ADDING AND SUBTRACTING FRACTIONS

To add or subtract fractions the **denominators** must be the same. After finding the lowest (least) common denominator, you can add or subtract the numerators, and the denominators stay the same.

Ex: $1/3 + 1/6 = ?$

Step 1: List multiples of each denominator multiples of 3 = $3, 6, 9, 12$ (+3) multiples of 6 = $6, 12, 18, 24$ (+6 +6)	Step 2: Circle the smallest common number of each set of multiples The answer is $\underline{6}$. This will be your lowest common denominator.
Step 3: Multiply each fraction (top and bottom numbers) by the number to make each denominator 6. $$= \frac{1 \times 2}{3 \times 2} + \frac{1 \times 1}{6 \times 1}$$	Step 4: Write the numerators (top numbers) over your lowest common denominator and simplify (combine numbers). Reduce your final answer. $$= \frac{2 + 1}{6}$$ $$= \frac{3}{6}$$ $$= \frac{1}{2}$$

YOUR TURN

Ex 1: $\frac{2 \cdot -1}{2 \cdot 2} + \frac{3}{4}$ $\left.\begin{array}{l}2, \boxed{4}, 6, 8 \\ \boxed{4}, 8, 12\end{array}\right\} LCM = 4$ $$= \frac{-2 + 3}{4}$$ $$= \frac{1}{4}$$	Ex 2: $\frac{5}{6} - \left(\frac{-3}{4}\right)$ $\left.\begin{array}{l}6, 12, 18 \\ 4, 8, 12\end{array}\right\} LCM = 12$ add ↓ opp $$= \frac{2 \cdot 5}{2 \cdot 6} + \frac{3 \cdot 3}{3 \cdot 4}$$ $$= \frac{10 + 9}{12}$$ $$= \frac{19}{12} \quad OR \quad 1\frac{7}{12}$$
Ex 3: $1\frac{1}{2} + 2\frac{3}{4}$ $$= \frac{2 \times 1 + 1}{2} + \frac{2 \times 4 + 3}{4}$$ $$= \frac{2 \cdot 3}{2 \cdot 2} + \frac{11}{4} \quad LCM = 4$$ $$= \frac{6 + 11}{4} \Rightarrow = \frac{17}{4} \; or \; 4\frac{1}{4}$$	Ex 4: $-2\frac{1}{5} - 4\frac{2}{3}$ $$= -\frac{2 \times 5 + 1}{5} - \frac{4 \times 3 + 2}{3}$$ $$= \frac{-11 \cdot 3}{5 \cdot 3} - \frac{14 \cdot 5}{3 \cdot 5} \quad LCM = 15$$ $$= \frac{-33 - 70}{15}$$ $$= \frac{-103}{15}$$ $$or$$ $$= -6\frac{13}{15}$$

PRACTICE

Evaluate the following: *final answers should be in lowest terms

a. $\dfrac{1}{2} {\cdot}^{7}_{7} + \dfrac{3}{7} {\cdot}^{2}_{2}$ LCD: 4

$= \dfrac{7}{14} + \dfrac{6}{14}$

$= \dfrac{7+6}{14}$

$= \dfrac{13}{14}$

b. $\dfrac{-1}{4} {\cdot}^{5}_{5} + \dfrac{-2}{5} {\cdot}^{4}_{4}$ LCD: 20

$= \dfrac{-5}{20} - \dfrac{8}{20}$

$= \dfrac{-5-8}{20}$

$= {}^{-13}\!/_{20}$

c. $\dfrac{1}{8} + 2\dfrac{1}{6} = \dfrac{1}{8} + \dfrac{2\cdot6+1}{6}$

$= \dfrac{1\cdot3}{8\cdot3} + \dfrac{13\cdot4}{6\cdot4}$ LCD: 24

$= \dfrac{3}{24} + \dfrac{52}{24}$

$= \dfrac{3+52}{24} = {}^{55}\!/_{24}$

d. $\dfrac{-1}{2} + \dfrac{2}{3} + 2\dfrac{1}{6} = \dfrac{-1}{2} + \dfrac{2}{3} + \dfrac{2\cdot6+1}{6}$

$= \dfrac{-1\cdot3}{2\cdot3} + \dfrac{2\cdot2}{3\cdot2} + \dfrac{13\cdot1}{6\cdot1}$ LCD: 6

$= \dfrac{-3}{6} + \dfrac{4}{6} + \dfrac{13}{6}$ GCF: 2

$= \dfrac{-3+4+13}{6} = \dfrac{14}{6} = {}^{7}\!/_{3}$

e. $\dfrac{2}{3} {\cdot}^{5}_{5} - \dfrac{1}{5} {\cdot}^{3}_{3}$ LCD: 15

$= \dfrac{10}{15} - \dfrac{3}{15}$

$= \dfrac{10-3}{15}$

$= {}^{7}\!/_{15}$

f. $\dfrac{8}{3} {\cdot}^{5}_{5} - \dfrac{9}{5} {\cdot}^{3}_{3}$ LCD: 15

$= \dfrac{40}{15} - \dfrac{27}{15}$

$= \dfrac{40-27}{15}$

$= {}^{13}\!/_{15}$

g. $2\dfrac{2}{3} - 4\dfrac{1}{5} = \dfrac{2\cdot3+2}{3} - \dfrac{4\cdot5+1}{5}$

$= \dfrac{8\cdot5}{3\cdot5} - \dfrac{21\cdot3}{5\cdot3}$ LCD: 15

$= \dfrac{40}{15} - \dfrac{63}{15}$

$= \dfrac{40-63}{15} = {}^{-23}\!/_{15}$

h. $-2\dfrac{1}{3} - 3\dfrac{1}{6} = -\dfrac{2\cdot3+1}{3} - \dfrac{3\cdot6+1}{6}$

$= \dfrac{-7\cdot2}{3\cdot2} - \dfrac{19}{6}$ LCD: 6

$= \dfrac{-14}{6} - \dfrac{19}{6}$ GCF: 3

$= \dfrac{-14-19}{6} = \dfrac{-33}{6} = \boxed{\dfrac{-11}{2}}$

ANSWERS: a. $\dfrac{13}{14}$ b. $\dfrac{-13}{20}$ c. $\dfrac{55}{24}$ d. $\dfrac{7}{3}$ e. $\dfrac{7}{15}$ f. $\dfrac{13}{15}$ g. $\dfrac{-23}{15}$ h. $\dfrac{-11}{2}$