

An Introduction to UEB Math/Science for Pre-Kindergarten – 1st Grade Students and Strategies for Supporting Math Learning

Lesson 1: Numbers and Linear Problems



University of South Carolina Upstate, Fall 2023

1

1

Lesson 1 Objectives

Participants will be able to:

1. Read and write the following UEB symbols
 - Numbers 0 to 120
 - Comma (7, 8, 9)
 - Plus and minus signs (+, -)
 - Equals sign, less than sign, greater than sign (=, <, >)
 - Visible space and question mark used as omission symbols in mathematical expressions
2. Number math problems
3. Read and write simple math problems

2

2

UEB Math/Science

- As of January 4, 2016, the United States transitioned to the Unified English Braille (UEB) Code.
- UEB is an approved braille code by the Braille Authority of North America (BANA).
- UEB is a complete code, including math and science materials.
- Sometimes the math and science portion of UEB is called UEB Math/Science or UEB Technical.

3

3

Guidance Documents Available in Print and Braille

- The Rules of Unified English Braille, 2nd Edition, 2013
<https://iceb.org/ueb.html>
- Unified English Braille Guidelines for Technical Material 2014
https://iceb.org/guidelines_for_technical_material_2014.pdf
 - As of July 2023, ICEB is working on the 2nd edition.
 - Section 3: Signs of Operation and Comparison was updated in 2018.
https://iceb.org/GTM3_Operation&Comparison.pdf
- Provisional Guidance on Transcribing Mathematics in UEB, 2019
https://www.brailleauthority.org/ueb/ueb_math_guidance/final_for_posting_ueb_math_guidance_may_2019_102419.pdf

4

4

Numbers from 0 to 120

1	2	3	4	5	6	7	8	9	0
⠠	⠠	⠠	⠠	⠠	⠠	⠠	⠠	⠠	⠠

- Yes, the numbers ARE in the upper part of the cell.
- To write a number from 0 to 120, you begin with the numeric indicator ⠠ (dots 3-4-5-6) and then immediately write the actual number.
- To write the number 14, you would write ⠠⠠⠠ and read it as fourteen.

5

5

Activity 1A

Interline the following numbers.

- ⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠
- ⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠⠠⠠
- ⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠
- ⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠
- ⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠⠠

6

6

Activity 1A: Answer Key

- | | | | |
|----|------|------|-------|
| | 34 | 41 | 75 |
| 1. | ⠠⠠⠠⠠ | ⠠⠠⠠⠠ | ⠠⠠⠠⠠ |
| | 97 | 20 | 108 |
| 2. | ⠠⠠⠠⠠ | ⠠⠠⠠⠠ | ⠠⠠⠠⠠⠠ |
| | 95 | 44 | 116 |
| 3. | ⠠⠠⠠⠠ | ⠠⠠⠠⠠ | ⠠⠠⠠⠠⠠ |
| | 31 | 12 | 63 |
| 4. | ⠠⠠⠠⠠ | ⠠⠠⠠⠠ | ⠠⠠⠠⠠ |
| | 85 | 28 | 109 |
| 5. | ⠠⠠⠠⠠ | ⠠⠠⠠⠠ | ⠠⠠⠠⠠⠠ |

7

7

Activity 1B

Braille these numbers as shown:

1 2 3 4 5

6 7 8 9 10

100 96

85 114

8

8

Activity 1B: Answer Key

1 2 3 4 5
 ⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠

6 7 8 9 10
 ⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠⠠

100 96
 ⠠⠠⠠⠠ ⠠⠠⠠⠠

85 114
 ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠

9

9

Comma

If you write several numbers in a row separated by a comma, use the comma ⠠⠠⠠ (dot 2) immediately after each number followed by a space.

7, 8, 9 would be written as: ⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠ ⠠⠠⠠

110, 111, 112 would be written as: ⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠

10

10

Activity 1C

Braille the following as shown below:

1, 2, 3, 4, 5

6, 7, 8, 9, 10

95, 96, 97

100, 101, 102

11

11

Activity 1C: Answer Key

1, 2, 3, 4, 5

⠠⠠⠠⠠⠠

6, 7, 8, 9, 10

⠠⠠⠠⠠⠠⠠

95, 96, 97

⠠⠠⠠⠠⠠⠠

100, 101, 102


⠠⠠⠠⠠⠠⠠⠠


12

12


Signs of Operation and Signs of Comparison


- Signs of Operation

 is the addition sign (+) (dot 5, dots 2-3-5)

 is the minus sign (−) (dot 5, dots 3-6)

- Signs of Comparison

 is the equal sign (=) (dot 5, dots 2-3-5-6)

 is the less than sign (<) (dot 4, dots 1-2-6)




 is the greater than sign (>) (dot 4, dots 3-4-5)

13

13

Rules for Simple Linear Problems with Signs of Operation and Signs of Comparison

- Use a numeric indicator with the numbers.
- There is typically no space on either side of the sign of operation.
- There is a space on either side of the sign of comparison.

      $45 - 25 = 20$

      $89 + 6 = 95$

      $100 + 11 < 120$


      $68 - 54 > 12$

14

14

Numbering Problems

- Use a period when numbering simple problems that include a period in print.

 period (.) (dots 2-5-6)

- Numbered simple problems begin in cell 1.

$$1. 5 - 2 = 3$$

$$2. 4 + 7 = 11$$


      

15

15







Visible Space and Question Mark as Signs of Omission

 question mark (?) (dots 2-3-6)

 visible space () (dots 3-4-6)

The visible space symbol is used for a blank space in print, except when the answer to a problem is left blank.

$$8 ? 2 = 10$$





$$14, 15, ?, 17$$

$$7 - 2 =$$

$$1 \quad 3 = 4$$

16

16

The Grade 1 Indicator

Use the Grade 1 indicator ⠠ (dots 5-6) to avoid confusion when a question mark is "standing alone".

1. 5+5 = ?

⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠

35. 6 ? 10 12

⠠⠠⠠⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠



Activity 1D: Interline the Linear Problems

⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠ ⠠⠠⠠⠠⠠

⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠

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⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠

Activity 1D: Answer Key

1. $25 + 48 < 75$

2. $36 - ? = 28$

3. $52 - ? > 35$

4. $71 + \quad = 74$

5. $87 - 37 > 40$

6. $98 - 22 = ?$

7. $17 + 59 < 98$

8. $33 \quad 49 = 82$

3. $25 + 48 < 75$

5. $36 - ? = 28$

7. $52 - ? > 35$

10. $71 + \quad = 74$

14. $87 - 37 > 40$

26. $98 - 22 = ?$

32. $17 + 59 < 98$

35. $33 \quad 49 = 82$