Fix Those Fractions!! Self-Help Guide!

Subtracting Fractions

Subtraction is usually first taught as "taking away" one number from another. If a candy bar was cut into four equal pieces and one of those four pieces was taken away (in this case eaten), how much of the candy bar is left? One whole candy bar minus $\frac{1}{4}$ of the candy bar must equal $\frac{3}{4}$ of the candy bar. If one more piece of the candy bar is taken away to share with a friend, how much remains? In other words, $\frac{3}{4}$ of the candy bar minus another $\frac{1}{4}$ would be $\frac{2}{4}$ which is equal to $\frac{1}{2}$. The process used to subtract fractions should always produce a reasonable answer.

Subtraction requires "like terms" which means like denominators or common denominators. If denominators are alike, combine the numerators. Simplify if necessary.

Example #23: $\mathbf{\frac{2}{5} - \frac{1}{5}}$

Combine the numerators: $\frac{2-1}{5} = \frac{1}{5}$

Example #24: $\mathbf{\frac{3}{8} - \frac{1}{8}}$

Combine the numerators: $\frac{3-1}{8} = \frac{2}{8}$

Simplify (divide by the GCF): $\frac{2}{8} \div \frac{2}{2} = \frac{2 \div 2}{8 \div 2} = \frac{1}{4}$

If the denominators are different, first produce common denominators. To find the least common denominator (LCD), find the ***least common multiple*** (LCM) which is the smallest number that is a multiple of both numbers.

Example #25: $\mathbf{\frac{1}{2} - \frac{1}{3}}$

Find the LCM (list multiples if necessary):
Multiples of 2: 2, 4, 6, 8, …
Multiples of 3: 3, 6, 9, …

Multiply by a form of 1 ($\frac{3}{3}$ and $\frac{2}{2}$) to produce the LCD: $\frac{1}{2} \cdot \frac{3}{3} - \frac{1}{3} \cdot \frac{2}{2} = \frac{1 \cdot 3}{2 \cdot 3} - \frac{1 \cdot 2}{3 \cdot 2}$

Combine the numerators: $\frac{3}{6} - \frac{2}{6} = \frac{3-2}{6} = \frac{1}{6}$

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Subtracting Fractions (continued)

Example #26: $\mathbf{\frac{3}{4} - \frac{2}{3}}$

Find the LCM (list multiples if necessary):
Multiples of 4: 4, 8, 12, …
Multiples of 3: 3, 6, 9, 12, 15, …

Multiply by a form of 1 ($\frac{3}{3}$ and $\frac{4}{4}$) to produce the LCD:
$$\frac{3}{4}\cdot\frac{3}{3} - \frac{2}{3}\cdot\frac{4}{4} = \frac{3\cdot 3}{4\cdot 3} - \frac{2\cdot 4}{3\cdot 4}$$

Combine the numerators:
$$\frac{9}{12} - \frac{8}{12} = \frac{9-8}{12} = \frac{1}{12}$$

Example #27: $\mathbf{8 - \frac{5}{6}}$

Place the whole number over 1:
$$\frac{8}{1} - \frac{5}{6}$$

Find the LCM (list multiples if necessary):
Multiples of 1: 1, 2, 3, 4, 5, 6, …
Multiples of 6: 6, 12, …

Multiply by a form of 1 ($\frac{6}{6}$) to produce the LCD:
$$\frac{8}{1}\cdot\frac{6}{6} - \frac{5}{6} = \frac{8\cdot 6}{1\cdot 6} - \frac{5}{6}$$

Combine the numerators:
$$\frac{48}{6} - \frac{5}{6} = \frac{48-5}{6} = \frac{43}{6}$$

Note: $\frac{43}{6}$ is an improper fraction. It is simplified because there are no common factors between the numerator and denominator. It can be changed to a mixed number if preferred.

In the above example, it is also possible to subtract by exchanging one whole for a fraction with the common denominator. Since 8 is equal to 7 + 1, rewrite 1 as $\frac{6}{6}$. The process is shown below:

$$8 - \tfrac{5}{6} = 7\tfrac{6}{6} - \tfrac{5}{6} = 7\tfrac{6-5}{6} = 7\tfrac{1}{6} \text{ (or } \tfrac{43}{6})$$