Boxed In

You can use multiplication to find sums and differences of fractions.

Look at the examples below. Both show the same way to find \( \frac{3}{4} - \frac{1}{2} \).

### Example 1

Find the cross products. Then write the sum (if adding) or difference (if subtracting) over the product of the denominators.

\[
\frac{3}{4} \times \frac{1}{2} = \frac{(3 \times 2) - (4 \times 1)}{4 \times 2} = \frac{6 - 4}{8} = \frac{2}{8} = \frac{1}{4}
\]

This can be shown algebraically as

\[
\frac{a}{b} - \frac{c}{d} = \frac{(a \times d) - (b \times c)}{b \times d}
\]

and

\[
\frac{a}{b} + \frac{c}{d} = \frac{(a \times d) + (b \times c)}{b \times d}
\]

### Example 2

Write the fractions in the boxes. Multiply the denominator of each fraction by the numerator of the other fraction.

\[
\begin{array}{ccc}
2 & 3 & 6 - 4 \\
3 & 1 & 2 \\
4 & 2 & 8 \\
\end{array}
\]

Subtract: \( 6 - 4 \)

Multiply: \( 4 \times 2 \)

so, \( \frac{3}{4} - \frac{1}{2} = \frac{2}{8} = \frac{1}{4} \).

Subtract (or add) the products to find the numerator of the difference (or sum).

Multiply the two denominators to find the denominator of the difference (or sum).

Use cross products or boxes to find each sum or difference. Simplify if necessary.

1. \( \frac{2}{8} + \frac{2}{3} \)
2. \( \frac{5}{6} - \frac{3}{4} \)
3. \( \frac{1}{4} + \frac{16}{25} \)
4. \( \frac{13}{15} - \frac{3}{4} \)

Complete the boxes and write the answer. Simplify if necessary.

5. \( \frac{2}{3} + \frac{1}{5} \)
6. \( \frac{9}{10} - \frac{5}{8} \)
7. \( \frac{5}{9} + \frac{3}{7} \)