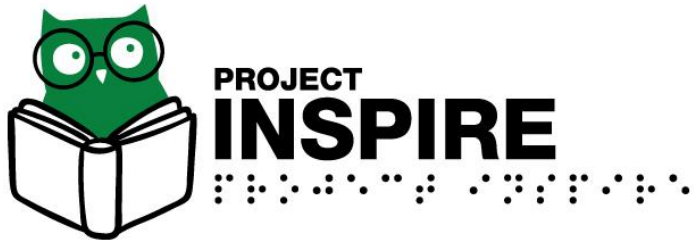
Grades 2 to 5: Nemeth Code Symbols for Fractions and Spatial Problems, Instructional Tools, Materials, and Technology

Lesson 2: Spatial Arrangements



University of South Carolina Upstate, Fall 2020

Lesson 2 Objectives

Participants will be able to read and write addition, subtraction, and multiplication spatially aligned problems that include:

- multi-digit numbers with and without commas
- decimals
- money
- simple fractions
- mixed numbers

Spatial Arrangements (Vertical) Problems for Addition and Subtraction

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 280
+15
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 295
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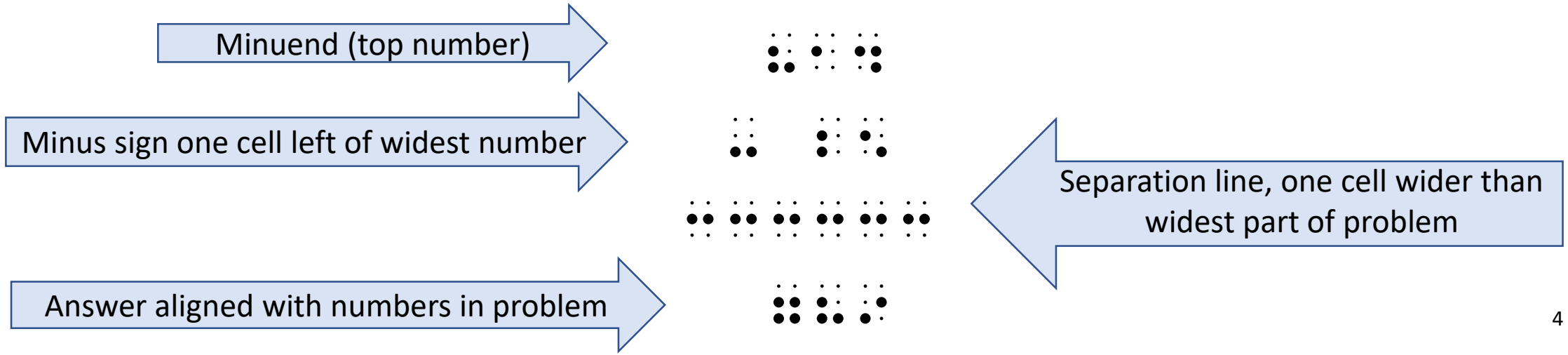
- Numbers must align in spatial arrangements.
- There are no numeric indicators in spatial problems.
- The addition or subtraction sign goes one cell to the left of the widest number above the separation line.
- The separation line (⠒⠒⠒⠒⠒⠒⠒) is one cell longer on either side of the widest part of the problem.
- You must have a blank line above and below a spatial arrangement.

Anatomy of a Spatial Problem

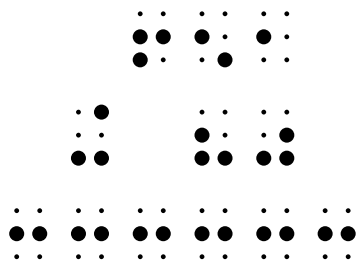
$$\begin{array}{r} 814 \\ -\ 25 \\ \hline 789 \end{array}$$



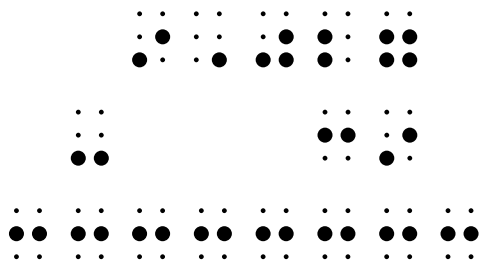
Examples of Spatial Problems

When spatial arrangements are placed side-by-side, insert 1 cell (or 2) between the end of one separation line and the beginning of the next separation line.

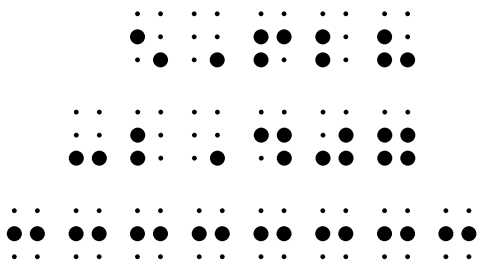
651
+ 80



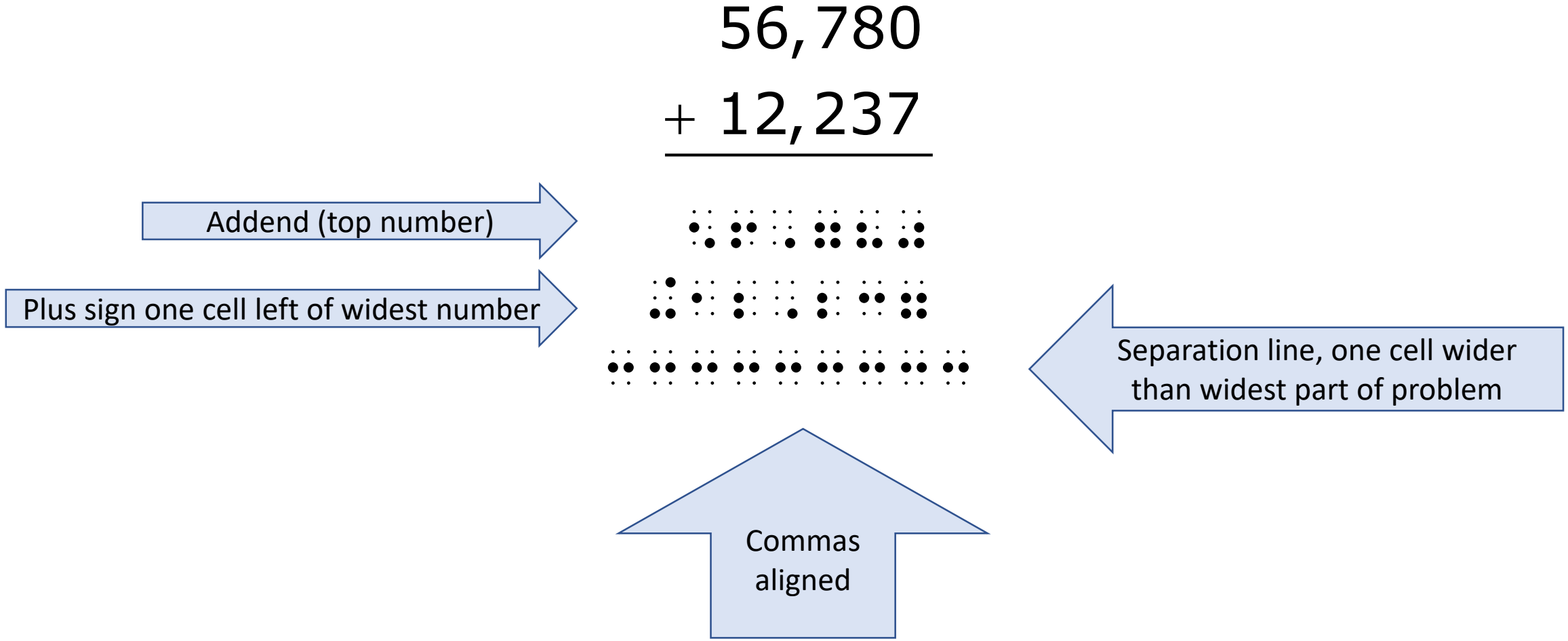
9,027
− 39



5,628
− 2,407

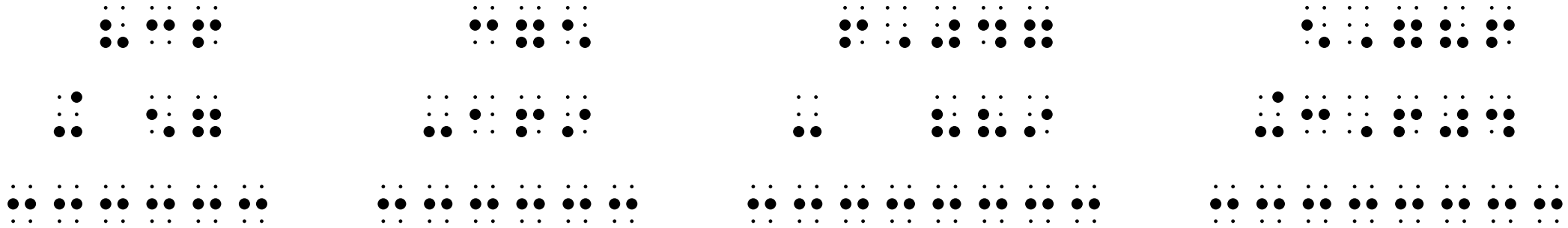


Anatomy of a Spatial Problem with Commas



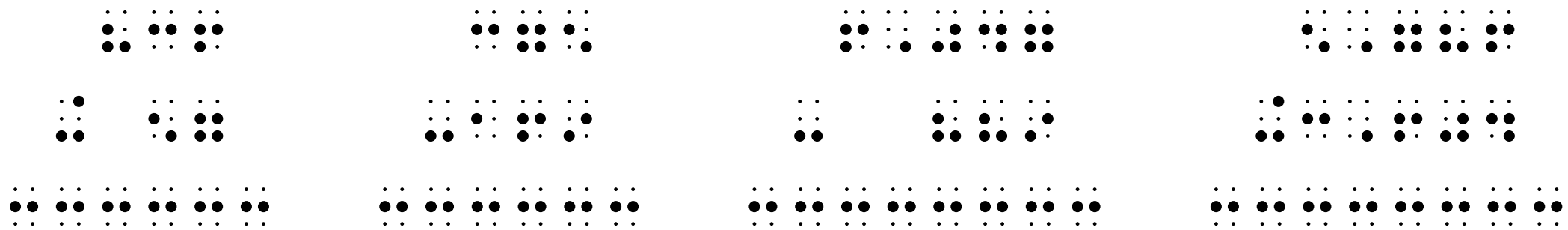
Activity 2A

Interline the spatial problems.



Activity 2A: Answer Key

836	375	6,047	5,786
+ 57	− 169	− 889	+ 3,604



Activity 2B

Transcribe the following spatial addition and subtraction problems.

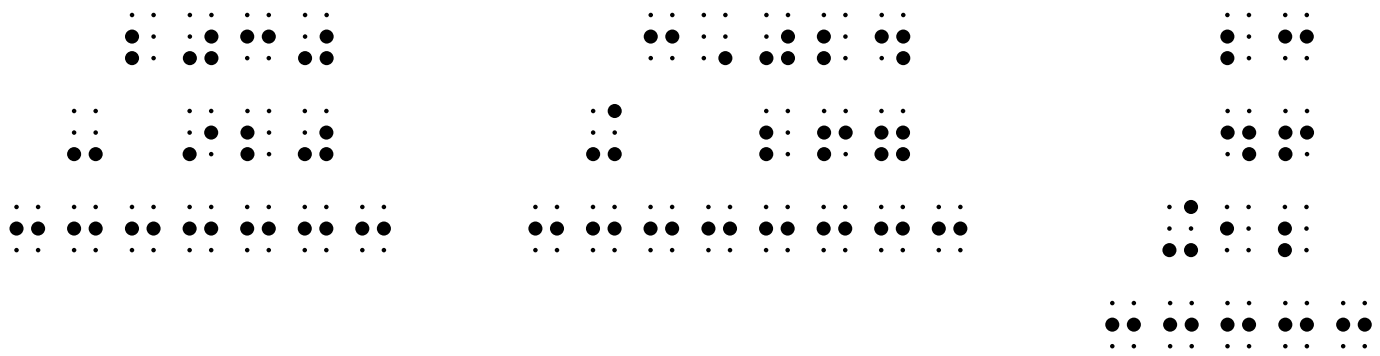
$$\begin{array}{r} 2030 \\ -\ \ 920 \\ \hline \end{array}$$

$$\begin{array}{r} 3{,}024 \\ +\quad 267 \\ \hline \end{array}$$

$$\begin{array}{r} 23 \\ 46 \\ +12 \\ \hline \end{array}$$

Activity 2B: Answer Key

$$\begin{array}{r} 2030 \\ -\ 920 \\ \hline \end{array} \qquad \begin{array}{r} 3{,}024 \\ +\ 267 \\ \hline \end{array} \qquad \begin{array}{r} 23 \\ 46 \\ +12 \\ \hline \end{array}$$

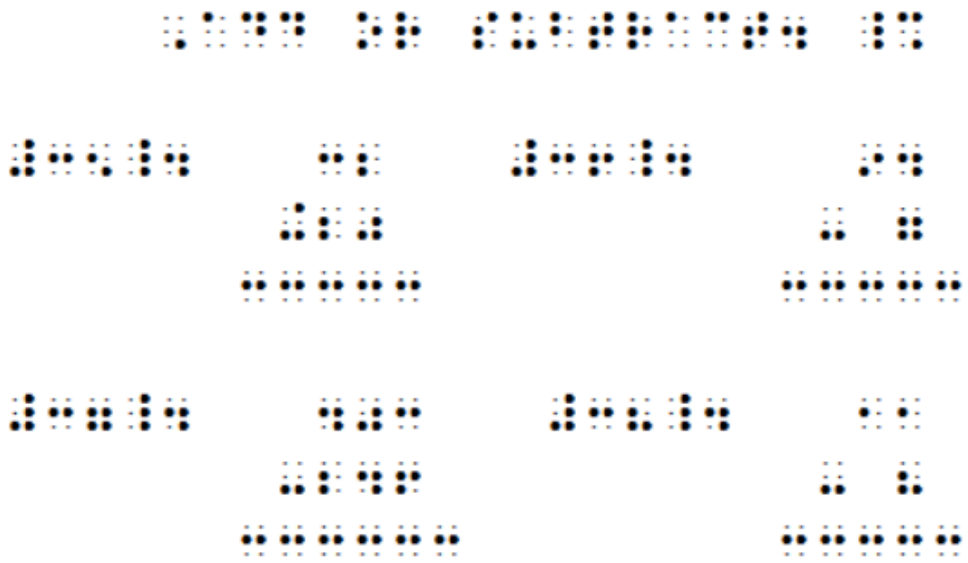


Numbered Problems

Opening Nemeth Code Indicator

There must be one cell between the end of a problem number and the start of the separation line.

Blank line above and below a problem.



Nemeth Terminator

Use one or two cells between the end of a separation line and start of the next problem number.

Add or subtract.

35. $\begin{array}{r} 32 \\ +20 \\ \hline \end{array}$

36. $\begin{array}{r} 94 \\ -7 \\ \hline \end{array}$

37. $\begin{array}{r} 403 \\ -246 \\ \hline \end{array}$

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

Spatial Arrangements for Multiplication

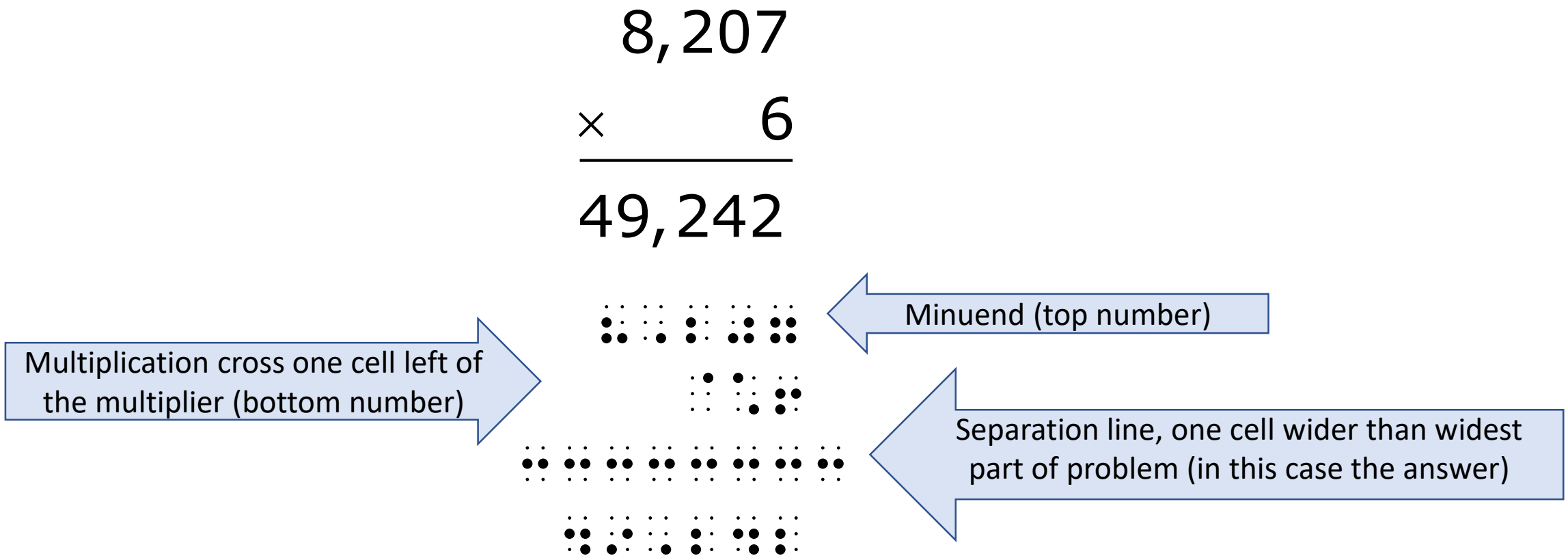
Just as with addition and subtraction:

- Numbers must align in spatial arrangements.
- The separation line (⠒⠒⠒⠒) is one cell longer on either side of the widest part of the problem.
- You must have a blank line above and below a spatial arrangement.

The difference:

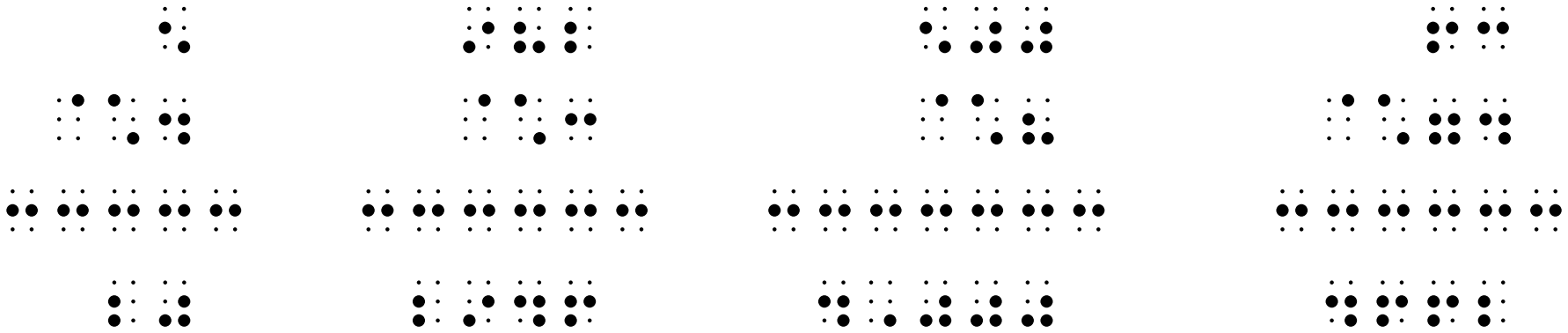
The multiplication cross goes one cell to the left of the multiplier.

Anatomy of a Multiplication Problem



Examples of Multiplication Problems

5	982	500	63
× 4	× 3	× 8	× 74
20	2946	4,000	4662

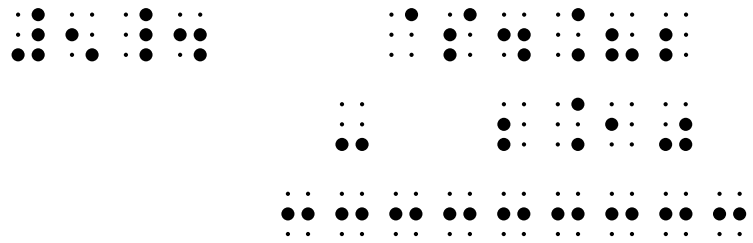


Spatial Arrangement for Problems that Include Decimals or Money

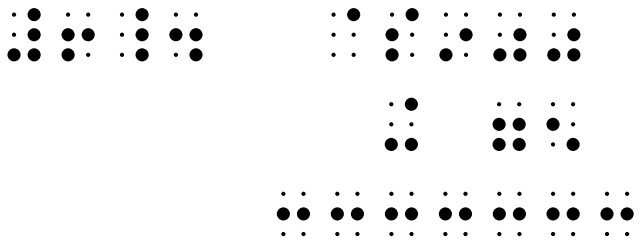
- The dollar sign is (⠈⠎) and the decimal point is (⠲).
- Follow the print to determine if the plus or minus goes to the left of the dollar sign or directly below the dollar sign.
- If placed below the dollar sign, align plus and minus sign with the second cell of the dollar sign.
- Decimal points are aligned with decimal points.

Examples of Spatial Problems with Dollar Signs and Decimals

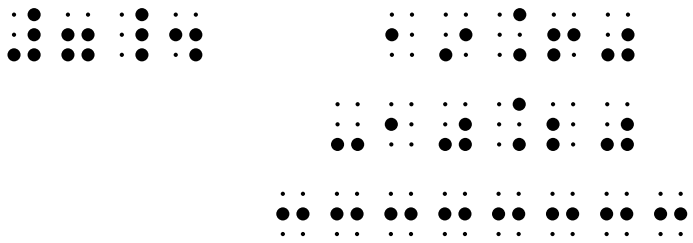
5.
$$\begin{array}{r} \$4.82 \\ -\ 2.10 \\ \hline \end{array}$$



6.
$$\begin{array}{r} \$900 \\ +\ 75 \\ \hline \end{array}$$



7.
$$\begin{array}{r} 19.60 \\ -10.20 \\ \hline \end{array}$$

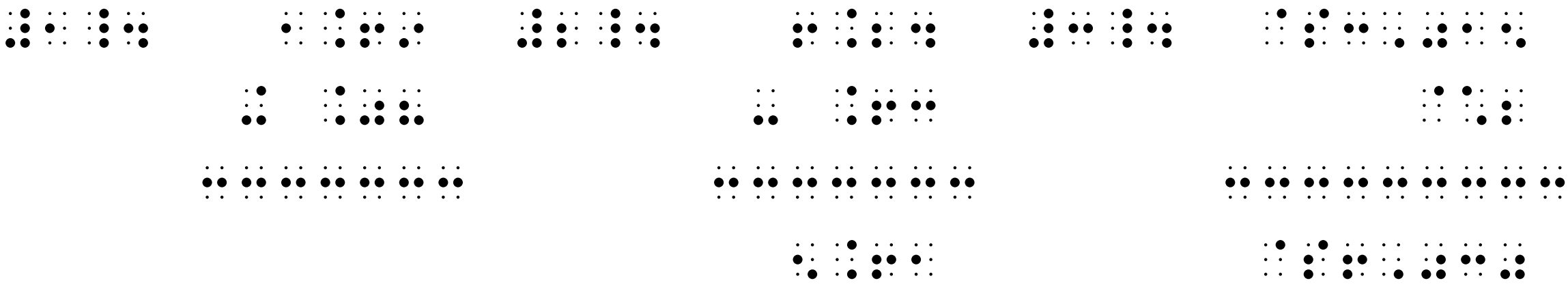


More Examples of Spatial Problems with Dollar Signs and Decimals

1. $1.69 + .08 = 1.77$

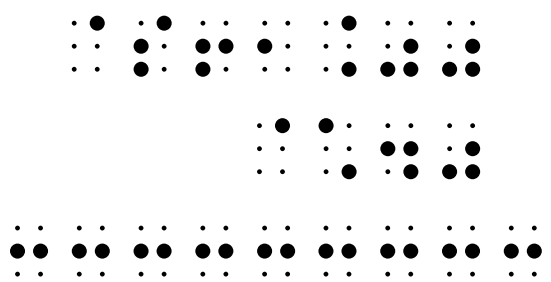
2. $6.24 - .63 = 5.61$

3. $\$3,015 \times 2 = \$6,030$

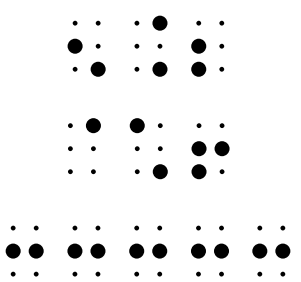


Two Last Examples – Spatial Arrangements with Dollar Signs and Decimals

$61.00
× 40

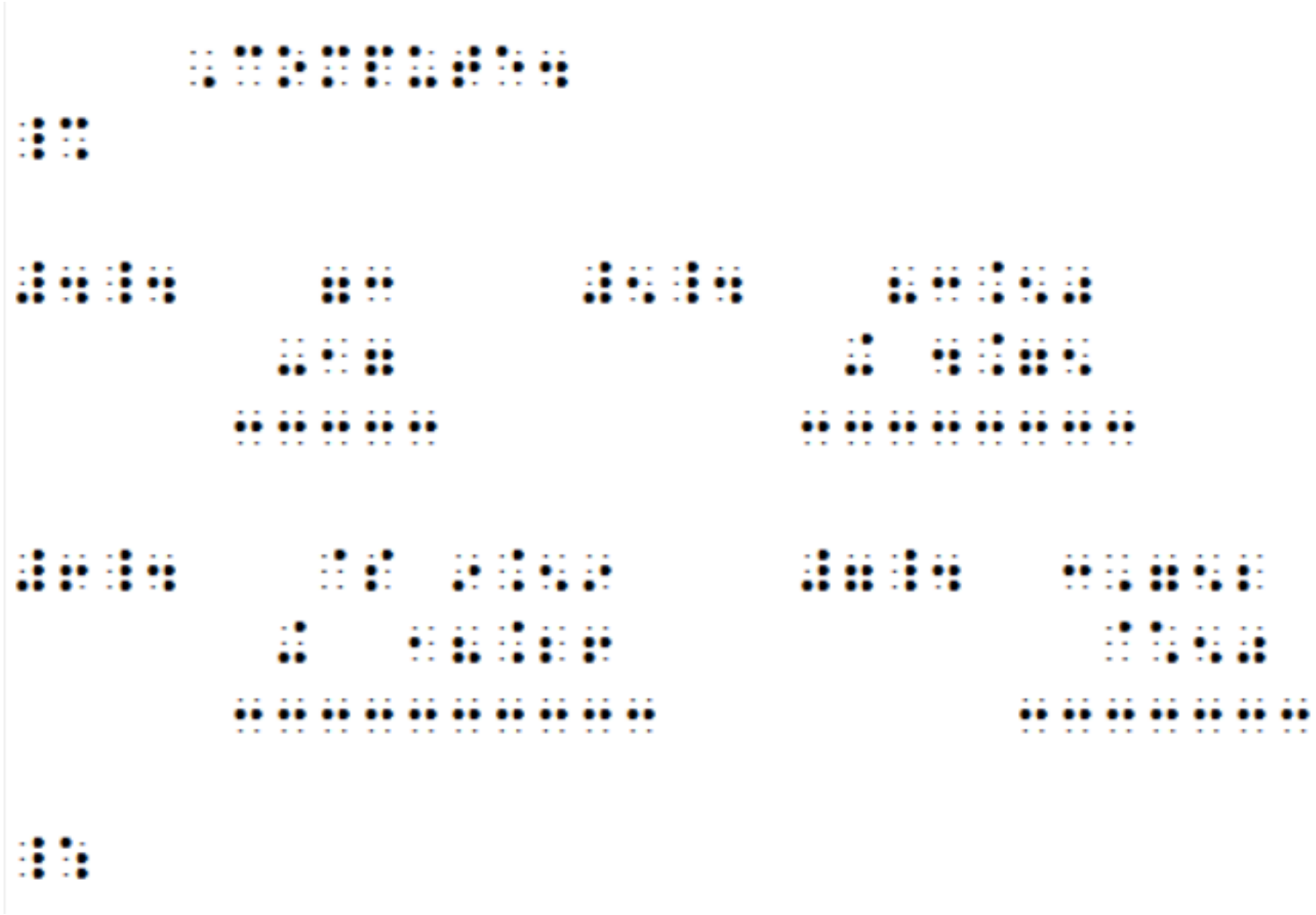


5.2
× 6



Activity 2C

Interline the following directions and problems.



Activity 2C: Answer Key

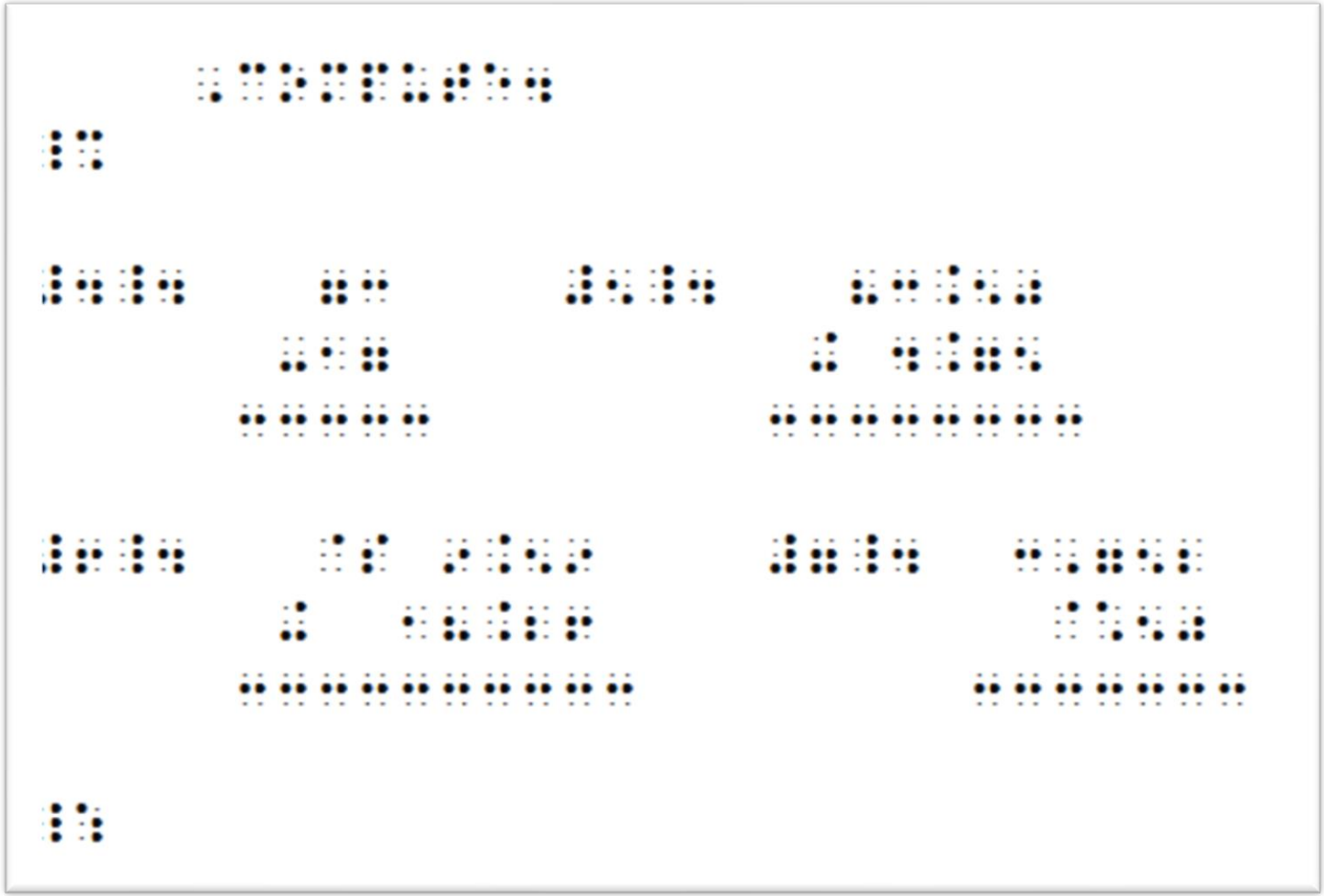
Compute.

4. 73
-17

5. 83.50
+ 4.75

6. $9.59
+18.26

7. 3,752
× 50



Activity 2D

Transcribe the following spatial problems.

4.
$$\begin{array}{r} \$510 \\ -\quad 25 \\ \hline \$485 \end{array}$$

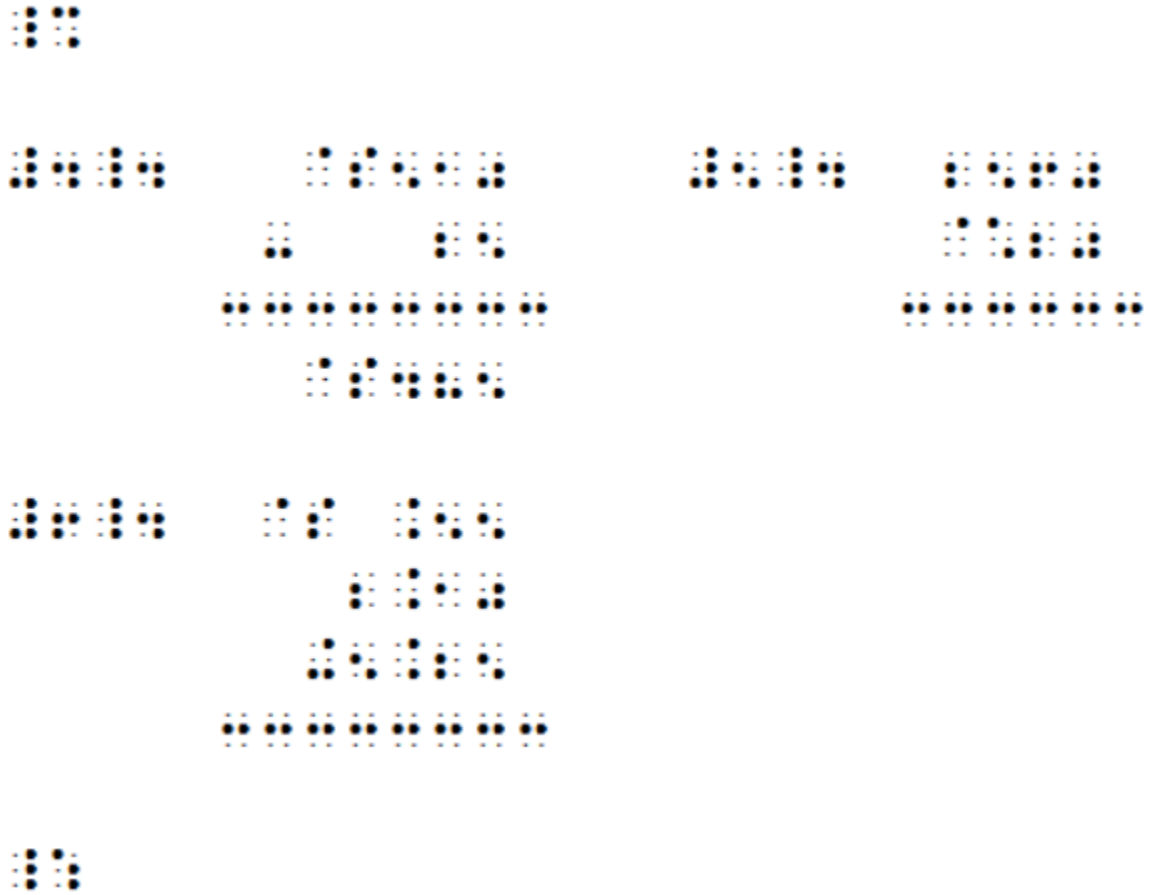
5.
$$\begin{array}{r} 2560 \\ \times 20 \\ \hline \end{array}$$

6.
$$\begin{array}{r} \$\ \ .55 \\ 2.10 \\ +5.25 \\ \hline \end{array}$$

Activity 2D: Answer Key

4.
$$\begin{array}{r} \$510 \\ -\ 25 \\ \hline \$485 \end{array}$$

5.
$$\begin{array}{r} 2560 \\ \times 20 \\ \hline \end{array}$$



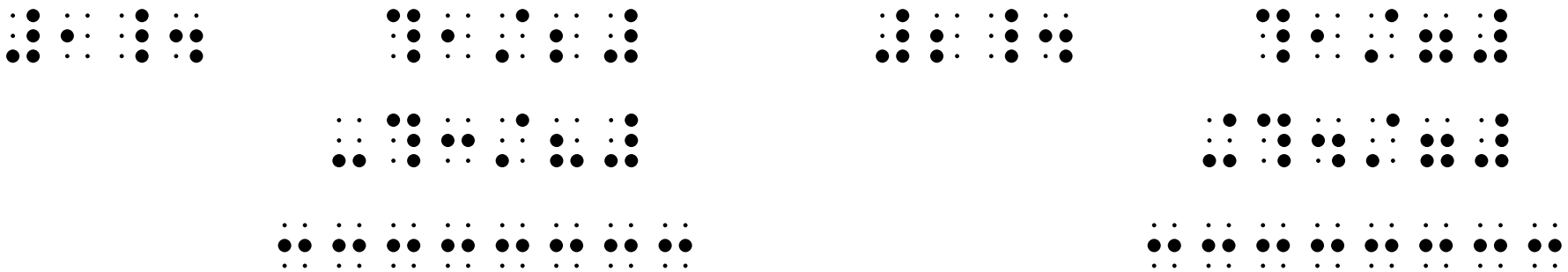
6.
$$\begin{array}{r} \$\ .55 \\ 2.10 \\ +5.25 \\ \hline \end{array}$$

Spatially Aligned Problems with Simple Fractions

- Set up spatially aligned fraction problems the same way you setup other spatial problems BUT also align: open fraction indicators, fraction lines, and closing fraction indicators.

1. $\begin{array}{r} \frac{1}{2} \\ -\ \frac{3}{8} \\ \hline \end{array}$

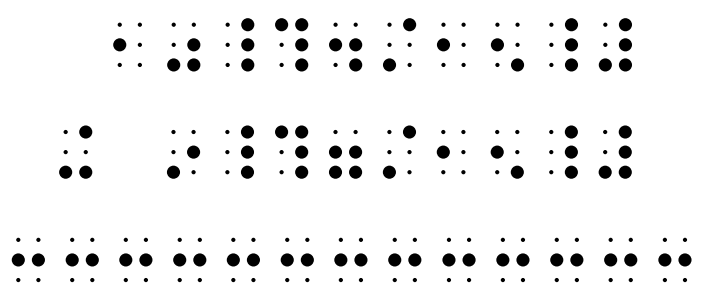
2. $\begin{array}{r} \frac{1}{7} \\ +\ \frac{4}{7} \\ \hline \end{array}$



Spatially Aligned Problems with Mixed Numbers

- Whole numbers, fraction indicators, and horizontal fraction lines are aligned vertically in each problem.
- The numeric indicator is not to be used in front of the whole number of the mixed number in spatially arranged problems.

$$\begin{array}{r} 10\frac{4}{15} \\ +\ 9\frac{7}{15} \\ \hline \end{array}$$

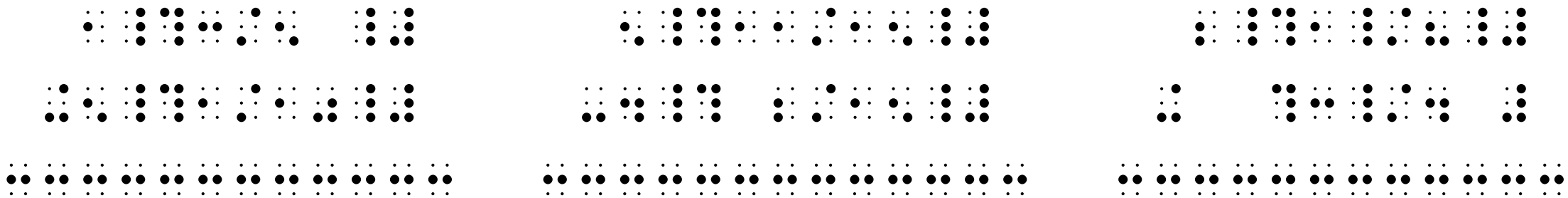


Examples of Spatial Problems with Mixed Numbers and Simple Fractions

$$\begin{array}{r} 1\frac{3}{5} \\ +\ 5\frac{1}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 5\frac{11}{15} \\ -\ 4\frac{2}{15} \\ \hline \end{array}$$

$$\begin{array}{r} 2\,1\!\!\diagup\!\!8 \\ +\ 3\!\!\diagup\!\!4 \\ \hline \end{array}$$



Activity 2E

Transcribe the following problems:

3.
$$\begin{array}{r} 23\frac{13}{21} \\ -\ 10\frac{5}{21} \\ \hline \end{array}$$

4.
$$\begin{array}{r} 49\ {}^{6}\!/_{50} \\ +\ \ 8\ {}^{27}\!/_{50} \\ \hline \end{array}$$

5.
$$\begin{array}{r} \frac{1}{16} \\ +\ \frac{5}{8} \\ \hline \end{array}$$

Activity 2E: Answer Key

3. $23\frac{13}{21} - 10\frac{5}{21}$

4. $49\ {}^{6}\!/_{50} + 8\ {}^{27}\!/_{50}$

5. $\frac{1}{16} + \frac{5}{8}$