Adding Fractions

$$\frac{1}{4}$$
Bottom numbers must be the same

$$+\ \frac{1}{4}$$
Add the top numbers

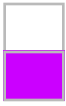$$\frac{2 \div 2}{4 \div 2} = \frac{1}{2}$$
reduce

RENAME:

If the bottom numbers are different, rename them so they are the same.

This is the main thing you have to know to add or subtract fractions.

Renaming is like reducing. but backwards, changing small numbers to large numbers.

Multiply the top and bottom by the same number

$$\frac{1 \bullet 2}{3 \bullet 2} = \frac{2}{6}$$

$$+\ \frac{1 \bullet 3}{2 \bullet 3} = \frac{3}{6}$$

$$\frac{5}{6}$$

RENAME:

Start with the largest bottom number, and try multiplying by 1, then 2, then 3, 4, 5, etc. until you get a number that is a multiple of all the bottom numbers

Rename
$$\frac{1 \bullet 6}{2 \bullet 6} = \frac{6}{12}$$

$$\frac{2 \bullet 4}{3 \bullet 4} = \frac{8}{12}$$

$$+\ \frac{3 \bullet 3}{4 \bullet 3} = \frac{9}{12}$$

$$\frac{23}{12} = 1\frac{11}{12}$$
Reduce

Start with the largest bottom number, 8, and try multiplying by 1, then 2, then 3, until you get 24, which is a multiple of all the bottom numbers

Rename
$$2\frac{3 \bullet 3}{8 \bullet 3} = \frac{9}{24}$$

$$3\frac{1 \bullet 8}{3 \bullet 8} = \frac{8}{24}$$

$$+\ 1\frac{5 \bullet 4}{6 \bullet 4} = \frac{20}{24}$$

$$6\ +\ \frac{37}{24} = 7\frac{13}{24}$$
Reduce

Subtracting Fractions

This one is easy because you don't have to borrow

$$\frac{1}{2} = \frac{3}{6}$$

$$-\ \frac{1}{3} = \frac{2}{6}$$

Rename, then subtract the top numbers
$$\frac{1}{6}$$

Borrow one from the 5

Rename the one as a fraction

$$\cancel{5} = 4\frac{3}{3}$$

$$-\ \frac{2}{3} \qquad \frac{2}{3}$$

Notice that the fraction is not below the 5
$$4\frac{1}{3}$$

This is the most confusing type of problem. The top fraction is less than the fraction below it, so it can't be subtracted. There are 4 steps:

1) Borrow one from the 5
2) Rename the one
3) Add the tops, 1 + 5

$$\cancel{5}\frac{1}{5} = 4\frac{1}{5} + \frac{5}{5} = 4\frac{6}{5}$$

$$-\ 1\frac{2}{5} \qquad 1\frac{2}{5} \qquad 1\frac{2}{5}$$

(To keep this example simple, it has the same bottom numbers, or else you would need to rename the fractions first).

$$3\frac{4}{5}$$

4) Subtract