

# **First Grade Module 4 Subtraction to 20 and Equal Shares of Circles and Rectangles Teacher Script Answer Key**

## **Introduction**

- This module should be completed with hard copy braille and a braillewriter instead of a refreshable braille display.
- 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: Review of Reading Spatial Subtraction Problems**

### **Section 1 Materials**

- Student Braille Document: G1-M4-Student-Materials.brf
- Optional: teddy bear manipulatives, Digi-Blocks, or Unifix cubes
- Activity 1
  - Timer
  - Flashcards available in braille within the curriculum
  - Optional: nonslip surface such as rubber shelf liner

### **Section 1 Teacher Note**

It may be helpful to 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.

### **Section 1 Teacher Script**

It's time to prepare for a helicopter ride! Before we begin our journey, locate the first line of braille on the page. It is at the top of the 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 4.

Now move your hands down to the third line of braille on the page. It begins in cell 5, and it says Section 1. It is followed by an opening Nemeth Code indicator.

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

⠠⠠⠠

What does this symbol tell us?

You got it! It tells us that we are going to read math or science.

### Fun Fact 1

A helicopter is a type of aircraft that does not have wings. Instead, it has rotors that are called blades.

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 section name and opening Nemeth Code indicator, there is an equation for you to explore with your hands.

[Make sure the student is viewing the first problem on page 1 which is 10 minus 2 equals.]

⠠⠠⠠  
⠠⠠⠠  
⠠⠠⠠⠠⠠⠠

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 the number 10 in the first line. 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.

For these types of spatial problems, the minus sign is spaced one cell to the left of the widest number. Since the minuend on the first line contains two digits in this problem and the subtrahend on the second line contains only one digit, there is a space between the minus sign and the subtrahend.

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

So far our problem reads 10-2. On the third line, there is a line of dots 2-5. Do you remember what this is called in Nemeth? That is correct. We call this a separation line. It begins one cell to the left of the minus sign and continues to the right one cell beyond the numbers.

So our problem reads ten minus two equals.

There are different strategies that we can use when subtracting if we do not know the answer immediately. One strategy is to count back. With this strategy, you begin with the minuend and count back from that number. So this time let's begin with 10 and count back two.

10, 9, 8

So what does  $10^{-2}$  equal? Yes,  $10^{-2}$  equals 8.

Try reading another equation. What does it begin with?

[Make sure the student is viewing the second problem on page 1.]

You got it, Nemeth superstar! The problem begins with the number 16. What follows the number 16 on the next line? Yes, there is a minus sign, followed by the number 3.

So our problem reads sixteen minus three equals. Let's use the count back strategy by beginning with 16 and count back 3.

16, 15, 14, 13

That's correct! Sixteen minus three equals 13!



## Section 2 Teacher Script

While we wait for the pilot to tell us when it is time to board the helicopter, let's learn another strategy we can use when subtracting. We can use the related doubles addition facts we learned in the last module to help us determine the difference when we subtract.

Before we learn how to use the doubles addition facts to help us subtract, let's quickly review our facts! Begin by confirming that you are on page 2. Braille page numbers are placed at the right margin on the last line of the page.

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 2. It is followed by an opening Nemeth Code indicator.

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

## Practice 2.1

Now read the addition problems on the top row of page 2 and then tell me the sum for each problem.

### Answer 2.1

The student should read 1 plus 1 equals 2, 2 plus 2 equals 4, 3 plus 3 equals 6, and 4 plus 4 equals 8.

$$\begin{array}{r} 1 \\ + 1 \\ \hline 2 \end{array}$$

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

$$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$$

Yes, that's right. The first problem is  $1+1$ . What does one plus one equal? You got it! One plus one equals two. Now move to the second addition problem and read it. Good job! The problem is  $2+2$ . What does  $2+2$  equal? Yes, it equals 4.

Now find the next problem and read it. Yes, the problem is 3+3. What does 3+3 equal? Perfect! Three plus three equals six. Now find the last problem on this row and read it. Yes, it is 4+4. What does 4+4 equal? Yes, it equals 8.

## Practice 2.2

Let's move to the second row of problems. Read the problems, beginning with the one on the left. Then tell me the answer before moving to the next problem.



## Answer 2.2

The student should read 5 plus 5 equals 10, 6 plus 6 equals 12, 7 plus 7 equals 14, and 8 plus 8 equals 16.

$$\begin{array}{r} 5 \\ +5 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 6 \\ +6 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 7 \\ +7 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 8 \\ +8 \\ \hline 16 \end{array}$$

Yes, the first problem is 5+5, and it equals ten. Now move to the second addition problem and read it. You got it! The problem is 6+6. What does 6+6 equal? Yes, it equals 12. Now find the next problem and read it. Yes, the problem is 7+7. What does 7+7 equal? Good job, Nemeth superstar! Seven plus seven equals fourteen. Now find the last problem on this row and read it. Yes, it is 8+8. What does 8+8 equal? Yes, it equals 16.

## Practice 2.3

We are ready for the last row of problems on the page. Just two more doubles addition problems to review!



### Answer 2.3

The student should read 9 plus 9 equals 18 and 10 plus 10 equals 20.

$$\begin{array}{r} 9 \\ +9 \\ \hline 18 \end{array} \qquad \begin{array}{r} 10 \\ +10 \\ \hline 20 \end{array}$$

Way to go! The first problem is 9+9, and it equals 18. Now move to the second addition problem and read it. Yes, it is 10+10. What does 10+10 equal? That's correct. Ten plus ten equals twenty!

Below the last row of problems on the page, 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 3

Leonardo Da Vinci drew sketches of a flying machine that resembled a helicopter in the 1480s.

## Section 3: Subtraction Using Doubles

### Section 3 Materials

- Student Braille Document: G1-M4-Student-Materials.brf
- Optional: teddy bear manipulatives, Digi-Blocks, or Unifix cubes
- Activity 2: same as materials used in the rest of Section 3

### Section 3 Teacher Script

Begin by finding the braille page number 3 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.

You found it! The section name is at the top of the page. It says Section 3, followed by an opening Nemeth Code indicator.

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

⠠⠠⠠

When we have a subtraction problem, we can use a related addition fact to help us figure out the difference. Let's practice an example together.

Begin by reading the problem at the top of page 3.

⠠⠠⠠  
⠠⠠⠠  
⠠⠠⠠⠠⠠⠠

What does it begin with? Yes, the problem begins with the number 16. What follows the number 16 on the next line? Yes, there is a minus sign, followed by the number 8.

So our problem reads sixteen minus eight. What does 16 minus 8 equal? If we remember that  $8+8 = 16$ , then we know that  $16-8 = 8$  since they are related facts.

Try reading the next problem.

What does it begin with?

⠠⠠⠠  
⠠⠠⠠  
⠠⠠⠠⠠⠠⠠

You got it, Nemeth superstar! The problem begins with the number 10. What follows the number 10 on the next line? Yes, there is a minus sign, followed by the number 5.

So our problem reads ten minus five. What does 10 minus 5 equal? Do you know a related doubles addition fact that might help us? Yes,  $5+5 = 10$ . So what does ten minus five equal? Yes, it equals 5.

Let's try one more together. Read the last problem on the page first.

⠠⠠⠠  
⠠⠠⠠  
⠠⠠⠠⠠⠠⠠



Yes, the problem is twenty minus ten. Do you know a related doubles addition fact that might help us? Yes,  $10+10 = 20$ .

So what does  $20-10$  equal? Way to go, math superstar! The answer is 10.

### Fun Fact 4

Helicopters can be used to fight fires by carrying tanks or huge buckets filled with water and suspended by a cable.

Co-pilot, now read the subtraction problems on page 4 and tell me the difference for each problem as you go. Use what you know about related doubles addition facts to help you.

### Practice 3.1

[Make sure the student is viewing the first row of problems on page 4.]

$\begin{array}{r} 12 \\ -6 \\ \hline 6 \end{array}$	$\begin{array}{r} 8 \\ -4 \\ \hline 4 \end{array}$	$\begin{array}{r} 18 \\ -9 \\ \hline 9 \end{array}$
---	--	---

Answer 3.1

The student should read 12 minus 6 equals 6, 8 minus 4 equals 4, and 18 minus 9 equals 9.

$\begin{array}{r} 12 \\ -6 \\ \hline 6 \end{array}$	$\begin{array}{r} 8 \\ -4 \\ \hline 4 \end{array}$	$\begin{array}{r} 18 \\ -9 \\ \hline 9 \end{array}$
---	--	---

### Practice 3.2

[Make sure the student is viewing the second row of problems on page 4.]

$\begin{array}{r} 12 \\ -6 \\ \hline 6 \end{array}$	$\begin{array}{r} 8 \\ -4 \\ \hline 4 \end{array}$	$\begin{array}{r} 18 \\ -9 \\ \hline 9 \end{array}$
---	--	---

### Answer 3.2

The student should read 6 minus 3 equals 3, 20 minus 10 equals 10, and 14 minus 7 equals 7.

$$\begin{array}{r} 6 \\ -3 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 20 \\ -10 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 14 \\ -7 \\ \hline 7 \end{array}$$

### Practice 3.3

[Make sure the student is viewing the last row of problems on page 4.]

$$\begin{array}{r} 6 \\ -3 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 20 \\ -10 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 14 \\ -7 \\ \hline 7 \end{array}$$

### Answer 3.3

The student should read 10 minus 5 equals 5, 4 minus 2 equals 2, and 16 minus 8 equals 8.

$$\begin{array}{r} 10 \\ -5 \\ \hline 5 \end{array}$$

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

$$\begin{array}{r} 16 \\ -8 \\ \hline 8 \end{array}$$

### Fun Fact 5

Helicopters are sometimes called choppers.

### Activity 2

Read each of the subtraction problems on page 5. Make sure you are on the correct page first by checking the braille page number! Then use the new strategies we have learned and tell me the difference before moving to the next problem.

### Practice 3.4

[Make sure the student is viewing the first row of problems on page 5.]

$$\begin{array}{r} 6 \\ -3 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 20 \\ -10 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 14 \\ -7 \\ \hline 7 \end{array}$$

Answer 3.4

The student should read 13 minus 1 equals 12, 17 minus 4 equals 13, and 16 minus 8 equals 8.

$$\begin{array}{r} 13 \\ -1 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 17 \\ -4 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 16 \\ -8 \\ \hline 8 \end{array}$$

**Practice 3.5**

[Make sure the student is viewing the second row of problems on page 5.]

$$\begin{array}{r} 11 \\ -3 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 20 \\ -10 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 15 \\ -2 \\ \hline 13 \end{array}$$

Answer 3.5

The student should read 11 minus 3 equals 8, 20 minus 10 equals 10, and 15 minus 2 equals 13.

$$\begin{array}{r} 11 \\ -3 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 20 \\ -10 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 15 \\ -2 \\ \hline 13 \end{array}$$

**Practice 3.6**

[Make sure the student is viewing the third row of problems on page 5.]

$$\begin{array}{r} 10 \\ -5 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 14 \\ -7 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 19 \\ -4 \\ \hline 15 \end{array}$$

Answer 3.6

The student should read 10 minus 5 equals 5, 14 minus 7 equals 7, and 19 minus 4 equals 15.

$$\begin{array}{r} 10 \\ -5 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 14 \\ -7 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 19 \\ -4 \\ \hline 15 \end{array}$$

### Practice 3.7

[Make sure the student is viewing the last row of problems on page 5.]

$\begin{array}{r} 10 \\ -5 \\ \hline 5 \end{array}$	$\begin{array}{r} 18 \\ -9 \\ \hline 9 \end{array}$	$\begin{array}{r} 12 \\ -0 \\ \hline 12 \end{array}$
---	---	--

Answer 3.7

The student should read 10 minus 5 equals 5, 18 minus 9 equals 9, and 12 minus 0 equals 12.

$\begin{array}{r} 10 \\ -5 \\ \hline 5 \end{array}$	$\begin{array}{r} 18 \\ -9 \\ \hline 9 \end{array}$	$\begin{array}{r} 12 \\ -0 \\ \hline 12 \end{array}$
---	---	--

Below the last row of problems, 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.

## Section 4: Review of Writing Spatial Subtraction Problems

### Section 4 Materials

- Braillewriter
- Braille paper
- Optional: G1-M4-Writing-Answers.brf

### Section 4 Teacher Notes

- Repeat saying each problem as many times as needed.
- Remind the student to move their fingers across the braille and check their work if needed.

## Section 4 Teacher Script

It is time to board the helicopter! Since helicopters are noisy, let's wear earplugs, a headset or safety earmuffs. If you are wearing a hat, hold onto it firmly because the rotors are generating a lot of air as they turn. As we walk toward the helicopter, crouch down and stay away from the rotors.

For the fourth part of the adventure, let's work together to review how to write spatially aligned subtraction problems.

### Practice 4.1

Let's begin by writing 8 minus 4 equals.

$$\begin{array}{r} 8 \\ -4 \end{array}$$

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 8 in cell 3, press the space bar twice.

How should we braille the number 8 in a vertically aligned problem? Yes, you should press dots 2-3-6. 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 4 will be brailled directly below the minuend in the first line. Since this is a vertically aligned problem, how do we write the number 4? Yes, you should press dots 2-5-6. We will not need a numeric indicator again since the problem is vertically aligned.

Where will we braille the minus sign? Yes, we will place the minus sign one cell to the left of the number 4 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 4. Then 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 number 4. How do you braille a separation line? Yes, we press the dots 2-5 four times to make the separation line. It will begin in cell 1 and continue one cell to the right of the numbers.

## Answer 4.1

The student should write 8 minus 4 equals spatially. The student can also check their answers for Section 4 using pages 1-3 of the writing answers document.

```

      ⠠⠠
    ⠠⠠⠠
  ⠠⠠⠠⠠
  
```

Way to go, co-pilot!

## Practice 4.2

Let's write another problem: 12 minus 3 equals.

```

12
-3
  
```

What should we braille first? Yes, begin by braille the minuend on the first line. What cell will it begin? You got it! The number 12 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 12.

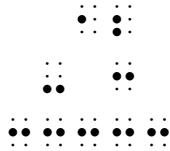
How should we braille the number 12 in a vertically aligned problem? Yes, you should press dot 2 first and then dots 2-3 in the next braille cell. We will not need a numeric indicator again since the problem is vertically aligned.

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 subtrahend. Use the backspace key to line up the embossing head and braille the minus sign and the number 3. The number 3 will be brailled directly below the number 2 in the minuend. Remember that the minus sign should be one cell to the left of the widest number in the spatially aligned subtraction problem.

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 five times to make the separation line. It will begin in cell 1 and continue one cell to the right of the numbers.

## Answer 4.2

The student should write 12 minus 3 equals spatially.



## Fun Fact 6

A helicopter can move forward, backward, and side-to-side.

## Practice 4.3

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

Once you finish writing the problems, keep your paper because we will use it again in Section 5.

Write the following problems: 16 minus 3 equals, 9 minus 4 equals, 12 minus 6 equals, 19 minus 1 equals, 20 minus 10 equals, 8 minus 0 equals, 14 minus 7 equals, and 13 minus 2 equals.

$$\begin{array}{r} 16 \\ -3 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ -4 \\ \hline \end{array}$$

$$\begin{array}{r} 12 \\ -6 \\ \hline \end{array}$$

$$\begin{array}{r} 19 \\ -1 \\ \hline \end{array}$$

$$\begin{array}{r} 20 \\ -10 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ -0 \\ \hline \end{array}$$

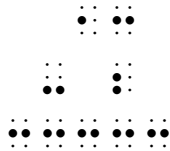
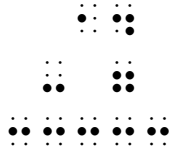
$$\begin{array}{r} 14 \\ -7 \\ \hline \end{array}$$

13  
-2

### Answer 4.3

The student should write the following spatial problems: 16 minus 3 equals, 9 minus 4 equals, 12 minus 6 equals, 19 minus 1 equals, 20 minus 10 equals, 8 minus 0 equals, 14 minus 7 equals, and 13 minus 2 equals.





### Fun Fact 7

In order to fly a helicopter in the United States, a person must be certified as a rotorcraft pilot by the Federal Aviation Administration.

## Section 5: Review of Writing Answers to Spatial Subtraction Problems

### Section 5 Materials

- Student's set of subtraction problems from Section 4
- Braillewriter
- Optional: teddy bear manipulatives, Digi-Blocks, or Unifix cubes, G1-M4-Writing-Answers.brf

### Section 5 Teacher Notes

- Provide assistance as needed.
- Remind the student to move their fingers across the braille and check their work if needed.
- Provide assistance in lining up the embossing head as needed.

### Section 5 Teacher Script

The pilot is giving a safety briefing before we take off. It is important that we fasten our seatbelts and stay seated during the flight! For the fifth part of the adventure, let's use the set of subtraction problems you just wrote and review how to write answers for subtraction problems that are vertically aligned. Begin by placing your paper in the braillewriter, and then roll the paper into the braillewriter by using the knobs on either side of the braillewriter. The paper should stop automatically. Then push the line spacing key.

We will write the answer to each subtraction problem on the line that is below the separation line.

### Practice 5.1

Let's work together to find the first problem and 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 separation line. You can see now how vertical aligned problems make it easier to calculate or compute the answer!

Read the first problem again. Yes, it is sixteen minus three. What does sixteen minus three equal? You got it! The difference is 13.

Where will we braille the answer? Yes, we will write the answer below the separation line. The digits in thirteen will be aligned by place value. The one will be in the tens column and the three will be in the ones column. Let's line up our embossing head together. You are ready to write your answer!

#### Answer 5.1

The student should write 13 below 16 minus 3 equals. The student can also check their answers for Section 5 using pages 4-5 of the writing answers document.

```

      ⠠⠠⠠⠠⠠⠠
    ⠠⠠⠠⠠⠠⠠
  ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠
    ⠠⠠⠠⠠⠠⠠
  
```

You got it! Congratulations! Good job, Nemeth superstar!

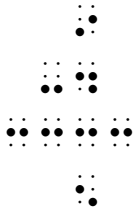
### Practice 5.2

Let's try one more together. Use your hands and find the next problem. You found it! Now read the problem. Yes, it is nine minus four. What does nine minus four equal? You got it! Nine minus four equals five.

Show me where we will write the answer. Perfect! We will write the answer below the separation line and the embossing head will be vertically in line with the minuend and subtrahend.

## Answer 5.2

The student should write 5 below 9 minus 4 equals.

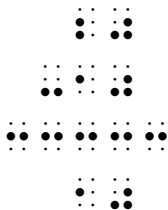
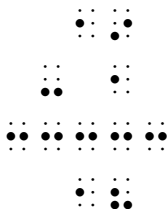
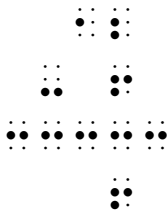


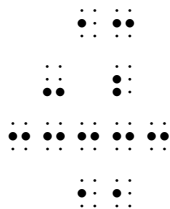
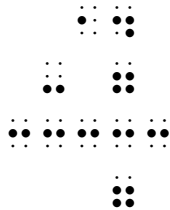
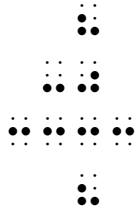
## Practice 5.3

Co-pilot, you are ready to write the answers for the rest of the problems. Afterwards, we will check your work together. Let me know if you need any help.

## Answer 5.3

The student should write 6 below 12 minus 6 equals, 18 below 19 minus 1 equals, 10 below 20 minus 10 equals, 8 below 8 minus 0 equals, 7 below 14 minus 7 equals, and 11 below 13 minus 2 equals.





### Fun Fact 8

Ross Perot and J. W. Coburn traveled around the world in a helicopter. Their trip around the world took 29 days, 3 hours, 8 minutes and 13 seconds.

Now that we are finished with the safety briefing and there is air circulating around the rotors, the helicopter has the lift it needs to take-off and fly! Let's begin to countdown! Five, four, three, two, one, time for take-off!

## Section 6: Equal Shares of Circles and Rectangles

### Section 6 Materials

- Activity 3
  - Work tray
  - Three circles, semi-circles, and rectangles available in the following products from the American Printing House for the Blind:
    - MathBuilders, Unit 7: Fractions, Mixed Numbers, and Decimals Kit
    - MathBuilders, Unit 6: Geometry Kit
    - Puzzle Form Board Kit

- Focus in Math Kit
  - Feel 'n Peel Sheets: Carousel of Textures has a variety of non-adhesive backed textured paper that can be used to create shapes
- Activity 4: two circles made of paper or another material that can be easily cut
- Activity 5
  - inTACT Sketchpad or the DRAFTSMAN: Tactile Drawing Board
  - Several pieces of drawing film
  - Ruler
  - Stylus or ball-point pen
  - Alternatives: Wikki Stix® or textured paper to create the shapes

## **Section 6 Teacher Notes**

- Activity 3

When the student is asked what they remember about circles and semi-circles from the last module, there are several possible correct responses to the question. For example, a circle is a perfectly round shape, each half-circle has a straight edge, and two half-circles can be put together to make a circle.
- Activity 4
  - Give the student a circle. After the student explores the circle, use scissors to cut it into halves. If desired, the student can assist you. Then give the student the half-circles.
  - Give the student another circle. After the student explores the circle, use scissors to cut it into two drastically unequal parts. If desired, the student can assist you. Then give the student the two unequal parts to explore.
- Activity 5
  - Draw three circles on the tactile film. Two of the circles should be divided into two equal parts with a line, and one of the circles should be divided into two unequal parts with a line.
  - Additional information about drawing shapes is available in the Teacher Guide.
  - If needed, use hand-under-hand technique to model scanning the drawing film from left to right.
  - Point out that a circle can be divided into two equal parts in many different ways, including with either a horizontal or vertical line.
  - If needed, provide information about how to hold the stylus and/or use hand-under-hand technique to draw the first shape together.

- It is recommended that shapes be drawn by using a continuous, clockwise motion.
- The student may enjoy drawing the shapes free-hand.
- Once the student has finished drawing the line that divides the circle into two equal parts, encourage them to check their work.
- If needed, discuss the different types of lines and draw examples of the lines using the stylus on the tactile drawing film.

## **Section 6 Teacher Script**

### **Activity 3**

The helicopter is in the air! For the sixth part of our adventure, let's learn more about shapes and equal shares of circles. What do you remember about circles and semi-circles from the last module?

There is a variety of shapes in your work tray. Pick up one shape at a time and tell me if it is a circle, semi-circle, or rectangle.

### **Fun Fact 9**

Helicopters have a number of limitations. They can be noisy, vibrate a lot, and are not as fast as airplanes.

### **Activity 4**

Very nice! Now place the objects back in the work tray and take a moment to explore this circle. If I cut the circle into two equal parts, then I will have two half-circles.

Sometimes half-circles are called semi-circles. Take a minute and explore the half-circles with your hands.

The two half-circles are the same size because we cut the circle into two equal parts. Each half-circle is half of the whole circle.

Now explore another circle.

I cut the circle into two parts again. This time the two parts are not equal. One piece is much larger than the second piece.

## **Activity 5**

Let's move to the inTACT Sketchpad (or the DRAFTSMAN: Tactile Drawing Board). I have drawn three circles on the tactile film. Two of the circles have been divided into two equal parts with a line, and one of the circles has been divided into two unequal parts with a line.

Use both hands and scan the drawing film from left to right. Tell me about the shapes, moving from left to right!

First find the two circles that have been divided into two equal parts with a line.

Now find the circle that has been divided into two unequal parts with a line.

Let's remove the film from the Sketchpad (or the DRAFTSMAN) and place a new sheet of tactile drawing film in the Sketchpad (or the DRAFTSMAN). Use the stylus and a stencil to draw a circle on the left side of the tactile drawing film using the Sketchpad (or the DRAFTSMAN). The stylus is sometimes called a drawing tool.

Now let's work together with a ruler to draw a line that divides the circle into two equal parts.

Excellent drawing, shape superstar! Tell me about your drawing.

We can also divide a rectangle into two equal parts. On the right side of the tactile drawing film, let's use the stylus and a stencil to draw a rectangle.

Since there are several ways to divide a rectangle into two equal parts, what kind of line would you like to use this time? We can use a horizontal, vertical, or a diagonal line.

Now let's work together with a ruler to draw that kind of line to divide the rectangle into two equal parts.

Remove the film from the Sketchpad (or the DRAFTSMAN) and place a new sheet of tactile drawing film in the Sketchpad (or the DRAFTSMAN). Let's work together to draw another circle and rectangle. Next divide one of the shapes into two equal parts and the other shape into two unequal parts.

Now that you are finished, tell me about the shapes and how you divided them into two parts.

Let's place the Sketchpad (or the DRAFTSMAN) to the side.

## Section 7: More Equal Shares of Circles and Rectangles

### Section 7 Materials

- Activity 6
  - One circle and one rectangle made of paper or another material that can be easily cut
  - Scissors
  - Piece of construction paper
  - Glue or glue stick
- Activity 7
  - Playdough
  - Circle cookie cutter (or mold)
  - Cutting tool such as a plastic knife
  - Optional: rectangular mold

### Section 7 Teacher Notes

- Activity 6
  - Give the student a circle. After the student explores the circle, use scissors to cut it into quarters. If desired, the student can assist you. Then give the student the pieces of the circle.
  - The student will need to glue the circle pieces on construction paper to form a circle.
  - Once the student has finished gluing the shape back together, encourage them to check their work.
  - Give the student a rectangle. After the student explores the rectangle, use scissors to cut it into quarters. Then give the student the pieces of the rectangle.
  - The student will need to glue the rectangle pieces on construction paper to form a rectangle.

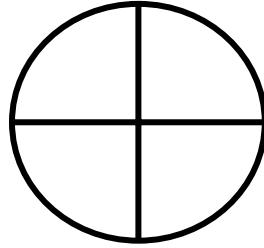
### Section 7 Teacher Script

#### Activity 6

Take a moment to explore this circle. I can divide this circle into 4 equal shares. Each equal part will be a fourth of the whole circle.



[a circle divided into four equal shares]



Take a minute and explore the four fourths of the circle with your hands. Each equal part is a quarter of the whole circle.

Let's glue the pieces onto the construction paper and create a circle. Excellent work, shape superstar!

I can also divide a rectangle into 4 equal shares. Take a moment to explore this rectangle. Let's work together to cut the rectangle into four equal parts. Each equal part will be a fourth of the whole rectangle.

Take a minute and explore the four fourths of the rectangle with your hands. Each equal part is a quarter of the whole rectangle.

Let's glue the pieces onto the construction paper and create a rectangle.

### **Fun Fact 10**

Hovering is one of the most difficult skills to learn when flying a helicopter. Constant control is required to maintain almost motionless flight over a point of interest and to offset the gusty air created by the helicopter.

### **Activity 7**

We will need playdough, a circle cookie cutter (or mold), and a cutting tool such as a plastic knife. Begin by flattening the playdough by pounding or squishing it. Next create a circle with the playdough. It may be helpful to use the circle cookie cutter (or mold). Now let's work together to cut the circle into two equal shares.

Now carefully place the pieces on top of each other so we can ensure that they are equal shares. Very nice!

Use your hands to squash the pieces back together into one piece and then create another circle with the playdough.

### Practice 7.1

Now let's work together to cut the circle into two unequal shares. Now carefully place the two pieces on top of each other. Are they the same size? If not, how do they differ?

Answer 7.1

No, the pieces are not the same size. One share is larger than the other share.

Way to go, shape superstar! Use your hands to squash the pieces back together into one piece and then create another circle with the playdough.

### Practice 7.2

Now let's work together to cut the circle into four equal shares!

Carefully place the four pieces on top of each other. Are they equal shares of the circle? How do you know?

Answer 7.2

Yes, the four pieces are all the same size.

Use your hands to squash the pieces back together into one piece again and then create a rectangle. Afterwards we will work together to cut the rectangle into four equal shares.

### Fun Fact 11

The German-made Focke Achgelis 61 was the first official helicopter.

## Section 8: Reading and Solving Spatial Subtraction Problems

### Section 8 Materials

- Student Braille Document: G1-M4-Student-Materials.brf
- Activity 8: same as materials used in the rest of Section 8

## Section 8 Teacher Script

The helicopter is hovering above the canyon so that a person can repel! As we stay almost motionless in the sky, let's learn about another subtraction strategy. We can use what we know about addition facts to help us solve subtraction problems. Sometimes this strategy is called the "think addition" strategy.

Begin by reading the section name and then the subtraction problem at the top of page 6.

$$\begin{array}{r} 13 \\ -7 \\ \hline \end{array}$$

Yes, that's right. It says Section 8, and the problem is 13-7.

Let's talk through the example problem together. Every subtraction fact has a related addition fact. So using the "think addition" strategy, we think of a related fact. Seven plus what number equals thirteen? You got it! Seven plus six equals thirteen. Thus, thirteen minus seven equals six. Now move to the second subtraction problem on the page and read it.

$$\begin{array}{r} 11 \\ -5 \\ \hline \end{array}$$

Good job! The problem is 11-5. So what related addition fact would we begin with? Yes, five plus what number equals eleven. Perfect! So what number plus five equals eleven? Yes, five plus six equals eleven.

So what does 11-5 equal? You got it! Eleven minus five equals six.

Now move to the third subtraction problem on the page and read it.

$$\begin{array}{r} 16 \\ -6 \\ \hline \end{array}$$

The problem is 16-6. So what addition fact would we begin with? Yes, six plus what number equals sixteen. Yes! So what number plus six equals sixteen? You got it! Six plus ten equals sixteen.

So what does  $16-6$  equal? Yes! Sixteen minus six equals ten.

## Practice 8.1

Now find the fourth problem and read it.

Yes, the problem is 10-8. Talk through the “think addition” strategy and then tell me what 10-8 equals.

### Answer 8.1

The problem is  $10-8$ . Eight plus what number equals 10? Eight plus two equals 10. So, ten minus eight equals two.

Perfect! Ten minus eight equals two.

## Practice 8.2

Now find the last problem on the page and read it.

Yes, the problem is 15-8. Once again, talk through the “think addition” strategy and then tell me what 15-8 equals.

### Answer 8.2

The problem is  $15-8$ . Eight plus what number equals 15? Eight plus seven equals 15. So, fifteen minus 8 equals seven.

You got it, Nemeth superstar! Yes, fifteen minus eight equals seven.

## Fun Fact 12

Helicopters used for carrying heavy cargo loads have two blades. They are horizontal and spin in opposite directions.

**Activity 8**

Read each of the numbered addition problems on page 7. Make sure you are on the right page by checking the braille page number on the last line! Then use the "think addition" strategy we have learned to help us with subtraction problems and tell me the answer before moving to the next problem.

**Practice 8.3**

[Make sure the student is viewing the first row of problems on page 7.]

$\begin{array}{r} 12 \\ -8 \\ \hline 4 \end{array}$	$\begin{array}{r} 6 \\ -4 \\ \hline 2 \end{array}$	$\begin{array}{r} 9 \\ -6 \\ \hline 3 \end{array}$
---	--	--

Answer 8.3

The student should read number 1: 12 minus 8 equals 4, number 2: 6 minus 4 equals 2, and number 3: 9 minus 6 equals 3.

$$\begin{array}{r} 1. \ 12 \\ -8 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 2. \ 6 \\ -4 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 3. \ 9 \\ -6 \\ \hline 3 \end{array}$$

**Practice 8.4**

[Make sure the student is viewing the second row of problems on page 7.]

$\begin{array}{r} 16 \\ -9 \\ \hline 7 \end{array}$	$\begin{array}{r} 14 \\ -5 \\ \hline 9 \end{array}$
---	---

Answer 8.4

The student should read number 4: 16 minus 9 equals 7, and number 5: 14 minus 5 equals 9.

$$\begin{array}{r} 4. \ 16 \\ -9 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 5. \ 14 \\ -5 \\ \hline 9 \end{array}$$

**Practice 8.5**

[Make sure the student is viewing the third row of problems on page 7.]

$$\begin{array}{r}
 13 \\
 -6 \\
 \hline
 7
 \end{array}
 \qquad
 \begin{array}{r}
 17 \\
 -9 \\
 \hline
 8
 \end{array}$$

Answer 8.5

The student should read number 6: 13 minus 6 equals 7, and number 7: 17 minus 9 equals 8.

$$\begin{array}{r}
 6. \ 13 \\
 -6 \\
 \hline
 7
 \end{array}
 \qquad
 \begin{array}{r}
 7. \ 17 \\
 -9 \\
 \hline
 8
 \end{array}$$

### Practice 8.6

[Make sure the student is viewing the fourth row of problems on page 7.]

$$\begin{array}{r}
 10 \\
 -7 \\
 \hline
 3
 \end{array}
 \qquad
 \begin{array}{r}
 11 \\
 -4 \\
 \hline
 7
 \end{array}$$

Answer 8.6

The student should read number 8: 10 minus 7 equals 3, and number 9: 11 minus 4 equals 7.

$$\begin{array}{r}
 8. \ 10 \\
 -7 \\
 \hline
 3
 \end{array}
 \qquad
 \begin{array}{r}
 9. \ 11 \\
 -4 \\
 \hline
 7
 \end{array}$$

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

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

⠠⠠⠠⠠⠠⠠

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 math content and are moving to literary material.

### Fun Fact 13

Igor Sikorsky made the first practical helicopter flight in the United States in 1939.

## Section 9: Writing and Solving Spatial Subtraction Problems

### Section 9 Materials

#### Activity 9

- Braillewriter
- Braille paper
- Optional: G1-M4-Writing-Answers.brf

### Section 9 Teacher Notes

#### Activity 9

- Repeat saying each problem as many times as needed.
- Remind the student to move their fingers across the braille and check their work if needed.

### Section 9 Teacher Script

Now that we are almost finished with our journey, the helicopter is slowly descending. We are getting closer to the ground! Before we land, let's practice writing subtraction problems on the braillewriter and using all of the mental math strategies we have learned for subtraction, including the count back strategy and thinking of related addition facts.

#### Activity 9

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

#### Practice 9.1

Listen and then braille what you hear. Then use a mental math strategy and write the answer to the problem. You will need to press your line spacing key twice to move to the next line before brailleing an equation each time.

Write the following problems: 14 minus 1 equals, 15 minus 5 equals, 7 minus 3 equals, 10 minus 3 equals, 18 minus 9 equals, 16 minus 8 equals, and 19 minus 9 equals.

$$\begin{array}{r} 14 \\ -1 \\ \hline \end{array}$$

$$\begin{array}{r} 15 \\ -5 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ -3 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ -3 \\ \hline \end{array}$$

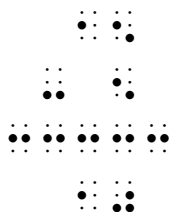
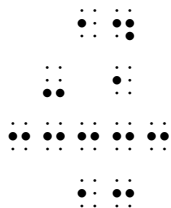
$$\begin{array}{r} 18 \\ -9 \\ \hline \end{array}$$

$$\begin{array}{r} 16 \\ -8 \\ \hline \end{array}$$

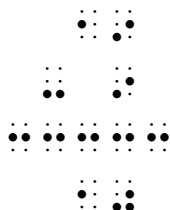
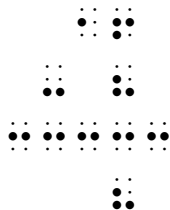
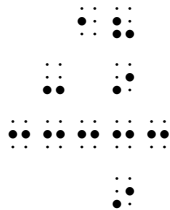
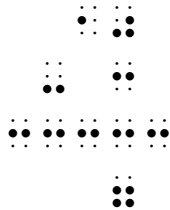
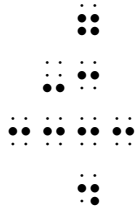
$$\begin{array}{r} 19 \\ -9 \\ \hline \end{array}$$

#### Answer 9.1

The student should write 14 minus 1 equals 13, 15 minus 5 equals 10, 7 minus 3 equals 4, 10 minus 3 equals 7, 18 minus 9 equals 9, 16 minus 8 equals 8, and 19 minus 9 equals 10. The student can also check their answers for Section 5 using pages 6-7 of the writing answers document.







Excellent work, Nemeth superstar!

### Fun Fact 14

NASA is studying the helicopter to see if it could be used on the planet Mars in the future.

## Section 10: Review

### Section 10 Materials

#### Activity 10

- Index cards
- Flashcards with various addition and subtraction problems shuffled
- Sorting tray with a 2-section divider
- Timer
- An empty container
- Braillewriter with braille paper or an abacus to keep score
- Optional: scented stickers, Wikki Stix®, buttons, textured paper

### Section 10 Teacher Notes

#### Activity 10

- Additional information about the game is available in the Teacher Guide.
- Previously made flashcards with subtraction and addition problems within 20 may be used instead of making new flashcards if preferred.
- Based on the student's preference, you can feed a dog, cat, or other animal instead of a monster.
- This game can easily be played with students who read print or braille. If one of the players reads print, add print to each of the flashcards.
- The length of time you play and the length of time to locate numbers is up to you.

### Section 10 Teacher Script

Now that the helicopter has safely returned to the ground, let's finish our adventure with an activity.

#### Activity 10

We are going to play a game called FEED THE MONSTER. You will need your braillewriter, notecards, flashcards with various addition and subtraction problems, a sorting tray, a timer, and an empty container.

Begin by decorating the empty container that will be the "monster". If you would like, you are welcome to name the monster. You can also "decorate" the monster with scented stickers, Wikki Stix®, buttons, or textured paper. Now shuffle the deck of flashcards and pass out an equal number of cards to each player.

**Instructions for playing FEED THE MONSTER:**

1. You will need 2 or more players for this game. I will shuffle the deck of cards and pass out an equal number of cards to each player. Then I will call out a number the monster is hungry for, and you will race to find a problem with that same number as the answer. For example, if the monster is hungry for the number 5, you will try to find a problem such as  $10-5$  or  $8-3$ .
2. As you read each problem, use a sorting tray to separate which cards you have read and which cards you have not read. As soon as you find a problem with an answer that is the same as the number that the monster is hungry for, try to be the first one to feed the monster. The monster can only eat the first flashcard it is given. It is then ready for another number. All of the players will be reading their flashcards at the same time. You will not be taking turns.
3. Every time you are the first to feed the monster, write a tally mark on a piece of braille paper to help you keep up with how many times you have fed the monster. Remember to write the tally marks in sets of five and leave a space between the sets. If you would prefer, you can also use an abacus to keep up with how many times you have fed the monster.
4. At the end of 10 minutes, whoever has fed the monster the most cards is the winner!