Adding and Subtracting Fractions

A. Common Denominators

I. When adding or subtracting fractions, it is *essential* that we have a **common denominator**. Why? Adding fractions involves taking a certain number of **items** (the **numerator**) of a certain size (the denominator) and doing an "inventory". We can only add/subtract items that are the same size, and they are only the same size if they have the same denominator!!

Example: If I have 1 eighth, and Ashlee has 2 eighths, then together we have 3 eighths.

$$\frac{1}{8} + \frac{2}{8} = \frac{3}{8}$$

Because the items are the **same size** (i.e. **same denominator**), we are allowed to add them together.

II. **What if the denominators are different?**
We can make a common denominator by creating equivalent fractions!

Example: If I have 1 third, and Ben has 1 sixth, then we can't say that we have 2 "thirixths" or 2 "sixirds".
We can't add our pieces together unless they are the same size! We need to make equivalent fractions! *Remember*: when making equivalent fractions, what you do to the numerator, you must do to the denominator!

$$\frac{1}{3} + \frac{1}{6} =$$

B. Adding and subtracting fractions

1. Convert all mixed numbers to improper fractions and give all whole numbers a denominator of 1
2. Create a common denominator by multiplying numerators and denominators by the same value to make equivalent fractions
3. Add or subtract numerators, and keep the common denominator
4. Reduce the final answer to lowest terms

Examples:

a. $\frac{4}{9} + \frac{1}{9}$

b. $\frac{3}{5} - \frac{4}{5}$

c. $12 - \frac{4}{3}$

d. $-\frac{7}{8} + \left(\frac{3}{4}\right)$

e. $-3 - 1\frac{2}{3}$

f. $\frac{5}{7} + \frac{9}{21}$

g. $\frac{1}{2} + \frac{5}{6} + \frac{4}{18}$

h. $3\frac{2}{3} - \left(-\frac{3}{4}\right)$