Addition and Subtraction of Rational Numbers

In order to add or subtract fractions or mixed numbers one must have a **Common Denominator**.

Ex 1 $3\frac{4}{15} - -2\frac{5}{15} + -1\frac{2}{15}$: Common denominator already exists so K.I.S.S. Problem

$3\frac{4}{15} + 2\frac{5}{15} - 1\frac{2}{15}$

$3^{+}\frac{4}{15} + 2^{+}\frac{5}{15} - 1^{-}\frac{2}{15}$: Put signs on fractions

$3+2-1 \;\vdots\; \frac{4+5-2}{15}$: Split problem into **whole** & **part**

$4\ 7/15$: Simplify, check to make sure sign matches for both part & whole

Ex 2 $9\frac{2}{11} + -1\frac{5}{11} - +2\frac{3}{11} - -1\frac{1}{11}$: Common denominator already exists so reduce number of signs

$9\frac{2}{11} - 1\frac{5}{11} - 2\frac{3}{11} + 1\frac{1}{11}$

$9^{+}\frac{2}{11} - 1^{-}\frac{5}{11} - 2^{-}\frac{3}{11} + 1^{+}\frac{1}{11}$: Put signs on fractions

$9-1-2+1 \;\vdots\; \frac{2-5-3+1}{11}$: Split into integers and fraction

$7 \quad \frac{-5}{11}$: Simplify, because the signs do not match one will need to borrow

$6\frac{11}{11} - \frac{5}{11}$: Notice $6\frac{11}{11}$ is still equal to 7

$6\frac{6}{11}$: Subtract fractional part and write as mixed number.

EXAMPLES WITH UNLIKE DENOMINATORS.

Ex 3 $-2\frac{4}{5} + -1\frac{1}{2} - -7\frac{2}{3}$: FIND COMMON DENOMINATOR AND K.I.S.S. SIGNS

$-2\frac{24}{30} - 1\frac{15}{30} + 7\frac{20}{30}$

$-2\frac{-24}{30} - 1\frac{-15}{30} + 7\frac{+20}{30}$: PUT SIGNS ON FRACTIONAL PART

$-2-1+7 \;\vdots\; \frac{-24-15+20}{30}$: SPLIT INTO INTEGERS & FRACTION

$4 \quad \frac{-19}{30}$: BECAUSE THE SIGNS DO NOT MATCH BORROW

$3\frac{30}{30} \quad \frac{-19}{30}$

$3\frac{11}{30}$: SIMPLIFY

Ex 4 $-3\frac{1}{4} + -2\frac{1}{2} - -1\frac{3}{4} + 1\frac{2}{3}$: FIND COMMON DENOMINATOR AND K.I.S.S. SIGNS

$-3\frac{3}{12} - 2\frac{6}{12} + 1\frac{9}{12} + 1\frac{8}{12}$

$-3\frac{-3}{12} - 2\frac{-6}{12} + 1\frac{+9}{12} + 1\frac{+8}{12}$: PUT SIGNS ON FRACTIONAL PART

$-3-2+1+1 \;\vdots\; \frac{-3-6+9+8}{12}$: SPLIT INTO INTEGERS & FRACTION

$-3 \quad \frac{+8}{12}$: REDUCE FRACTION & BORROW SINCE SIGNS DO NOT MATCH

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

Ex 5 $6\frac{1}{3} - 2\frac{4}{5} - + |\frac{1}{2} - - |\frac{2}{3}$: Find common denominator and K.I.S.S. signs

$6\frac{10}{30} - 2\frac{24}{30} - |\frac{15}{30} + |\frac{20}{30}$

$6^{+\frac{10}{30}} - 2^{-\frac{24}{30}} - |^{-\frac{15}{30}} + |^{+\frac{20}{30}}$: Put signs on fraction

$6 - 2 - 1 + 1 \;\vdots\; \frac{10 - 24 - 15 + 20}{30}$: Split into integers and fraction

$4 \quad \frac{-9}{30}$: Borrow because signs do not match

$3\frac{30}{30} - \frac{9}{30}$

$3\frac{21}{30}$: Reduce fraction

$3\frac{7}{10}$