Nemeth Code Symbols Used in High School and Strategies for Supporting Math Learning

Lesson 4: Formatting Materials for High School Students

1

1

Objectives

Participants will be able to:

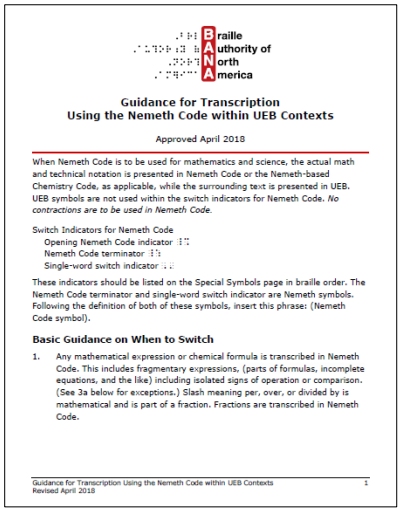
1. Locate and use formatting resources
2. Transcribe and/or prepare the following:
   - Word problems
   - Keeping math expressions together
   - Dividing math expressions
3. Format the following:
   - Headings
   - Directions
   - Numbered problems
   - Formal proofs

2

2

Guidance for Transcription Using the Nemeth Code within UEB Contexts

- Available from the Braille Authority of North America (BANA)
- Information about formatting begins on page 15.
- The new Nemeth Code book has been approved by BANA and should be online later this year!



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

https://www.brailleauthority.org/nemeth-code

3

3

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 12 offers examples of formal proofs.
- Lesson 17 offers examples of matrices and determinants.

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

4

4

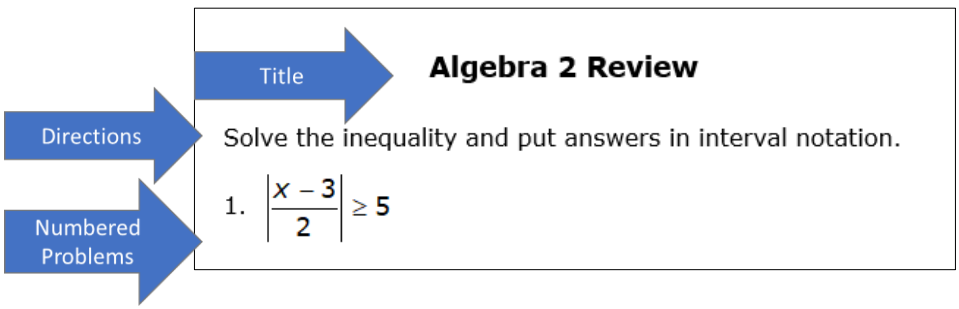
Formatting Basics for High School Students

- 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 directions or problems.

5

5

Example of a Worksheet in Print

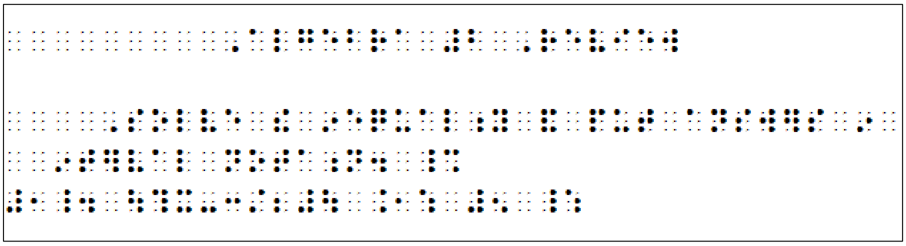


6

6

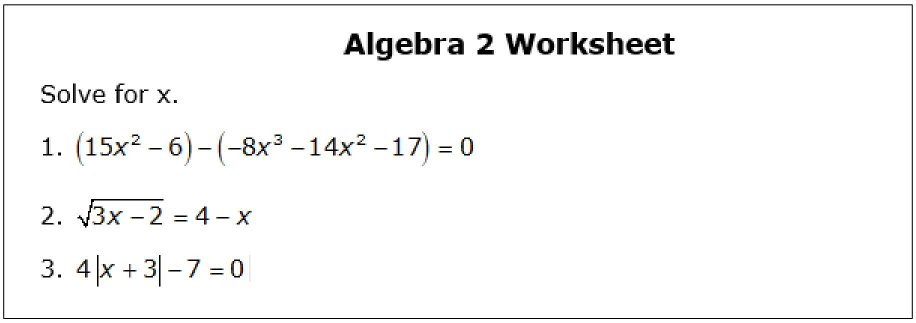
Example of a Worksheet in Braille

- Begin with a centered heading followed by a blank line.
- Directions begin in cell 5 with runover in cell 3.
- The opening Nemeth Code indicator is placed on the same line as the directions.
- Problems begin in cell 1 with runover in cell 3.
- We chose to close Nemeth after the problem.



Activity 4A

- Transcribe the worksheet below.

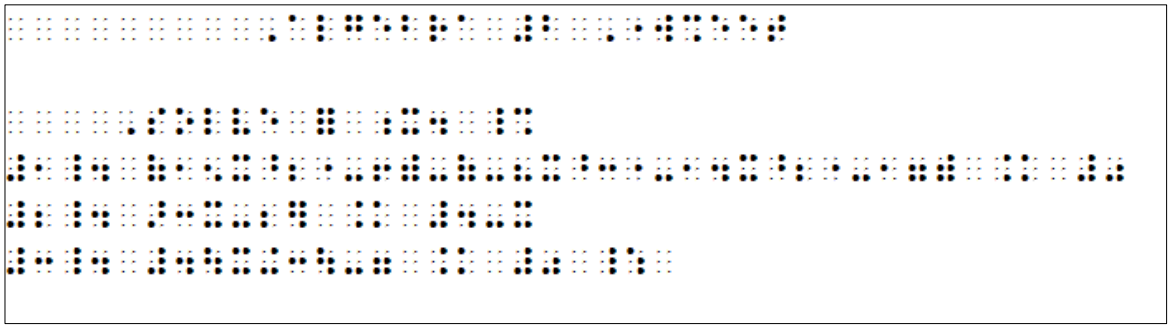


Algebra 2 Worksheet

Solve for x.

1. $(15x^2 - 6) - (-8x^3 - 14x^2 - 17) = 0$
2. $\sqrt{3x - 2} = 4 - x$
3. $4|x + 3| - 7 = 0$

Activity 4A: Answer Key



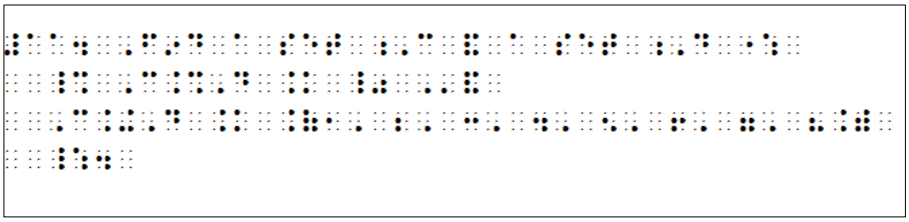
9

9

Keeping Math Expressions Together When Possible

- A math expression cannot be divided across lines if it fits on a single braille line.
- Switch indicators may be separated from the math.

11. Find a set C and a set D where $C \cap D = \varnothing$ and $C \cup D = \{1,2,3,4,5,6,7,8\}$.



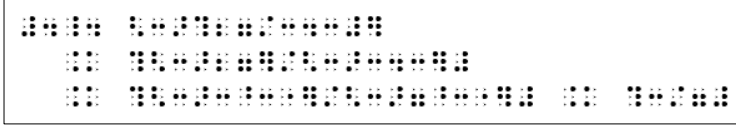
10

10

Dividing Long Problems Across Lines

- When a math expression will not fit on one line, divide
  - before the sign of comparison
  - before an operation sign

4. $\sqrt[3]{\frac{27}{343}} = \frac{\sqrt[3]{27}}{\sqrt[3]{343}} = \frac{\sqrt[3]{3^3}}{\sqrt[3]{7^3}} = \frac{3}{7}$



8. $99 \times 6[(5-1) \times (2+4)] + 37 \div \frac{1}{2} = ?$

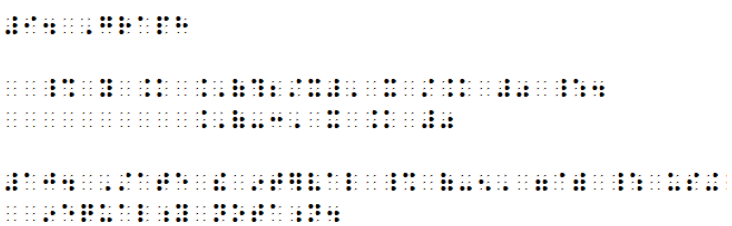
11

Example of a Word Problem

- Numbering of word problems can be in UEB.
- There is a blank line before and after the piecewise equation.
- Enlarged grouping symbols begin in the same braille cell.
- The period is placed at the end of the first line of the equation.

9. Graph $y = \begin{cases} \frac{2}{x}, x \neq 0 \\ -3, x = 0 \end{cases}$.

10. State the interval $(-5, 7]$ using inequality notation.



12

Activity 4B

- Transcribe the problems below.

1. Graph $y = \begin{cases} -x-2, x \le -2 \\ \sqrt{4-x^2}, -2 < x < 2 \\ x-2, x \ge 2 \end{cases}$.

2. What is the final step? $\sqrt[3]{\frac{y^5}{x^3}} = \frac{\sqrt[3]{y^5}}{\sqrt[3]{x^3}} = \frac{\sqrt[3]{y^3 \cdot y^2}}{\sqrt[3]{x^3}} =$

Activity 4B: Answer Key

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Formal Geometry Proofs

- Leave a blank line between auxiliary paragraphs and the beginning of the formal proof.
- Start each step in cell 1.
- After each step number, transcribe "S" for statement or "R" for reason. There is no space between the number and subsequent letter.
- If necessary, run-over lines for each step begin in cell 3.
- It is important that "each step from the Statements column is immediately followed by the corresponding step from the Reasons column."

15

15

Example of a Formal Proof

Auxiliary statements

Blank line

Given: $\overline{BC} \cong \overline{DC}, \overline{AB} \parallel \overline{DE}$

Prove: $\triangle ABC \cong \triangle EDC$

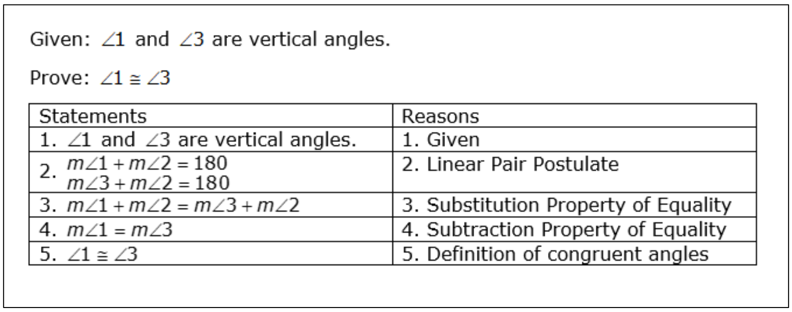
Statement	Reason
1. $\overline{BC} \cong \overline{DC}, \overline{AB} \parallel \overline{DE}$	1. Given
2. $\angle ACB \cong \angle ECD$	2. Vertical angles are congruent
3. $\angle ABC \cong \angle EDC$	3. If parallel, alternate interior angles are congruent
4. $\triangle ABC \cong \triangle EDC$	4. ASA

16

16

Activity 4C

Transcribe the auxiliary paragraphs and formal proof below:

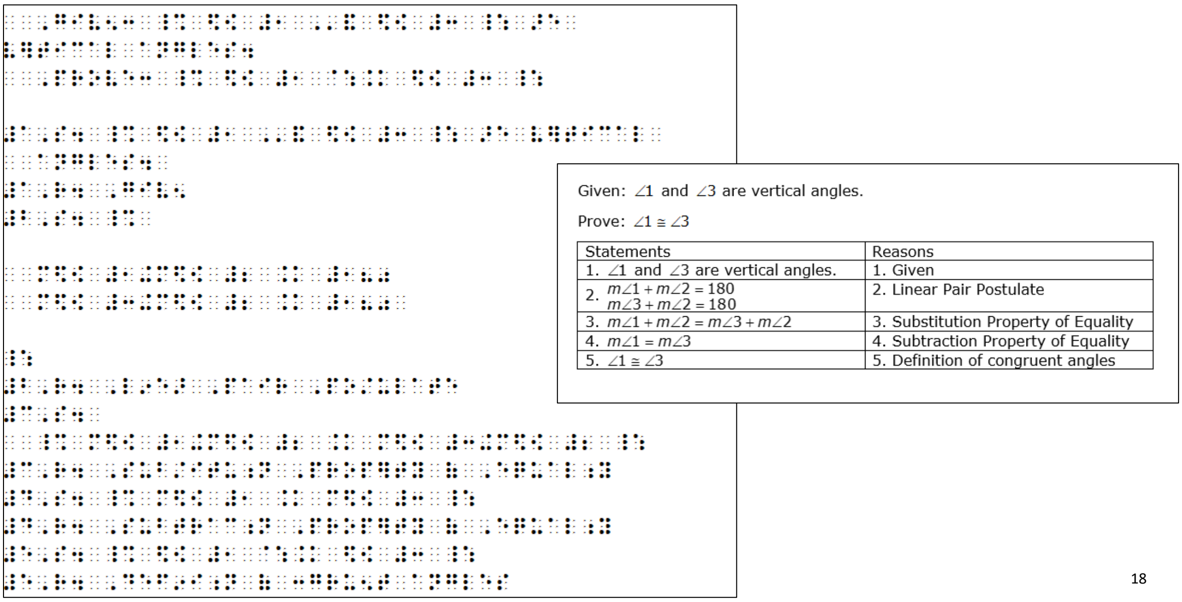


Given: ∠1 and ∠3 are vertical angles.

Prove: ∠1 ≅ ∠3

Statements	Reasons
1. ∠1 and ∠3 are vertical angles.	1. Given
2. $m\angle 1 + m\angle 2 = 180$ $m\angle 3 + m\angle 2 = 180$	2. Linear Pair Postulate
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	3. Substitution Property of Equality
4. $m\angle 1 = m\angle 3$	4. Subtraction Property of Equality
5. ∠1 ≅ ∠3	5. Definition of congruent angles

Activity 4C: Answer Key



Given: ∠1 and ∠3 are vertical angles.

Prove: ∠1 ≅ ∠3

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