1. List the rational numbers $-1\frac{1}{4}, -\frac{3}{5}, -\frac{13}{10}, -\frac{11}{10}$ in ascending order.

2. Mark the location of each of the rational numbers $-\frac{11}{8}, -\frac{3}{4}, -\frac{17}{2}, -1, -\frac{11}{16}$ on a number line.

3. Write either $>$ or $<$ between each pair of fractions.
   a. $\frac{7}{8}$, $\frac{9}{10}$
   b. $\frac{21}{12}$, $\frac{17}{10}$
   c. $-\frac{6}{7}$, $-\frac{5}{6}$
   d. $-\frac{42}{35}$, $-\frac{4}{3}$

4. Determine which of the fractions $\frac{3}{8}, \frac{4}{5}, \frac{31}{40}, \frac{9}{20}, \frac{7}{10}$ is greater than $\frac{1}{2}$ and less than $\frac{3}{4}$.

5. Simplify each of the following. Reduce to lowest terms.
   a. $\frac{1}{3} \times \frac{1}{4}$
   b. $\frac{7}{8} \times 16$
   c. $\frac{2}{3} \times \left( -\frac{4}{11} \right)$
   d. $\frac{-24}{5} \times \frac{15}{-16} \times \frac{-12}{-8}$
   e. $\frac{8}{15} + \frac{4}{9}$
   f. $-8 + \frac{2}{3}$
   g. $6 \frac{3}{4} + \frac{-1}{4}$
   h. $\left( -\frac{5}{4} \right) \div 3 \frac{3}{8}$
   i. $\frac{7}{3} - \frac{3}{4}$
   j. $\frac{18}{7} - \frac{16}{5}$
   k. $\frac{-3}{4} + \frac{5}{12} - \frac{7}{6}$
   l. $2 \frac{3}{4} - \frac{-3}{5} + \frac{-7}{8}$

Remember:
\[ \frac{-m}{n} = \frac{m}{-n} = -\frac{m}{n} = -\frac{-m}{n} \]
where $n \neq 0$.

Expectation: simplify numerical expressions involving rational numbers. For more activities and resources from the University of Waterloo’s Faculty of Mathematics, please visit www.cemc.uwaterloo.ca.
6. A sign painter is to centre a 12-letter word on a 15-foot signboard. Each letter is to be three-fifths of a foot wide and there is to be one-fifth of a foot between consecutive letters. Determine the number of feet left at each end of the board.

7. The sum of the numbers in each row, column, and diagonal is $-\frac{1}{4}$. Complete the magic square.

\[
\begin{array}{ccc}
\frac{1}{6} & -\frac{5}{12} & \\
3 & 3 & \\
\frac{4}{10} & & \\
\frac{1}{4} & & \\
\end{array}
\]

8. Simplify each of the following.

\begin{align*}
a. \quad & \frac{3}{5} + \frac{2}{15} + \frac{3}{4} \quad \text{b.} \quad \frac{2}{3} - \frac{1}{6} + \frac{5}{8} \\
& \frac{3}{5} + \frac{1}{10} & \frac{5}{3} - \frac{3}{2} \quad \text{c.} \quad -\frac{3}{8} - \frac{5}{6} + \frac{1}{3} \\
& & \frac{5}{3} - \frac{3}{2} & -\frac{2}{3} + \frac{1}{6} - \frac{3}{4} \\
\end{align*}

9. Use the order of operations to simplify the following.

\begin{align*}
a. \quad & -\frac{3}{4} \left( -\frac{2}{9} - \frac{1}{2} \right) \\
& -\frac{5}{8} - \frac{1}{3} + \left( -\frac{5}{6} \right) \\
& \frac{5}{9} - \frac{1}{2} + \left( -\frac{3}{14} \right) \times \frac{3}{2} \\
& \frac{4}{21} \left( \frac{3}{8} + \frac{1}{2} \right) + 8 \frac{1}{4} \div \left( \frac{5}{2} - \frac{2}{3} \right) \\
& \frac{1}{4} \times \frac{12}{39} \div \left[ \frac{2}{3} + \left( -\frac{5}{6} \right) \right] \\
\end{align*}

10. Your investment club shares its earnings. The president receives half of the money. The vice-president gets a quarter of the remainder. Then, the secretary gets one-third of what is left. Finally, the treasurer and you share what is left equally. Your share is $300. Calculate the investment club’s total earnings.
TRY THESE!

Adding mixed numbers with the same denominator
www.aaamath.com/B/fra66dx2.htm#pgtp

Dividing Fractions
http://www.aaamath.com/B/fra66ox2.htm

SKILLS CHALLENGE!

11. If \( a \oplus b = \frac{a}{b} + \frac{b}{a} \) where \( a \neq 0 \), \( b \neq 0 \), then determine the value of \( 5 \oplus 3 \).

\[
\frac{4}{3} - \frac{5}{4} + \frac{5}{6} - \frac{3}{4}
\]

12. Simplify \( \frac{3}{3} - \frac{2}{2} \).

12. Simplify \( \frac{1}{2} + \frac{1}{4} - 2 \).

13. TRY THIS FRACTIONS PROBLEM!

There are many numbers from 1 to 1000 whose sum of its digits is 4. For example, 310, has a sum of 4 for its digits \( (3 + 1 + 0 = 4) \). If there are \( b \) numbers with this property and \( a \) of these are prime numbers, then determine the value of \( \frac{a}{b} \).

EXTENSION!

14. The fraction \( \frac{37}{13} \) can be written in the form \( 2 + \frac{1}{x + \frac{1}{y + \frac{1}{z}}} \). Determine the value of \( x + y + z \).