got it! It is a long dash. Notice that there is a space before and after the long dash. When reading an equation with a long dash, you may read the long dash as "blank" or "what number".

What follows the long dash? Yes, there is a space, followed by an equals sign, another space, and then the number 4.

Read along with me as I read the equation once more. 3 plus blank equals 4.
Now you try reading. Yes, 3 plus blank equals 4.

To figure out the missing addend, we can ask ourselves 3 plus what number equals 4. Way to go, math superstar! 3 plus 1 equals 4.

Let's try another one. Begin by reading the equation and finding the long dash.

[Make sure the student is viewing the last equation on page 4 which is blank plus 5 equals 6.]

Way to go! You found the long dash.

The equation begins with a long dash, so we would read it as blank or what number. We would read the equation as blank plus 5 equals 6.

How can we figure out the missing addend? That's right. We can ask ourselves blank plus 5 equals 6.

What is the missing addend?

Yes, the missing addend is 1 because 1 plus 5 equals 6.

Fun Fact 8

After their toy helicopter broke, Wilbur and Orville Wright made several copies of the toy together.

Activity 6

You will need your braillewriter and braille paper for the next activity.

Practice 7.1

Read the first 5 equations at the top of page 5 and find the long dash.

After you find the long dash, write the missing addend. Don't forget to number your problems. You can do it!

[Number 1: 2 plus blank equals 4, number 2: 7 plus blank equals 7, number 3: blank plus 1 equals 9, number 4: blank plus 4 equals 8, and number 5: 6 plus blank equals 9.]

Answer 7.1

The student can check their answers for Section 7 using page 4 of the writing answers document.

1. The long dash is in the middle of the equation, and the missing addend is 2.
2. The long dash is in the middle of the equation, and the missing addend is 0.
3. The long dash is at the beginning of the equation, and the missing addend is 8.
4. The long dash is at the beginning of the equation, and the missing addend is 4.
5. The long dash is in the middle of the equation, and the missing addend is 3.

The figure shows a 5x4 grid of 20 small 3x3 dot patterns. Each pattern is a 3x3 grid of dots where some dots are black and others are white. The patterns are arranged in four rows of four and a final row of four. The patterns represent different configurations of a 3x3 grid with 9 possible dot positions.

Practice 7.2

Let's try some more problems on page 5, beginning with number 6. This time you may find the long dash at the beginning, middle, or end of the equation. The long dash may be standing for a missing addend or a missing sum. Good luck, pilot!

[Number 6: 4 plus 5 equals blank, number 7: blank equals 2 plus 8, number 8: 0 plus blank equals 0, number 9: blank plus 3 equals 5, number 10: 1 plus 1 equals blank, number 11: 4 plus blank equals 10, and number 12: blank plus 3 equals 6.]

The image displays a 4x4 grid of 16 dot patterns. Each pattern is a 4x4 array of dots with some dots missing to form various shapes. The patterns are arranged in four rows and four columns.

- Row 1:**
 - Pattern 1: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 2: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 3: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 4: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
- Row 2:**
 - Pattern 5: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 6: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 7: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 8: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
- Row 3:**
 - Pattern 9: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 10: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 11: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 12: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
- Row 4:**
 - Pattern 13: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 14: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 15: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).
 - Pattern 16: A 4x4 grid with dots at (1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4).

Answer 7.2

6. The long dash is at the end of the equation, and the missing addend is 9.
7. The long dash is at the beginning of the equation, and the missing addend is 10.
8. The long dash is in the middle of the equation, and the missing addend is 0.
9. The long dash is at the beginning of the equation, and the missing addend is 2.
10. The long dash is in the end of the equation, and the missing addend is 2.

11. The long dash is at the middle of the equation, and the missing addend is 6.
12. The long dash is at the beginning of the equation, and the missing addend is 3.

Figure 1 shows four 3x3 dot patterns. Pattern (a) has 6 dots, (b) has 7 dots, (c) has 8 dots, and (d) has 9 dots. The dots are arranged in various configurations within the 3x3 grid.

Figure 1 shows four 3x3 dot patterns. Pattern (a) has 5 dots: (1,1), (1,2), (2,1), (2,2), (3,1). Pattern (b) has 6 dots: (1,1), (1,2), (2,1), (2,2), (2,3), (3,1). Pattern (c) has 7 dots: (1,1), (1,2), (2,1), (2,2), (2,3), (3,1), (3,2). Pattern (d) has 8 dots: (1,1), (1,2), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3).

At the end of the last problem, there is a symbol that tells us that we are finishing math content. What is it called?

[dots 4-5-6, dots 1-5-6]

Yes, the two-cell symbol is called a Nemeth Code terminator.

Fun Fact 9

The Wright brothers owned a bicycle business. They sold, repaired, and later built bicycles. They also built many parts of their plane in the backroom of their bicycle shop.

Activity 7

Let's use flashcards to practice reading addition problems that have a long dash. Afterwards, tell me what the missing number is. Once you can read all of the equations correctly, go back and time how quickly you can read the equations and answer the problems! Do you think you can read the equations and answer the problems even quicker? If so, try one more time!

Section 8: Writing a Long Dash

Section 8 Materials

- Braillewriter
- Braille paper
- Optional: G1-M1-Writing-Answers.brf
- Activities 8 and 9: same as materials used in the rest of Section 8

Section 8 Teacher Notes

- When voicing the equations, _____ = 2+2, say "Blank equals 2 plus 2." or "What number equals 2 plus 2?"
- When voicing the equation, 5+ _____ = 8, say "5 plus blank equals 8." or "5 plus what number equals 8?"
- Activity 9
 - Repeat saying each equation as many times as needed.
 - Remind the student to move their fingers across the braille and check their work if needed.

Section 8 Teacher Script

For the eighth part of the adventure, let's learn how to write a long dash in braille. Place your fingers on the correct keys on your braillewriter. Then press the ring finger on your left hand and the ring finger on your right hand four times to write the long dash. Now use your line spacing key twice and move to the next line. Then practice writing the long dash again.

Activity 8

You will need your braillewriter and braille paper for this activity.

Practice 8.1

Listen and then braille what you hear. Use your line spacing key twice and move to the next line each time.

1. long dash
2. plus sign
3. equals sign
4. minus sign
5. long dash

6. general omission symbol

7. tally mark

8. ellipsis

9. long dash

10. plus sign

Answer 8.1

The student can check their answers for Section 8 using pages 5-6 of the writing answers document.

1. long dash (4 cells of dots 3-6)

⠠⠠⠠⠠⠠⠠⠠⠠

2. plus sign (dots 3-4-6)

⠠⠠⠠⠠⠠⠠⠠⠠

3. equals sign (dots 4-6, dots 1-3)

⠠⠠⠠⠠⠠⠠⠠⠠

4. minus sign (dots 3-6)

⠠⠠⠠⠠⠠⠠⠠⠠

5. long dash (4 cells of dots 3-6)

⠠⠠⠠⠠⠠⠠⠠⠠

6. general omission symbol (dots 1-2-3-4-5-6)

⠠⠠⠠⠠⠠⠠⠠⠠

7. tally mark (dots 4-5-6)

⠠⠠⠠⠠⠠⠠⠠⠠

8. ellipsis (3 cells of dot 3)

9. long dash (4 cells of dots 3-6)

10. plus sign (dots 3-4-6)

Now move your fingers across your braille and check your work as I say the Nemeth symbols again. Nice writing, co-pilot!

Fun Fact 10

Before building a plane, Orville and Wilbur Wright built a glider and flew it more than 1,000 times over 4 years to learn more about flying.

Let's practice writing blank (or what number) equals 2 plus 2

$$= 2+2$$

What should we braille first? Yes, we will begin by brailleing the long dash. Press the ring finger on your left hand and the ring finger on your right hand four times to write the long dash.

What should we braille next? Yes, we need a space and then an equals sign. How do we write the equals sign in braille? Yes, the equals sign begins with the dots 4-6, followed by the dots 1-3.

Will we need another space after the equals sign? Yes, we will need a space before and after an equals sign in braille. What should we write next? You got it! We will need a numeric indicator followed by the dots 2-3. This will be followed by the plus sign. How do we write a plus sign in braille? Yes, a plus sign is made with the dots 3-4-6. Will we need a space before or after the plus sign? That's right. We will not need a space.

Next, we will write the number 2. We do not need another numeric indicator because the number is coming after the plus sign. So we would press dots 2-3 after the plus sign to write the number 2.

Practice 8.2

Move to the next line by pressing the line spacing key twice. Practice writing blank equals 2 plus 2 several times. You will need to press your line spacing key twice to move to the next line before brailleing the equation each time.

Answer 8.2

The directions are to write blank equals 2 plus 2 several times, so there may be variation in how many times the problem is written. Any number of times is considered correct.

Co-pilot, let's practice writing an equation where an addend is missing.

5 plus blank (or what number) equals 8

$$5 + \quad = 8$$

What should we braille first? Yes, we will begin by brailleing a numeric indicator followed by the dots 2-6. This will be followed by the plus sign. How do we write a plus sign in braille? Yes, a plus sign is made with the dots 3-4-6.

Will we need a space before the plus sign? That's right. We will not need a space before the plus sign.

Will we need a space between the plus sign and the long dash? Yes, we will need a space because of the long dash.

Next, we will braille the long dash. Press the ring finger on your left hand and the ring finger on your right hand four times to write the long dash.

What should we braille next? Yes, we need a space and then an equals sign. How do we write the equals sign in braille? Yes, the equals sign begins with the dots 4-6, followed by the dots 1-3.

Will we need another space after the equals sign? Yes, we will need a space before and after an equals sign in braille. What should we write next? You got it! We will write the number 8.

Answer 8.4

The student should write the following problems horizontally: 5 plus 0 equals blank, blank plus 2 equals 6, 7 plus 1 equals blank, 1 plus 3 equals blank, 4 plus blank equals 9, 3 plus 3 equals blank, 2 plus blank equals 5, and blank plus 5 equals 10.

Fun Fact 11

The Wright brothers built a plane with 32-foot wings and a movable tail.

Section 9: Reading Subtraction Problems

Section 9 Materials

- Student Braille Document: G1-M1-Student-Materials.brf
- Five/ten frame available in the curriculum (Alternatives: APH Tactile Five and Ten Frames, line segments from the APH Picture Maker Wheatley Tactile Diagramming Kit placed in the shape of a five/ten frame)
- Ten pennies (Alternatives: APH Tactile Tokens, small pieces of Wikki Stix®, magnetic counters, shapes from the APH Picture Maker Wheatley Tactile Diagramming Kit) in a bowl or work tray
- Optional: nonslip surface such as rubber shelf liner for the five/ten frame (Alternatives: cookie sheet, magnetic board, if using magnets)

- Activity 10
 - Timer
 - Pages 6-8 of G1-M1-Flashcards.brf
 - Optional: nonslip surface such as a rubber shelf liner

Section 9 Teacher Notes

- A numeric indicator is not used when a number follows a sign of operation without a space.
- Encourage the student to verbalize the process they use to determine what number is missing. Provide assistance as needed.
- If needed, remind the student that the long dash will be voiced as “blank” in the equations.
- If needed, remind the student to place pennies on the top row first, beginning on the far left of the ten frame.
- Activity 10: Building fluency in reading and answering addition and subtraction problems to 10 is a key skill in first grade. This will require practice across time. Activities such as this one will help the child develop grade-level fluency.

Section 9 Teacher Script

It's time for the ninth part of the adventure! Begin by finding braille page number 6 to make sure that we are on the correct page. Where do you find the braille page number?

You got it! Now find the name of the section.

Yes, the top line of braille says Section 9. It is following by an opening Nemeth Code indicator.

[dots 4-5-6, dots 1-4-6]

It tells us that we are going to read math or science next. On the second line of braille, there is an equation. Let's read it together.

[4 minus 1 equals blank]

It begins with the numeric indicator followed by dots 2-5-6. What number is this? That's right. It's the number 4. Afterwards, there is 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. Also notice that there is not a space before or after the minus sign.

After the minus sign, there is a single dot 2. What number is made with the dot 2? Yes, the number is 1.

So far, our equation reads 4 minus 1. What follows the number 1? Yes, there is a space followed by an equals sign.

What follows the equals sign? That's right. The equals sign is followed by a space and then a long dash. Four cells of dots 3-6 make a long dash. So we would read the equation as 4 minus 1 equals blank.

In subtraction, we find the difference between two numbers. In the equation “four minus one equals blank”, we are trying to find the difference between 4 and 1.

Let's use our five frame and pennies to figure out the answer to the problem.

That's right! Four minus one equals three. In this problem, the difference is three.

Try reading another equation.

[Make sure the student is viewing the second problem on page 6.]

[illegible]

Yes, we would read the equation as 5 minus 0 equals blank. Let's use our five frame and pennies to find the difference.

How should we begin? Yes, we should place 5 pennies on the five frame. How many pennies should we remove from the five frame for the number 0? That is correct. We should not remove any pennies from the five frame because 0 means no objects.

So 5 minus 0 equals what number? Way to go! 5 minus 0 equals 5.

Practice 9.1

Now read the equations below. Then find the difference. Good luck, co-pilot!

[Make sure the student is viewing the set of subtraction problems on page 6 that begin on the fourth line of braille. The problems are 5 minus 2 equals blank, 3 minus 1 equals blank, 4 minus 4 equals blank, 2 minus 0 equals blank, 5 minus 4 equals blank, 1 minus 0 equals blank, 4 minus 2 equals blank, and 3 minus 2 equals blank.]

$$\begin{array}{r} 5 \\ - 2 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ - 1 \\ \hline \end{array}$$

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

$$\begin{array}{r} 2 \\ - 0 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ - 4 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ - 0 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ - 2 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ - 2 \\ \hline \end{array}$$

Answer 9.1

Problem 1: 5 minus 2 equals blank.
The difference is 3.

Problem 2: 3 minus 1 equals blank.
The difference is 2.

Problem 3: 4 minus 4 equals blank.
The difference is 0.

Problem 4: 2 minus 0 equals blank.
The difference is 2.

Problem 5: 5 minus 4 equals blank.
The difference is 1.

Problem 6: 1 minus 0 equals blank.
The difference is 1.

Problem 7: 4 minus 2 equals blank.
The difference is 2.

Problem 8: 3 minus 2 equals blank.
The difference is 1.

Fun Fact 12

The Wright brothers continued to fly planes, and together they helped found the aviation industry. Aviation means air travel or flight.

Now let's work together to solve subtraction problems with our ten frame and pennies. Begin by reading the equation at the top of page 7.

Yes, we would read the equation as 10 minus 5 equals blank. Let's use our ten frame and pennies to find the difference.

How should we begin? Yes, we should place 10 pennies on the ten frame. Did you remember to place pennies on the top row first, beginning on the far left?

How many pennies should we remove from the ten frame for the number 5?
That is correct. We should remove 5 pennies from the ten frame.

So 10 minus 5 equals what number? Way to go! 10 minus 5 equals 5.

Try another problem. Begin by reading the equation.

[Make sure the student is viewing the second problem on page 7.]

Yes, we would read the equation as 6 minus 3 equals blank. Let's use our ten frame and pennies to find the difference.

How should we begin? Yes, we should place 6 pennies on the ten frame.

How many pennies should we remove from the ten frame? That is correct. We should remove 3 pennies from the ten frame.

So 6 minus 3 equals what number? Way to go! 6 minus 3 equals 3.

Practice 9.2

Now read the equations below. Then use your ten frame and pennies to find the difference.

[Make sure the student is viewing the set of subtraction problems on page 7 that begin on the third line of braille.]

$$8 - 4 = \quad$$

$$7 - 0 = \quad$$

$$6 - 4 = \quad$$

$$10 - 3 = \quad$$

$$9 - 5 = \quad$$

Answer 9.2

Problem 1: 8 minus 4 equals blank.
The difference is 4.

Problem 2: 7 minus 0 equals blank.
The difference is 7.

Problem 3: 6 minus 4 equals blank.
The difference is 2.

Problem 4: 10 minus 3 equals blank.
The difference is 7.

Problem 5: 9 minus 5 equals blank.
The difference is 4.

Practice 9.3

Let's try some more subtraction problems on page 7. For a challenge, try to find the difference without using your ten frame and pennies.

[Make sure the student is viewing the last four problems on page 7.]

Answer 9.3

Problem 1: 7 minus 4 equals blank.
The difference is 3.

Problem 2: 5 minus 2 equals blank.
The difference is 3.

Problem 3: 9 minus 9 equals blank.
The difference is 0.

Problem 2: 10 minus 7 equals blank.
The difference is 3.

At the end of the last problem, there is another Nemeth Code terminator.

Activity 10

Let's use flashcards to practice reading subtraction problems that have a long dash. Afterwards, tell me the answer to the problem. Once you can read all of the equations correctly, go back and time how quickly you can read the equations and answer the problems! Do you think you can read the equations and answer the problems even quicker? If so, try one more time!

Way to go, math superstar!

Fun Fact 13

The original 1903 Wright airplane is now displayed in the National Air and Space Museum in Washington D.C.

Section 10: Writing Subtraction Problems

Section 10 Materials

- Braillewriter
- Braille paper
- Optional: G1-M1-Writing-Answers.brf
- Activity 11: same as materials used in the rest of Section 10

Section 10 Teacher Notes

- Repeat saying the equation as many times as needed. Also remind the student to move their fingers across the braille and check their work if needed.
- When voicing the equation, $4-3 = \underline{\quad}$, say "4 minus 3 equals blank."
- When voicing the equation, $5-1 = \underline{\quad}$, say "5 minus 1 equals blank."
- Activity 11: If needed, remind the student how to number the equations, including the dot configuration for the punctuation indicator.

Section 10 Teacher Script

For the tenth part of the adventure, let's review how to write equations with a minus sign in braille. Place your fingers on the correct keys on your braillewriter.

Begin by writing 4 minus 3 equals blank.

$4-3 = \underline{\quad}$

What should we braille first? Yes, we will begin by brailleing the number 4, followed by the minus sign.

How do we write a minus sign in braille? Yes, a minus sign is made with the dots 3-6. Remember that there will not be a space before or after the minus sign.

Next, we will write the number 3. We will not need another numeric indicator. So we would press only the dots 2-5 after the minus sign to write the number 3.

We will need a space after the number 3 so we will press the space bar one time. How do we write the equals sign in braille? Yes, the equals sign begins with the dots 4-6, followed by the dots 1-3.

We will need another space after the equals sign. Then we will need to braille the long dash. Four cells of dots 3-6 are used to write the long dash.

Super work, Nemeth superstar!

Practice 10.1

Move to the next line by pressing the line spacing key twice. Practice writing 4 minus 3 equals blank several times. You will need to press your line spacing key twice to move to the next line before brailleing the equation each time.

Answer 10.1

The directions are to write 4 minus 3 equals blank several times, so there may be variation in how many times the problem is written. Any number of times is considered correct. The student can check their answers for Section 10 using page 7 of the writing answers document.

Let's practice brailleing another equation.

5 minus 1 equals blank

$$5-1 =$$

What should we braille first? Yes, we will begin by brailleing the number 5, followed by the minus sign. How do we write a minus sign in braille? Yes, a minus sign is made with the dots 3-6. Will we need a space before or after the minus sign? That's right. We will not need a space.

Next, we will write the number 1. We do not need another numeric indicator because the number is coming after the minus sign. So we would press dot 2 after the minus sign to write the number 1.

What should we braille next? Yes, we need a space and then an equals sign. How do we write the equals sign in braille? Yes, the equals sign begins with the dots 4-6, followed by the dots 1-3.

Will we need another space after the equals sign? Yes, we will need a space before and after an equals sign in braille. Then we will end the equation with a long dash. What dots are used to write a long dash in Nemeth? Yes, dots 3-6 are used to write the long dash. How many times will you press dots 3-6 to make a long dash? That's correct. You will press dots 3-6 four times.

Practice 10.2

Move to the next line by pressing the line spacing key twice. Practice writing 5 minus 1 equals blank several times. You will need to press your line spacing key twice to move to the next line before brailleing the equation each time.

Answer 10.2

The directions are to write 5 minus 1 equals blank several times, so there may be variation in how many times the problem is written. Any number of times is considered correct.

Fun Fact 14

Today, airplanes are used for transportation, recreation, and military purposes.

Activity 11

You will need your braillewriter and braille paper for this activity.

Practice 10.3

Listen and then braille what you hear.

Write the following problems: 2 minus 0 equals blank, 5 minus 5 equals blank, 3 minus 2 equals blank, and 4 minus 1 equals blank.

$2-0 =$

$5-5 = \underline{\hspace{2cm}}$

$3-2 =$

$$4-1 = \underline{\hspace{1cm}}$$

Answer 10.3

The student should write the following problems horizontally: 2 minus 0 equals blank, 5 minus 5 equals blank, 3 minus 2 equals blank, and 4 minus 1 equals blank.

$$\begin{array}{c} \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \end{array}$$

$$\begin{array}{c} \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \end{array}$$

$$\begin{array}{c} \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \end{array}$$

$$\begin{array}{c} \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \end{array}$$

Practice 10.4

Let's try a few more. This time number the equations.

Write the following problems: number 1: 3 minus 1 equals blank, number 2: 4 minus 2 equals blank, number 3: 5 minus 3 equals blank, number 4: 3 minus 0 equals blank, and number 5: 2 minus 1 equals blank.

$$1. \ 3-1 = \underline{\hspace{1cm}}$$

$$2. \ 4-2 = \underline{\hspace{1cm}}$$

$$3. \ 5-3 = \underline{\hspace{1cm}}$$

$$4. \ 3-0 = \underline{\hspace{1cm}}$$

$$5. \ 2-1 = \underline{\hspace{1cm}}$$

Answer 10.4

The student should write the following problems horizontally.

Number 1: 3 minus 1 equals blank

$$\begin{array}{c} \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \end{array}$$

Number 2: 4 minus 2 equals blank

$$\begin{array}{c} \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \\ \cdot\cdot\cdot\cdot\cdot\cdot \end{array}$$

Number 3: 5 minus 3 equals blank

Number 4: 3 minus 0 equals blank

Number 5: 2 minus 1 equals blank

Fun Fact 15

Today some planes are flown remotely or by computers. These are called drones.

Section 11: Solving Subtraction Problems within 10

Section 11 Materials

- Student Braille Document: G1-M1-Student-Materials.brf
- Ten frame available in uncontracted and contracted braille within the curriculum (Alternatives: APH Tactile Five and Ten Frames, line segments from the APH Picture Maker Wheatley Tactile Diagramming Kit placed in the shape of a ten frame)
- Ten pennies in a bowl or container (Alternatives: APH Tactile Tokens, small pieces of Wikki Stix®, magnetic counters, shapes from the APH Picture Maker Wheatley Tactile Diagramming Kit) in a bowl or work tray
- Braillewriter
- Braille paper
- Optional: nonslip surface such as rubber shelf liner for the ten frame (Alternatives: cookie sheet, magnetic board, if using magnets)
- Activity 12
 - Braillewriter
 - Braille paper
 - Optional: G1-M1-Writing-Answers.brf, five/ten frame, pennies, work tray, nonslip surface

Section 11 Teacher Notes

- Encourage the student to verbalize the process they use to determine the missing number.
- Repeat saying each equation as many times as needed. Also remind the student to move their fingers across the braille and check their work if needed.
- When voicing the equation, ____ - 2 = 3, say "blank minus 2 equals 3."
- When voicing the equation, 8 - ____ = 4, say "8 minus blank equals 4."
- Activity 12: For the numbered problems, if needed, remind the student how to number the equations, including the dot configuration for the punctuation indicator.

Section 11 Teacher Script

For the eleventh part of our flight, let's learn a little more about subtraction. It begins at the top of page 8. Where do you find the braille page number to make sure that we are on the correct page?

Yes, that's right. The braille page number is placed at the right margin on the last line.

Now find the name of the section.

You found it! It begins in cell 5 at the top of the page, and it says Section 11. It is followed by an opening Nemeth Code indicator.

[dots 4-5-6, dots 1-4-6]

What does this symbol tell us?

Yes, this symbol tells us that we are going to read math or science next. Read the equation on the second line of braille.

Yes, the problem would be read 7 minus 3 equals 4.

4 is called the difference. The 7 is called a minuend. It is the number from which another is to be subtracted. The 3 is called a subtrahend. It is the number to be subtracted. Both words minuend and subtrahend come from Latin.

Let's read another subtraction problem together.

[Make sure the student is viewing the second problem on page 8 which is 3 minus blank equals 2.]

The equation begins with the numeric indicator followed by dots 2-5. What number is this? That's right. It's the number 3. What comes after the number 3? Yes, there is a minus sign after the number 3.

What comes after the minus sign in the equation? Yes, there is a space after the minus sign. What comes next? You got it! It is a long dash. Notice that there is a space before and after the long dash, even when it follows a minus sign. When reading an equation with a long dash, you may read the long dash as "blank" or "what number".

What follows the long dash? Yes, there is a space, followed by an equals sign, another space, and then the number 2.

Read along with me as I read the equation once more. 3 minus blank equals 2. Now you try reading it. Yes, 3 minus blank equals 2.

To figure out the missing number, we can ask ourselves 3 minus what number equals 2. Way to go, math superstar! 3 minus 1 equals 2.

Let's try two more subtraction problems. This time read the problems by yourself.

[Make sure the student is viewing the third problem on page 8.]

That's right! 8 minus what number equals 4! Now use your ten frame and pennies to figure out the missing number.

You got it! The missing number is 4 because 8 minus 4 equals 4. In this problem, the missing number comes first in the equation.

[Make sure the student is viewing the fourth problem on page 8.]

Good reading! Blank (or what number) minus 5 equals 1. What is the missing number?

Way to go! 6 is the missing number since 6 minus 5 equals 1.

Practice 11.1

Now read the equations below. Then use your ten frame and pennies to find the missing number.

[Make sure the student is viewing the set of problems on page 8 that begin on the sixth line of braille.]

Figure 1 shows four 3x3 dot patterns. Pattern (a) has 10 dots: (1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3), and (2,2) is missing. Pattern (b) has 8 dots: (1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), and (3,2) is missing. Pattern (c) has 12 dots: (1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3), and (2,2), (2,3), (3,1), (3,2) are all present. Pattern (d) has 11 dots: (1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3), and (2,2), (2,3), (3,1), (3,2) are all present, but (1,2) is missing.

Answer 11.1

Problem 1: 2 minus blank equals 1.
The missing number is 1.

Problem 2: blank minus 3 equals 0.
The missing number is 3.

Problem 3: 6 minus 4 equals blank.
The missing number is 2.

Problem 4: 10 minus blank equals 5.
The missing number is 5.

Problem 5: blank minus 2 equals 6.
The missing number is 8.

Problem 6: 9 minus 6 equals blank.
The missing number is 3.

Did you notice that a Nemeth Code terminator followed the last equation?

It is time to begin our initial descent by learning how to write equations when the subtraction problem begins with a missing number. Place your fingers on the correct keys on your braillewriter.

Begin by writing blank minus 2 equals 3.

$$-2 = 3$$

What should we braille first? Yes, we will begin by brailleing a long dash. How do we write a long dash in braille? That's right. Four cells of dots 3-6 are used to write the long dash.

What do we need after the long dash? Yes, we need a space after the long dash.

What will come next? You got it! We will write a minus sign. How do we write a minus sign in braille? Yes, a minus sign is made with the dots 3-6. Remember that there will not be a space after the minus sign.

Next, we will write the number 2. We will not need a numeric indicator. So we will press only the dots 2-3 after the minus sign to write the number 2.

We will need a space after the number 2 so we will press the space bar one time. How do we write the equals sign in braille? Yes, the equals sign begins with the dots 4-6, followed by the dots 1-3.

What do we need after the equals sign? Yes, we will need a space after the equals sign. What should you braille next? That's correct. You should braille the number 3.

Super work, Nemeth superstar!

Practice 11.2

Move to the next line by pressing the line spacing key twice. Practice writing blank minus 2 equals 3 several times. You will need to press your line spacing key twice to move to the next line before brailleing the equation each time.

Answer 11.2



The directions are to write blank minus 2 equals 3 several times, so there may be variation in how many times the problem is written. Any number of times is considered correct. The student can check their answers for Section 11 using pages 8-9 of the writing answers document.

Let's practice brailleing another equation.

8 minus blank equals 4

$$8 - \quad = 4$$

What should we braille first? Yes, we will begin by brailleing the number 8, followed by the minus sign. How do we write a minus sign in braille? Yes, a minus sign is made with the dots 3-6.

What comes next in the equation? Yes, a space and then a long dash comes next. Why do we need a space after the minus sign? That's right. We need a space because a space comes before and after a long dash.

What dots are used to write a long dash in Nemeth? Yes, dots 3-6 are used to write the long dash. How many times will you press dots 3-6 to make a long dash? That's correct. You will press dots 3-6 four times.

What should we braille next? Yes, we need a space and then an equals sign. How do we write the equals sign in braille? You got it! The equals sign begins with the dots 4-6, followed by the dots 1-3.

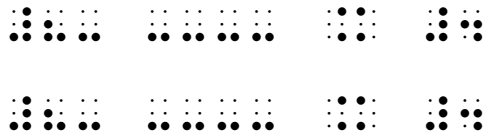
Will we need another space after the equals sign? Yes, we will need a space before and after an equals sign in braille. Then we will end the equation with a number 4.

Practice 11.3

Move to the next line by pressing the line spacing key twice. Practice writing 8 minus blank equals 4 several times. You will need to press your line spacing key twice to move to the next line before brailleing the equation each time.

Answer 11.3





The directions are to write 8 minus blank equals 4 several times, so there may be variation in how many times the problem is written. Any number of times is considered correct.

Fun Fact 16

Some airplanes can travel faster than sound.

Activity 12

You will need your braillewriter and braille paper for this activity.

Practice 11.4

Listen and then braille what you hear. After you finish writing the equations, go back and tell me the missing number in each equation.

Write the following problems: blank minus 5 equals 3, 2 minus blank equals 0, 10 minus blank equals 1, blank minus 2 equals 4, and 9 minus blank equals 5.

 - 5 = 3

$$2 - \quad = 0$$

$$10^{-\quad} = 1$$

$$-2 = 4$$

$$9 - \underline{\quad} = 5$$

Answer 11.4

The student should write the following problems horizontally:

Problem 1: blank minus 5 equals 3?



The missing number is 8.

Problem 2: 2 minus blank equals 0?

The missing number is 2.

Problem 3: 10 minus blank equals 1?

The missing number is 9.

Problem 4: Blank minus 2 equals 4?

The missing number is 6.

Problem 5: 9 minus blank equals 5?

The missing number is 4.

Practice 11.5

Let's try a few more. This time number the equations. After you finish writing the numbered equations, go back and tell me the missing number in each equation.

Write the following problems: number 1: 8 minus 0 equals blank, number 2: 5 minus blank equals 4, number 3: blank minus 1 equals 7, number 4: 3 minus 0 equals blank, number 5: 9 minus blank equals 6, and number 6: 2 minus 1 equals blank.

1. $8-0 = \underline{\hspace{2cm}}$

$$2.5 - \quad = 4$$

3. $-1 = 7$

4. $3-0 =$ _____

$$5.9 - \quad = 6$$

6. $2^{-1} =$

Answer 11.5

The student should write the following problems horizontally:

Number 1: 8-0 equals blank?

The missing number is 8.

Number 2: 5 minus blank equals 4?

The missing number is 1.

Number 3: blank minus 1 equals 7?

The missing number is 8.

Number 4: 3 minus 0 equals blank?

Figure 1 shows four 3x3 dot patterns. Pattern (a) has 10 dots: (1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3), and (2,2) is missing. Pattern (b) has 11 dots: (1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3), (2,2), and (2,3) is missing. Pattern (c) has 8 dots: (1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), and (3,2) is missing. Pattern (d) has 12 dots: (1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3), (2,2), (2,3), and (2,3) is missing.

The missing number is 3.

Number 5: 9 minus blank equals 6?

The missing number is 3.

Number 6: 2 minus 1 equals blank?

The missing number is 1.

Fun Fact 17

Pilots usually fly airplanes from a cockpit located toward the front of the plane.

Section 12: Multiple Choice Questions

Section 12 Materials

- Student Braille Document: G1-M1-Student-Materials.brf
- Braillewriter
- Braille paper
- Optional: five/ten frame, pennies, work tray, G1-M1-Writing-Answers.brf
- Activity 13: same as materials used in the rest of Section 12

Section 12 Teacher Notes

- Remind the student to read the problem and answer choices again if needed.
- Activity 13
 - Encourage the student to pay close attention to the sign of operation and verbalize the process they use to determine the missing number.
 - Remind the student to move their fingers across the braille and check their work if needed.

Section 12 Teacher Script

The next part of our journey begins on page 9. Let's make sure that we are on the right page by locating the braille page number and the name of the section.

First, show me the braille page number! You got it!

Second, scan the entire page and find the name of the section. Remember that section names begin in cell 5. Way to go, Nemeth superstar!

What is the section name followed by?

Yes, it is followed by an opening Nemeth Code indicator.

[dots 4-5-6, dots 1-4-6]

⠠⠠⠠

Now you are ready to learn about multiple choice questions with answer choices. Sometimes in math, you will be given a problem with answer choices to select from. The answer choices are often labeled a, b, c, and d.

Sometimes there is a period after each letter, and sometimes there is not a period after each letter. Let's read an example together.

[Make sure the student is viewing the first problem on page 9 which is number 1: 5 plus blank equals 9, followed by 4 answer choices. Answer a is 3, answer b is 4, answer c is 5, and answer d is 6.]

Begin by reading the problem first. That's correct! 5 plus blank equals 9. Notice how the problem begins in cell 1 of the braille line.

Now move to the next line. You will notice that the answer choices begin in cell 3 with dots 5-6 each time. This is called an English letter indicator in Nemeth. The indicator helps us know that a letter and not a word is coming next.

Which letter does the first answer choice begin with? Yes, it is the letter "a". What follows the letter "a"? You got it! It is the number 3.

Go to the next line of braille. Notice how it begins in cell 3 also. Now try reading the second answer choice. Yes, it is the letter b followed by 4.

Now go to the next two lines of braille and read the last two answer choices.

Perfect! The third answer choice would be read "c 5". The last answer choice would be read "d 6".

Which answer choice is correct?

Yes, the correct answer choice is b.

Read the next problem and answer choices. I will help you if needed.

[Make sure the student is viewing the second problem on page 9 which is number 2: 10 minus 2 equals blank, followed by 3 answer choices. Answer a is 5, answer b is 7, and answer c is 8.]

Way to go, Nemeth superstar! The problem would be read as:

2. 10 minus 2 equals blank (or what number)

The answer choices would be read as:

a 5

b 7

c 8

What is the correct answer? Yes, the correct answer would be c.

Did you notice that there were only 3 answer choices this time? Sometimes there are 2 answer choices; sometimes there are 3 answer choices; and sometimes there are four or more answer choices.

Sometimes a punctuation indicator and period follows the letter in answer choices. Read the next problem and answer choices for an example of letters followed by a punctuation indicator and period. I will help you if needed.

[Make sure the student is viewing the last problem on page 9 which is 6 minus blank equals 3. Answer choice a is 3 and answer choice b is 4.]

Good reading, pilot! The problem would be read as:

3. 6 minus blank (or what number) equals 3

The answer choices are:

- a. 3
- b. 4

What is the correct answer? Yes, the correct answer would be the first answer choice, letter a.

Before beginning our last activity, let's learn how to write the English letter indicator. You will need your braillewriter and braille paper.

Dots 5-6 are used to write the English letter indicator. Braille the dots 5-6 with your right hand. Then press your line spacing key twice to move to the next line. Now braille the answer choice b. You will be begin with dots 5-6 and then the letter b. You got it! Let's braille another one. This time braille the answer choice c.

What will you begin with? Yes, begin with the dots 5-6. What should you braille next? That's right. You will braille the letter "c" next.

Activity 13

You will need your braillewriter and braille paper for this activity.

Practice 12.1

Begin by reading each problem and answer choices. Then use your ten frame and pennies to find the missing number. Afterwards, write the problem number and letter of the correct answer choice. Then press your line spacing key twice to move to the next line of braille before beginning the next problem.

[Make sure the student is viewing the first problem on page 10.]

6 4 = 6 4 = 6 4 = 6 4 = 6 4 =

6 4 = 6 4 =

6 4 = 6 4 =

6 4 = 6 4 =

6 4 = 6 4 =

Answer 12.1

The student can check their answers for Section 12 using page 10 of the writing answers document.

1. 6 plus 4 equals blank (or what number)

a 8

b 7

c 10

d 9

Written Response: 1. c

6 4 = 6 4 = 6 4 =

Practice 12.2

[Make sure the student is viewing the second problem on page 10.]

6 4 = 6 4 = 6 4 = 6 4 = 6 4 =

6 4 = 6 4 =

6 4 = 6 4 =

6 4 = 6 4 =

6 4 = 6 4 =

Answer 12.2

2. 7 minus 3 equals blank (or what number)

a 4

b 5

c 6

d 1

Written Response: 2. a

Practice 12.3

[Make sure the student is viewing the first problem on page 11.]

Answer 12.3

3. 9 minus blank (or what number) equals 8

a 0

b 1

c 2

d 3

Written Response: 3. b

Practice 12.4

[Make sure the student is viewing the second problem on page 11.]

4. Blank (or what number) plus 4 equals 8

a 6

b 3

c 4

Answer 12.4

4. Blank (or what number) plus 4 equals 8

a 6

b 3

c 4

Written Response: 4. c

4. Blank (or what number) plus 4 equals 8

Practice 12.5

[Make sure the student is viewing the last problem on page 11.]

4. Blank (or what number) plus 4 equals 8

a 6

b 3

c 4

- This activity can easily be completed with several students who read print or braille. If some of the players read print, add print to each of the flashcards and Connect Four cards.

Section 13 Teacher Script

Since we have completed our final descent and arrived at the airport, let's taxi to the gate with an activity.

Activity 14

We are going to play a new game called Connect Four. We will need Connect Four game cards, the problem set with subtraction and addition problems to 10 in braille, and markers. Small stickers or pieces of Wikki Stix® can be used for markers.

The first player to get 4 markers in a row wins the game! Each time you find a missing number in an equation, you will earn the right to place a marker on the number somewhere on the Connect Four game board. Once you have 4 markers horizontally in a row, vertically in a column, or going diagonally, call out Connect Four.

Let's get started by using your hands to explore the Connect Four game card. You will find the title centered on the first line. Afterwards there will be 6 rows with six numbers on each row. We will play until a winner calls out "Connect Four".

Next, take turns reading the equation on the problem set. Then figure out the missing number in the equation. Then find the missing number on the Connect Four game board and place a marker on top of it. There are more than 1 of each number on the game board, so you get to decide where to place your sticker or Wikki Stix® each time. Think about which one will help you get 4 markers in a row horizontally, vertically, or diagonally.