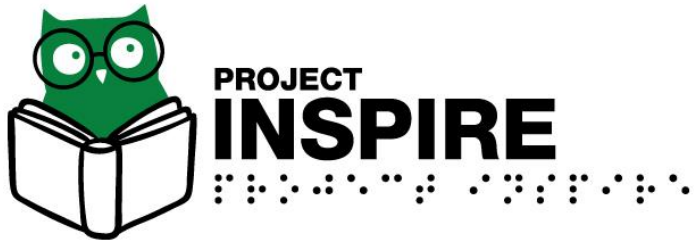
Grades 2 to 5: Nemeth Code Symbols for Fractions and Spatial Problems, Instructional Tools, Materials, and Technology

Lesson 4: Formatting Spatial Materials and Number Lines for Students in Grades 2-5



University of South Carolina Upstate, Fall 2020

Lesson 4 Objectives

Participants will be able to:

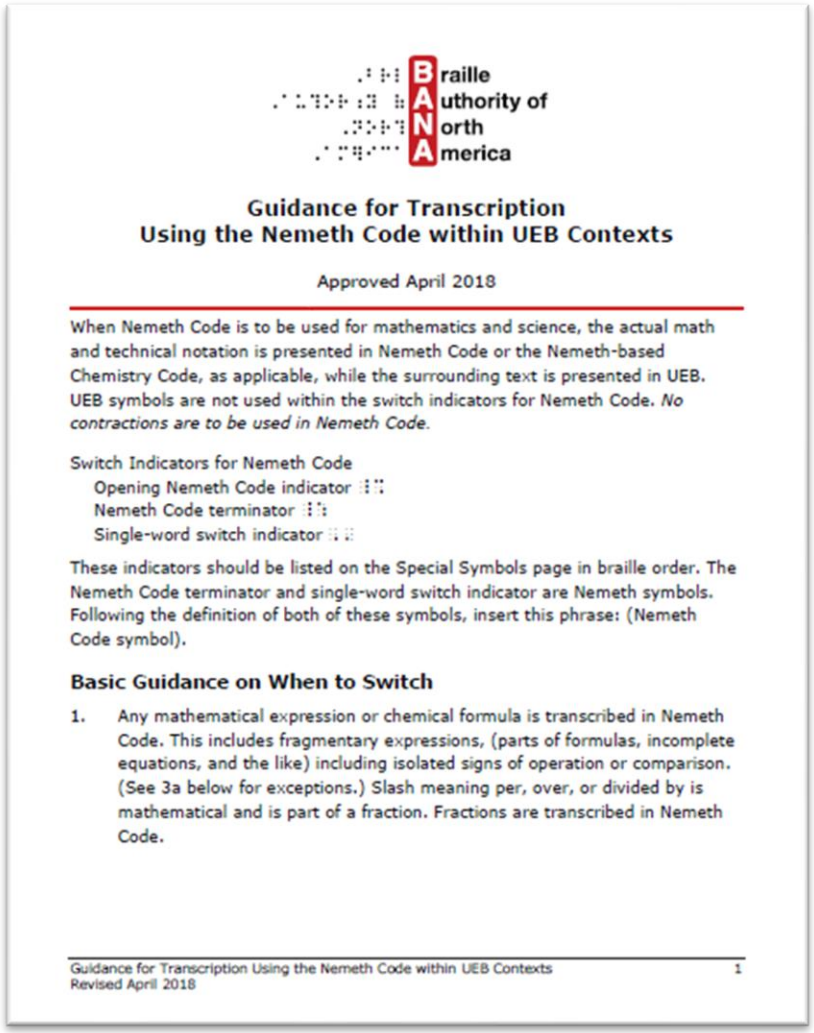
1. Locate and use formatting resources
2. Format the following:
   - Directions
   - Transcriber’s notes
   - Example problems
   - Numbered spatial problems
   - Number lines

BANA Terminology

- **Centered heading:** Term used for titles
- **Exercise:** Term used for a set of math problems
- **Instructions:** Term used for directions
- **Runover:** Term used for second or subsequent lines of a problem or a paragraph
- **Transcriber's note:** Term used for anything not shown in print that is included in the braille

Guidance for Transcription Using the Nemeth Code within UEB Contexts

- Available from the Braille Authority of North America (BANA)
- Information about spatial problems is on page 10.
- Information about number lines is on page 14.



Braille Authority of North America

Guidance for Transcription
Using the Nemeth Code within UEB Contexts

Approved April 2018

When Nemeth Code is to be used for mathematics and science, the actual math and technical notation is presented in Nemeth Code or the Nemeth-based Chemistry Code, as applicable, while the surrounding text is presented in UEB. UEB symbols are not used within the switch indicators for Nemeth Code. *No contractions are to be used in Nemeth Code.*

Switch Indicators for Nemeth Code
Opening Nemeth Code indicator
Nemeth Code terminator
Single-word switch indicator

These indicators should be listed on the Special Symbols page in braille order. The Nemeth Code terminator and single-word switch indicator are Nemeth symbols. Following the definition of both of these symbols, insert this phrase: (Nemeth Code symbol).

Basic Guidance on When to Switch

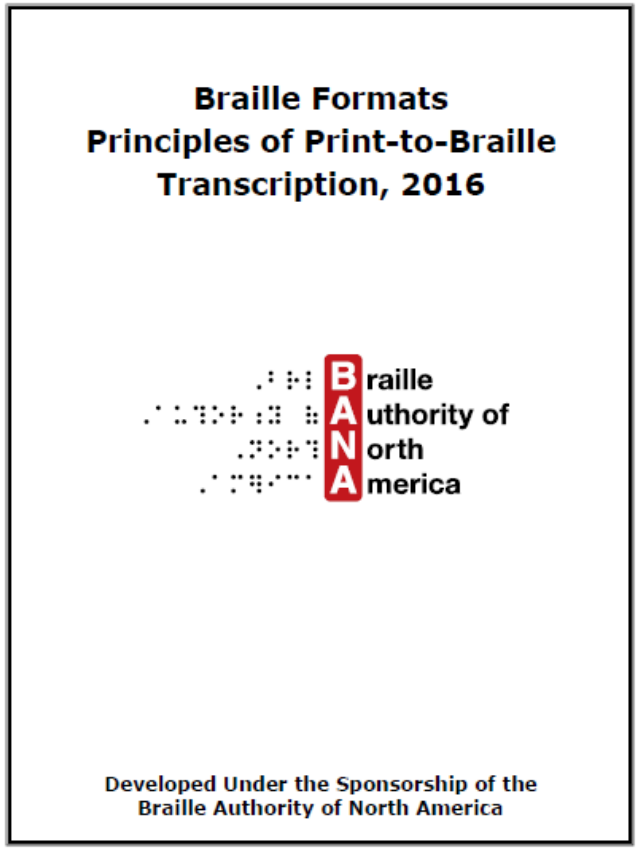
1. Any mathematical expression or chemical formula is transcribed in Nemeth Code. This includes fragmentary expressions, (parts of formulas, incomplete equations, and the like) including isolated signs of operation or comparison. (See 3a below for exceptions.) Slash meaning per, over, or divided by is mathematical and is part of a fraction. Fractions are transcribed in Nemeth Code.

Guidance for Transcription Using the Nemeth Code within UEB Contexts 1
Revised April 2018

http://www.brailleauthority.org/mathscience/math-science.html

Braille Formats: Principles of Print-to-Braille Transcription, 2016

- Often referred to as “Braille Formats”.
- Available from the Braille Authority of North America (BANA)
- Section 3 provides examples of transcriber’s notes.



http://brailleauthority.org/formats/formats2016.html

Resource to Use When Transcribing Math Materials

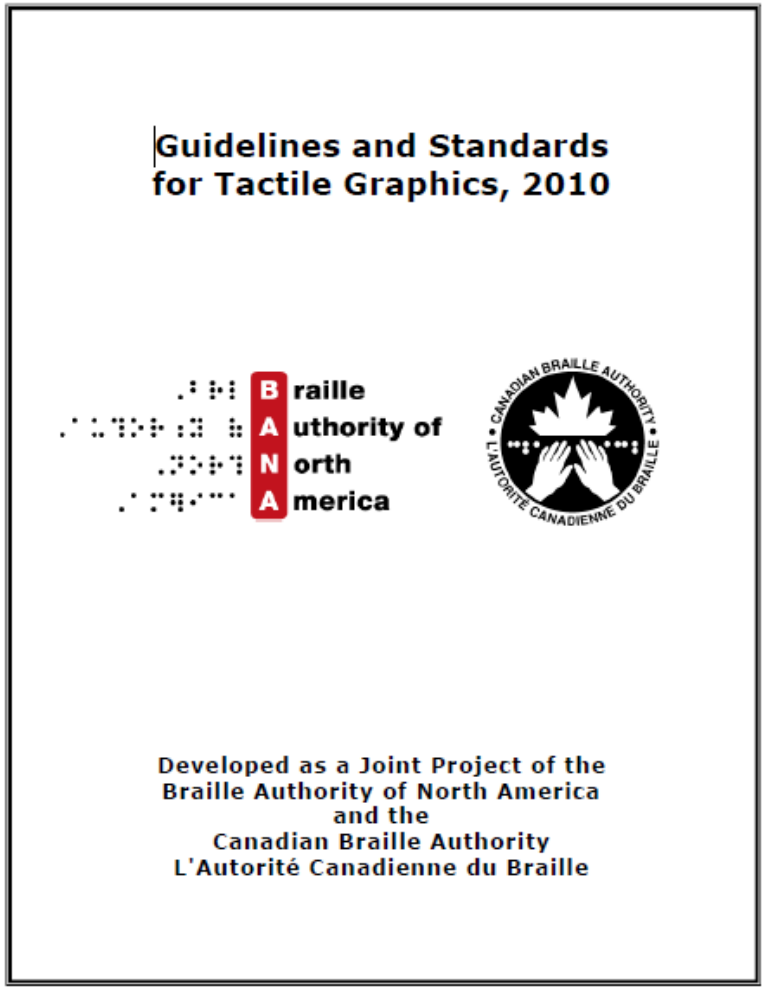
An Introduction to Braille Mathematics Using Nemeth Code within UEB Contexts

- Available from the National Federation of the Blind
- Lesson 10 includes examples of spatial arrangements for addition and subtraction.
- Lessons 12-13 include examples of spatial arrangements for multiplication and division.

https://www.nfb.org/programs-services/braille-certification/mathematics-braille-transcribing

Guidelines and Standards for Tactile Graphics

- Units 5 and 6 offer information about how to create tactile graphics as well as several example number lines in print and SimBraille.
- The supplement also provides examples in braille, including a number line created as a tactile graphic for a younger student.

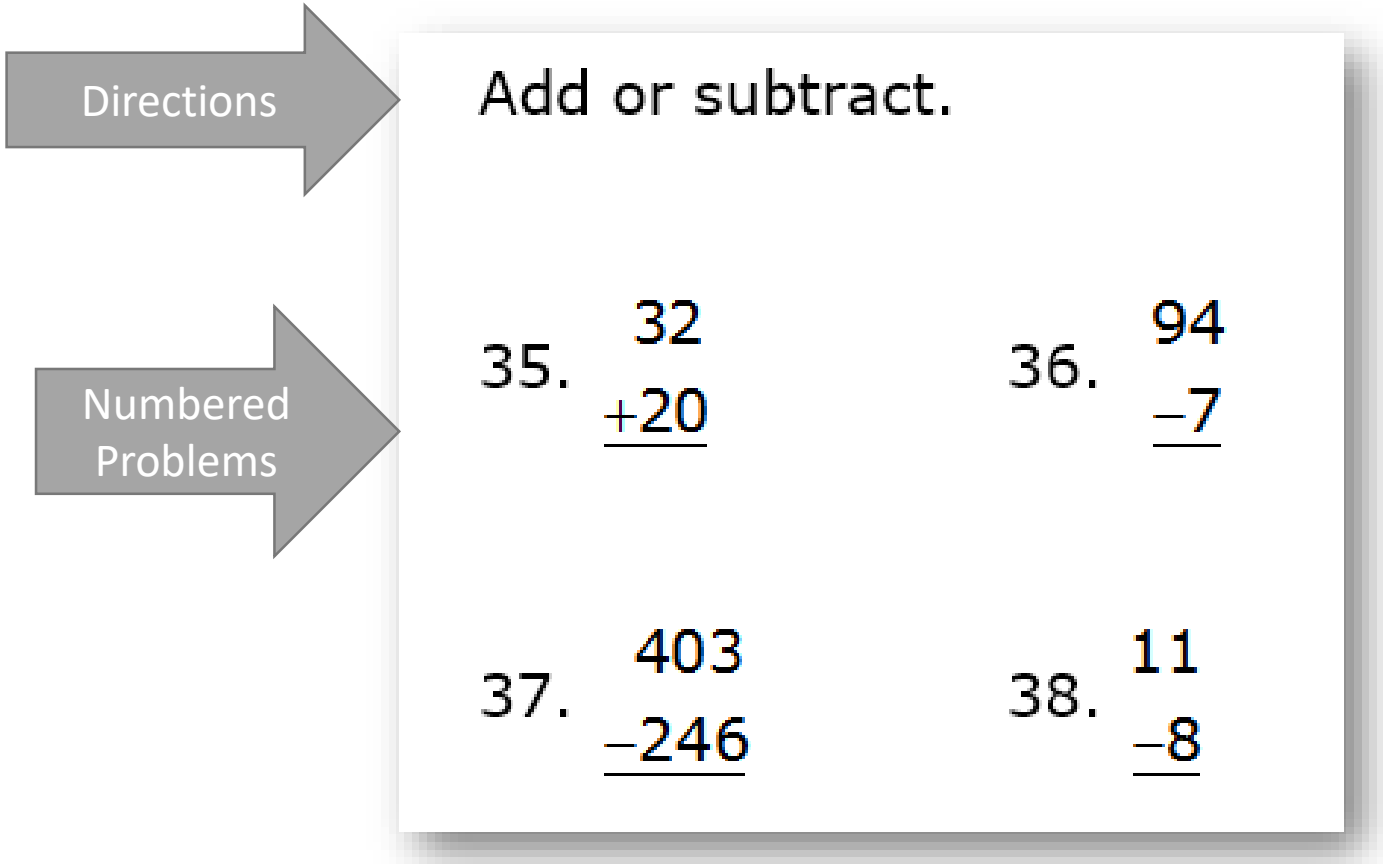


http://www.brailleauthority.org/tg/index.html

Formatting Basics for Students in Grades 2-5

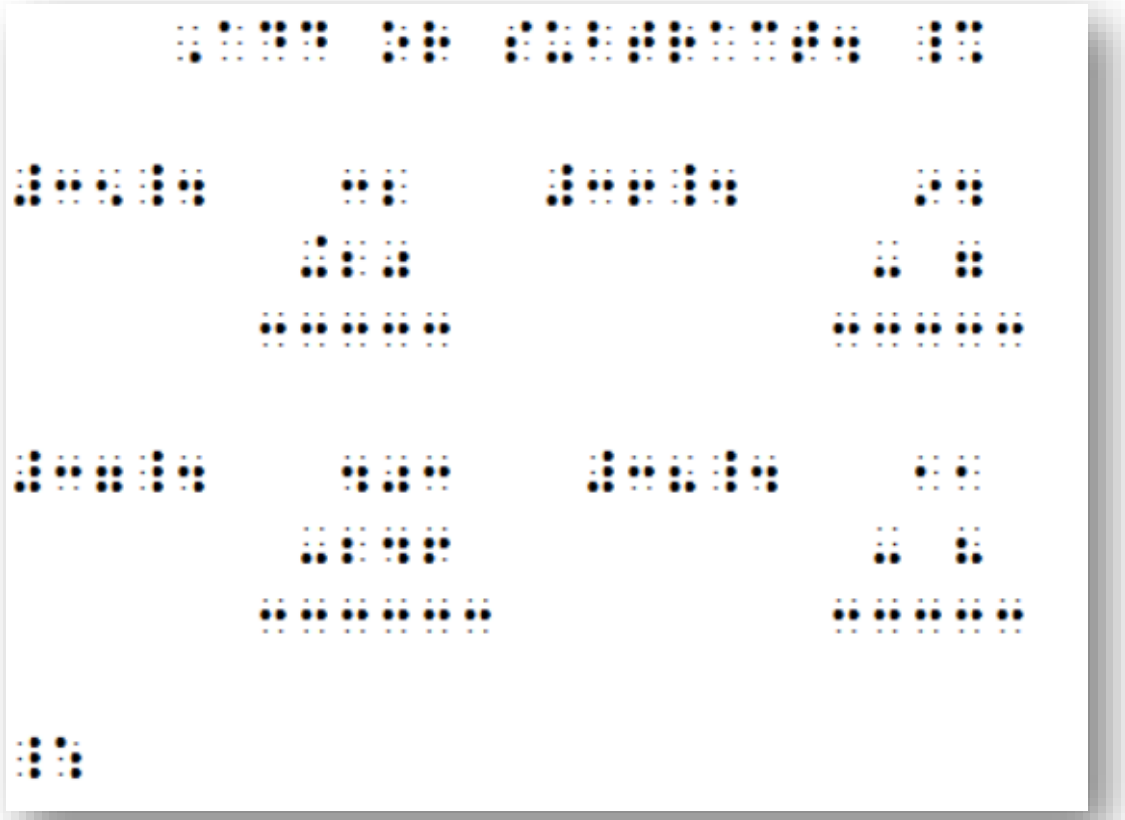
- Materials are single-spaced.
- BANA refers to titles as “centered headings.”
- Center the title of a worksheet on the first line of the page, and leave a blank line following it.
- Follow print for the sequence of problems, punctuation, and capitalization.
- Do not change the wording of directions or problems.

Example of a Set of Spatial Problems in Print

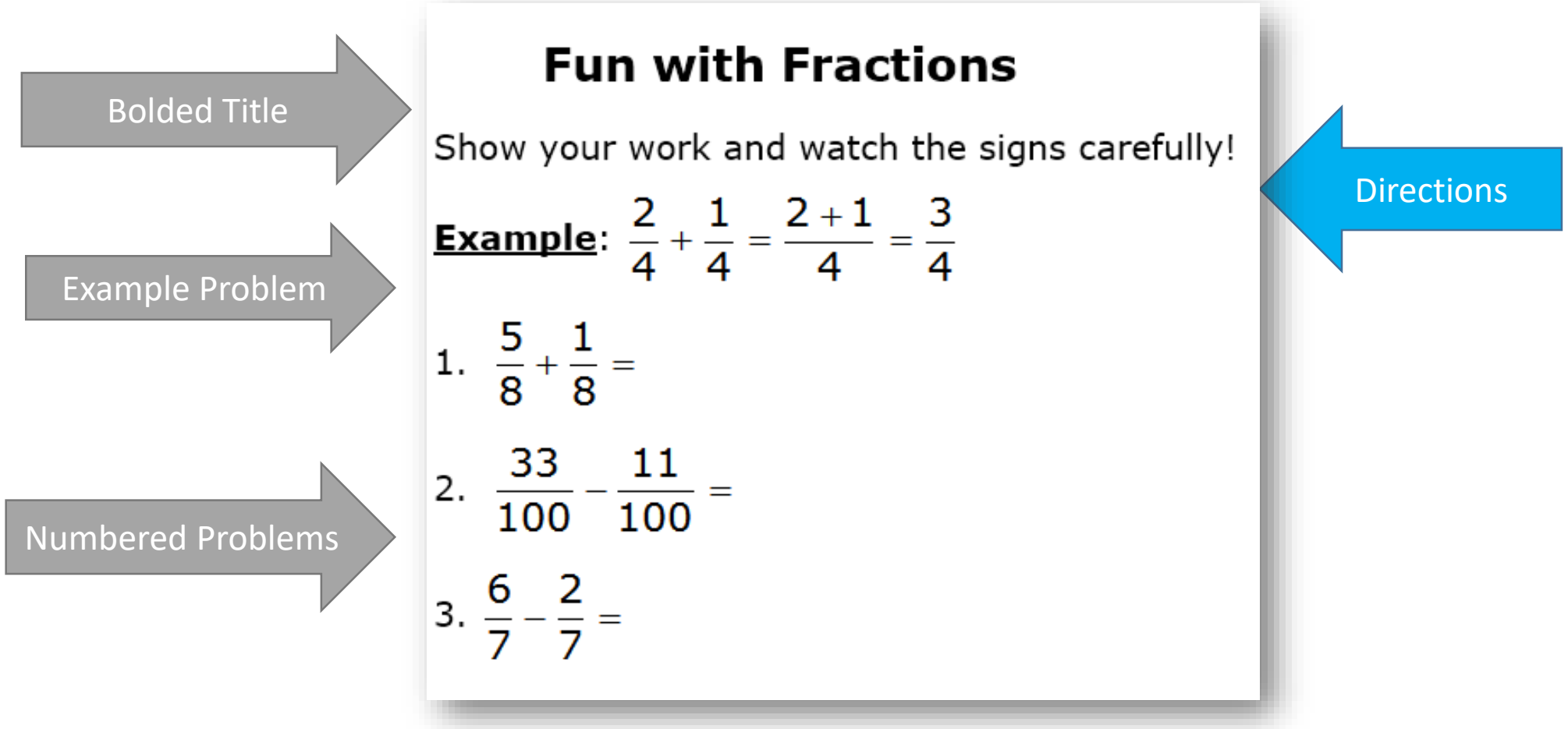


Directions Followed by Numbered Problems

- Begin directions in cell 5.
- The opening Nemeth Code indicator is placed on the same line as the directions.
- Print is followed for the problems.
- Problems begin in cell 1.
- There is a blank line above and below each problem and 1 or 2 cells on either side of the separation line.
- The Nemeth Code terminator is on a line by itself.



Anatomy of a Worksheet with An Example Problem



Worksheet with an Example Problem

Fun with Fractions

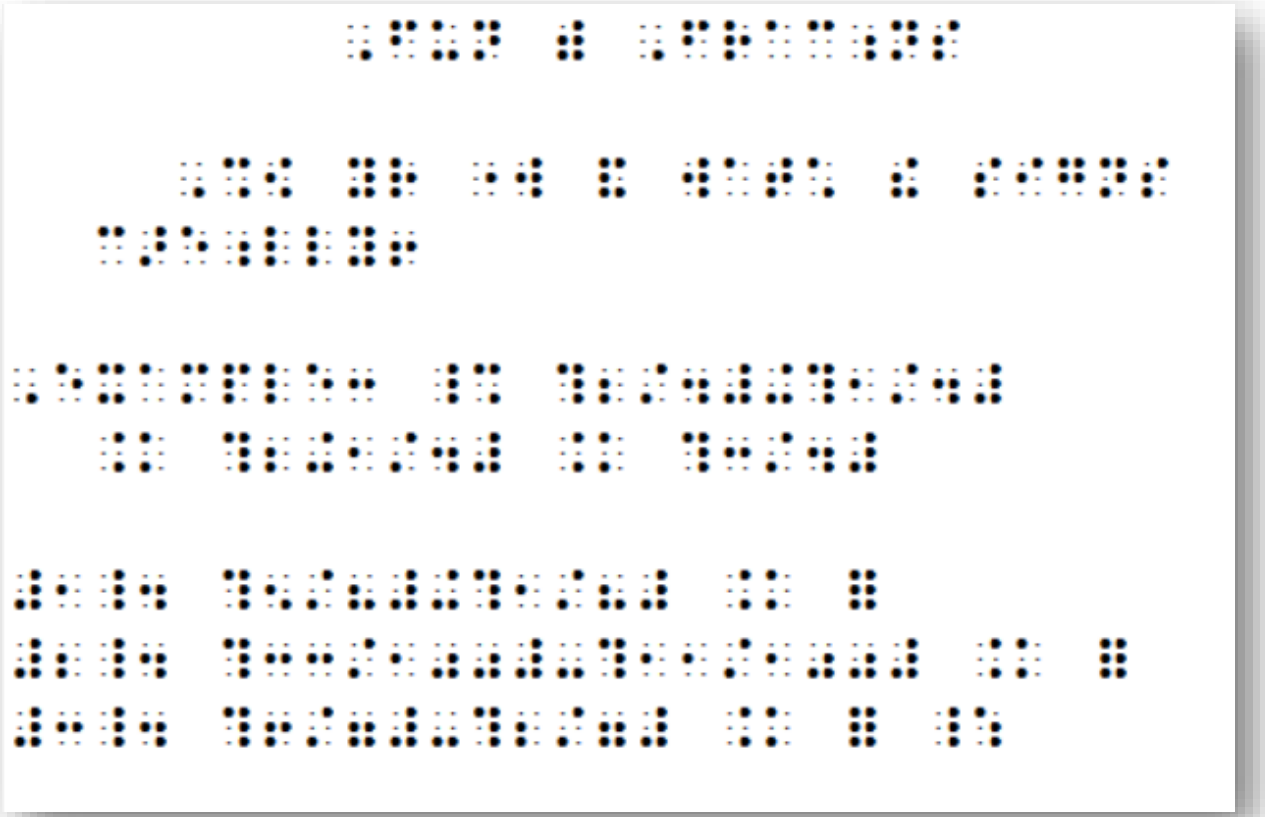
Show your work and watch the signs carefully!

Example: $\frac{2}{4}+\frac{1}{4}=\frac{2+1}{4}=\frac{3}{4}$

1. $\frac{5}{8}+\frac{1}{8}=$

2. $\frac{33}{100}-\frac{11}{100}=$

3. $\frac{6}{7}-\frac{2}{7}=$



- Leave a blank line above and below the example.
- When a colon follows the word “example” do not bold, underline, or italicize it.
- Format the exercise example like other problems.
- If you need to divide a problem, do so at the sign of comparison.

Transcriber’s Notes

⠐⠣ Opening transcriber’s note indicator

⠐⠜ Closing transcriber’s note indicator

- Transcriber’s notes are used to provide braille readers with information such as when different directions are needed or a different format has been used.
- Be brief and use age-appropriate language.
- Begin the transcriber’s note in cell 7 with runovers beginning in cell 5.

Same Worksheet with a Transcriber's Note

Fun with Fractions

Show your work and watch the signs carefully!

Example: $\frac{2}{4}+\frac{1}{4}=\frac{2+1}{4}=\frac{3}{4}$

1. $\frac{5}{8}+\frac{1}{8}=$

2. $\frac{33}{100}-\frac{11}{100}=$

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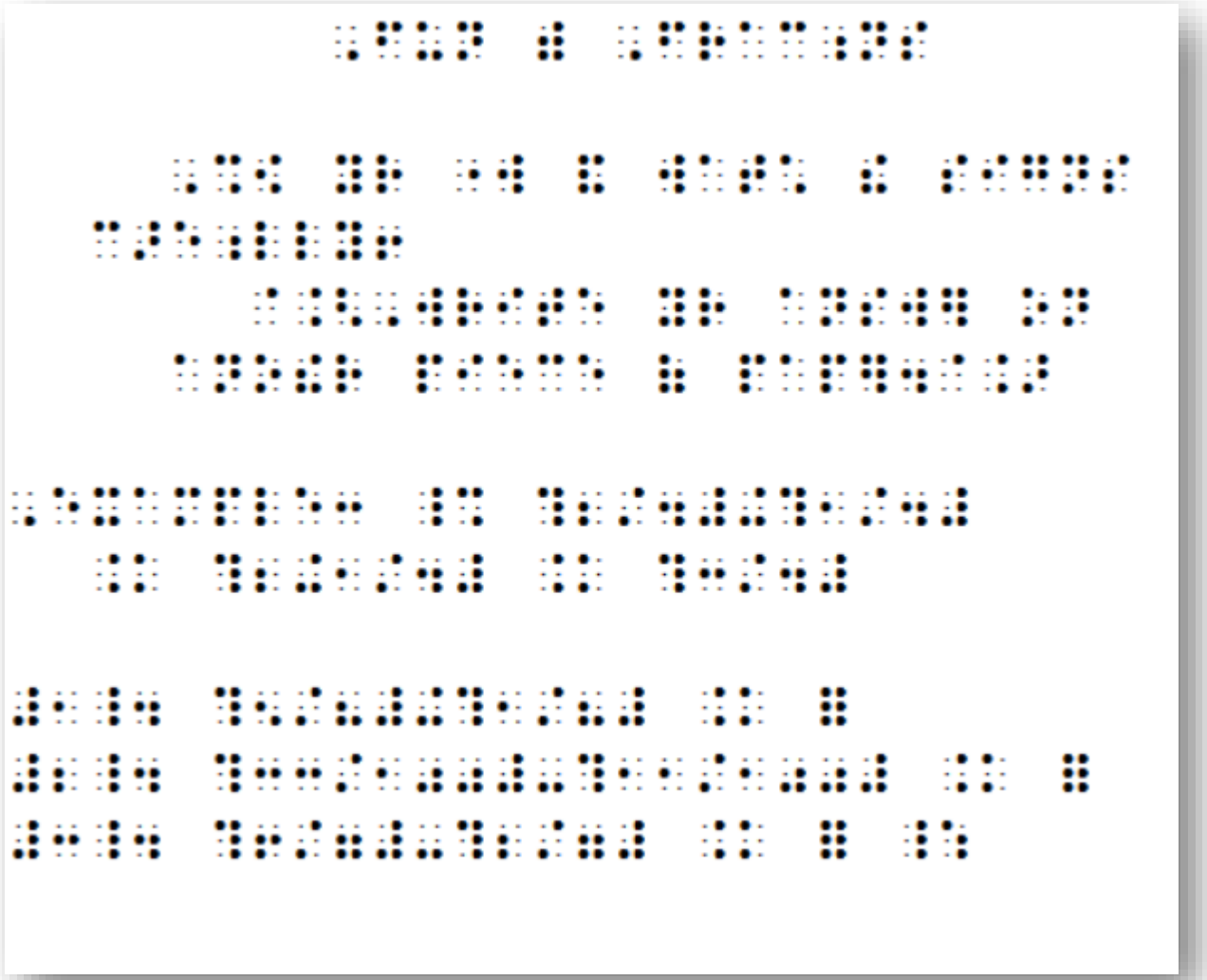


A transcriber's note has been added after the directions. It instructs the student to write their answers on another piece of paper.

Activity 4A

Decide if each statement is true or false.

1. Most materials for students in second grade are single-spaced.
2. When brailling spatial problems, an opening Nemeth Code indicator and Nemeth Code terminator are not needed.
3. Directions begin in cell 5 with runovers in cell 3 when followed by numbered spatial or linear problems.
4. Divide example problems that will not fit on a single line before a sign of comparison.
5. Omit the word “example” for example problems on worksheets in Nemeth Code.
6. Transcriber’s notes are only used when directions have been changed.

Activity 4A: Answer Key

1. True – Most materials for students in second grade are single-spaced.
2. False – An opening Nemeth Code indicator and Nemeth Code terminator are needed when transcribing spatial problems.
3. True – Directions begin in cell 5 with runovers in cell 3 when followed by numbered spatial or linear problems.
4. True – Divide example problems that will not fit on a single line before a sign of comparison.

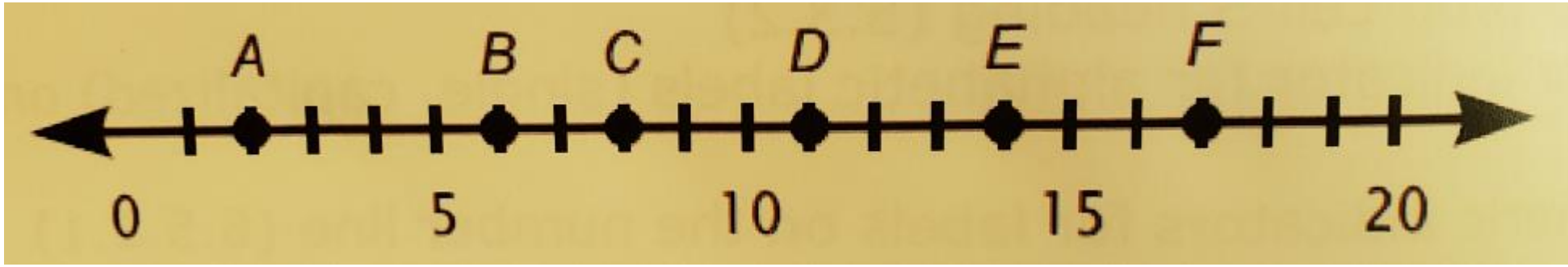
Activity 4A: Answer Key (continued)

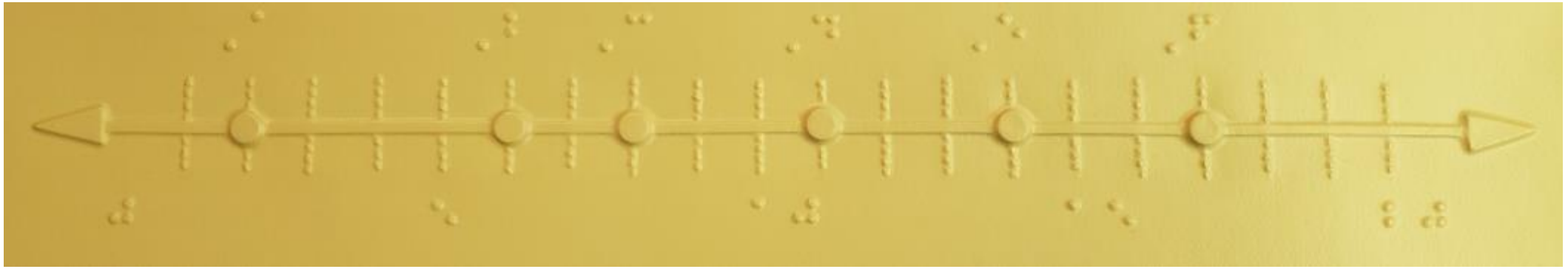
5. False – The word “example” for example problems is included on worksheets in Nemeth Code.

6. False – Transcriber’s notes are used for a variety of reasons, including when the format and/or directions have been changed. They can also be used to define symbols rarely used and provide pertinent information about pictures.

Number Lines for Young Students

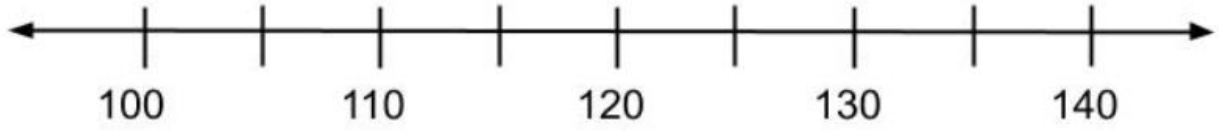
- Number lines are created as a tactile graphic through third grade.
- Only labels should be brailled.



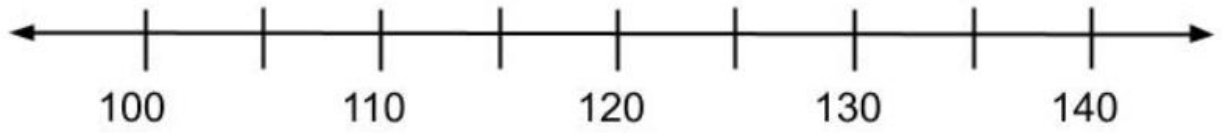


Number Lines for Students in Grades 4 and Up

- Number lines may be prepared using braille symbols.
- It is important to include a special symbols page or a transcriber's note when students are learning the braille symbols for number lines.
- Number lines are transcribed in Nemeth Code.



Commonly Used Number Line Symbols

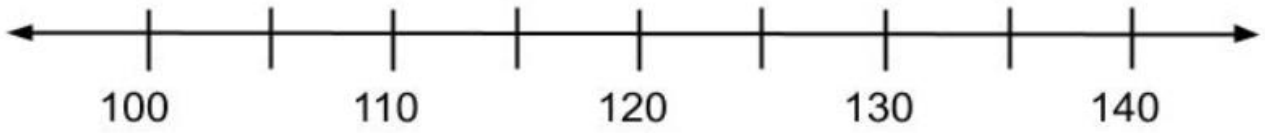


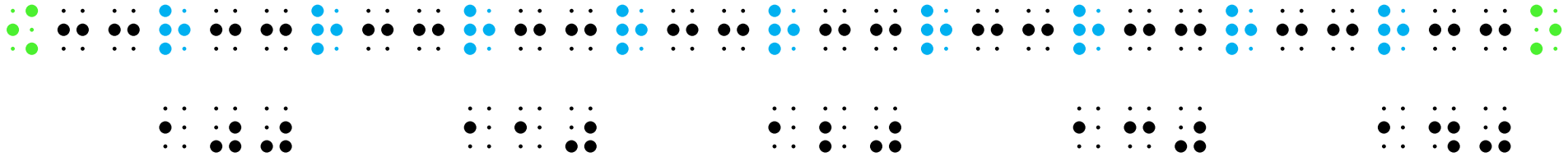
- Left-pointing arrowhead
- Line (axis line)
- Scale (tick) mark
- Right-pointing arrowhead

Basic Rules for Creating Number Lines

- The units on the number line must be equally spaced.
- Scale (tick) marks are labeled below the number line.
- Use Nemeth Code numbers without numeric indicators on a number line.
- The tick mark and the first digit of its numeric label should be aligned, even if preceded by a plus or a minus sign.

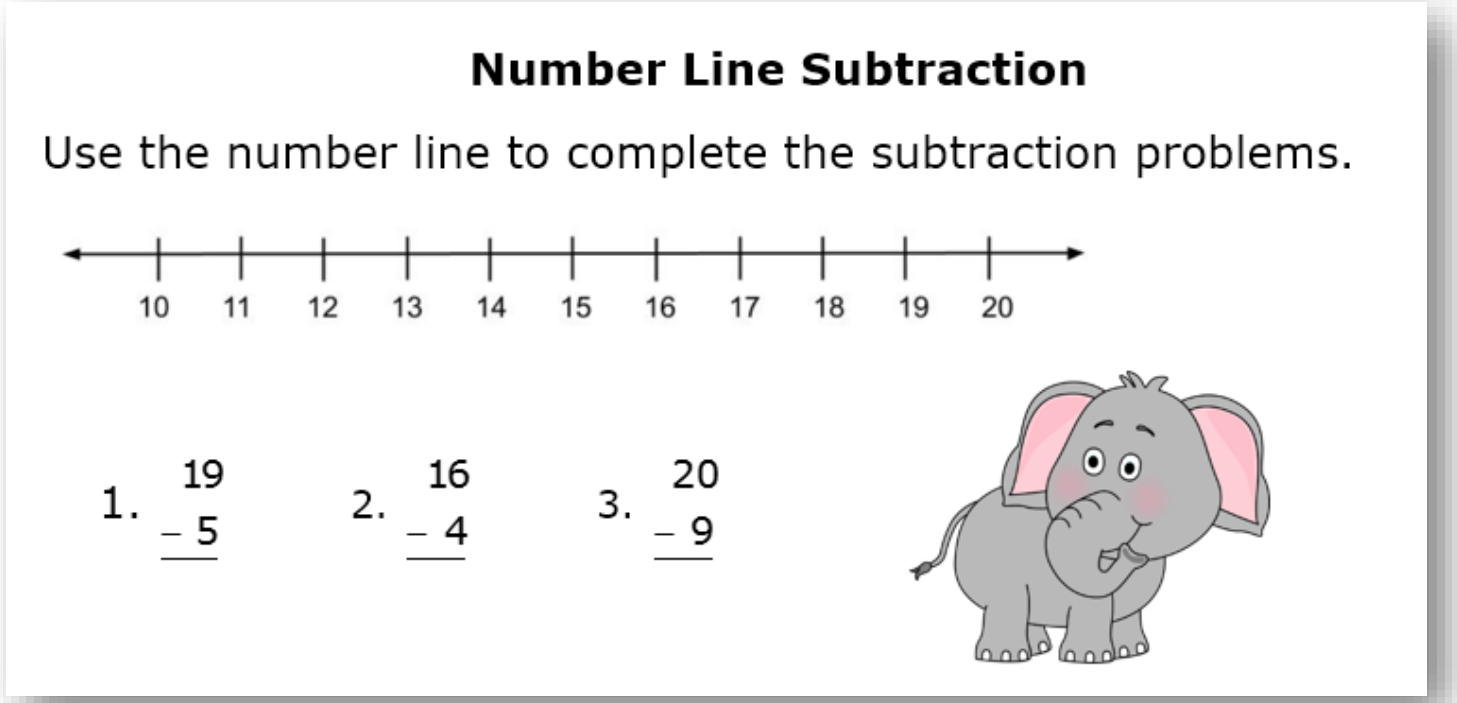
Number Line Produced in Braille



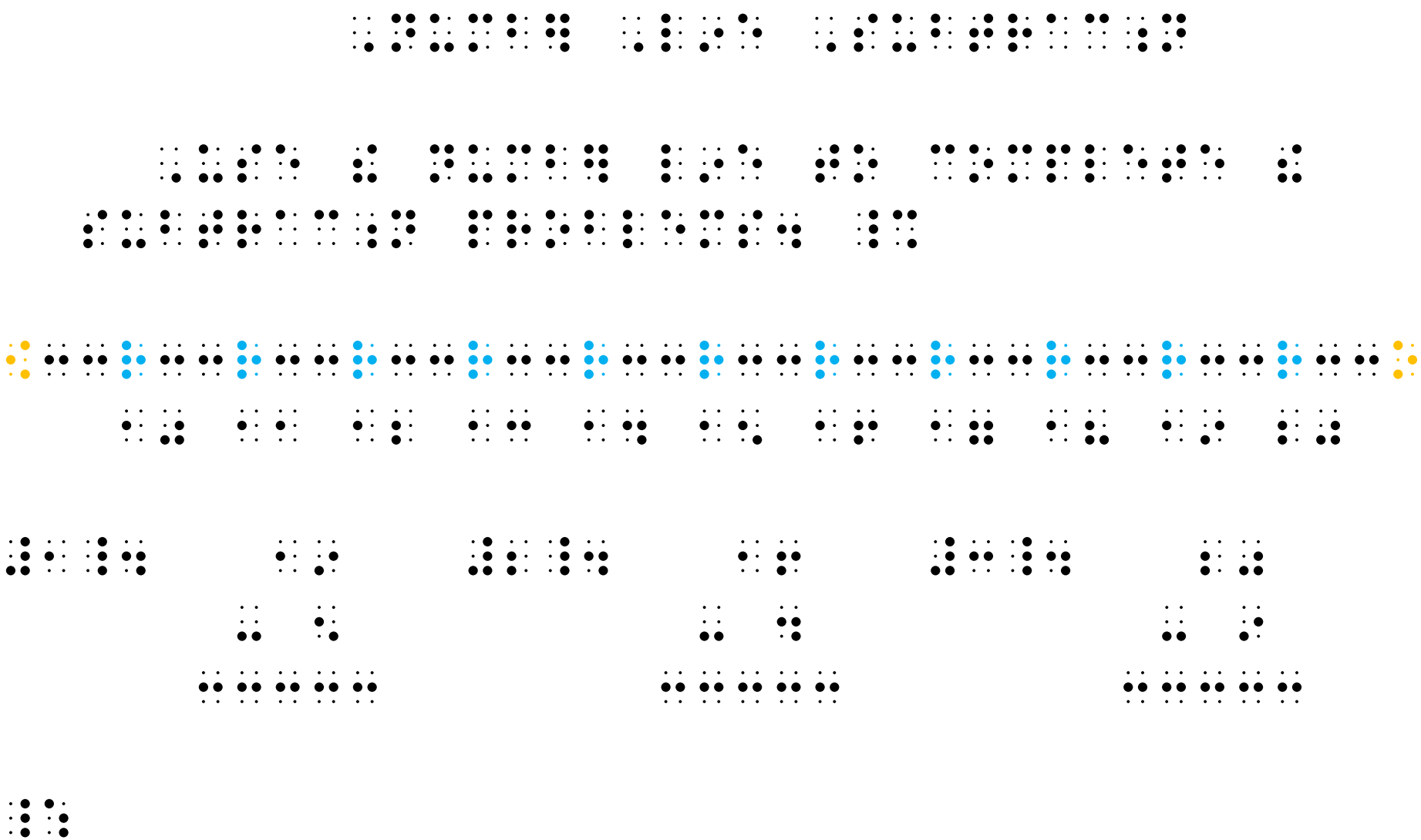


Example of a Number Line Worksheet in Print

- A number line is preceded and followed by a blank line.
- Use Nemeth Code switch indicators.

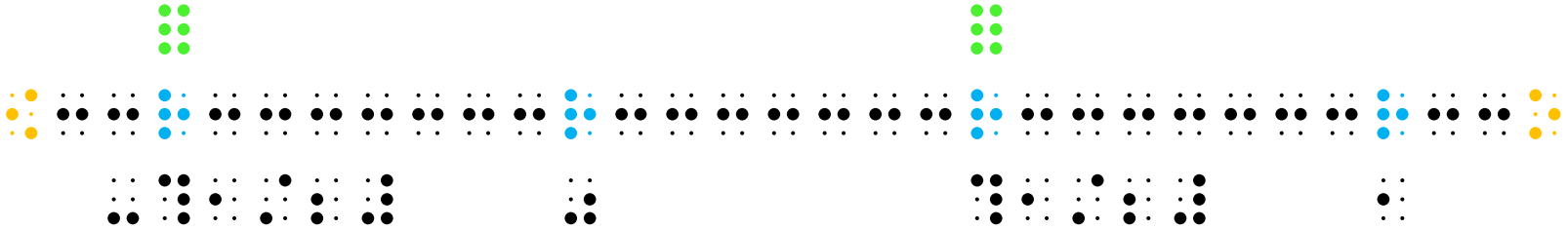


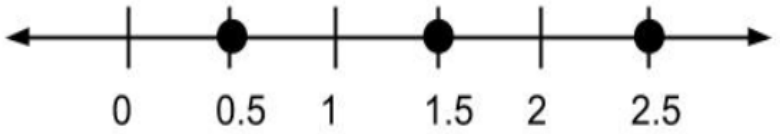
Example of a Number Line Worksheet in Braille

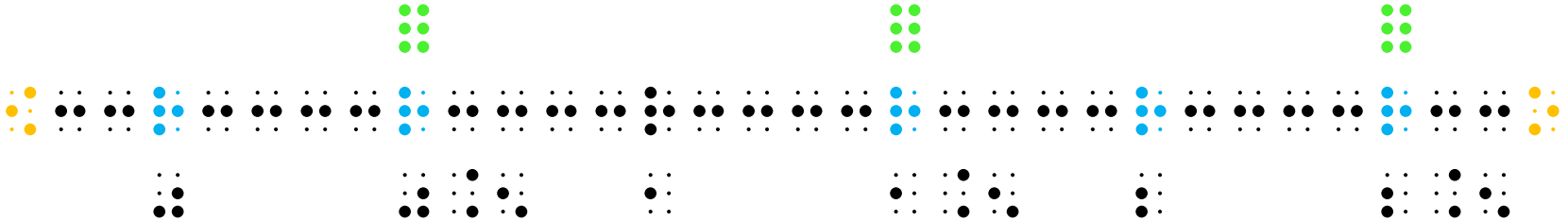


Number Lines with Solid (Filled in) Circles

Solid (filled in) circle

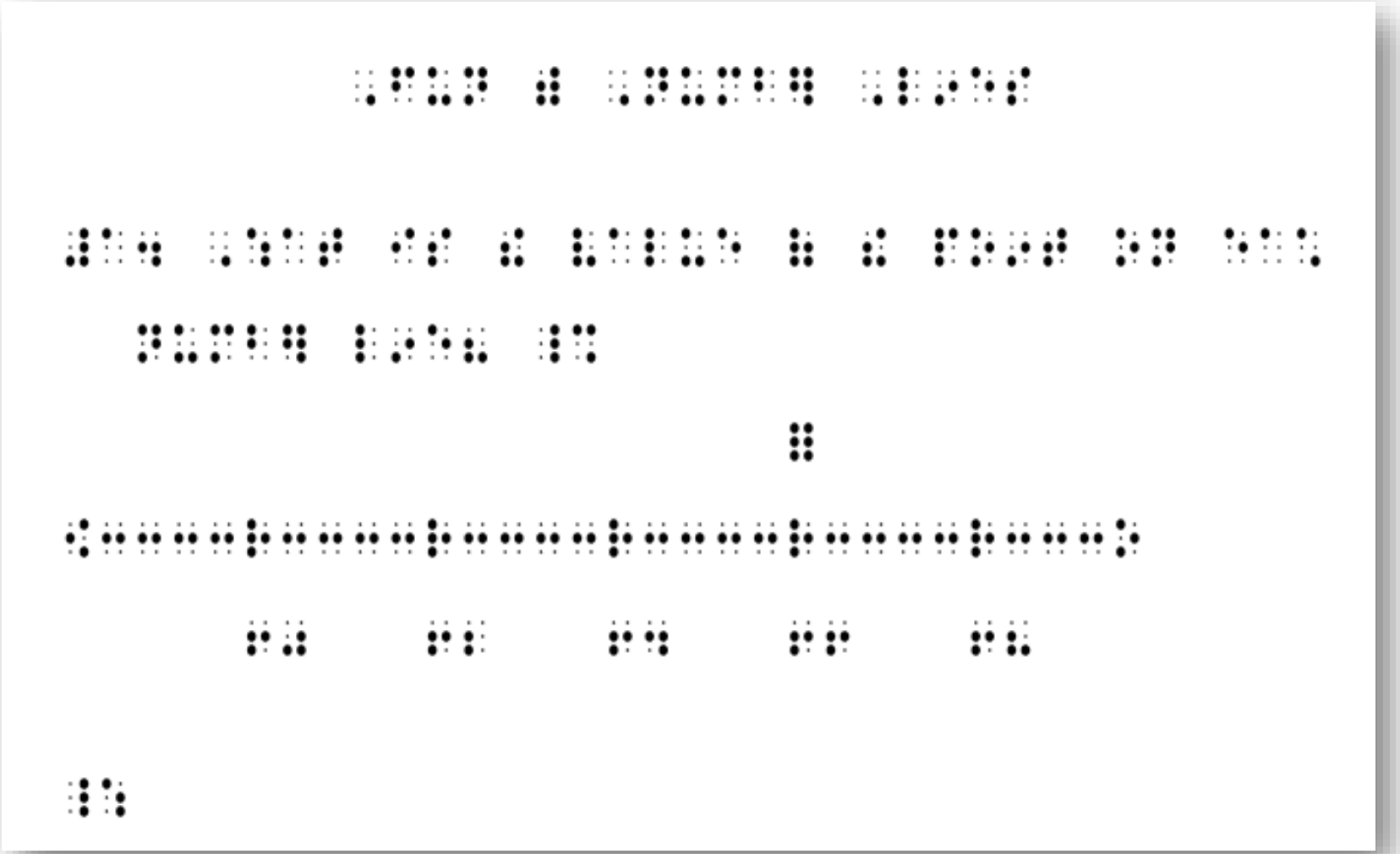






Activity 4B

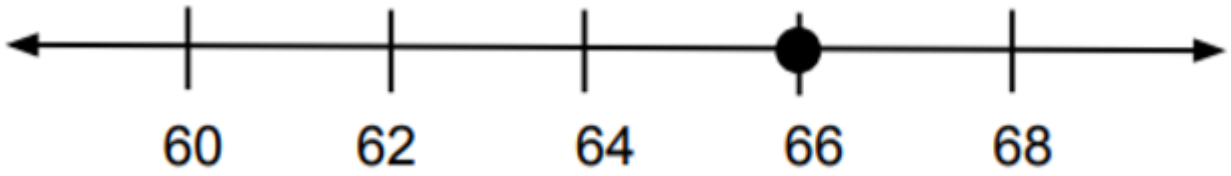
Interline the worksheet.



Activity 4B: Answer Key

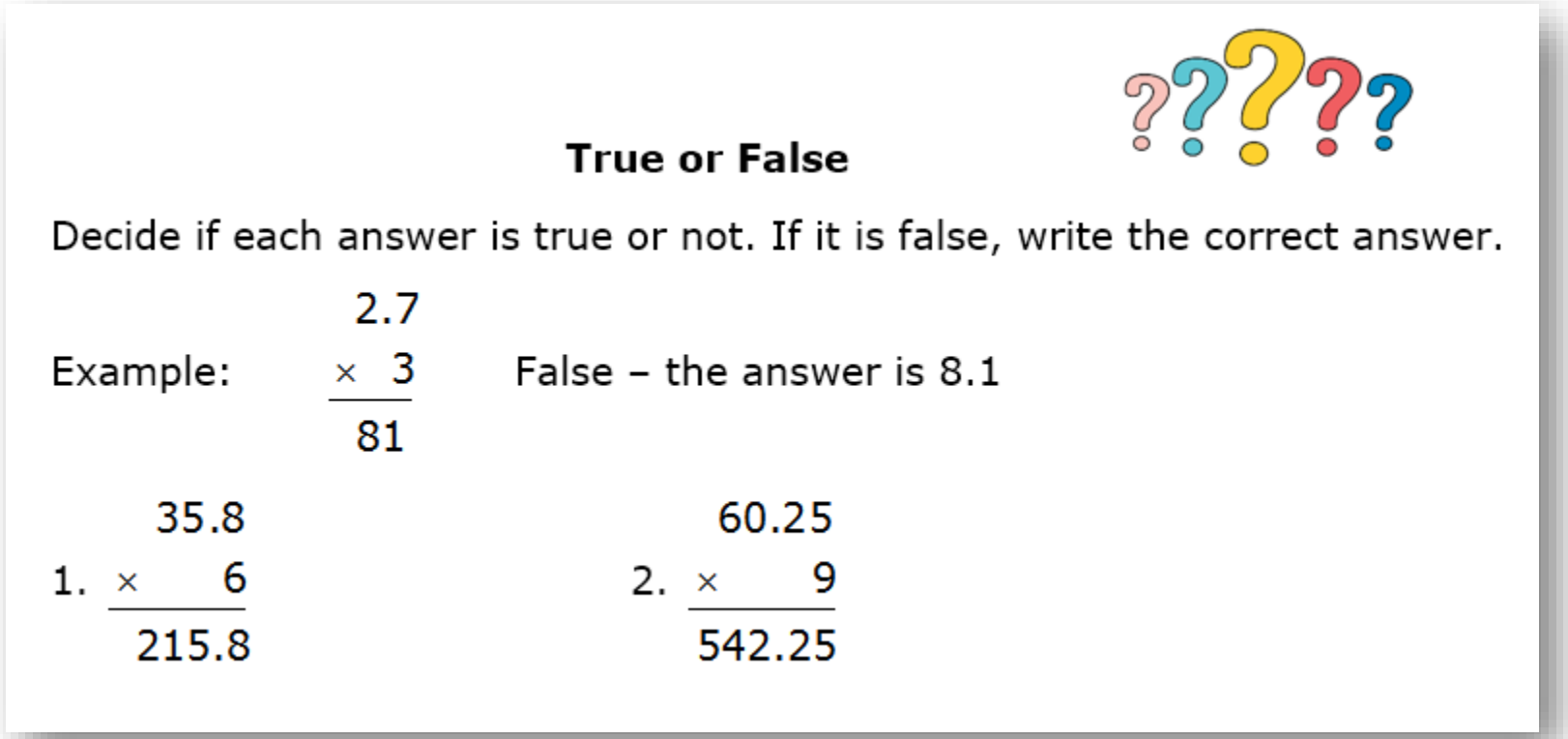
Fun with Number Lines

1. What is the value of the point on each number line?



Activity 4C

Transcribe this worksheet in braille.



True or False

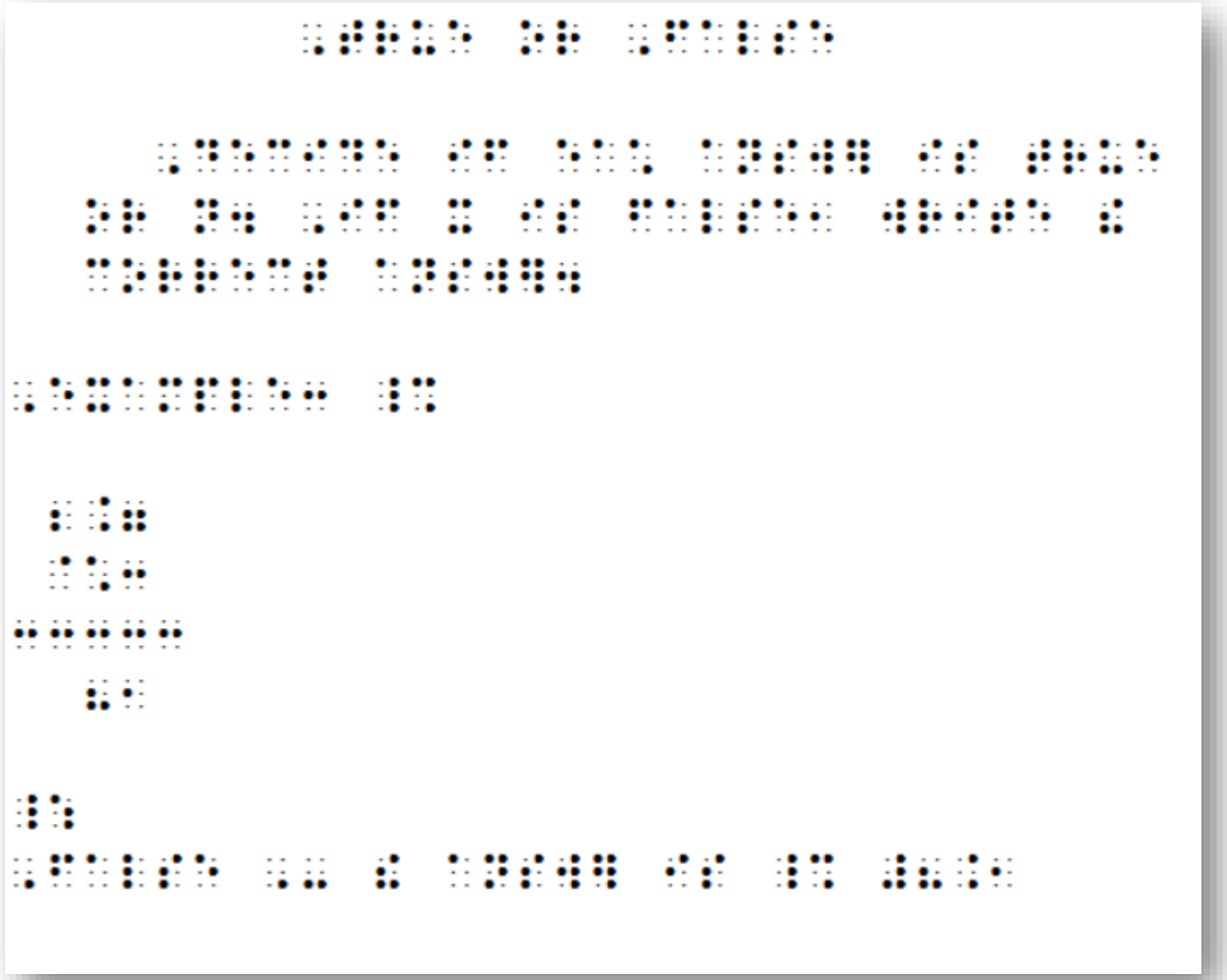
Decide if each answer is true or not. If it is false, write the correct answer.

Example: $\begin{array}{r} 2.7 \\ \times \quad 3 \\ \hline 81 \end{array}$ False – the answer is 8.1

1. $\begin{array}{r} 35.8 \\ \times \qquad 6 \\ \hline 215.8 \end{array}$

2. $\begin{array}{r} 60.25 \\ \times \qquad 9 \\ \hline 542.25 \end{array}$

Activity 4C: Answer Key



Activity 4C: Answer Key (continued)