

Fractions Lesson 6

Spatial Arrangements

with Simple Fractions and Mixed Numbers

Important Note

For all braille examples, emboss the "L6-Fractions-Problems-Only.brf" file as a supplement to this lesson.

Background

Although you have already learned how to write simple fractions and mixed number problems in a linear format, you will now learn how to write them in a vertically aligned format. Vertically aligned problems are called **spatial arrangements** in the Nemeth Code. The lesson is limited to addition and subtraction problems, as it is very rare to multiply or divide fractions or mixed numbers using a spatial arrangement.

As a quick review, the following Nemeth symbols will be used:

- Opening simple fraction indicator (dots 1-4-5-6) ⠠
- Horizontal fraction line (dots 3-4) ⠬
- Closing simple fraction indicator (dots 3-4-5-6) ⠡
- Numeric indicator to write the whole number (dots 3-4-5-6) ⠼
- Opening mixed number indicator (dots 4-5-6, dots 1-4-5-6) ⠰
- Closing mixed number indicator (dots 4-5-6, dots 3-4-5-6) ⠠
- Plus sign (dots 3-4-6) (+) ⠸
- Minus sign (dots 3-6) (−) ⠾

Basic Rules with Simple Fractions

When a spatially aligned problem contains fractions, the fraction indicators and fraction line must be vertically aligned. The plus or minus sign is placed one cell to the left of the opening simple fraction indicator, and the separation line extends one cell to the left and one cell to the right of the widest line in each arrangement. Notice how the numerator and denominator snuggle the fraction line in each example. We have chosen to show only

horizontal fraction lines to reduce the number of examples, but you could also use diagonal fraction lines.

Since we numbered our example problems, notice that we needed to leave one blank column between the period of the problem number and the beginning of the separation line. Also, a blank line must be left above and below a spatial arrangement.

Examples with Simple Fractions

1. one-fifth plus one-fourth

$$\begin{array}{r} \frac{1}{5} \\ + \frac{1}{4} \\ \hline \end{array}$$

2. seven-eighths minus eleven-sixteenths

$$\begin{array}{r} \frac{7}{8} \\ - \frac{11}{16} \\ \hline \end{array}$$

3. three-tenths plus one-hundredth

$$\begin{array}{r} \frac{3}{10} \\ + \frac{1}{100} \\ \hline \end{array}$$

$$\begin{array}{r} 16 \\ 17 \\ 9 \\ - \quad 34 \\ \hline \end{array}$$

4. sixteen-seventeenths minus nine thirty-fourths

$$\begin{array}{r} 16 \\ 17 \\ 9 \\ - \quad 34 \\ \hline \end{array}$$

$$\begin{array}{r} 16 \\ 17 \\ 9 \\ - \quad 34 \\ \hline \end{array}$$

Activity Time with Simple Fractions

Write the spatially arranged problems with simple fractions from Examples 1 to 4:

1. one-fifth plus one-fourth
2. seven-eighths minus eleven-sixteenths
3. three-tenths plus one-hundredth
4. sixteen-seventeenths minus nine thirty-fourths

Basic Rules with Mixed Numbers

When a spatially aligned problem contains mixed numbers, the whole numbers must also be vertically aligned based on place value, and the numeric indicator must not be used with the whole number. The plus or minus sign is placed directly above the separation line and left of any digit or fraction indicator in the problem. All other rules for spatially aligned problems with fractions apply. Notice how the whole numbers, fraction indicators, and horizontal fraction lines are aligned vertically in each example. We have chosen to show only horizontal fraction lines to reduce the number of examples, but you could also use diagonal fraction lines.

Since we numbered our example problems, notice that we needed to leave one blank column between the period of the problem number and the beginning of the separation line. Also, a blank line must be left above and below a spatial arrangement.

Examples with Mixed Numbers

1. three and three-fourths plus one and five-twelfths

$$\begin{array}{r} 3\frac{3}{4} \\ + 1\frac{5}{12} \\ \hline \end{array}$$

2. forty and eleven-thirteenths minus one and two-thirteenths

$$\begin{array}{r} 40\frac{11}{13} \\ - 1\frac{2}{13} \\ \hline \end{array}$$

3. eight and one-fourth plus two and one-fifth

$$\begin{array}{r} 8\frac{1}{4} \\ + 2\frac{1}{5} \\ \hline \end{array}$$

4. six and two-thirds minus one-ninth

$$\begin{array}{r} 6\frac{2}{3} \\ - \frac{1}{9} \\ \hline \end{array}$$

Activity Time with Mixed Numbers

Write the spatially arranged problems with mixed numbers from Examples 1 to 4:

1. three and three-fourths plus one and five-twelfths
2. forty and eleven-thirteenths minus one and two-thirteenths
3. eight and one-fourth plus two and one-fifth
4. six and two-thirds minus one-ninth